

WIPP No Further Action Petition for Solid Waste Management Units and Areas of Concern

September 2002

**Waste Isolation Pilot Plant
Carlsbad, New Mexico**

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The following appendices are available from the Site Compliance Section of the WTS Environmental Compliance Department. They consist of hard copies of scientific data generated and are not available electronically.

Appendix D - BLM Documentation

Appendix E - NMED and DOE Correspondence

Appendix F - SWMU 001g (H-14/P-1 Mud Pit[s])

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Appendix L - SWMU 001n (P-15 Mud Pit)

Appendix M - SWMU 001o (Badger Unit Drilling Mud Pit[s])

Appendix N - SWMU 001p (Cotton Baby Drilling Mud Pit[s])

Appendix O - SWMU 001q (DOE-1 Drilling Mud Pit[s])

Appendix P - SWMU 001s (ERDA-9 Mud Pit)

Appendix Q - SWMU 001t (IMC-374 Mud Pit)

Appendix R - SWMU 001x (WIPP-13 Drilling Mud Pit[s])

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Appendix X - AOC 001w (IMC-457 Mud Pit)

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ACRONYMS AND ABBREVIATIONS

ACAA	Accelerated Corrective Action Approach
AOC	Area of Concern
bgs	below ground surface
BLM	Bureau of Land Management
CFR	Code of Federal Regulations
COC	Constituent of Concern
DOE	U.S. Department of Energy
DQO	Data Quality Objective
DSP	Duval Sulphur & Potash Company
EPA	U.S. Environmental Protection Agency
ERDA	Energy Research and Development Administration
HSWA	Hazardous and Solid Waste Amendments
HWDU	Hazardous Waste Disposal Unit
IMC	International Minerals & Chemical Corporation
LWA	Land Withdrawal Act
NaCl	sodium chloride
NaOH	sodium hydroxide
NFA	No Further Action
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NMOCD	New Mexico Oil Conservation Division
ppm	parts per million
QA	Quality Assurance
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
SAP	Sampling and Analysis Plan
SWMU	Solid Waste Management Unit
TCLP	Toxicity Characteristic Leaching Procedure
TSD	Technical Support Document

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USGS	United States Geological Survey
UTL	Upper Tolerance Limit
VRA	Voluntary Release Assessment
VRA/CA	Voluntary Release Assessment/Corrective Action
WLWA	WIPP Land Withdrawal Area
WIPP	Waste Isolation Pilot Plant
WTS	Westinghouse TRU Solutions LLC

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DEFINITIONS

Area of Concern (AOC)¹ - Any discernable unit or area which, in the opinion of the New Mexico Environment Department (NMED) Secretary, may have received solid or hazardous waste or waste containing hazardous constituents at any time.

Direct Push Methodology - Truck-mounted soil sampling device. Soil is collected in a stainless steel cylinder that is pushed through soil to the desired depth using a hydraulic ram.

Hazardous Constituent¹ - Any constituent identified in 20 NMAC [New Mexico Administrative Code] 4.1.200 (incorporating Title 40 *Code of Federal Regulations* (CFR) Part 261 Appendix VIII), any constituent identified in 20 NMAC 4.1.500 (incorporating 40 CFR Part 264 Appendix IX), any constituent identified in a hazardous waste listed in 20 NMAC 4.1.200 (incorporating 40 CFR Part 261 Subpart D), or any constituent identified in a toxicity characteristic waste in 20 NMAC 4.1.200 (incorporating 40 CFR § 264.24, Table 1).

Hazardous Waste¹ - A solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may cause, or notably contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed.

HSWA¹ - The 1984 Hazardous and Solid Waste Amendments to the Resource Conservation and Recovery Act (RCRA)

LWA - WIPP Land Withdrawal Act (Public Law 102-579) transferred the jurisdiction for the WIPP Land Withdrawal Area (WLWA) from the United States Secretary of the Interior to the United States Secretary of Energy. These lands "are withdrawn from all forms of entry, appropriation, and disposal under the public land laws" and are reserved for the use of the Secretary of Energy "for the construction, experimentation, operation, repair and maintenance, disposal, shutdown, monitoring, decommissioning, and other authorized activities, associated with the purposes of WIPP."

Permit - WIPP Hazardous Waste Facility Permit NM4890139088-TSDF

Permittees - U.S. Department of Energy (DOE) and co-operator personnel

RCRA¹ - The Resource Conservation and Recovery Act of 1980 as amended by HSWA in 1984.

¹ These definitions were extracted directly from the October 27, 1999, Waste Isolation Pilot Plant Hazardous Waste Facility Permit.

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Release¹ - Any spilling, leaking, pouring, emitting, emptying, discharging, injecting, pumping, escaping, leaching, dumping, or disposing of hazardous wastes (including hazardous constituents) into the environment (including the abandonment or discarding of barrels, containers, and other closed receptacles containing hazardous wastes or hazardous constituents).

Solid Waste Management¹ - The systematic administration of activities which provide for the collection, source separation, storage, transportation, transfer, processing, treatment, and disposal of solid waste.

Solid Waste Management Unit (SWMU)¹ - Any discernible unit at which solid wastes have been placed at any time, irrespective of whether the unit was intended for the management of solid or hazardous waste. Such units include any area at a facility at which solid wastes have been routinely and systematically released. The definition includes regulated units (i.e., landfills, surface impoundments, waste piles, and land treatment units), but does not include passive leakage or one-time spills from production areas and units in which wastes have not been managed (e.g., product storage areas).

WLWA - The WIPP Land Withdrawal Area is the 16-section federal land area, delineated by the WIPP site boundary, under the jurisdiction of the DOE. This area is located in Eddy County, New Mexico, approximately 30 miles east of Carlsbad, New Mexico.

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EXECUTIVE SUMMARY

This No Further Action (NFA) petition was prepared to fulfill requirements of Module VII, Section VII.O of the Waste Isolation Pilot Plant (WIPP) Hazardous Waste Facility Permit NM4890139088-TSDF (the Permit) (New Mexico Environment Department [NMED], 1999a). This NFA petition addresses 15 Solid Waste Management Units (SWMUs) and 8 Areas of Concern (AOCs) listed in Module VII, Tables 2 and 3, of the Permit. The petition provides information demonstrating that each SWMU and AOC meets one of the NFA criteria defined in Table 4 of the *Technical Support Document; Exclusion/Inclusion of Solid Waste Management Units and Areas of Concern; Permit Module VII Corrective Action for Solid Waste Management Units* (TSD) (NMED 1999b) and that an NFA is justified for each SWMU and AOC.

This NFA petition addresses the current Permit requirements for a Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) report for SWMUs and AOCs. It summarizes the results of all of the previous SWMU investigations performed at WIPP. As an alternative to the RFI report specified in Module VII of the Permit, current NMED guidance identifies an Accelerated Corrective Action Approach (ACAA) that may be used for any SWMU or AOC (NMED, 1998). This accelerated approach is used to replace the standard RFI work plan and report sequence with a more flexible decision-making approach. The ACAA process allows a facility to exit the schedule of compliance contained in the facility's Hazardous and Solid Waste Amendments (HSWA) permit module and proceed on an accelerated time frame. Thus, the ACAA process can be entered either before or after a RFI work plan. According to the NMED's guidance, a facility can prepare a RFI work plan or Sampling and Analysis Plan (SAP) for any SWMU or AOC (NMED, 1998). In April 2000, the NMED granted approval for submission of a SAP (NMED, 2000a). A SAP was prepared in 2000 and implemented in 2001 (DOE, 2000). This NFA petition replaces the RFI report under the ACAA process.

The 15 SWMUs and 8 AOCs identified in the Permit are associated with: (1) natural resource exploration activities prior to the development of WIPP, or (2) early WIPP mineral assessment and geological studies to support the development of the facility, or (3) facility construction.

The 15 SWMUs included in the Permit that require an RFI are:

SWMU 001g (H-14/P-1 Mud Pit[s])
SWMU 001h (H-15/P-2 Mud Pit[s])
SWMU 001j (P-3 Mud Pit)
SWMU 001k (P-4 Mud Pit)
SWMU 001L (WIPP-12 Drilling Mud Pit/P-5 Drilling Mud Pit)
SWMU 001m (P-6 Mud Pit)
SWMU 001n (P-15 Mud Pit)
SWMU 001o (Badger Unit Drilling Mud Pit[s])
SWMU 001p (Cotton Baby Drilling Mud Pit[s])

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SWMU 001q (DOE-1 Drilling Mud Pit[s])
SWMU 001s (ERDA-9 Mud Pit)
SWMU 001t (IMC-374 Mud Pit)
SWMU 001x (WIPP-13 Drilling Mud Pit[s])
SWMU 004a (Portacamp Storage Yard, West Side)
SWMU 007b (SW Evaporation Pond)

The 8 AOCs included in the Permit are:

AOC 001r (D-123 Drilling Mud Pit)
AOC 001u (IMC-376 Drilling Mud Pit)
AOC 001v (IMC-456 Drilling Mud Pit)
AOC 001w (IMC-457 Drilling Mud Pit)
AOC 001ac (DSP-207 Mud Pit)
AOC 001ae (IMC-377 Mud Pit)
AOC 010b (Waste Handling Shaft Sump)
AOC 010c (Exhaust Shaft Sump)

The scope of this petition is to provide sufficient information to demonstrate that at least one of the NMED NFA Criteria has been met and that an NFA is justified for each SWMU and AOC. A summary of the NFA criterion applicable to each of the SWMUs and AOCs is presented in Table ES.1.

Approval of the NFA petition by the NMED will allow the Permittees to request a permit modification to exit the RFI/Corrective Measures process, and remove the SWMUs and AOCs from the Permit.

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**Table ES.1
Summary of NFA Petition for SWMUs and AOCs**

SWMU/AOC	NFA Criteria			NFA Petition Section
	3. No Release	4. Concentrations are acceptable	5. Closed Under Another Authority	
SWMU 001g	H-14		P-1	2.0
SWMU 001h	H-15		P-2	3.0
SWMU 001j			P-3	4.0
SWMU 001k			P-4	5.0
SWMU 001L		WIPP-12	P-5	6.0
SWMU 001m			P-6	7.0
SWMU 001n			P-15	8.0
SWMU 001o			Badger Unit	9.0
SWMU 001p			Cotton Baby	10.0
SWMU 001q		DOE-1		11.0
SWMU 001s	ERDA-9			12.0
SWMU 001t			IMC-374	13.0
SWMU 001x		WIPP-13		14.0
SWMU 004a		Portacamp		15.0
SWMU 007b		SW Evap. Pond		16.0
AOC 001r			D-123	17.0
AOC 001u			IMC-376	18.0
AOC 001v			IMC-456	19.0
AOC 001w			IMC-457	20.0
AOC 001ac			DSP-207	21.0
AOC 001ae			IMC-377	22.0
AOC 010b	Waste Handling Shaft Sump			23.0
AOC 010c	Exhaust Shaft Sump			24.0

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1.0 INTRODUCTION

This NFA petition was prepared to fulfill requirements of Module VII, Section VII.O of the WIPP Hazardous Waste Facility Permit NM4890139088-TSDF (the Permit) (NMED, 1999a). This NFA petition addresses 15 SWMUs and 8 AOCs listed in the Permit. The petition provides information demonstrating that each SWMU and AOC meets one of the NFA criteria defined in Table 4 of the *Technical Support Document; Exclusion/Inclusion of Solid Waste Management Units and Areas of Concern; Permit Module VII Corrective Action for Solid Waste Management Units* (TSD) (NMED 1999b). Table 4 of the TSD is reproduced as Table 1 in this NFA petition. Where there are two mud pits in a particular SWMU, separate criteria may apply to each distinct mud pit. Otherwise, the NFA petition for each SWMU/AOC is based on only one of the criteria.

This NFA petition addresses the current Permit requirements for an RFI report for SWMUs and AOCs. It uses the results of the previous investigations performed at WIPP. As an alternative to the RFI report specified in Module VII of the Permit, current NMED guidance identifies an ACAA that may be used for any SWMU or AOC (NMED, 1998). This accelerated approach is used to replace the standard RFI work plan and report sequence with a more flexible decision-making approach. The ACAA process allows a facility to exit the schedule of compliance contained in the facility's Hazardous and Solid Waste Amendments (HSWA) permit module and proceed on an accelerated time frame. Thus, the ACAA process can be entered either before or after a RFI work plan. According to the NMED's guidance, a facility can prepare a RFI work plan or SAP for any SWMU or AOC (NMED, 1998). In April 2000, the NMED granted approval for submission of a SAP (NMED, 2000a). A SAP was prepared in 2000 and implemented in 2001 (DOE, 2000). This NFA petition replaces the RFI report under the ACAA process.

Westinghouse TRU Solutions LLC (WTS) is the co-operator of the WIPP hazardous waste facility. For the purposes of this NFA Request, references to WIPP personnel include both DOE and co-operator personnel.

1.1 Objectives and Scope

The objective of this petition is to demonstrate that the request for an NFA determination for SWMUs and AOCs at WIPP is defensible. The Permit identifies 15 SWMUs requiring an RFI and 8 AOCs in the 16-section WIPP Land Withdrawal Area (WLWA).

Some of the SWMUs and AOCs were identified in the original RCRA Part B Permit Application for the facility (DOE, 1991 and 1996), and were included in a RCRA Facility Assessment (RFA) performed by the NMED (NMED, 1994). The 15 SWMUs and 8 AOCs identified in the Permit are associated with: (1) natural resource exploration activities prior to the development of WIPP, or (2) early WIPP mineral assessment and geological studies to support the development of the facility, or (3) facility construction. More information on each SWMU and AOC can be found in (1) *Assessment of Solid*

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Waste Management Units at the Waste Isolation Pilot Plant the WIPP RCRA Facility Assessment (RFA)(NMED, 1994), (2) Final Voluntary Release Assessment/Corrective Action Report (DOE, 1996), (3) Supplemental Information Requested by the New Mexico Environment Department for Solid Waste Management Units (DOE, 1997), and (4) Technical Support Document, Exclusion/Inclusion of Solid Waste Management Units and Areas of Concern (NMED, 1999b).

The 15 SWMUs included in the Permit that require an RFI are:

SWMU 001g (H-14/P-1 Mud Pit[s])
SWMU 001h (H-15/P-2 Mud Pit[s])
SWMU 001j (P-3 Mud Pit)
SWMU 001k (P-4 Mud Pit)
SWMU 001L (WIPP-12 Drilling Mud Pit/P-5 Drilling Mud Pit)
SWMU 001m (P-6 Mud Pit)
SWMU 001n (P-15 Mud Pit)
SWMU 001o (Badger Unit Drilling Mud Pit[s])
SWMU 001p (Cotton Baby Drilling Mud Pit[s])
SWMU 001q (DOE-1 Drilling Mud Pit[s])
SWMU 001s (ERDA-9 Mud Pit)
SWMU 001t (IMC-374 Mud Pit)
SWMU 001x (WIPP-13 Drilling Mud Pit[s])
SWMU 004a (Portacamp Storage Yard, West Side)
SWMU 007b (SW Evaporation Pond)

The 8 AOCs included in the Permit are:

AOC 001r (D-123 Drilling Mud Pit)
AOC 001u (IMC-376 Drilling Mud Pit)
AOC 001v (IMC-456 Drilling Mud Pit)
AOC 001w (IMC-457 Drilling Mud Pit)
AOC 001ac (DSP-207 Mud Pit)
AOC 001ae (IMC-377 Mud Pit)
AOC 010b (Waste Handling Shaft Sump)
AOC 010c (Exhaust Shaft Sump)

The locations of these SWMUs and AOCs are presented in Figures 1.1, 1.2, and 1.3.

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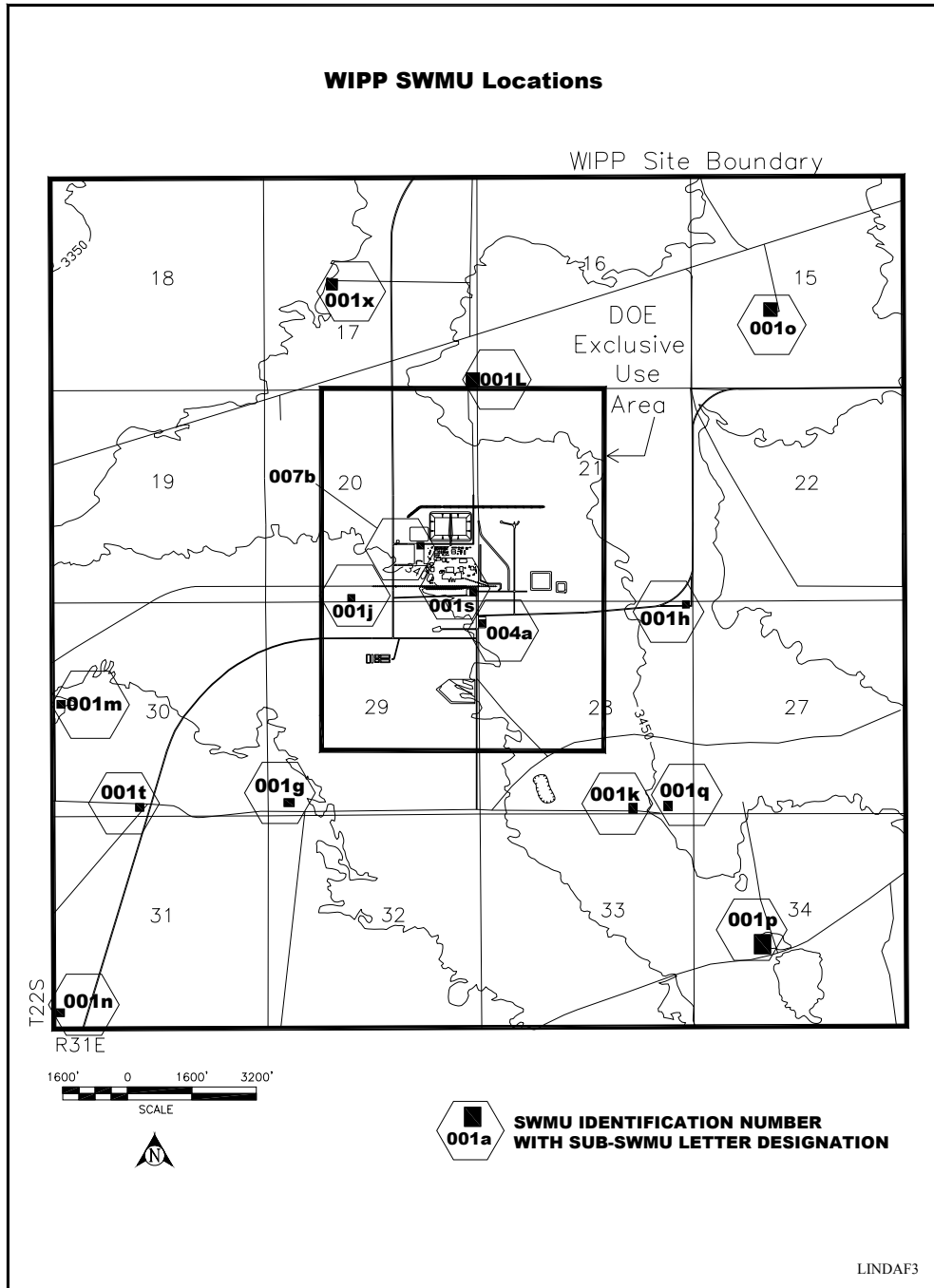


Figure 1.1 - WIPP SWMU Locations

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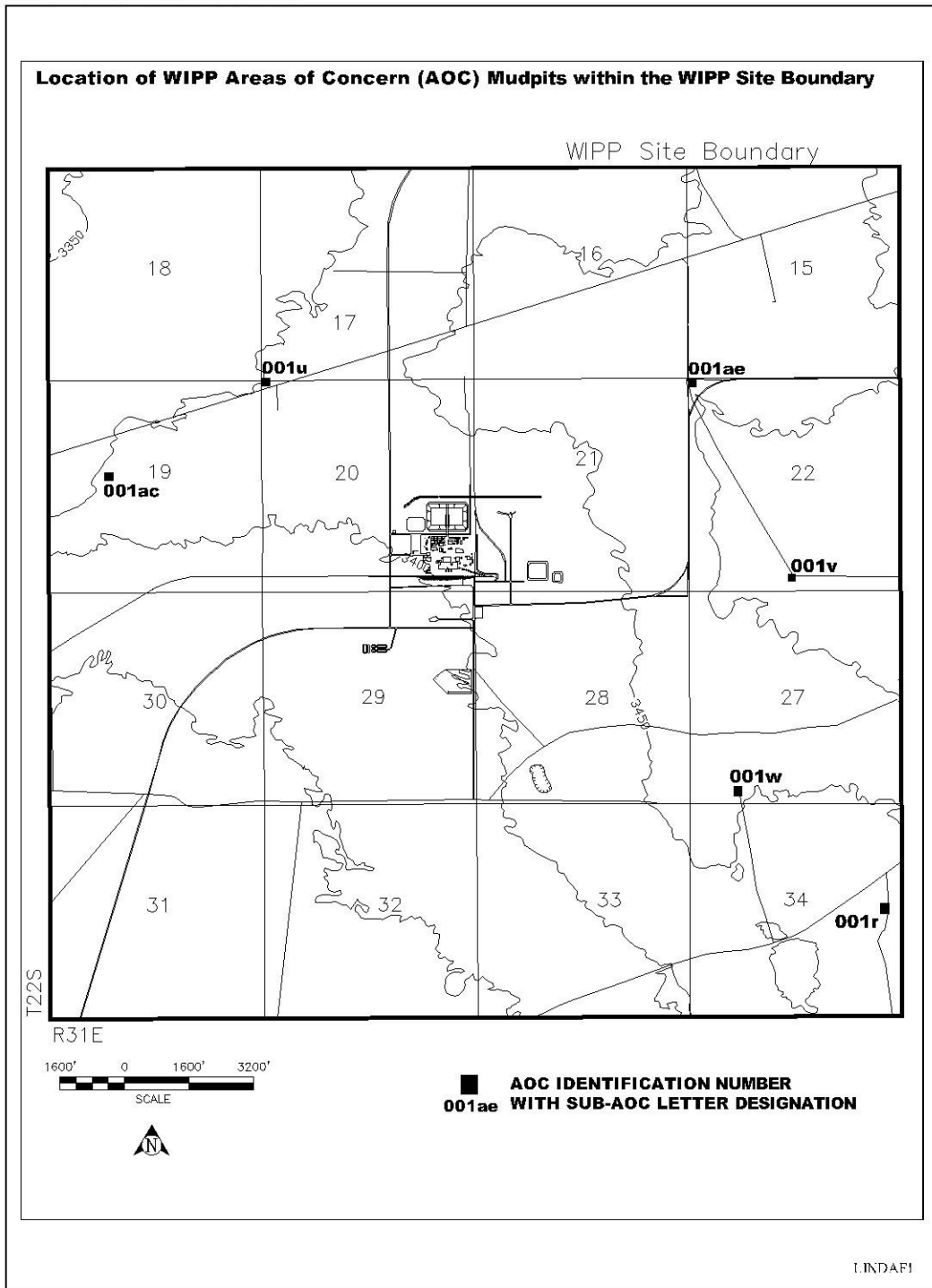


Figure 1.2 - AOC Locations

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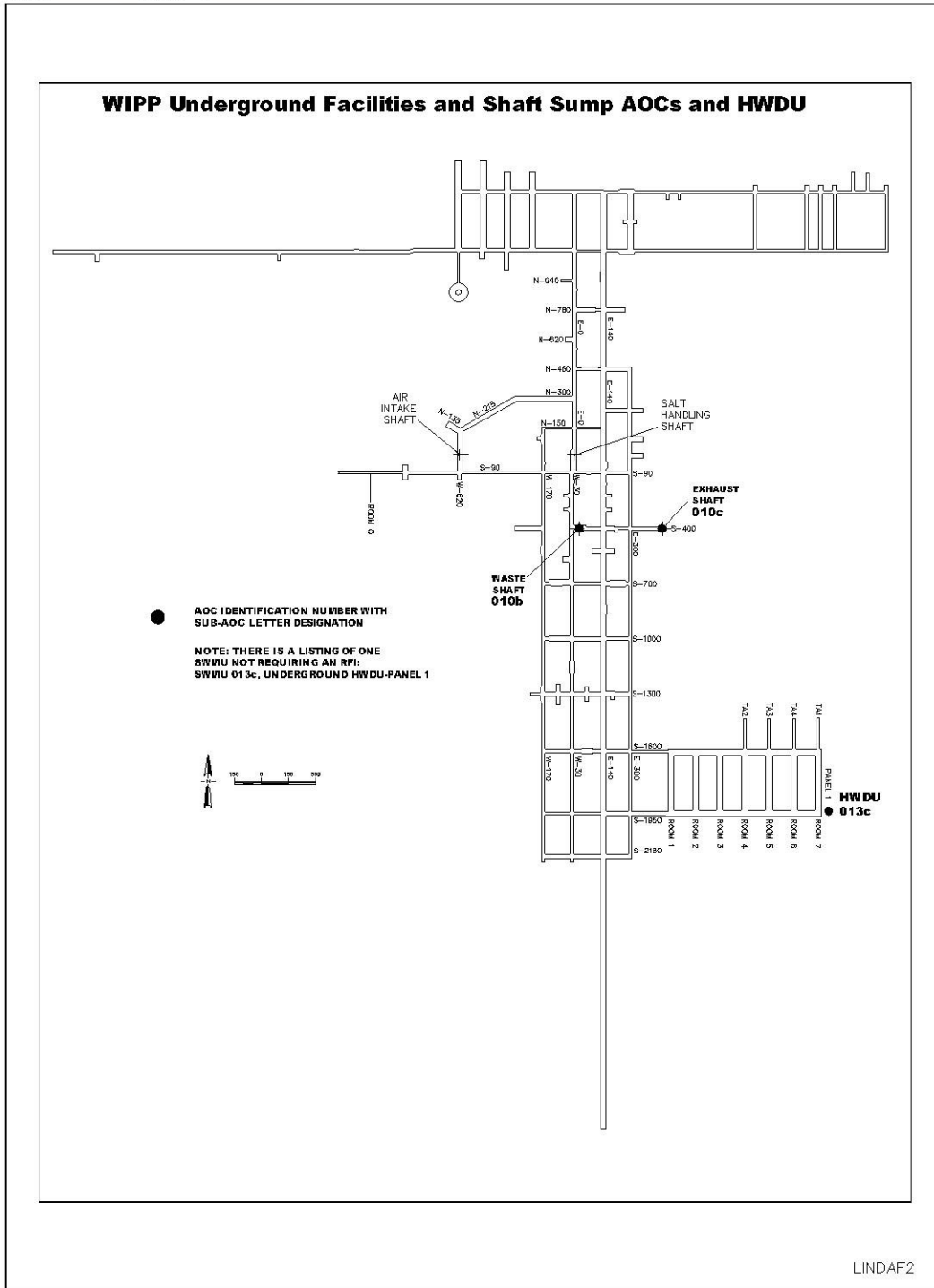


Figure 1.3 - Underground AOC Locations

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The scope of this petition is to provide sufficient information to demonstrate that one of the NMED NFA Criteria presented in Table 1.1 and the TSD (NMED, 1999b) has been met and that an NFA is justified for each SWMU and AOC.

Table 1.1 - NMED No Further Action Criteria

Number	NFA Criteria
1	The site does not exist.
2	The site was not used for the management of hazardous constituents.
3	There was no release of hazardous constituents to the environment.
4	There was a release, but hazardous constituents are at acceptably low levels.
5	There was a release, but the site has been characterized and/or closed under another authority.
6	There was a release, but the site was remediated.

1.2 Background Issues

WIPP is located in Eddy County in southeastern New Mexico, approximately 36 miles east of Carlsbad. Congress approved the WIPP Land Withdrawal Act (Public Law 102-579) and created the WIPP Land Withdrawal Area (WLWA) in October 1992. This Act transferred the responsibility for the management of the WLWA from the Secretary of the Interior to the Secretary of Energy. In accordance with Sections 3(a)(1) and (3) of the Act, these lands ". . . are withdrawn from all forms of entry, appropriation, and disposal under the public land laws . . ." and are reserved for the use of the Secretary of Energy ". . . for the construction, experimentation, operation, repair and maintenance, disposal, shutdown, monitoring, decommissioning, and other activities, associated with the purposes of WIPP as set forth in Section 213 of the Department of Energy National Security and Military Applications of Nuclear Energy Act of 1980 (Public Law 96-164; 93 Statute 1259, 1265) and this Act."

WIPP is an industrial facility that consists of 16 square miles of land surface, surface buildings and structures, an underground network of subsurface excavated openings, and vertical shafts, that connect the surface and subsurface areas. The 16-section WLWA includes a significant portion of Township 22 South, Range 31 East. The DOE has developed a 1,454 acre exclusive use area located in the center of the 16 sections. Land uses within this area are limited to activities associated with the disposal of wastes. Land uses in the balance of the 16 sections include grazing, hunting, and recreational activities. Hunting, grazing, mining, oil and gas exploration and production, and recreational activities are the predominant land uses in areas outside the WLWA. Equipment, waste, and personnel enter the underground facility through designated shafts. The facility operational period is estimated to be 35 years with a 30-year postclosure care period. Active institutional NFA controls will be maintained during postclosure for a period of 100 years.

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The underground hazardous waste disposal units (HWDUs), defined as waste panels, are located 2,150 feet (655 meters) below ground surface, in the WIPP underground. The waste panels consist of seven rooms and two access drifts each. Each room is approximately 300 feet (91 meters) long, 33 feet (10 meters) wide, and 13 feet (4 meters) high. Access drifts connect the rooms and have the same cross section. The HWDUs are not addressed in this NFA petition.

Samples were collected at some of the SWMUs as part of a RFA performed by the NMED (NMED, 1994). WIPP conducted two rounds of soil sampling at selected SWMUs in 1995 and 1996. In the summer of 1995 soil samples were collected for initial characterization by the toxicity characteristic leaching procedure (TCLP). A second round of sampling at the same SWMUs was conducted in the summer of 1996 and involved the collection of soil samples for total constituent analyses. The total constituent analysis data were collected based on a request from the NMED to support the TCLP metals data collected in the initial sampling round.

The NMED reviewed the sampling conducted by WIPP at the SWMUs and defined a list of SWMUs with constituents of concern and AOCs to be included in the Permit. These SWMUs/AOCs and constituents of concern for the SWMUs were described in the TSD (NMED, 1999b).

Additional investigations of 4 SWMUs are conducted in August 2001 as part of implementing the NMED-approved *WIPP Sampling and Analysis Plan for Solid Waste Management Units and Areas of Concern* (DOE, 2000).

1.3 Other Issues

This NFA petition addresses the current Permit requirements for investigations at the SWMUs and AOCs. It uses the results of previous investigations performed at WIPP as required by the Permit.

Currently, the Permittees believe that a number of the mud pit SWMUs and all of the AOC mud pits have been closed under another regulatory authority. The documentation for closure of these SWMUs and AOCs is included in Appendix D of this NFA petition. The Permittees use the results of the field investigations and other documentation to petition for an NFA determination for all SWMUs and AOCs specified in the permit. Approval of the NFA petition by the NMED will allow the Permittees to request a permit modification to exit the RFI/Corrective Measures process, and remove the SWMUs and AOCs from the Permit.

1.3.1 Background Levels for Evaluation of Analytical Results

Because metals are included in the list of target analytes for the SAP investigations, establishing site background concentrations is important to assess the potential impact of the SWMU sites on the surrounding environment. Soil samples were collected outside the SWMU at each SWMU site sampled. These data constitute background

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information and are included in the discussions of analytical results for each SWMU presented in subsequent chapters of this report. WIPP pooled the background sample analysis results to better assess general background metals concentrations across the WIPP site. Information regarding site background concentrations is presented in Appendix A to allow review of the background data sets and the statistical analyses performed.

1.3.2 Thallium Concentration Data

In the TSD, the NMED included five SWMUs for further investigation because of elevated analytical reporting for thallium (NMED, 1999b). During September 1999, WIPP personnel collected additional subsurface soil samples at these SWMUs and submitted the samples for analysis of thallium concentrations. As described in Appendix B, there were no detections of thallium in any of the potential source material at the SWMUs. There was one detection of thallium outside one SWMU mud pit. Consequently, thallium is not a constituent of concern for the investigations described in this NFA petition.

1.4 NFA Petition Organization

This NFA petition follows the outline provided by the NMED in their guidance document (NMED, 1998). Sections 2.0 through 24.0 of this petition address the 15 SWMUs (13 mud pits, 1 storage yard, and 1 evaporation pond) and 8 AOCs (6 mud pits and 2 mine shaft sumps) included in the Permit. Based on the NFA petition outline, the organization of Section 2.0 is repeated in Sections 3.0 through 24.0. Each of these sections include discussion of the SWMU/AOC description and operational history, land use, investigatory activities, site conceptual model, site assessments and an NFA petition. Subsections that are not applicable for a particular SWMU or AOC are identified in the text. Section 25.0 is a summary. References are included in Section 26.0.

2.0 SWMU 001g (H-14/P-1 MUD PIT[S])

The following subsections provide a description of the SWMU, an assessment of available site characterization data, risk assessment information and rationale for this NFA petition.

2.1 Summary

The Permittees are requesting an NFA decision for SWMU 001g, H-14/P-1 mud pits. SWMU 001g consists of drilling mud pits associated with the H-14 Culebra test well and the P-1 potash exploration borehole. Review and analysis of relevant data for SWMU 001g indicate that no hazardous constituents exist in the H-14 mud pit above background. In addition, documentation is provided in this section to demonstrate that the P-1 drilling mud pit was closed under U.S. Geological Survey (USGS) authority in 1976.

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Thus, an NFA determination is requested for SWMU 001g, because there has been no release of hazardous waste (including hazardous constituents) to the environment from this mud pit. The P-1 drilling mud pit was closed under USGS regulatory authority.

2.2 Description and Operational History

The site description and operational history are provided in the following subsections.

2.2.1 Site Description

SWMU 001g is located in the southwest (SW) $\frac{1}{4}$ of the SW $\frac{1}{4}$ of the SW $\frac{1}{4}$ of Section 29, Township 22 South, Range 31 East (Figure 2.1). Two boreholes were drilled at this location (P-1 and H-14). SWMU 001g consists of the mud pits constructed for the drilling of the P-1 potash exploration well and the H-14 Culebra test well. A sketch of SWMU 001g is presented in Figure 2.1.

The drill pad where the P-1 and H-14 boreholes are located has been extensively graded and regraded. The H-14 well site has been used as a monitoring well since it was drilled in 1986. The H-14 mud pit is located on the north side of the drill pad area adjacent to the H-14 borehole. The H-14 mud pit measures approximately 30 feet wide and 100 feet long. The area of the mud pit is delineated by disturbed soil covered with rock fragments.

The P-1 mud pit is located in the middle of the SWMU 001g drill pad. The mud pit area is approximately 25 feet wide and 37 feet long. The mud pit area is identified by a slightly discolored, sunken area 50 feet south of the H-14 borehole and adjacent to the P-1 borehole.

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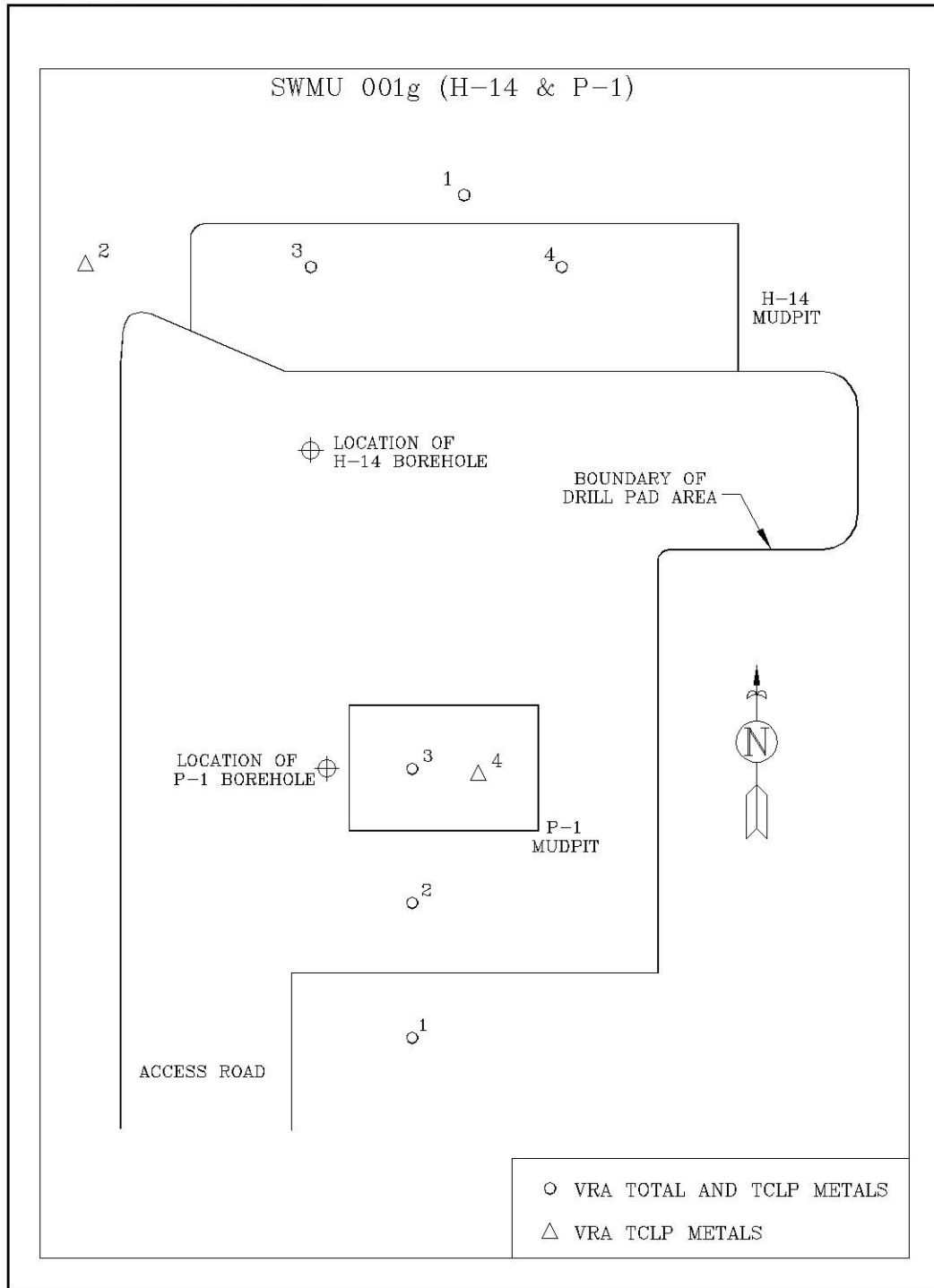


Figure 2.1 - Sample Location Sketch - SWMU 001g (H-14 & P-1 Mud Pit[s]) (map not to scale)

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2.2.2 Operational History

The P-1 potash exploration borehole was drilled by the Pennsylvania Drilling Company in August of 1976 as part of a 21-well USGS resource evaluation program to investigate the potash resources in the Salado Formation. The total depth of the P-1 borehole was 1,591 feet. The site was closed by the USGS in 1976 (see Appendix D).

Salt mud water and brine were used to complete the P-1 borehole. Drilling fluids that were used to complete the H-14 borehole include brine and fresh water. A mixture of saturated sodium and potassium chloride brine, starch and salt gel, and attapulgitite was used to reduce the degree of dissolution of the Salado Formation during drilling operations for P-1. An organic tracer (meta-trifluorobenzoic acid 10 mg/l) was added to freshwater at H-14 to measure contamination of the Culebra Formation resulting from the drilling process. Approximately 4,260 gallons of traced drilling fluid were lost during the drilling representing about 80 to 90 percent of the recirculated drilling fluid.

The USGS Conservation Division was the approval authority for potash exploration boreholes drilled during the period 1953 through 1978 in Eddy County, New Mexico. During this period, the USGS administered the drilling programs under the authority granted it by the U.S. Congress.

The USGS permitted private exploration boreholes, which were drilled by mineral leaseholders. The USGS received and approved Sundry Notices and Reports on Wells from leaseholders. Prior to drilling a borehole, the company submitted a Notice of Intention to Drill for approval by the USGS. Following completion of the drilling and closure of the drilling location, the company notified the USGS of its intention to abandon the site. Upon approval of the notice, the USGS considered the drilling location closed. No additional closure documentation was required.

The USGS approved the closure and abandonment of the drilling sites according to then current requirements. The permitting and closure activities for potash exploration were established by the USGS in the early 1950's. These activities have not changed substantially since that time, as evidenced by recent permits being granted by the Bureau of Land Management (BLM).

The H-14 borehole was drilled in October 1986 to provide a Culebra-dolomite monitoring well in the southwest quadrant of the WIPP site. The H-14 monitoring well was drilled to a total depth of 589 feet. The H-14 well was originally drilled using a 7.85-inch rock bit to a depth of 533 feet, 12 feet above the Culebra Formation. The original borehole was hydrologically tested in the Dewey Lake and Rustler Formations. A 5.5-inch casing was set in the hole and cemented to the surface. A 4.5-inch hole was then cored through the cement and then continued to a depth of 574 feet. After a series of drill stem tests in the Culebra Formation, the borehole was reamed to 4.75 inches and deepened to a final depth of 589 feet.

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Closure documentation for P-1 is included in Appendix D. Additional information on the H-14/P-1 drilling is included in Appendix F.

2.3 Land Use

This section presents a summary of current and future/proposed land use for SWMU 001g.

2.3.1 Current

This SWMU is located within the 16-section WLWA. The WIPP Land Withdrawal Act (Public Law 102-579) created the WLWA in October 1992. This Act transferred the jurisdiction of the WLWA from the Secretary of the Interior to the Secretary of Energy. In accordance with sections 3(a)(1) and (3) of the Act, these lands ". . . are withdrawn from all forms of entry, appropriation, and disposal under the public land laws . . ." and are reserved for the use of the Secretary [of Energy] for the construction, experimentation, operation, repair and maintenance, disposal, shutdown, monitoring, decommissioning, and other authorized activities, associated with the purposes of WIPP as set forth in section 213 of the Department of Energy National Security and Military Applications of Nuclear Energy Act of 1980 (Public Law 96-164; 93 Statute 1259, 1265) and this Act." SWMU 001g is located on land under the jurisdiction of the DOE. The land around this SWMU is occasionally used for livestock grazing, and recreational activities; no other current uses exist.

2.3.2 Future/Proposed

The facility operational period is estimated to be 35 years with a 30-year postclosure care period. Active institutional controls will be maintained during postclosure for 100 years. The future/proposed land use is industrial and recreational.

2.4 Investigatory Activities

SWMU 001g was investigated in a series of three investigations. The following subsections describe previous sampling activities that have been conducted at the site.

2.4.1 Summary

SWMU 001g was visually inspected by the NMED in 1993 as part of a RFA. No samples were collected. SWMU 001g was initially investigated in 1995 under the Voluntary Release Assessment (VRA) program for TCLP metals. A subsequent investigation in 1996 evaluated total metals concentrations. The following subsections describe data that were collected at SWMU 001g.

2.4.2 Investigation #1 – RFA

SWMU 001g was visually inspected by the NMED in 1993 as part of a RFA.

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2.4.2.1 Nonsampling Data Collection

No nonsampling data collection was performed during the RFA.

2.4.2.2 Sampling Data Collection

No sampling activities were performed at this SWMU during the RFA.

2.4.2.3 Data Gaps

Because there were no samples collected during the RFA at this SWMU, there were no data available for risk-based decision making.

2.4.2.4 Results and Conclusions

The RFA concluded that the potential release of hazardous constituents to soil was high. The RFA also concluded that migration potential to groundwater was low relative to other locations on site.

2.4.3 Investigation #2 – VRA (1995)

As part of the VRA 1995 investigation soil samples were collected for TCLP analysis.

2.4.3.1 Nonsampling Data Collection

No nonsampling activities were performed at this SWMU during this investigation.

2.4.3.2 Sampling Data Collection

During the summer 1995 sampling event, 24 soil samples and 4 associated quality assurance/quality control (QA/QC) samples were collected to characterize the vertical and horizontal extent of any potential release from the SWMU 001g. The DOE collected 8 soil-boring samples from the P-1 mud pit area and 8 soil boring samples from the H-14 site for TCLP metals analysis; the remaining boring samples were collected for TCLP volatiles analysis (DOE, 1996).

The rationale for selecting sample depths at mud pits was based on an evaluation of the SWMU 001g site, and historical information contained in the RFA (NMED, 1994). Samples collected for TCLP analyses in the mud pit area at the 12- to 24-inch depth were used to provide data from the depth where the highest concentration of potential hazardous constituents was anticipated. Samples collected at the 60- to 72-inch depth were used to evaluate the maximum vertical extent of potential constituent migration. Approximate sample locations are presented in Figure 2.1. The TCLP soil sampling and analysis data are presented in Appendix F.

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2.4.3.3 Data Gaps

The sample collection and TCLP analyses performed during 1995 did not allow determination of total metals concentrations in the mud pit material.

2.4.3.4 Results and Conclusions

The sample collection and TCLP analyses, performed during 1995, demonstrated that the material in the mud pits was not a hazardous waste.

2.4.4 Investigation #3 – VRA (1996)

As part of the VRA 1996 investigation soil samples were collected for total constituent analysis.

2.4.4.1 Nonsampling Data Collection

No nonsampling activities were performed at this SWMU.

2.4.4.2 Sampling Data Collection

The 1995 SWMU 001g soil sampling locations were sampled again in the summer of 1996. During the summer 1996 sampling event, twenty soil boring samples (12 samples for metals analysis, and 8 samples for volatiles analysis) and 4 associated QA/QC samples were collected for total constituent analysis to further characterize the vertical and horizontal extent of any potential release of hazardous constituents from the SWMU 001g mud pits.

The rationale for selecting sample depths at mud pits was based on an evaluation of the SWMU 001g site, and historical information contained in the RFA (NMED, 1994). Samples collected for analyses in the mud pit area at the 12- to 24-inch depth were used to provide data from the depth where the highest concentration of potential hazardous constituents was anticipated. Samples collected at the 60- to 72-inch depth were used to evaluate the maximum vertical extent of potential constituent migration.

The TSD identified lead and thallium as potential constituents of concern for the mud pit materials in this SWMU. Concentrations of lead were detected at SWMU 001g by total metals analyses. Table 2.1 presents a summary of the soil sampling and analysis data for lead for this investigation. Additional data are contained in Appendix F. The soil sampling locations are presented in Figure 2.1.

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**Table 2.1
Summary of Measured Concentrations for Constituents of Concern
Voluntary Release Assessment (1996 Samples)
SWMU 001g (H-14 & P-1 Mud Pit[s])**

Description	Hole #	Depth (in.) (in. bgs)	Constituent	Concentration (ppm)	Qualifier
H-14 Mud Pit	1	12 to 24	Lead	1.9	J
		60 to 72	Lead	2.7	J
	3	12 to 24	Lead	2	J
		60 to 72	Lead	3.4	J
	4	12 to 24	Lead	3.4	J
		60 to 72	Lead	2.6	J
P-1 Mud Pit	1	12 to 24	Lead	2.1	J
		60 to 72	Lead	3.8	J
	2	12 to 24	Lead	1.8	J
		60 to 72	Lead	5.4	J
	3	12 to 24	Lead	3.2	J
		60 to 72	Lead	2.4	J

Notes:

NMED Industrial Screening values = 1,000 ppm for lead
 NMED Residential Screening values = 400 ppm for lead
 Background concentration for lead = 5.4 ppm
 ppm = parts per million
 in. bgs = inches below ground surface
 J = Result should be considered an estimated value.
 SWMU = Solid Waste Management Unit

2.4.4.3 Data Gaps

No data gaps exist for this SWMU.

2.4.4.4 Results and Conclusions

As stated above, available data indicate that no hazardous constituents exist in SWMU 001g above background. Further, no release of hazardous constituents has occurred. Table 4 of the TSD provides criteria for evaluation of NFA at RCRA sites. Based on the criteria provided in Table 4 of the TSD, there has been no release of hazardous waste (including hazardous constituents) from this SWMU that pose a threat to human health or the environment.

2.5 Site Conceptual Model

The following subsections define various aspects of the conceptual model developed for this SWMU.

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2.5.1 Nature and Extent of Contamination

Total metals concentrations of lead measured in SWMU 001g are below the lead background concentration (Table 2.1 and Appendix A). In addition, as defined in Appendix B, thallium has been eliminated as a constituent of concern for the SWMUs. Based on the information contained in Table 2.1, Appendix A, and Appendix B, there has been no release of hazardous constituents at this SWMU. In addition, P-1 was closed by the USGS in 1976.

2.5.2 Environmental Fate

As stated above, available data indicate that no hazardous constituents exist in SWMU 001g above background. Table 4 of the TSD provides criteria for evaluation of NFA at RCRA sites. Based on the criteria provided in Table 4 of the TSD, there has been no release of hazardous waste (including hazardous constituents) from this SWMU that pose a threat to human health or the environment.

2.6 Site Assessments

No site assessments or risk assessments were required, because no concentrations of hazardous constituents exist above background. The sampling and analysis results indicate that SWMU 001g does not have potential to incrementally increase human health or ecological risk above background risk.

2.6.1 Summary

No screening assessments were required.

2.6.2 Screening Assessments

No human health or ecological assessments were required.

2.6.2.1 Human Health

All measured concentrations were below background. No human health screening assessment was required.

2.6.2.2 Ecological

All measured concentrations were below background. No ecological screening assessment was required.

2.6.3 Risk Assessments

This section discusses the baseline risk assessment for human health and ecological risk.

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2.6.3.1 Human Health

Because the measured metal concentrations in soil are below background, this SWMU does not have the potential to affect human health. A baseline human health risk assessment is not required for SWMU 001g.

2.6.3.2 Ecological

Because the measured metal concentrations in soil are below background, this SWMU does not have the potential to affect ecological receptors. A baseline ecological risk assessment is not required for SWMU 001g.

2.6.4 Other Applicable Assessments

Applicable assessments pertaining to surface water, groundwater, and underground storage tanks are discussed below.

2.6.4.1 Surface Water

No surface water is present at this site and this subsection is not applicable.

2.6.4.2 Groundwater

Measured concentrations do not exceed background. No groundwater evaluation is required.

2.6.4.3 Underground Storage Tanks

No underground storage tanks are known to have been present at this site. This section is, therefore, not applicable.

2.6.4.4 Other

No other assessments are required.

2.7 No Further Action Petition

The NMED has developed six criteria to identify whether a site should be identified for NFA (NMED, 1999b). Based on these criteria, an NFA petition is reasonable if:

- The site does not exist,
- The site was not used for the management of hazardous constituents,
- There was no release of hazardous constituents to the environment,

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- There was a release, but hazardous constituents are at acceptably low levels,
- There was a release, but the site has been characterized and/or closed under another authority, or
- There was a release, but the site was remediated.

The rationale and criterion for this NFA petition are discussed in the following subsections.

2.7.1 Rationale

Based on the field investigations for the H-14 mud pit, an NFA is being recommended for the H-14 mud pit for the following reason: no constituents of concern (COCs) were present in concentrations considered hazardous to human health or the environment. This mud pit meets Criterion 3.

Based on the documentation provided in Appendix D for the P-1 mud pit, it was closed by the USGS in 1976. Consequently, an NFA is recommended for the P-1 mud pit because it meets Criterion 5.

2.7.2 Criterion

Based on the evidence provided above, an NFA determination is requested for SWMU 001g in conformance with Criterion 3 for the H-14 mud pit and with Criterion 5 for the P-1 mud pit.

3.0 SWMU 001h (H-15/P-2 MUD PIT[S])

The following subsections provide a description of the SWMU, an assessment of available site characterization data, risk assessment information and rationale for this NFA petition.

3.1 Summary

The Permittees are requesting an NFA decision for SWMU 001h H-15/P-2 mud pits. SWMU 001h consists of drilling mud pits associated with the H-15 Culebra test well and the P-2 potash exploration borehole. Review and analysis of relevant data for SWMU 001h indicate that no hazardous constituents exist in SWMU 001h above background. In addition, documentation is provided in this section to demonstrate that the P-2 drilling mud pit was closed under USGS authority in 1976.

Thus, an NFA determination is requested for SWMU 001h because there has been no release of hazardous waste (including hazardous constituents) from the H-14 mud pit to the environment. The P-1 drilling mud pit was closed under USGS regulatory authority.

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3.2 Description and Operational History

The site description and operational history are provided in the following subsections.

3.2.1 Site Description

SWMU 001h is located in the northeast (NE) $\frac{1}{4}$ of the NE $\frac{1}{4}$ of the NE $\frac{1}{4}$ of Section 28, Township 22 South, Range 31 East. Two boreholes were drilled at this location (H-15 and P-2). SWMU 001h consists of the mud pits constructed for the drilling of the P-2 potash exploration well and the H-15 Culebra test well. A sketch of SWMU 001h is presented in Figure 3.1.

Well H-15 was drilled in 1986 to conduct a series of water quality evaluations and to develop a database of Culebra Formation water levels. The H-15 mud pit is a rectangular mud pit approximately 18 feet wide and 55 feet long, located approximately 18 feet east of the H-15 well cap and in the northeast corner of the P-2 drill pad area.

The P-2 mud pit is located approximately 40 feet southeast of the P-2 well head, on the eastern edge of the P-2 well pad. The P-2 mud pit is approximately 20 feet wide and 35 feet long. The P-2 well pad is not vegetated and is covered with compacted caliche.

3.2.2 Operational History

The P-2 borehole was drilled in September 1976 by Boyles Brothers Drilling Company as part of a 21-well USGS resource evaluation program to investigate the potash resources in the Salado Formation. The P-2 site was closed by the USGS in 1976 (see Appendix D).

The USGS Conservation Division was the approval authority for potash exploration boreholes drilled during the period 1953 through 1978 in Eddy County, New Mexico. During this period, the USGS administered the drilling programs under the authority granted it by the U.S. Congress.

The USGS permitted private exploration boreholes, which were drilled by mineral leaseholders. The USGS received and approved Sundry Notices and Reports on Wells from leaseholders. Prior to drilling a borehole, the company submitted a Notice of Intention to Drill for approval by the USGS. Following completion of the drilling and closure of the drilling location, the company notified the USGS of its intention to abandon the site. Upon approval of the notice, the USGS considered the drilling location closed. No additional closure documentation was required.

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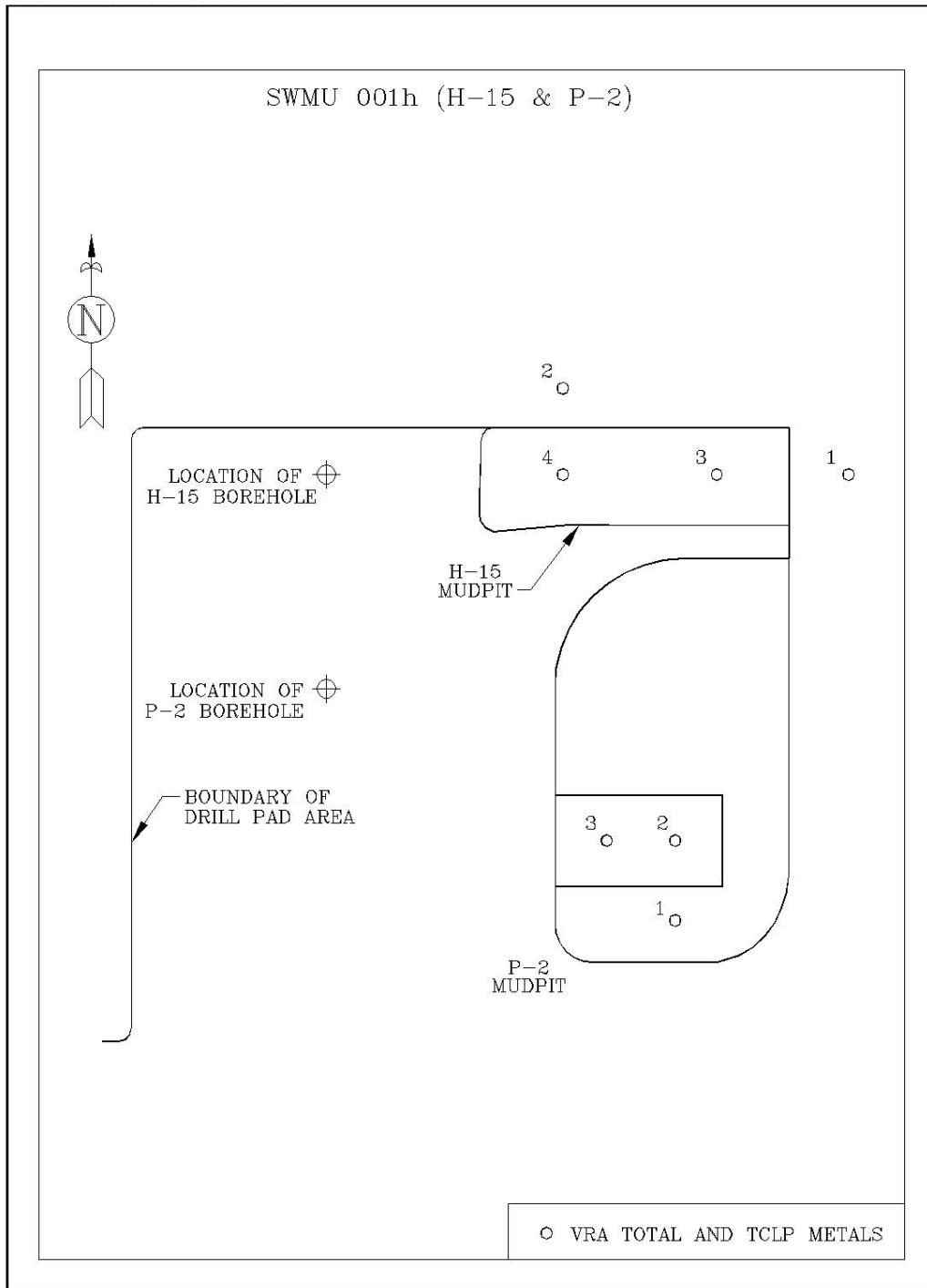


Figure 3.1 - Sample Location Sketch - SWMU 001h (H-15 & P-2 Mud Pit[s]) (map not to scale)

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The USGS approved the closure and abandonment of the drilling sites according to then current requirements. The permitting and closure activities for potash exploration were established by the USGS in the early 1950's. These activities have not changed substantially since that time, as evidenced by recent permits being granted by the BLM.

The H-15 test well was drilled to a total depth of 1,895 feet. After setting 20 feet of 7-inch casing, a 5.875-inch rotary borehole was drilled to 1,038 feet below land surface. A 4.5-inch casing liner was installed and the hole was deepened to 1,500 feet using a 3.94-inch rotary drill bit. The hole was drilled to the final depth of 1,895 feet using a 3.94-inch core bit.

The USGS drilling logs indicate that air foam was used during the drilling of P-2. Salt mud was also used to complete the P-2 borehole.

Saturated brine and "traced" freshwater are listed as drilling fluid constituents in the H-15 borehole data report. Saturated brine is specifically described as a 70-30 mixture of cement slurry and salt with 2 percent bentonitic gel. Meta-trifluorobenzoic acid (2 mg/l) was added to measure borehole and aquifer contamination of the Culebra from the drilling process. Approximately 1,336 gallons of traced drilling fluid were lost to the formation, representing about 75 percent of the drilling fluid used.

Closure documentation for P-2 is included in Appendix D. Other information on the H-15/P-2 drilling is included in Appendix G.

3.3 Land Use

This section presents a summary of current and future/proposed land use for SWMU 001h.

3.3.1 Current

This SWMU is located within the 16-section WLWA. The WIPP Land Withdrawal Act (Public Law 102-579) created the WLWA in October 1992. This Act transferred the jurisdiction of the WLWA from the Secretary of the Interior to the Secretary of Energy. In accordance with sections 3(a)(1) and (3) of the Act, these lands ". . . are withdrawn from all forms of entry, appropriation, and disposal under the public land laws . . ." and are reserved for the use of the Secretary [of Energy] for the construction, experimentation, operation, repair and maintenance, disposal, shutdown, monitoring, decommissioning, and other authorized activities, associated with the purposes of WIPP as set forth in section 213 of the Department of Energy National Security and Military Applications of Nuclear Energy Act of 1980 (Public Law 96-164; 93 Statute 1259, 1265) and this Act." SWMU 001h is located on land under the jurisdiction of the DOE. The land around this SWMU is occasionally used for livestock grazing, and recreational activities; no other current uses exist.

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3.3.2 Future/Proposed

The facility operational period is estimated to be 35 years with a 30-year postclosure care period. Active institutional controls will be maintained during postclosure for 100 years. The future/proposed land use is industrial and recreational.

3.4 Investigatory Activities

SWMU 001h was investigated in a series of three investigations. The following subsections describe previous sampling activities that have been conducted at the site.

3.4.1 Summary

SWMU 001h was visually inspected by the NMED in 1993 as part of a RFA. No samples were collected. SWMU 001h was initially investigated in 1995 under the VRA program for TCLP metals. A subsequent investigation in 1996 evaluated total metals concentrations. The following subsections describe data that were collected at SWMU 001h.

3.4.2 Investigation #1 – RFA

SWMU 001h was visually inspected by the NMED in 1993 as part of a RFA.

3.4.2.1 Nonsampling Data Collection

No nonsampling data collection was performed during the RFA.

3.4.2.2 Sampling Data Collection

No sampling activities were performed at this SWMU during the RFA.

3.4.2.3 Data Gaps

Because there were no samples collected during the RFA at this SWMU, there were no data available for risk-based decision making.

3.4.2.4 Results and Conclusions

The RFA concluded that the potential release of hazardous constituents to soil was high. The RFA also concluded that migration potential to groundwater was low relative to other locations on site.

3.4.3 Investigation #2 – VRA (1995)

As part of the VRA 1995 investigation soil samples were collected for TCLP analysis.

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3.4.3.1 Nonsampling Data Collection

No nonsampling activities were performed at this SWMU during this investigation.

3.4.3.2 Sampling Data Collection

During the summer 1995 sampling event at SWMU 001h, a total of 22 soil boring samples and 4 associated QA/QC samples were collected for TCLP analysis to assess the potential for release of hazardous constituents from SWMU 001h (DOE, 1996).

The rationale for selecting sample depths at mud pits was based on an evaluation of the SWMU 001h site, and historical information contained in the RFA (NMED, 1994). Samples collected for TCLP analyses in the mud pit area at the 12- to 24-inch depth were used to provide data from the depth where the highest concentration of potential hazardous constituents was anticipated. Samples collected at the 60- to 72-inch depth were used to evaluate the maximum vertical extent of potential constituent migration. Approximate sample locations are presented in Figure 3.1. The TCLP soil sampling and analysis data are presented in Appendix G.

3.4.3.3 Data Gaps

The sample collection and TCLP analyses performed during 1995 did not allow determination of total metals concentrations in the mud pit material.

3.4.3.4 Results and Conclusions

The sample collection and TCLP analyses, performed during 1995, demonstrated that the material in the mud pits was not a hazardous waste.

3.4.4 Investigation #3 – VRA (1996)

As part of the VRA 1996 investigation soil samples were collected for total constituent analysis.

3.4.4.1 Nonsampling Data Collection

No nonsampling activities were performed at this SWMU.

3.4.4.2 Sampling Data Collection

Soil sampling locations at the SWMU were sampled again in the summer of 1996. During the summer 1996 sampling event, 22 soil boring samples (14 samples for metals analysis, and 8 samples for volatiles analysis) and 4 associated QA/QC samples were collected for total constituent analysis to further characterize the vertical and horizontal extent of any potential release of hazardous constituents from the SWMU 001h mud pits.

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The rationale for selecting sample depths at mud pits was based on an evaluation of the SWMU 001h site, and historical information contained in the RFA. Samples collected for analyses in the mud pit area at the 12- to 24-inch depth were used to provide data from the depth where the highest concentration of potential hazardous constituents was anticipated. Samples collected at the 60- to 72-inch depth were used to evaluate the maximum vertical extent of potential constituent migration. Figure 3.1 is a site map showing sample locations.

The TSD identified barium and thallium as potential constituents of concern for the mud pit materials in this SWMU. Concentrations of barium were detected at SWMU 001h by total metals analyses. Table 3.1 presents a summary of the soil sampling and analysis data for barium for this investigation. Additional data are contained in Appendix G.

**Table 3.1
Summary of Measured Concentrations for Constituents of Concern
Voluntary Release Assessment (1996 Samples)
SWMU 001h (H-15 & P-2 Mud Pit[s])**

Description	Hole #	Depth (in. bgs)	Constituent	Concentration (ppm)	Qualifier
H-15 Mud Pit	1	12 to 24	Barium	21	N/A
		60 to 72	Barium	33	N/A
	2	12 to 24	Barium	27	N/A
		60 to 72	Barium	170	N/A
	3	12 to 24	Barium	20	N/A
		60 to 72	Barium	64	N/A
	4	12 to 24	Barium	26	N/A
		60 to 72	Barium	140	N/A
P-2 Mud Pit	1	12 to 24	Barium	19	N/A
		60 to 72	Barium	28	N/A
	2	12 to 24	Barium	20	N/A
		60 to 72	Barium	65	N/A
	3	12 to 24	Barium	69	N/A
		60 to 72	Barium	150	

Notes:
 NMED Industrial Screening values = 15,000 ppm for barium
 NMED Residential Screening values = 5,200 ppm for barium
 Background concentration for barium = 197 ppm
 ppm = parts per million
 in. bgs = inches below ground surface
 SWMU = Solid Waste Management Unit

3.4.4.3 Data Gaps

No data gaps exist for this SWMU.

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3.4.4.4 Results and Conclusions

As stated above, available data indicate that no hazardous constituents exist in SWMU 001h above background. Further, no release of hazardous constituents has occurred. Table 4 of the TSD provides criteria for evaluation of NFA at RCRA sites. Based on the criteria provided in Table 4 of the TSD, there has been no release of hazardous waste (including hazardous constituents) from this SWMU that pose a threat to human health or the environment.

3.5 Site Conceptual Model

The following subsections define various aspects of the conceptual model developed for this SWMU.

3.5.1 Nature and Extent of Contamination

Total metals concentrations of barium measured in SWMU 001h are below the barium background concentration (Table 3.1 and Appendix A). In addition, as defined in Appendix B, thallium has been eliminated as a constituent of concern for the SWMUs. Based on the information contained in Table 3.1, Appendix A, and Appendix B, there has been no release of hazardous constituents at this SWMU. In addition, P-2 was closed by the USGS in 1976.

3.5.2 Environmental Fate

As stated above, available data indicate that no hazardous constituents exist in SWMU 001h above background. Table 4 of the TSD provides criteria for evaluation of NFA at RCRA sites. Based on the criteria provided in Table 4 of the TSD, there has been no release of hazardous waste (including hazardous constituents) from this SWMU that pose a threat to human health or the environment.

3.6 Site Assessments

No site assessments or risk assessments were required, because no concentrations of hazardous constituents exist above background. The sampling and analysis results indicate that SWMU 001h does not have potential to incrementally increase human health or ecological risk above background risk.

3.6.1 Summary

No screening assessments were required.

3.6.2 Screening Assessments

No human health or ecological assessments were required.

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3.6.2.1 Human Health

All measured concentrations were below background. No human health screening assessment was required.

3.6.2.2 Ecological

All measured concentrations were below background. No ecological screening assessment was required.

3.6.3 Risk Assessments

This section discusses the baseline risk assessment for human health and ecological risk.

3.6.3.1 Human Health

Because the measured metal concentrations in soil are below background, this SWMU does not have the potential to affect human health. A baseline human health risk assessment is not required for SWMU 001h.

3.6.3.2 Ecological

Because the measured metal concentrations in soil are below background, this SWMU does not have the potential to affect ecological receptors. A baseline ecological risk assessment is not required for SWMU 001h.

3.6.4 Other Applicable Assessments

Applicable assessments pertaining to surface water, groundwater, and underground storage tanks are discussed below.

3.6.4.1 Surface Water

No surface water is present at this site and this subsection is not applicable.

3.6.4.2 Groundwater

Measured concentrations do not exceed background. No groundwater evaluation is required.

3.6.4.3 Underground Storage Tanks

No underground storage tanks are known to have been present at this site. This section is, therefore, not applicable.

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3.6.4.4 Other

No other assessments are required.

3.7 No Further Action Petition

The NMED has developed six criteria to identify whether a site should be identified for NFA (NMED, 1999b). Based on these criteria, an NFA petition is reasonable if:

- The site does not exist;
- The site was not used for the management of hazardous constituents;
- There was no release of hazardous constituents to the environment;
- There was a release, but hazardous constituents are at acceptably low levels;
- There was a release, but the site has been characterized and/or closed under another authority; or
- There was a release, but the site was remediated.

The rationale and criterion for this NFA petition are discussed in the following subsections.

3.7.1 Rationale

Based on the field investigations for the H-15 mud pit, an NFA is being recommended for this mud pit for the following reason: there was no release of hazardous constituents to the environment. This SWMU meets Criterion 3.

Based on the documentation provided in Appendix D for the P-2 mud pit, it was closed by the USGS in 1976. Consequently, an NFA is recommended for the P-2 mud pit because it meets Criterion 5.

3.7.2 Criterion

Based on the evidence provided above, an NFA determination is requested for SWMU 001h conformance with Criterion 3 for the H-15 mud pit and with Criterion 5 for the P-2 mud pit.

4.0 SWMU 001j (P-3 MUD PIT)

The following subsections provide a description of the SWMU, an assessment of available site characterization data, risk assessment information and rationale for this NFA petition.

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4.1 Summary

The Permittees are requesting an NFA decision for SWMU 001j, P-3 mud pit. SWMU 001j consists of a drilling mud pit associated with the P-3 potash exploration borehole. Review and analysis of relevant data and documentation provided for this SWMU demonstrate that the P-3 drilling mud pit was closed under USGS authority in 1976.

4.2 Description and Operational History

The site description and operational history are provided in the following subsections.

4.2.1 Site Description

SWMU 001j is located in the SE $\frac{1}{4}$ of the SE $\frac{1}{4}$ of the SW $\frac{1}{4}$ of Section 20, Township 22 south, Range 31 East. One borehole (P-3) was drilled at this location. The mud pit constructed for the drilling of the P-3 potash exploration well is SWMU 001j. The P-3 mud pit is a single rectangular mud pit that is located on the south central part of the drill pad. The P-3 well pad is heavily vegetated. A sketch of SWMU 001j is presented in Figure 4.1.

4.2.2 Operational History

The P-3 borehole was drilled by the Pennsylvania Drilling Company in August 1976 as part of a 21-well USGS resource evaluation program to investigate the potash resources in the Salado Formation. Once drilling of the P-3 borehole was completed, the hole was plugged to the surface. The P-3 site was closed by the USGS in 1976 (see Appendix D).

The USGS Conservation Division was the approval authority for potash exploration boreholes drilled during the period 1953 through 1978 in Eddy County, New Mexico. During this period, the USGS administered the drilling programs under the authority granted it by the U.S. Congress.

The USGS permitted private exploration boreholes, which were drilled by mineral leaseholders. The USGS received and approved Sundry Notices and Reports on Wells from leaseholders. Prior to drilling a borehole, the company submitted a Notice of Intention to Drill for approval by the USGS. Following completion of the drilling and closure of the drilling location, the company notified the USGS of its intention to abandon the site. Upon approval of the notice, the USGS considered the drilling location closed. No additional closure documentation was required.

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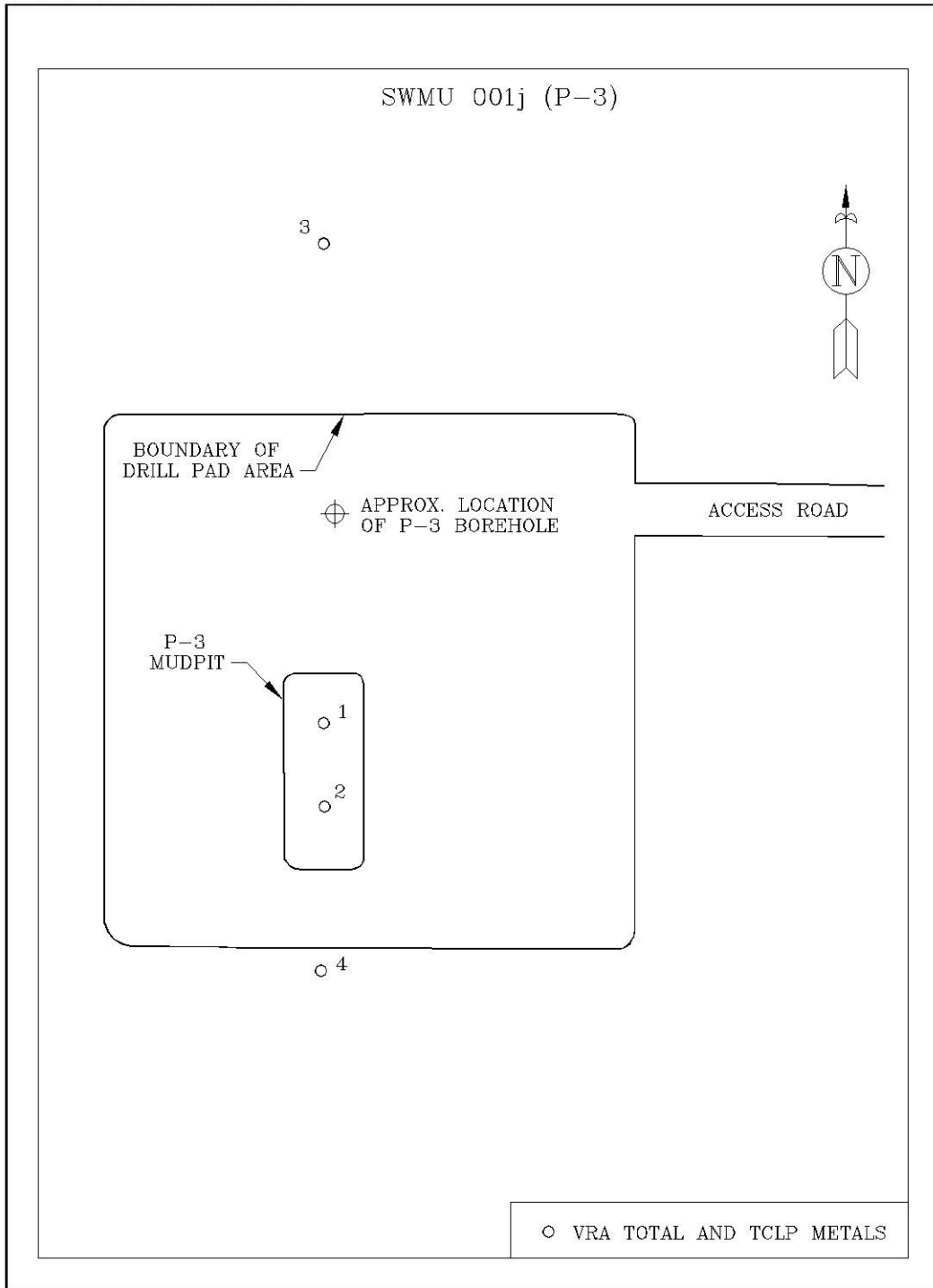


Figure 4.1 - Sample Location Sketch - SWMU 001j (P-3 Mud Pit) (map not to scale)

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The USGS approved the closure and abandonment of the drilling sites according to then current requirements. The permitting and closure activities for potash exploration were established by the USGS in the early 1950's. These activities have not changed substantially since that time, as evidenced by recent permits being granted by the BLM.

Drilling fluids used at the P-3 site include mud, brine, and brine mud. Closure documentation for P-3 is included in Appendix D. Additional information on the P-3 drilling is included in Appendix H.

4.3 Land Use

This section presents a summary of current and future/proposed land use for SWMU 001j.

4.3.1 Current

This SWMU is located within the exclusive use area, which is a subpart of the 16-section WLWA. The WIPP Land Withdrawal Act (Public Law 102-579) created the WLWA in October 1992. This Act transferred the jurisdiction of the WLWA from the Secretary of the Interior to the Secretary of Energy. In accordance with sections 3(a)(1) and (3) of the Act, these lands ". . . are withdrawn from all forms of entry, appropriation, and disposal under the public land laws . . ." and are reserved for the use of the Secretary [of Energy] for the construction, experimentation, operation, repair and maintenance, disposal, shutdown, monitoring, decommissioning, and other authorized activities, associated with the purposes of WIPP as set forth in section 213 of the Department of Energy National Security and Military Applications of Nuclear Energy Act of 1980 (Public Law 96-164; 93 Statute 1259, 1265) and this Act." SWMU 001j is located on land under the jurisdiction of the DOE. The land around this SWMU is occasionally used for livestock grazing, and recreational activities; no other current uses exist.

4.3.2 Future/Proposed

The facility operational period is estimated to be 35 years with a 30-year postclosure care period. Active institutional controls will be maintained during postclosure for 100 years. The future/proposed land use is industrial and recreational.

4.4 Investigatory Activities

SWMU 001j was investigated in a series of three investigations. The following subsections describe previous sampling activities that have been conducted at the site.

4.4.1 Summary

SWMU 001j was visually inspected by the NMED in 1992 as part of a RFA. No samples were collected. SWMU 001j was initially investigated in 1995 under the VRA program

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for TCLP metals. A subsequent investigation in 1996 evaluated total metals concentrations. The following subsections describe data that were collected at SWMU 001j.

4.4.2 Investigation #1 – RFA

SWMU 001j was visually inspected by the NMED in 1992 as part of a RFA.

4.4.2.1 Nonsampling Data Collection

No nonsampling data collection was performed during the RFA.

4.4.2.2 Sampling Data Collection

No sampling activities were performed at this SWMU during the RFA.

4.4.2.3 Data Gaps

Because there were no samples collected during the RFA at this SWMU, there were no data available for risk-based decision making.

4.4.2.4 Results and Conclusions

The RFA concluded that the potential release of hazardous constituents to soil was high. The RFA also concluded that migration potential to groundwater was low relative to other locations on site.

4.4.3 Investigation #2 – VRA (1995)

As part of the VRA 1995 investigation soil samples were collected for TCLP analysis.

4.4.3.1 Nonsampling Data Collection

No nonsampling activities were performed at this SWMU during this investigation.

4.4.3.2 Sampling Data Collection

During the summer 1995 sampling event, a total of 16 soil boring samples and 10 associated QA/QC samples were collected for TCLP analysis to assess the potential for release of hazardous constituents from the SWMU 001j mud pit (DOE, 1996).

The rationale for selecting sample depths at mud pits during the previous sampling was based on an evaluation of the SWMU 001j site, and historical information contained in the RFA. Samples collected for analyses in the mud pit area at the 12- to 24-inch depth were used to provide data from the depth where the highest concentration of potential hazardous constituents was anticipated. Samples collected at the 60- to 72-inch depth

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were used to evaluate the maximum vertical extent of potential constituent migration. Approximate sample locations are presented in Figure 4.1. The TCLP soil sampling and analysis data are presented in Appendix H.

4.4.3.3 Data Gaps

The sample collection and TCLP analyses performed during 1995 did not allow determination of total metals concentrations in the mud pit material.

4.4.3.4 Results and Conclusions

The sample collection and TCLP analyses, performed during 1995, demonstrated that the material in the mud pits was not a hazardous waste.

4.4.4 Investigation #3 – VRA (1996)

As part of the VRA 1996 investigation soil samples were collected for total constituent analysis.

4.4.4.1 Nonsampling Data Collection

No nonsampling activities were performed at this SWMU.

4.4.4.2 Sampling Data Collection

Soil sampling locations at the SWMU were sampled again in the summer of 1996. During the summer 1996 sampling event, 12 soil boring samples (8 samples for metals analysis, and 4 samples for volatiles analysis) and 2 associated QA/QC samples were collected for total constituent analysis to further characterize the vertical and horizontal extent of any potential release of hazardous constituents from the SWMU 001j mud pit.

The rationale for selecting sample depths at mud pits was based on an evaluation of the SWMU 001j site, and historical information contained in the RFA. Samples collected for analyses in the mud pit area at the 12- to 24-inch depth were used to provide data from the depth where the highest concentration of potential hazardous constituents was anticipated. Samples collected at the 60- to 72-inch depth were used to evaluate the maximum vertical extent of potential constituent migration. Figure 4.1 is a site map showing sample locations. The total constituent soil sampling and analysis data are presented in Appendix H.

4.4.4.3 Data Gaps

No data gaps exist for this SWMU.

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4.4.4.4 Results and Conclusions

Based on documentation presented in Appendix D, this site was closed by the USGS in 1976.

4.5 Site Conceptual Model

The following subsections define various aspects of the conceptual model developed for this SWMU.

4.5.1 Nature and Extent of Contamination

As stated above, this site was closed by the USGS in 1976.

4.5.2 Environmental Fate

As stated above, this site was closed by the USGS in 1976.

4.6 Site Assessments

No site assessments or risk assessments were required, because the site was closed by the USGS in 1976.

4.6.1 Summary

No screening assessments were required, because the site was closed by the USGS in 1976.

4.6.2 Screening Assessments

No human health or ecological assessments were required, because the site was closed by the USGS in 1976.

4.6.2.1 Human Health

No human health screening assessment was required, because the site was closed by the USGS in 1976.

4.6.2.2 Ecological

No ecological screening assessment was required, because the site was closed by the USGS in 1976.

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4.6.3 Risk Assessments

This section discusses the baseline risk assessment for human health and ecological risk.

4.6.3.1 Human Health

A baseline human health risk assessment is not required for SWMU 001j, because the site was closed by the USGS in 1976.

4.6.3.2 Ecological

A baseline ecological risk assessment is not required for SWMU 001j, because the site was closed by the USGS in 1976.

4.6.4 Other Applicable Assessments

Applicable assessments pertaining to surface water, groundwater, and underground storage tanks are discussed below.

4.6.4.1 Surface Water

No surface water is present at this site and this subsection is not applicable.

4.6.4.2 Groundwater

The site was closed by the USGS in 1976. No groundwater evaluation is required.

4.6.4.3 Underground Storage Tanks

No underground storage tanks are known to have been present at this site. This section is, therefore, not applicable.

4.6.4.4 Other

No other assessments are required.

4.7 No Further Action Petition

The NMED has developed six criteria to identify whether a site should be identified for NFA (NMED, 1999b). Based on these criteria, an NFA petition is reasonable if:

- The site does not exist;
- The site was not used for the management of hazardous constituents;

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- There was no release of hazardous constituents to the environment;
- There was a release, but hazardous constituents are at acceptably low levels;
- There was a release, but the site has been characterized and/or closed under another authority; or
- There was a release, but the site was remediated.

The rationale and criterion for this NFA petition are discussed in the following subsections.

4.7.1 Rationale

Based on the documentation provided in Appendix D for the P-3 mud pit, an NFA is being recommended for this SWMU for the following reason: the site was closed by the USGS in 1976. This SWMU meets Criterion 5.

4.7.2 Criterion

Based on the evidence provided above, an NFA determination is requested for SWMU 001j in conformance with Criterion 5 for the P-3 mud pit.

5.0 SWMU 001k (P-4 MUD PIT)

The following subsections provide a description of the SWMU, an assessment of available site characterization data, risk assessment information and rationale for this NFA petition.

5.1 Summary

The Permittees are requesting an NFA decision for SWMU 001k, P-4 mud pit. SWMU 001k consists of a drilling mud pit associated with the P-4 potash exploration borehole. Review and analysis of relevant data and documentation provided for this SWMU demonstrate that the P-4 drilling mud pit was closed under USGS authority in 1976.

5.2 Description and Operational History

The site description and operational history are provided in the following subsections.

5.2.1 Site Description

SWMU 001k is located in the SE $\frac{1}{4}$ of the SW $\frac{1}{4}$ of the SE $\frac{1}{4}$ of Section 28, Township 22 South, Range 31 East. The abandoned mud pit from the drilling of the P-4 borehole is SWMU 001k. A sketch of SWMU 001k is presented in Figure 5.1.

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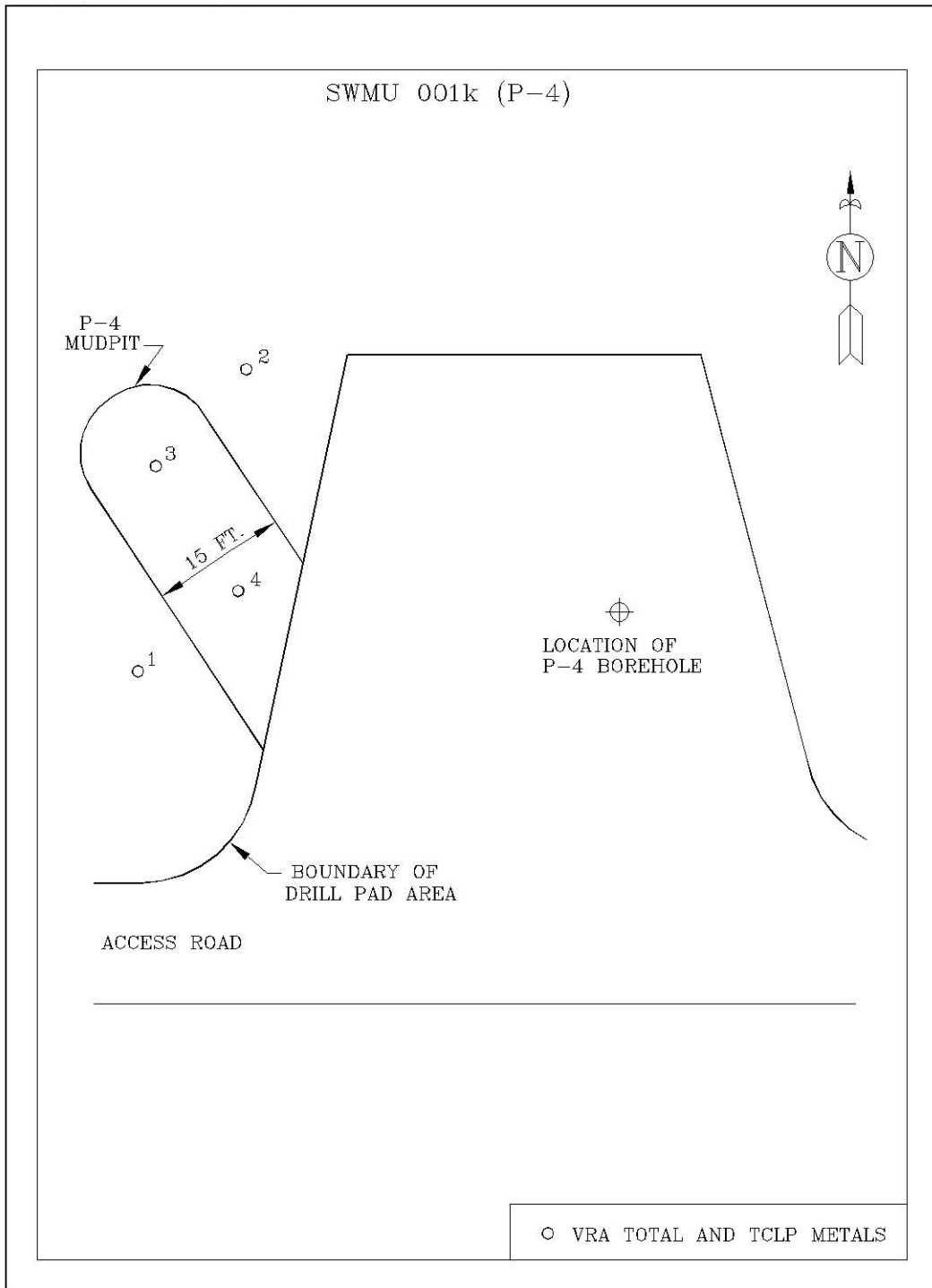


Figure 5.1 - Sample Location Sketch - SWMU 001k (P-4 Mud Pit) (map not to scale)

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The P-4 drill pad has been extensively graded and regraded since the mud pit was closed in 1976. The P-4 mud pit is located in a hummocky sand dune area on the west side of the SWMU 001k drill pad. The mud pit area sits at approximately a 45 degree angle to the P-4 drill pad and is approximately 15 feet wide and 70 feet long. Mixed, uncompacted soil, broken caliche, and red sandstone on the surface suggest extensive grading along the west side of the drill pad.

5.2.2 Operational History

The P-4 borehole was drilled by Boyles Brothers Drilling Company in August and September of 1976 as part of a 21-well USGS resource evaluation program to investigate the potash resources in the Salado Formation. The total depth of the hole was 1,858 feet. This site was closed by the USGS in 1976 (see Appendix D).

The USGS Conservation Division was the approval authority for potash exploration boreholes drilled during the period 1953 through 1978 in Eddy County, New Mexico. During this period, the USGS administered the drilling programs under the authority granted it by the U.S. Congress.

The USGS permitted private exploration boreholes, which were drilled by mineral leaseholders. The USGS received and approved Sundry Notices and Reports on Wells from leaseholders. Prior to drilling a borehole, the company submitted a Notice of Intention to Drill for approval by the USGS. Following completion of the drilling and closure of the drilling location, the company notified the USGS of its intention to abandon the site. Upon approval of the notice, the USGS considered the drilling location closed. No additional closure documentation was required.

Drilling fluids that may have been used to complete the P-4 borehole include brine and salt mud. Air foam was used beginning at a depth of 958 feet and continued until the hole was completed to maintain circulation and help remove cuttings from the hole. Closure documentation for P-4 is included in Appendix D. Additional information on the P-4 drilling is included in Appendix I.

5.3 Land Use

This section presents a summary of current and future/proposed land use for SWMU 001k.

5.3.1 Current

This SWMU is located within the 16-section WLWA. The WIPP Land Withdrawal Act (Public Law 102-579) created the WLWA in October 1992. This Act transferred the jurisdiction of the WLWA from the Secretary of the Interior to the Secretary of Energy. In accordance with sections 3(a)(1) and (3) of the Act, these lands ". . . are withdrawn from all forms of entry, appropriation, and disposal under the public land laws . . ." and are reserved for the use of the Secretary [of Energy] for the construction,

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experimentation, operation, repair and maintenance, disposal, shutdown, monitoring, decommissioning, and other authorized activities, associated with the purposes of WIPP as set forth in section 213 of the Department of Energy National Security and Military Applications of Nuclear Energy Act of 1980 (Public Law 96-164; 93 Statute 1259, 1265) and this Act." SWMU 001k is located on land under the jurisdiction of the DOE. The land around this SWMU is occasionally used for livestock grazing, and recreational activities; no other current uses exist.

5.3.2 Future/Proposed

The facility operational period is estimated to be 35 years with a 30-year postclosure care period. Active institutional controls will be maintained during postclosure for 100 years. The future/proposed land use is industrial and recreational.

5.4 Investigatory Activities

SWMU 001k was investigated in a series of 4 investigations. The following subsections describe previous sampling activities that have been conducted at the site.

5.4.1 Summary

SWMU 001k was visually inspected by the NMED in 1992 as part of a RFA. No samples were collected. SWMU 001k was initially investigated in 1995 under the VRA program for TCLP metals. A subsequent investigation in 1996 evaluated total metals concentrations. In September 1999, soil samples were collected and analyzed for total thallium. The following subsections describe data that were collected at SWMU 001k.

5.4.2 Investigation #1 – RFA

SWMU 001k was visually inspected by the NMED in 1993 as part of a RFA.

5.4.2.1 Nonsampling Data Collection

No nonsampling data collection was performed during the RFA.

5.4.2.2 Sampling Data Collection

No sampling activities were performed at this SWMU during the RFA.

5.4.2.3 Data Gaps

Because there were no samples collected during the RFA at this SWMU, there were no data available for risk-based decision making.

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5.4.2.4 Results and Conclusions

The RFA concluded that the potential release of hazardous constituents to soil was high. The RFA also concluded that migration potential to groundwater was low relative to other locations on site.

5.4.3 Investigation #2 – VRA (1995)

As part of the VRA 1995 investigation soil samples were collected for TCLP analysis.

5.4.3.1 Nonsampling Data Collection

No nonsampling activities were performed at this SWMU during this investigation.

5.4.3.2 Sampling Data Collection

During the summer 1995 sampling event at SWMU 001k, a total of 12 soil boring samples and 4 associated QA/QC samples were collected for TCLP analysis to assess the potential for release of hazardous constituents from the SWMU 001k mud pit (DOE, 1996).

The rationale for selecting sample depths at mud pits during the previous sampling was based on an evaluation of the SWMU 001k site, and historical information contained in the RFA (NMED, 1994). Samples collected for analyses in the mud pit area at the 12- to 24-inch depth were used to provide data from the depth where the highest concentration of potential hazardous constituents was anticipated. Samples collected at the 60- to 72-inch depth were used to quantify the maximum vertical extent of potential constituent migration. The TCLP soil sampling and analysis data are presented in Appendix I. Approximate sampling locations presented in Figure 5.1.

5.4.3.3 Data Gaps

The sample collection and TCLP analyses performed during 1995 did not allow determination of total metals concentrations in the mud pit material.

5.4.3.4 Results and Conclusions

The sample collection and TCLP analyses, performed during 1995, demonstrated that the material in the mud pits was not a hazardous waste.

5.4.4 Investigation #3 – VRA (1996)

As part of the VRA 1996 investigation soil samples were collected for total constituent analysis.

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5.4.4.1 Nonsampling Data Collection

No nonsampling activities were performed at this SWMU.

5.4.4.2 Sampling Data Collection

Soil sampling locations at the SWMU were sampled again in the summer of 1996. During the summer 1996 sampling event, 12 soil boring samples (8 samples for metals, and 4 samples for volatiles analysis) and 2 associated QA/QC samples were collected for total constituent analysis to further characterize the vertical and horizontal extent of any potential release of hazardous constituents from the SWMU 001k mud pit.

The rationale for selecting sample depths at mud pits during the previous sampling was based on an evaluation of the SWMU 001k site, and historical information contained in the RFA. Samples collected for metals analyses in the mud pit area at the 12- to 24-inch depth were used to provide data from the depth where the highest concentration of potential hazardous constituents was anticipated. Samples collected at the 60- to 72-inch depth were used to quantify the maximum vertical extent of potential constituent migration. The total constituent soil sampling and analysis data are presented in Appendix I.

5.4.4.3 Data Gaps

The TSD describes total thallium concentrations as unknown.

5.4.4.4 Results and Conclusions

Based on documentation presented in Appendix D, this site was closed by the USGS in 1976.

5.4.5 Investigation #4 – Thallium (1999)

In September 1999, soil boring samples were collected and analyzed for total thallium at this SWMU as part of an overall investigation of total thallium concentrations. The total thallium data are presented in Appendix B.

5.4.5.1 Nonsampling Data Collection

No nonsampling activities were performed at this SWMU.

5.4.5.2 Sampling Data Collection

In September 1999, a total of 8 soil boring samples and 1 associated QA/QC sample were collected and analyzed for total thallium.

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The rationale for selecting sample depths at mud pits during the previous sampling was based on an evaluation of the SWMU 001k site, and historical information contained in the RFA. Samples collected for metals analyses in the mud pit area at the 12- to 24-inch depth were used to provide data from the depth where the highest concentration of potential hazardous constituents was anticipated. Samples collected at the 60- to 72-inch depth were used to quantify the maximum vertical extent of potential constituent migration. The total thallium soil sampling and analysis data are presented in Appendix B. Approximate sample locations are presented in Figure 5.1.

5.4.5.3 Data Gaps

No data gaps exist for this SWMU.

5.4.5.4 Results and Conclusions

Based on the information presented in Appendix B, no elevated thallium concentrations exist at this SWMU.

5.5 Site Conceptual Model

The following subsections define various aspects of the conceptual model developed for this SWMU.

5.5.1 Nature and Extent of Contamination

As stated above, this site was closed by the USGS in 1976.

5.5.2 Environmental Fate

As stated above, this site was closed by the USGS in 1976.

5.6 Site Assessments

No site assessments or risk assessments were required, because the site was closed by the USGS in 1976.

5.6.1 Summary

No screening assessments were required, because the site was closed by the USGS in 1976.

5.6.2 Screening Assessments

No human health or ecological assessments were required, because the site was closed by the USGS in 1976.

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5.6.2.1 Human Health

No human health screening assessment was required, because the site was closed by the USGS in 1976.

5.6.2.2 Ecological

No ecological screening assessment was required, because the site was closed by the USGS in 1976.

5.6.3 Risk Assessments

This section discusses the baseline risk assessment for human health and ecological risk.

5.6.3.1 Human Health

A baseline human health risk assessment is not required for SWMU 001k, because the site was closed by the USGS in 1976.

5.6.3.2 Ecological

A baseline ecological risk assessment is not required for SWMU 001k, because the site was closed by the USGS in 1976.

5.6.4 Other Applicable Assessments

Applicable assessments pertaining to surface water, groundwater, and underground storage tanks are discussed below.

5.6.4.1 Surface Water

No surface water is present at this site and this subsection is not applicable.

5.6.4.2 Groundwater

The site was closed by the USGS in 1976. No groundwater evaluation is required.

5.6.4.3 Underground Storage Tanks

No underground storage tanks are known to have been present at this site. This section is, therefore, not applicable.

5.6.4.4 Other

No other assessments are required.

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5.7 No Further Action Petition

The NMED has developed six criteria to identify whether a site should be identified for NFA (NMED, 1999b). Based on these criteria, an NFA petition is reasonable if:

- The site does not exist;
- The site was not used for the management of hazardous constituents;
- There was no release of hazardous constituents to the environment;
- There was a release, but hazardous constituents are at acceptably low levels;
- There was a release, but the site has been characterized and/or closed under another authority; or
- There was a release, but the site was remediated.

The rationale and criterion for this NFA petition are discussed in the following subsections.

5.7.1 Rationale

Based on the documentation provided in Appendix D for the P-4 mud pit, an NFA is being recommended for this SWMU for the following reason: the site was closed by the USGS in 1976. This SWMU meets Criterion 5.

5.7.2 Criterion

Based on the evidence provided above, an NFA determination is requested for SWMU 001k in conformance with Criterion 5 for the P-4 mud pit.

6.0 SWMU 001L (WIPP-12/P-5 MUD PIT[S])

The following subsections provide a description of the SWMU, an assessment of available site characterization data, risk assessment information and rationale for this NFA petition.

6.1 Summary

The Permittees are requesting an NFA decision for SWMU 001L, WIPP-12/P-5 mud pits. SWMU 001L consists of drilling mud pits associated with the WIPP-12 exploration borehole and the P-5 potash exploration borehole. Review and analysis of relevant data for SWMU 001L indicate that concentrations of COCs in the WIPP-12 drilling mud pits are less than applicable risk-based screening levels for industrial facilities and for

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residential land use for two COCs. Documentation is provided in this section to demonstrate that the P-5 drilling mud pit was closed under USGS authority in 1976.

Thus, an NFA determination is requested for SWMU 001L based on additional sampling conducted in the summer of 2001. Data from this sampling event demonstrate that COCs that may have been released from the WIPP-12 drilling mud pits into the environment pose an acceptable level of risk under current and projected future land use. The P-5 drilling mud pit was closed under USGS regulatory authority. The following subsections discuss the characterization and setting and field investigation activities that have been conducted at SWMU 001L.

6.2 Description and Operational History

The site description and operational history are provided in the following subsections.

6.2.1 Site Description

SWMU 001L is located in the SE $\frac{1}{4}$ of the SE $\frac{1}{4}$ of the SE $\frac{1}{4}$ of Section 17, Township 22 South, Range 31 East. SWMU 001L is made up of the mud pit developed for the drilling of the WIPP-12 exploration borehole and the mud pit constructed to support the drilling of the P-5 potash exploration borehole. A sketch of SWMU 001L is presented in Figure 6.1.

The WIPP-12 mud pit is approximately 3 acres in size. As part of reclamation of this mud pit, caliche and native soils were used to fill in and cover the mud pit. This site is characterized by hummocky, dark bands of fill material that form berms running east and west. Linear dark bands of soil and sparse vegetation delineate the mud pit location. The mud pit areas are rough graded, exposing a mixture of surface sands and caliche material.

The P-5 mud pit is located approximately 45 feet south of the P-5 borehole. The P-5 mud pit is approximately 18 feet wide and 60 feet long. The area around P-5 mud pit is made up of compacted caliche, and there is essentially no vegetative growth on the P-5 drill pad.

6.2.2 Operational History

WIPP-12 was drilled in 1978 and deepened in 1981 and 1982 to investigate lithologic and stratigraphic details of the Salado and Castile Formations. WIPP-12 was drilled to a total depth of 3,928 feet.

Several types of drilling fluids were used to drill WIPP-12. A salt-based drilling mud was used to a depth of 1,000 feet, a 10-pounds/gallon mix of starch, soda ash, and caustic soda (sodium hydroxide -NaOH for pH control) was used between 1,000 and 2,773 feet, and a brine-salt gel (attapulgite) mixture was used to 3,927 feet. A sodium chloride (NaCl)-based weighing agent was added to control the flow from pressurized brine

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encountered at 3,011 feet below the surface. An organic material (lignite) and a density-increasing material such as barite may also have been used.

The Pennsylvania Drilling Company drilled P-5 in 1976 as part of a 21-well USGS resource evaluation program to investigate the potash resources in the Salado Formation. Drilling fluid mixtures used at this site include salt mud, diesel oil, and mud.

The USGS Conservation Division was the approval authority for potash exploration boreholes drilled during the period 1953 through 1978 in Eddy County, New Mexico. During the period, the USGS administered the drilling programs under the authority granted it by the U.S. congress.

The USGS permitted private exploration boreholes, which were drilled by mineral leaseholders. The USGS received and approved Sundry Notices and Reports on Wells from leaseholders from the leaseholders. Prior to drilling a borehole, the company submitted a Notice of Intention to Drill for approval by the USGS. Following completion of the drilling and closure of the drilling location, the company notified the USGS of its intention to abandon the site. Upon approval of the notice, the USGS considered the drilling location closed. No additional closure documentation was required.

The USGS approved the closure and abandonment of the drilling sites according to the then current requirements. The permitting and closure activities for potash exploration were established by the USGS in the early 1950's. These activities have not changed substantially since that time, as evidenced by recent permits being granted by the BLM. Closure documentation for P-5 is included in Appendix D. Other information on the WIPP-12/P-5 drilling is included in Appendix J.

6.3 Land Use

This section presents a summary of current and future/proposed land use for SWMU 001L.

6.3.1 Current

This SWMU is located within the 16-section WLWA. The WIPP Land Withdrawal Act (Public Law 102-579) created the WLWA in October 1992. This Act transferred the jurisdiction of the WLWA from the Secretary of the Interior to the Secretary of Energy. In accordance with sections 3(a)(1) and (3) of the Act, these lands ". . . are withdrawn from all forms of entry, appropriation, and disposal under the public land laws . . ." and are reserved for the use of the Secretary [of Energy] for the construction, experimentation, operation, repair and maintenance, disposal, shutdown, monitoring, decommissioning, and other authorized activities, associated with the purposes of WIPP as set forth in section 213 of the Department of Energy National Security and Military Applications of Nuclear Energy Act of 1980 (Public Law 96-164; 93 Statute 1259, 1265) and this Act." SWMU 001L is located on land under the jurisdiction of the DOE. The land around this

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SWMU is occasionally used for livestock grazing, and recreational activities; no other current uses exist.

6.3.2 Future/Proposed

The facility operational period is estimated to be 35 years with a 30-year postclosure care period. Active institutional controls will be maintained during postclosure for 100 years. The future/proposed land use is industrial and recreational.

6.4 Investigatory Activities

SWMU 001L has been investigated in a series of four investigations. The following subsections describe previous sampling activities that have been conducted at the site.

6.4.1 Summary

SWMU 001L was visually inspected by the NMED in 1992 as part of a RFA. No samples were collected. SWMU 001L was initially investigated in 1995 under the VRA program for TCLP metals. A subsequent investigation in 1996 evaluated total metals concentrations. During the summer of 2001, additional samples were collected at the SWMU to define the extent of metal concentrations in the SWMU. The following subsections describe data that were collected at SWMU 001L.

6.4.2 Investigation #1 – RFA

SWMU 001L was visually inspected by the NMED in 1992 as part of a RFA.

6.4.2.1 Nonsampling Data Collection

No nonsampling data collection was performed during the RFA.

6.4.2.2 Sampling Data Collection

No sampling activities were performed at this SWMU during the RFA.

6.4.2.3 Data Gaps

Because there were no samples collected during the RFA at this SWMU, there were no data available for risk-based decision making.

6.4.2.4 Results and Conclusions

The RFA concluded that the potential release of hazardous constituents to soil was high. The RFA also concluded that migration potential to groundwater was low relative to other locations on site.

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6.4.3 Investigation #2 – VRA (1995)

As part of the VRA 1995 investigation soil samples were collected for TCLP analysis.

6.4.3.1 Nonsampling Data Collection

No nonsampling activities were performed at this SWMU during this investigation.

6.4.3.2 Sampling Data Collection

During the summer 1995 sampling event at SWMU 001L, a total of 20 soil boring samples and 4 associated QA/QC samples were collected for TCLP analysis to assess the potential for release of hazardous constituents from SWMU 001L (DOE, 1996). Appendix J contains a summary of these data.

The rationale for selecting sample depths at mud pits was based on an evaluation of the SWMU 001L site, and historical information contained in the RFA (NMED, 1994). Samples collected for TCLP analyses in the mud pit area at the 12- to 24-inch depth were used to provide data from the depth where the highest concentration of potential hazardous constituents was anticipated. Samples collected at the 60- to 72-inch depth were used to evaluate the maximum vertical extent of potential constituent migration. Approximate sample locations are presented in Figure 6.1.

6.4.3.3 Data Gaps

The sample collection and TCLP analyses performed during 1995 did not allow determination of total metals concentrations in the mud pit material.

6.4.3.4 Results and Conclusions

The sample collection and TCLP analyses, performed during 1995, demonstrated that the material in the mud pits was not a hazardous waste.

6.4.4 Investigation #3 – VRA (1996)

As part of the VRA 1996 investigation, soil samples were collected for total constituent analysis.

6.4.4.1 Nonsampling Data Collection

No nonsampling activities were performed at this SWMU.

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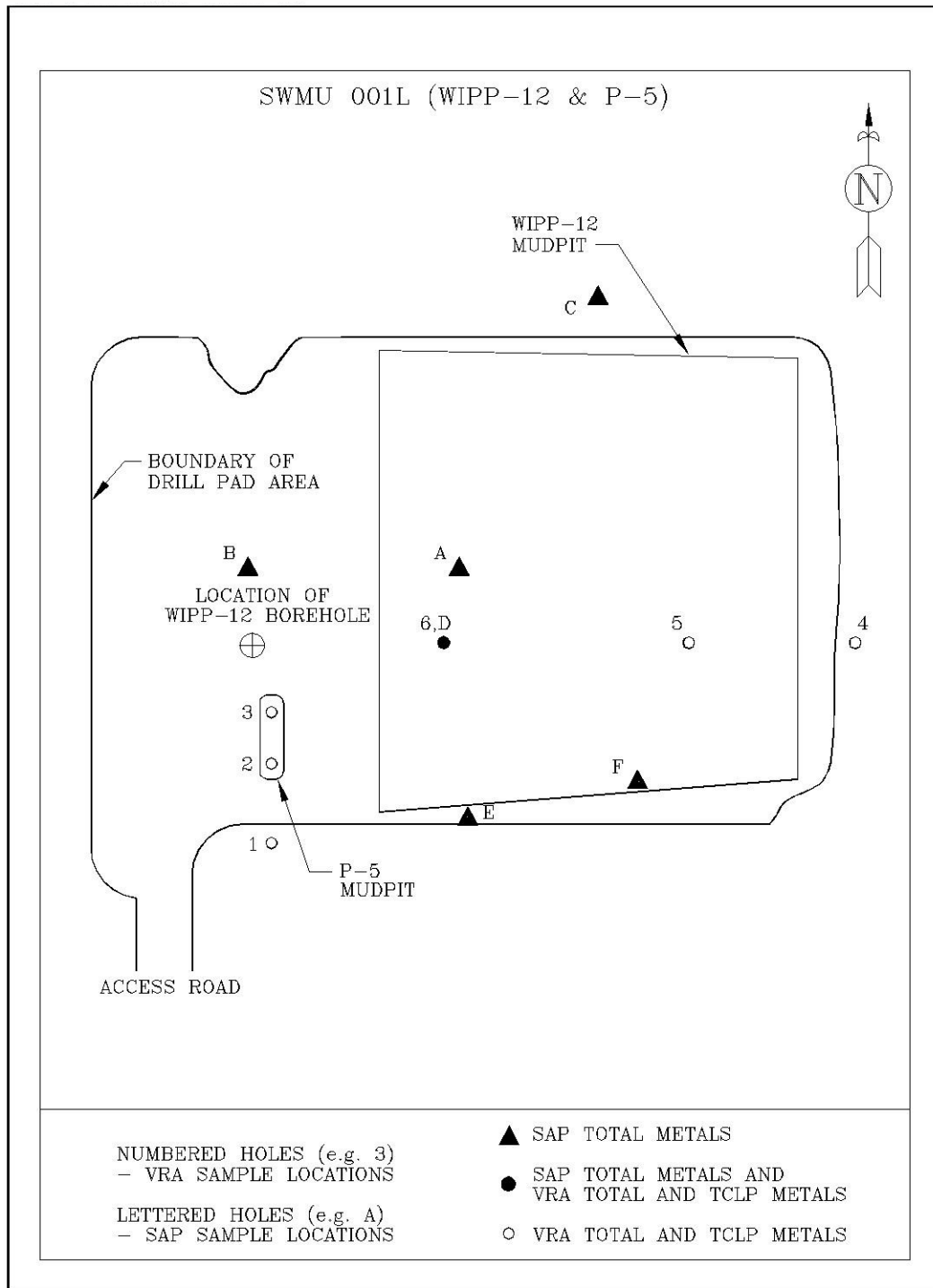


Figure 6.1 - Sample Location Sketch - SWMU 001L (WIPP-12 & P-5 Drilling Mud Pit[s]) (map not to scale)

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6.4.4.2 Sampling Data Collection

Soil sampling locations at the SWMU during the 1995 VRA investigations were sampled again in the summer of 1996 (DOE, 1996). During the summer 1996 sampling event, 20 soil boring samples (12 samples for metals analysis, and 8 samples for volatiles analysis) and 4 associated QA/QC samples were collected for total constituent analysis to further characterize the vertical and horizontal extent of any potential release of hazardous constituents from the SWMU 001L mud pits. The rationale for selecting sample depths at mud pits was based on an evaluation of the SWMU 001L site, and historical information contained in the RFA (NMED, 1994). Samples collected for analyses in the mud pit area at the 12- to 24-inch depth were used to provide data from the depth where the highest concentration of potential hazardous constituents was anticipated. Samples collected at the 60- to 72-inch depth were used to evaluate the maximum vertical extent of potential constituent migration.

Table 6.1 presents a summary of the soil sampling and analysis data for barium and lead for this investigation. Additional data are contained in Appendix J. The soil sampling locations are presented in Figure 6.1.

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**Table 6.1
Summary of Measured Concentrations for Constituents of Concern
Voluntary Release Assessment (1996 Samples)
SWMU 001L (WIPP-12 Drilling Mud Pit[s])**

Description	Hole #	Depth (in. bgs)	Constituent	Concentration (ppm)	Qualifier
P-5P Mud Pits	1	12 to 24	Barium Lead	120 2.2	J
		60 to 72	Barium Lead	62 3.6	J
	2	12 to 24	Barium Lead	490 4.2	J
		60 to 72	Barium Lead	400 5.1	J
	3	12 to 24	Barium Lead	390 3.5	J
		60 to 72	Barium Lead	290 3.6	J
WIPP-12 Mud Pit	4	12 to 24	Barium Lead	18 1.4	J
		60 to 72	Barium Lead	36 1.8	J
	5	12 to 24	Barium Lead	140 1.7	J
		60 to 72	Barium Lead	120 1.5	J
	6	12 to 24	Barium Lead	1700 2.2	J
		60 to 72	Barium Lead	860 1.8	J

Notes:

NMED Industrial Screening values = 15,000 ppm for barium; 1,000 ppm for lead
 NMED Residential Screening values = 5,200 ppm for barium; 400 ppm for lead
 Background concentration for barium = 197 ppm
 Background concentration for lead = 5.4 ppm
 ppm = parts per million
 in. bgs = inches below ground surface
 J = Result should be considered an estimated value.
 SWMU = Solid Waste Management Unit

6.4.4.3 Data Gaps

According to the TSD (NMED, 1999b), the results of the VRA sampling investigations were not adequate to define the nature, rate, and extent of hazardous constituents (barium and lead) in this SWMU. Based on an analysis of background metals concentrations reported in the SAP (DOE, 2000), measured concentrations of lead in SWMU 001L were below background. NMED comments on the SAP requested additional sample collection to delineate the extent of barium concentrations greater than background (NMED, 2000b).

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6.4.4.4 Results and Conclusions

Although some of the barium presented in Table 6.1 exceeds background, the results of the VRA indicated that no hazardous constituents exist in SWMU 001L that are above the action levels derived from the proposed Subpart S regulations (40 CFR §264.514, FR. Vol. 55, No. 145). In addition, the barium concentrations presented in Table 6.1 do not exceed the industrial and residential screening levels presented in NMED guidance (NMED, 2000).

6.4.5 Investigation #4 – SAP (2001)

Soil concentrations of barium were further evaluated during this investigation.

6.4.5.1 Nonsampling Data Collection

No nonsampling activities were performed at this SWMU.

6.4.5.2 Sampling Data Collection

As part of the SAP implementation, additional subsurface soil samples were collected within and outside the SWMU 001L boundary during the summer of 2001. Samples were collected by means of direct push methodology at three locations in the mud pit and two locations outside the mud pit. Direct push technology refers to the forcing of a sampling device, constructed of stainless steel, to the desired sampling depth using a hydraulic ram. The purpose of the sampling was to further define the extent of barium concentrations above background. Shallow samples were collected and composited over a two-foot interval. Deep samples were collected and composited over a one foot interval. The NMED collected six split samples for independent analysis as a quality assurance evaluation of the DOE SAP program at this SWMU. Figure 6.1 is a site sketch showing SAP sample locations. Total barium concentrations for samples collected at SWMU 001L are presented in Table 6.2.

**Table 6.2
Summary of Measured Concentrations for Constituents of Concern
Sampling and Analysis Plan (2001 Samples)
SWMU 001L (WIPP-12 Drilling Mud Pit[s])**

Description	Hole #	Depth (in. bgs)	Constituent	Concentration (ppm)	Qualifier
WIPP-12 Mud Pits	A	3 to 27	Barium	1170 / 1370 ^b	Duplicate
		84 to 96	Barium	398 / 356	
	B	24 to 48	Barium	28.3 / 25	
		84 to 96	Barium	197 / 133	
	C	3 to 27	Barium	20.5	
		48 to 54 ^a	Barium	69.8	
D	96 to 108	Barium	1450 / 1330		

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**Table 6.2
Summary of Measured Concentrations for Constituents of Concern
Sampling and Analysis Plan (2001 Samples)
SWMU 001L (WIPP-12 Drilling Mud Pit[s])**

Description	Hole #	Depth (in. bgs)	Constituent	Concentration (ppm)	Qualifier
	E	3 to 27	Barium	17.1	B
		48 to 54 ^a	Barium	222	
	F	12 to 36	Barium	426 / 510	
		72 to 84 ^a	Barium	83.6	

Notes:

NMED Industrial Screening values = 15,000 ppm for barium
 NMED Residential Screening values = 5,200 ppm for barium
 Background concentration for barium = 197 ppm
 ppm = parts per million
 in. bgs = inches below ground surface
 B = Reported value is below the required reporting limit, but above the instrument detection limit.
 SWMU = Solid Waste Management Unit
^a Sampling equipment met refusal at the lowest depth.
^b Results represent DOE/NMED analyses. NMED data are reported second.

6.4.5.3 Data Gaps

Analytical data are sufficient to characterize the nature and extent of releases of COCs at SWMU 001L. There are no further data gaps regarding characterization of SWMU 001L.

6.4.5.4 Results and Conclusions

The DOE and the NMED split sample analytical results are generally consistent. Although the barium concentrations presented in Table 6.2 exceed background, the concentrations do not exceed the industrial and residential screening levels presented in NMED guidance (Appendix E). In accordance with the data quality objectives (DQOs) defined in the SAP, the horizontal and vertical dimensions of the concentrations above background have been defined within 50 percent, and the average (and maximum) concentrations are less than the NMED soil screening criteria. The highest concentration, 1720 ppm, is approximately 33 percent of the residential screening criterion for barium.

6.5 Site Conceptual Model

The following subsections define various aspects of the conceptual model developed for this SWMU.

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6.5.1 Nature and Extent of Contamination

The TSD identified barium, lead, and thallium as potential COCs for the mud pit materials in this SWMU. Total metals concentrations of lead measured in SWMU 001L are below the lead background concentration and thallium has been eliminated as a constituent of concern (DOE, 2000). Based on the information contained in the SAP, only the extent of contamination of barium in SWMU 001L WIPP-12 mud pits was unknown. The summer 2001 sampling event included collection of 12 samples (six locations, two depths at all but one location, and one duplicate sample) and analysis of the 12 samples for barium. When the results of these samples are combined with the results of the 1996 VRA sampling, elevated barium concentrations (relative to background) exist in an area approximately 1.5 acres in size (approximately one-half the area of the mud pit). Elevated barium concentrations exist from approximately 18 inches (the mud pit liner was encountered approximately 21 inches below ground surface) to more than 9 feet below ground surface at one location.

6.5.2 Environmental Fate

The depth to proven groundwater below SWMU 001L is at least 804 feet, and it is estimated that less than 0.5 inches of precipitation per year infiltrates the underlying strata. Thus, the potential to migrate to groundwater is extremely low. The mud pit material has been covered with native soil and caliche, so there is no possibility for surface water or wind transport of mud pit material. Furthermore, because the land has been withdrawn from public use and the potential for intrusive activities is low, the potential exposure of human receptors to metals in the SWMU is minimal to nonexistent.

The current land use for SWMU 001L is industrial. In addition, the future/proposed land use is industrial and/or recreational. Measured barium concentrations in soil are below the residential screening criterion in NMED guidance (NMED, 2000b). Potential biota receptors include flora and fauna at the site. Direct soil ingestion is considered the potential exposure route for biota, in addition to ingesting COCs through food chain transfers or the direct uptake of COCs.

6.6 Site Assessments

The site assessment process for SWMU 001L includes risk-screening assessments. This section briefly summarizes the site assessment results. The following subsections describe site assessments that have been conducted to identify human and ecological risks associated with SWMU 001L.

6.6.1 Summary

The site assessment concludes that SWMU 001L does not have potential to affect human health under a residential land use scenario. After considering the uncertainties associated with the available data and modeling assumptions, ecological risks

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associated with SWMU 001L were not found to be significant. Descriptions of these assessments are provided in the following subsections.

6.6.2 Screening Assessments

Risk screening assessments were performed for both human health risk and ecological health risk for SWMU 001L. The following subsections describe the results.

6.6.2.1 Human Health

SWMU 001L is part of the WIPP facility. Measured concentrations from the summer 2001 and 1996 VRA sampling and analyses were compared to the NMED industrial and residential soil screening criteria (NMED, 2000b). This comparison demonstrates that all measured concentrations were below the NMED criteria for barium (15,000 and 5,200 parts per million). Consequently, it can be concluded that SWMU 001L does not have the potential to affect human health under industrial or residential land use scenarios.

6.6.2.2 Ecological

An ecological screening assessment was performed for SWMU 001L in 1998 (DOE, 1998). Based on an evaluation of uncertainties, ecological risks associated with this site were expected to be low.

6.6.3 Risk Assessments

This section discusses the baseline risk assessment for human health and ecological risk.

6.6.3.1 Human Health

Because the human health results of the screening assessment summarized in Section 6.6.2.1 indicate that SWMU 001L does not have the potential to affect human health under an industrial or residential land use setting, a baseline human health risk assessment is not required for SWMU 001L.

6.6.3.2 Ecological

An updated ecological screening risk evaluation was performed for SWMU 001L (Appendix C). No ecological screening quotient greater than one was calculated for this SWMU. Based on these results, ecological risk associated with this site is expected to be low or insignificant.

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6.6.4 Other Applicable Assessments

Applicable assessments pertaining to surface water, groundwater, and underground storage tanks are discussed below.

6.6.4.1 Surface Water

No surface water is present at this site and this subsection is not applicable.

6.6.4.2 Groundwater

Groundwater is not currently used nor is likely to be used in the future as a potable source. The groundwater is not potable due to naturally occurring salinity levels. The depth to proven groundwater below SWMU 001L is at least 804 feet, and it is estimated that less than 0.5 inches of precipitation per year infiltrates the underlying strata. Thus, the potential to migrate to groundwater is extremely low.

6.6.4.3 Underground Storage Tanks

No underground storage tanks are known to have been present at this site. This section is, therefore, not applicable.

6.6.4.4 Other

No other assessments are required.

6.7 No Further Action Petition

The NMED has developed six criteria to identify whether a site should be identified for NFA (NMED, 1999b). Based on these criteria, an NFA petition is reasonable if:

- The site does not exist;
- The site was not used for the management of hazardous constituents;
- There was no release of hazardous constituents to the environment;
- There was a release, but hazardous constituents are at acceptably low levels;
- There was a release, but the site has been characterized and/or closed under another authority; or
- There was a release, but the site was remediated.

The rationale and criterion for this NFA petition are discussed in the following subsections.

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6.7.1 Rationale

Based on the field investigations for the WIPP-12 mud pit, and the human health risk assessment and the ecological risk evaluation, an NFA is being recommended for the WIPP-12 mud pit for the following reason: no COCs were present in concentrations considered hazardous to human health (under a residential land use scenario) or the environment. This mud pit meets Criterion 4.

The P-5 mud pit was closed by the USGS in 1976. Consequently, an NFA is recommended for the P-5 mud pit because it meets Criterion 5.

6.7.2 Criterion

Based on the evidence provided above, an NFA determination is requested for SWMU 001L in conformance with Criterion 4 for the WIPP-12 mud pit and with Criterion 5 for the P-5 mud pit.

7.0 SWMU 001m (P-6 MUD PIT)

The following subsections provide a description of the SWMU, an assessment of available site characterization data, risk assessment information and rationale for this NFA petition.

7.1 Summary

The Permittees are requesting an NFA decision for SWMU 001m, P-6 mud pit. SWMU 001m consists of a drilling mud pit associated with the P-6 potash exploration borehole. Review and analysis of relevant data and documentation provided for this SWMU demonstrate that the P-6 drilling mud pit was closed under USGS authority in 1976.

7.2 Description and Operational History

The site description and operational history are provided in the following subsections.

7.2.1 Site Description

SWMU 001m is located in the SW $\frac{1}{4}$ of the SW $\frac{1}{4}$ of the NW $\frac{1}{4}$ of Section 30, Township 22 South, Range 31 East. SWMU 001m is the abandoned mud pit generated by the drilling of the P-6 exploration well. A sketch of SWMU 001m is presented in Figure 7.1.

The access roads and the surface of the site have been rough graded. The edges of the mud pit are not easily distinguished, so information from a visual site inspection described in the RFA was used to survey the location of the P-6 mud pit.

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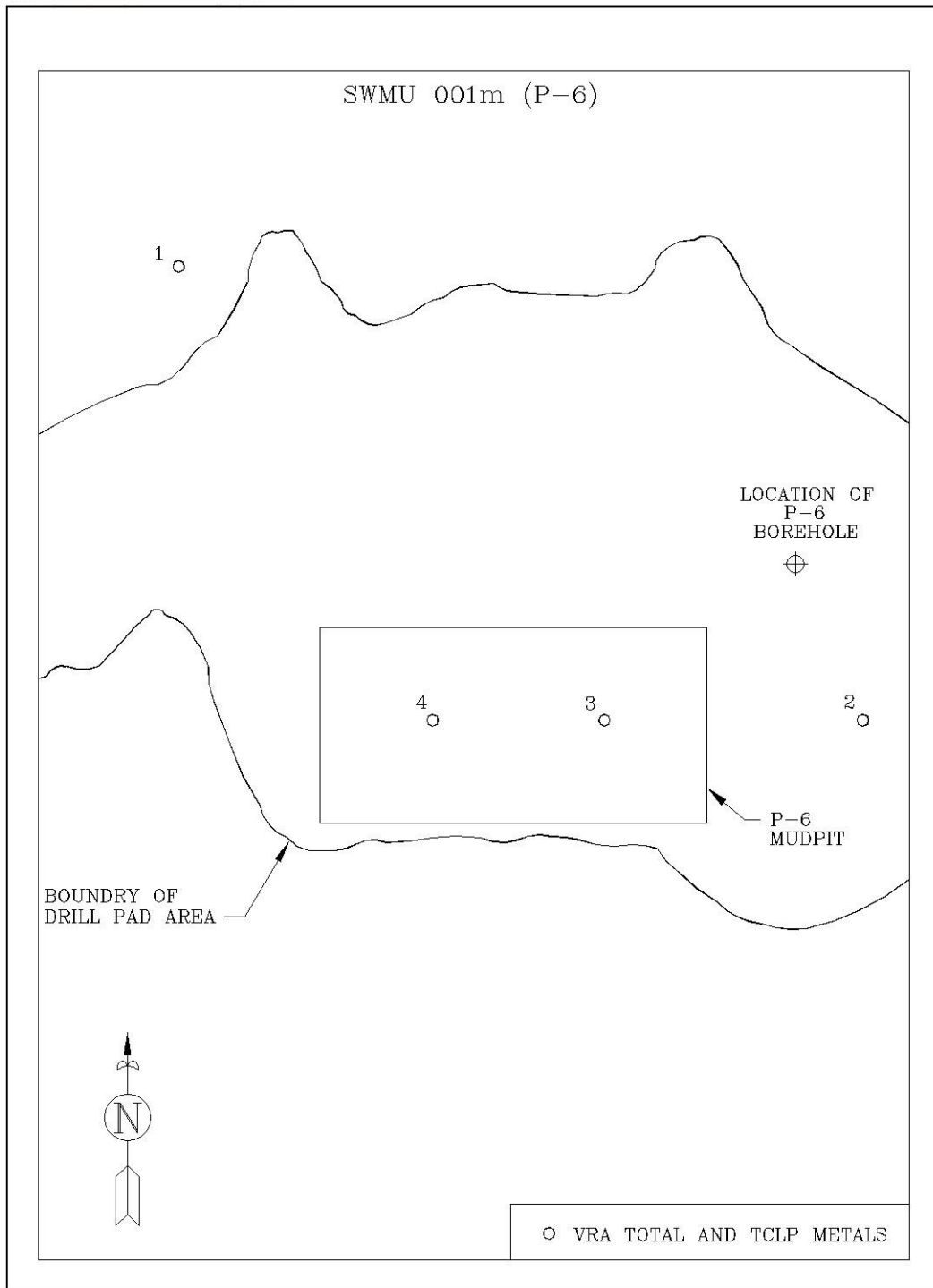


Figure 7.1 - Sample Location Sketch - SWMU 001m (P-6 Mud Pit) (map not to scale)

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7.2.2 Operational History

Boyles Brothers Drilling Company drilled the P-6 potash exploration well in September 1976 as part of a 21-well USGS resource evaluation program to investigate the potash resources in the Salado Formation. One joint of 3-1/2-inch O.D. casing was set in soft cement and cut off 1 foot above the ground level to mark the hole. The P-6 site was closed by the USGS in 1976 (see Appendix D).

The USGS Conservation Division was the approval authority for potash exploration boreholes drilled during the period 1953 through 1978 in Eddy County, New Mexico. During this period, the USGS administered the drilling programs under the authority granted it by the U.S. Congress.

The USGS permitted private exploration boreholes, which were drilled by mineral leaseholders. The USGS received and approved Sundry Notices and Reports on Wells from leaseholders. Prior to drilling a borehole, the company submitted a Notice of Intention to Drill for approval by the USGS. Following completion of the drilling and closure of the drilling location, the company notified the USGS of its intention to abandon the site. Upon approval of the notice, the USGS considered the drilling location closed. No additional closure documentation was required.

The USGS approved the closure and abandonment of the drilling sites according to then current requirements. The permitting and closure activities for potash exploration were established by the USGS in the early 1950's. These activities have not changed substantially since that time, as evidenced by recent permits being granted by the BLM.

As with other USGS potash resource evaluation boreholes, salt mud was used to complete the P-6 borehole. Closure documentation for P-6 is included in Appendix D. Other information on the P-6 drilling is included in Appendix K.

7.3 Land Use

This section presents a summary of current and future/proposed land use for SWMU 001m.

7.3.1 Current

This SWMU is located within the 16-section WLWA. The WIPP Land Withdrawal Act (Public Law 102-579) created the WLWA in October 1992. This Act transferred the jurisdiction of the WLWA from the Secretary of the Interior to the Secretary of Energy. In accordance with sections 3(a)(1) and (3) of the Act, these lands ". . . are withdrawn from all forms of entry, appropriation, and disposal under the public land laws . . ." and are reserved for the use of the Secretary [of Energy] for the construction, experimentation, operation, repair and maintenance, disposal, shutdown, monitoring, decommissioning, and other authorized activities, associated with the purposes of WIPP as set forth in Section 213 of the Department of Energy National Security and Military Applications of

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Nuclear Energy Act of 1980 (Public Law 96-164; 93 Statute 1259, 1265) and this Act." SWMU 001m is located on land under the jurisdiction of the DOE. The land around this SWMU is occasionally used for livestock grazing, and recreational activities; no other current uses exist.

7.3.2 Future/Proposed

The facility operational period is estimated to be 35 years with a 30-year postclosure care period. Active institutional controls will be maintained during postclosure for 100 years. The future/proposed land use is industrial and recreational.

7.4 Investigatory Activities

SWMU 001m was investigated in a series of four investigations. The following subsections describe previous sampling activities that have been conducted at the site.

7.4.1 Summary

SWMU 001m was visually inspected by the NMED in 1992 as part of a RFA. No samples were collected. SWMU 001m was initially investigated in 1995 under the VRA program for TCLP metals. A subsequent investigation in 1996 evaluated total metals concentrations. In September 1999, soil samples were collected and analyzed for total thallium. The following subsections describe data that were collected at SWMU 001m.

7.4.2 Investigation #1 – RFA

SWMU 001m was visually inspected by the NMED in 1993 as part of a RFA.

7.4.2.1 Nonsampling Data Collection

No nonsampling data collection was performed during the RFA.

7.4.2.2 Sampling Data Collection

No sampling activities were performed at this SWMU during the RFA.

7.4.2.3 Data Gaps

Because there were no samples collected during the RFA at this SWMU, there were no data available for risk-based decision making.

7.4.2.4 Results and Conclusions

The RFA concluded that the potential release of hazardous constituents to soil was high. The RFA also concluded that migration potential to groundwater was low relative to other locations on site.

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7.4.3 Investigation #2 – VRA (1995)

As part of the VRA 1995 investigation soil samples were collected for TCLP analysis.

7.4.3.1 Nonsampling Data Collection

No nonsampling activities were performed at this SWMU during this investigation.

7.4.3.2 Sampling Data Collection

During the summer 1995 sampling event at SWMU 001m, a total of 16 soil boring samples and 6 associated QA/QC samples were collected for TCLP analysis to assess the potential for release of hazardous constituents from the SWMU 001m mud pit (DOE, 1996).

The rationale for selecting sample depths at mud pits during the previous sampling was based on an evaluation of the SWMU 001m site, and historical information contained in the RFA. Samples collected for TCLP analyses in the mud pit area at the 12- to 24-inch depth were used to provide data from the depth where the highest concentration of potential hazardous constituents was anticipated. Samples collected at the 60- to 72-inch depth were used to quantify the maximum vertical extent of potential constituent migration. The TCLP soil sampling and analysis data are presented in Appendix K. Approximate sample locations are presented in Figure 7.1.

7.4.3.3 Data Gaps

The sample collection and TCLP analyses performed during 1995 did not allow determination of total metals concentrations in the mud pit material.

7.4.3.4 Results and Conclusions

The sample collection and TCLP analyses, performed during 1995, demonstrated that the material in the mud pits was not a hazardous waste.

7.4.4 Investigation #3 – VRA (1996)

As part of the VRA 1996 investigation soil samples were collected for total constituent analysis.

7.4.4.1 Nonsampling Data Collection

No nonsampling activities were performed at this SWMU.

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7.4.4.2 Sampling Data Collection

During the summer 1996 sampling event, 12 soil boring samples (8 samples for metals analysis, and 2 samples for volatiles analysis) and 2 associated QA/QC samples were collected for total constituent analysis to further characterize the vertical and horizontal extent of any potential release of hazardous constituents from the SWMU 001m mud pit.

The rationale for selecting sample depths at mud pits during the previous sampling was based on an evaluation of the SWMU 001m site, and historical information contained in the RFA. Samples collected for analyses in the mud pit area at the 12- to 24-inch depth were used to provide data from the depth where the highest concentration of potential hazardous constituents was anticipated. Samples collected at the 60- to 72-inch depth were used to quantify the maximum vertical extent of potential constituent migration. The total constituent soil sampling and analysis data are presented in Appendix K. Approximate sample locations are presented in Figure 7.1.

7.4.4.3 Data Gaps

According to the TSD, total thallium concentrations were unknown.

7.4.4.4 Results and Conclusions

Based on documentation presented in Appendix D, this site was closed by the USGS in 1976.

7.4.5 Investigation #4 – Thallium (1999)

In September 1999, soil boring samples were collected and analyzed for total thallium at this SWMU as part of an overall investigation of total thallium concentrations. The total thallium data are presented in Appendix B.

7.4.5.1 Nonsampling Data Collection

No nonsampling activities were performed at this SWMU.

7.4.5.2 Sampling Data Collection

In September 1999, a total of 8 soil boring samples and 2 associated QA/QC samples were collected and analyzed for total thallium.

The rationale for selecting sample depths at mud pits during the previous sampling was based on an evaluation of the SWMU 001m site, and historical information contained in the RFA. Samples collected for metals analyses in the mud pit area at the 12- to 24-inch depth were used to provide data from the depth where the highest concentration of potential hazardous constituents was anticipated. Samples collected at

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the 60- to 72-inch depth were used to quantify the maximum vertical extent of potential constituent migration. The total thallium soil sampling and analysis data are presented in Appendix B.

7.4.5.3 Data Gaps

No data gaps exist for this SWMU.

7.4.5.4 Results and Conclusions

Based on the information presented in Appendix B, no elevated thallium concentrations exist at this SWMU.

7.5 Site Conceptual Model

The following subsections define various aspects of the conceptual model developed for this SWMU.

7.5.1 Nature and Extent of Contamination

As stated above, this site was closed by the USGS in 1976.

7.5.2 Environmental Fate

As stated above, this site was closed by the USGS in 1976.

7.6 Site Assessments

No site assessments or risk assessments were required, because the site was closed by the USGS in 1976.

7.6.1 Summary

No screening assessments were required, because the site was closed by the USGS in 1976.

7.6.2 Screening Assessments

No human health or ecological assessments were required, because the site was closed by the USGS in 1976.

7.6.2.1 Human Health

No human health screening assessment was required, because the site was closed by the USGS in 1976.

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7.6.2.2 Ecological

No ecological screening assessment was required, because the site was closed by the USGS in 1976.

7.6.3 Risk Assessments

This section discusses the baseline risk assessment for human health and ecological risk.

7.6.3.1 Human Health

A baseline human health risk assessment is not required for SWMU 001m, because the site was closed by the USGS in 1976.

7.6.3.2 Ecological

A baseline ecological risk assessment is not required for SWMU 001m, because the site was closed by the USGS in 1976.

7.6.4 Other Applicable Assessments

Applicable assessments pertaining to surface water, groundwater, and underground storage tanks are discussed below.

7.6.4.1 Surface Water

No surface water is present at this site and this subsection is not applicable.

7.6.4.2 Groundwater

The site was closed by the USGS in 1976. No groundwater evaluation is required.

7.6.4.3 Underground Storage Tanks

No underground storage tanks are known to have been present at this site. This section is, therefore, not applicable.

7.6.4.4 Other

No other assessments are required.

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7.7 No Further Action Petition

The NMED has developed six criteria to identify whether a site should be identified for NFA (NMED, 1999b). Based on these criteria, an NFA petition is reasonable if:

- The site does not exist;
- The site was not used for the management of hazardous constituents;
- There was no release of hazardous constituents to the environment;
- There was a release, but hazardous constituents are at acceptably low levels;
- There was a release, but the site has been characterized and/or closed under another authority; or
- There was a release, but the site was remediated.

The rationale and criterion for this NFA petition are discussed in the following subsections.

7.7.1 Rationale

Based on the documentation provided in Appendix D for the P-6 mud pit, an NFA is being recommended for this SWMU for the following reason: the site was closed by the USGS in 1976. This SWMU meets Criterion 5.

7.7.2 Criterion

Based on the evidence provided above, an NFA determination is requested for SWMU 001m in conformance with Criterion 5 for the P-6 mud pit.

8.0 SWMU 001n (P-15 MUD PIT)

The following subsections provide a description of the SWMU, an assessment of available site characterization data, risk assessment information and rationale for this NFA petition.

8.1 Summary

The Permittees are requesting an NFA decision for SWMU 001n, P-15 mud pit. SWMU 001n consists of a drilling mud pit associated with the P-15 potash exploration borehole. Review and analysis of relevant data and documentation provided for this SWMU demonstrate that the P-15 drilling mud pit was closed under USGS authority in 1976.

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8.2 Description and Operational History

The site description and operational history are provided in the following subsections.

8.2.1 Site Description

SWMU 001n is located in the SW $\frac{1}{4}$ of the SW $\frac{1}{4}$ of the SW $\frac{1}{4}$ of Section 31, Township 22 South, Range 31 East. The mud pit constructed for the drilling of the P-15 potash exploration well is SWMU 001n. A sketch of SWMU 001n is presented in Figure 8.1.

Location data contained in the RFA were used to survey the location of the P-15 mud pit. A single rectangular mud pit approximately 10 feet wide and 20 feet long is located on the northeastern edge of the drill pad. The P-15 well pad is heavily vegetated, and no discolored soil or liner material were identified during sampling activities.

8.2.2 Operational History

Boyles Brothers Drilling Company drilled the P-15 borehole in October 1976 as part of a 21-well USGS resource evaluation program to investigate the potash resources in the Salado Formation. USGS drill reports indicate that the P-15 borehole was drilled with air to a depth of 405 feet. The well was recompleted in 1979 to a depth of 1,465 feet. This site was closed by the USGS with BLM concurrence (see Appendix D).

The USGS Conservation Division was the approval authority for potash exploration boreholes drilled during the period 1953 through 1978 in Eddy County, New Mexico. During this period, the USGS administered the drilling programs under the authority granted it by the U.S. Congress.

The USGS permitted private exploration boreholes, which were drilled by mineral leaseholders. The USGS received and approved Sundry Notices and Reports on Wells from leaseholders. Prior to drilling a borehole, the company submitted a Notice of Intention to Drill for approval by the USGS. Following completion of the drilling and closure of the drilling location, the company notified the USGS of its intention to abandon the site. Upon approval of the notice, the USGS considered the drilling location closed. No additional closure documentation was required.

The USGS approved the closure and abandonment of the drilling sites according to then current requirements. The permitting and closure activities for potash exploration were established by the USGS in the early 1950's. These activities have not changed substantially since that time, as evidenced by recent permits being granted by the BLM.

As with other USGS potash test boreholes, a salt-based mud was used to complete the P-15 borehole. Closure documentation for P-15 is included in Appendix D. Other information on the P-15 drilling is included in Appendix L.

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8.3 Land Use

This section presents a summary of current and future/proposed land use for SWMU 001n.

8.3.1 Current

This SWMU is located within the 16-section WLWA. The WIPP Land Withdrawal Act (Public Law 102-579) and created the WLWA in October 1992. This Act transferred the jurisdiction of the WLWA from the Secretary of the Interior to the Secretary of Energy. In accordance with sections 3(a)(1) and (3) of the Act, these lands ". . . are withdrawn from all forms of entry, appropriation, and disposal under the public land laws . . ." and are reserved for the use of the Secretary [of Energy] for the construction, experimentation, operation, repair and maintenance, disposal, shutdown, monitoring, decommissioning, and other authorized activities, associated with the purposes of WIPP as set forth in section 213 of the Department of Energy National Security and Military Applications of Nuclear Energy Act of 1980 (Public Law 96-164; 93 Statute 1259, 1265) and this Act." SWMU 001n is located on land under the jurisdiction of the DOE. The land around this SWMU is occasionally used for livestock grazing, and recreational activities; no other current uses exist.

8.3.2 Future/Proposed

The facility operational period is estimated to be 35 years with a 30-year postclosure care period. Active institutional controls will be maintained during postclosure for 100 years. The future/proposed land use is industrial and recreational.

8.4 Investigatory Activities

SWMU 001n has been investigated in a series of four investigations. The following subsections describe previous sampling activities that have been conducted at the site.

8.4.1 Summary

SWMU 001n was visually inspected by the NMED in 1992 as part of a RFA. No samples were collected. SWMU 001n was initially investigated in 1995 under the VRA program for TCLP metals. A subsequent investigation in 1996 evaluated total metals concentrations. In September 1999, soil samples were collected and analyzed for total thallium. The following subsections describe data that were collected at SWMU 001m.

8.4.2 Investigation #1 – RFA

SWMU 001n was visually inspected by the NMED in 1992 as part of a RFA.

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8.4.2.1 Nonsampling Data Collection

No nonsampling data collection was performed during the RFA.

8.4.2.2 Sampling Data Collection

No sampling activities were performed at this SWMU during the RFA.

8.4.2.3 Data Gaps

Because there were no samples collected during the RFA at this SWMU, there were no data available for risk-based decision making.

8.4.2.4 Results and Conclusions

The RFA concluded that the potential release of hazardous constituents to soil was high. The RFA also concluded that migration potential to groundwater was moderate relative to other locations on site.

8.4.3 Investigation #2 – VRA (1995)

As part of the VRA 1995 investigation soil samples were collected for TCLP analysis.

8.4.3.1 Nonsampling Data Collection

No nonsampling activities were performed at this SWMU during this investigation.

8.4.3.2 Sampling Data Collection

During the summer 1995 sampling event at SWMU 001n, a total of 16 soil boring samples and 8 associated QA/QC samples were collected for TCLP analysis to assess the potential for release of hazardous constituents from the SWMU 001n mud pit (DOE, 1996). Approximate sample locations are presented in Figure 8.1.

The rationale for selecting sample depths at mud pits during the previous sampling was based on an evaluation of the SWMU 001n site, and historical information contained in the RFA. Samples collected for analyses in the mud pit area at the 12- to 24-inch depth were used to provide data from the depth where the highest concentration of potential hazardous constituents was anticipated. Samples collected at the 60- to 72-inch depth were used to quantify the maximum vertical extent of potential constituent migration. The TCLP soil sampling and analysis data are presented in Appendix L.

8.4.3.3 Data Gaps

The sample collection and TCLP analyses performed during 1995 did not allow determination of total metals concentrations in the mud pit material.

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8.4.3.4 Results and Conclusions

The sample collection and TCLP analyses, performed during 1995, demonstrated that the material in the mud pits was not a hazardous waste.

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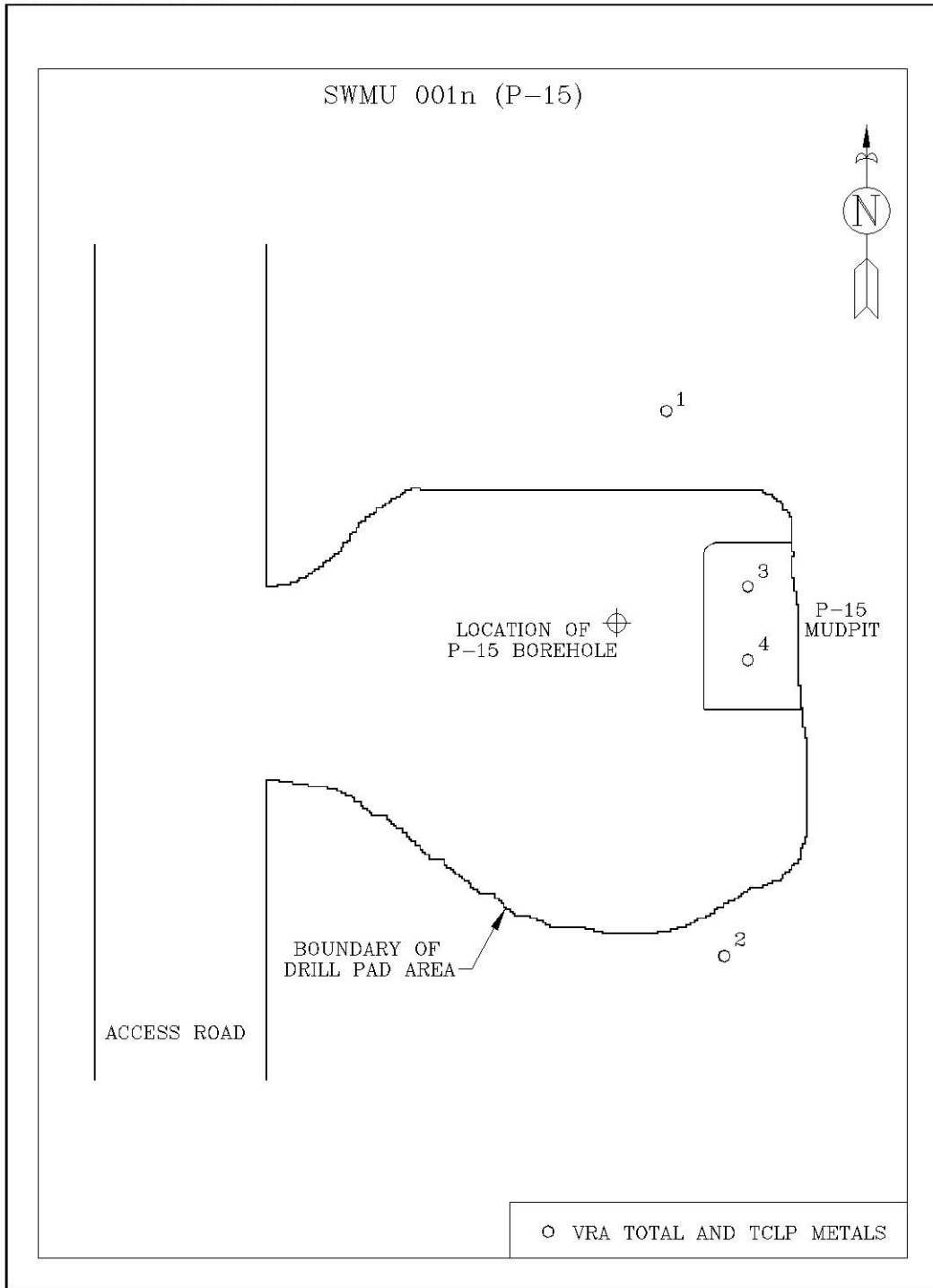


Figure 8.1 - Sample Location Sketch - SWMU 001n (P-15 Mud Pit) (map not to scale)

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8.4.4 Investigation #3 – VRA (1996)

As part of the VRA 1996 investigation soil samples were collected for total constituent analysis.

8.4.4.1 Nonsampling Data Collection

No nonsampling activities were performed at this SWMU.

8.4.4.2 Sampling Data Collection

Soil sampling locations at the SWMU were sampled again in the summer of 1996. During the summer 1996 sampling event, 12 soil boring samples (8 samples for metals analysis, and 4 samples for volatiles analysis) and 2 associated QA/QC samples were collected for total constituent analysis to further characterize the vertical and horizontal extent of any potential release of hazardous constituents from the SWMU 001n mud pit. Approximate sample locations are presented in Figure 8.1.

The rationale for selecting sample depths at mud pits during the previous sampling was based on an evaluation of the SWMU 001n site, and historical information contained in the RFA. Samples collected for analyses in the mud pit area at the 12- to 24-inch depth were used to provide data from the depth where the highest concentration of potential hazardous constituents was anticipated. Samples collected at the 60- to 72-inch depth were used to quantify the maximum vertical extent of potential constituent migration. The total constituent soil sampling and analysis data are presented in Appendix L.

8.4.4.3 Data Gaps

According to the TSD, total thallium concentrations were unknown.

8.4.4.4 Results and Conclusions

Based on documentation presented in Appendix D, this site was closed by the USGS in 1976.

8.4.5 Investigation #4 – Thallium (1999)

In September 1999, soil boring samples were collected and analyzed for total thallium at this SWMU as part of an overall investigation of total thallium concentrations. The total thallium data are presented in Appendix B.

8.4.5.1 Nonsampling Data Collection

No nonsampling activities were performed at this SWMU.

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8.4.5.2 Sampling Data Collection

In September 1999, a total of 8 soil boring samples and 3 associated QA/QC samples were collected and analyzed for total thallium.

The rationale for selecting sample depths at mud pits during the previous sampling was based on an evaluation of the SWMU 001n site, and historical information contained in the RFA. Samples collected for metals analyses in the mud pit area at the 12- to 24-inch depth were used to provide data from the depth where the highest concentration of potential hazardous constituents was anticipated. Samples collected at the 60- to 72-inch depth were used to quantify the maximum vertical extent of potential constituent migration. The total thallium soil sampling and analysis data are presented in Appendix B.

8.4.5.3 Data Gaps

No data gaps exist for this SWMU.

8.4.5.4 Results and Conclusions

Based on the information presented in Appendix B, no elevated thallium concentrations exist at this SWMU.

8.5 Site Conceptual Model

The following subsections define various aspects of the conceptual model developed for this SWMU.

8.5.1 Nature and Extent of Contamination

As stated above, this site was closed by the USGS in 1976.

8.5.2 Environmental Fate

As stated above, this site was closed by the USGS in 1976.

8.6 Site Assessments

No site assessments or risk assessments were required, because the site was closed by the USGS in 1976.

8.6.1 Summary

No screening assessments were required, because the site was closed by the USGS in 1976.

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8.6.2 Screening Assessments

No human health or ecological assessments were required, because the site was closed by the USGS in 1976.

8.6.2.1 Human Health

No human health screening assessment was required, because the site was closed by the USGS in 1976.

8.6.2.2 Ecological

No ecological screening assessment was required, because the site was closed by the USGS in 1976.

8.6.3 Risk Assessments

This section discusses the baseline risk assessment for human health and ecological risk.

8.6.3.1 Human Health

A baseline human health risk assessment is not required for SWMU 001n, because the site was closed by the USGS in 1976.

8.6.3.2 Ecological

A baseline ecological risk assessment is not required for SWMU 001n, because the site was closed by the USGS in 1976.

8.6.4 Other Applicable Assessments

Applicable assessments pertaining to surface water, groundwater, and underground storage tanks are discussed below.

8.6.4.1 Surface Water

No surface water is present at this site and this subsection is not applicable.

8.6.4.2 Groundwater

The site was closed by the USGS in 1976. No groundwater evaluation is required.

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8.6.4.3 Underground Storage Tanks

No underground storage tanks are known to have been present at this site. This section is, therefore, not applicable.

8.6.4.4 Other

No other assessments are required.

8.7 No Further Action Petition

The NMED has developed six criteria to identify whether a site should be identified for NFA (NMED, 1999b). Based on these criteria, an NFA petition is reasonable if:

- The site does not exist;
- The site was not used for the management of hazardous constituents;
- There was no release of hazardous constituents to the environment;
- There was a release, but hazardous constituents are at acceptably low levels;
- There was a release, but the site has been characterized and/or closed under another authority; or
- There was a release, but the site was remediated.

The rationale and criterion for this NFA petition are discussed in the following subsections.

8.7.1 Rationale

Based on the documentation provided in Appendix D for the P-15 mud pit, an NFA is being recommended for this SWMU for the following reason: the site was closed by the USGS in 1976. This SWMU meets Criterion 5.

8.7.2 Criterion

Based on the evidence provided above, an NFA determination is requested for SWMU 001n conformance with Criterion 5 for the P-15 mud pit.

9.0 SWMU 001o (BADGER UNIT MUD PIT[S])

The following subsections provide a description of the SWMU, an assessment of available site characterization data, risk assessment information and rationale for this NFA petition.

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9.1 Summary

The Permittees are requesting an NFA decision for SWMU 001o, Badger Unit mud pits. SWMU 001o consists of a drilling mud pit associated with the Badger Unit petroleum exploration borehole. Review and analysis of relevant data and documentation provided for this SWMU demonstrate that the Badger Unit drilling mud pit was closed by the New Mexico Oil Conservation Division (NMOCD) in 1974 with the concurrence of the BLM.

9.2 Description and Operational History

The site description and operational history are provided in the following subsections.

9.2.1 Site Description

SWMU 001o is located in the NW $\frac{1}{4}$ of the NE $\frac{1}{4}$ of the SW $\frac{1}{4}$ of Section 15, Township 22 South, Range 31 East. The mud pit constructed for the drilling of the petroleum exploration well is SWMU 001o. A sketch of SWMU 001o is presented in Figure 9.1.

The mud pit area is a large stained nonvegetated area ringed with stressed vegetation. Many fragments of intact black polyethylene plastic liner protrude through the surface as much as 20 feet outside the stained soil area. The entire area measures approximately 280 feet by 400 feet and appears to have been graded.

9.2.2 Operational History

USGS well records indicate that the Badger Unit Federal #1 well was drilled in 1973 by Superior Oil Company as a wildcat petroleum exploration well. The total well depth was 15,225 feet, and the well was abandoned in 1974. The well was closed by the NMOCD in 1974 with the concurrence of the BLM.

Drilling fluids used in the drilling of the Badger Unit Federal #1 well included the following: saturated brine water, potassium chloride brine, fresh water gel, polymer, and sodium hydroxide.

Closure documentation for Badger Unit has been archived by the NMOCD and is not available. Information on the Badger Unit drilling is included in Appendix M.

9.3 Land Use

This section presents a summary of current and future/proposed land use for SWMU 001o.

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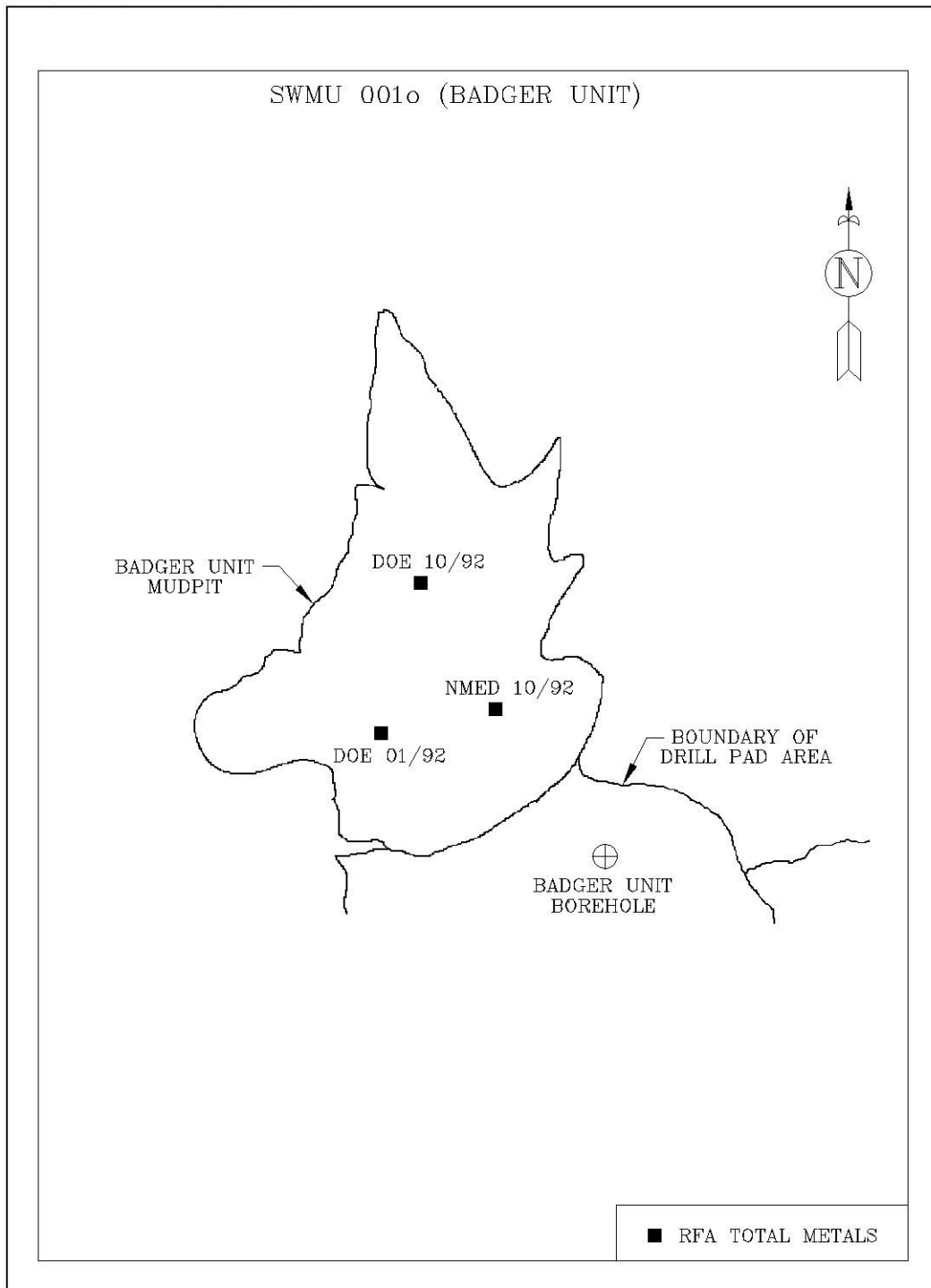


Figure 9.1 - Sample Location Sketch - SWMU 001o (Badger Unit Drilling Mud Pit[s])
(map not to scale)

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9.3.1 Current

This SWMU is located within the 16-section WLWA. The WIPP Land Withdrawal Act (Public Law 102-579) and created the WLWA in October 1992. This Act transferred the jurisdiction of the WLWA from the Secretary of the Interior to the Secretary of Energy. In accordance with sections 3(a)(1) and (3) of the Act, these lands ". . . are withdrawn from all forms of entry, appropriation, and disposal under the public land laws . . ." and are reserved for the use of the Secretary [of Energy] for the construction, experimentation, operation, repair and maintenance, disposal, shutdown, monitoring, decommissioning, and other authorized activities, associated with the purposes of WIPP as set forth in section 213 of the Department of Energy National Security and Military Applications of Nuclear Energy Act of 1980 (Public Law 96-164; 93 Statute 1259, 1265) and this Act." SWMU 001o is located on land under the jurisdiction of the DOE. The land around this SWMU is occasionally used for livestock grazing, and recreational activities; no other current uses exist.

9.3.2 Future/Proposed

The facility operational period is estimated to be 35 years with a 30-year postclosure care period. Active institutional controls will be maintained during postclosure for 100 years. The future/proposed land use is industrial and recreational.

9.4 Investigatory Activities

SWMU 001o was investigated during the RFA. The following subsections describe previous sampling activities that have been conducted at the site.

9.4.1 Summary

SWMU 001o was visually inspected and sampled by the NMED in 1992 as part of a RFA. Samples were collected from one location. The following subsections describe data that were collected at SWMU 001o.

9.4.2 Investigation #1 – RFA

SWMU 001o was visually inspected and sampled by the NMED in 1992 as part of a RFA.

9.4.2.1 Nonsampling Data Collection

No nonsampling data collection was performed during the RFA.

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9.4.2.2 Sampling Data Collection

On two occasions during 1992 as part of the RFA, soil boring samples were collected by the NMED and WIPP for total constituent analysis to assess the potential for release of hazardous constituents from the SWMU 001o mud pit.

Samples collected for analyses in the mud pit area at the 18- to 24-inch depth were used to provide data from the depth where the highest concentration of potential hazardous constituents was anticipated. Samples collected at the 84- to 90-inch depth were used to evaluate the maximum vertical extent of potential constituent migration.

9.4.2.3 Data Gaps

No data gaps exist for this SWMU.

9.4.2.4 Results and Conclusions

The RFA concluded that the potential release of hazardous constituents to soil was high. The RFA also concluded that migration potential to groundwater was low relative to other locations on site.

9.5 Site Conceptual Model

The following subsections define various aspects of the conceptual model developed for this SWMU.

9.5.1 Nature and Extent of Contamination

This site was closed by the NMOCD and the BLM in 1974. Consequently, no additional investigations will be conducted at this SWMU.

9.5.2 Environmental Fate

As stated above, this site was closed by the NMOCD and BLM in 1974.

9.6 Site Assessments

No site assessments or risk assessments were required, because the site was closed by the NMOCD and the BLM in 1974.

9.6.1 Summary

No screening assessments were required, because the site was closed by the NMOCD and the BLM in 1974.

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9.6.2 Screening Assessments

No human health or ecological assessments were required, because the site was closed by the NMOCD and the BLM in 1974.

9.6.2.1 Human Health

No human health screening assessment was required, because the site was closed by the NMOCD and the BLM in 1974.

9.6.2.2 Ecological

No ecological screening assessment was required, because the site was closed by the NMOCD and the BLM in 1974.

9.6.3 Risk Assessments

This section discusses the baseline risk assessment for human health and ecological risk.

9.6.3.1 Human Health

A baseline human health risk assessment is not required for SWMU 001o, because the site was closed by the NMOCD and the BLM in 1974.

9.6.3.2 Ecological

A baseline ecological risk assessment is not required for SWMU 001o, because the site was closed by the NMOCD and the BLM in 1974.

9.6.4 Other Applicable Assessments

Applicable assessments pertaining to surface water, groundwater, and underground storage tanks are discussed below.

9.6.4.1 Surface Water

No surface water is present at this site and this subsection is not applicable.

9.6.4.2 Groundwater

The site was closed by the NMOCD and the BLM in 1974. No groundwater evaluation is required.

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9.6.4.3 Underground Storage Tanks

No underground storage tanks are known to have been present at this site. This section is, therefore, not applicable.

9.6.4.4 Other

No other assessments are required.

9.7 No Further Action Petition

The NMED has developed six criteria to identify whether a site should be identified for NFA (NMED, 1999b). Based on these criteria, an NFA petition is reasonable if:

- The site does not exist;
- The site was not used for the management of hazardous constituents;
- There was no release of hazardous constituents to the environment;
- There was a release, but hazardous constituents are at acceptably low levels;
- There was a release, but the site has been characterized and/or closed under another authority; or
- There was a release, but the site was remediated.

The rationale and criterion for this NFA petition are discussed in the following subsections.

9.7.1 Rationale

Based on the document provided in Appendix D for the Badger Unit mud pit, an NFA is being recommended for this SWMU for the following reason: the site was closed by the NMOCD and BLM in 1974. This SWMU meets Criterion 5.

9.7.2 Criterion

Based on the evidence provided above, an NFA determination is requested for SWMU 001o in conformance with Criterion 5 for the Badger Unit mud pit.

10.0 SWMU 001p (COTTON BABY MUD PIT[S])

The following subsections provide a description of the SWMU, an assessment of available site characterization data, risk assessment information and rationale for this NFA petition.

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10.1 Summary

The Permittees are requesting an NFA decision for SWMU 001p, Cotton Baby mud pits. SWMU 001p consists of a drilling mud pit associated with the Cotton Baby petroleum exploration borehole. Review and analysis of relevant data and documentation provided for this SWMU demonstrate that the Cotton Baby drilling mud pit was closed by the NMOCD in 1974 with the concurrence of the BLM.

10.2 Description and Operational History

The site description and operational history are provided in the following subsections.

10.2.1 Site Description

SWMU 001p is located in the SW $\frac{1}{4}$ of the NE $\frac{1}{4}$ of the SW $\frac{1}{4}$ of Section 34, Township 22 South, Range 31 East. The mud pits constructed for the drilling of the petroleum exploration well are SWMU 001p. The total well depth was 4,475 feet, and the well was abandoned in 1974. A sketch of SWMU 001p is presented in Figure 10.1.

There are two stained mud pits on the Cotton Baby drill pad. The remnants of plastic liner material, and stressed vegetation, can be seen at both mud pits. The smaller rectangular mud pit on the east side of the drill pad measures approximately 15 feet by 55 feet. A second irregularly shaped mud pit is located to the west of the smaller mud pit and measures approximately 65 feet by 85 feet.

10.2.2 Operational History

The Cotton Baby well was drilled in 1973 by Michael Grace Company as a wildcat petroleum exploration well. The total well depth was 4,475 feet, and the well was abandoned in 1974. This site was closed by the NMOCD with the concurrence of the BLM in 1974.

Drilling fluids used in the drilling of the Cotton Baby well included the following: drilling mud, spot oil, and water.

Closure documentation for Cotton Baby has been archived by the NMOCD and is not available. Information on the Cotton Baby drilling is included in Appendix N.

10.3 Land Use

This section presents a summary of current and future/proposed land use for SWMU 001p.

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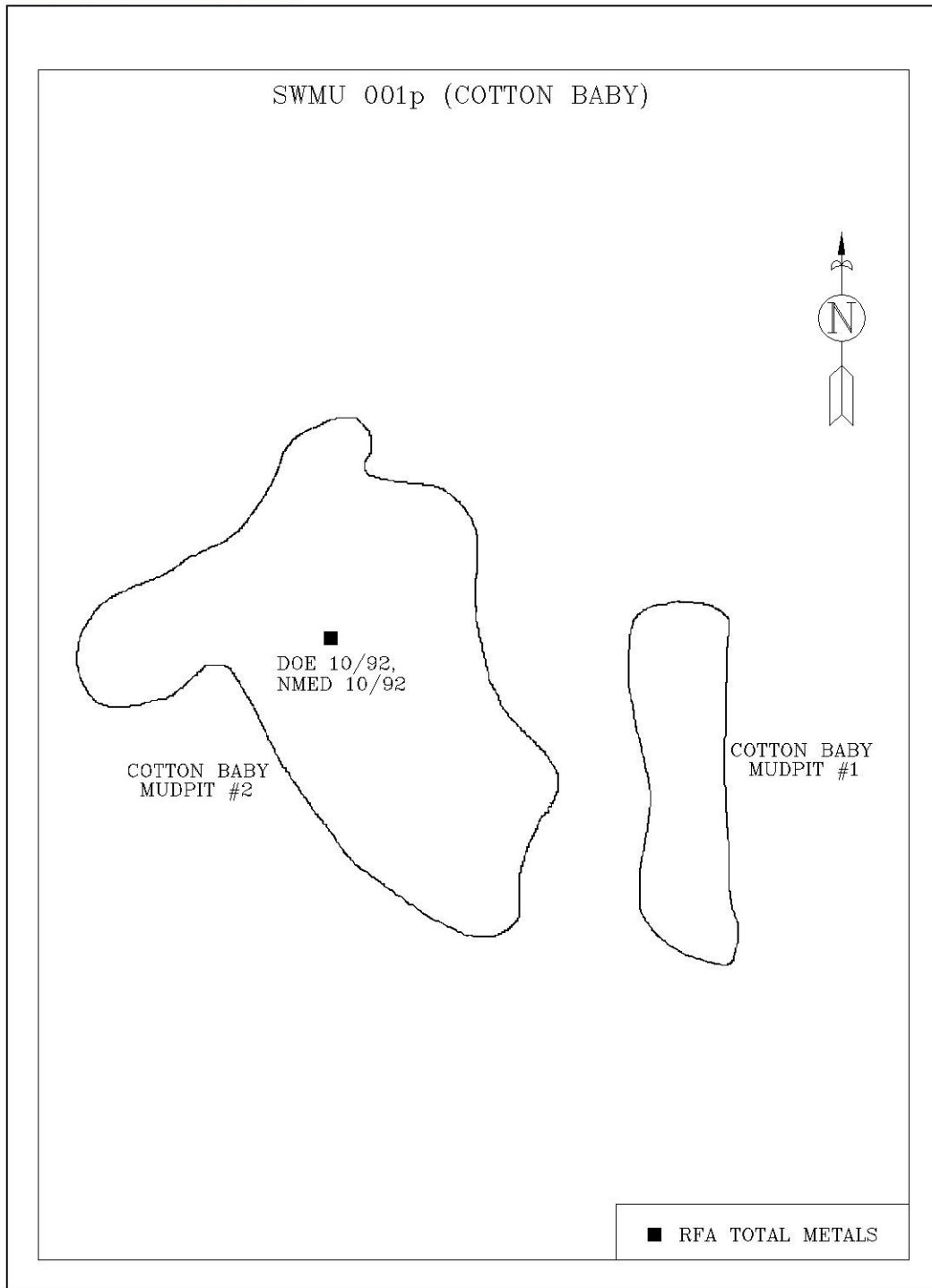


Figure 10.1 - Sample Location Sketch - SWMU 001p (Cotton Baby Drilling Mud Pit[s])
(map not to scale)

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10.3.1 Current

This SWMU is located within the 16-section WLWA. The WIPP Land Withdrawal Act (Public Law 102-579) and created the WLWA in October 1992. This Act transferred the jurisdiction of the WLWA from the Secretary of the Interior to the Secretary of Energy. In accordance with sections 3(a)(1) and (3) of the Act, these lands ". . . are withdrawn from all forms of entry, appropriation, and disposal under the public land laws . . ." and are reserved for the use of the Secretary [of Energy] for the construction, experimentation, operation, repair and maintenance, disposal, shutdown, monitoring, decommissioning, and other authorized activities, associated with the purposes of WIPP as set forth in Section 213 of the Department of Energy National Security and Military Applications of Nuclear Energy Act of 1980 (Public Law 96-164; 93 Statute 1259, 1265) and this Act." SWMU 001p is located on land under the jurisdiction of the DOE. The land around this SWMU is occasionally used for livestock grazing, and recreational activities; no other current uses exist.

10.3.2 Future/Proposed

The facility operational period is estimated to be 35 years with a 30-year postclosure care period. Active institutional controls will be maintained during postclosure for 100 years. The future/proposed land use is industrial and recreational.

10.4 Investigatory Activities

SWMU 001p was investigated during the RFA. The following subsections describe previous sampling activities that have been conducted at the site.

10.4.1 Summary

SWMU 001p was visually inspected and sampled by the NMED in 1992 as part of a RFA. Samples were collected from one location. The following subsections describe data that were collected at SWMU 001p.

10.4.2 Investigation #1 – RFA

SWMU 001p was visually inspected and sampled by the NMED in 1992 as part of a RFA.

10.4.2.1 Nonsampling Data Collection

No nonsampling data collection was performed during the RFA.

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10.4.2.2 Sampling Data Collection

During the 1992 RFA, soil boring samples were collected by the NMED and WIPP for total constituent analysis to assess the potential for release of hazardous constituents from the SWMU 001p mud pit.

Samples collected for analyses in the mud pit area at the 22.8- to 26.4-inch depth were used to provide data from the depth where the highest concentration of potential hazardous constituents was anticipated. Samples collected at the 61.2- to 66-inch depth were used to evaluate the maximum vertical extent of potential constituent migration. Approximate sample locations are presented in Figure 10.1.

10.4.2.3 Data Gaps

No data gaps exist for this SWMU.

10.4.2.4 Results and Conclusions

The RFA concluded that the potential release of hazardous constituents to soil was high. The RFA also concluded that migration potential to groundwater was moderate relative to other locations on site.

10.5 Site Conceptual Model

The following subsections define various aspects of the conceptual model developed for this SWMU.

10.5.1 Nature and Extent of Contamination

This site was closed by NMOCD and BLM in 1974.

10.5.2 Environmental Fate

As stated above, this site was closed by the NMOCD and BLM in 1974.

10.6 Site Assessments

No site assessments or risk assessments were required, because the site was closed by the NMOCD and the BLM in 1974.

10.6.1 Summary

No screening assessments were required, because the site was closed by the NMOCD and the BLM in 1974.

10.6.2 Screening Assessments

No human health or ecological assessments were required, because the site was closed by the NMOCD and the BLM in 1974.

10.6.2.1 Human Health

No human health screening assessment was required, because the site was closed by the NMOCD and the BLM in 1974.

10.6.2.2 Ecological

No ecological screening assessment was required, because the site was closed by the NMOCD and the BLM in 1974.

10.6.3 Risk Assessments

This section discusses the baseline risk assessment for human health and ecological risk.

10.6.3.1 Human Health

A baseline human health risk assessment is not required for SWMU 001p, because the site was closed by the NMOCD and the BLM in 1974.

10.6.3.2 Ecological

A baseline ecological risk assessment is not required for SWMU 001p, because the site was closed by the NMOCD and the BLM in 1974.

10.6.4 Other Applicable Assessments

Applicable assessments pertaining to surface water, groundwater, and underground storage tanks are discussed below.

10.6.4.1 Surface Water

No surface water is present at this site and this subsection is not applicable.

10.6.4.2 Groundwater

The site was closed by the NMOCD and the BLM in 1974. No groundwater evaluation is required.

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10.6.4.3 Underground Storage Tanks

No underground storage tanks are known to have been present at this site. This section is, therefore, not applicable.

10.6.4.4 Other

No other assessments are required.

10.7 No Further Action Petition

The NMED has developed six criteria to identify whether a site should be identified for NFA (NMED, 1999b). Based on these criteria, an NFA petition is reasonable if:

- The site does not exist;
- The site was not used for the management of hazardous constituents;
- There was no release of hazardous constituents to the environment;
- There was a release, but hazardous constituents are at acceptably low levels;
- There was a release, but the site has been characterized and/or closed under another authority; or
- There was a release, but the site was remediated.

The rationale and criterion for this NFA petition are discussed in the following subsections.

10.7.1 Rationale

Based on the documentation provided in Appendix D for the Cotton Baby mud pits, an NFA is being recommended for this SWMU for the following reason: the site was closed by the NMOCD and the BLM in 1974. This SWMU meets Criterion 5.

10.7.2 Criterion

Based on the evidence provided above, an NFA determination is requested for SWMU 001p in conformance with Criterion 5 for the Cotton Baby mud pits.

11.0 SWMU 001q (DOE-1 MUD PIT[S])

The following subsections provide a description of the SWMU, an assessment of available site characterization data, risk assessment information and rationale for this NFA petition.

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11.1 Summary

The Permittees are requesting an NFA decision for SWMU 001q, DOE-1 mud pits. SWMU 001q consists of drilling mud pits associated with the DOE-1 exploration borehole. Review and analysis of relevant data for SWMU 001q indicate that concentrations of COCs in the DOE-1 drilling mud pits are less than applicable risk-based screening levels for industrial facilities and for residential land use for three COCs.

Thus, an NFA determination is requested for SWMU 001q based on additional sampling conducted in the summer of 2001. Data from this sampling event demonstrate that COCs that may have been released from the DOE-1 drilling mud pits into the environment pose an acceptable level of risk under current and projected future land use. The following subsections discuss the characterization and setting and field investigation activities that have been conducted at SWMU 001q.

11.2 Description and Operational History

The site description and operational history are provided in the following subsections.

11.2.1 Site Description

SWMU 001q is located in the SE $\frac{1}{4}$ of the SE $\frac{1}{4}$ of the SE $\frac{1}{4}$ of Section 28, Township 22 South, Range 31 East. The DOE-1 was drilled in 1982 to collect stratigraphic, structural, and hydrologic data. The mud pits constructed for the drilling of DOE-1 comprise SWMU 001q. A sketch of SWMU 001q is presented in Figure 11.1.

There are two mud pits at the DOE-1 drill pad. The primary pit measures approximately 150 feet by 45 feet, and a second reserve pit encompasses an area approximately 50 feet by 75 feet. Both areas were lined with 8 mil (8 thousandths of an inch) reinforced polyethylene liner. Only one of the mud pits appears to have been used.

11.2.2 Operational History

Salazar Brothers drilled the DOE-1 borehole to a depth of 4,065 feet to examine the nature of the Castile Formation. Field operations were initiated July 1982 and completed in that same month.

Drilling fluids used in the drilling of DOE-1 included the following components: fresh water gel, soda ash, paper, salt water gel, starch, potassium chloride brine, and lime.

Information on the DOE-1 drilling is included in Appendix O.

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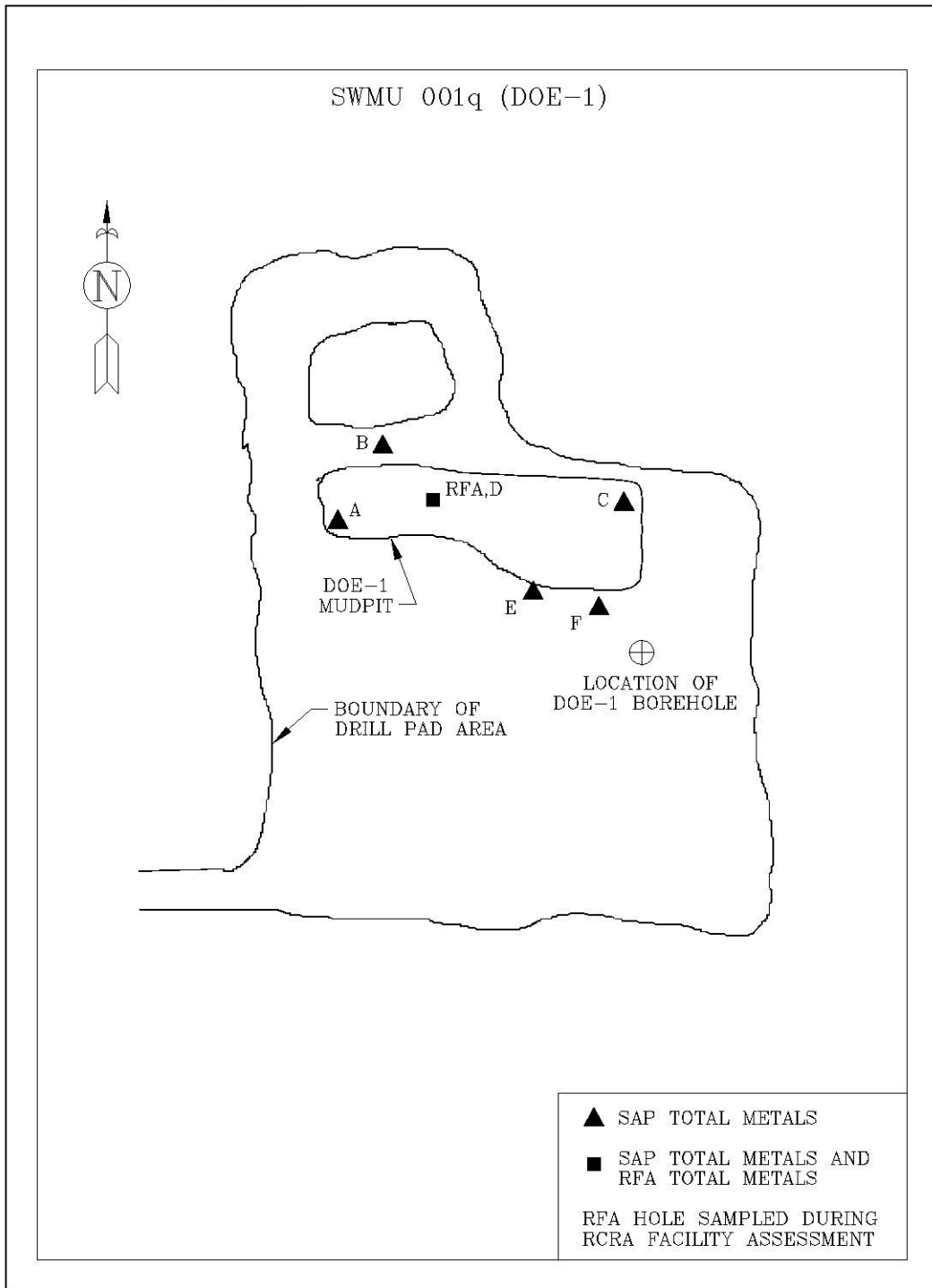


Figure 11.1 - Sample Location Sketch - SWMU 001q (DOE-1 Drilling Mud Pit[s]) (map not to scale)

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11.3 Land Use

This section presents a summary of current and future/proposed land use for SWMU 001q.

11.3.1 Current

This SWMU is located within the 16-section WLWA. The WIPP Land Withdrawal Act (Public Law 102-579) and created the WLWA in October 1992. This Act transferred the jurisdiction of the WLWA from the Secretary of the Interior to the Secretary of Energy. In accordance with Sections 3(a)(1) and (3) of the Act, these lands ". . . are withdrawn from all forms of entry, appropriation, and disposal under the public land laws . . ." and are reserved for the use of the Secretary [of Energy] for the construction, experimentation, operation, repair and maintenance, disposal, shutdown, monitoring, decommissioning, and other authorized activities, associated with the purposes of WIPP as set forth in section 213 of the Department of Energy National Security and Military Applications of Nuclear Energy Act of 1980 (Public Law 96-164; 93 Statute 1259, 1265) and this Act." SWMU 001q is located on land under the jurisdiction of the DOE. The land around this SWMU is occasionally used for livestock grazing, and recreational activities; no other current uses exist.

11.3.2 Future/Proposed

The facility operational period is estimated to be 35 years with a 30-year postclosure care period. Active institutional controls will be maintained during postclosure for 100 years. The future/proposed land use is industrial and recreational.

11.4 Investigatory Activities

SWMU 001q was investigated in a series of two investigations. The following subsections describe previous sampling activities that have been conducted at the site.

11.4.1 Summary

SWMU 001q was visually inspected and sampled by the NMED in 1992 as part of a RFA. During the summer of 2001, additional samples were collected at the SWMU to define the extent of metal concentrations in the SWMU. The following subsections describe data that were collected at SWMU 001q.

11.4.2 Investigation #1 – RFA

SWMU 001q was visually inspected and sampled by the NMED in 1992 as part of a RFA.

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11.4.2.1 Nonsampling Data Collection

No nonsampling data collection was performed during the RFA.

11.4.2.2 Sampling Data Collection

Soil samples were collected by WIPP and the NMED during the 1992 RFA. The samples collected were submitted for total constituent analysis to assess the potential for release of hazardous constituents from the SWMU 001q mud pit.

Samples collected for analyses in the mud pit area at the 21.6- to 25.2-inch depth were used to provide data from the depth where the highest concentration of potential hazardous constituents was anticipated. Samples collected at the 27.6- to 32.4-inch depth were used to evaluate the maximum vertical extent of potential constituent migration. Figure 11.1 is a site sketch showing sample locations at SWMU 001q. Additional information on the sampling and analysis are included in Appendix O.

11.4.2.3 Data Gaps

The TSD identified barium, chromium, and lead as potential constituents of concern for the mud pit materials in this SWMU. In addition, the DOE identified nickel as a constituent of concern at this SWMU. Concentrations of chromium, nickel, and lead were detected above background at SWMU 001q by total metals analysis. The sampling and analysis data are presented in Table 11.1.

**Table 11.1
Summary of Measured Concentrations for Constituents of Concern
RCRA Facility Assessment (1992 Samples)
SWMU 001q (DOE-1 Drilling Mud Pit[s])**

Description	Hole #	Depth (in. bgs)	Constituent	Concentration (ppm)	Qualifier
DOE-1	A ⁽¹⁾	21.6 to 25.2	Nickel	7	N/A
			Chromium	43	N/A
			Lead	12	N/A
		27.6 to 32.4	Nickel	10	N/A
			Chromium	-	N/A
			Lead	6	N/A
	A ⁽²⁾	21.6 to 25.2	Nickel	6	N/A
			Chromium	27	N/A
Lead			20	N/A	
27.6 to 32.4		Nickel	10	N/A	
		Chromium	53	N/A	
		Lead	5	U	

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Notes:

Background concentration for nickel = 12.4 ppm

Background concentration for chromium = 26 ppm

Background concentration for lead = 5.4 ppm

NMED Industrial Screening values = 4,400 ppm for nickel; 660 ppm for chromium;
1,000 ppm for lead

NMED Residential Screening values = 1,500 ppm for nickel; 230 ppm for chromium;
400 ppm for lead

(1) Sampled by the DOE 10/92

(2) Sampled by the NMED 10/92

- = Sample result not available

NMED = New Mexico Environment Department

ppm = parts per million

in. bgs = inches below ground surface.

SWMU = Solid Waste Management Unit

U = Analyte was not detected; value is the method reporting limit.

11.4.2.4 Results and Conclusions

The RFA concluded that the potential release of hazardous constituents to soil was high. The RFA also concluded that migration potential to groundwater was low to moderate relative to other locations on site.

11.4.2.5 Data Gaps

According to the TSD (NMED, 1999b), the results of the sampling investigations were not adequate to define the nature, rate, and extent of hazardous constituents (barium chromium, and lead) in this SWMU. Based on an analysis of background metals concentrations reported in the SAP (DOE, 2000), measured concentrations of barium in SWMU 001q were below background.

11.4.3 Investigation #2 – SAP (2001)

Soil concentrations of chromium, lead, and nickel were further evaluated during this investigation.

11.4.3.1 Nonsampling Data Collection

No nonsampling activities were performed at this SWMU.

11.4.3.2 Sampling Data Collection

As part of the SAP implementation, additional subsurface soil samples were collected within and outside the SWMU 001q boundary during the summer of 2001. Samples were collected by means of direct push methodology at three locations in the mud pit and three locations outside the mud pit. Direct push technology refers to the forcing of a sampling device, constructed of stainless steel, to the desired sampling depth using a hydraulic ram. The purpose of the sampling was to further define the extent of

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chromium, lead, and nickel concentrations above background. Shallow samples were collected and composited over a two-foot interval. Deep samples were collected and composited over a one foot interval. Figure 11.1 is a site sketch showing SAP sample locations. Total metal concentrations for samples collected at SWMU 001q are presented in Table 11.2.

**Table 11.2
Summary of Measured Concentrations for Constituents of Concern
Sampling and Analysis Plan (2001 Samples)
SWMU 001q (DOE-1 Drilling Mud Pit[s])**

Description	Hole #	Depth (in. bgs)	Constituent	Concentration (ppm)	Qualifier
DOE-1 Mud Pits	A	24 to 48	Chromium	6.5	N
			Lead	3.9	*
			Nickel	4.3	
		84 to 96	Chromium	3.1	N
			Lead	3.2	*
			Nickel	4.8	
	B	24 to 48	Chromium	3.7	N
			Lead	1.8	*
			Nickel	1.7	B
		84 to 96	Chromium	4.5	N
			Lead	2.6	*
			Nickel	5	
	C	24 to 48	Chromium	9.5	N, J
			Lead	32.2*	*
			Nickel	2.9	B
		Duplicate	Chromium	12.6	N
			Lead	32.3*	*
			Nickel	2.6	B
	48 to -51 ^a	Chromium	8.4	N	
		Lead	12.2	*	
		Nickel	2.7	B	
D	90 to 102	Chromium	4.8	N	
		Lead	2.9	*	
		Nickel	4	B	
E	24 to 28	Chromium	3.8	N	
		Lead	1.9	*	
		Nickel	5		
	72 to 84	Chromium	21.2	N	
		Lead	6.1	*	
		Nickel	19.8		
F	24 to 48	Chromium	7.5	N	
		Lead	3.7	*	
		Nickel	12.4		
	48 to 54 ^a	Chromium	7.5	N	
		Lead	3.2	*	
		Nickel	9.8		

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Notes:

Background concentration for nickel = 12.4 ppm
Background concentration for chromium = 26 ppm
Background concentration for lead = 5.4 ppm
NMED Industrial Screening values = 4,400 ppm for nickel; 660 ppm for chromium;
1,000 ppm for lead
NMED Residential Screening values = 1,500 ppm for nickel; 230 ppm for chromium;
400 ppm for lead
ppm = parts per million
in. bgs = inches below ground surface
* = Duplicate sample results not within laboratory control limits
N = Results associated with matrix spike analysis not within laboratory limits
J = Value qualified as estimated during data validation
B = Reported value is below the required reporting limit, but above the instrument
detection limit.
SWMU = Solid Waste Management Unit
^aSampling equipment met refusal at the lowest depth, because of a layer of caliche.

11.4.3.3 Data Gaps

Analytical data are sufficient to characterize the nature and extent of releases of COCs at SWMU 001q. There are no further data gaps regarding characterization of SWMU 001q.

11.4.3.4 Results and Conclusions

Although some of the chromium, lead, and nickel concentrations presented in Tables 11.1 and 11.2 exceed background, the concentrations do not exceed the industrial and residential screening levels presented in NMED guidance (2000). In accordance with the data quality objectives defined in the SAP, the horizontal and vertical dimensions of the concentrations above background have been defined within 50 percent and the average (and maximum) concentrations are less than the NMED soil screening criteria. The highest chromium concentration, 53 ppm, is approximately 23 percent of the residential screening criterion for chromium. The highest lead concentration, 32.3 ppm, is approximately 8 percent of the residential screening criterion for lead. The highest nickel concentration, 19.8 ppm, is approximately 1 percent of the residential screening criterion for nickel.

11.5 Site Conceptual Model

The following subsections define various aspects of the conceptual model developed for this SWMU.

11.5.1 Nature and Extent of Contamination

The TSD identified barium, chromium, and lead as potential constituents of concern for the mud pit materials in this SWMU. In addition, the DOE identified nickel as a constituent of concern at this SWMU. Concentrations of chromium, nickel, and lead

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were detected above background at SWMU 001q by total metals analysis (Tables 11.1 and 11.2) Total metals concentrations of barium measured in SWMU 001q are below the barium background concentration and thallium has been eliminated as a constituent of concern (DOE, 2000, and Appendices A and B).

The summer 2001 sampling event included collection of 12 samples (6 locations, two depths at all but one location, and one duplicate sample) and analysis of the 12 samples for chromium, lead, and nickel. When the results of these samples are combined with the results of the 1992 RFA sampling, elevated barium concentrations (relative to background) exist in an area approximately 0.11 acres in size. Elevated barium concentrations exist from approximately 22 inches to 7 feet below ground surface at one location at the edge of the mud pit (sampling location E). Concentrations of the three constituents were below background for a sample collected at 8 feet (sampling location A). A portion of the SWMU area was found to be underlain by a layer of caliche that could not be penetrated with the direct push methodology. This would inhibit further vertical movement.

11.5.2 Environmental Fate

The Dewey Lake and Magenta formations are known to contain groundwater in some areas beneath the WIPP site. It is possible that these formations underlie this SWMU. The Dewey Lake, if it exists at this location, would occur at approximately 140 feet. The depth to proven groundwater in the Culebra Formation below SWMU 001q is 400 to 500 feet, and it is estimated that less than 0.5 inch of precipitation per year infiltrates the underlying strata. Thus, the potential for these metals to migrate to groundwater is extremely low. In all cases, the groundwater risk is nonexistent. The SWMU has been covered with native soil and crushed caliche in some places. The SWMU material is not considered to be susceptible to surface water or wind erosion. The surface material at this SWMU is potentially susceptible to surface water run-on. In the fall of 1999, WIPP installed silt fences and trenches at this SWMU to control potential surface run-on during rain storm events as a best management practice for the SWMU. Furthermore, because the land has been withdrawn from public use and the potential for intrusive activities is low, the potential exposure of human receptors to metals in the SWMU is minimal to nonexistent.

11.6 Site Assessments

The site assessment process for SWMU 001q includes risk-screening assessments. This section briefly summarizes the site assessment results. The following subsections describe site assessments that have been conducted to identify human and ecological risks associated with SWMU 001q.

11.6.1 Summary

The site assessment concludes that SWMU 001q does not have potential to affect human health under an industrial or residential land use scenario. After considering the

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uncertainties associated with the available data and modeling assumptions, ecological risks associated with SWMU 001q were not found to be significant. Descriptions of these assessments are provided in the following subsections.

11.6.2 Screening Assessments

Risk screening assessments were performed for both human health risk and ecological health risk for SWMU 001q. The following subsections describe the results.

11.6.2.1 Human Health

SWMU 001q is part of the WIPP facility. Measured concentrations from the summer 2001 and 1992 RFA sampling and analyses were compared to the NMED industrial and residential soil screening criteria (NMED, 2000b). This comparison demonstrates that all measured concentrations were below the NMED criteria for chromium (660 and 230 ppm); lead (1,000 and 400 ppm); and nickel (4,400 and 1,500 ppm). Consequently, it can be concluded that SWMU 001q does not have the potential to affect human health under industrial or residential land use scenarios.

11.6.2.2 Ecological

An ecological screening assessment was performed for SWMU 001q in 1998 (DOE, 1998). Based on an evaluation of uncertainties, ecological risks associated with this site were expected to be low.

11.6.3 Risk Assessments

This section discusses the baseline risk assessment for human health and ecological risk.

11.6.3.1 Human Health

Because the human health results of the screening assessment summarized in Section 11.6.2.1 indicate that SWMU 001q does not have the potential to affect human health under an industrial or residential land use setting, a baseline human health risk assessment is not required for SWMU 001q.

11.6.3.2 Ecological

An updated ecological screening risk evaluation was performed for SWMU 001q (Appendix C). No ecological screening quotient greater than one was calculated for this SWMU. Based on these results, ecological risk associated with this site is expected to be low or insignificant.

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11.6.4 Other Applicable Assessments

Applicable assessments pertaining to surface water, groundwater, and underground storage tanks are discussed below.

11.6.4.1 Surface Water

No surface water is present at this site and this subsection is not applicable.

11.6.4.2 Groundwater

Groundwater within the 15 sections withdrawn from public access by the Land Withdrawal Act is not currently used nor is likely to be used in the future as a potable source. Due to the limited extent of the potential contamination (above 15 feet) and the depth to ground water approximately 150 feet and it is estimated that less than 0.5 inch of precipitation per year infiltrates the underlying strata, the risk of contamination is nonexistent. Thus, the potential for these metals to migrate to groundwater is extremely low.

11.6.4.3 Underground Storage Tanks

No underground storage tanks are known to have been present at this site. This section is, therefore, not applicable.

11.6.4.4 Other

No other assessments are required.

11.7 No Further Action Petition

The NMED has developed six criteria to identify whether a site should be identified for NFA (NMED, 1999b). Based on these criteria, an NFA petition is reasonable if:

- The site does not exist;
- The site was not used for the management of hazardous constituents;
- There was no release of hazardous constituents to the environment;
- There was a release, but hazardous constituents are at acceptably low levels;
- There was a release, but the site has been characterized and/or closed under another authority; or
- There was a release, but the site was remediated.

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The rationale and criterion for this NFA petition are discussed in the following subsections.

11.7.1 Rationale

Based on the field investigations for the DOE-1 mud pits, and the human health risk assessment and the ecological risk evaluation, an NFA is being recommended for the DOE-1 mud pits for the following reason: no COCs were present in concentrations considered hazardous to human health (under a residential land use scenario) or the environment. This mud pit meets Criterion 4.

11.7.2 Criterion

Based on the evidence provided above, an NFA determination is requested for SWMU 001q in conformance with Criterion 4 for the DOE-1 mud pits.

12.0 SWMU 001s (ERDA-9 MUD PIT)

The following subsections provide a description of the SWMU, an assessment of available site characterization data, risk assessment information and rationale for this NFA petition.

12.1 Summary

The Permittees are requesting an NFA decision for SWMU 001s, ERDA-9 mud pit. SWMU 001s consists of a drilling mud pit associated with the WIPP exploration borehole. Review and analysis of relevant data and documentation provided for this SWMU demonstrate that there has been no release of hazardous waste (or hazardous constituents) to the environment.

12.2 Description and Operational History

The site description and operational history are provided in the following subsections.

12.2.1 Site Description

SWMU 001s is located in the SE $\frac{1}{4}$ of the SE $\frac{1}{4}$ of the SE $\frac{1}{4}$ of Section 20, Township 22 South, Range 31 East. The abandoned mud pit constructed for the drilling of the ERDA-9 borehole is SWMU 001s. A sketch of SWMU 001s is presented in Figure 12.1.

The ERDA-9 mud pit area is transected by the south WIPP security fence. Information contained in the WIPP RFA describes the mud pit location. A rectangular discolored zone identified in 1982 aerial photographs is now partially covered by a railroad embankment and the compacted caliche used in the construction of the site. The drill pad where the ERDA-9 borehole and associated mud pit are located have been extensively graded and regraded.

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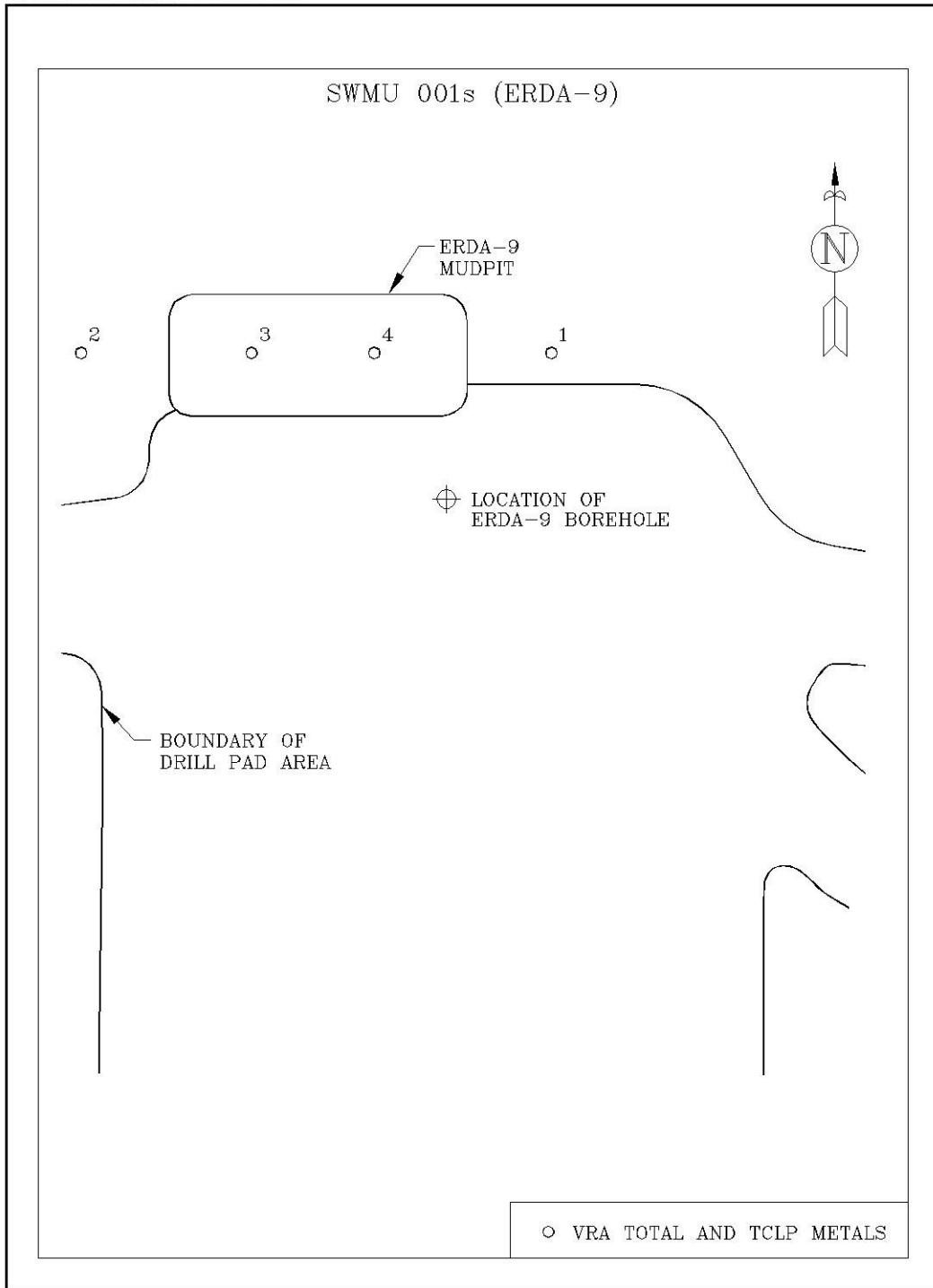


Figure 12.1 - Sample Location Sketch - SWMU 001s (ERDA-9 Mud Pit) (map not to scale)

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12.2.2 Operational History

ERDA-9 was the first WIPP exploratory borehole to test salt beds for the disposal of transuranic wastes at the WIPP site. An earthen emergency pit was constructed to support the closed-mud circulation system. Aerial photographs show a discolored rectangular zone just to the north-northwest of the well head, suggesting that the emergency pit was used. The feature measured approximately 50 feet by 145 feet.

The ERDA-9 borehole was recompleted in October 1986, as a Culebra observation well. Recompletion work involved cutting the 7-inch casing in ERDA-9 at a depth of 980 feet with an explosive charge and removing the casing from the borehole. A 7-inch retrievable bridge plug was installed inside the 10.75-inch casing at a depth of 760 feet from the top of the wellhead.

Salt-based drilling fluids were used for the first 1,033 feet of the borehole. The well was then deepened to 2,877 feet using an oil-emulsion drilling mud composed of diesel fuel, water, EZ MUD liquid emulsifier GELTONE viscofier, and calcium chloride.

During recompletion, the well was flushed with approximately 13,200 gallons of fresh water, followed by 6,340 gallons of a 0.27 mg/l solution of MilChem-MD detergent-type degreaser. All detergent-laden rinse solutions were collected in surface fractionation tanks and transported to an offsite disposal facility.

Information on the P-15 drilling is included in Appendix P.

12.3 Land Use

This section presents a summary of current and future/proposed land use for SWMU 001s.

12.3.1 Current

This SWMU is located within the exclusive use area, which is a subpart of the 16-section WLWA. The WIPP Land Withdrawal Act (Public Law 102-579) created the WLWA in October 1992. This Act transferred the jurisdiction of the WLWA from the Secretary of the Interior to the Secretary of Energy. In accordance with sections 3(a)(1) and (3) of the Act, these lands ". . . are withdrawn from all forms of entry, appropriation, and disposal under the public land laws . . ." and are reserved for the use of the Secretary [of Energy] for the construction, experimentation, operation, repair and maintenance, disposal, shutdown, monitoring, decommissioning, and other authorized activities, associated with the purposes of WIPP as set forth in section 213 of the Department of Energy National Security and Military Applications of Nuclear Energy Act of 1980 (Public Law 96-164; 93 Statute 1259, 1265) and this Act." SWMU 001s is located on land under the jurisdiction of the DOE. The land around this SWMU is part of the surface facilities. Therefore, access is restricted to authorized personnel.

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12.3.2 Future/Proposed

The facility operational period is estimated to be 35 years with a 30-year postclosure care period. Active institutional controls will be maintained during postclosure for 100 years. The future/proposed land use is industrial and recreational.

12.4 Investigatory Activities

SWMU 001s was investigated in a series of four investigations. The following subsections describe previous sampling activities that have been conducted at the site.

12.4.1 Summary

SWMU 001s was visually inspected by the NMED in 1992 as part of a RFA. No samples were collected. SWMU 001m was initially investigated in 1995 under the VRA program for TCLP metals. A subsequent investigation in 1996 evaluated total metals concentrations. In September 1999, soil samples were collected and analyzed for total thallium. The following subsections describe data that were collected at SWMU 001s.

12.4.2 Investigation #1 – RFA

SWMU 001s was visually inspected by the NMED in 1992 as part of a RFA.

12.4.2.1 Nonsampling Data Collection

No nonsampling data collection was performed during the RFA.

12.4.2.2 Sampling Data Collection

No sampling activities were performed at this SWMU during the RFA.

12.4.2.3 Data Gaps

Because there were no samples collected during the RFA at this SWMU, there were no data available for risk-based decision making.

12.4.2.4 Results and Conclusions

The RFA concluded that the potential release of hazardous constituents to soil was high. The RFA also concluded that migration potential to groundwater was low relative to other locations on site.

12.4.3 Investigation #2 – VRA (1995)

As part of the VRA 1995 investigation soil samples were collected for TCLP analysis.

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12.4.3.1 Nonsampling Data Collection

No nonsampling activities were performed at this SWMU during this investigation.

12.4.3.2 Sampling Data Collection

During the summer 1995 sampling event at SWMU 001s, a total of 12 soil boring samples and 4 associated QA/QC samples were collected for TCLP analysis to assess the potential for release of hazardous constituents from the SWMU 001s mud pit (DOE, 1996).

The rationale for selecting sample depths at mud pits during the previous sampling was based on an evaluation of the SWMU 001s site, and historical information contained in the RFA. Samples collected for analyses in the mud pit area at the 12- to 24-inch depth were used to provide data from the depth where the highest concentration of potential hazardous constituents was anticipated. Samples collected at the 60- to 72-inch depth were used to evaluate the maximum vertical extent of potential constituent migration. The TCLP soil sampling and analysis data are presented in Appendix P. Approximate sample locations are presented in Figure 12.1.

12.4.3.3 Data Gaps

The sample collection and TCLP analyses performed during 1995 did not allow determination of total metals concentrations in the mud pit material.

12.4.3.4 Results and Conclusions

The sample collection and TCLP analyses, performed during 1995, demonstrated that the material in the mud pits was not a hazardous waste.

12.4.4 Investigation #3 – VRA (1996)

As part of the VRA 1996 investigation, soil samples were collected for total constituent analysis.

12.4.4.1 Nonsampling Data Collection

No nonsampling activities were performed at this SWMU.

12.4.4.2 Sampling Data Collection

Soil sampling locations at the SWMU were sampled again in the summer of 1996. During the summer 1996 sampling event, 12 soil boring samples (8 samples for metals analysis, and 4 samples for volatiles analysis) and 2 associated QA/QC samples were collected for total constituent analysis to further characterize the vertical and horizontal

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extent of any potential release of hazardous constituents from the SWMU 001s mud pits.

The rationale for selecting sample depths at mud pits during the previous sampling was based on an evaluation of the SWMU 001s site, and historical information contained in the RFA. Samples collected for analyses in the mud pit area at the 12- to 24-inch depth were used to provide data from the depth where the highest concentration of potential hazardous constituents was anticipated. Samples collected at the 60- to 72-inch depth were used to evaluate the maximum vertical extent of potential constituent migration. The total constituent soil sampling and analysis data are presented in Appendix P. Approximate sample locations are presented in Figure 12.1.

12.4.4.3 Data Gaps

According to the TSD, total thallium concentrations were unknown.

12.4.4.4 Results and Conclusions

Only concentrations of thallium were unknown. Concentrations of other constituents were at or below background.

12.4.5 Investigation #4 – Thallium (1999)

In September 1999, soil boring samples were collected and analyzed for total thallium at this SWMU as part of an overall investigation of total thallium concentrations. The total thallium data are presented in Appendix B.

12.4.5.1 Nonsampling Data Collection

No nonsampling activities were performed at this SWMU.

12.4.5.2 Sampling Data Collection

In September 1999, a total of 8 soil boring samples and 1 associated QA/QC sample were collected for total thallium analysis.

The rationale for selecting sample depths at mud pits during the previous sampling was based on an evaluation of the SWMU 001s site, and historical information contained in the RFA. Samples collected for metals analyses in the mud pit area at the 12- to 24-inch depth were used to provide data from the depth where the highest concentration of potential hazardous constituents was anticipated. Samples collected at the 60- to 72-inch depth were used to quantify the maximum vertical extent of potential constituent migration. The total thallium soil sampling and analysis data are presented in Appendix B.

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12.4.5.3 Data Gaps

No data gaps exist for this SWMU.

12.4.5.4 Results and Conclusions

Thallium was detected in one sample collected outside the SWMU slightly above the laboratory detection limit (i.e., 0.13 ppm versus 0.10 ppm detection limit). As described in Appendix B, thallium has been eliminated as a constituent of concern for the SWMUs. Consequently, all measured constituent concentrations for this SWMU are at or below background.

12.5 Site Conceptual Model

The following subsections define various aspects of the conceptual model developed for this SWMU.

12.5.1 Nature and Extent of Contamination

The TSD identified thallium as a potential constituent of concern for the mud pit materials in this SWMU. As described in Appendix B, samples were collected at this SWMU in September 1999 and analyzed for thallium. Thallium was detected in one sample collected outside the SWMU. As described in Appendix B, thallium has been eliminated as a constituent of concern for the SWMUs. Based on the information contained in Appendix B, there has been no release of hazardous constituents at this SWMU.

12.5.2 Environmental Fate

As stated above, available data indicate that no hazardous constituents exist in SWMU 001s above background. Based on the criteria provided in Table 4 of the TSD, there has been no release of hazardous waste (including hazardous constituents) from this SWMU that poses a threat to human health or the environment.

12.6 Site Assessments

No site assessments or risk assessments were required, because there has been no release of hazardous waste (including hazardous constituents) from this SWMU.

12.6.1 Summary

No screening assessments were required, because there has been no release of hazardous waste (including hazardous constituents) from this SWMU.

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12.6.2 Screening Assessments

No human health or ecological assessments were required, there has been no release of hazardous waste (including hazardous constituents) from this SWMU.

12.6.2.1 Human Health

No human health screening assessment was required, there has been no release of hazardous waste (including hazardous constituents) from this SWMU.

12.6.2.2 Ecological

No ecological screening assessment was required, there has been no release of hazardous waste (including hazardous constituents) from this SWMU.

12.6.3 Risk Assessments

This section discusses the baseline risk assessment for human health and ecological risk.

12.6.3.1 Human Health

A baseline human health risk assessment is not required for SWMU 001s, because there has been no release of hazardous waste (including hazardous constituents) from this SWMU.

12.6.3.2 Ecological

A baseline ecological risk assessment is not required for SWMU 001s, because there has been no release of hazardous waste (including hazardous constituents) from this SWMU.

12.6.4 Other Applicable Assessments

Applicable assessments pertaining to surface water, groundwater, and underground storage tanks are discussed below.

12.6.4.1 Surface Water

No surface water is present at this site and this subsection is not applicable.

12.6.4.2 Groundwater

No groundwater evaluation is required, because there has been no release of hazardous waste (including hazardous constituents) from this SWMU.

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12.6.4.3 Underground Storage Tanks

No underground storage tanks are known to have been present at this site. This section is, therefore, not applicable.

12.6.4.4 Other

No other assessments are required.

12.7 No Further Action Petition

The NMED has developed six criteria to identify whether a site should be identified for NFA (NMED, 1999b). Based on these criteria, an NFA petition is reasonable if:

- The site does not exist;
- The site was not used for the management of hazardous constituents;
- There was no release of hazardous constituents to the environment;
- There was a release, but hazardous constituents are at acceptably low levels;
- There was a release, but the site has been characterized and/or closed under another authority; or
- There was a release, but the site was remediated.

The rationale and criterion for this NFA petition are discussed in the following subsections.

12.7.1 Rationale

Based on the field investigations for the ERDA-9 mud pit, an NFA is being recommended for the ERDA-9 mud pit for the following reason: no COCs were present in concentrations considered hazardous to human health or the environment. This mud pit meets Criterion 3.

12.7.2 Criterion

Based on the evidence provided above, an NFA determination is requested for SWMU 001s in conformance with Criterion 3 for the ERDA-9 mud pit.

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13.0 SWMU 001t (IMC-374 MUD PIT)

The following subsections provide a description of the SWMU, an assessment of available site characterization data, risk assessment information and rationale for this NFA petition.

13.1 Summary

The Permittees are requesting an NFA decision for SWMU 001t, IMC-374 mud pit. SWMU 001t consists of a drilling mud pit associated with the IMC-374 potash exploration borehole. Review and analysis of relevant data and documentation provided for this SWMU demonstrate that the IMC-374 drilling mud pit was closed under USGS authority in 1965.

13.2 Description and Operational History

The site description and operational history are provided in the following subsections.

13.2.1 Site Description

SWMU 001t is located in the SE $\frac{1}{4}$ of the SE $\frac{1}{4}$ of the SW $\frac{1}{4}$ of Section 30, Township 22 South, Range 31 East. The abandoned mud pit constructed for the drilling of borehole 374 by the International Mineral and Chemical Corporation (IMC-374) is SWMU 001t. A sketch of SWMU 001t is presented in Figure 13.1.

The mud pit area is located in a hummocky sandy area along the west side of the drill pad. The mud pit area measures approximately 15 feet by 70 feet. No mud pit liners were encountered during the boring of sampling sites. An area of slightly stained soil, originally referenced in the RFA, was not evident during the sampling visits, and may have resulted from a precipitation event prior to the RFA site visit.

13.2.2 Operational History

The IMC-374 exploration borehole was drilled by Boyles Brothers Drilling Company in April 1965. The total depth of the hole was 1,149 feet. The IMC-374 site was closed by the USGS in 1965 (see Appendix D).

The USGS Conservation Division was the approval authority for potash exploration boreholes drilled during the period 1953 through 1978 in Eddy County, New Mexico. During this period, the USGS administered the drilling programs under the authority granted it by the U.S. Congress.

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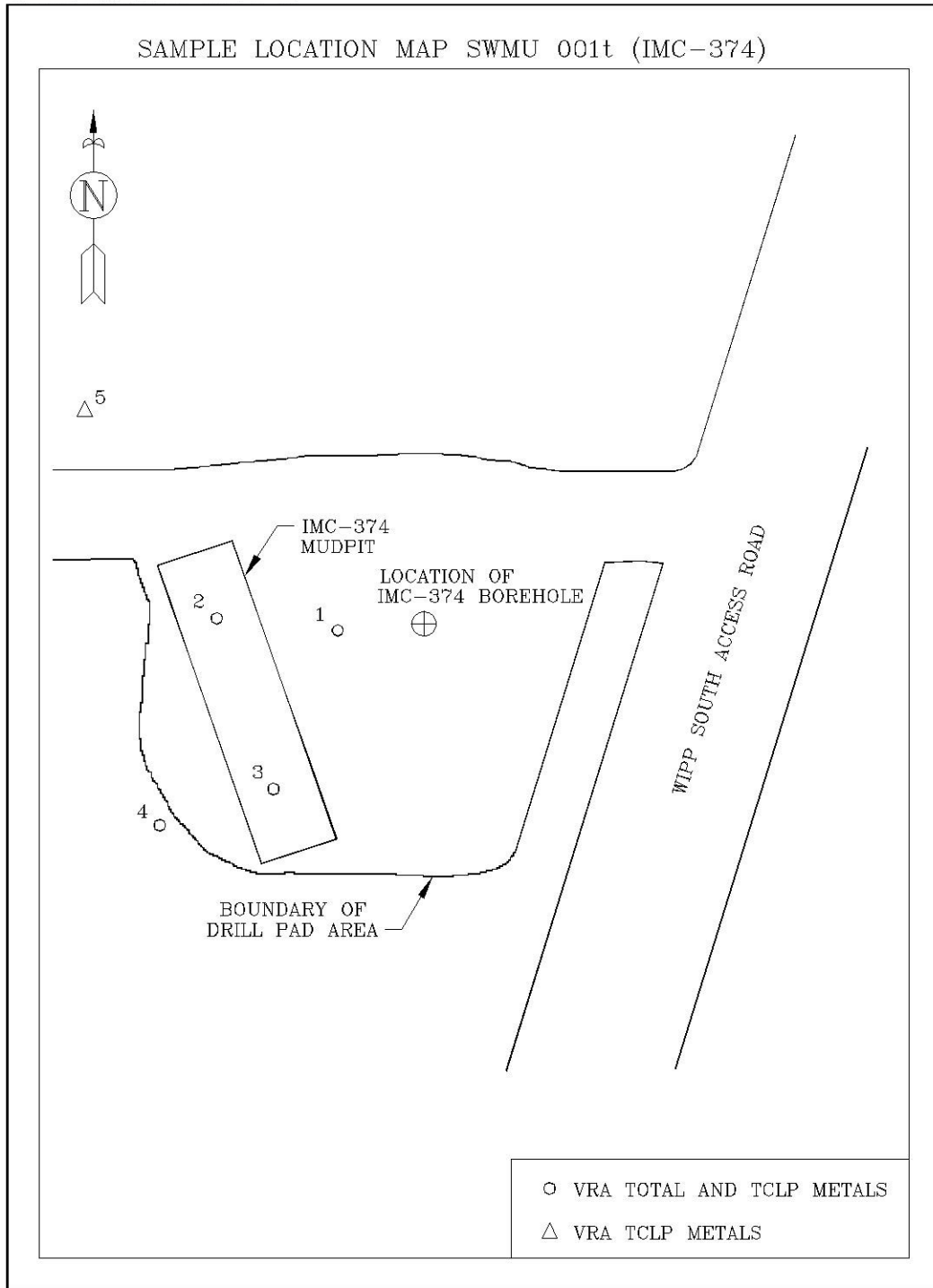


Figure 13.1 - Sample Location Sketch - SWMU 001t (IMC-374 Mud Pit) (map not to scale)

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The USGS permitted private exploration boreholes, which were drilled by mineral leaseholders. The USGS received and approved Sundry Notices and Reports on Wells from leaseholders. Prior to drilling a borehole, the company submitted a Notice of Intention to Drill for approval by the USGS. Following completion of the drilling and closure of the drilling location, the company notified the USGS of its intention to abandon the site. Upon approval of the notice, the USGS considered the drilling location closed. No additional closure documentation was required.

The USGS approved the closure and abandonment of the drilling sites according to then current requirements. The permitting and closure activities for potash exploration were established by the USGS in the early 1950's. These activities have not changed substantially since that time, as evidenced by recent permits being granted by the BLM.

Saturated brine was used to complete the IMC-374 borehole. Closure documentation for IMC-374 is included in Appendix D. Other information on the IMC-374 drilling is included in Appendix Q.

13.3 Land Use

This section presents a summary of current and future/proposed land use for SWMU 001t.

13.3.1 Current

This SWMU is located within the 16-section WLWA. The WIPP Land Withdrawal Act (Public Law 102-579) created the WLWA in October 1992. This Act transferred the jurisdiction of the WLWA from the Secretary of the Interior to the Secretary of Energy. In accordance with sections 3(a)(1) and (3) of the Act, these lands ". . . are withdrawn from all forms of entry, appropriation, and disposal under the public land laws . . ." and are reserved for the use of the Secretary [of Energy] for the construction, experimentation, operation, repair and maintenance, disposal, shutdown, monitoring, decommissioning, and other authorized activities, associated with the purposes of WIPP as set forth in section 213 of the Department of Energy National Security and Military Applications of Nuclear Energy Act of 1980 (Public Law 96-164; 93 Statute 1259, 1265) and this Act." SWMU 001t is located on land under the jurisdiction of the DOE. The land around this SWMU is occasionally used for livestock grazing, and recreational activities; no other current uses exist.

13.3.2 Future/Proposed

The facility operational period is estimated to be 35 years with a 30-year postclosure care period. Active institutional controls will be maintained during postclosure for 100 years. The future/proposed land use is industrial and recreational.

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13.4 Investigatory Activities

SWMU 001t was investigated in a series of four investigations. The following subsections describe previous sampling activities that have been conducted at the site.

13.4.1 Summary

SWMU 001t was visually inspected by the NMED in 1992 as part of a RFA. No samples were collected. SWMU 001t was initially investigated in 1995 under the VRA program for TCLP metals. A subsequent investigation in 1996 evaluated total metals concentrations. In September 1999, soil samples were collected and analyzed for total thallium. The following subsections describe data that were collected at SWMU 001t.

13.4.2 Investigation #1 – RFA

SWMU 001t was visually inspected by the NMED in 1992 as part of a RFA.

13.4.2.1 Nonsampling Data Collection

No nonsampling data collection was performed during the RFA.

13.4.2.2 Sampling Data Collection

No sampling activities were performed at this SWMU during the RFA.

13.4.2.3 Data Gaps

Because there were no samples collected during the RFA at this SWMU, there were no data available for risk-based decision making.

13.4.2.4 Results and Conclusions

The RFA concluded that the potential release of hazardous constituents to soil was high. The RFA also concluded that migration potential to groundwater was moderate relative to other locations on site.

13.4.3 Investigation #2 – VRA (1995)

As part of the VRA 1995 investigation, soil samples were collected for TCLP analysis.

13.4.3.1 Nonsampling Data Collection

No nonsampling activities were performed at this SWMU during this investigation.

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13.4.3.2 Sampling Data Collection

During the summer 1995 sampling event at SWMU 001t, a total of 20 soil boring samples and 6 associated QA/QC samples were collected for TCLP analysis to assess the potential for release of hazardous constituents from the SWMU 001t mud pit (DOE, 1996).

The rationale for selecting sample depths at mud pits during the previous sampling was based on an evaluation of the SWMU 001t site, and historical information contained in the RFA. Samples collected for analyses in the mud pit area at the 12- to 24-inch depth were used to provide data from the depth where the highest concentration of potential hazardous constituents was anticipated. Samples collected at the 60- to 72-inch depth were used to quantify the maximum vertical extent of potential constituent migration. The TCLP soil sampling and analysis data are presented in Appendix Q. Approximate sample locations are presented in Figure 13.1.

13.4.3.3 Data Gaps

The sample collection and TCLP analyses performed during 1995 did not allow determination of total metals concentrations in the mud pit material.

13.4.3.4 Results and Conclusions

The sample collection and TCLP analyses, performed during 1995, demonstrated that the material in the mud pits was not a hazardous waste.

13.4.4 Investigation #3 – VRA (1996)

As part of the VRA 1996 investigation soil samples were collected for total constituent analysis.

13.4.4.1 Nonsampling Data Collection

No nonsampling activities were performed at this SWMU.

13.4.4.2 Sampling Data Collection

Soil sampling locations at the SWMU were sampled again in summer 1996. During the summer of 1996 sampling event, 12 soil boring samples (8 samples for metals analysis, and 4 samples for volatiles analysis) and 2 associated QA/QC samples were collected for total constituent analysis to further characterize the vertical and horizontal extent of any potential release of hazardous constituents from the SWMU 001t mud pit.

The rationale for selecting sample depths at mud pits during the previous sampling was based on an evaluation of the SWMU 001t site, and historical information contained in the RFA. Samples collected for metals analyses in the mud pit area at the 12- to

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24-inch depth were used to provide data from the depth where the highest concentration of potential hazardous constituents was anticipated. Samples collected at the 60- to 72-inch depth were used to quantify the maximum vertical extent of potential constituent migration. The total constituent soil sampling and analysis data are presented in Appendix Q. Approximate sample locations are presented in Figure 13.1.

13.4.4.3 Data Gaps

According to the TSD, total thallium concentrations were unknown.

13.4.4.4 Results and Conclusions

Based on documentation presented in Appendix D, this site was closed by the USGS in 1965.

13.4.5 Investigation #4 – Thallium (1999)

In September 1999, soil boring samples were collected and analyzed for total thallium at this SWMU as part of an overall investigation of total thallium concentrations. The total thallium data are presented in Appendix B.

13.4.5.1 Nonsampling Data Collection

No nonsampling activities were performed at this SWMU.

13.4.5.2 Sampling Data Collection

During September 1999, a total of 10 soil boring samples and 3 associated QA/QC samples were collected and analyzed for total thallium.

The rationale for selecting sample depths at mud pits during the previous sampling was based on an evaluation of the SWMU 001t site, and historical information contained in the RFA. Samples collected for analyses in the mud pit area at the 12- to 24-inch depth were used to provide data from the depth where the highest concentration of potential hazardous constituents was anticipated. Samples collected at the 60- to 72-inch depth were used to quantify the maximum vertical extent of potential constituent migration. The total thallium soil sampling and analysis data are presented in Appendix B.

13.4.5.3 Data Gaps

No data gaps exist for this SWMU.

13.4.5.4 Results and Conclusions

Based on the information presented in Appendix B, no elevated thallium concentrations exist at this SWMU.

13.5 Site Conceptual Model

The following subsections define various aspects of the conceptual model developed for this SWMU.

13.5.1 Nature and Extent of Contamination

As stated above, this site was closed by the USGS in 1965.

13.5.2 Environmental Fate

As stated above, this site was closed by the USGS in 1965.

13.6 Site Assessments

No site assessments or risk assessments were required, because the site was closed by the USGS in 1965.

13.6.1 Summary

No screening assessments were required, because the site was closed by the USGS in 1965.

13.6.2 Screening Assessments

No human health or ecological assessments were required, because the site was closed by the USGS in 1965.

13.6.2.1 Human Health

No human health screening assessment was required, because the site was closed by the USGS in 1965.

13.6.2.2 Ecological

No ecological screening assessment was required, because the site was closed by the USGS in 1965.

13.6.3 Risk Assessments

This section discusses the baseline risk assessment for human health and ecological risk.

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13.6.3.1 Human Health

A baseline human health risk assessment is not required for SWMU 001t, because the site was closed by the USGS in 1965.

13.6.3.2 Ecological

A baseline ecological risk assessment is not required for SWMU 001t, because the site was closed by the USGS in 1965.

13.6.4 Other Applicable Assessments

Applicable assessments pertaining to surface water, groundwater, and underground storage tanks are discussed below.

13.6.4.1 Surface Water

No surface water is present at this site and this subsection is not applicable.

13.6.4.2 Groundwater

The site was closed by the USGS in 1965. No groundwater evaluation is required.

13.6.4.3 Underground Storage Tanks

No underground storage tanks are known to have been present at this site. This section is, therefore, not applicable.

13.6.4.4 Other

No other assessments are required.

13.7 No Further Action Petition

The NMED has developed six criteria to identify whether a site should be identified for NFA (NMED, 1999b). Based on these criteria, an NFA petition is reasonable if:

- The site does not exist;
- The site was not used for the management of hazardous constituents;
- There was no release of hazardous constituents to the environment;
- There was a release, but hazardous constituents are at acceptably low levels;

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- There was a release, but the site has been characterized and/or closed under another authority; or
- There was a release, but the site was remediated.

The rationale and criterion for this NFA petition are discussed in the following subsections.

13.7.1 Rationale

Based on the documentation provided in Appendix D for the IMC-374 mud pit, an NFA is being recommended for this SWMU for the following reason: the site was closed by the USGS in 1965. This SWMU meets Criterion 5.

13.7.2 Criterion

Based on the evidence provided above, an NFA determination is requested for SWMU 001t in conformance with Criterion 5 for the IMC-374 mud pit.

14.0 SWMU 001x (WIPP-13 MUD PIT)

The following subsections provide a description of the SWMU, an assessment of available site characterization data, risk assessment information and rationale for this NFA petition.

14.1 Summary

The Permittees are requesting an NFA decision for SWMU 001x, WIPP-13 mud pit. SWMU 001x consists of a drilling mud pit associated with the WIPP-13 exploration borehole. Review and analysis of relevant data for SWMU 001x indicate that concentrations of COCs in the WIPP-13 drilling mud pit are less than applicable risk-based screening levels for industrial facilities and for residential land use for three COCs.

Thus, an NFA determination is requested for SWMU 001x based on additional sampling conducted in the summer of 2001. Data from this sampling event demonstrate that COCs that may have been released from the WIPP-13 drilling mud pit into the environment pose an acceptable level of risk under current and projected future land use. The following subsections discuss the characterization and setting and field investigation activities that have been conducted at SWMU 001x.

14.2 Description and Operational History

The site description and operational history are provided in the following subsections.

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14.2.1 Site Description

SWMU 001x is located in the NW $\frac{1}{4}$ of the NE $\frac{1}{4}$ of the SW $\frac{1}{4}$ of Section 17, Township 22 South, Range 31 East. The abandoned mud pit constructed for the drilling of borehole WIPP-13 is SWMU 001x. A sketch of SWMU 001x is presented in Figure 14.1.

During the sampling visits to SWMU 001x, a single mud pit was located that measures approximately 100 feet wide and 120 feet long. The mud pits area is sunken approximately 1.5 feet below the surface grade of the pad. No vegetation is growing on the mud pit area, and the soil in the mud pit is a dark grey color. Black plastic liners protrude through the surface and delineate the mud pit.

14.2.2 Operational History

The WIPP-13 borehole was drilled by the Pennsylvania Drilling company in July 1978 to a depth of 1,025 feet. The borehole was deepened to 3,850 feet in 1979. Once drilling of the WIPP-13 borehole was completed in 1978, the entire 8-inch borehole was filled with salt-based drilling mud. In 1979, the well was reamed to a 12.25-inch open hole diameter. The hole was then cased and cemented with 9.75-inch casing to the upper part of the Salado Formation at a depth of 1,025 feet. The hole was then deepened to a depth of 3,850 feet in the Castile Formation. WIPP-13 was left filled with a brine-gel drilling fluid and capped at the surface. In 1985, the hole was acidified after a retrievable bridge plug was set in the casing at a depth of approximately 740 feet. The casing was then perforated between 702 feet and 727 feet. This portion of the hole was capped at the surface and the hole left open for water level monitoring.

Salt-based drilling fluid was used during initial drilling and a brine-gel mixture was used for later reaming and deepening of the hole in 1979. Additionally, 8,600 liters of a 20 percent concentration hydrochloric acid solution was used in 1986 to complete the well for monitoring purposes. Aerial photographs from 1986 show no evidence that the mud pit was reopened for this activity.

Information on the WIPP-13 drilling is included in Appendix R.

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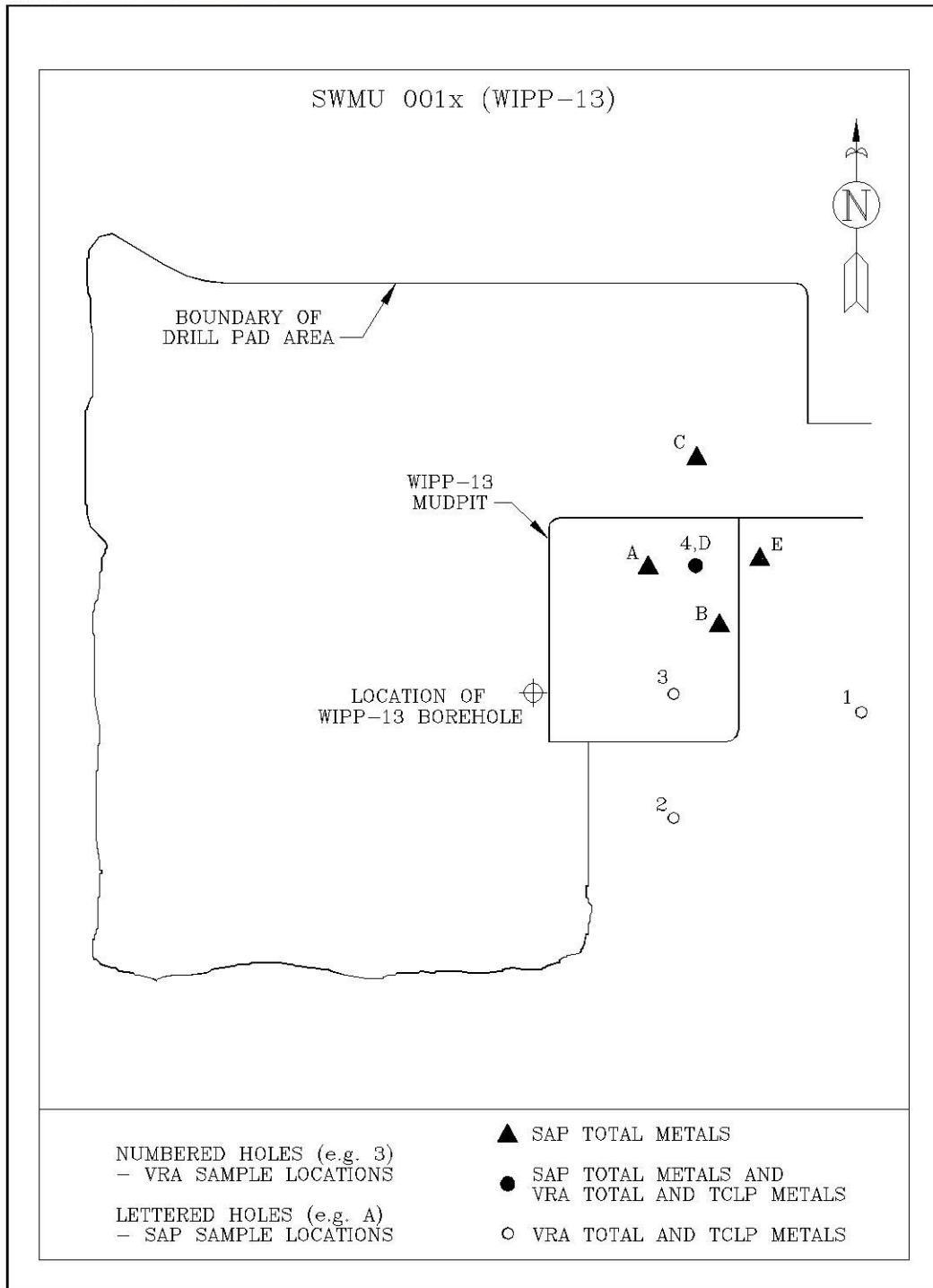


Figure 14.1 - Sample Location Sketch - SWMU 001x (WIPP-13 Drilling Mud Pit[s])
(map not to scale)

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14.3 Land Use

This section presents a summary of current and future/proposed land use for SWMU 001x.

14.3.1 Current

This SWMU is located within the 16-section WLWA. The WIPP Land Withdrawal Act (Public Law 102-579) created the WLWA in October 1992. This Act transferred the jurisdiction of the WLWA from the Secretary of the Interior to the Secretary of Energy. In accordance with sections 3(a)(1) and (3) of the Act, these lands ". . . are withdrawn from all forms of entry, appropriation, and disposal under the public land laws . . ." and are reserved for the use of the Secretary [of Energy] for the construction, experimentation, operation, repair and maintenance, disposal, shutdown, monitoring, decommissioning, and other authorized activities, associated with the purposes of WIPP as set forth in section 213 of the Department of Energy National Security and Military Applications of Nuclear Energy Act of 1980 (Public Law 96-164; 93 Statute 1259, 1265) and this Act." SWMU 001x is located on land under the jurisdiction of the DOE. The land around this SWMU is occasionally used for livestock grazing, and recreational activities; no other current uses exist.

14.3.2 Future/Proposed

The facility operational period is estimated to be 35 years with a 30-year postclosure care period. Active institutional controls will be maintained during postclosure for 100 years. The future/proposed land use is industrial and recreational.

14.4 Investigatory Activities

SWMU 001x was investigated in a series of four investigations. The following subsections describe previous sampling activities that have been conducted at the site.

14.4.1 Summary

SWMU 001x was visually inspected by the NMED in 1992 as part of a RFA. No samples were collected. SWMU 001x was initially investigated in 1995 under the VRA program for TCLP metals. A subsequent investigation in 1996 evaluated total metals concentrations. During the summer of 2001, additional samples were collected at the SWMU to define the extent of metal concentrations in the SWMU. The following subsections describe data that were collected at SWMU 001x.

14.4.2 Investigation #1 – RFA

SWMU 001x was visually inspected by the NMED in 1992 as part of a RFA.

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14.4.2.1 Nonsampling Data Collection

No nonsampling data collection was performed during the RFA.

14.4.2.2 Sampling Data Collection

No sampling activities were performed at this SWMU during the RFA.

14.4.2.3 Data Gaps

Because there were no samples collected during the RFA at this SWMU, there were no data available for risk-based decision making.

14.4.2.4 Results and Conclusions

The RFA concluded that the potential release of hazardous constituents to soil was high. The RFA also concluded that migration potential to groundwater was low relative to other locations on site.

14.4.3 Investigation #2 – VRA (1995)

As part of the VRA 1995 investigation soil samples were collected for TCLP analysis.

14.4.3.1 Nonsampling Data Collection

No nonsampling activities were performed at this SWMU during this investigation.

14.4.3.2 Sampling Data Collection

During the summer 1995 sampling event at SWMU 001x, a total of 16 soil boring samples and 8 associated QA/QC samples were collected for TCLP analysis to assess the potential for release of hazardous constituents from the SWMU 001x mud pit (DOE, 1996). Appendix R contains a summary of these data.

The rationale for selecting sample depths at mud pits was based on an evaluation of the SWMU 001x site, and historical information contained in the RFA (NMED, 1994). Samples collected for TCLP analyses in the mud pit area at the 12- to 24-inch depth were used to provide data from the depth where the highest concentration of potential hazardous constituents was anticipated. Samples collected at the 60- to 72-inch depth were used to evaluate the maximum vertical extent of potential constituent migration. Approximate sample locations are presented in Figure 14.1.

14.4.3.3 Data Gaps

The sample collection and TCLP analyses performed during 1995 did not allow determination of total metals concentrations in the mud pit material.

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14.4.3.4 Results and Conclusions

The sample collection and TCLP analyses, performed during 1995, demonstrated that the material in the mud pits was not a hazardous waste.

14.4.4 Investigation #3 – VRA (1996)

As part of the VRA 1996 investigation, soil samples were collected for total constituent analysis.

14.4.4.1 Nonsampling Data Collection

No nonsampling activities were performed at this SWMU.

14.4.4.2 Sampling Data Collection

Soil sampling locations at the SWMU were sampled again in the summer of 1996. During the summer 1996 sampling event, 12 soil boring samples (8 samples for metals analysis, and 4 samples for volatiles analysis) and 2 associated QA/QC samples were collected for total constituent analysis to further characterize the vertical and horizontal extent of any potential release of hazardous constituents from the SWMU 001x mud pit.

The rationale for selecting sample depths at mud pits was based on an evaluation of the SWMU 001x site, and historical information contained in the RFA (NMED, 1994). Samples collected for analyses in the mud pit area at the 12- to 24-inch depth were used to provide data from the depth where the highest concentration of potential hazardous constituents was anticipated. Samples collected at the 60- to 72-inch depth were used to evaluate the maximum vertical extent of potential constituent migration.

Table 14.1 presents a summary of the soil sampling and analysis data for barium, chromium, and lead for this investigation. Additional data are contained in Appendix R. The soil sampling locations are presented in Figure 14.1.

**Table 14.1
Summary of Measured Concentrations for Constituents of Concern
Voluntary Release Assessment (1996 Samples)
SWMU 001x (WIPP-13 Drilling Mud Pit[s])**

Description	Hole #	Depth (in. bgs)	Constituent	Concentration (ppm)	Qualifier
WIPP-13 Drilling Mud Pits	1	12 to 24	Barium	10	
			Chromium	3	
			Lead	1.6	
		60 to 72	Barium	12	
			Chromium	4	
			Lead	1.5	

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**Table 14.1
Summary of Measured Concentrations for Constituents of Concern
Voluntary Release Assessment (1996 Samples)
SWMU 001x (WIPP-13 Drilling Mud Pit[s])**

Description	Hole #	Depth (in. bgs)	Constituent	Concentration (ppm)	Qualifier
	2	12 to 24	Barium	13	
			Chromium	6	
			Lead	1.3	
		60 to 72	Barium	17	
			Chromium	3	
			Lead	1.7	
	3	12 to 24	Barium	16	
			Chromium	7	
			Lead	1.8	
		60 to 72	Barium	40	
			Chromium	8	
			Lead	2.8	
4	12 to 24	Barium	3800		
		Chromium	36		
		Lead	270		
	60 to 72	Barium	680		
		Chromium	10		
		Lead	5		

Notes:

NMED Industrial Screening values = 15,000 ppm for barium; 660 ppm for chromium; 1,000 ppm for lead
 NMED Residential Screening values = 5,200 ppm for barium; 230 ppm for chromium; 400 ppm for lead
 Background concentration for barium = 197 ppm
 Background concentration for chromium = 26 ppm
 Background concentration for lead = 5.4 ppm
 ppm = parts per million
 in. bgs = inches below ground surface
 J = Result should be considered an estimated value.
 SWMU = Solid Waste Management Unit

14.4.4.3 Data Gaps

According to the TSD (NMED, 1999b), the results of the VRA sampling investigations were not adequate to define the nature, rate, and extent of hazardous constituents (barium, chromium, and lead) in this SWMU.

14.4.4.4 Results and Conclusions

The results of the VRA indicated that no hazardous constituents exist in SWMU 001x that are above the action levels derived from the proposed Subpart S regulations

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(40 CFR 264.514, FR. Vol. 55, No. 145). In addition, the barium, chromium, and lead concentrations presented in Table 14.1 do not exceed the industrial and residential screening levels presented in NMED guidance (2000).

14.4.5 Investigation #4 – SAP (2001)

Soil concentrations of barium were further evaluated during this investigation.

14.4.5.1 Nonsampling Data Collection

No nonsampling activities were performed at this SWMU.

14.4.5.2 Sampling Data Collection

As part of the SAP implementation, additional subsurface soil samples were collected within and outside the SWMU 001x boundary during the summer of 2001. Samples were collected by means of direct push methodology at three locations in the mud pit and two locations outside the mud pit. Direct push technology refers to the forcing of a sampling device, constructed of stainless steel, to the desired sampling depth using a hydraulic ram. The purpose of the sampling was to further define the extent of barium, chromium, and lead concentrations above background. Shallow samples were collected and composited over a two-foot interval. Deep samples were collected and composited over a one foot interval. The NMED collected five split samples for independent analysis as a quality assurance evaluation of the DOE sampling and analysis program at this SWMU. Figure 14.1 is a site sketch showing SAP sample locations. Total metal concentrations for samples analyzed by the DOE and the NMED are presented in Table 14.2.

**Table 14.2
Summary of Measured Concentrations for Constituents of Concern
Sampling and Analysis Plan (2001 Samples)
SWMU 001x (WIPP-13 Drilling Mut Pit[s])**

Description	Hole #	Depth (in. bgs)	Constituent	Concentration (ppm)	Qualifier
WIPP-13 Mud Pit	A	6 to 30	Barium	1330	E, *
			Chromium	10.8	
			Lead	7	
		84 to 96	Barium	29.6	E, *
			Chromium	9.1	
			Lead	3.4	
	B	6 to 30	Barium	2230 / 359 ^a	E, *
			Chromium	13.4 / 20.3	
Lead			11 / 21.0		
Duplicate		Barium	1790 / 846	E, *	
		Chromium	17.9 / 16.1		
		Lead	15 / 13.8	*	

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**Table 14.2
Summary of Measured Concentrations for Constituents of Concern
Sampling and Analysis Plan (2001 Samples)
SWMU 001x (WIPP-13 Drilling Mut Pit[s])**

Description	Hole #	Depth (in. bgs)	Constituent	Concentration (ppm)	Qualifier
		84 to 96	Barium	31.5 / 34.3	E, * *
			Chromium	7.1 / 8.2	
			Lead	4.3 / 4.9	
	C	28 to 40	Barium	21.6	E, *, J
			Chromium	5.7	
			Lead	2.4	
		96 to 108	Barium	106	N E, * *
			Chromium	2.9	
			Lead	1.9	
	D	108 to 120	Barium	50.6	E, * *
			Chromium	4.3	
			Lead	2.7	
E	6 to 30	Barium	16.1 / 14.7	B E, * *	
		Chromium	4.7 / 3.2		
		Lead	1.8 / 1.9		
	84 to 96	Barium	36 / 53.2	E, * *	
Chromium		8.8 / 10.7			
Lead		4.5 / 5.4			

Notes:

Background concentration for barium = 197 ppm
 Background concentration for chromium = 26 ppm
 Background concentration for lead = 5.4 ppm
 NMED Industrial Screening values = 15,000 ppm for barium; 660 ppm for chromium;
 1,000 ppm for lead
 NMED Residential Screening values = 5,200 ppm for barium; 230 ppm for chromium;
 400 ppm for lead
 ppm = parts per million
 in. bgs = inches below ground surface
 * = Duplicate sample results not within laboratory control limits
 E = Result from serial dilution differs from original result by more than 10 percent
 J = Value qualified as estimated during data validation
 B = Reported value is below the required reporting limit, but above the instrument
 detection limit.
 N = Result for associated matrix spike not within laboratory limits
^a Results represent DOE/NMED analyses. NMED data are reported second.
 SWMU = Solid Waste Management Unit

14.4.5.3 Data Gaps

Analytical data are sufficient to characterize the nature and extent of releases of COCs at SWMU 001x. There are no further data gaps regarding characterization of SWMU 001x.

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14.4.5.4 Results and Conclusions

The DOE and NMED data for split samples are generally consistent. Although some of the barium, chromium, and lead concentrations presented in Tables 14.1 and 14.2 exceed background, the concentrations do not exceed the industrial and residential screening levels presented in NMED guidance (2000). In accordance with the data quality objectives defined in the SAP, the horizontal and vertical dimensions of the concentrations above background have been defined within 50 percent and the average (and maximum) concentrations are less than the NMED soil screening criteria. The highest barium concentration, 3,800 ppm, is approximately 73 percent of the residential screening criterion for barium. The highest chromium concentration, 36 ppm, is approximately 16 percent of the residential screening criterion for chromium. The highest lead concentration, 270 ppm, is approximately 68 percent of the residential screening criterion for lead.

14.5 Site Conceptual Model

The following subsections define various aspects of the conceptual model developed for this SWMU.

14.5.1 Nature and Extent of Contamination

The TSD identified barium, chromium, lead, and thallium as potential constituents of concern for the mud pit materials in this SWMU. Concentrations of barium, chromium, and lead were detected at SWMU 001x by total metals analysis (Table 14.1). In addition, as defined in Appendix B, thallium has been eliminated as a constituent of concern for the SWMUs. The summer 2001 sampling event included collection of ten samples (five locations, two depths at all but one location, and one duplicate sample) and analysis of the ten samples for barium, chromium, and lead. When the results of these samples are combined with the results of the 1996 VRA sampling, elevated barium, chromium, and lead concentrations (relative to background) exist in an area approximately 0.15 acre in size (approximately one-half the area of the mud pit). Elevated barium concentrations exist from approximately 6 inches to no more than 8 feet below ground surface.

14.5.2 Environmental Fate

The depth to proven groundwater below SWMU 001x is at least 700 feet, and it is estimated that less than 0.5 inch of precipitation per year infiltrates the underlying strata. Thus, the potential for these metals to migrate to groundwater is extremely low. The mud pit material has been covered with native soil excavated from the mud pit, so there is no possibility for surface water or wind transport of mud pit material. Furthermore, because the land has been withdrawn from public use and the potential for intrusive activities is low, the potential exposure of human receptors to metals in the SWMU is minimal to nonexistent.

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The current land use for SWMU 001x is industrial. In addition, the future/proposed land use is industrial and/or recreational. Measured metal concentrations in soil are below the residential screening criterion in NMED guidance. Potential biota receptors include flora and fauna at the site. Direct soil ingestion is considered the potential exposure route for biota, in addition to ingesting COCs through food chain transfers or the direct uptake of COCs.

14.6 Site Assessments

The site assessment process for SWMU 001x includes risk-screening assessments. This section briefly summarizes the site assessment results. The following subsections describe site assessments that have been conducted to identify human and ecological risks associated with SWMU 001x.

14.6.1 Summary

The site assessment concludes that SWMU 001x does not have potential to affect human health under an industrial or residential land use scenario. After considering the uncertainties associated with the available data and modeling assumptions, ecological risks associated with SWMU 001x were not found to be significant. Descriptions of these assessments are provided in the following subsections.

14.6.2 Screening Assessments

Risk screening assessments were performed for both human health risk and ecological health risk for SWMU 001x. The following subsections describe the results.

14.6.2.1 Human Health

SWMU 001x is part of the WIPP facility. Measured concentrations from the summer 2001 and 1996 VRA sampling and analyses were compared to the NMED industrial and residential soil screening criteria (NMED, 2001). This comparison demonstrates that all measured concentrations were below the NMED criteria for barium, chromium, and lead. Consequently, it can be concluded that SWMU 001x does not have the potential to affect human health under industrial or residential land use scenarios.

14.6.2.2 Ecological

An ecological screening assessment was performed for SWMU 001x in 1998 (DOE, 1998). Based on an evaluation of uncertainties, ecological risks associated with this site were expected to be low.

14.6.3 Risk Assessments

This section discusses the baseline risk assessment for human health and ecological risk.

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14.6.3.1 Human Health

Because the results of the human health screening assessment summarized in Section 14.6.2.1 indicate that SWMU 001x does not have the potential to affect human health under an industrial or residential land use setting, a baseline human health risk assessment is not required for SWMU 001x.

14.6.3.2 Ecological

An updated ecological screening risk evaluation was performed for SWMU 001x (Appendix C). One ecological screening quotient equal to two was calculated for this SWMU for the deer mouse receptor. Based on the size of the SWMU relative to the size of the WLWA and the thousands of other drilling mud pits outside the WLWA boundary, ecological risk associated with this site is expected to be low or insignificant.

14.6.4 Other Applicable Assessments

Applicable assessments pertaining to surface water, groundwater, and underground storage tanks are discussed below.

14.6.4.1 Surface Water

No surface water is present at this site and this subsection is not applicable.

14.6.4.2 Groundwater

The depth to proven groundwater below SWMU 001x is at least 700 feet, and it is estimated that less than 0.5 inch of precipitation per year infiltrates the underlying strata. Thus, the potential for these metals to migrate to groundwater is extremely low. Groundwater is not currently used nor is likely to be used in the future as a potable source. The groundwater is not potable due to naturally occurring salinity levels. Thus, the potential for metals to migrate to groundwater is extremely low.

14.6.4.3 Underground Storage Tanks

No underground storage tanks are known to have been present at this site. This section is, therefore, not applicable.

14.6.4.4 Other

No other assessments are required.

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14.7 No Further Action Petition

The NMED has developed six criteria to identify whether a site should be identified for NFA (NMED, 1999b). Based on these criteria, an NFA petition is reasonable if:

- The site does not exist;
- The site was not used for the management of hazardous constituents;
- There was no release of hazardous constituents to the environment;
- There was a release, but hazardous constituents are at acceptably low levels;
- There was a release, but the site has been characterized and/or closed under another authority; or
- There was a release, but the site was remediated.

The rationale and criterion for this NFA petition are discussed in the following subsections.

14.7.1 Rationale

Based on the field investigations for the WIPP-13 mud pit, and the human health risk assessment and the ecological risk evaluation, an NFA is being recommended for the WIPP 13-mud pit for the following reason: no COCs were present in concentrations considered hazardous to human health (under a residential land use scenario) or the environment. This mud pit meets Criterion 4.

14.7.2 Criterion

Based on the evidence provided above, an NFA determination is requested for SWMU 001x in conformance with Criterion 4 for the WIPP-13 mud pit.

15.0 SWMU 004a (PORTACAMP STORAGE YARD, WEST SIDE)

The following subsections provide a description of the SWMU, an assessment of available site characterization data, risk assessment information and rationale for this NFA petition.

15.1 Summary

The Permittees are requesting an NFA decision for SWMU 004a, Portacamp Storage Yard, West Side. SWMU 004a is an active materials storage area. Review and analysis of relevant data for SWMU 004a indicate that concentrations of constituents of concern (COCs) in SWMU 004a are less than background.

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Thus, an NFA determination is requested for SWMU 004a based on additional sampling conducted in the summer of 2001. Data from this sampling event demonstrate that no hazardous waste (or hazardous constituents) were released from the Portacamp storage yard. The following subsections discuss the characterization and setting and field investigation activities that have been conducted at SWMU 004a.

15.2 Description and Operational History

The site description and operational history are provided in the following subsections.

15.2.1 Site Description

SWMU 004a, the Portacamp Storage Yard, is an active materials storage area located in the E ½ of the NE ¼ of the NE ¼ of Section 29, Township 22 South, Range 31 East. The Portacamp Storage Area is primarily designed to store new parts and materials such as drums, pipe, and equipment. The Portacamp is also used to store and manage used hydraulic oil, used motor oil, used antifreeze, and discontinued oils prior to recycling or disposal at offsite facilities. A sketch of SWMU 004a is presented in Figure 15.1.

The 300-by-300-foot storage complex is surrounded by a locked, 8-foot chain-link fence. This complex is also divided into two separately managed areas divided by an 8-foot, chain-link fence. The west side of the Portacamp area is managed by WTS, and the east side is managed by Sandia National Laboratories. Access to each area is limited to WTS and Sandia materials control personnel, and the area is regularly patrolled by WIPP security.

The west side of the Portacamp storage yard contains a 100-foot long by 20-foot wide by 14-foot high open-sided metal shed located in the southwest corner of the compound.

15.2.2 Operational History

Stored beneath the shed located in the southwest corner are new hazardous waste handling containers; operational and maintenance equipment; an electric transformer substation; and used oils and lubricants. Beginning in 1995, used oils scheduled for recycling at an offsite facility were stored on spill control pallets under the metal shelter.

The southern half of the WTS Portacamp area is used to store construction and maintenance materials such as steel stock, pipe, fencing materials, and mining timbers. The north central area was historically used as a holding area for nonhazardous waste waters and non-RCRA regulated oils awaiting appropriate disposal or reclamation. Labeled nonhazardous waste drums were historically stored on wooden pallets, which sat directly on the caliche pad. The site inspection revealed four small areas of surface discoloration on the caliche pad in and around the empty nonhazardous waste drum storage area. Digging in the area of the stained soil indicated that soil discoloration was

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confined to the top 6 to 8 inches of caliche, and the largest stain was approximately 3 feet in diameter.

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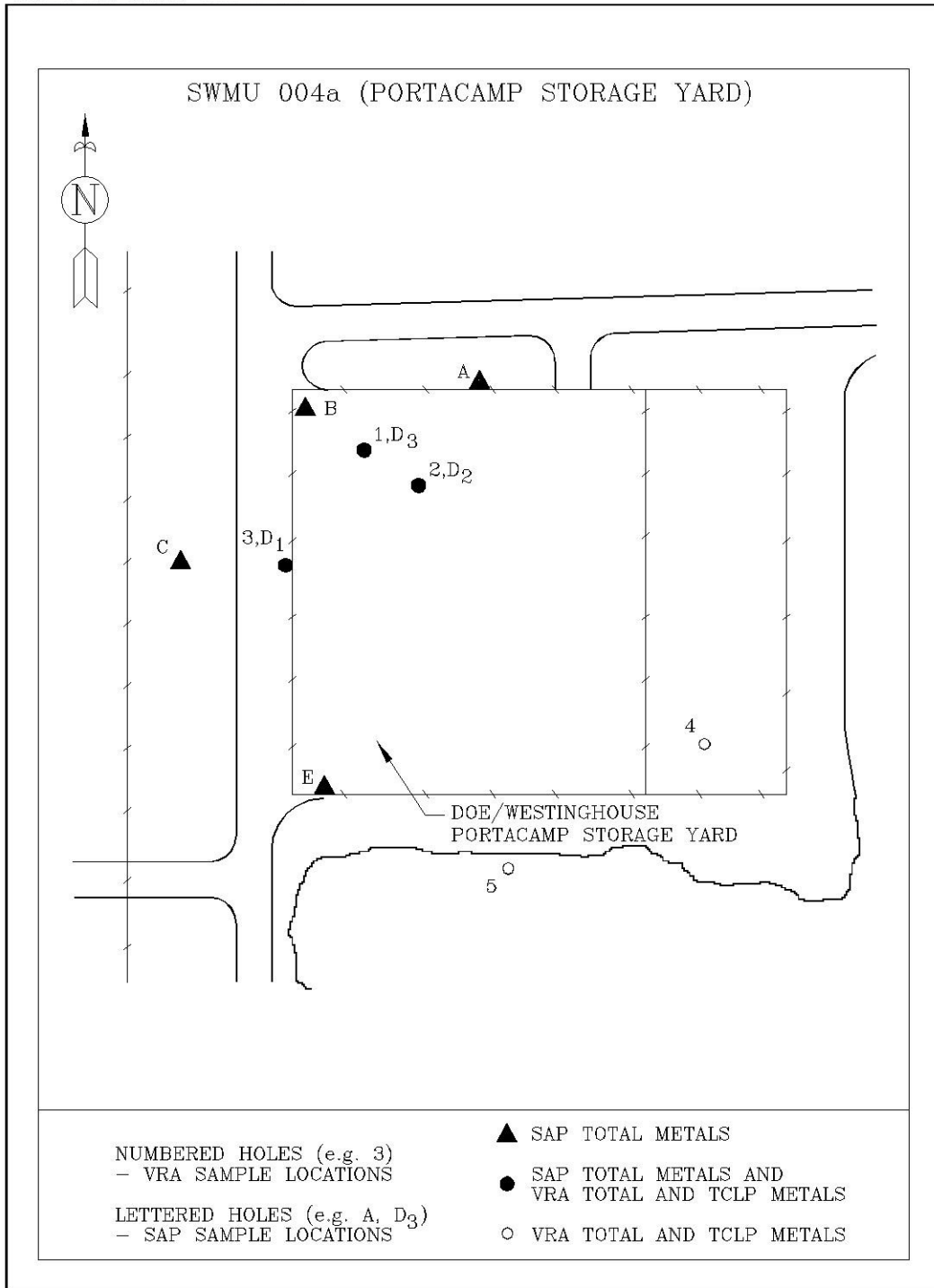


Figure 15.1 - Sample Location Sketch - SWMU 004a (Portacamp Storage Yard, West Side) (map not to scale)

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Equipment and nonhazardous and hazardous materials and wastes have been managed in the Portacamp area since 1976. WIPP began formalized management of hazardous materials and hazardous wastes in 1988. WIPP has developed procedures that provide specific guidance for the management of hazardous wastes generated at WIPP, as well as the identifying spill response and spill remediation requirements at the site.

Beginning in 1991, all RCRA regulated wastes were managed in the WIPP Hazardous Waste Storage Area (Building 474-B). Used oil that contains one or more hazardous constituents is managed at the Hazardous Waste Staging Area located in Building 474-B.

Sampling and analysis information on the Portacamp Storage Yard is included in Appendix S.

15.3 Land Use

This section presents a summary of current and future/proposed land use for SWMU 004a.

15.3.1 Current

This SWMU is located within the exclusive use area, which is a subpart of the 16-section WLWA. The WIPP Land Withdrawal Act (Public Law 102-579) created the WLWA in October 1992. This Act transferred the jurisdiction of the WLWA from the Secretary of the Interior to the Secretary of Energy. In accordance with sections 3(a)(1) and (3) of the Act, these lands ". . . are withdrawn from all forms of entry, appropriation, and disposal under the public land laws . . ." and are reserved for the use of the Secretary [of Energy] for the construction, experimentation, operation, repair and maintenance, disposal, shutdown, monitoring, decommissioning, and other authorized activities, associated with the purposes of WIPP as set forth in section 213 of the Department of Energy National Security and Military Applications of Nuclear Energy Act of 1980 (Public Law 96-164; 93 Statute 1259, 1265) and this Act." SWMU 004a is located within the facility exclusive use areas on land under the jurisdiction of the DOE. Therefore, access is restricted to authorized personnel. No other current uses exist.

15.3.2 Future/Proposed

The facility operational period is estimated to be 35 years with a 30-year postclosure care period. Active institutional controls will be maintained during postclosure for 100 years. The future/proposed land use is industrial and recreational.

15.4 Investigatory Activities

SWMU 004a has been investigated in a series of four investigations. The following subsections describe previous sampling activities that have been conducted at the site.

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15.4.1 Summary

SWMU 004a was visually inspected by the NMED in 1992 as part of a RFA. No samples were collected. SWMU 004a was initially investigated in 1995 under the VRA program for TCLP metals. A subsequent investigation in 1996 evaluated total metals concentrations. During the summer of 2001, additional samples were collected at the SWMU to define the extent of metal concentrations in the SWMU. The following subsections describe data that were collected at SWMU 004a.

15.4.2 Investigation #1 – RFA

SWMU 004a was visually inspected by the NMED in 1992 as part of a RFA.

15.4.2.1 Nonsampling Data Collection

No nonsampling data collection was performed during the RFA.

15.4.2.2 Sampling Data Collection

No sampling activities were performed at this SWMU during the RFA.

15.4.2.3 Data Gaps

Because there were no samples collected during the RFA at this SWMU, there were no data available for risk-based decision making.

15.4.2.4 Results and Conclusions

The RFA concluded that the potential release of hazardous constituents to soil was high. The RFA also concluded that migration potential to groundwater was low relative to other locations on site.

15.4.3 Investigation #2 – VRA (1995)

As part of the VRA 1995 investigation soil samples were collected for TCLP analysis.

15.4.3.1 Nonsampling Data Collection

No nonsampling activities were performed at this SWMU during this investigation.

15.4.3.2 Sampling Data Collection

During the summer 1995 sampling event at SWMU 004a, a total of 26 soil boring samples and 6 associated QA/QC samples were collected for TCLP analysis to assess the potential for release of hazardous constituents from the SWMU (DOE, 1996). Appendix S contains a summary of these data.

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Samples were collected in the Portacamp Storage Yard as well as in the Sandia Portacamp Yard. Sampling at the WTS Portacamp and Sandia Portacamp areas focused on both current and historic waste and material storage areas. Sampling in the Sandia Portacamp area also focused on the area where drilling additives are stored.

Grab samples were collected from the top 48 inches of the compacted caliche surface. Samples were collected from the 12- to 24-inch depth to characterize the area of maximum potential contamination at the Portacamp Storage Yard. The samples collected from a 36- to 48-inch depth were designed to characterize the vertical extent of any potential release onto the compacted caliche storage pad. Additional samples were planned if stained soils were visible at the 48-inch sampling depth. During the Portacamp Storage Yard sampling visit, no stained or discolored soils were encountered. Figure 15.1 is a site map showing approximate sample locations at SWMU 004a.

15.4.3.3 Data Gaps

The sample collection and TCLP analyses performed during 1995 did not allow determination of total metals concentrations in the soil material.

15.4.3.4 Results and Conclusions

The sample collection and TCLP analyses, performed during 1995, demonstrated that the soil was not a hazardous waste.

15.4.4 Investigation #3 – VRA (1996)

As part of the VRA 1996 investigation soil samples were collected for total constituent analysis.

15.4.4.1 Nonsampling Data Collection

No nonsampling activities were performed at this SWMU.

15.4.4.2 Sampling Data Collection

During the summer 1996 sampling event, 26 soil boring samples (10 samples for metals analysis, 8 samples for volatiles analysis, and 8 samples for semivolatiles analysis) and 2 associated QA/QC samples were collected for total constituent analysis to further characterize the vertical and horizontal extent of any potential release of hazardous constituents from SWMU 004a.

Samples were collected in the Portacamp Storage Yard as well as in the Sandia Portacamp Yard. Sampling at the WTS Portacamp and Sandia Portacamp areas focused on both current and historic waste and material storage areas. Sampling in the Sandia Portacamp area also focused on the area where drilling additives are stored.

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Grab samples were collected from the top 48 inches of the compacted caliche surface. Samples were collected from the 12- to 24-inch depth to characterize the area of maximum potential contamination at the Portacamp Storage Yard. The samples collected from a 36- to 48-inch depth were designed to characterize the vertical extent of any potential release onto the compacted caliche storage pad. Additional samples were planned if stained soils were visible at the 48-inch sampling depth. During the Portacamp Storage Yard sampling visit, no stained or discolored soils were encountered. Figure 15.1 is a site map showing sample locations at SWMU 004a. Table 15.1 presents a summary of the soil sampling and analysis data for chromium, nickel, and methanol for this investigation. Additional data are contained in Appendix S.

**Table 15.1
Summary of Measured Concentrations for Constituents of Concern
Voluntary Release Assessment (1996 Samples)
SWMU 004a (Portacamp Storage Yard, West Side)**

Description	Hole #	Depth (in. bgs)	Constituent	Concentration (ppm)	Qualifier
Portacamp Storage Yard	1	12 to 24	Chromium	15	U
			Lead	1.6	
	Nickel		6		
	Methanol		2		
	36 to 48	Chromium	25	U	
		Lead	1.5		
		Nickel	12		
		Methanol	2		
	2	12 to 24	Chromium	4	U
			Lead	1.7	
	Nickel		3		
	Methanol		2		
36 to 48	Chromium	8	U		
	Lead	1.2			
	Nickel	5			
	Methanol	2			
3	12 to 24	Chromium	50	U	
		Lead	4.2		
Nickel		22			
Methanol		2			
36 to 48	Chromium	120	U		
	Lead	2.4			
	Nickel	54			
	Methanol	42			
4	12 to 24	Chromium	140	U	
		Lead	2.6		
		Nickel	66		
		Methanol	200		

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**Table 15.1
Summary of Measured Concentrations for Constituents of Concern
Voluntary Release Assessment (1996 Samples)
SWMU 004a (Portacamp Storage Yard, West Side)**

Description	Hole #	Depth (in. bgs)	Constituent	Concentration (ppm)	Qualifier	
		36 to 48	Chromium	4	U	
			Lead	4.8		
			Nickel	2		
			Methanol	200		
	5	12 to 24	Chromium	2	U	
			Lead	1.4		
			Nickel	2		
			Methanol	2		
			36 to 48	Chromium	4	U
				Lead	1.5	
				Nickel	2	
				Methanol	2	

Notes:

NMED Industrial Screening values = 660 ppm for chromium; 1,000 ppm for lead; 4,400 ppm for nickel; 100,000 for methanol
 NMED Residential Screening values = 230 ppm for chromium; 400 ppm for lead; 1,500 ppm for nickel; 31,000 ppm for methanol
 Background concentration for chromium = 26 ppm
 Background concentration for lead = 5.4 ppm
 Background concentration for nickel = 12.4 ppm
 Background concentration for methanol = 0 ppm
 ppm = parts per million
 in. bgs = inches below ground surface
 J = Result should be considered an estimated value.
 SWMU = Solid Waste Management Unit
 U = Analyte was not detected; value is the method reporting limit.

15.4.4.3 Data Gaps

The TSD identified chromium, lead, methanol, nickel, and thallium as potential constituents of concern for the mud pit materials in this SWMU. Concentrations of chromium, methanol, and nickel were detected above background at SWMU 004a by total constituent analysis (Table 15.1). Total metals concentrations of lead measured in SWMU 004a are below the lead background concentration (Table 15.1 and Appendix A). As defined in Appendix B, thallium has been eliminated as a constituent of concern for the SWMUs. According to the TSD (NMED, 1999b) and subsequent comments on the SAP (Appendix E), the results of the VRA sampling investigations were not adequate to define the nature, rate, and extent of hazardous constituents (chromium, and nickel) in this SWMU.

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15.4.4.4 Results and Conclusions

The results of the VRA indicated that no hazardous constituents exist in SWMU 004a that are above the action levels derived from the proposed Subpart S regulations (40 CFR §264.514, FR. Vol. 55, No. 145). In addition, the chromium, lead, nickel, and methanol concentrations presented in Table 15.1 do not exceed the industrial and residential screening levels presented in NMED guidance (2000). The DOE and the NMED concur that the methanol concentrations are anomalous and probably laboratory contaminants (see Appendix E). In addition, the DOE and the NMED do not consider the measured concentrations at Hole 4 presented on Figure 15.1 to be associated with potential releases at SWMU 004a. No additional samples are required near this location. Methanol and lead were not defined to be COCs in the SAP.

15.4.5 Investigation #4 – SAP (2001)

Soil concentrations of chromium and nickel were further evaluated during this investigation.

15.4.5.1 Nonsampling Data Collection

No nonsampling activities were performed at this SWMU.

15.4.5.2 Sampling Data Collection

As part of the SAP implementation, additional subsurface soil samples were collected within and outside the SWMU 004a boundary during the summer of 2001. Samples were collected by means of direct push methodology at three locations in the storage yard and three locations outside the storage yard. Direct push technology refers to the forcing of a sampling device constructed of stainless steel to the desired sampling depth using a hydraulic ram. The purpose of the sampling was to further define the extent of chromium and nickel concentrations above background. Shallow samples and deep were collected and composited over a one foot interval. Figure 15.1 is a site sketch showing SAP sample locations. Total metal concentrations for samples collected at SWMU 004a are presented in Table 15.2.

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**Table 15.2
Summary of Measured Concentrations for Constituents of Concern
Sampling and Analysis Plan (2001 Samples)
SWMU 004a (Portacamp Storage Yard, West Side)**

Description	Hole #	Depth (in. bgs)	Constituent	Concentration (ppm)	Qualifier
Portacamp Storage Yard, West Side	A	12 to 24	Chromium	2.9	N, *
			Nickel	1.5	B
		72 to 84	Chromium	5.7	N, *
			Nickel	3.7	B
	B	12 to 24	Chromium	3.5	N, *
			Nickel	1.9	B
		Duplicate	Chromium	4.5	N, *
			Nickel	2.2	B
	72 to 84	Chromium	4.1	N, *, J	
		Nickel	2.7	B	
	C	12 to 24	Barium	5	N, *
			Lead	2.5	B
		72 to 84	Chromium	6.7	N, *
			Nickel	4.8	
	D1	72 to 84	Chromium	7.3	N, *
	D2	72 to 84	Chromium	6.7	N, *
Nickel			4.8		
D3	72 to 84	Chromium	5.7	N, *	
		Nickel	3.9	B	
E	12 to 24	Chromium	3.4	N, *	
		Nickel	1.6	B	
72 to 84	Chromium	4.5	N, *		
	Nickel	2.6	B		

Notes:

NMED Industrial Screening values = 660 ppm for chromium; 4,400 ppm for nickel
 NMED Residential Screening values = 230 ppm for chromium; 1,500 ppm for nickel
 Background concentration for chromium = 26 ppm
 Background concentration for nickel = 12.4 ppm
 ppm = parts per million
 in. bgs = inches below ground surface
 * = Duplicate sample results not within laboratory control limits
 J = Value qualified as estimated during data validation
 B = Reported value is below the required reporting limit, but above the instrument detection limit.
 N = Result for associated matrix spike not within laboratory limits
 SWMU = Solid Waste Management Unit

15.4.5.3 Data Gaps

Analytical data are sufficient to characterize the nature and extent of releases of COCs at SWMU 004a. There are no further data gaps regarding characterization of SWMU 004a.

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15.4.5.4 Results and Conclusions

None of the chromium, and nickel concentrations presented in Tables 15.1 and 15.2 exceed NMED industrial and residential soil screening criteria. In accordance with the data quality objectives defined in the SAP, the horizontal and vertical dimensions of the concentrations above background have been defined within 50 percent and the average (and maximum) concentrations are less than the NMED soil screening criteria. Concentrations of chromium and nickel in soil exceeded background at only one location between the physical SWMU boundary and the facility road (Hole 3-D₃). Concentrations above background at this location extend from approximately 12 inches bgs to no more than 72 inches bgs. It is possible that elevated concentrations exist at this point outside the SWMU because of traffic on the adjacent road. The highest chromium concentration, 120 ppm, is approximately 52 percent of the residential screening criterion for chromium. The highest nickel concentration, 54 ppm, is approximately 4 percent of the residential screening criterion for nickel.

15.5 Site Conceptual Model

The following subsections define various aspects of the conceptual model developed for this SWMU.

15.5.1 Nature and Extent of Contamination

The TSD identified chromium, lead, methanol, nickel, and thallium as potential constituents of concern for the mud pit materials in this SWMU. Concentrations of chromium, methanol, and nickel were detected above background at SWMU 004a by total metals analysis (Table 15.1). Methanol concentrations were considered to be anomalous laboratory artifacts. Total metals concentrations of chromium and nickel measured in SWMU 004a are below the NMED industrial and residential soil screening criteria (NMED, 2000b). In addition, as defined in Appendix B, thallium has been eliminated as a constituent of concern for the SWMUs.

15.5.2 Environmental Fate

The Dewey Lake and Magenta formations are known to contain groundwater in some areas beneath the WIPP site. It is possible that these formations underlie this SWMU. The Dewey Lake, if it exists at this location, would occur at approximately 140 feet. The depth to proven groundwater (Culebra) near SWMU 004a is at least 880 feet, and it is estimated that less than 0.5 inch of precipitation per year infiltrates the underlying strata. Thus, the potential for these metals to migrate to groundwater is extremely low. In all cases, the groundwater risk is nonexistent. The site is covered with crushed caliche, so the potential for surface water or wind transport of constituents is low. Furthermore, because the land has been withdrawn from public use and the potential for intrusive activities is low, the potential exposure of human receptors (other than WIPP Portacamp workers) to metals in the SWMU is minimal to nonexistent.

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15.6 Site Assessments

The site assessment process for SWMU 004a includes risk-screening assessments. This section briefly summarizes the site assessment results. The following subsections describe site assessments that have been conducted to identify human and ecological risks associated with SWMU 004a.

15.6.1 Summary

The site assessment concludes that SWMU 004a does not have potential to affect human health or the environment. All measured metal concentrations in soil are below background. Descriptions of these assessments are provided in the following subsections.

15.6.2 Screening Assessments

Risk screening assessments were performed for both human health risk and ecological health risk for SWMU 004a. The following subsections describe the results.

15.6.2.1 Human Health

SWMU 004a is part of the WIPP facility. Measured concentrations from the summer 2001 and 1996 VRA sampling and analyses were below NMED soil screening criteria for both industrial and residential land uses. Consequently, it can be concluded that SWMU 004a does not have the potential to affect human health.

15.6.2.2 Ecological

An ecological screening assessment was performed for SWMU 004a in 1998 (DOE, 1998). Based on an evaluation of uncertainties, ecological risks associated with this site were expected to be low.

15.6.3 Risk Assessments

This section discusses the baseline risk assessment for human health and ecological risk.

15.6.3.1 Human Health

Because the human health results of the screening assessment summarized in Section 15.6.2.1 indicate that SWMU 004a does not have the potential to affect human health, a baseline human health risk assessment is not required for SWMU 004a.

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15.6.3.2 Ecological

An updated ecological screening risk evaluation was performed for SWMU 004a (Appendix C). Average chromium and nickel concentrations for SWMU 004a were at or below background. No incremental ecological risk is expected for this SWMU.

15.6.4 Other Applicable Assessments

Applicable assessments pertaining to surface water, groundwater, and underground storage tanks are discussed below.

15.6.4.1 Surface Water

No surface water is present at this site and this subsection is not applicable.

15.6.4.2 Groundwater

All measured total metal concentrations are below background, no groundwater assessment is required.

15.6.4.3 Underground Storage Tanks

No underground storage tanks are known to have been present at this site. This section is, therefore, not applicable.

15.6.4.4 Other

No other assessments are required.

15.7 No Further Action Petition

The NMED has developed six criteria to identify whether a site should be identified for NFA (NMED, 1999b). Based on these criteria, an NFA petition is reasonable if:

- The site does not exist;
- The site was not used for the management of hazardous constituents;
- There was no release of hazardous constituents to the environment;
- There was a release, but hazardous constituents are at acceptably low levels;
- There was a release, but the site has been characterized and/or closed under another authority; or
- There was a release, but the site was remediated.

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The rationale and criterion for this NFA petition are discussed in the following subsections.

15.7.1 Rationale

Based on the field investigations for the Portacamp Storage Yard, an NFA is being recommended for the following reason: no COCs were present in concentrations considered hazardous to human health (under a residential land use scenario) or the environment. This SWMU meets Criterion 4.

15.7.2 Criterion

Based on the evidence provided above, an NFA determination is requested for SWMU 004a in conformance with Criterion 4 for the Portacamp Storage Yard, West Side.

16.0 SWMU 007b (SW Evaporation Pond)

The following subsections provide a description of the SWMU, an assessment of available site characterization data, risk assessment information and rationale for this NFA petition.

16.1 Summary

The Permittees are requesting an NFA decision for SWMU 007b SW Evaporation Pond. SWMU 007b is a former evaporation pond. Review and analysis of relevant data and documentation provided for SWMU 007b demonstrate that concentrations of hazardous constituents are at acceptable levels.

16.2 Description and Operational History

The site description and operational history are provided in the following subsections.

16.2.1 Site Description

SWMU 007b is an approximate 145 feet by 145 feet area located approximately 770 feet due west of the WIPP Waste Handling Building. The location of SWMU 007b, now completely graded, lies within an area that receives storm water and domestic water resulting from fire flow performance testing. A sketch of the former SWMU 007b SW Evaporation Pond is presented in Figure 16.1.

16.2.2 Operational History

During construction of the facility (late 1983 to early 1984), the evaporation pond received water from personnel showers.

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The evaporation pond received only water from personnel showers (grey water), and analytical results for the grey water are not available. Information on SWMU 007b is included in Appendix T.

16.3 Land Use

This section presents a summary of current and future/proposed land use for SWMU 007b.

16.3.1 Current

This SWMU is located within the exclusive use area, which is a subpart of the 16-section WLWA. The WIPP Land Withdrawal Act (Public Law 102-579) created the WLWA in October 1992. This Act transferred the jurisdiction of the WLWA from the Secretary of the Interior to the Secretary of Energy. In accordance with sections 3(a)(1) and (3) of the Act, these lands " . . . are withdrawn from all forms of entry, appropriation, and disposal under the public land laws . . . " and are reserved for the use of the Secretary [of Energy] for the construction, experimentation, operation, repair and maintenance, disposal, shutdown, monitoring, decommissioning, and other authorized activities, associated with the purposes of WIPP as set forth in section 213 of the Department of Energy National Security and Military Applications of Nuclear Energy Act of 1980 (Public Law 96-164; 93 Statute 1259, 1265) and this Act." SWMU 007b is located on land under the jurisdiction of the DOE. The land around this SWMU is part of the surface facilities of WIPP. Therefore, access is restricted to authorized personnel.

16.3.2 Future/Proposed

The facility operational period is estimated to be 35 years with a 30-year postclosure care period. Active institutional controls will be maintained during postclosure for 100 years. The future/proposed land use is industrial and recreational.

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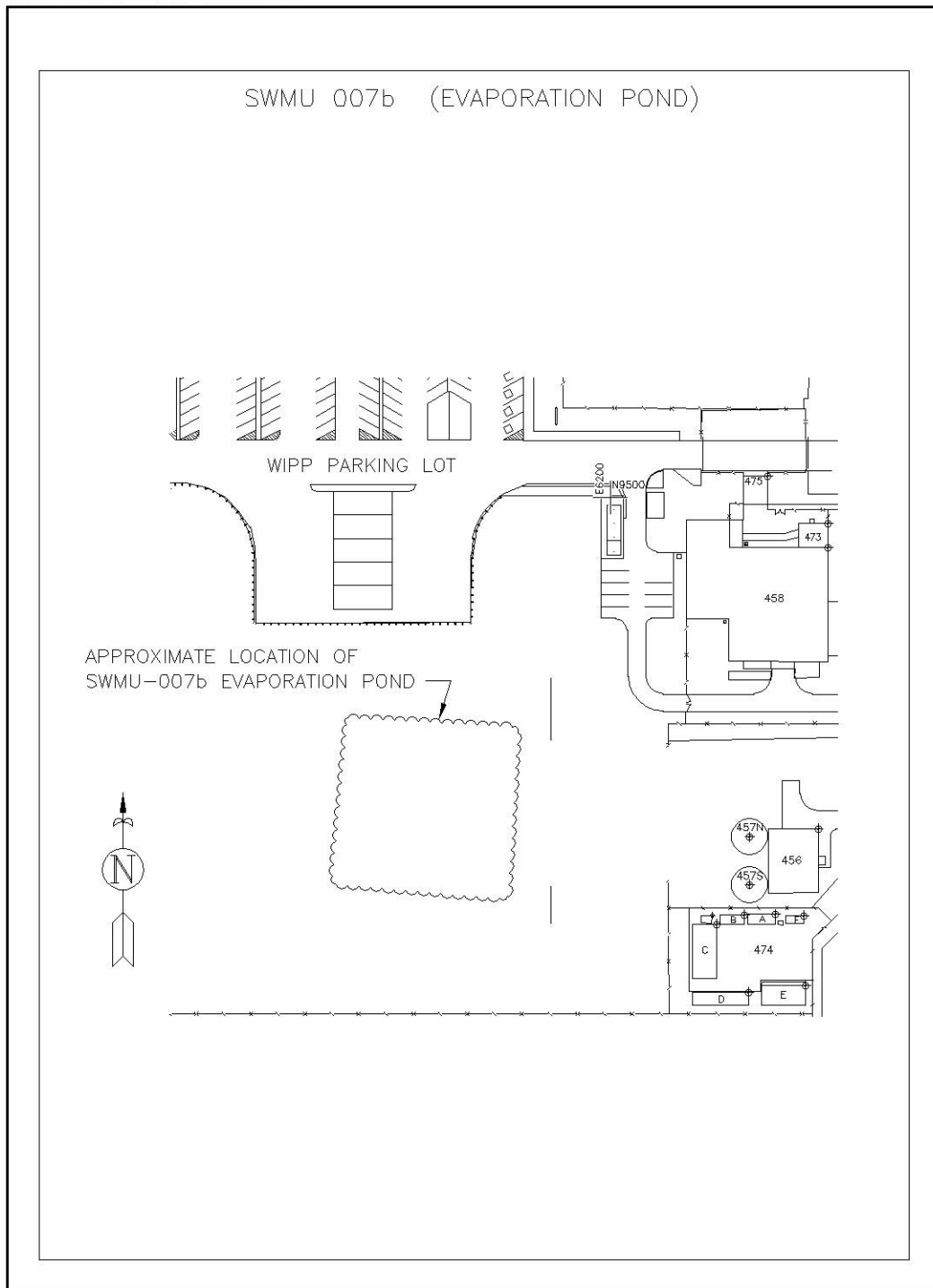


Figure 16.1 - Sample Location Sketch - SWMU 007b (SW Evaporation Pond) (map not to scale)

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16.4 Investigatory Activities

SWMU 007b has been investigated during the RFA. The following subsections describe previous sampling activities that have been conducted at the site.

16.4.1 Summary

SWMU 007b was visually inspected and sampled by the NMED in 1992 as part of a RFA. Samples were collected from one location. No documentation exists as to the exact location of these collected samples. The following subsections describe data that were collected at SWMU 007b.

16.4.2 Investigation #1 – RFA

SWMU 007b was visually inspected and sampled by the NMED in 1992 as part of a RFA.

16.4.2.1 Nonsampling Data Collection

No nonsampling data collection was performed during the RFA.

16.4.2.2 Sampling Data Collection

During the 1992 RFA, soil boring samples were collected by the NMED and WIPP for total constituent analysis to assess the potential for release of hazardous constituents from SWMU 007b. WIPP collected one investigative sample and one background sample in 1992 as part of that investigation. The NMED also collected an investigative sample at the site during that time. Figure 16.1 is a site sketch. No documentation exists as to the exact location of the collected samples at SWMU 007b. Soil concentration data are presented in Table 16.1.

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**Table 16.1
Summary of Measured Concentrations for Constituents of Concern
RCRA Facility Assessment (1992 Samples)
SWMU 007b (SW Evaporation Pond)**

Description	Hole #	(Depth in. bgs)	Constituent	Concentration (ppm)	Qualifier
SW Evaporation Pond	A ⁽¹⁾	12 to 24	Lead	6	
			Nickel	5	
	60 to 72	Lead	6		
		Nickel	4		
	A ⁽²⁾	12 to 24	Lead	< 5	U
			Nickel	7	

Notes:

NMED Industrial Screening values = 1,000 ppm for lead; 4,400 ppm for nickel
 NMED Residential Screening values = 400 ppm for lead; 1,500 ppm for nickel
 Background concentration for lead = 5.4 ppm
 Background concentration for nickel = 12.4 ppm
 ppm = parts per million
 in. bgs = inches below ground surface
 U = compound was not detected in the sample
 SWMU = Solid Waste Management Unit
 (1) Sampled by the DOE 10/92
 (2) Sampled by the NMED 10/92

16.4.2.3 Data Gaps

No data gaps exist for this SWMU.

16.4.2.4 Results and Conclusions

The RFA concluded that the potential release of hazardous constituents to soil was high. The RFA also concluded that migration potential to groundwater was moderate relative to other locations on site. NMED comments on the SAP stated that enough information is available for this SWMU to warrant NFA (see Appendix E). This conclusion was based on (1) the evaporation pond received only grey water from personnel showers and currently receives storm water and domestic water resulting from fire flow performance testing, and (2) detected concentrations of lead are only slightly above background (i.e., 6 ppm vs. 5.4 ppm background).

16.5 Site Conceptual Model

The following subsections define various aspects of the conceptual model developed for this SWMU.

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16.5.1 Nature and Extent of Contamination

The former location of SWMU 007b, now completely graded, lies within an area that receives storm water and domestic water resulting from fire flow performance testing. The storm water retention basin is bermed on all four sides and has been completely revegetated. Lead concentrations are slightly above background.

16.5.2 Environmental Fate

The depth to proven groundwater near SWMU 007b is at least 880 feet, and it is estimated that less than 0.5 inches of precipitation per year infiltrates the underlying strata. Thus, the potential for lead to migrate to groundwater is extremely low. The site is covered with vegetation, so the potential for surface water or wind transport of constituents is low. Metal concentrations in soil are at or below background.

16.6 Site Assessments

No site assessments or risk assessments were required, because the metal concentrations in soil are at or below background. Further, the NMED has stated that enough information is available to warrant NFA (Appendix E).

16.6.1 Summary

No screening assessments were required, because the metal concentrations in soil are below background or only slightly above background.

16.6.2 Screening Assessments

No human health or ecological assessments were required, because the metal concentrations in soil are below background or only slightly above background.

16.6.2.1 Human Health

No human health screening assessment was required, because the metal concentrations in soil are below background or only slightly above background.

16.6.2.2 Ecological

No ecological screening assessment was required, because the metal concentrations in soil are below background or only slightly above background.

16.6.3 Risk Assessments

This section discusses the baseline risk assessment for human health and ecological risk.

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16.6.3.1 Human Health

A baseline human health risk assessment is not required for SWMU 007b, because the metal concentrations in soil are below background or only slightly above background.

16.6.3.2 Ecological

A baseline ecological risk assessment is not required for SWMU 007b, because the metal concentrations in soil are below background or only slightly above background.

16.6.4 Other Applicable Assessments

Applicable assessments pertaining to surface water, groundwater, and underground storage tanks are discussed below.

16.6.4.1 Surface Water

This subsection is not applicable according to the NMED's comments on the SAP.

16.6.4.2 Groundwater

This subsection is not applicable according to the NMED's comments on the SAP.

16.6.4.3 Underground Storage Tanks

No underground storage tanks are known to have been present at this site. This section is, therefore, not applicable.

16.6.4.4 Other

No other assessments are required.

16.7 No Further Action Petition

The NMED has developed six criteria to identify whether a site should be identified for NFA (NMED, 1999b). Based on these criteria, an NFA petition is reasonable if:

- The site does not exist;
- The site was not used for the management of hazardous constituents;
- There was no release of hazardous constituents to the environment;
- There was a release, but hazardous constituents are at acceptably low levels;

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- There was a release, but the site has been characterized and/or closed under another authority; or
- There was a release, but the site was remediated.

The rationale and criterion for this NFA request are discussed in the following subsections.

16.7.1 Rationale

Based on the data presented in Table 16.1 for the SW Evaporation Pond, an NFA is being recommended for this SWMU for the following reason: concentrations of hazardous constituents are at acceptably low levels. This SWMU meets Criterion 4.

16.7.2 Criterion

Based on the evidence provided above, an NFA determination is requested for SWMU 007b in conformance with Criterion 4 for the SW Evaporation Pond.

17.0 AOC 001r (D-123 MUD PIT)

The following subsections provide a description of the AOC, an assessment of available site characterization data, risk assessment information and rationale for this NFA petition.

17.1 Summary

The Permittees are requesting an NFA decision for AOC 001r, D-123 mud pit. AOC 001r consists of a drilling mud pit associated with the D-123 potash exploration borehole. Review and analysis of relevant data and documentation provided for the AOC demonstrate that the D-123 drilling mud pit was closed under USGS authority in 1953.

17.2 Description and Operational History

The site description and operational history are provided in the following subsections.

17.2.1 Site Description

AOC 001r is located in the NE $\frac{1}{4}$ of the SE $\frac{1}{4}$ of Section 34, Township 22 South, Range 31 East. The abandoned mud pit constructed for the drilling of borehole D-123 is AOC 001r. A sketch of AOC 001r is presented in Figure 17.1.

AOC 001r is covered with dune sand and accommodates a livestock watering tank. No mud pit liners or stained soil are evident. The mud pit is located in the southeastern portion of the cleared area and has approximate dimensions of 8 feet by 16 feet.

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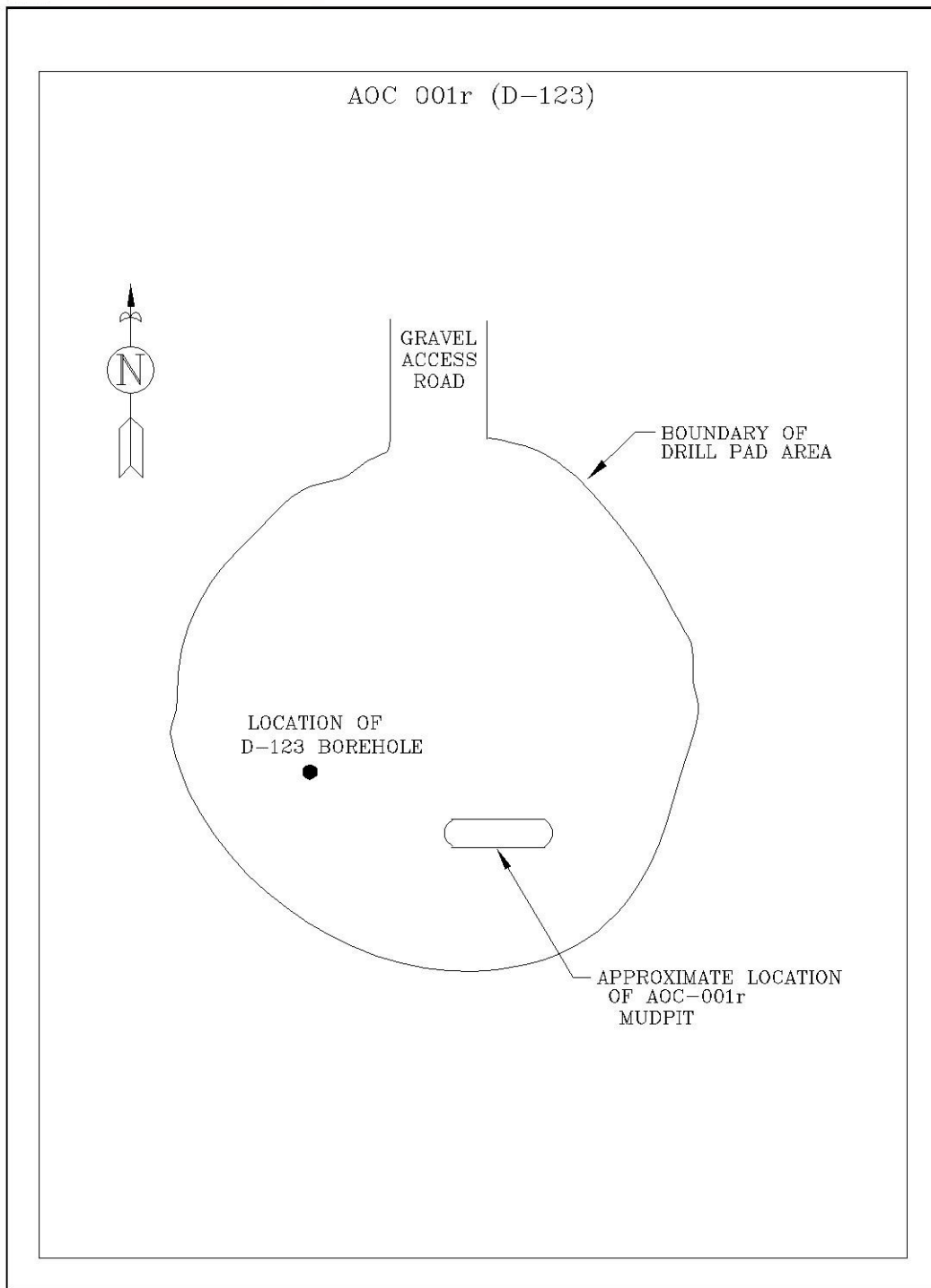


Figure 17.1 - Sample Location Sketch - AOC 001r (D-123 Drilling Mud Pit) (map not to scale)

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17.2.2 Operational History

Borehole D-123 was completed by the Weaver Drilling Company on behalf of the Duval Sulphur and Potash Company in August, 1953. The hole was drilled to a total depth of 1,880 feet, with coring efforts commencing at 932 feet below ground surface. The Weaver Drilling Company used a Sullivan 200-A core drill, pulling 31 feet of drill rods and coring with a 22 foot core barrel and a 3-13/16-inch diamond bit.

The borehole was abandoned using 73 sacks of cement mixed with 3 percent calcium chloride and brine at the bottom of the hole. Forty-five sacks of cement mixed with fresh water bottomed at 880 feet bgs, and the remainder of the hole was filled with cuttings to ground surface. The D-123 site was closed by the USGS in 1953 (see Appendix D).

The USGS Conservation Division was the approval authority for potash exploration boreholes drilled during the period 1953 through 1978 in Eddy County, New Mexico. During this period, the USGS administered the drilling programs under the authority granted it by the U.S. Congress.

The USGS permitted private exploration boreholes, which were drilled by mineral leaseholders. The USGS received and approved Sundry Notices and Reports on Wells from leaseholders. Prior to drilling a borehole, the company submitted a Notice of Intention to Drill for approval by the USGS. Following completion of the drilling and closure of the drilling location, the company notified the USGS of its intention to abandon the site. Upon approval of the notice, the USGS considered the drilling location closed. No additional closure documentation was required.

The USGS approved the closure and abandonment of the drilling sites according to then current requirements. The permitting and closure activities for potash exploration were established by the USGS in the early 1950's. These activities have not changed substantially since that time, as evidenced by recent permits being granted by the BLM.

The principal drilling materials used for the drilling of hole D-123 were saturated brine and mud. Closure documentation for D-123 is included in Appendix D. Other information on the D-123 drilling is included in Appendix U.

17.3 Land Use

This section presents a summary of current and future/proposed land use for AOC 001r.

17.3.1 Current

This AOC is located within the 16-section WLWA. The WIPP Land Withdrawal Act (Public Law 102-579) created the WLWA in October 1992. This Act transferred the jurisdiction of the WLWA from the Secretary of the Interior to the Secretary of Energy. In accordance with sections 3(a)(1) and (3) of the Act, these lands " . . . are withdrawn

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from all forms of entry, appropriation, and disposal under the public land laws . . . " and are reserved for the use of the Secretary [of Energy] for the construction, experimentation, operation, repair and maintenance, disposal, shutdown, monitoring, decommissioning, and other authorized activities, associated with the purposes of WIPP as set forth in section 213 of the Department of Energy National Security and Military Applications of Nuclear Energy Act of 1980 (Public Law 96-164; 93 Statute 1259, 1265) and this Act." AOC 001r is located on land under the jurisdiction of the DOE. The land around this AOC is occasionally used for livestock grazing, and recreational activities; no other current uses exist.

17.3.2 Future/Proposed

The facility operational period is estimated to be 35 years with a 30-year postclosure care period. Active institutional controls will be maintained during postclosure for 100 years. The future/proposed land use is industrial and recreational.

17.4 Investigatory Activities

AOC 001r was investigated one time. The following subsections describe this investigation.

17.4.1 Summary

AOC 001r was visually inspected by the NMED in 1992 as part of a RFA. No samples were collected.

17.4.2 Investigation #1 – RFA

AOC 001r was visually inspected by the NMED in 1992 as part of a RFA.

17.4.2.1 Nonsampling Data Collection

No nonsampling data collection was performed during the RFA.

17.4.2.2 Sampling Data Collection

No sampling activities were performed at this AOC during the RFA.

17.4.2.3 Data Gaps

There were no samples collected during the RFA at this AOC.

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17.4.2.4 Results and Conclusions

The RFA concluded that the potential release of hazardous constituents to soil was high. The RFA also concluded that migration potential to groundwater was moderate relative to other locations on site. The site was closed by the USGS in 1953.

17.5 Site Conceptual Model

The following subsections define various aspects of the conceptual model developed for this AOC.

17.5.1 Nature and Extent of Contamination

As stated above, this site was closed by the USGS in 1953.

17.5.2 Environmental Fate

As stated above, this site was closed by the USGS in 1953.

17.6 Site Assessments

No site assessments or risk assessments were required, because the site was closed by the USGS in 1953.

17.6.1 Summary

No screening assessments were required, because the site was closed by the USGS in 1953.

17.6.2 Screening Assessments

No human health or ecological assessments were required, because the site was closed by the USGS in 1953.

17.6.2.1 Human Health

No human health screening assessment was required, because the site was closed by the USGS in 1953.

17.6.2.2 Ecological

No ecological screening assessment was required, because the site was closed by the USGS in 1953.

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17.6.3 Risk Assessments

This section discusses the baseline risk assessment for human health and ecological risk.

17.6.3.1 Human Health

A baseline human health risk assessment is not required for AOC 001r, because the site was closed by the USGS in 1953.

17.6.3.2 Ecological

A baseline ecological risk assessment is not required for AOC 001r, because the site was closed by the USGS in 1953.

17.6.4 Other Applicable Assessments

Applicable assessments pertaining to surface water, groundwater, and underground storage tanks are discussed below.

17.6.4.1 Surface Water

No surface water is present at this site and this subsection is not applicable.

17.6.4.2 Groundwater

The site was closed by the USGS in 1953. No groundwater evaluation is required.

17.6.4.3 Underground Storage Tanks

No underground storage tanks are known to have been present at this site. This section is, therefore, not applicable.

17.6.4.4 Other

No other assessments are required.

17.7 No Further Action Petition

The NMED has developed six criteria to identify whether a site should be identified for NFA (NMED, 1999b). Based on these criteria, an NFA petition is reasonable if:

- The site does not exist;
- The site was not used for the management of hazardous constituents;

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- There was no release of hazardous constituents to the environment;
- There was a release, but hazardous constituents are at acceptably low levels;
- There was a release, but the site has been characterized and/or closed under another authority; or
- There was a release, but the site was remediated.

The rationale and criterion for this NFA petition are discussed in the following subsections.

17.7.1 Rationale

Based on the documentation provided in Appendix D for the D-123 mud pit, an NFA is being recommended for this AOC for the following reason: the site was closed by the USGS in 1953. This AOC meets Criterion 5.

17.7.2 Criterion

Based on the evidence provided above, an NFA determination is proposed for AOC 1001r in conformance with Criterion 5 for the D-123 mud pit.

18.0 AOC 001u (IMC-376 MUD PIT)

The following subsections provide a description of the AOC, an assessment of available site characterization data, risk assessment information and rationale for this NFA petition.

18.1 Summary

WIPP is proposing an NFA decision for AOC 001u, IMC-376 mud pit. AOC 001u consists of a drilling mud pit associated with the IMC-376 potash exploration borehole. Review and analysis of relevant data and documentation provided for the AOC demonstrate that the IMC-376 drilling mud pit was closed under USGS authority in 1965.

18.2 Description and Operational History

The site description and operational history are provided in the following subsections.

18.2.1 Site Description

AOC 001u is located in the NW ¼ of Section 20, Township 22 South, Range 31 East. The abandoned mud pit constructed for the drilling of borehole IMC-376 is AOC 001u. A sketch of AOC 001u is presented in Figure 18.1.

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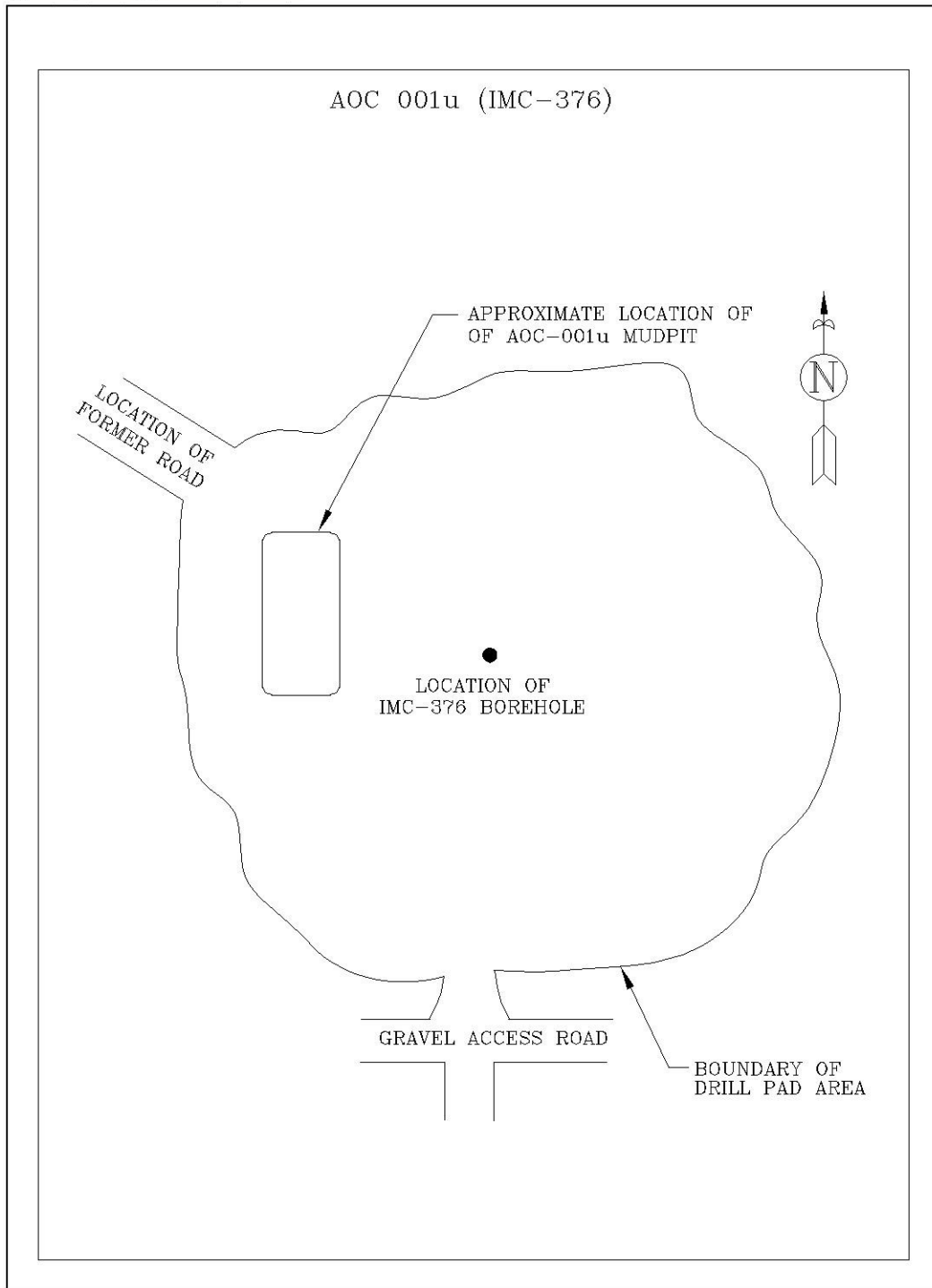


Figure 18.1 - Sample Location Sketch - AOC 001u (IMC-376 Drilling Mud Pit) (map not to scale)

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The drill pad for IMC-376 appears to be relatively clean and well reclaimed. A zone of discolored soil and sparse vegetation in the northwestern portion of the drill pad represents the location of the approximately 12- by 24-foot mud pit.

18.2.2 Operational History

Borehole IMC-376 was drilled by the Boyles Brothers Drilling Company on behalf of the International Minerals and Chemicals Corporation in June of 1965 as a potash exploration borehole. IMC-376 was drilled to a total depth of 1,702 feet below ground surface. The borehole was abandoned with cement and mud. The IMC-376 site was closed by the USGS in 1965.

The USGS Conservation Division was the approval authority for potash exploration boreholes drilled during the period 1953 through 1978 in Eddy County, New Mexico. During this period, the USGS administered the drilling programs under the authority granted it by the U.S. Congress.

The USGS permitted private exploration boreholes, which were drilled by mineral leaseholders. The USGS received and approved Sundry Notices and Reports on Wells from leaseholders. Prior to drilling a borehole, the company submitted a Notice of Intention to Drill for approval by the USGS. Following completion of the drilling and closure of the drilling location, the company notified the USGS of its intention to abandon the site. Upon approval of the notice, the USGS considered the drilling location closed. No additional closure documentation was required.

The USGS approved the closure and abandonment of the drilling sites according to then current requirements. The permitting and closure activities for potash exploration were established by the USGS in the early 1950's. These activities have not changed substantially since that time, as evidenced by recent permits being granted by the BLM.

The principal drilling materials used for the drilling of hole IMC-376 were saturated brine and air. Closure documentation for IMC-376 is included in Appendix D. Other information on the IMC-376 drilling is included in Appendix V.

18.3 Land Use

This section presents a summary of current and future/proposed land use for AOC 001u.

18.3.1 Current

This AOC is located within the 16-section WLWA. The WIPP Land Withdrawal Act (Public Law 102-579) created the WLWA in October 1992. This Act transferred the jurisdiction of the WLWA from the Secretary of the Interior to the Secretary of Energy. In accordance with sections 3(a)(1) and (3) of the Act, these lands " . . . are withdrawn from all forms of entry, appropriation, and disposal under the public land laws . . . " and

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are reserved for the use of the Secretary [of Energy] for the construction, experimentation, operation, repair and maintenance, disposal, shutdown, monitoring, decommissioning, and other authorized activities, associated with the purposes of WIPP as set forth in section 213 of the Department of Energy National Security and Military Applications of Nuclear Energy Act of 1980 (Public Law 96-164; 93 Statute 1259, 1265) and this Act." AOC 001u is located on land under the jurisdiction of the DOE. The land around this AOC is occasionally used for livestock grazing, and recreational activities; no other current uses exist.

18.3.2 Future/Proposed

The facility operational period is estimated to be 35 years with a 30-year postclosure care period. Active institutional controls will be maintained during postclosure for 100 years. The future/proposed land use is industrial and recreational.

18.4 Investigatory Activities

AOC 001u was investigated one time. The following subsections describe this investigation.

18.4.1 Summary

AOC 001u was visually inspected by the NMED in 1992 as part of a RFA. No samples were collected.

18.4.2 Investigation #1 – RFA

AOC 001u was visually inspected by the NMED in 1992 as part of a RFA.

18.4.2.1 Nonsampling Data Collection

No nonsampling data collection was performed during the RFA.

18.4.2.2 Sampling Data Collection

No sampling activities were performed at this AOC during the RFA.

18.4.2.3 Data Gaps

There were no samples collected during the RFA at this AOC.

18.4.2.4 Results and Conclusions

The RFA concluded that the potential release of hazardous constituents to soil was high. The RFA also concluded that migration potential to groundwater was low relative to other locations on site. The site was closed by the USGS in 1965.

18.5 Site Conceptual Model

The following subsections define various aspects of the conceptual model developed for this AOC.

18.5.1 Nature and Extent of Contamination

As stated above, this site was closed by the USGS in 1965.

18.5.2 Environmental Fate

As stated above, this site was closed by the USGS in 1965.

18.6 Site Assessments

No site assessments or risk assessments were required, because the site was closed by the USGS in 1965.

18.6.1 Summary

No screening assessments were required, because the site was closed by the USGS in 1965.

18.6.2 Screening Assessments

No human health or ecological assessments were required, because the site was closed by the USGS in 1965.

18.6.2.1 Human Health

No human health screening assessment was required, because the site was closed by the USGS in 1965.

18.6.2.2 Ecological

No ecological screening assessment was required, because the site was closed by the USGS in 1965.

18.6.3 Risk Assessments

This section discusses the baseline risk assessment for human health and ecological risk.

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18.6.3.1 Human Health

A baseline human health risk assessment is not required for AOC 001u, because the site was closed by the USGS in 1965.

18.6.3.2 Ecological

A baseline ecological risk assessment is not required for AOC 001u, because the site was closed by the USGS in 1965.

18.6.4 Other Applicable Assessments

Applicable assessments pertaining to surface water, groundwater, and underground storage tanks are discussed below.

18.6.4.1 Surface Water

No surface water is present at this site and this subsection is not applicable.

18.6.4.2 Groundwater

The site was closed by the USGS in 1965. No groundwater evaluation is required.

18.6.4.3 Underground Storage Tanks

No underground storage tanks are known to have been present at this site. This section is, therefore, not applicable.

18.6.4.4 Other

No other assessments are required.

18.7 No Further Action Petition

The NMED has developed six criteria to identify whether a site should be identified for NFA (NMED, 1999b). Based on these criteria, an NFA petition is reasonable if:

- The site does not exist;
- The site was not used for the management of hazardous constituents;
- There was no release of hazardous constituents to the environment;
- There was a release, but hazardous constituents are at acceptably low levels;

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- There was a release, but the site has been characterized and/or closed under another authority; or
- There was a release, but the site was remediated.

The rationale and criterion for this NFA petition are discussed in the following subsections.

18.7.1 Rationale

Based on the documentation provided in Appendix D for the IMC-376 mud pit, an NFA is being recommended for this AOC for the following reason: the site was closed by the USGS in 1965. This AOC meets Criterion 5.

18.7.2 Criterion

Based on the evidence provided above, an NFA determination is proposed for AOC 001u in conformance with Criterion 5 for the IMC-376 mud pit.

19.0 AOC 001v (IMC-456 MUD PIT)

The following subsections provide a description of the AOC, an assessment of available site characterization data, risk assessment information and rationale for this NFA petition.

19.1 Summary

The Permittees are requesting an NFA decision for AOC 001v, IMC-456 mud pit. AOC 001v consists of a drilling mud pit associated with the IMC-456 potash exploration borehole. Review and analysis of relevant data and documentation provided for the AOC demonstrate that the IMC-456 drilling mud pit was closed under USGS authority in 1976.

19.2 Description and Operational History

The site description and operational history are provided in the following subsections.

19.2.1 Site Description

The drill pad for IMC-456 is relatively clean and well reclaimed. A zone of discolored soil and sparse vegetation in the northern portion of the drill pad represents the location of the approximately 8- by 21-foot mud pit. A sketch of AOC 001v is presented in Figure 19.1.

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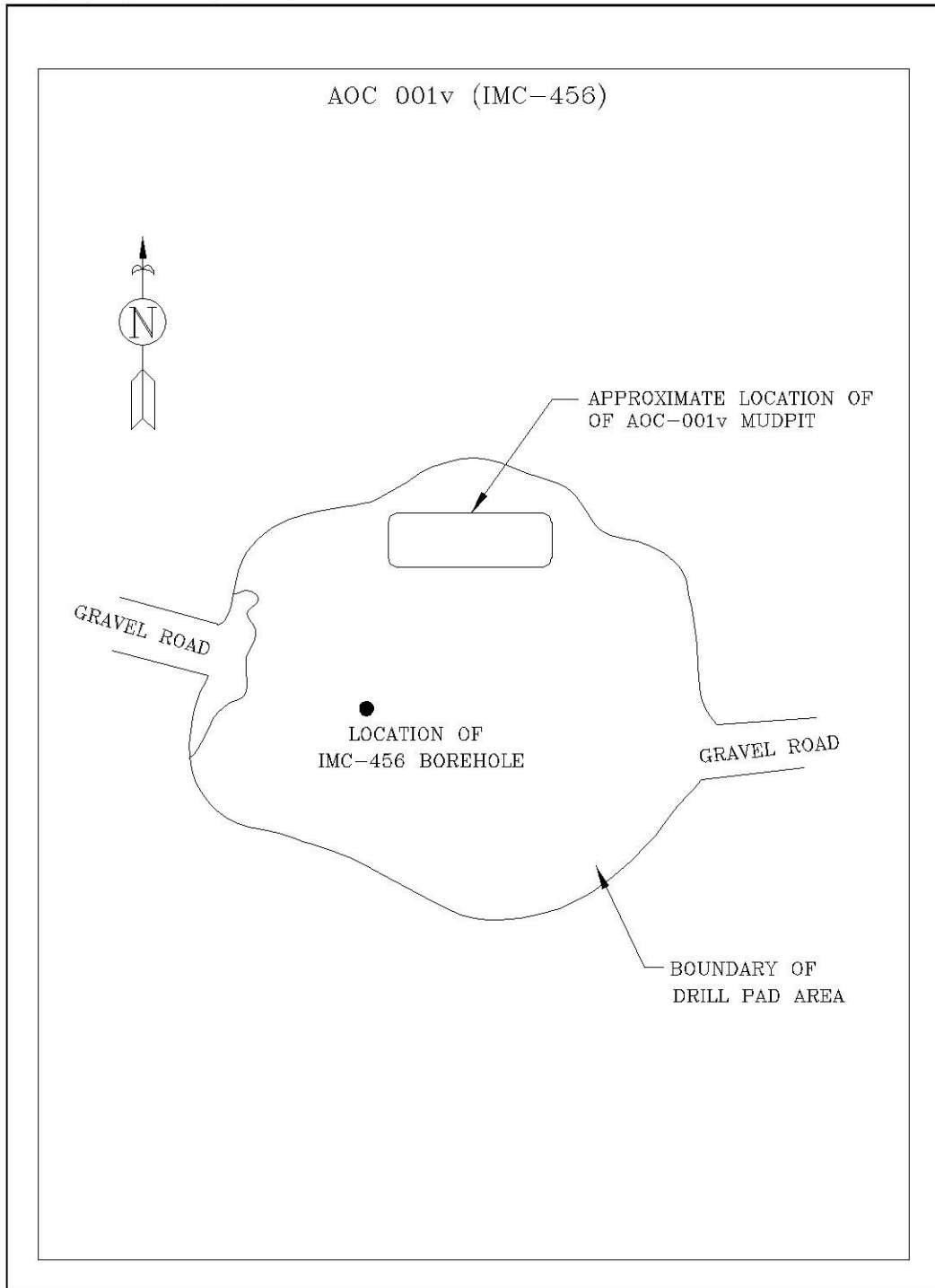


Figure 19.1 - Sample Location Sketch - AOC 001v (IMC-456 Mud Pit) (map not to scale)

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19.2.2 Operational History

Borehole IMC-456 was drilled by the Boyles Brothers Drilling Company on behalf of the International Minerals and Chemicals Corporation in July of 1976 as a potash exploration borehole. IMC-456 was drilled to a total depth of 1,975 feet below ground surface. The borehole was abandoned with cement. The IMC-456 site was closed by the USGS in 1976.

The USGS Conservation Division was the approval authority for potash exploration boreholes drilled during the period 1953 through 1978 in Eddy County, New Mexico. During this period, the USGS administered the drilling programs under the authority granted it by the U.S. Congress.

The USGS permitted private exploration boreholes, which were drilled by mineral leaseholders. The USGS received and approved Sundry Notices and Reports on Wells from leaseholders. Prior to drilling a borehole, the company submitted a Notice of Intention to Drill for approval by the USGS. Following completion of the drilling and closure of the drilling location, the company notified the USGS of its intention to abandon the site. Upon approval of the notice, the USGS considered the drilling location closed. No additional closure documentation was required.

The USGS approved the closure and abandonment of the drilling sites according to then current requirements. The permitting and closure activities for potash exploration were established by the USGS in the early 1950's. These activities have not changed substantially since that time, as evidenced by recent permits being granted by the BLM.

The principal drilling material used for the drilling of hole IMC-456 was saturated brine. Closure documentation for IMC-456 is included in Appendix D. Other information on the IMC-456 drilling is included in Appendix W.

19.3 Land Use

This section presents a summary of current and future/proposed land use for AOC 001v.

19.3.1 Current

This AOC is located within the 16-section WLWA. The WIPP Land Withdrawal Act (Public Law 102-579) created the WLWA in October 1992. This Act transferred the jurisdiction of the WLWA from the Secretary of the Interior to the Secretary of Energy. In accordance with sections 3(a)(1) and (3) of the Act, these lands ". . . are withdrawn from all forms of entry, appropriation, and disposal under the public land laws . . ." and are reserved for the use of the Secretary [of Energy] for the construction, experimentation, operation, repair and maintenance, disposal, shutdown, monitoring, decommissioning, and other authorized activities, associated with the purposes of WIPP as set forth in section 213 of the Department of Energy National Security and Military Applications of

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Nuclear Energy Act of 1980 (Public Law 96-164; 93 Statute 1259, 1265) and this Act." AOC 001v is located on land under the jurisdiction of the DOE. The land around this AOC is occasionally used for livestock grazing, and recreational activities; no other current uses exist.

19.3.2 Future/Proposed

The facility operational period is estimated to be 35 years with a 30-year postclosure care period. Active institutional controls will be maintained during postclosure for 100 years. The future/proposed land use is industrial and recreational.

19.4 Investigatory Activities

AOC 001v was investigated one time. The following subsections describe this investigation.

19.4.1 Summary

AOC 001v was visually inspected by the NMED in 1992 as part of a RFA. No samples were collected.

19.4.2 Investigation #1 – RFA

AOC 001v was visually inspected by the NMED in 1992 as part of a RFA.

19.4.2.1 Nonsampling Data Collection

No nonsampling data collection was performed during the RFA.

19.4.2.2 Sampling Data Collection

No sampling activities were performed at this AOC during the RFA.

19.4.2.3 Data Gaps

There were no samples collected during the RFA at this AOC.

19.4.2.4 Results and Conclusions

The RFA concluded that the potential release of hazardous constituents to soil was high. The RFA also concluded that migration potential to groundwater was low relative to other locations on site. The site was closed by the USGS in 1976.

19.5 Site Conceptual Model

The following subsections define various aspects of the conceptual model developed for this AOC.

19.5.1 Nature and Extent of Contamination

As stated above, this site was closed by the USGS in 1976.

19.5.2 Environmental Fate

As stated above, this site was closed by the USGS in 1976.

19.6 Site Assessments

No site assessments or risk assessments were required, because the site was closed by the USGS in 1976.

19.6.1 Summary

No screening assessments were required, because the site was closed by the USGS in 1976.

19.6.2 Screening Assessments

No human health or ecological assessments were required, because the site was closed by the USGS in 1976.

19.6.2.1 Human Health

No human health screening assessment was required, because the site was closed by the USGS in 1976.

19.6.2.2 Ecological

No ecological screening assessment was required, because the site was closed by the USGS in 1976.

19.6.3 Risk Assessments

This section discusses the baseline risk assessment for human health and ecological risk.

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19.6.3.1 Human Health

A baseline human health risk assessment is not required for AOC 001v, because the site was closed by the USGS in 1976.

19.6.3.2 Ecological

A baseline ecological risk assessment is not required for AOC 001v, because the site was closed by the USGS in 1976.

19.6.4 Other Applicable Assessments

Applicable assessments pertaining to surface water, groundwater, and underground storage tanks are discussed below.

19.6.4.1 Surface Water

No surface water is present at this site and this subsection is not applicable.

19.6.4.2 Groundwater

The site was closed by the USGS in 1976. No groundwater evaluation is required.

19.6.4.3 Underground Storage Tanks

No underground storage tanks are known to have been present at this site. This section is, therefore, not applicable.

19.6.4.4 Other

No other assessments are required.

19.7 No Further Action Petition

The NMED has developed six criteria to identify whether a site should be identified for NFA (NMED, 1999b). Based on these criteria, an NFA petition is reasonable if:

- The site does not exist;
- The site was not used for the management of hazardous constituents;
- There was no release of hazardous constituents to the environment;
- There was a release, but hazardous constituents are at acceptably low levels;

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- There was a release, but the site has been characterized and/or closed under another authority; or
- There was a release, but the site was remediated.

The rationale and criterion for this NFA petition are discussed in the following subsections.

19.7.1 Rationale

Based on the documentation provided in Appendix D for the IMC-456 mud pit, an NFA is being recommended for this AOC for the following reason: the site was closed by the USGS in 1976. This AOC meets Criterion 5.

19.7.2 Criterion

Based on the evidence provided above, an NFA determination is requested for AOC 001v in conformance with Criterion 5 for the IMC-456 mud pit.

20.0 AOC 001w (IMC-457 MUD PIT)

The following subsections provide a description of the AOC, an assessment of available site characterization data, risk assessment information and rationale for this NFA petition.

20.1 Summary

The Permittees are requesting an NFA decision for AOC 001w, IMC-457 mud pit. AOC 001w consists of a drilling mud pit associated with the IMC-457 potash exploration borehole. Review and analysis of relevant data and documentation provided for the AOC demonstrate that the IMC-457 drilling mud pit was closed under USGS authority in 1976.

20.2 Description and Operational History

The site description and operational history are provided in the following subsections.

20.2.1 Site Description

AOC 001w is located in the SW $\frac{1}{4}$ of Section 27, Township 22 South, Range 31 East. The abandoned mud pit constructed for the drilling of borehole IMC-457 is AOC 001w. A sketch of AOC 001w is presented in Figure 20.1.

The drill pad for IMC-457 is built up about 0.3 meters above the natural terrain. A zone of discolored soil and sparse vegetation in the northwestern portion of the drill pad represents the location of the approximately 8 feet by 18 feet mud pit.

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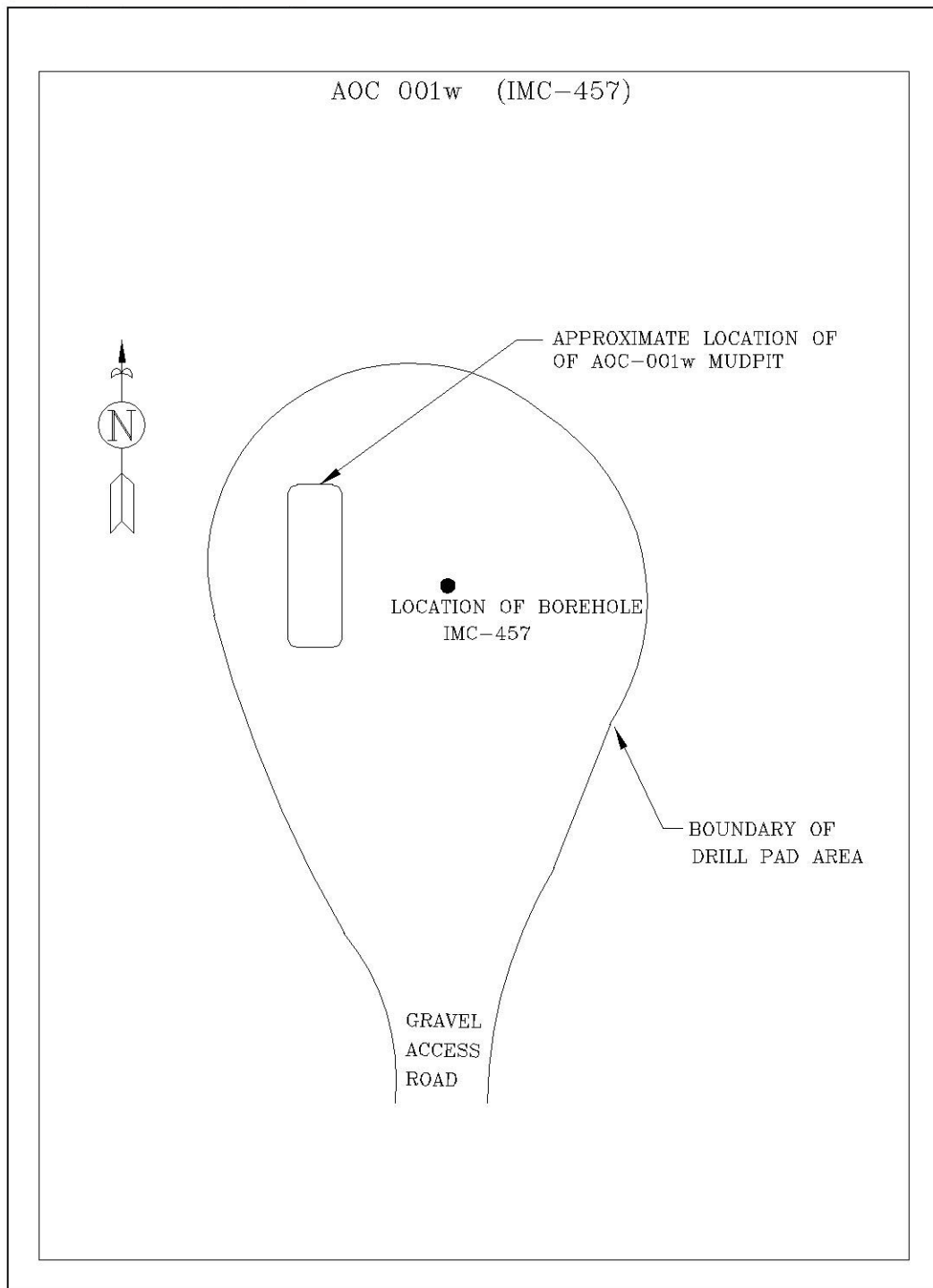


Figure 20.1 - Sample Location Sketch - AOC 001w (IMC-457 Drilling Mud Pit) (map not to scale)

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20.2.2 Operational History

Borehole IMC-457 was drilled by the Boyles Brothers Drilling Company on behalf of the International Minerals and Chemicals Corporation in July of 1976 as a potash exploration borehole. IMC-457 was drilled to a total depth of 1,885 feet below ground surface. The borehole was abandoned with cement. The IMC-457 site was closed by the USGS in 1976.

The USGS Conservation Division was the approval authority for potash exploration boreholes drilled during the period 1953 through 1978 in Eddy County, New Mexico. During this period, the USGS administered the drilling programs under the authority granted it by the U.S. Congress.

The USGS permitted private exploration boreholes, which were drilled by mineral leaseholders. The USGS received and approved Sundry Notices and Reports on Wells from leaseholders. Prior to drilling a borehole, the company submitted a Notice of Intention to Drill for approval by the USGS. Following completion of the drilling and closure of the drilling location, the company notified the USGS of its intention to abandon the site. Upon approval of the notice, the USGS considered the drilling location closed. No additional closure documentation was required.

The USGS approved the closure and abandonment of the drilling sites according to then current requirements. The permitting and closure activities for potash exploration were established by the USGS in the early 1950's. These activities have not changed substantially since that time, as evidenced by recent permits being granted by the BLM.

The principal drilling material used for the drilling of hole IMC-457 was saturated brine. Closure documentation for IMC-457 is included in Appendix D. Other information on the IMC-457 drilling is included in Appendix X.

20.3 Land Use

This section presents a summary of current and future/proposed land use for AOC 001w.

20.3.1 Current

This AOC is located within the 16-section WLWA. The WIPP Land Withdrawal Act (Public Law 102-579) created the WLWA in October 1992. This Act transferred the jurisdiction of the WLWA from the Secretary of the Interior to the Secretary of Energy. In accordance with sections 3(a)(1) and (3) of the Act, these lands ". . . are withdrawn from all forms of entry, appropriation, and disposal under the public land laws . . ." and are reserved for the use of the Secretary [of Energy] for the construction, experimentation, operation, repair and maintenance, disposal, shutdown, monitoring, decommissioning, and other authorized activities, associated with the purposes of WIPP as set forth in Section 213 of the Department of Energy National Security and Military Applications of

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Nuclear Energy Act of 1980 (Public Law 96-164; 93 Statute 1259, 1265) and this Act." AOC 001w is located on land under the jurisdiction of the DOE. The land around this AOC is occasionally used for livestock grazing, and recreational activities; no other current uses exist.

20.3.2 Future/Proposed

The facility operational period is estimated to be 35 years with a 30-year postclosure care period. Active institutional controls will be maintained during postclosure for 100 years. The future/proposed land use is industrial and recreational.

20.4 Investigatory Activities

AOC 001w was investigated one time. The following subsections describe this investigation.

20.4.1 Summary

AOC 001w was visually inspected by the NMED in 1992 as part of a RFA. No samples were collected.

20.4.2 Investigation #1 – RFA

AOC 001w was visually inspected by the NMED in 1992 as part of a RFA.

20.4.2.1 Nonsampling Data Collection

No nonsampling data collection was performed during the RFA.

20.4.2.2 Sampling Data Collection

No sampling activities were performed at this AOC during the RFA.

20.4.2.3 Data Gaps

There were no samples collected during the RFA at this AOC.

20.4.2.4 Results and Conclusions

The RFA concluded that the potential release of hazardous constituents to soil was high. The RFA also concluded that migration potential to groundwater was low relative to other locations on site. The site was closed by the USGS in 1976.

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20.5 Site Conceptual Model

The following subsections define various aspects of the conceptual model developed for this AOC.

20.5.1 Nature and Extent of Contamination

As stated above, this site was closed by the USGS in 1976.

20.5.2 Environmental Fate

As stated above, this site was closed by the USGS in 1976.

20.6 Site Assessments

No site assessments or risk assessments were required, because the site was closed by the USGS in 1976.

20.6.1 Summary

No screening assessments were required, because the site was closed by the USGS in 1976.

20.6.2 Screening Assessments

No human health or ecological assessments were required, because the site was closed by the USGS in 1976.

20.6.2.1 Human Health

No human health screening assessment was required, because the site was closed by the USGS in 1976.

20.6.2.2 Ecological

No ecological screening assessment was required, because the site was closed by the USGS in 1976.

20.6.3 Risk Assessments

This section discusses the baseline risk assessment for human health and ecological risk.

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20.6.3.1 Human Health

A baseline human health risk assessment is not required for AOC 001w, because the site was closed by the USGS in 1976.

20.6.3.2 Ecological

A baseline ecological risk assessment is not required for AOC 001w, because the site was closed by the USGS in 1976.

20.6.4 Other Applicable Assessments

Applicable assessments pertaining to surface water, groundwater, and underground storage tanks are discussed below.

20.6.4.1 Surface Water

No surface water is present at this site and this subsection is not applicable.

20.6.4.2 Groundwater

The site was closed by the USGS in 1976. No groundwater evaluation is required.

20.6.4.3 Underground Storage Tanks

No underground storage tanks are known to have been present at this site. This section is, therefore, not applicable.

20.6.4.4 Other

No other assessments are required.

20.7 No Further Action Petition

The NMED has developed six criteria to identify whether a site should be identified for NFA (NMED, 1999b). Based on these criteria, an NFA petition is reasonable if:

- The site does not exist;
- The site was not used for the management of hazardous constituents;
- There was no release of hazardous constituents to the environment;
- There was a release, but hazardous constituents are at acceptably low levels;

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- There was a release, but the site has been characterized and/or closed under another authority; or
- There was a release, but the site was remediated.

The rationale and criterion for this NFA petition are discussed in the following subsections.

20.7.1 Rationale

Based on the documentation provided in Appendix D for the IMC-457 mud pit, an NFA is being recommended for this AOC for the following reason: the site was closed by the USGS in 1976. This AOC meets Criterion 5.

20.7.2 Criterion

Based on the evidence provided above, an NFA determination is requested for AOC 001w in conformance with Criterion 5 for the IMC-457 mud pit.

21.0 AOC 001ac (DSP-207 MUD PIT)

The following subsections provide a description of the AOC, an assessment of available site characterization data, risk assessment information and rationale for this NFA petition.

21.1 Summary

The Permittees are requesting an NFA decision for AOC 001ac, DSP-207 mud pit. AOC 001ac consists of a drilling mud pit associated with the DSP-207 potash exploration borehole. Review and analysis of relevant data and documentation provided for the AOC demonstrate that the DSP-207 drilling mud pit was closed under USGS authority in 1958.

21.2 Description and Operational History

The site description and operational history are provided in the following subsections.

21.2.1 Site Description

AOC 001ac is located in the SW $\frac{1}{4}$ of the NE $\frac{1}{4}$ of the SW $\frac{1}{4}$ Section 19, Township 22 South, Range 31 East. The abandoned mud pit constructed for the drilling of borehole DSP-207 is AOC 001ac. A sketch of AOC 001ac is presented in Figure 21.1.

The drill pad for DSP-207 is sparsely vegetated and appears to have been regraded. A zone of discolored soil and sparse vegetation in the southern portion of the drill pad represents the location of the approximately 8-foot-by-18-foot mud pit.

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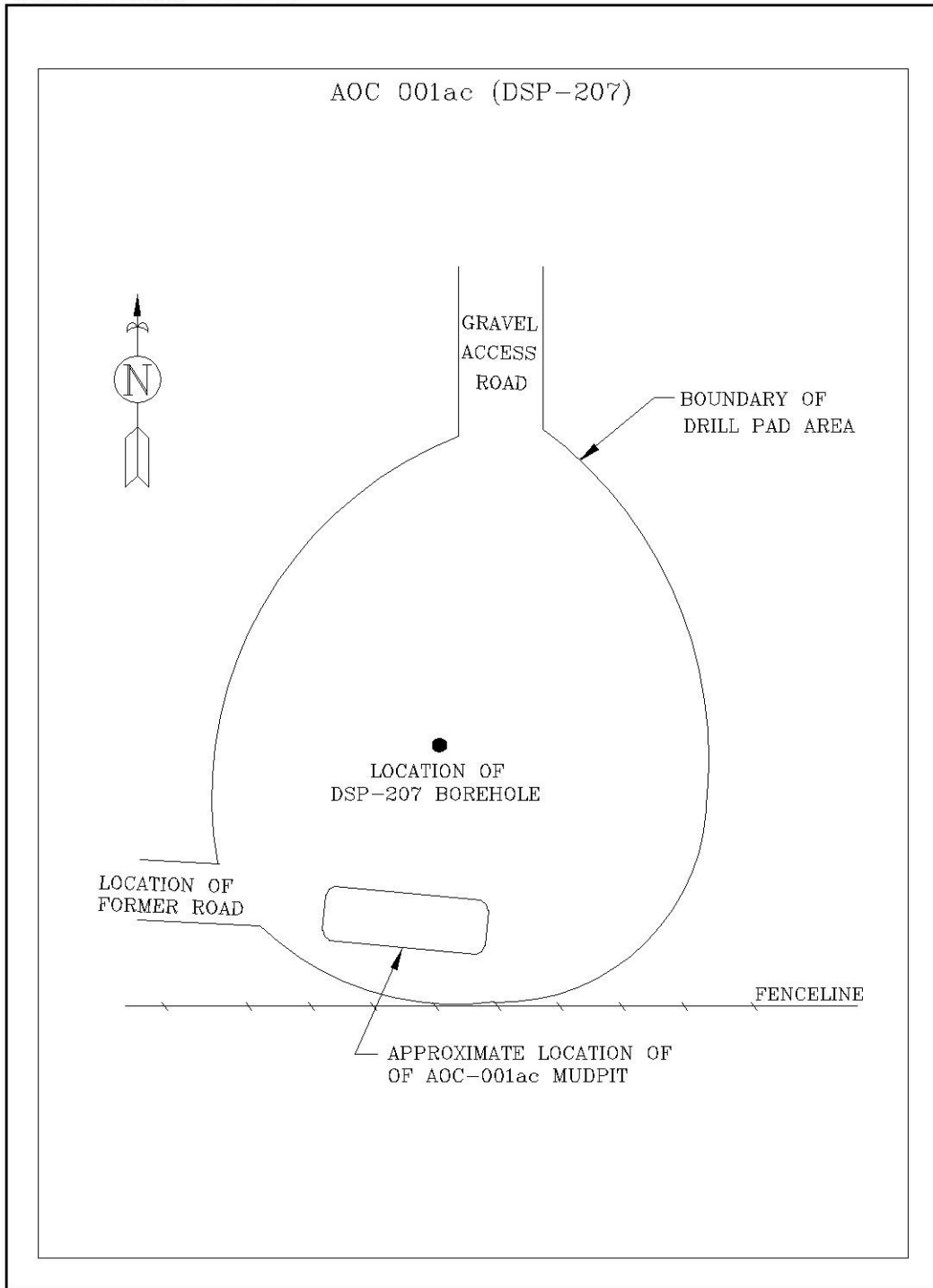


Figure 21.1 - Sample Location Sketch - AOC 001ac (DSP-207 Drilling Mud Pit) (map not to scale)

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21.2.2 Operational History

Borehole DSP-207 was drilled by the Joy Drilling Company on behalf of the Duval Sulphur and Potash Company in June of 1958 as a potash exploration borehole. DSP-207 was drilled to a total depth of 1,613 feet below ground surface. The borehole was abandoned with cement. The DSP-207 site was closed by the USGS in 1958.

The USGS Conservation Division was the approval authority for potash exploration boreholes drilled during the period 1953 through 1978 in Eddy County, New Mexico. During this period, the USGS administered the drilling programs under the authority granted it by the U.S. Congress.

The USGS permitted private exploration boreholes, which were drilled by mineral leaseholders. The USGS received and approved Sundry Notices and Reports on Wells from leaseholders. Prior to drilling a borehole, the company submitted a Notice of Intention to Drill for approval by the USGS. Following completion of the drilling and closure of the drilling location, the company notified the USGS of its intention to abandon the site. Upon approval of the notice, the USGS considered the drilling location closed. No additional closure documentation was required.

The USGS approved the closure and abandonment of the drilling sites according to then current requirements. The permitting and closure activities for potash exploration were established by the USGS in the early 1950's. These activities have not changed substantially since that time, as evidenced by recent permits being granted by the BLM.

The principal drilling material used for the drilling of hole DSP-207 was saturated brine and drilling mud. Closure documentation for DSP-207 is included in Appendix D. Other information on the DSP-207 drilling is included in Appendix Y.

21.3 Land Use

This section presents a summary of current and future/proposed land use for AOC 001ac.

21.3.1 Current

This AOC is located within the 16-section WLWA. The WIPP Land Withdrawal Act (Public Law 102-579) created the WLWA in October 1992. This Act transferred the jurisdiction of the WLWA from the Secretary of the Interior to the Secretary of Energy. In accordance with sections 3(a)(1) and (3) of the Act, these lands ". . . are withdrawn from all forms of entry, appropriation, and disposal under the public land laws . . ." and are reserved for the use of the Secretary [of Energy] for the construction, experimentation, operation, repair and maintenance, disposal, shutdown, monitoring, decommissioning, and other authorized activities, associated with the purposes of WIPP as set forth in section 213 of the Department of Energy National Security and Military Applications of Nuclear Energy Act of 1980 (Public Law 96-164; 93 Statute 1259, 1265) and this Act."

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AOC 001ac is located on land under the jurisdiction of the DOE. The land around this AOC is occasionally used for livestock grazing, and recreational activities; no other current uses exist.

21.3.2 Future/Proposed

The facility operational period is estimated to be 35 years with a 30-year postclosure care period. Active institutional controls will be maintained during postclosure for 100 years. The future/proposed land use is industrial and recreational.

21.4 Investigatory Activities

AOC 001ac was investigated one time. The following subsections describe this investigation.

21.4.1 Summary

AOC 001ac was visually inspected by the NMED in 1992 as part of a RFA. No samples were collected.

21.4.2 Investigation #1 – RFA

AOC 001ac was visually inspected by the NMED in 1992 as part of a RFA.

21.4.2.1 Nonsampling Data Collection

No nonsampling data collection was performed during the RFA.

21.4.2.2 Sampling Data Collection

No sampling activities were performed at this AOC during the RFA.

21.4.2.3 Data Gaps

There were no samples collected during the RFA at this AOC.

21.4.2.4 Results and Conclusions

The RFA concluded that the potential release of hazardous constituents to soil was high. The RFA also concluded that migration potential to groundwater was low relative to other locations on site. The site was closed by the USGS in 1958.

21.5 Site Conceptual Model

The following subsections define various aspects of the conceptual model developed for this AOC.

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21.5.1 Nature and Extent of Contamination

As stated above, this site was closed by the USGS in 1958.

21.5.2 Environmental Fate

As stated above, this site was closed by the USGS in 1958.

21.6 Site Assessments

No site assessments or risk assessments were required, because the site was closed by the USGS in 1958.

21.6.1 Summary

No screening assessments were required, because the site was closed by the USGS in 1958.

21.6.2 Screening Assessments

No human health or ecological assessments were required, because the site was closed by the USGS in 1958.

21.6.2.1 Human Health

No human health screening assessment was required, because the site was closed by the USGS in 1958.

21.6.2.2 Ecological

No ecological screening assessment was required, because the site was closed by the USGS in 1958.

21.6.3 Risk Assessments

This section discusses the baseline risk assessment for human health and ecological risk.

21.6.3.1 Human Health

A baseline human health risk assessment is not required for AOC 001ac, because the site was closed by the USGS in 1958.

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21.6.3.2 Ecological

A baseline ecological risk assessment is not required for AOC 001ac, because the site was closed by the USGS in 1958.

21.6.4 Other Applicable Assessments

Applicable assessments pertaining to surface water, groundwater, and underground storage tanks are discussed below.

21.6.4.1 Surface Water

No surface water is present at this site and this subsection is not applicable.

21.6.4.2 Groundwater

The site was closed by the USGS in 1958. No groundwater evaluation is required.

21.6.4.3 Underground Storage Tanks

No underground storage tanks are known to have been present at this site. This section is, therefore, not applicable.

21.6.4.4 Other

No other assessments are required.

21.7 No Further Action Petition

The NMED has developed six criteria to identify whether a site should be identified for NFA (NMED, 1999b). Based on these criteria, an NFA petition is reasonable if:

- The site does not exist;
- The site was not used for the management of hazardous constituents;
- There was no release of hazardous constituents to the environment;
- There was a release, but hazardous constituents are at acceptably low levels;
- There was a release, but the site has been characterized and/or closed under another authority; or
- There was a release, but the site was remediated.

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The rationale and criterion for this NFA petition are discussed in the following subsections.

21.7.1 Rationale

Based on the documentation provided in Appendix D for the DSP-207 mud pit, an NFA is being recommended for this AOC for the following reason: the site was closed by the USGS in 1958. This AOC meets Criterion 5.

21.7.2 Criterion

Based on the evidence provided above, an NFA determination is requested for AOC 001ac in conformance with Criterion 5 for the DSP-207 mud pit.

22.0 AOC 001ae (IMC-377 MUD PIT)

The following subsections provide a description of the AOC, an assessment of available site characterization data, risk assessment information and rationale for this NFA petition.

22.1 Summary

The Permittees are requesting an NFA decision for AOC 001ae, IMC-377 mud pit. AOC 001ae consists of a drilling mud pit associated with the IMC-377 potash exploration borehole. Review and analysis of relevant data and documentation provided for the AOC demonstrate that the IMC-377 drilling mud pit was closed under USGS authority in 1965.

22.2 Description and Operational History

The site description and operational history are provided in the following subsections.

22.2.1 Site Description

AOC 001ae is located in the NW $\frac{1}{4}$ of the NW $\frac{1}{4}$ of Section 22, Township 22 South, Range 31 East. The abandoned mud pit constructed for the drilling of borehole IMC-377 is AOC 001ae. A sketch of AOC 001ae is presented in Figure 22.1.

The drill pad for IMC-377 is sparsely vegetated and appears to have been regraded. A zone of depressed soil in the northeastern portion of the drill pad represents the location of the approximately 8-foot-by-16-foot mud pit.

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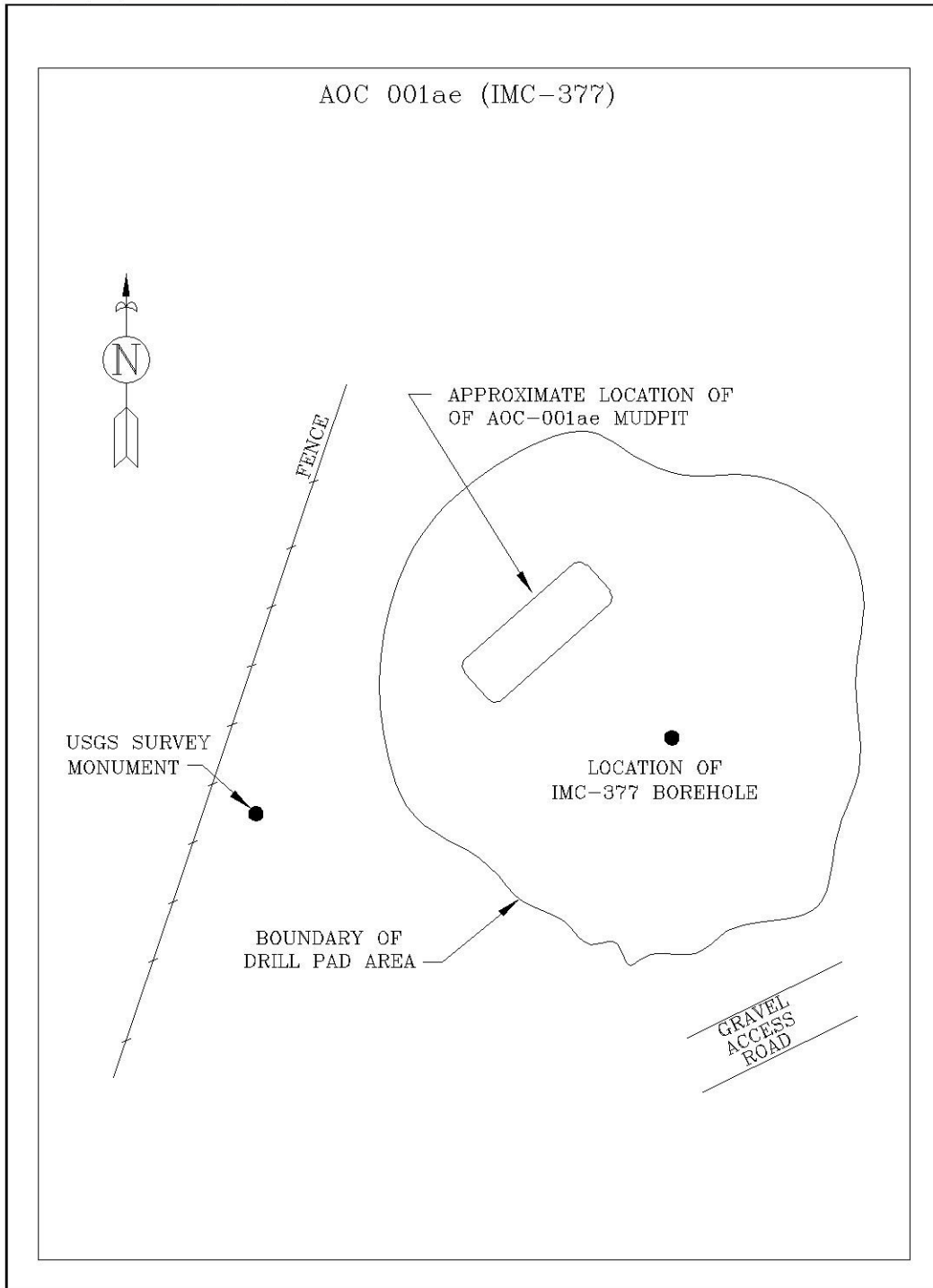


Figure 22.1 - Sample Location Sketch - AOC 001ae (IMC-377 Drilling Mud Pit) (map not to scale)

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22.2.2 Operational History

Borehole IMC-377 was drilled by the Boyles Brothers Drilling Company on behalf of the International Minerals and Chemicals Corporation in July of 1965 as a potash exploration borehole. IMC-377 was drilled to a total depth of 1,876 feet below ground surface. The borehole was abandoned with cement. The site IMC-377 site was closed by the USGS in 1965.

The USGS Conservation Division was the approval authority for potash exploration boreholes drilled during the period 1953 through 1978 in Eddy County, New Mexico. During this period, the USGS administered the drilling programs under the authority granted it by the U.S. Congress.

The USGS permitted private exploration boreholes, which were drilled by mineral leaseholders. The USGS received and approved Sundry Notices and Reports on Wells from leaseholders. Prior to drilling a borehole, the company submitted a Notice of Intention to Drill for approval by the USGS. Following completion of the drilling and closure of the drilling location, the company notified the USGS of its intention to abandon the site. Upon approval of the notice, the USGS considered the drilling location closed. No additional closure documentation was required.

The USGS approved the closure and abandonment of the drilling sites according to then current requirements. The permitting and closure activities for potash exploration were established by the USGS in the early 1950's. These activities have not changed substantially since that time, as evidenced by recent permits being granted by the BLM.

The principal drilling materials used for the drilling of hole IMC-377 was saturated brine. Closure documentation for IMC-377 is included in Appendix D. Other information on the IMC-377 drilling is included in Appendix Z.

22.3 Land Use

This section presents a summary of current and future/proposed land use for AOC 001ae.

22.3.1 Current

This AOC is located within the 16-section WLWA. The WIPP Land Withdrawal Act (Public Law 102-579) created the WLWA in October 1992. This Act transferred the jurisdiction of the WLWA from the Secretary of the Interior to the Secretary of Energy. In accordance with sections 3(a)(1) and (3) of the Act, these lands ". . . are withdrawn from all forms of entry, appropriation, and disposal under the public land laws . . ." and are reserved for the use of the Secretary [of Energy] for the construction, experimentation, operation, repair and maintenance, disposal, shutdown, monitoring, decommissioning, and other authorized activities, associated with the purposes of WIPP as set forth in section 213 of the Department of Energy National Security and Military Applications of

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Nuclear Energy Act of 1980 (Public Law 96-164; 93 Statute 1259, 1265) and this Act." AOC 001ae is located on land under the jurisdiction of the DOE. The land around this AOC is occasionally used for livestock grazing, and recreational activities; no other current uses exist.

22.3.2 Future/Proposed

The facility operational period is estimated to be 35 years with a 30-year postclosure care period. Active institutional controls will be maintained during postclosure for 100 years. The future/proposed land use is industrial and recreational.

22.4 Investigatory Activities

No investigations have taken place at this AOC.

22.5 Site Conceptual Model

The following subsections define various aspects of the conceptual model developed for this AOC.

22.5.1 Nature and Extent of Contamination

As stated above, this site was closed by the USGS in 1965.

22.5.2 Environmental Fate

As stated above, this site was closed by the USGS in 1965.

22.6 Site Assessments

No site assessments or risk assessments were required, because the site was closed by the USGS in 1965.

22.6.1 Summary

No screening assessments were required, because the site was closed by the USGS in 1965.

22.6.2 Screening Assessments

No human health or ecological assessments were required, because the site was closed by the USGS in 1965.

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22.6.2.1 Human Health

No human health screening assessment was required, because the site was closed by the USGS in 1965.

22.6.2.2 Ecological

No ecological screening assessment was required, because the site was closed by the USGS in 1965.

22.6.3 Risk Assessments

This section discusses the baseline risk assessment for human health and ecological risk.

22.6.3.1 Human Health

A baseline human health risk assessment is not required for AOC 001ae, because the site was closed by the USGS in 1965.

22.6.3.2 Ecological

A baseline ecological risk assessment is not required for AOC 001ae, because the site was closed by the USGS in 1965.

22.6.4 Other Applicable Assessments

Applicable assessments pertaining to surface water, groundwater, and underground storage tanks are discussed below.

22.6.4.1 Surface Water

No surface water is present at this site and this subsection is not applicable.

22.6.4.2 Groundwater

The site was closed by the USGS in 1965. No groundwater evaluation is required.

22.6.4.3 Underground Storage Tanks

No underground storage tanks are known to have been present at this site. This section is, therefore, not applicable.

22.6.4.4 Other

No other assessments are required.

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22.7 No Further Action Petition

The NMED has developed six criteria to identify whether a site should be identified for NFA (NMED, 1999b). Based on these criteria, an NFA petition is reasonable if:

- The site does not exist;
- The site was not used for the management of hazardous constituents;
- There was no release of hazardous constituents to the environment;
- There was a release, but hazardous constituents are at acceptably low levels;
- There was a release, but the site has been characterized and/or closed under another authority; or
- There was a release, but the site was remediated.

The rationale and criterion for this NFA petition are discussed in the following subsections.

22.7.1 Rationale

Based on the documentation provided in Appendix D for the IMC-377 mud pit, an NFA is being recommended for this AOC for the following reason: the site was closed by the USGS in 1965. This AOC meets Criterion 5.

22.7.2 Criterion

Based on the evidence provided above, an NFA determination is requested for AOC 001ae in conformance with Criterion 5 for the IMC-377 mud pit.

23.0 AOC 010b (WASTE HANDLING SHAFT SUMP)

The following subsections provide a description of the AOC, an assessment of available site characterization data, risk assessment information and rationale for this NFA petition.

23.1 Summary

The Permittees are requesting an NFA decision for AOC 010b, Waste Handling Shaft Sump. AOC 010b consists of a sump at the bottom of the waste handling shaft. Based on the location of this AOC, there has been no release of hazardous constituents to the environment.

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23.2 Description and Operational History

The site description and operational history are provided in the following subsections.

23.2.1 Site Description

AOC 010b is located at S400/E300 at the bottom of the Waste Handling Shaft, approximately 2,269 feet below ground surface. The location of AOC 010b is shown in Figure 1.3.

The diameter of the Waste Handling Shaft is 20 feet and extends 119 feet below the facility horizon to accommodate the hoist counter weights. The unlined sump at the bottom of this shaft is AOC 010b.

23.2.2 Operational History

The Waste Handling Shaft is the route of entry for waste to be disposed of in the HWDUs. The shaft is part of the operation of the facility and will continue to be used until the facility is closed in the future.

Waste reportedly accumulated in the AOC during the construction phase of the facility included: cement grout, chemical grout, grease, and other construction debris. All of these wastes have been removed from the sump.

Brine has been observed in the sump. Sampling of the brine indicated some of it contained elevated levels of lead. The brine, as it flows down the exhaust shaft, leaches lead from chain-link mesh attached to the exhaust shaft. The lead-containing brine is currently managed and disposed of at an off-site treatment, storage, and disposal facility. The installation of a catchment basin at the base of the exhaust shaft has prevented any new flow of brine to the Waste Handling Shaft.

Information on AOC 010b is included in Appendix AA.

23.3 Land Use

This section presents a summary of current and future/proposed land use for AOC 010b.

23.3.1 Current

This AOC is located within the 16-section WLWA. The WIPP Land Withdrawal Act (Public Law 102-579) created the WLWA in October 1992. This Act transferred the jurisdiction of the WLWA from the Secretary of the Interior to the Secretary of Energy. In accordance with sections 3(a)(1) and (3) of the Act, these lands ". . . are withdrawn from all forms of entry, appropriation, and disposal under the public land laws . . ." and are reserved for the use of the Secretary [of Energy] for the construction, experimenta-

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tion, operation, repair and maintenance, disposal, shutdown, monitoring, decommissioning, and other authorized activities, associated with the purposes of WIPP as set forth in section 213 of the Department of Energy National Security and Military Applications of Nuclear Energy Act of 1980 (Public Law 96-164; 93 Statute 1259, 1265) and this Act." AOC 010b is located under land under the jurisdiction of the DOE.

23.3.2 Future/Proposed

The facility operational period is estimated to be 35 years with a 30-year postclosure care period. Active institutional controls will be maintained during postclosure for 100 years. The future/proposed land use is industrial and recreational.

23.4 Investigatory Activities

No investigations have taken place at this AOC.

23.5 Site Conceptual Model

The following subsections define various aspects of the conceptual model developed for this AOC.

23.5.1 Nature and Extent of Contamination

The TSD does not identify any specific constituents of potential concern for this AOC, although lead is discussed. Any lead that may have leached from the brine remains in the salt of the repository.

23.5.2 Environmental Fate

Because any lead in the brine is located at least 2,150 feet below ground surface, in a facility that contains no groundwater, there is no possibility that the lead will be transported beyond the facility. In addition, because the sump is located well below ground, there is no complete exposure pathway for human or environmental receptors.

There was no release of hazardous constituents to the environment, because there is no complete exposure pathway. In addition, the sump will be closed at the end of operations, ensuring that there will be no complete exposure pathway in the future.

23.6 Site Assessments

No site assessments or risk assessments were required, because there has been no release of hazardous constituents to the environment or environmental receptors.

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23.6.1 Summary

No screening assessments were required, because there has been no release of hazardous constituents to the environment or environmental receptors.

23.6.2 Screening Assessments

No human health or ecological assessments were required, because there has been no release of hazardous constituents to the environment or environmental receptors.

23.6.2.1 Human Health

No human health screening assessment was required, because there has been no release of hazardous constituents to the environment or environmental receptors.

23.6.2.2 Ecological

No ecological screening assessment was required, because there has been no release of hazardous constituents to the environment or environmental receptors.

23.6.3 Risk Assessments

This section discusses the baseline risk assessment for human health and ecological risk.

23.6.3.1 Human Health

A baseline human health risk assessment is not required for AOC 010b, because there has been no release of hazardous constituents to the environment or environmental receptors.

23.6.3.2 Ecological

A baseline ecological risk assessment is not required for AOC 010b, because there has been no release of hazardous constituents to the environment or environmental receptors.

23.6.4 Other Applicable Assessments

Applicable assessments pertaining to surface water, groundwater, and underground storage tanks are discussed below.

23.6.4.1 Surface Water

This subsection is not applicable.

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23.6.4.2 Groundwater

This subsection is not applicable.

23.6.4.3 Underground Storage Tanks

No underground storage tanks are known to have been present at this site. This section is, therefore, not applicable.

23.6.4.4 Other

No other assessments are required.

23.7 No Further Action Petition

The NMED has developed six criteria to identify whether a site should be identified for NFA (NMED, 1999b). Based on these criteria, an NFA petition is reasonable if:

- The site does not exist;
- The site was not used for the management of hazardous constituents;
- There was no release of hazardous constituents to the environment;
- There was a release, but hazardous constituents are at acceptably low levels;
- There was a release, but the site has been characterized and/or closed under another authority; or
- There was a release, but the site was remediated.

The rationale and criterion for this NFA petition are discussed in the following subsections.

23.7.1 Rationale

An NFA is being recommended for this AOC for the following reason: there was no release of hazardous constituents to the environment. This AOC meets Criterion 3.

23.7.2 Criterion

An NFA determination is requested for AOC 010b in conformance with Criterion 3 for the Waste Handling Shaft Sump.

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24.0 AOC 010c (EXHAUST SHAFT SUMP)

The following subsections provide a description of the AOC, an assessment of available site characterization data, risk assessment information and rationale for this NFA petition.

24.1 Summary

The Permittees are requesting an NFA decision for AOC 010c, Exhaust Shaft Sump. AOC 010c consists of a sump at the bottom of the exhaust shaft. Based on the location of this AOC, there has been no release of hazardous constituents to the environment.

24.2 Description and Operational History

The site description and operational history are provided in the following subsections.

24.2.1 Site Description

AOC 010c is located at S400/E480 at the bottom of the Exhaust Shaft, approximately 2,150 feet below ground surface. The location of AOC 010c is shown in Figure 1.3.

24.2.2 Operational History

The Exhaust Shaft is the main ventilation exhaust route for the underground facility. The shaft is part of the operation of the facility and will continue to be used until the facility is closed in the future.

Waste reportedly accumulated in the AOC during the construction phase of the facility included: cement grout, chemical grout, grease, and other construction debris. All of these wastes have been removed from the sump.

Brine has been observed in the sump. Sampling of the brine indicated some of it contained elevated levels of lead. The source of the increased brine flow was traced to water condensing in the Exhaust Shaft and from anthropogenic water in the Santa Rosa Formation at the Dewey Lake Formation contact. The brine, as it flows down the exhaust shaft, leaches lead from chain-link mesh attached to the exhaust shaft. The lead-containing brine is currently managed and disposed of at an off-site treatment, storage, and disposal facility. A catchment basin has been installed at the base of the exhaust shaft to collect the brine.

Information on AOC 010c is included in Appendix BB.

24.3 Land Use

This section presents a summary of current and future/proposed land use for AOC 010c.

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24.3.1 Current

This AOC is located within the 16-section WLWA. The WIPP Land Withdrawal Act (Public Law 102-579) created the WLWA in October 1992. This Act transferred the jurisdiction of the WLWA from the Secretary of the Interior to the Secretary of Energy. In accordance with sections 3(a)(1) and (3) of the Act, these lands ". . . are withdrawn from all forms of entry, appropriation, and disposal under the public land laws . . ." and are reserved for the use of the Secretary [of Energy] for the construction, experimentation, operation, repair and maintenance, disposal, shutdown, monitoring, decommissioning, and other authorized activities, associated with the purposes of WIPP as set forth in section 213 of the Department of Energy National Security and Military Applications of Nuclear Energy Act of 1980 (Public Law 96-164; 93 Statute 1259, 1265) and this Act." AOC 010c is located under land under the jurisdiction of the DOE.

24.3.2 Future/Proposed

The facility operational period is estimated to be 35 years with a 30-year postclosure care period. Active institutional controls will be maintained during postclosure for 100 years. The future/proposed land use is industrial and recreational.

24.4 Investigatory Activities

No investigations have taken place at this AOC.

24.5 Site Conceptual Model

The following subsections define various aspects of the conceptual model developed for this AOC.

24.5.1 Nature and Extent of Contamination

The TSD does not identify any specific constituents of potential concern for this AOC, although lead is discussed. Any lead that may have been deposited from the brine remains in the salt of the repository. Currently, brines associated with this AOC are tested and properly managed and disposed of.

24.5.2 Environmental Fate

Because any lead in the brine is located at least 2,150 feet below ground surface, in a facility that contains no circulating ground water, as demonstrated by the numerical modeling submitted with the permit application, the possibility that the lead will be transported beyond the facility is insignificant. In addition, because the sump is located deep underground, there is no complete exposure pathway for human or environmental receptors.

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There was no release of hazardous constituents to the environment, because there is no complete exposure pathway. In addition, the sump will be closed at the end of operations, ensuring that there will be no complete exposure pathway in the future.

24.6 Site Assessments

No site assessments or risk assessments were required, because there has been no release of hazardous constituents to the environment or environmental receptors.

24.6.1 Summary

No screening assessments were required, because there has been no release of hazardous constituents to the environment or environmental receptors.

24.6.2 Screening Assessments

No human health or ecological assessments were required, because there has been no release of hazardous constituents to the environment or environmental receptors.

24.6.2.1 Human Health

No human health screening assessment was required, because there has been no release of hazardous constituents to the environment or environmental receptors.

24.6.2.2 Ecological

No ecological screening assessment was required, because there has been no release of hazardous constituents to the environment or environmental receptors.

24.6.3 Risk Assessments

This section discusses the baseline risk assessment for human health and ecological risk.

24.6.3.1 Human Health

A baseline human health risk assessment is not required for AOC 010c, because there has been no release of hazardous constituents to the environment or environmental receptors.

24.6.3.2 Ecological

A baseline ecological risk assessment is not required for AOC 010c, because there has been no release of hazardous constituents to the environment or environmental receptors.

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24.6.4 Other Applicable Assessments

Applicable assessments pertaining to surface water, groundwater, and underground storage tanks are discussed below.

24.6.4.1 Surface Water

This subsection is not applicable.

24.6.4.2 Groundwater

This subsection is not applicable.

24.6.4.3 Underground Storage Tanks

No underground storage tanks are known to have been present at this site. This section is, therefore, not applicable.

24.6.4.4 Other

No other assessments are required.

24.7 No Further Action Petition

The NMED has developed six criteria to identify whether a site should be identified for NFA (NMED, 1999b). Based on these criteria, an NFA petition is reasonable if:

- The site does not exist;
- The site was not used for the management of hazardous constituents;
- There was no release of hazardous constituents to the environment;
- There was a release, but hazardous constituents are at acceptably low levels;
- There was a release, but the site has been characterized and/or closed under another authority; or
- There was a release, but the site was remediated.

The rationale and criterion for this NFA petition are discussed in the following subsections.

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24.7.1 Rationale

An NFA is being recommended for this AOC for the following reason: there was no release of hazardous constituents to the environment. This AOC meets Criterion 3.

24.7.2 Criterion

An NFA determination is requested for AOC 010c in conformance with Criterion 3 for the Exhaust Shaft Sump.

25.0 SUMMARY

This NFA petition was prepared to fulfill requirements of Module VII, Section VII.O of the WIPP Hazardous Waste Facility Permit NM4890139088-TSDF (the Permit) (NMED, 1999a). This NFA petition addresses 15 SWMUs and 8 AOCs listed in the Permit. The petition provides information demonstrating that each SWMU and AOC meets one of the NFA criteria defined in Table 4 of the TSD (NMED 1999b) and that an NFA is justified for each SWMU and AOC. A summary of the NFA criterion for each of the SWMUs and AOCs is presented in Table 25.1.

Approval of the NFA petition by the NMED will allow the Permittees to request a permit modification to exit the RFI/Corrective Measures process, and remove the SWMUs and AOCs from the Permit.

**Table 25.1
Summary of NFA Petition for SWMUs and AOCs**

SWMU/AOC	NFA Criteria			NFA Petition Section
	3. No Release	4. Concentrations are acceptable	5. Closed Under Another Authority	
SWMU 001g	H-14		P-1	2.0
SWMU 001h	H-15		P-2	3.0
SWMU 001j			P-3	4.0
SWMU 001k			P-4	5.0
SWMU 001L		WIPP-12	P-5	6.0
SWMU 001m			P-6	7.0
SWMU 001n			P-15	8.0
SWMU 001o			Badger Unit	9.0
SWMU 001p			Cotton Baby	10.0
SWMU 001q		DOE-1		11.0
SWMU 001s	ERDA-9			12.0
SWMU 001t			IMC-374	13.0
SWMU 001x		WIPP-13		14.0
SWMU 004a		Portacamp		15.0
SWMU 007b		SW Evap. Pond		16.0

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**Table 25.1
Summary of NFA Petition for SWMUs and AOCs**

SWMU/AOC	NFA Criteria			NFA Petition Section
	3. No Release	4. Concentrations are acceptable	5. Closed Under Another Authority	
AOC 001r			D-123	17.0
AOC 001u			IMC-376	18.0
AOC 001v			IMC-456	19.0
AOC 001w			IMC-457	20.0
AOC 001ac			DSP-207	21.0
AOC 001ae			IMC-377	22.0
AOC 010b	Waste Handling Shaft Sump			23.0
AOC 010c	Exhaust Shaft Sump			24.0

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APPENDIX A

STATISTICAL EVALUATION OF BACKGROUND METALS DATA

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Appendix A - Statistical Evaluation of Background Metals Data

1.0 INTRODUCTION

As part of the Waste Isolation Pilot Plant (WIPP) Voluntary Release Assessment/ Corrective Action (VRA/VCA) Program (DOE, 1996) and the WIPP Sampling and Analysis Plan (SAP) for Solid Waste Management Units and Areas of Concern (DOE, 2000), background soil samples were collected from areas outside Solid Waste Management Units (SWMU) mud pits at WIPP. Because some of the target metals for the sampling occur naturally in soil, including soil in the WIPP Land Withdrawal Area, it is necessary to distinguish metal concentrations that represent potential releases of metals from background concentrations of metals. This appendix describes the statistical methods used to evaluate background concentrations of metals and identifies appropriate metals background concentrations for the WIPP investigations.

As was described in the WIPP VRA/VCA report and the SAP, background soil samples were collected from depths of 3 to 120 inches below ground surface (bgs). The background soil samples were submitted for analyses of total metals, including barium, chromium, lead, and nickel. For this statistical evaluation, the metal concentrations in soil samples collected from all soil intervals were combined into one data set. The following paragraphs describe the approach and results of the statistical evaluation.

2.0 STATISTICAL EVALUATION APPROACH

The analytical results for the background soil samples were evaluated statistically. The general logic and statistical methods used in this analysis are consistent with the EPA guidance documents "Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities – Interim Final Guidance (EPA, 1989) and Addendum to the Interim Final Guidance" (EPA, 1992). Specific descriptions of the statistical methods and techniques can be found in these two documents. This guidance was developed for the analysis of groundwater sample analytical results; however, the statistical methods defined in the guidance are well-defined and are directly applicable to the background metals analysis results from the VRA/CA and SAP.

2.1 Summary Statistics

Background metal summary statistics for barium, chromium, lead, and nickel were calculated using standard Excel[®] spreadsheet statistical functions. For each metal, summary statistics included the maximum and minimum concentrations, average and geometric means, and standard deviation. These data are presented in Table A.1. The locations of the soil borings are presented in the main body of this document.

2.2 Background Statistics

The following paragraphs describe statistical analyses performed as part of the background statistics evaluation.

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2.2.1 Evaluation of Data Distribution

The data distributions for barium, chromium, lead, and nickel and were evaluated to identify whether the data should be treated as parametric (normal or lognormal distribution) or nonparametric (other distribution). For small data sets, EPA recommends that distributional testing be performed on the natural logarithms of the data to test for lognormal distribution. If the data are lognormally distributed, tests for normality can be performed on the transformed data. If the data are not lognormally distributed, the tests can be performed on the original data. If the data are neither lognormally or normally distributed, a nonparametric technique was used to identify background concentrations.

The normality testing was performed using methods described by EPA (EPA, 1992). For data sets containing 50 or fewer sample results, the Shapiro-Wilk test of normality was used. For larger data sets, the Shapiro-Francia test of normality was used. These tests are recommended to test the premise that data are normally or lognormally distributed.

2.2.2 Selection of Upper Tolerance Limits

For detection monitoring programs, compliance point samples are assumed to come from the same population as background samples, until significant evidence of contamination can be shown. To test this hypothesis, a 95 percent coverage tolerance limit can be constructed for the background data. Once the interval is constructed, results for compliance samples can be compared to the upper tolerance limit (UTL). The procedure for constructing the tolerance limit must consider the number of detected and nondetected sample results, and the distribution of the background results (e.g. normal, lognormal or other).

When the percentage of nondetected values in a sample exceeds 50 percent or the data are not normally or lognormally distributed, it is not possible to calculate a UTL. EPA guidance recommends selecting the highest measured value as the UTL. The highest value is referred to as the nonparametric UTL.

For this evaluation, the percentage of nondetected values was less than 50 percent for the four metals (Table A1). In addition, the distributions of the barium, chromium, lead and nickel data were unknown. Consequently, the value representing the background concentrations of barium, chromium, lead, and nickel were their respective nonparametric UTLs.

3.0 RESULTS OF THE STATISTICAL EVALUATION

Table A.1 presents the background analytical results for barium, chromium, lead, and nickel. Also included in the table are summary statistics and background statistics. The following results are based on the information provided in Table A.1.

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- The concentrations of barium, chromium, lead, and nickel were neither normally nor lognormally distributed (i.e., the distribution is unknown).
- The nonparametric UTL was selected to represent background concentrations of metals. The nonparametric UTL values were 197 mg/kg (barium), 26 mg/kg (chromium), 5.4 mg/kg (lead) and 12.4 mg/kg (nickel).

4.0 SUMMARY

A statistical evaluation of metals concentrations in background soil samples was performed. The statistical evaluation resulted in the identification of nonparametric UTLs. The nonparametric UTLs will be used for comparison to concentrations of barium, chromium, lead and nickel in investigative soil samples collected from SWMUs at the WIPP site. Sample results that are less than their respective background metal concentrations will be interpreted to indicate that no release has occurred. Conversely, values that exceed their respective background metal concentrations may identify a potential release.

5.0 REFERENCES

- U.S. Department of Energy, 1996. Final Voluntary Release Assessment/Corrective Action Report, Waste Isolation Pilot Plant, Carlsbad, New Mexico. November.
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Table A.1 - WIPP Combined Background Metal Concentrations										
SWMU	Hole	Location	Barium		Chromium		Lead		Nickel	
001g	1	P-1 Mud Pit	52		2		3.8	J		
001g	1	P-1 Mud Pit	35		5		2.1	J		
001g	1	H-14 Mud Pit	26		7		2.7	J		
001g	1	H-14 Mud Pit	15		3		1.9	J		
001g	2	P-1 Mud Pit	34		7		5.4	J		
001g	2	P-1 Mud Pit	39		3		1.8	J		
001h	1	H-15 Mud Pit	33		5		2.9	J		
001h	1	H-15 Mud Pit	21		4		2.8	J		
001h	1	P-2 Mud Pit	19		6		2.1			
001h	1	P-2 Mud Pit	28		6		2.6			
001h	2	H-15 Mud Pit	27		5		2.4	J		
001h	2	H-15 Mud Pit	170		5		2.2	J		
001j	3	P-3 Mud Pit	20		5		2			
001j	3	P-3 Mud Pit	17		26		1.5			
001j	4	P-3 Mud Pit	33		4		2.3			
001j	4	P-3 Mud Pit	16		4		1.9			
001k	1	P-4 Mud Pit	18	J	4	J	1.6			
001k	1	P-4 Mud Pit	14	J	4	J	1.5			
001k	2	P-4 Mud Pit	15	J	4	J	1.4			
001k	2	P-4 Mud Pit	19	J	4	J	1.4			
001L	1	P-5 Mud Pit	62		4		3.6	J		
001L	1	P-5 Mud Pit	120		3		2.2	J		
001L	4	WIPP-12 Mud Pit	36		4		1.8	J		
001L	4	WIPP-12 Mud Pit	18		2		1.4	J		
001L	B	WIPP-12 Mud Pit	28.3							
001L	B	WIPP-12 Mud Pit	197							
001L	C	WIPP-12 Mud Pit	20.5							
001L	C	WIPP-12 Mud Pit	69.8							
001m	1	P-6 Mud Pit	11	J	2	UJ	1.3			
001m	1	P-6 Mud Pit	10	J	4	J	1.2			
001m	2	P-6 Mud Pit	20	J	6	J	5.1			
001m	2	P-6 Mud Pit	19	J	4	J	1.8			
001n	1	P-15 Mud Pit	13		4		1.2			
001n	1	P-15 Mud Pit	16		5		1.4			
001n	2	P-15 Mud Pit	19		4		1.6			
001n	2	P-15 Mud Pit	12		4		1.3			
001q	B	DOE-1 Mud Pit			3.7	N	1.8	*	1.7	B
001q	B	DOE-1 Mud Pit			4.5	N	2.6	*	5	
001q	F	DOE-1 Mud Pit			7.5	N	3.7	*	12.4	
001q	F	DOE-1 Mud Pit			7.5	N	3.2	*	9.8	
001s	1	ERDA-9 Mud Pit	15		4		1.8			
001s	1	ERDA-9 Mud Pit	110	J	4	J	1.9			

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Table A.1 - WIPP Combined Background Metal Concentrations										
SWMU	Hole	Location	Barium		Chromium		Lead		Nickel	
001s	2	ERDA-9 Mud Pit	24	J	4	J	1.5			
001s	2	ERDA-9 Mud Pit	39		4		2.2			
001t	1	IMC-374 Mud Pit	10		4		1.5			
001t	1	IMC-374 Mud Pit	15		5		1.6			
001t	4	IMC-374 Mud Pit	9.3		3		1.2			
001t	4	IMC-374 Mud Pit	20		2	U	1.4	J		
001x	1	WIPP-13 Mud Pit	10		3		1.6			
001x	1	WIPP-13 Mud Pit	12		4		1.5			
001x	2	WIPP-13 Mud Pit	17		3		1.7			
001x	2	WIPP-13 Mud Pit	13		6		1.3			
001x	C	WIPP-13 Mud Pit	21.6		5.7	E*J	2.4	*		
001x	C	WIPP-13 Mud Pit	106		2.9	E*	1.9	*		
001x	E	WIPP-13 Mud Pit	16.1	B	4.7	E*	1.8	*		
001x	E	WIPP-13 Mud Pit	36		8.8	E*	4.5	*		
004a	5	Portacamp	14		4		1.5		2	U
004a	5	Portacamp	14		2		1.4		2	U
0.1666667	C	Portacamp			5	*NJ			2.5	B
0.1666667	C	Portacamp			6.7	0			4.8	
007b	1	SW Evaporation Pond	11		3		2.5	U		

	Barium		Chromium		Lead		Nickel		
<u>Summary Statistics</u>									
Maximum Value	197		26		5.4	J	12.4		
Minimum Value	9.3		2	UJ	1.2		1.7		
Average	33		5		2.2		5		
Geometric Mean	24		4		2		4		
Standard Deviation	38		3		1		4		
Number of Values	55		57		55		9		
<u>Background Statistics</u>									
>50% Non Detect:	No		No		No		No		
Normally Distributed	No		No		No		No		
Lognormally Distributed	No		No		No		No		
Recommended Background Statistic	NPUTL		NPUTL		NPUTL		NPUTL		
Recommended Background Value	197		26		5.4		12.4		
Carlsbad Background Value	500		50		<10		20		
Western U.S. Background Value	580		41		17		19		

Concentrations reported as milligrams per kilogram

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Blank cell = no data

NPUTL = Nonparametric upper tolerance limit

B = Reported value is below the required detection limit, but above the instrument detection limit

E = Result from serial dilution differs from original result by more than 10 percent

J = Estimated value

U = Not detected

* = Duplicate sample results not within laboratory control limits

References for Carlsbad and Western U.S. Background Values (USGS, 1984)

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APPENDIX B

THALLIUM SAMPLING AND ANALYSIS RESULTS

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Appendix B - Thallium Sampling and Analysis Results

1.0 INTRODUCTION

As part of voluntary investigation activities at the Waste Isolation Pilot Plant (WIPP), soil samples were collected at five solid waste management units (SWMUs) and analyzed for thallium. This Appendix B to the WIPP Sampling and Analysis Plan (SAP) for SWMUs, describes the sampling and analysis program.

2.0 REGULATORY BACKGROUND

In the draft Technical Support Document, Exclusion/Inclusion of Solid Waste Management Units and Areas of Concern, Permit Module VII Corrective Action for Solid Waste Management Units (TSD), the New Mexico Environment Department (NMED, 1999) identified five SWMUs where:

This SWMU could have been granted NFA if DOE had chosen to resample for thallium using an appropriate analytical technique to demonstrate that no release had occurred.

The five SWMUs were identified as:

- 001k (P-4 mud pit)
- 001m (P-6 mud pit)
- 001n (P-15 mud pit)
- 001s (ERDA-9 mud pit)
- 001t (IMC-374 mud pit)

3.0 SAMPLING AND ANALYSIS PROGRAM

In response to the draft TSD, WIPP performed soil sampling and analysis for thallium at the 5 SWMUs listed above, during September 1999. As part of the sampling program, WIPP collected 42 investigative samples at the same locations and same depths as in the Voluntary Release Assessment (VRA) program (DOE/WIPP 96-2209). In addition, ten associated QA/QC samples were collected as part of the sampling.

The 52 field samples were analyzed for thallium using Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS); Method AS-6-R06 (Equivalent to EPA SW-846 Method 6020; EPA, 1997). The validated analytical results are presented in Table B.1 on a dry weight basis. Overall, thallium was not detected in 51 of the 52 samples. The single detection occurred at SWMU 001s in a sample collected outside the mud pit.

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4.0 DISCUSSION

The results presented in Table B.1 demonstrate that no release of thallium occurred at the five SWMUs. Based on these results, no additional sampling is proposed in the SAP for these SWMUs.

In addition, the five SWMUs sampled in September 1999 represent a statistically significant subset of the 11 SWMUs sampled during the VRA. Because thallium was not detected in any of the sampled SWMUs, and thallium has not been identified as a constituent in any material used at any SWMU or area of concern (AOC), thallium will be eliminated as a constituent of concern for all SWMUs and AOCs as part of the SAP.

5.0 REFERENCES

DOE/WIPP 96-2209. Final Voluntary Release Assessment/Corrective Action Report, Waste Isolation Pilot Plant, Carlsbad, New Mexico, November.

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Table B.1 - Thallium Sampling and Analysis Results

SWMU	Hole	Depth, Inches	Comment	Result, ppmw
001k	Rinseate	NA	Blank	<1.1 U
	1	20		<0.10 U
	1	60 to 66		<0.10 U
	2	23		<0.10 U
	2	60 to 64		<0.11 U
	3	24		<0.10 U
	3	60 to 66		<0.11 U
	4	23		<0.10 U
	4	62 to 68		<0.11 U
001m	Rinseate	NA	Blank	<1.1 U
	1	20		<0.10 U
	1	60 to 66		<0.10 U
	2	20		<0.10 U
	2	62 to 68		<0.10 U
	3	16		<0.10 U
	3	16	Duplicate	<0.10 U
	3	48	Caliche @48 in.	<0.10 U
	4	22		<0.10 U
	4	60 to 66		<0.10 U
001n	Rinseate	NA	Blank	<1.1 U
	1	18		<0.10 U
	1	60 to 72		<0.11 U
	2	20		<0.10 U
	2	60 to 66		<0.10 U
	3	24		<0.10 U
	3	24	Duplicate	<0.10 U
	3	62 to 68		<0.10 U
	3	62 to 68	Duplicate	<0.10 U
	4	22		<0.10 U
	4	60 to 66		<0.10 U
001s	Rinseate	NA	Blank	<1.1 U
	1	23		<0.10 U

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Table B.1 - Thallium Sampling and Analysis Results

SWMU	Hole	Depth, Inches	Comment	Result, ppmw
	1	66 to 72		<0.11 U
	2	24		<0.10 U
	2	61 to 67		0.13
	3	22		<0.10 U
	3	65 to 71		<0.11 U
	4	23		<0.10 U
	4	62 to 68		<0.11 U
001t	Rinseate	NA	Blank	<1.1 U
	1	20		<0.10 U
	1	20	Duplicate	<0.10 U
	1	64 to 70		<0.11 U
	2	23		<0.10 U
	2	60 to 66		<0.11 U
	3	17		<0.10 U
	3	60 to 66		<0.10 U
	4	20		<0.10 U
	4	66 to 72		<0.10 U
	5	20		<0.10 U
	5	20	Duplicate	<0.10 U
	5	60 to 66		<0.10 U

Hole = Sample location, see figures in Sampling and Analysis Plan

Depth = Approximate depth of soil sample, inches below ground surface

Rinseate = Equipment rinse blank

Duplicate = Duplicate sample for a given hole and depth

ppmw = parts per million, on a dry weight basis

in. = inch

U = The compound was not detected, at the reported analytical detection limit

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APPENDIX C

ECOLOGICAL RISK EVALUATION

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Appendix C - Ecological Risk Evaluation

1.0 INTRODUCTION

The Waste Isolation Pilot Plant (WIPP) near Carlsbad, New Mexico is a facility built by the U.S. Department of Energy (DOE) for the disposal of transuranic waste associated with federal nuclear defense activities. Although a number of buildings and operational features are present on the surface, the waste disposal facilities located in salt formations 2,150 feet below the surface comprise the primary working portion of the WIPP facility. The potential risk associated with disposal of transuranic waste has been extensively studied and documented elsewhere, and will not be addressed in this risk assessment report.

This risk evaluation was conducted by the DOE Carlsbad Field Office (DOE CBFO) to evaluate the potential risks associated with chemical constituents detected in soil samples collected at four Solid Waste Management Units (SWMUs) identified at WIPP. The four SWMUs include three drill pad/mud pit units and a storage yard that were originally identified in the Resource Conservation and Recovery Act (RCRA) Facility Assessment (RFA) report prepared by the New Mexico Environmental Department (NMED) for the WIPP site (NMED, 1994). These SWMUs are 001L (WIPP-12 Drilling Mud Pit and P-5 Drilling Mud Pit), 001q (DOE-1 Drilling Mud Pit), 001x (WIPP-13 Drilling Mud Pit), and 004a (Portacamp Storage Area, West Side).

These four SWMUs were investigated as part of implementing the *WIPP Sampling and Analysis Plan (SAP) for Solid Waste Management Units and Areas of Concern* (DOE, 2000). The risk evaluation uses site-specific exposure parameters unique to WIPP and the four SWMUs, because the WIPP site has been withdrawn from public use since 1978. The Land Withdrawal Act (LWA) passed by Congress in 1992 (Public Law 102-579) withdrew the lands permanently. The WIPP site encompasses 16 square miles (10,240 acres) of land.

1.1 SWMU Descriptions

The descriptions of the four SWMUs evaluated in this risk assessment are described below.

1.1.1 SWMU 001L (WIPP-12 Drilling Mud Pit)

SWMU 001L is located in the SE $\frac{1}{4}$ of the SE $\frac{1}{4}$ of the SE $\frac{1}{4}$ of Section 17, Township 22 South, Range 31 East. SWMU 001L is made up of the mud pit complex developed for the drilling of the WIPP-12 exploration borehole. WIPP-12 was drilled in 1978 and deepened in 1981 and 1982 to investigate lithologic and stratigraphic details of the Salado and Castile Formations. WIPP-12 was drilled to a total depth of 3,928 feet.

The WIPP-12 mud pit is approximately 3 acres in size. As part of reclamation of this mud pit, caliche and native soils were used to fill in and cover the mud pit. This site is

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characterized by hummocky, dark bands of fill material that form berms running east and west. Linear dark bands of soil and sparse vegetation delineate the mud pit location. The mud pit areas are rough graded, exposing a mixture of surface sands and caliche material.

1.1.2 SWMU 001q (DOE-1 Drilling Mud Pit)

SWMU 001q is located in the SE $\frac{1}{4}$ of the SE $\frac{1}{4}$ of the SE $\frac{1}{4}$ of Section 28, Township 22 South, Range 31 East. DOE-1 was drilled in 1982 to collect stratigraphic, structural, and hydrologic data. The mud pits constructed for the drilling of DOE-1 comprise SWMU 001q. Salazar Brothers drilled the DOE-1 borehole to a depth of 4,065 feet to examine the nature of the Castile Formation. Field operations were initiated July 1982 and completed in that same month.

There are two mud pits at the DOE-1 drill pad. The primary pit measures approximately 150 feet by 45 feet, and a second reserve pit encompasses an area approximately 50 feet by 75 feet. Both areas were lined with 8-mil (0.008-m) reinforced polyethylene liner. Only one of the mud pits appears to have been used.

1.1.3 SWMU 001x (WIPP-13 Drilling Mud Pit)

SWMU 001x is located in the NW $\frac{1}{4}$ of the NE $\frac{1}{4}$ of the SW $\frac{1}{4}$ of Section 17, Township 22 South, Range 31 East. The abandoned mud pit constructed for the drilling of borehole number WIPP-13 is SWMU 001x.

There is a single mud pit that measures approximately 100 feet wide and 120 feet long. The mud pit area is sunken approximately 1.5 feet below the surface grade of the pad. No vegetation is growing on the mud pit area, and the soil in the mud pit is a dark grey color. Black plastic liners protrude through the surface and delineate the mud pit.

The WIPP-13 borehole was drilled by the Pennsylvania Drilling company in July 1978 to a depth of 1,025 feet. The borehole was deepened to 3,850 feet in 1979. In 1985, the hole was acidified after a retrievable bridge plug was set in the casing at a depth of approximately 740 feet. The casing was then perforated between 702 feet and 727 feet. This portion of the hole was capped at the surface and the hole left open for water level monitoring.

1.1.4 SWMU 004a (Portacamp Storage Yard, West Side)

SWMU 004a, the Portacamp Storage Yard, is an active materials storage area located in the E $\frac{1}{2}$ of the NE $\frac{1}{4}$ of the NE $\frac{1}{4}$ of Section 29, Township 22 South, Range 31 East. The Portacamp Storage Area is primarily designed to store new parts and materials. In the past, the Portacamp was used to store and manage used hydraulic oil, used motor oil, used antifreeze, and discontinued oils prior to recycling or disposal at offsite facilities.

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The 300 by 300 foot storage complex is covered with caliche and is surrounded by a locked, eight-foot chain-link fence. This complex is also divided into two separately managed areas divided by an eight-foot, chain-link fence. The west side of the Portacamp area is managed by Westinghouse, and the east side is managed by Sandia National Laboratories. Access to each area is limited to Westinghouse and Sandia materials control personnel, and the area is regularly patrolled by WIPP security.

The west side of the Portacamp storage yard is SWMU 004a and contains a 100-foot long by 20-foot wide concrete pad covered by a by 14-foot high metal roof. This area is located in the southwest corner of the compound.

Stored on the concrete pad located in the southwest corner are operational and maintenance equipment; an electric transformer substation; and used oils and lubricants. Beginning in 1995, all used oils scheduled for recycling at an offsite facility were stored on spill control pallets under the metal shelter.

The southern half of the Westinghouse Portacamp area is used to store construction and maintenance materials. The north central area was historically used as a holding area for nonhazardous waste waters and non-RCRA regulated oils awaiting appropriate disposal or reclamation. Labeled nonhazardous waste drums were historically stored on wooden pallets, which sat directly on the caliche pad.

1.2 Previous Analyses

Ecological risk was evaluated for three of these SWMUs and documented in *Human Health and Ecological Risk Assessment Waste Isolation Pilot Plant Solid Waste Management Units (DOE, 1998)*. This report provided a site-specific evaluation of the risk to ecological receptors resulting from exposure to regulated constituents in the SWMU soil, using NMED screening-level exposure factors.

The primary objective of the previous risk assessment was to exclude risk values estimated in *WIPP Screening-Level Ecological Risk Assessment (SLERA)* (NMED, 1998a). To meet this objective, a focused evaluation that used the basic exposure assumptions in the SLERA was applied. Additional refinement was incorporated into the NMED calculations using well-documented site- and species-specific criteria that effect potential risk. The most important factors in this approach were: (1) correct an apparent error in the SLERA calculations, (2) use average species body weight and average ingestion rate in the risk calculations, rather than the minimum body weight and maximum ingestion rate used by NMED, (3) incorporate species-specific home range criteria, and (4) compare the potential home range exposure risk when the home range includes both the SWMU concentration area and background concentration area versus the exposure risk when the home range area consists only of the natural background.

The report was submitted to the New Mexico Environment Department (NMED) in July 1998. To the date, NMED has not provided comments on this submittal.

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Three of the SWMU sites exhibited Hazard Indexes (HIs) higher than background. An evaluation of the potential ecological receptor population impact, demonstrated that the potential impacts were insignificant. Based on these results, it was recommended that no additional ecological risk assessment be undertaken for these three SWMUs until a risk management team was formed and valued ecological resources were identified according to EPA guidance (EPA, 1998). The risk management team is described by EPA as the lead agency, supporting agencies, land owners, land users, other agencies that manage environmental resources, and the public. According to EPA, this team should define the valued ecological resources to be protected at the WIPP site. The NMED would serve as the lead agency for this activity and DOE represents the land owner and one of the other agencies.

1.3 Current Analyses

Both the NMED and DOE ecological screening-level analyses completed in 1998 showed risk to ecological receptors. The DOE analyses showed potential risk to ecological receptors associated with exposure to background concentrations of inorganic constituents (metals) in soil. Because both analyses used risk-maximizing assumptions for the screening-level analyses, calculated risk is overstated in the reports. This ecological risk evaluation uses recent NMED guidance (NMED, 2000), other references, and reasonably conservative assumptions to calculate risk for ecological receptors. The methodology used in the analyses maintains a level of conservatism in the calculation of ecological risk; however, ecological relevance and professional judgement are also incorporated in the analyses. In addition, the analyses include one SWMU that was not evaluated in either of the previous analyses.

1.4 Organization of the Ecological Risk Evaluation

The three main components of this ecological risk assessment include: (1) problem formulation, (2) exposure analysis, and (3) risk characterization. Section 2.0 addresses the problem formulation component and includes identification of SWMUs, contaminants of potential concern, site conceptual model, sources and migration pathways, selected ecological indicators, and assessment and measurement endpoint selection. Section 3.0 addresses the exposure analysis component. This phase of the risk assessment evaluates exposure parameters and makes assumptions about the indicator species and the selection of toxicity data. Section 4.0 addresses the risk characterization component and includes risk estimates for the selected indicator species and a qualitative discussion of uncertainties inherent in this ecological risk evaluation. Section 5.0 presents a summary of risks for each SWMU evaluated. Section 6.0 presents the references.

2.0 PROBLEM FORMULATION

The focus of the problem formulation step is to define objectives for the risk assessment. Normally, this process would identify the valued ecological resources that may require protection. The valued ecological resources may be identified based on

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societal values, ecological significance, a threatened or endangered species, economic significance, or other reasons. This report does not provide a rigorous evaluation of the valued ecological resources at the WIPP site, but focuses on “key surrogate species”.

The primary objective of this ecological risk evaluation is to calculate reasonable risk values for total metals concentrations in four SWMUs. To meet this objective, a focused evaluation that used basic exposure assumptions in NMED guidance and data from other references was applied. Additional refinement was incorporated into the calculations using well-documented site- and species-specific criteria that affect potential risk. The most important factors in this approach were: (1) use of average total metal concentrations for the SWMU calculations, (2) use average species body weight and average ingestion rate in the risk calculations, (3) incorporate species-specific home range criteria, (4) use reasonable exposure and toxicological parameters, and (5) compare the potential home range exposure risk when the home range includes both the SWMU concentration area and background concentration area versus the exposure risk when the home range area consists only of the natural background.

An analysis of the site-specific conditions significantly affects the problem formulation process. For example, the very small relative size of the individual SWMUs compared to the available habitat in the local ecosystem means that the SWMUs would have to have very high concentrations of total metals compared to background to exhibit a significant ecological impact.

2.1 Contaminants of Potential Concern

Contaminants of potential concern for ecological receptors used in this ecological risk assessment were those compounds investigated as part of the SAP. The chemical constituents evaluated are: (1) SWMU 001L - barium, chrome, and nickel, (2) SWMU 001q - chrome, lead, and nickel, (3) SWMU 001x - barium and lead, and (4) SWMU 004a - chrome, and nickel. The chemical exposure concentrations used in this ecological risk assessment were the average concentrations detected at depths of 5 feet or less. The chemical constituent concentrations were derived from the DOE VRA/CA program results (DOE/WIPP 96-2209, 1996), the RCRA facility assessment performed by NMED (NMED, 1994), and the results of the SAP investigations performed by the DOE. The NMED also analyzed split soil samples as part of the SWMU 001L and 001x investigations as verification of the DOE sampling and analysis protocol. The NMED found the two sets of analytical results to be generally consistent. The NMED data were not used in the calculations.

Background chemical constituent soil concentrations were obtained from a statistical analysis of background samples presented in Appendix A (No Further Action Petition). The average chemical constituent concentrations for each SWMU and for background sample locations are presented in Table C.1.

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**Table C.1
Summary of Measured Concentrations for Constituents of Potential Concern**

SWMU	Area, acres	Average Total Metals Concentration, mg/kg			
		Barium	Chromium	Lead	Nickel
001L	3	700	NA	NA	NA
001q	0.1	NA	21	14	3.7
001x	0.3	1800	17	72	NA
0.166666666667	1	NA	26	NA	12
Background		200	26	5.4	12

Note: All values are rounded to two significant figures

NA = Compound not included in the SAP investigations

mg = milligram

kg = kilogram

As presented in Table C.1, average total metals concentrations of chromium and nickel in the four SWMUs are less than or equal to background concentrations. Consequently, only barium and lead are explicitly evaluated for ecological risk. Barium is evaluated for SWMUs 001L and 001x. Lead is evaluated for SWMUs 001q and 001x. None of the constituents of concern exceed background for SWMU 004a. Therefore, this SWMU is excluded from the ecological risk evaluation.

2.2 Conceptual Model

The conceptual site model (CSM) for the WIPP identifies the SWMUs as the source of potential chemical constituent exposure for ecological receptors. The CSM is a pathway analysis tool used to describe the sources, release mechanisms, chemical transport pathways, and potential receptor exposure routes at each SWMU. A representative schematic of a CSM for the SWMUs is presented in Figure C.1. Because the constituents of concern are metals, vaporization is not a release mechanism of concern.

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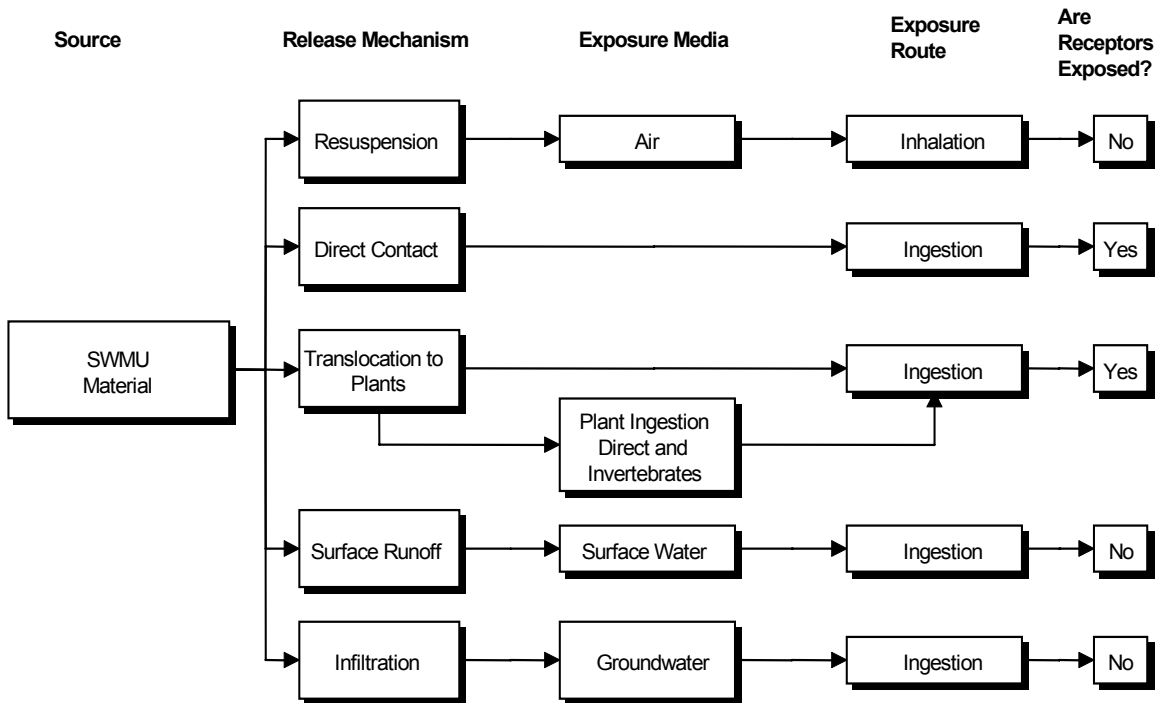


Figure C.1. Conceptual Site Model

2.3 Release Mechanisms

The chemical transport pathways shown in Figure C.1 describe the mechanisms by which chemical constituents may move from a SWMU into the surrounding environmental media. In general, chemical constituents may be released to receptors or environmental media by wind erosion, direct contact, translocation to plants, surface runoff, and infiltration and leaching of chemical constituents to groundwater. The first release mechanism in Figure C.1 is the resuspension of SWMU material into air by wind erosion. The relatively small areal size of the SWMUs compared to the total exposed soil area at WIPP and the fact that the SWMU material is covered with native soil or other material make this release mechanism insignificant.

The direct contact release mechanism via ingestion of SWMU material is judged to be a complete pathway and is evaluated as part of this ecological risk assessment. The translocation of chemical constituents into plants, which are either directly ingested by the selected receptors or are ingested by other animals that are subsequently ingested by the selected receptors, is a chemical transport pathway that is also evaluated in the ecological risk assessment for SWMU 001L. There is sparse vegetation in the mud pits at SWMUs 001q and 001x. SWMU 001L is sparsely vegetated and limited in area relative to home ranges of most terrestrial animal species that potentially forage for food

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within the WIPP land withdrawal area. In addition, the inorganic chemical constituents detected in these SWMUs and evaluated in the ecological risk assessment do not have high potential to bioaccumulate. These factors significantly limit the significance of this chemical transport pathway.

Surface water runoff and sediment transport are not viable release mechanisms, because of the infrequent precipitation, surrounding sand dunes, and gentle topography at the WIPP site (NMED, 1998b). The release of chemical constituents to groundwater is considered to be unlikely. Section 4.0 of the RFA (NMED, 1994) describes the potential for a release of chemical constituents to groundwater in the vicinity of most SWMUs as low to moderately low based on the depth to groundwater (180 feet or more below ground surface), the relative low permeability of the Dewey Lake formation (the shallowest potential water bearing zone) and the low amount of precipitation. There is also no evidence that groundwater is released to the surface within several miles of the WIPP site. Consequently, the release mechanisms evaluated in this ecological risk assessment are direct contact and translocation to plants.

2.3.1 Potential Receptors and Exposure

Potentially exposed ecological receptors include plants, invertebrates, reptiles, birds, and mammals. Media-specific exposure routes for these receptors include soil ingestion (bio-uptake for plants), ingestion of plants and dietary prey, inhalation (or respiration for plants), and dermal contact (or ambient contact for plants). Surface water is not considered an exposure medium. The presence of surface water at the WIPP site is limited, because of low regional precipitation and soil characteristics at the site. Groundwater is not considered an exposure medium for ecological receptors at the WIPP because it is not directly accessible to these receptors. Inhalation and dermal exposures are not generally assessed in ecological risk assessments, because adequate quantitative methodology is lacking and these exposure pathways are substantially less significant than exposure by ingestion.

2.3.2 Ecological Indicator Species

The ecological evaluation considers invertebrates, plants, and two indicator species for this ecological risk assessment. These species were the deer mouse and the kit fox. Neither the kit fox nor the cave myotis bat were observed on the WIPP Land Withdrawal Area during the 1996 threatened and endangered species survey. Consequently, they are not necessarily qualified to be key ecological species for a site ecological risk evaluation. These two receptors serve as conservative surrogates for species that do exist within the WIPP land withdrawal area (i.e., the kangaroo rat and coyote).

A formal identification of the valued ecological resources to be protected at the WIPP site was not performed as a planning step in previous analyses or in this risk evaluation. Because valued ecological resources and decisions to be made about those resources were not identified, the key ecological species are considered to be conservative representatives for other potential ecological receptors.

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3.0 EXPOSURE ANALYSIS

Exposure analysis identifies the exposure parameters and assumptions used in the risk assessment. For example, assumptions related to the selection of indicator species and the toxicity criteria used in the evaluation are defined below. The exposure of ecological receptors to chemical constituents is limited by environmental conditions and SWMU characteristics at the WIPP site. Valued ecological resources or receptors of special concern that would normally be included in an ecological risk assessment have not been identified. Valued ecological resources are defined by societal value, regulation, or economic rationale.

3.1 Exposure Parameters

This ecological risk assessment uses some of the same primary exposure factors as the NMED SLERA. Exposure parameters include receptor body weights, food intake rates, and fraction of food intake rates attributed to soil, plant, invertebrate, or prey ingestion. Use of these parameters is standard protocol for ecological risk evaluations and is an appropriate approach to produce information to be used in risk management decision making (selecting a remedial alternative).

The exposure criteria include (1) exposure frequency, (2) exposure duration, (3) bioavailability of COCs, and (4) bioaccumulation factors. The selected values are reasonable for this evaluation. However, the results of the risk calculations presented in this report should be considered to be conservative.

At WIPP, the area of the SWMUs is small compared to the potential home range of the land withdrawal area for the receptors. Therefore, it is appropriate to apply area use factors when estimating potential exposure. Area use factors are defined as the ratio of the area of contamination (SWMU area) to the area used by the receptor species (i.e., the receptor home range). Area use factors were used in this ecological risk assessment for each of the species evaluated. This approach more accurately reflects the potential use of each SWMU by these species and gives a more precise risk estimate.

Table C.2 presents a summary of the exposure factors for the two ecological receptors.

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**Table C.2
Exposure Factors for Ecological Receptors**

Ecological Variable	Deer Mouse	Kit Fox
Trophic Level	Omnivore	Carnivore
Average Body Weight (kg) ^a	0.021	4.5
Average Ingestion Rate (kg/kg BW-day) ^a	0.26	0.11
Soil Ingestion Rate (kg DW/kg BW-day) ^b	0.0014	0.0015
Fraction of Diet Composed of Plants ^c	0.55	NA
Fraction of Diet Composed of Invertebrates ^c	0.45	NA
Fraction of Diet Composed of Mice ^c	NA	0.19
Home Range (acres) ^a	0.27	2600

Note: All values are rounded to two significant figures

NA = not applicable

kg = kilogram

BW = body weight

DW = dry weight

^a Calculated from data contained in EPA, 1993

^b NMED, 2000

^c ORNL, 1996

To calculate risk, additional data are needed regarding the media to receptor bioconcentration factors (BCFs) for the constituents of potential concentration. Table C.3 presents the values used in the ecological risk evaluation.

**Table C.3
Bioconcentration Factors for Constituents of Potential Concern**

Media-to-Receptor	Barium	Lead
Soil-to Plant ^a	0.15	0.045
Soil-to Invertebrate ^a	0.22	0.03
Plant to Omnivorous Mammal ^a	9.0 E-05	1.8 E-04
Soil to Omnivorous Mammal ^a	2.2 E-07	4.3 E-07

Note: All values are rounded to two significant figures

^a NMED, 2000

The exposure and bioconcentration factors, SWMU areas, and SWMU and background total metals concentrations presented in Tables C.1-C.3 were used to calculate potential

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chemical concentrations in the four receptors at each SWMU. Direct uptake of metals from the soil was considered the only significant route of exposure for plants and invertebrates. Exposure modeling for the wildlife receptors was limited to food and soil ingestion pathways. Inhalation and dermal exposure were considered insignificant pathways compared to ingestion. Drinking water was considered an insignificant pathway because surface water will only occur at the SWMUs immediately after a rain storm.

Home range was factored into the calculations. An area use factor was calculated for the two mammals based on the size of the SWMU and the home range of the mammal. For SWMU 001L, it was assumed that invertebrates, plants, and deer mice could be present within the SWMU boundaries.

There is only sparse vegetation at SWMU 001q and 001x, so there is no complete pathway to plants. The invertebrate pathway was assumed to be complete for these two SWMUs. Because of the lack of vegetation, it was assumed that a deer mouse would spend only one-half of the available time within the boundaries of the two SWMUs. The remainder of the time would be spent outside the SWMU.

Table C.4 presents a summary of concentrations in each receptor attributed to uptake or ingestion of metals. Because receptors can uptake or ingest metals from both background soils and SWMU material, concentrations are reported separately for SWMU and background. No values are reported for the Kit Fox, because it is considered to be the top of the food web for this evaluation.

Table C.4 Ecological Receptor Concentrations, mg/kg			
SWMU/Metal	Plants	Invertebrates	Deer Mouse
SWMU 001L Barium	13	150	69
Background Barium	3.6	44	20
SWMU 001q Lead	0.029	0.42	0.12
Background Lead	0.029	0.16	0.073
SWMU 001x Barium	3.6	400	99
Background Barium	3.6	44	20
SWMU 001x Lead	0.029	2.2	0.52
Background Lead	0.029	0.16	0.073

Note: All values are rounded to two significant figures

mg = milligram

kg = kilogram

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3.2 Selection of Toxicity Criteria

Table C.4 presents benchmark toxicity values for the plant, invertebrate, and wildlife receptors. The toxicity criteria used in this ecological risk evaluation were derived from published information (ORNL 1996, ORNL 1997a, ORNL 1997b). For plants and invertebrates, the benchmarks are based on the lowest-observed-adverse-effect-level (LOAEL). For wildlife the benchmarks are based on the no-observed-adverse-effect-level (NOAEL) in a similar test species, and converted to the wildlife body weight.

**Table C.5
Toxicity Benchmarks for Ecological Receptors**

	Plants^a	Invertebrates^b	Deer Mouse^c	Kit Fox^c
Barium	500	NA	10	2.8
Lead	50	500	16	4.2

Note: All values are rounded to two significant figures

^a ORNL, 1997a; mg/kg

^b ORNL, 1997b, mg/kg

^c ORNL, 1996, mg/kg-day

NA = data not available

4.0 RISK CHARACTERIZATION

Risk characterization identifies the risk estimates for the selected indicator species. Although the risk estimates are numbers, these values are considered qualitative. The qualitative nature of these values is a result of the uncertainty inherent in the assumptions used to make the risk estimates.

4.1 Ecological Screening Quotients

The ecological screening quotient (ESQ) risk values estimated in this ecological risk assessment are presented in Table C.6. The ESQ values are calculated as the ratio of dose to the receptor for wildlife (or concentration in the receptor for plants and invertebrates) (Table C.6) and toxicity benchmark (Table C.5). Dose and concentration calculations follow NMED guidance (NMED, 2000). Concentration values are also presented in Table C.4. For these calculations, an ESQ greater than 1 indicates an ecological risk.

The risk estimates are given in Table C.6 for three SWMUs, four receptors and three risk evaluation scenarios. The risk evaluation scenarios are (1) receptor exposure to chemical constituent concentrations in the SWMU area as part of the receptor home range, (2) receptor exposure to background concentrations of chemical constituents, and (3) incremental receptor exposure to SWMU constituents over normal background exposure. For SWMU 001x, the incremental ESQ is calculated as the sum of the ESQs for barium and lead.

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**Table C.6
Ecological Risk Values**

Location/Result	Plant	Invertebrate	Deer Mouse	Kit Fox
SWMU 001L - Barium				
SWMU dose/concentration	13	150	21	0.69
Background dose/concentration	3.6	44	6	0.69
SWMU ESQ	0.03	NA	2	0.2
Background ESQ	0	NA	1	0.2
Incremental ESQ	0.02	NA	1	0
SWMU 001q - Lead				
SWMU dose/concentration	0.029	0.42	0.048	0.01
Background dose/concentration	0.029	0.16	0.031	0.01
SWMU ESQ	0	0.0008	0.003	0.002
Background ESQ	0	0.0003	0.002	0.002
Incremental ESQ	0	0.0005	0.001	0
SWMU 001x - Barium				
SWMU dose/concentration	3.6	400	28	0.69
Background dose/concentration	3.6	44	6	0.69
SWMU ESQ	0.01	NA	3	0.2
Background ESQ	0.01	NA	0.6	0.2
Incremental ESQ	0	NA	2	0
SWMU 001x - Lead				
SWMU dose/concentration	0.029	2.2	0.19	0.01
Background dose/concentration	0.029	0.16	0.031	0.01
SWMU ESQ	0	0.004	0.01	0.002
Background ESQ	0	0.0003	0.002	0.002
Incremental ESQ	0	0.004	0.01	0
Total ESQ Barium + Lead	0	0.004	2	0

dose = mg/kg BW-day
concentration = mg/kg WW
mg = milligram
kg = kilogram
WW = wet weight
BW = body weight
ESQ = ecological screening quotient
NA = not available

4.2 Uncertainty

Many uncertainties are associated with the estimates of ecological risk at the three SWMUs. These uncertainties result from assumptions used in calculating risk. For this

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risk evaluation, assumptions were made that are more likely to overestimate exposures and risk rather than to underestimate them. Conservative assumptions incorporated into this evaluation include: (1) selection of surrogate wildlife receptors, (2) selection of NOAEL toxicity benchmarks, (3) specification that the receptors exist in the SWMUs, (4) selection of bioconcentration factors, (5) body weight conversion factors, (6) estimates of metal concentrations across the entire SWMU to a depth of 5 feet, and (6) the basic exposure calculation algorithms.

In the estimation of ecological risk, background concentrations of metals contribute to the final ESQ values. The background ESQ was subtracted from the SWMU-based ESQ to calculate the incremental risk.

5.0 SUMMARY OF RISK

As presented in Table 5.1, there is only one SWMU with an incremental ESQ greater than 1.0. This SWMU is 001x. The calculated incremental ESQ for the deer mouse for this SWMU indicates a potential small ecological impact based on EPA criteria. For all of the other SWMUs and receptors, the calculated incremental ESQs are less than one.

The potential ecological impacts can be evaluated by comparing the area of SWMU 001x to the total potential deer mouse home range within the WIPP land withdrawal area. This SWMU covers about 3.1 acres, compared to the 10,240 acres within the land withdrawal area. Only about 0.03 percent of the potential home range area of the deer mouse consists of the SWMU land area. Therefore, potential ecological impacts from the SWMUs would affect no more than 0.04 percent of the deer mouse population. This small effect is not measurable. Annual increases and decreases in the population due to other natural effects are much greater than this result (on the order of a 25 percent change from year to year). In addition, a 0.03 percent change is not measurable with current field survey methods. Consequently, the predicted ecological impacts from these SWMUs are considered to be insignificant.

6.0 REFERENCES

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The following appendices are available from the Site Compliance Section of the WTS Environmental Compliance Department. They consist of hard copies of scientific data generated and are not available electronically.

Appendix D - BLM Documentation

Appendix E - NMED and DOE Correspondence

Appendix F - SWMU 001g (H-14/P-1 Mud Pit[s])

Appendix G - SWMU 001h (H-15/P-2 Mud Pit[s])

Appendix H - SWMU 001j (P-3 Mud Pit)

Appendix I - SWMU 001k (P-4 Mud Pit)

Appendix J - SWMU 001L (WIPP-12 Drilling Mud Pit/P-5 Drilling Mud Pit)

Appendix K - SWMU 001m (P-6 Mud Pit)

Appendix L - SWMU 001n (P-15 Mud Pit)

Appendix M - SWMU 001o (Badger Unit Drilling Mud Pit[s])

Appendix N - SWMU 001p (Cotton Baby Drilling Mud Pit[s])

Appendix O - SWMU 001q (DOE-1 Drilling Mud Pit[s])

Appendix P - SWMU 001s (ERDA-9 Mud Pit)

Appendix Q - SWMU 001t (IMC-374 Mud Pit)

Appendix R - SWMU 001x (WIPP-13 Drilling Mud Pit[s])

Appendix S - SWMU 004a (Portacamp Storage Area, West Side)

Appendix T - SWMU 007bSW (Evaporation Pond)

Appendix U - AOC 001r (D-123 Mud Pit)

Appendix V - AOC 001u (IMC-376 Mud Pit)

Appendix W - AOC 001v (IMC-456 Mud Pit)

Appendix X - AOC 001w (IMC-457 Mud Pit)

Appendix Y - AOC 001ac (DSP-207 Mud Pit)

Appendix Z - AOC 001ae (IMC-377 Mud Pit)

Appendix AA - AOC 010b (Waste Handling Shaft Sump)

Appendix BB - AOC 010c (Exhaust Shaft Sump)