SNL04

National Nuclear Security Administration
Sandia Site Office
P.O. Box 5400
Albuquerque, New Mexico 87185-5400

OCT 12 2004

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NMED Hazardous Waste Bureau

Mr. James Bearzi, Chief
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Road East
Building 1
Santa Fe, NM 87505

Dear Mr. Bearzi:

On behalf of Sandia Corporation and the Department of Energy (DOE), DOE is notifying you of a voluntary corrective action at Solid Waste Management Unit (SWMU) 68, Old Burn Site, at Sandia National Laboratories/New Mexico (SNL/NM) (EPA ID No. NM5890110518). Enclosed please find the Voluntary Corrective Action (VCA) Plan for SWMU 68.

The VCA is designed to excavate lead contaminated soil from one area at SWMU 68, to conduct confirmatory sampling to ensure that the cleanup goal for lead is achieved, and to remove debris from other areas at SWMU 68. Work is expected to begin in the first quarter of federal fiscal year 2005. An Investigation Report for SWMU 68 will be submitted by September 30, 2005, as required by Table XI-3 of the Compliance Order on Consent for SNL/NM. To ensure that the schedule is met, we are requesting that you provide any comments on the VCA Plan by October 27, 2004.

Please contact John Gould at (505) 845-6089 with any questions regarding this submittal.

Sincerely,

Patty Wagner

Patty Wagner
Manager

Enclosure

cc w/enclosures:
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CERTIFICATION STATEMENT FOR APPROVAL AND FINAL RELEASE OF DOCUMENTS

Document title: **Voluntary Corrective Action (VCA) Plan for Solid Waste Management Unit 68, Old Burn Site**

Document author: **Eric Larsen, Dept. 6134**

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

Signature: Peter B. Davies 10/6/04

Peter B. Davies
Director
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Date

and

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Patty Wagner
Manager
U.S. Department of Energy
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Owner and Co-Operator

Date

Sandia National Laboratories/New Mexico
Environmental Restoration Project

VOLUNTARY CORRECTIVE ACTION PLAN FOR SOLID WASTE MANAGEMENT UNIT 68, OLD BURN SITE

October 2004

United States Department of Energy
Sandia Site Office

Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

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ACRONYMS AND ABBREVIATIONS

AOP	Administrative Operating Procedure
AR/COC	Analysis Request/Chain-of-Custody
bgs	below ground surface
CEARP	Comprehensive Environmental Assessment and Response Program
COC	constituent of concern
COOC	Compliance Order on Consent
DOE	U.S. Department of Energy
DQO	data quality objective
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration
HASP	Health and Safety Plan
HE	high explosive
HRS	Hazard Ranking System
IRP	Installation Restoration Program
KAFB	Kirtland Air Force Base
kg	kilogram(s)
MDL	method detection limit
mg	milligram(s)
NaI	sodium iodide
NMED	New Mexico Environment Department
NOD	Notice of Deficiency
OU	Operable Unit
ppm	parts per million
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
RSI	Request for Supplemental Information
SMO	Sample Management Office
SNAP	Space Nuclear Program
SNL/NM	Sandia National Laboratories/New Mexico
SVOC	semivolatile organic compound
SWMU	Solid Waste Management Unit
TA	Technical Area
UCL	upper confidence limit
USAF	U.S. Air Force
UXO	unexploded ordnance
VCA	Voluntary Corrective Action
VCM	voluntary corrective measure
VOC	volatile organic compound

1.0 INTRODUCTION

This document describes the Voluntary Corrective Action (VCA) to be conducted at Sandia National Laboratories/New Mexico (SNL/NM) Environmental Restoration (ER) Project Solid Waste Management Unit (SWMU) 68, the Old Burn Site.

1.1 Objectives and Scope

The objectives of the VCA at SWMU 68 are to reduce impacts to human health and the environment through remediation of the site. This remedial action consists of source removal involving excavation and removal of lead-contaminated soil and an underlying concrete slab; confirmatory soil sampling; disassembly of a burn pan structure and spreading/surveying of the surrounding berm material; removal of general debris; and final site restoration. This VCA is intended to be the final remedy for SWMU 68.

The ER Project considered the following factors in determining the need for a VCA at SWMU 68:

- A small overflow basin located in the southwestern quadrant of the site was backfilled with lead-contaminated soil.
- Scattered debris, a burn pan structure surrounded by a soil berm, and several excavated pits remain at the site.
- The soil berm surrounding the burn pan structure could potentially contain radiological contamination (metal fragments) based upon its assumed source (surface soil from other areas of the site).
- Previous sampling and archival data are sufficient for identifying the constituents of concern (COCs) and developing a comprehensive conceptual site model.
- The potential remedy is obvious and can be readily applied.
- Complete assessment and final remediation requires excavation at the site.
- The remedial action is intended as a final resolution to eliminate source material (lead-contaminated soil and potential radiological contamination) and prevent potential release or migration of contaminants from the site.
- Environmental, safety, and health risk reductions will be achieved.

1.2 Approach and Implementation

The nature and extent of contamination associated with the Old Burn Site were determined during previous Resource Conservation and Recovery Act (RCRA) Facility Investigations (RFIs). The VCA will consist of the following primary activities:

- Excavation and removal of lead-contaminated backfill soil from a small overflow basin

- Removal of a concrete pad located at the base of the overflow basin excavation

- Disposal of lead-contaminated soil and solid waste (concrete) at approved facilities

- Collection of confirmatory soil samples

After confirmation data have been reviewed and it is determined that cleanup goals for the overflow basin have been achieved, the excavated area will be backfilled using local native soil. Completion of this VCA will also involve the following housekeeping activities:

- Disassembly of the burn pan

- Although radionuclides were detected at levels slightly above the maximum background activity limits specified for the Coyote Test Field (Dinwiddie September 1997), these are not considered COCs because of the very low activities and related negligible risk. However, since the potential exists for the presence of depleted uranium and/or throrium-232 within the soil berm material surrounding the burn pan. Spreading and surveying of the associated soil berm material for potential radiological contamination (metal fragments) will be performed.

- Disposal and/or recycling of the solid waste (burn pan assembly) and radiological waste (if discovered) at approved facilities

- Removal of general debris

- Final site restoration that will consist of grading and revegetating the site

The VCA activities described in this plan will remove current site features, eliminate soil exceeding risk criteria for lead, and dispose of various testing debris currently present at the site.

1.3 Background Issues

1.3.1 Regulatory Issues

This VCA will be conducted under Sections VI.H.3 and 4 of the Compliance Order on Consent (COOC) issued on April 29, 2004 (NMED April 2004) and will not pose unacceptable risk to human health or the environment. The corrective action objectives developed for this VCA have been designed to achieve source reduction and are consistent with the final site remedy. Final confirmatory sampling and VCA fieldwork documentation will be used to verify that the objectives have been achieved. As required by Sections VI.H and XI of the COOC, this VCA Plan will be submitted to the New Mexico Environment Department (NMED) at least 15 days prior to the start of fieldwork, and the Investigation Report will be submitted to the NMED by September 30, 2005. The Investigation Report will present the results of this VCA, the complete investigation history of SWMU 68, and a final site risk assessment, including end-state conditions, and will serve as the basis for the Corrective Action Complete determination.

1.3.2 Lead Cleanup Goal

The U.S. Environmental Protection Agency (EPA) intentionally does not provide human health toxicological data on lead; therefore, no risk parameter values can be calculated. However, NMED guidance for the lead screening concentration for Unrestricted Industrial Land Use is 750 milligrams (mg)/kilogram (kg) (Olson and Moats March 2000). The EPA screening guidance value for residential land use is 400 mg/kg (EPA, July 1994). For SWMU 68, a soil cleanup goal of 750 mg/kg of lead will be used as a corrective action objective for this VCA. This will result in a "Corrective Action Complete with Restrictions" status. However, if a soil cleanup goal of 400 mg/kg of lead is achieved, this will result in a "Corrective Action Complete without Restrictions" status.

1.3.3 DQO Process

This VCA will be conducted in accordance with the data quality objectives (DQOs) development process specified in the RFI Work Plan for Operable Unit (OU) 1335, Southwest Test Area (SNL/NM March 1996a). The primary data requirement for this VCA is to verify that the base and sidewalls of the excavated overflow basin meet the lead cleanup goal of 750 mg/kg. SNL/NM's DQO process for this VCA follows these general steps:

- Compile and evaluate site background information.
- Develop and refine a conceptual site model based upon field investigation and laboratory data.
- Establish DQOs, including:
  - Corrective action objectives and cleanup goals
  - Confirmatory methods to ensure corrective action objectives have been achieved

2.0 DESCRIPTION OF SWMU 68—OLD BURN SITE

This chapter presents the site description, operational history, waste characteristics, and geology/hydrogeology of SWMU 68. This information has been combined with site investigation data to develop the conceptual site model discussed in Chapter 3.0.

2.1 Site Description

SWMU 68 is located on Kirtland Air Force Base (KAFB) land permitted to the U.S. Department of Energy (DOE) (Figure 2.1-1). The site is situated on the north side of Isleta Road, across from the KAFB shock tube facility, approximately 1 mile east of the intersection of Lovelace and Isleta Roads. SWMU 68 lies within the boundary of SWMU 71, the Moonlight Shot Area (Figure 2.1-2), and occupies approximately 6.5 acres. In general, the terrain is flat with a gentle slope to the southwest. Precipitation is low in the region (approximately 8 inches per year) with minimal surface runoff. No primary arroyo channels are present in the immediate vicinity of SWMU 68. Vegetation primarily consists of desert grasses, cacti, and tumbleweeds.

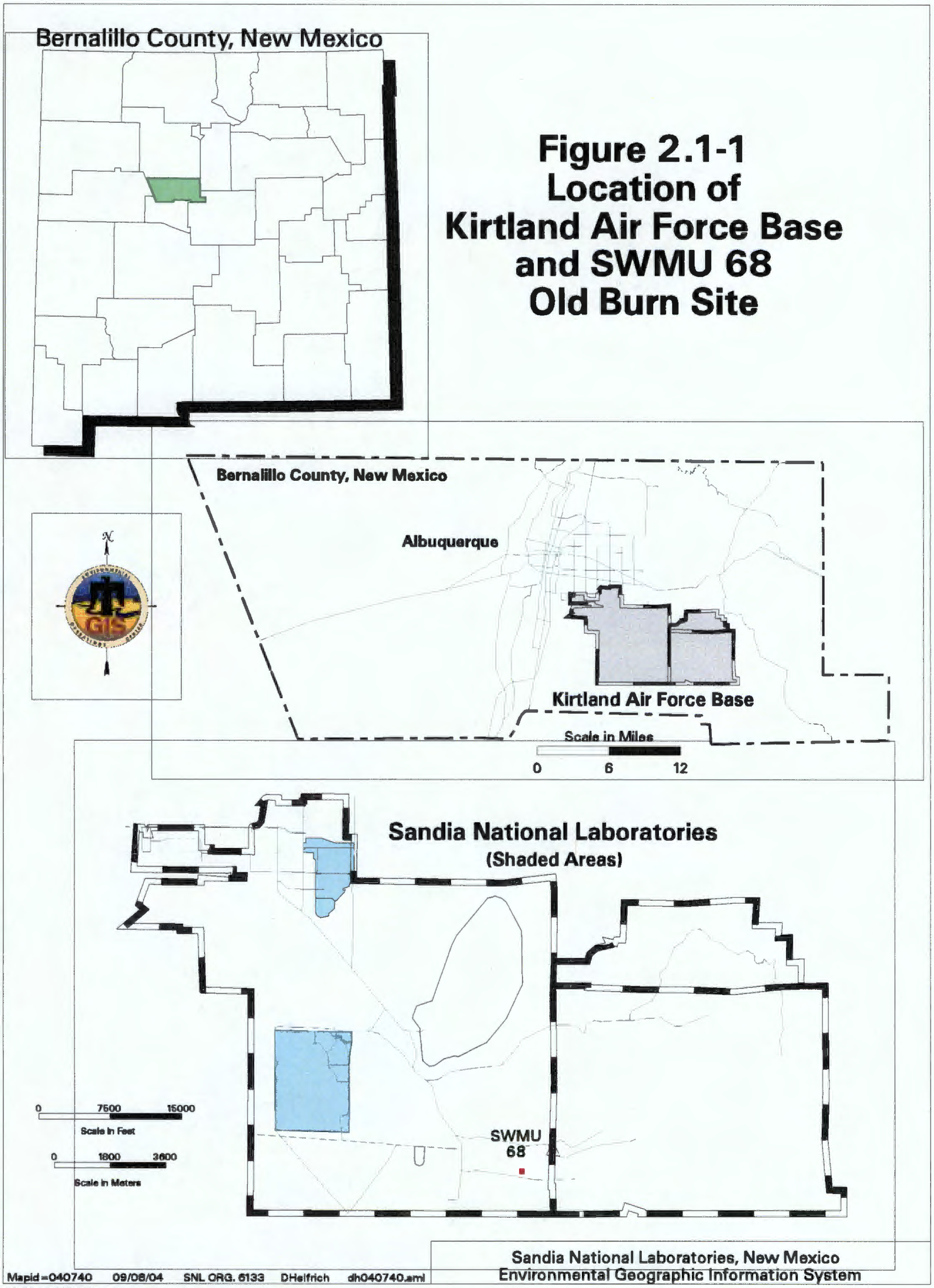
SWMU 68 consists of an aboveground, earthen-bermed, square, metal burn pan with a concrete base, a drainage ditch and overflow basin, a rectangular burn pit that was once lined with plastic, a variety of scattered debris, and two irregularly shaped borrow pits (depressions) (Figure 2.1-3). The site is fenced and posted with ER Site location signs.

The burn pan measures 30 by 30 feet and is set inside a square, earthen-bermed area. Entrenched into the ground, the pan has a 32- by 32-foot concrete slab base with a metal floor and 3-foot-high sides emplaced 1 foot inside the outer edges of the concrete slab. The concrete slab is sloped towards the center diagonal, where three 3-inch-diameter, galvanized iron floor drains are located. The floor drains empty into a 3-inch-diameter galvanized iron pipe that discharges into a drainage ditch at the southwest corner of the burn pan. The drainage ditch leads to a plastic-lined, wood-framed overflow basin located southwest of the burn pan. A discharge valve is located approximately 10 feet southwest of the southwestern corner of the burn pan. Inside the burn pan are rusted metal test stands, tumbleweeds, and other plant and sediment debris. Metal test stands are located on the ground surface southeast and northwest of the burn pan as well.

Another rectangular pit that contains evidence of a burned plastic liner is located approximately 175 feet south of the burn pan. This pit was used as a burn pit in conjunction with burn tests carried out in the metal burn pan (SNL/NM December 1993a, Berry August 1969).

A variety of debris is scattered across the site. In addition, two wooden utility poles are lying on the ground surface northeast of the burn pan.

Two irregular shaped borrow pits are located to the north and south of the burn pan that probably provided material used in the construction of the earthen berm surrounding the burn pan. Metal and wood scrap is present in these pits. There is no indication, either visually or through project records, that these pits were used for anything other than earthen borrow pits.



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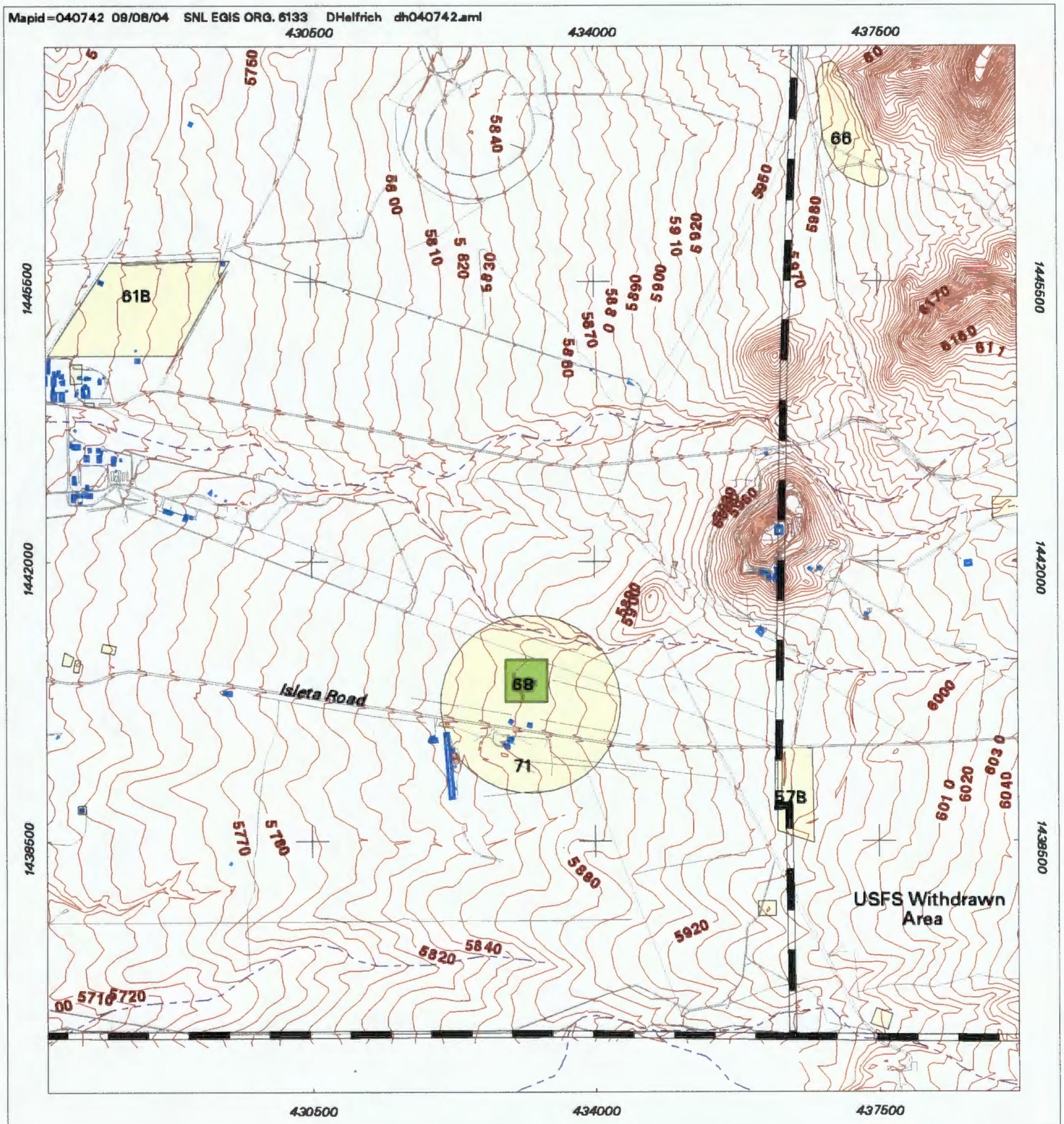

Figure 2.1-2
Location of SWMU 68
Old Burn Site

Sandia National Laboratories, New Mexico
Environmental Geographic Information System

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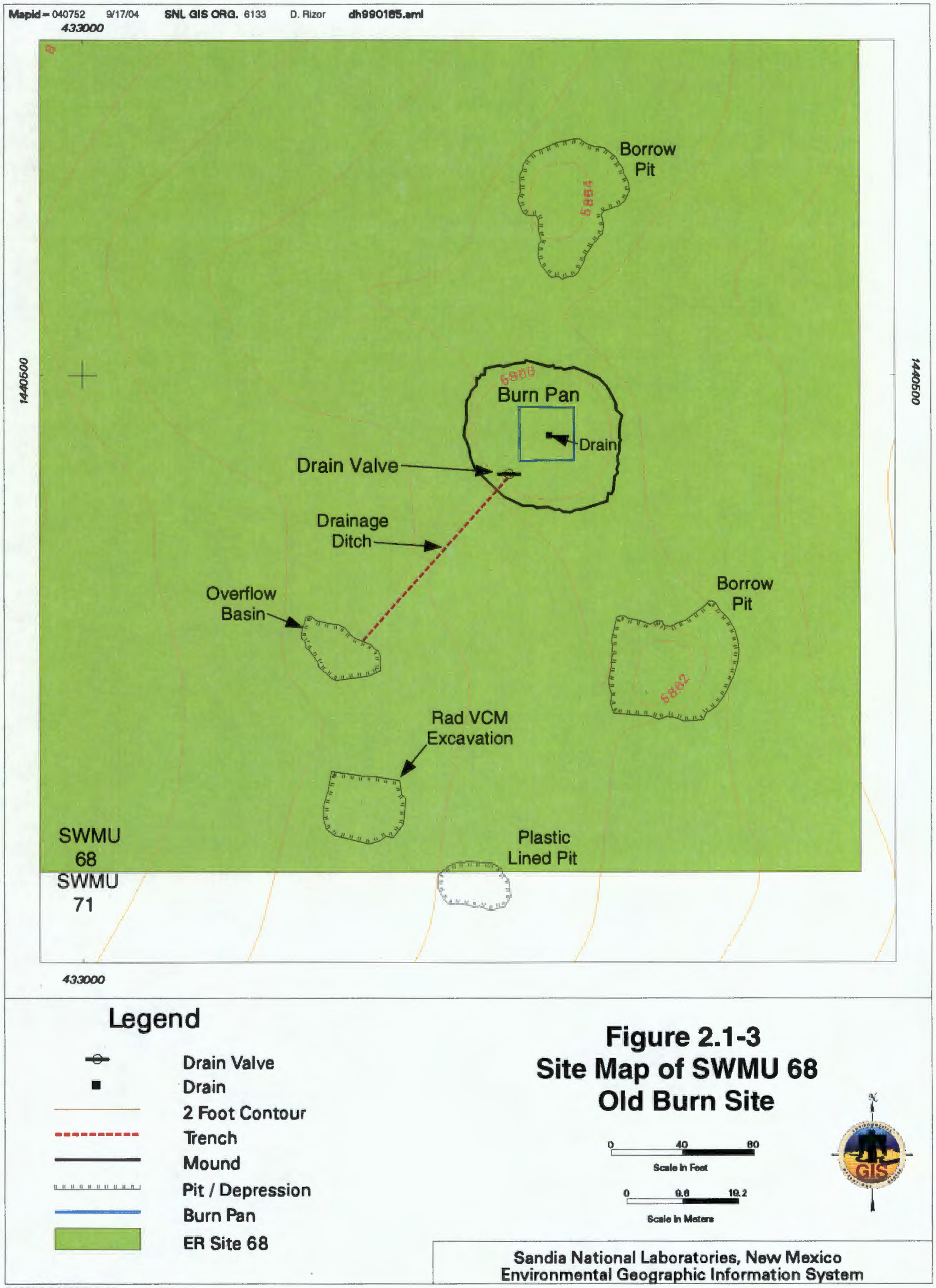

Figure 2.1-3
Site Map of SWMU 68
Old Burn Site

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2.2 Operational History

SWMU 68 is located in the former Area Y explosives testing area of the Coyote Test Field. Prior to its use by SNL/NM, the area that comprises the Coyote Test Field was the setting for early homesteads, agriculture, ranching, and recreational activities. Several of the old structures found in the Coyote Test Field were used later for SNL/NM operations. By 1950, the need for large-scale testing (blast-model studies) became apparent and economically feasible. In the mid-1950s, the Atomic Energy Commission requested that the Sandia Corporation participate in fallout predictions on future full-scale testing operations. In 1956, additional land was requested for these studies and work was begun. In 1957, in an agreement with the Atomic Energy Commission , the Armed Forces Special Weapons Project finally granted the use of Areas X, Y, and Z. By 1966, Area W was added to the Coyote Test Field. These four areas, all of which were used for high explosive (HE) tests, covered approximately 32,400 acres. Area W was used for miscellaneous HE tests; Area X, for 15,000-pound HE tests; Area Y, for fallout, seismic, and miscellaneous explosives tests; and Area Z, for 250-pound HE tests (SNL/NM September 1966). Expended ordnance debris related to anti-aircraft proximity fuse development and testing activities at Area Y was found within SWMU 68 during a visual survey conducted by KAFB Explosive Ordnance Disposal personnel in November 1993 (see Section 3.1.2.2). The type and age of the ordnance precludes its association with SNL/NM SWMU activities.

Although SWMU 68 is located within Area Y, the main impacts to the site were from the pool fire testing that occurred there. The pool fire tests were conducted at SWMU 68 to study the effects of fire on weapons components and to determine the potential for release of radioactive material in case of a transportation (air, truck, rail) accident. The type of pool fire tests conducted at this site related to the development of shipping containers, space nuclear power reactors (the Space Nuclear Program [SNAP] reactor) (Sandhaus August 1994, Berry August 1969, Baker and Cranfill May 1971), and development of nuclear weapons. Nuclear materials were not used during these tests.

Testing took place at this site from approximately 1960 through 1978 (SNL/NM December 1993b). Construction diagrams for the burn pan are dated 1965; therefore, it is estimated that the burn pan was probably constructed in the mid-1960s. The construction timeframe is supported by aerial photographs (USGS 1961, USGS 1971). When the current burn facility was constructed at Lurance Canyon around 1981 (SNL/NM December 1993b), this site became inactive.

During the operational years, the testing procedure included preparing the instrumentation for the fire, placing the test unit on stands within the burn pan, filling the burn pan with water, and floating a defined amount of fuel on top of the water to provide the desired burn time. Magnesium scrap was also ignited in some of the burn tests involving SNAP reactors (Berry August 1969). The types of materials in the instrumentation included steel, fiberglass, asbestos, and magnesium oxide. Previous site investigations have determined that none of these materials are present at this time. When tests were performed, all equipment was brought to the site in a trailer, and a diesel generator was used for power. Water for the tests was brought to the site by tanker truck, and a U.S. Air Force (USAF) fuel truck delivered fuel. It is unknown whether any fuel spills occurred (SNL/NM December 1993b).

Burn tests commonly lasted 30 minutes. The normal rate of burn was 0.25 inches of fuel per minute. Based upon the size of the burn pan, approximately 1,500 gallons of fuel would be used for a 30-minute test. All of the fuel was consumed during the test. An interviewee involved in the testing indicated that jet petroleum-4 fuel was predominantly used for the burn tests because of its availability from the USAF (SNL/NM December 1993b).

After a pool fire test was performed, the remaining water was probably released through the valve at the southwest corner of the burn pan and discharged into the drainage ditch, which drained to the overflow basin southwest of the burn pan. The test unit would then be recovered and returned to the project group for a post-test examination. However, in some tests, depending upon what materials were used in the test unit, the unit was taken directly to either the Chemical Waste or Mixed Waste Landfills in Technical Area (TA)-III for disposal (SNL/NM December 1993b). Following the termination of pool-fire testing activities in 1978, the overflow basin was backfilled with lead-contaminated fill material obtained from an unknown off-site source.

Burn tests with magnesium scrap and the SNAP reactors were conducted in the plastic-lined pit (Berry August 1969). The residual polyethylene was reportedly cleaned up and disposed of after the tests were completed (SNL/NM December 1993b). Burned remains of plastic and wooden frames are visible.

2.3 Waste Characteristics

The potential materials released to the environment during each test were dependent upon the item being tested. Shipping containers were tested without any weapons materials present. The containers used at the time were of two basic types. One container was a composite made of redwood overlain by steel, and one was a lead-lined, steel vessel. Only one container tested has been specifically identified as the Radioactive Materials Shipping Cask manufactured by DuPont (SNL/NM December 1993b).

The SNAP reactors contained magnesium-thorium alloy, aluminum, Haynes-25 alloy, graphite, and stainless steel (Berry August 1969). These materials surrounded the simulated reactor materials, which consisted of zirconium oxide fuel capsules (Berry August 1969).

Beryllium may have been present in some of the weapons components tested. Lead was not present in weapon components. Some of the alloys used contained thorium. A magnesium-thorium alloy was used for structural simulations (SNL/NM September 1993, SNL/NM December 1993b).

Test component materials may have been altered from fire effects, and a small amount of material (less than 1 percent) may have been released through oxidation. Metals used in testing may have become molten, accumulated in the bottom of the burn pan, and resolidified. Pieces of slag were generally disposed of after a test. The fuel and any explosives in the test components used would have burned completely (SNL/NM December 1993b). Therefore, in the original conceptual site model of the site, the potential COCs associated with SWMU 68 include lead, thorium, beryllium, possibly other metals, and fuel residue.

2.4 Geology/Hydrology

SWMU 68 is located on alluvial deposits correlated to Tijeras/Latene soil units (IT May 1994), with permeabilities ranging from 0.6 to 2.0 inches per hour (USDA June 1977). The geologic and hydrologic conditions are expected to be similar to those encountered at Wells TRS-1 and

TRS-2 to the west. Geologic information from Well TRS-1 indicates that the local area is covered with approximately 122 feet of Tertiary to Quaternary proximal to mid-fan alluvial sediments. An outcrop of Paleozoic limestone is present at the site, and basement granite is present in the arroyo channel at the northern portion of the site. Water levels are fairly stable in both the bedrock and overlying alluvial aquifer (SNL/NM March 1998). Depth to groundwater is estimated at between 116 and 123 feet below ground surface (bgs) (Foutz et al. 1995). The direction of groundwater flow in the vicinity of SWMU 68 is generally to the west-southwest (SNL/NM March 1998).

3.0 SUMMARY OF EXISTING DATA

Investigations conducted under the Comprehensive Environmental Assessment and Response Program (CEARP) (DOE September 1987) and the "Final RCRA Facility Assessment [RFA] Report of Solid Waste Management Units at Sandia National Laboratories, Albuquerque, New Mexico" (EPA April 1987) identified the Old Burn Site as a potential SWMU. Several investigations have been conducted at SWMU 68 beginning in the mid-1980s. The investigative history of the site is presented in the following sections and includes a brief description of each investigation with a corresponding summary of the results. This information has been integrated into a conceptual site model that forms the basis for the VCA. After completion of this VCA, a complete discussion of previous investigations will be presented in the Final Investigation Report, which will be submitted to the NMED by September 30, 2005.

3.1 Previous Investigations

Initial investigations of SWMU 68 were conducted in the mid-1980s under the KAFB Installation Restoration Program (IRP), the U.S. Department of Energy CEARP in conformance with the Comprehensive Environmental Response, Compensation and Liability Act, and the EPA RFA. In 1992, preliminary investigations began that included background information reviews, personnel interviews, field surveys, and scoping sampling. From January 1995 through February 1999, the SNL/NM ER Project conducted radiological and "housekeeping" voluntary corrective measures (VCMs), including confirmatory soil sampling.

3.1.1 Initial SWMU Assessments

3.1.1.1 Nonsampling Data Collection

Prompted by KAFB's IRP survey that identified potential radioactively contaminated sites on the base, a radiation survey of SWMU 68 was conducted in 1983 (SNL/NM December 1993c). Thorium contamination, the source of which was the thoria (thorium oxide) used on the thermocouples for the burn tests, was identified at the site. Thoria, a brittle insulation material, degraded over time resulting in the thorium contamination at the site. Radioactively contaminated soil was removed from the site and taken to the TA-III Mixed Waste Landfill for disposal. The location and amount of the thoria-contaminated soil was not documented (SNL/NM December 1993c).

SWMU 68 was identified as the Old Burn Site during investigations conducted under the CEARP (DOE September 1987) and during the RFA (EPA April 1987). The site was not located during the RFA, but was located and documented during the CEARP.

3.1.1.2 Sampling Data Collection

No sampling was conducted under either the IRP or RFA. In 1989, soil sampling was conducted at the site as part of the CEARP investigation (DOE January 1989). Four composite subsurface soil samples were collected from depths of 0 to 1.5 feet bgs near the overflow basin located southwest of the burn pan and along the drainage ditch that led from the burn pan to the overflow basin. The samples were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), HE compounds, polychlorinated biphenyls, metals, total uranium, thorium, strontium-90, and plutonium (DOE January 1989).

3.1.1.3 Data Gaps

A lack of information prevented calculation of the Hazard Ranking System (HRS) and Modified HRS migration mode scores. SWMU 68 was identified but not investigated as part of the RFA (EPA April 1987).

3.1.2 SNL/NM ER Project Preliminary Investigations

3.1.2.1 SNL/NM ER Project Background Information Review

A review of background information was conducted in order to collect available relevant information regarding SWMU 68. Sources included interviews with SNL/NM staff and contractors familiar with the site's operational history, existing historical site records and reports, and an aerial photo image interpretation of the site (IT April 1994).

3.1.2.2 SNL/NM ER Project UXO/HE Survey

In November 1993, KAFB Explosives Ordnance Disposal personnel conducted a visual survey for the presence of unexploded ordnance (UXO)/HE on the ground surface at SWMU 68 in conjunction with SWMU 71. No live ordnance or HE were discovered. Expended ordnance debris that was collected and removed from the site included seven expended projectile fuses, three empty projectile base assemblies, one empty spotting smoke projectile, one empty practice projectile, one empty projectile fuse booster, and one concrete-filled ballistic projectile (Young and Byrd September 1994). The ordnance is related to anti-aircraft proximity fuse development and testing activities in this portion of the Central Coyote Test Area. The type and age of the ordnance predates the testing activities that occurred at the Old Burn Site.

3.1.2.3 SNL/NM ER Project Radiological Survey(s)

A Phase I surface radiation survey was conducted at SWMU 68 as part of a larger effort to survey SWMU 71 during December 1993 and January 1994 (RUST Geotech Inc. December 1994). The survey covered a total of 78.9 acres of flat alluvial terrain. Approximately 14.7 acres in the central portion of the area were scanned at 6-foot centers (100-percent coverage) while the remaining area was scanned at 10-foot centers (70-percent coverage) using sodium iodide (NaI) detectors. Within the boundaries of SWMU 68, a total of 64 point sources of gamma activity either greater than 30 percent or greater than natural background of approximately 11 microroentgens/hour were identified (SNL/NM September 1997). A detailed summary of the surface radiological survey and anomalies found at the site is presented in Section 5.7.7 of the

"Final Report, Surface Gamma Radiation Surveys for Sandia National Laboratories/New Mexico Environmental Restoration Project" (RUST Geotech Inc. December 1994).

In December 1993, Los Alamos National Laboratory conducted an alpha radiation survey of the site with an electrostatic long-range alpha detector (Bounds January 1994). In contrast to the numerous point source anomalies found in the gamma radiation survey, "no widespread low-level radiation contamination was detected." The lack of detections above background probably results from the 200-foot grid spacing, the nature of contaminants, and the smaller percentage of area covered through this survey technique.

3.1.2.4 SNL/NM ER Project Cultural Resources Survey

Cultural resources surveys were conducted at SWMU 68 in 1981 and again in 1993 (Hoagland and Dello-Russo February 1995). No cultural resource concerns were identified in either survey.

3.1.2.5 SNL/NM ER Project Sensitive Species Survey

A sensitive species survey was conducted at SWMU 68 in June 1994 using parallel transects 100 feet apart. The survey indicated the site to be an area of highly disturbed habitat, with limited probability that sensitive species were present. No sensitive species were found at SWMU 68 (IT February 1995).

3.1.2.6 SNL/NM ER Project Scoping Sampling Data Collection

In June 1995, SWMU 68 was investigated as part of a site-wide scoping sampling program. The purpose of this scoping sampling effort was to obtain preliminary analytical data to support the ER Project site ranking and prioritization. Five surface soil samples were collected from 0 to 0.5 feet bgs at SWMU 68.

Arsenic, beryllium, cadmium, mercury, selenium, and silver were not detected in any of the five samples; however the method detection limits (MDLs) ranged from 10 mg/kg (for silver) to 50 mg/kg (for arsenic), exceeding the NMED background concentration levels in most cases. No HE compounds were detected in any of the samples. However, low concentrations of VOCs (0 to 3 parts per million [ppm]) were detected in one sample and total petroleum hydrocarbons were detected above 100 ppm in another sample. Although uranium-238 and uranium-235 were not detected in any of the samples, thorium-232 was detected slightly above background in three samples as was cesium-137 in two samples.

3.1.2.7 Soil-Vapor Survey

In August 1998, a soil-vapor survey was conducted at SWMU 68. The survey involved drilling two boreholes. Borehole 1 was drilled to a depth of 9.5 feet bgs and Borehole 2 was drilled to a depth of 8.0 feet bgs. Insignificant, trace concentrations of VOC soil gas were detected in both boreholes.

3.1.2.8 SNL/NM ER Project Scoping Data Gaps

Information gathered from process knowledge, a review of historical site files, and personal interviews aided in identifying the most likely COCs at SWMU 68 and selecting the types of analyses to be performed on soil samples. However, because the MDLs were greater than NMED-approved background concentrations, the preliminary scoping sampling data were not adequate to support a risk assessment.

3.1.3 SNL/NM ER Project VCM and Confirmatory Sampling

3.1.3.1 VCM Activities

A surface radiological VCM was conducted at SWMU 68 in conjunction with SWMU 71 from January to March 1995 and January to March 1996. VCM activities were initially based upon findings of the Phase I survey (Section 3.1.2.3) performed at SWMU 68. Point and small area sources identified during the Phase I survey were removed during the activities conducted from January to March 1995. Resurveying (scanning) of SWMU 68 in conjunction with SWMU 71 was performed on 6-foot centers (100-percent coverage) from January to March 1996. Point and area sources identified during the resurveying were removed during the January to March 1996 VCM.

VCM activities included radiation scanning to verify anomaly location, removal of fragments and/or soil until readings were at levels less than 1.3 times site-specific background, and post-cleanup (verification) soil sampling for gamma spectroscopy analysis. Of the sources identified during the Phase I survey, 64 point sources were remediated at SWMU 68 during the initial cleanup activities conducted from January to March 1995. All new point and area sources identified during the January to March 1996 resurveying activities at the site were either remediated or determined to be associated with naturally occurring geologic material.

After the removal of radiologically contaminated soil during the January to March 1995 VCM activities, seven post-cleanup (verification) samples were collected within SWMU 68 from point and area sources. Samples were collected in the immediate vicinity of point sources at a frequency of one for every ten locations. Samples were collected from area sources exhibiting the highest residual gamma radiation readings. Gamma spectroscopy analysis was performed on these samples to characterize the residual radioactivity remaining in the soil.

A total of two point sources and one area source still remained at SWMU 68 after the January to March 1995 and January to March 1996 VCM activities were completed. As a result, radiological VCM activities were continued from May to June 1998 to complete remediation of area source anomalies. During the remediation of the single area source, buried debris and other materials were discovered. An area approximately 30 by 36 by 4 feet was excavated resulting in 144 55-gallon drums, 10 soil piles (about 10 cubic yards each), and 5 to 10 cubic yards of contaminated scrap metal pieces, concrete, wire, and other debris. The drums were disposed of off site as radioactive-only waste. In August 2001, the soil piles and scrap materials were removed from the site and disposed of at appropriate off-site facilities.

In August 1996, a large mound was identified northwest of SWMU 68 within SWMU 71. The mound (herein referred to as the "68A Mound") was assumed to be associated with activities conducted at SWMU 68 and, pursuant to the NMED Request for Supplemental Information (RSI) (NMED August 1997, SNL/NM November 1997), was to be investigated as part of the SWMU 68 RFI sampling activities. Based upon discussions with NMED personnel, an informal sampling and analysis plan (or Field Implementation Plan) was developed for the 68A Mound, which was subsequently investigated in February 1999. The results of this additional remediation are presented in Section 3.1.3.2.

3.1.3.2 Site-Specific Background and RFI Confirmatory Sampling

Sampling activities were performed in accordance with the rationale and procedures described in the OU 1334 Draft Work Plan (SNL/NM October 1994), as reviewed by the NMED (DOE Oversight Bureau) and the EPA. Pursuant to draft EPA comments on the Work Plan (EPA November 1995), the sampling depth for subsurface samples was changed from 1.5 to 2.0 feet bgs to 0.5 to 1.0 feet bgs. The RSI issued by the NMED (August 1997) also required the following:

- Sampling at four locations beneath the burn pan (at 0 to 0.5 and 1.5 to 2.0 feet bgs)
- Sampling at four locations beneath the overflow basin and plastic-lined pit
- Additional samples along the drainage ditch spaced no further than 25 feet apart
- VOC, gross alpha/gross beta, and gamma spectroscopy analyses of samples collected beneath the borrow pits, burn pan, drainage ditch, overflow basin, plastic-lined pit, and arroyo channel
- Total SVOC and total metals analyses of samples collected beneath the burn pan
- Sampling of material beneath the debris mound near utility poles

Pursuant to NMED Notice of Deficiency (NOD) comments on the Work Plan (NMED March 1998, SNL/NM July 1998), the following additional sampling requirements were specified:

- VOCs, total SVOCs, total metals, gross alpha/gross beta, and gamma spectroscopy analyses of samples collected at the burn pan
- VOC analysis of samples collected beneath the borrow pits, burn pan, drainage ditch, overflow basin, plastic-lined pit, and arroyo channel

RFI confirmatory sampling took place at SWMU 68 in August, September, and December 1996, and from October to November 1998. Sample collection followed the methodology presented in the OU 1334 Draft Work Plan (SNL/NM October 1994). Background soil and arroyo sediment samples were collected to establish site-specific background concentrations and activities for metals and radionuclides.

RFI confirmatory samples were collected from the following areas within SWMU 68 where potential releases to the environment could have occurred:

- Arroyo channel sediment
- Plastic-lined pit
- Overflow basin and buried concrete slab
- Drainage ditch
- Burn pan sediment
- Burn pan concrete and underlying sediment
- Borrow pits
- Debris piles
- Radiological VCM excavation
- 68A Mound

Confirmatory sampling was conducted to determine whether potential COC concentrations exceeded background limits or were sufficient to pose a risk to human health or the environment.

From November to December 1998, geophysical surveys were conducted at SWMU 68 around the burn pan and surrounding area to detect possible locations of additional buried waste. The 68A Mound was also surveyed. No anomalies indicative of buried waste were identified using a Geometrics G-858 cesium vapor magnetometer. No evidence of buried debris was discovered during investigation of the 68A Mound. As a result, the mound was dismantled and the contents spread over the area.

3.1.3.3 Data Gaps

The analytical data from the radiological VCM and confirmatory sampling are sufficient to characterize the nature and extent of any possible COC releases at SWMU 68. Confirmatory RFI sampling was conducted according to NMED requirements provided in the OU 1334 NOD (NMED March 1998) and RSI (NMED August 1997). As detailed in section 3.2, the soil within the berm surrounding the burn pan structure will be inspected for depleted uranium and/or thorium as a housekeeping activity. There are no further data gaps regarding characterization of the site.

3.2 Potential for Depleted Uranium/Thorium-232 Contamination

The soil berm that surrounds the burn pan structure may contain depleted uranium and/or thorium-232 fragments. As described in Section 2.1, the soil that was used to create the berm may have been obtained from the borrow pits located north and south of the burn pan structure (Figure 2.1-2). The berm was constructed prior to the SWMU 68 surface radiological VCM activities conducted in 1995 and 1996. Based upon the number of point and area sources removed from SWMU 68 during the VCM, the potential exists that depleted uranium or thorium-232 fragments were incorporated into the excavated material used to construct the berm. The potential anomalies could have been shielded from detection due to the thickness of the berm.

3.3 Conceptual Site Model Overview

The key elements of the conceptual site model for SWMU 68 are summarized as follows:

- The primary COC at the site is lead. Although radionuclides were detected at levels slightly above the maximum background activity limits specified for the Coyote Test Field (Dinwiddie September 1997), these are not considered COCs because of the very low activities and related negligible risk.

- Soil contamination exceeding the 750 mg/kg cleanup goal for lead is only present within the overflow basin.

- Contamination also occurs at the site in the form of test structures (metal burn pan) and test debris (solid waste).

- The potential exists for the presence of depleted uranium and/or thorium-232 fragments within the soil berm material surrounding the burn pan structure based upon its assumed source (surface soil from other areas of the site).

The potential contaminant migration pathways at SWMU 68 include air, surface soil, surface water, infiltrating surface water (into the subsurface), and (secondarily) groundwater. Based upon the physical characteristics of SWMU 68 and the nature and extent of contamination, only surface soil is considered to be a primary pathway. The primary exposure pathway for the site receptors (industrial worker and native animal species) is ingestion and inhalation of lead-contaminated dust.

No primary arroyo channels are located in the near vicinity of SWMU 68; therefore, the surface-water pathway is not relevant. In addition, there is limited precipitation (less then 9 inches per year) and high evaporation (98 percent of total rainfall), which results in a negligible amount of runoff. Limited precipitation, the low permeability of the surface soil, the low infiltration rates, and the depth to groundwater (estimated to be approximately 120 feet bgs in this area) preclude groundwater as a viable exposure pathway.

3.4 VCA Approach

The VCA approach presented in this plan consists of source removal based upon the conceptual site model presented in Section 3.3. Based upon the analytical data that characterizes SWMU 68, the primary activity of this VCA will involve the excavation of approximately 230 cubic yards of lead-contaminated soil from the overflow basin and removal of the underlying concrete pad. Confirmatory soil samples will be collected from below the excavated area. All confirmatory soil samples will be homogenized according to EPA guidance (EPA March 1995) using a ball mill or similar approach and analyzed at an off-site laboratory for total lead concentration in case the lead occurs as discrete, fine particles. The confirmatory analytical results for the confirmatory soil samples will be combined and the 95% upper confidence limit (UCL) of the mean concentration will be calculated. As long as the 95% UCL of the mean concentration is equal to or less than 750 mg/kg for total lead, no additional corrective action will be required for the overflow basin. If the 95% UCL of the mean concentration is greater than 750 mg/kg, the need for additional corrective action will be discussed with the NMED and likely result in expanded excavation activities.

The remaining activities for completion of the VCA will include the following:

- Disassembly of the burn pan
- Spreading and surveying of the associated soil berm material for potential radiological contamination (metal fragments)
- Disposal and/or recycling of the solid waste (burn pan assembly) at approved facilities
- Disposal of radiological waste at approved facilities (if generated)
- Removal of general debris
- Final site restoration that will consist of grading and revegetating the site.

These "housekeeping" activities are consistent with NMED guidance for SNL/NM ER Project site remediation.

4.0 SWMU 68 VCA

The primary activities of this VCA are the excavation and off-site disposal of the overflow basin soil, which involves the following:

- Excavation and removal of lead-contaminated soil from the overflow basin
- Removal of the concrete pad located at the base of the overflow basin excavation
- Disposal of lead-contaminated soil and solid waste (concrete) at an approved off-site facility
- Collection of confirmatory soil samples

After confirmation data have been reviewed and it is determined that cleanup goals have been met, the excavated area will be backfilled with local material, regraded, and revegetated.

The secondary activities for completion of this VCA include the following:

- Disassembling and decommissioning the burn pan assembly including removal of the surrounding soil berm
- Spreading and surveying the soil berm material for depleted uranium and thorium-232 contamination and segregation and disposal of these materials, if generated, at an approved facility
- Disposing of the solid waste (debris/burn pan assembly) at an approved facility
- Removing general debris
- Grading and backfilling disturbed surfaces and revegetating the site

4.1 Primary VCA Activities

The following corrective action objective has been developed for the primary activities of the SWMU 68 VCA:

> <u>Removal of Lead-Contaminated Soil Exceeding 750 mg/kg and Underlying Concrete Pad</u>: Excavation and removal of lead-contaminated soil contained in the overflow basin, which is the only soil at the site that exceeds the 750 mg/kg cleanup standard for lead. Removal of the concrete pad located at the base of the overflow basin excavation.

The primary corrective action objective will be verified as follows:

> <u>Verification of Cleanup Goal</u>: Total lead concentration equal to or less than 750 mg/kg by area based upon the 95% UCL of the mean concentration calculated for the overflow basin confirmatory data set (in situ samples).

4.1.1 Excavation of Lead-Contaminated Soil and Removal of Underlying Concrete Pad

4.1.1.1 Soil Excavation

The lead-contaminated soil will be excavated from the overflow basin, and the underlying concrete pad will be removed. The depth of excavation is estimated to be approximately 3.5 feet, or to the top of the underlying concrete pad. A backhoe, tracked excavator, or equivalent heavy equipment will be used to excavate the lead-contaminated soil and load the material into appropriate containers for off-site disposal. Once filled, the containers will either be staged on site and managed within a RCRA 90-day-waste-accumulation-area until final disposal at an appropriate off-site facility or be transported immediately after loading to the appropriate waste management facility.

Prior to excavation activities, an earthen berm will be constructed around the perimeter of the area being excavated using native materials to minimize storm water run-on/runoff. If sheet flow at the site cannot be directed using earthen berms, other suitable storm water controls, such as rock, straw bales, and/or silt fencing, will be installed in locations requiring additional support.

4.1.1.2 Concrete Pad Removal

After excavation of the lead-contaminated soil has been completed, the underlying concrete pad will be broken up using a trackhoe-mounted hydraulic hammer or equivalent equipment and disposed of at an appropriate off-site facility.

4.1.2 Verification of Cleanup Goal

Confirmatory soil samples will be collected from the sidewalls and the floor underlying the excavated concrete pad to confirm the remaining soil meets the cleanup goal for total lead concentration. The soil samples will be analyzed for total lead, and the results for the overflow basin will be compiled for statistical analysis. The excavated area will meet the cleanup goal once the analytical results confirm that the total lead concentration for the excavated area is equal to or less than 750 mg/kg, based upon the 95% UCL of the mean concentration calculated for the confirmatory data set.

A total of three confirmatory soil samples will be collected from the sidewalls of the overflow basin excavation prior to the removal of the concrete pad. Upon removal of the concrete pad, a 20-foot grid will be established on the excavation floor of the overflow basin, and a grab sample will be collected from the node of each grid point. Approximately nine confirmatory soil samples are expected to be collected from the overflow basin.

If the cleanup goal is not achieved based upon confirmatory sample results, additional excavation and sampling will be performed.

4.1.2.1 Site Sampling

The sampling activities at the site will include confirmatory sampling of soil beneath the excavated area. This section presents the data collection procedures. Soil sampling data will determine whether project objectives have been met for the overflow basin. Field and laboratory procedures associated with the VCA will be specified in a separate field implementation plan.

All samples collected will be delivered to the SNL/NM Sample Management Office (SMO) for shipment to the analytical laboratory. Every sample collected at the site will be recorded using an SMO Analysis Request/Chain-of-Custody (AR/COC) form and tracked according to the AR/COC record number. Sampling personnel will follow SMO protocol for completing AR/COC forms and sample labeling requirements. In addition to the SMO sample identification requirements, each sample will be assigned a site-specific identification.

Disposable polyethylene-type scoops will be used to collect the soil samples. Each scoop will be used only once per confirmatory sample location. Used scoops will be cleaned with a dry brush until all visible signs of contamination have been removed. Following decontamination, the used scoops will be disposed of as solid waste.

The excavated soil is characterized by existing analytical results and will not be further sampled as part of this VCA unless required by the off-site disposal facility.

4.1.2.2 DQOs

The primary DQO for the VCA confirmatory sampling program is to produce defensible analytical results to determine whether lead-contaminated soil has been removed from the site. Confirmatory samples will be collected from beneath the excavated area. The samples will be analyzed for total lead using EPA Method 6010. A total of three samples will be collected from the sidewalls, and approximately nine samples will be collected from the floor beneath the concrete pad.

Confirmatory laboratory data will require an analytical Level III data package provided by an off-site laboratory. Inorganic compound analyses shall be performed by the laboratory using EPA procedures contained in the most recent edition of "Test Methods for Evaluating Solid Waste" (SW-846) (EPA November 1986) or equivalent, nationally recognized, validated analytical methods.

Laboratory data will be evaluated using EPA SW-846 criteria and the SNL/NM ER Project "Data Validation Procedure for Chemical and Radiochemical Data," AOP (Administrative Operating Procedure) 00-03 (SNL/NM January 2000). This SNL/NM procedure was developed in accordance with the EPA "Contract Laboratory Program National Functional Guidelines For Inorganic and Organic Data Review" (EPA February 1994).

4.2 Secondary VCA Activities

The following corrective action objectives have been developed for the secondary activities to complete the SWMU 68 VCA:

1. Disassembling the Burn Pan Structure/Removing Surrounding Soil Berm: The burn pan assembly will be disassembled following removal of the surrounding soil berm.

2. Spreading/Surveying Soil Berm Material: Soil berm material removed from the burn pan assembly area will be spread on the ground surface to allow for radiological screening of the material for potential depleted uranium and/or thorium-232 contamination.

3. Removing General Debris: The small piles of scattered debris (scrap wood, concrete chunk, ceramic/epoxy pipe coating, various metal burn test debris) and several wooden utility poles will be removed from the site.

4. Site Grading and Revegetation: Site grading will be performed to restore the local topography and fill in the shallow pits. Disturbed areas will be seeded with a native seed blend in accordance with the City of Albuquerque Specification 1012—Native Grass Reseeding.

4.2.1 Disassembling the Burn Pan Structure/Removing Surrounding Soil Berm

In order to provide adequate access to the burn pan components for disassembly, the surrounding soil berm will first be removed using appropriate heavy equipment. Disassembling the burn pan structure will involve cutting the steel components of the pan into manageable-sized pieces using a cutting torch, power saw, or equivalent equipment. The underlying concrete pad will be broken up using a trackhoe-mounted hydraulic hammer or equivalent equipment. All debris resulting from the disassembly of the burn pan structure will be disposed of or recycled at an appropriate off-site facility.

4.2.2 Spreading/Surveying Soil Berm Material

Soil berm material removed from around the burn pan structure will be staged at a predetermined location at the site and spread over the ground surface to a thickness of less than 6 inches. The material will then be surveyed for radiological anomalies using hand-held NaI detectors. Point and area sources identified during the survey will be removed from the berm material, containerized in 55-gallon drums, and disposed of at an appropriate off-site facility.

4.2.3 Removing General Debris

The small piles of scattered debris (scrap wood, concrete chunks, ceramic/epoxy pipe coating, burn test debris) will be containerized in appropriate containers. The wooden utility poles will be cut into manageable-sized pieces using a chain saw or equivalent equipment. All debris removed from the site will be disposed of or recycled at an appropriate off-site facility.

4.2.4 Site Grading and Revegetation

Disturbed areas (burn pan removal area, soil berm material, and drainage ditch) at the site will be graded using standard heavy equipment. Excess soil generated from grading activities will be used to backfill the shallow excavated pits (overflow basin, radiological VCM excavation, plastic lined pit, and borrow pits) at the site. Additional clean soil required to backfill the pits will be acquired from an approved borrow pit in TA-III, if necessary. Water will be added to backfill material to control dust and achieve reasonable soil compaction levels. After grading activities have been completed, disturbed areas will be seeded with a native seed blend in accordance with the City of Albuquerque Specification 1012—Native Grass Reseeding.

4.3 Project Schedule

Table 4.3-1 presents the proposed VCA schedule that has been developed to ensure submittal of the Final Investigation Report to the NMED by September 30, 2005, as required by the COOC (NMED April 2004).

Table 4.3-1
SWMU 68 VCA Schedule of Activities

Activity	Begin Date	End Date
Submit SWMU 68 VCA Plan to NMED	NA	10-13-04
Perform Site Preparations for VCA	10-15-04	10-29-04
Implement VCA Fieldwork Activities	11-01-04	12-03-04
Complete Site Restoration	12-04-04	07-30-05[a]
Submit Final Investigation Report	NA	09-30-05

[a]To maximize the revegetation effort, final reseeding may be performed prior to the July–August 2005 monsoonal period.
NA = Not applicable.
SWMU = Solid Waste Management Unit.
VCA = Voluntary Corrective Action.

4.4 Project Waste

Several waste streams will be generated during the SWMU 68 VCA. Where possible, metal debris will be recycled. Table 4.4-1 summarizes the expected waste streams and the anticipated disposal paths.

Table 4.4-1
SWMU 68 VCA Waste Streams and Anticipated Disposal Paths

Waste Streams	Anticipated Disposal Paths
Overflow Basin Soil (Hazardous Waste)	Permitted Off-Site Disposal Facility
Burn Pan Metal	Recycled or Disposed of at an Off-Site Facility
Radioactive Fragments and Soil	Permitted Off-Site Disposal Facility
Various Debris	Off-Site Disposal Facility (metal debris will be recycled off-site, if feasible)
Project-Generated Waste from Excavation and Sampling	Off-Site Disposal Facility

SWMU = Solid Waste Management Unit.
VCA = Voluntary Corrective Action.

All waste and materials for recycling will be managed in accordance with applicable SNL/NM waste disposal guidelines contained in the Environmental Safety and Health Manual (SNL/NM August 2004).

4.5 Health and Safety Requirements

Field activities associated with this project will be performed under the Southwest Test Area, OU 1335 Health and Safety Plan (HASP) (SNL/NM March 1996b) and a project-specific HASP Addendum. The HASP Addendum will be completed prior to the commencement of fieldwork. Emergency phone numbers and hospital route maps will be posted in the SWMU 68 field office during project fieldwork. An initial health and safety briefing will be conducted at the beginning of the project, and daily tailgate safety meetings will be performed to address specific concerns for the daily activities.

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