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Date: September 21, 2006
Refer to: EP2006-0856

Mr. James Bearzi
NMED – Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505-6303

SUBJECT: RESPONSE TO COMMENTS IN THE "APPROVAL AND CERTIFICATE OF COMPLETION, REMEDY COMPLETION REPORT FOR THE INVESTIGATION AND REMEDIATION OF SOLID WASTE MANAGEMENT UNIT 33-013, TECHNICAL AREA 33"

Dear Mr. Bearzi:

Enclosed please find two hard copies, with electronic files on CD, of a replacement page 6 of the "Remedy Completion Report for Solid Waste Management Unit 33-013, a Former Storage Area at Technical Area 33," with both dates in Section 3.1.1 corrected to 2005.

During a meeting with Paula Bertino at TA-33 on Wednesday, September 13, 2006, Mark Cummings of your staff determined that references to figures and tables on page 10 of the report were in fact correct. We appreciate your staff's (Darlene Goering and Mark Cummings) engagement in identifying and resolving the issues associated with the accelerated investigation and remediation of SWMU 33-013.

If you have questions or require any additional information, please contact Melanee Shurter at (505) 667-7369 (mshurter@lanl.gov) or Leonard (Tony) Trujillo at (505) 845-5987 (ltrujillo@doeal.gov).

Sincerely,

Andrew Phelps, Associate Director
Environmental Programs
Los Alamos National Laboratory

Sincerely,

for

David Gregory, Federal Project Director
Department of Energy
Los Alamos Site Office

4806

AP/DG/MMS/jr

Enclosure: Two hard copies, with electronic files on CD, of a replacement page 6 of the "Remedy Completion Report for Solid Waste Management Unit 33-013, a Former Storage Area at Technical Area 33," with both dates in Section 3.1.1 corrected to 2005

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LA-UR-06-1218
March 2006
ER2006-0046

Remedy Completion Report for the Investigation and Remediation of Solid Waste Management Unit 33-013

Facility ID: SWMU 33-013
Facility Operator: US Department of Energy

Los Alamos
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CDs included with this document

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Prepared by
Environmental Stewardship Division–
Environmental Remediation and Surveillance Program

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LA-UR-06-1218
ER2006-0046

Remedy Completion Report for the Investigation and Remediation of Solid Waste Management Unit 33-013

March 2006

Responsible project leader:

Printed Name	Signature	Title	Organization	Date
Melanee Shurter	Melanee M Shurter	Project Leader	ENV-ECR	3/1/06

Responsible UC representative:

Printed Name	Signature	Title	Organization	Date
David McInroy		Deputy Program Director	ENV-ERS	3/1/06

Responsible DOE representative:

Printed Name	Signature	Title	Organization	Date
David Gregory	David B Gregory	Federal Project Director	DOE-LASO	3/1/06

Professional Engineer Certification

This certification was prepared pursuant to the requirements of Section VII.E.6 of the March 1, 2005, Compliance Order on Consent signed by the New Mexico Environment Department (NMED) and the United States Department of Energy (DOE) and the Regents of the University of California for a registered professional engineer's certification. The activities described in this remedy completion report have been performed with the care and skill ordinarily exercised by members of the profession practicing under similar conditions in the same manner or in a similar locality. We make no other warranty either expressed or implied. The information presented in this report is, to the best of our knowledge and belief, true, accurate, and complete. With the signatures below we certify that, except for the deviations presented in section 3.3, the investigation and/or remediation of this site (Solid Waste Management Unit [SWMU] 33-013) was conducted in accordance with the accelerated corrective action work plan for SWMU 33-013 (LANL 2005, 88839), approved with modifications by NMED on April 25, 2005 (NMED 2005, 90159), and the Field Implementation Plan for Preconstruction Investigation and Removal of SWMU 33-013 (LANL 2005, 91433). The finding and certification are based on (1) review of the remedy completion report and supporting records and documentation, (2) witnessing remediation and sampling activities, and (3) reviewing the analytical results and supporting documentation.

Paula M. Bertino, ENV-ECR Field Team Leader

Vincent Y. Sing, KSL Project Manager

James A. Holden, KSL Field Team Leader

With the signature and seal below, I certify that, except for the deviations presented in section 3.3, the investigation and/or remediation of this site SWMU 33-013 was conducted in accordance with the accelerated corrective action work plan for SWMU 33-013 (LANL 2005, 88839), approved with modifications by NMED on April 25, 2005 (NMED 2005, 90159), and the Field Implementation Plan for Preconstruction Investigation and Removal of SWMU 33-013 (LANL 2005, 91433). I make no other warranty either expressed or implied.

Mario R. Madrid
Professional Engineer, #16228

MARIO R. MADRID
NEW MEXICO
16228
LICENSED PROFESSIONAL ENGINEER
2/28/06

Owner — Operator Certification

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

Date: 3/1/06

David McInroy, Deputy Program Director
Environmental Remediation & Surveillance Program
Los Alamos National Laboratory

Date: 3/1/06

David Gregory, Federal Project Director
Environmental Restoration Program
Department of Energy/Los Alamos Site Office

EXECUTIVE SUMMARY

This remedy completion report presents the results of recent accelerated corrective action (ACA) activities at Solid Waste Management Unit (SWMU) 33-013, a former drum storage area within the Chaquehui Canyon Aggregate Area at Los Alamos National Laboratory (LANL or the Laboratory). This ACA was prompted by the planned construction of the Laboratory's new high bay complex at Technical Area (TA) 33. SWMU 33-013 is located within the planned construction design footprint of the TA-33 high bay complex and was investigated and remediated before the commencement of construction activities, as described in the approved ACA work plan.

The purpose of the remedy completion report is to describe recent ACA activities at SWMU 33-013. ACA objectives include (1) removing asphalt and potentially contaminated soil from SWMU 33-013, and (2) collecting confirmation samples to define the nature and extent of contamination at SWMU 33-013 following the completion of removal activities to support a request for a Certificate of Completion for the site. To meet this objective, the Laboratory's Environmental Stewardship Division-Environmental Remediation and Surveillance Program (formerly the Environmental Restoration Project) conducted the following activities at SWMU 33-013:

- performed site surveys
- removed asphalt and potentially contaminated soil
- collected confirmation samples to characterize the lateral and vertical extent of any residual contamination at the site
- remediated the site as necessary, based on the concentrations of chemicals detected, to reduce potential risk to human and ecological receptors
- Best management practices (BMPs) were installed and maintained during and following remediation of the site and the Laboratory's high bay complex project team will install and maintain BMPs as necessary during construction activities at the site.

Results of the 2005 data evaluation show that the nature and extent of contamination have been defined for SWMU 33-013. In addition, the results of the human-health and ecological screening assessments for SWMU 33-013 indicate that there is no potential unacceptable risk posed to human health or the environment for industrial land use and construction activities. Thus, the Laboratory requests that a Certificate of Completion "complete with controls" be granted for SWMU 33-013.

Wastes generated during the ACA sampling and remediation activities were characterized in accordance with applicable Laboratory and regulatory requirements. A request for a Certificate of Completion, complete with controls, for SWMU 33-013 is included as part of this report. The request requires that the land occupied by SWMU 33-013 will be maintained by the Laboratory for industrial use for the foreseeable future.

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Acronyms and Abbreviations

ACA	accelerated corrective action
ALLH	all-horizons soil sample
AUF	area use factor
bgs	below ground surface
BMP	best management practice
BV	background value
CD	compact disc
COC	chain of custody
COD	chemical oxygen demand
Consent Order	Compliance Order on Consent
COPC	chemical of potential concern
COPEC	chemical of potential ecological concern
C_{sat}	soil saturation limit

CWDR	Chemical Waste Disposal Request
D&D	decontamination and decommissioning
DOE	Department of Energy (U.S.)
ENV	Environmental Stewardship (a LANL division)
EPA	Environmental Protection Agency (U.S.)
EQL	estimated quantitation limit
ER	environmental restoration
ERS	Environmental Remediation and Surveillance (an ENV program)
ESL	ecological screening level
FD	field duplicate
FV	fallout value
ha	hectare
HE	high explosives
HI	hazard index
HR	home range
HQ	hazard quotient
HSR-1	Health Physics Operations (a LANL group)
ID	identification
LAL	lower acceptance level
LANL	Los Alamos National Laboratory
LCS	laboratory control sample
LLW	low-level waste
MAQ	Meteorology and Air Quality (a LANL group)
MDL	method detection limit
MSGP	multi-sector general permit
NMED	New Mexico Environment Department
NOAEL	no-observed-adverse-effect level
PAH	polyaromatic hydrocarbon
PAUF	population area use factor
PCB	polychlorinated biphenyl
PID	photoionization detector
PPE	personal protective equipment
QA	quality assurance
QC	quality control
R	rejected
RCRA	Resource Conservation and Recovery Act
RESRAD	residual radioactive material (computer code)
RfD	reference dose

RFI	RCRA facility investigation
RPD	relative-percent difference
RPF	Records Processing Facility (an ENV document archive)
RWP	radiological work permit
SAL	screening action level
SCL	sample collection log
SF	slope factor
SMO	Sample Management Office (an ENV office)
SOP	standard operating procedure
SSHASP	site-specific health and safety plan
SSL	soil screening level
SVOC	semivolatile organic compound
SWMU	solid waste management unit
TA	technical area
TAL	target analyte list
T&E	threatened and endangered
TRV	toxicity reference value
UAL	upper acceptance level
UCL	upper confidence limit
VCP	vitrified clay pipe
VOC	volatile organic compound
WQH	Water Quality and Hydrology (a LANL group)

Data Qualifier Definitions

Data Qualifier	Definition
U	The analyte was analyzed for but not detected.
J	The analyte was positively identified, and the associated numerical value is estimated to be more uncertain than would normally be expected for that analysis.
J+	The analyte was positively identified, and the result is likely to be biased high.
J-	The analyte was positively identified, and the result is likely to be biased low.
UJ	The analyte was not positively identified in the sample, and the associated value is an estimate of the sample-specific detection or quantitation limit.
R	The data are rejected as a result of major problems with quality-assurance/quality-control parameters.

1.0 INTRODUCTION

Los Alamos National Laboratory (LANL or the Laboratory) is a multidisciplinary research facility owned by the U.S. Department of Energy (DOE) and managed by the Regents of the University of California. The Laboratory is located in northcentral New Mexico, approximately 60 mi northeast of Albuquerque and 20 mi northwest of Santa Fe. The Laboratory site covers 40 mi^2 of the Pajarito Plateau, which consists of a series of finger-like mesas separated by deep canyons. These canyons contain ephemeral and intermittent streams that run west to east. Mesa tops range in elevation from approximately 6200 ft to 7800 ft. The plateau's eastern portion stands 300 ft to 900 ft above the Rio Grande valley.

The Laboratory's Environmental Stewardship (ENV) Division-Environmental Remediation and Surveillance (ERS) Program (formerly the Environmental Restoration [ER] Project) is involved in a national DOE effort to reduce the risk to human health and the environment at its facilities. The goal of the ENV-ERS Program is to ensure that past operations do not threaten human or environmental health and safety in and around Los Alamos County. To achieve this goal, ENV-ERS is investigating and, as necessary, remediating sites potentially contaminated by past Laboratory operations. ENV-ERS recently performed accelerated corrective action (ACA) activities at Solid Waste Management Unit (SWMU) 33-013, a former drum storage area in Technical Area (TA) 33 (Figure 1.0-1), within the Laboratory's Chaquehui Canyon Aggregate Area.

In accordance with the Compliance Order on Consent (hereafter, the Consent Order) signed by the New Mexico Environment Department (NMED), DOE, and the Regents of the University of California on March 1, 2005, the investigation work plan for the Chaquehui Canyon Aggregate Area is due to NMED in November 2009. The Laboratory conducted the ACA at SWMU 33-013 within the aggregate in advance of the work plan's deliverable date because this site lies in the path of the planned TA-33 high bay complex and may be inaccessible during and after construction, which is currently scheduled to begin in mid-2006.

The Laboratory completed corrective actions at SWMU 33-013 to the levels required for NMED to issue a Certificate of Completion "complete with controls". The Laboratory will assume responsibility for the controls specified for the site by NMED in accordance with the level of remediation performed. The Laboratory expects that such controls will be limited to institutional or administrative controls to ensure that the land use remains consistent with the residual contamination at the site.

This remedy completion report describes the ACA activities completed at SWMU 33-013 in advance of high bay complex construction activities. The ACA work plan (LANL 2005, 88839) was approved by NMED with modifications on April 25, 2005 (NMED 2005, 90159). The investigation and remediation activities discussed in this remedy completion report were conducted in accordance with the approved ACA work plan and NMED's requested modifications.

1.1 Location of ACA Activities

SWMU 33-013, the former drum storage area, is situated in an area of proposed construction of the Laboratory's high bay complex within the northern portion of TA-33 known as Main Site (Figure 1.1-1). SWMU 33-013 was an uncovered surface storage area for items such as vacuum pumps, drums containing oil contaminated with tritium and possibly with metals and solvents, and dumpsters of miscellaneous materials awaiting disposal. The site has been inactive since 1989.

1.2 Purpose of ACA Activities

The purpose of the ACA activities described in this remedy completion report was to complete investigation and remediation activities in support of obtaining a Certificate of Completion for SWMU 33-013. Activities that support this certification include the removal of asphalt and soil with contamination above applicable soil screening levels (SSLs) and the confirmation that the lateral and vertical extent of contamination has been determined.

ACA investigation and remediation activities were implemented at SWMU 33-013 because the site will be inaccessible during and after the construction of the high bay complex. The investigation and remediation activities were conducted in accordance with the Consent Order.

1.3 Report Organization

This report follows the proposed format for remedy completion reports for ACAs submitted by LANL to NMED on August 8, 2005 (LANL 2005, 89553). This remedy completion report describes investigation and remediation activities performed at SWMU 33-013 and contains the analytical sampling results from these activities. Section 2 presents background information on the site, including a site description, operational history, types of waste historically present at the site, and a summary of previous investigations. Section 3 provides a description of the characterization and remediation activities implemented in accordance with the approved ACA work plan (LANL 2005, 88839; NMED 2005, 90159); regulatory criteria; deviations from the work plan; and a description of the site's final disposition. Section 4 summarizes the data, etc. as well as includes a request for a Certificate of Completion for SWMU 33-013 and describes controls already in place and that will be maintained to ensure that human health and the environment will be protected against any residual contamination. Appendix A shows site photos taken during ACA activities, while Appendix B (on compact disc [CD]) provides copies of the sample collection logs (SCLs), and original field-screening and monitoring sheets. Appendix C (on CD) contains analytical data, data packages, data validation reports, and chain-of-custody forms. Appendix D presents the results of the risk assessments. Appendix E (on CD) provides copies of waste management data, disposal records, and waste tables.

2.0 BACKGROUND

2.1 Facility Description

TA-33 (Figure 1.0-1) was established in 1947 as a substitute test site for weapons' components experiments being conducted at Trinity Site in southern New Mexico. Main Site (Figure 1.1-1) housed offices, laboratories, and shops within a fenced area just south of State Highway 4. The high-pressure tritium facility (former Building 33-86) was located at the southern end of Main Site within a separate fence. Construction of the high-pressure tritium facility, which processed tritium gas, was completed in 1955. The tritium facility ceased operations in 1990 and underwent decontamination and decommissioning (D&D) in the mid-1990s.

A 50-ft square asphalt pad (SWMU 33-013) in the northeast corner of the former tritium facility security fence was used as a drum storage area for liquid and solid waste. Former employees stated that material awaiting disposal, including vacuum pumps from throughout the Laboratory, waste oil, and dumpsters containing miscellaneous solid waste, was also staged on the asphalt pad (LANL 1995, 71300; LANL 1997, 57021). Use of this storage area ceased in 1989 when operations at the tritium facility were discontinued.

2.1.1 SWMU 33-013, Former Drum Storage Area

The SWMU is located within the Main Site area of TA-33 (Figure 1.1-1). SWMU 33-013 was an uncovered surface storage area for items awaiting disposal. The storage area was approximately 50 ft x 50 ft and was located on an asphalt surface inside the northeast corner of the fence surrounding the former TA-33 tritium facility (Building 33-86). The entire fenced area is flat and runoff from the site is minimal. Any runoff from the SWMU would have been to the northeast, toward a drainage leading to Chaquehui Canyon. East of the fence the ground slopes at a moderate grade without obvious channeling. The surface of the site consisted of a thin layer (approximately 3 to 6 in.) of soil with pumice from grading the site following D&D of the tritium facility (LANL 1997, 57021). A weathered and cracked asphalt pad approximately 6 in. thick was present beneath the soil/pumice veneer. Stains were noted on the asphalt during a 1987 site visit (LANL 1992, 07671).

2.2 Facility Process

Materials stored at SWMU 33-013 reportedly included vacuum pumps from throughout the Laboratory, drums containing oil contaminated with tritium and possibly with metals and solvents, and dumpsters of miscellaneous materials (LANL 1995, 71300; LANL 1997, 57021). Some of these containers reportedly leaked, and some materials were stored in this area for years (LANL 1995, 71300; LANL 1997, 57021). The exact date that storage operations began is not known but might date back to the initial operation of Building 33-86 in June 1955. Storage activities were discontinued in 1989.

2.3 Description of Waste

Based on historical knowledge, the waste materials stored at SWMU 33-013 included dumpsters of miscellaneous materials and oil contaminated with tritium and possibly with metals and solvents. Chemicals of potential concern (COPCs) include polychlorinated biphenyls (PCBs), petroleum hydrocarbons, volatile organic compounds (VOCs), inorganic compounds, semivolatile organic compounds (SVOCs), inorganic chemicals, and tritium.

2.4 Previous Investigation Activities

Prior to the most recent ACA activities, the Laboratory conducted Resource Conservation and Recovery Act (RCRA) facility investigations (RFIs) in 1993 (LANL 1995, 71300) and 1996 (LANL 1997, 57021). RFI data collected at SWMU 33-013 are discussed in the following section; the results of these investigations were provided in Appendix B of the approved ACA work plan (LANL 2005, 88839; NMED 2005, 90159).

In 1993, during the Phase I RFI three surface soil samples were collected at random locations from the 0- to 6-in. depth interval beneath the asphalt pad. The samples were field screened for radioactivity and submitted to an off-site contract laboratory and analyzed for inorganic chemicals, gamma emitters, tritium, SVOCs, and herbicides. Field screening detected no radioactivity above local background. Inorganic chemicals detected above background values (BVs) were beryllium, cadmium, chromium, lead, nickel, and silver. Several SVOCs associated with asphalt were detected at low concentrations. Tritium was also detected above the soil fallout value (FV).

In 1996, during the Phase II RFI, 14 surface soil samples (directly beneath the asphalt pad) and one near-surface (6- to 12-in.) soil sample were collected within the storage area. Nine of the samples were collected at random locations within each cell of a nine-cell grid over the storage area. The remaining samples were collected at locations biased toward stains observed on the asphalt pad. The samples were submitted to an off-site contract laboratory and analyzed for inorganic chemicals and total uranium.

Inorganic chemicals detected above BVs were antimony, cadmium, copper, lead, mercury, silver, uranium, and zinc. Total uranium was not detected above FVs.

3.0 ACCELERATED CORRECTIVE ACTION ACTIVITIES

In anticipation of the planned construction of the TA-33 high bay complex, ACA investigation and remediation activities were initiated in the summer of 2005 at SWMU 33-013 to remove the asphalt pad and potentially contaminated soil beneath the pad of the former drum storage area, define the nature and extent of contamination, and ensure that contamination at the site did not exceed target cleanup levels established in the Consent Order. The scope of the ACA included the following activities:

- mobilization and site preparation
- geodetic surveys
- excavation, packaging, hauling, and disposal of contaminated media
- collection of confirmation samples
- site restoration

ACA investigation and remediation activities were performed in accordance with appropriate quality assurance (QA) requirements addressed in the ENV-ERS Quality Management Plan and thus were implemented by using applicable quality procedures, standard operating procedures (SOPs), and Laboratory requirement documents (e.g., Laboratory implementation requirements and Laboratory performance requirements), or equivalent Laboratory-approved subcontractor documents (e.g., statements of work or field implementation plans). Table 3.0-1 presents a summary of the investigation methods used during the ACA activities at SWMU 33-013; implementation of these methods during the ACA is discussed in detail below.

Details regarding the ACA investigation and remediation activities implemented at the site are presented below. A discussion of the target cleanup goals selected for the site, and their regulatory framework, is presented in section 3.2. Additional details regarding deviations from the activities prescribed in the approved ACA work plan (LANL 2005, 88839; NMED 2005, 90159) for SWMU 33-013 are summarized in section 3.3. Final site conditions are described in section 3.4.

3.1 Investigation and Remediation Activities

Given the results of the 1993 Phase I and 1996 Phase II RFIs, and because SWMU 33-013 will be inaccessible after the construction of the TA-33 high bay complex, it was determined that the base coarse covering the site, the asphalt pad, and the first 6 in. of soil beneath the asphalt pad would be excavated and removed. The main objective of the ACA remediation and confirmation sampling activities was to ensure that upon completion the site would meet the target cleanup goals and that no further action would be required. Thus, the primary focus of the ACA remediation was excavation and removal of potentially contaminated media.

Confirmation samples were collected in accordance with the most current versions of SOP-06.09, “Spade and Scoop Method for Collection of Soil Samples,” and SOP-06.10, “Hand Auger and Thin-Wall Tube Sampler.” Surface and near-surface samples were extracted using a stainless-steel auger and placed into stainless-steel bowls for collection. The sampled interval was described and recorded on applicable SCLs (Appendix B).

Sampled media were placed into preassigned sample containers [provided by the Sample Management Office (SMO)], in the field and stored on ice in accordance with the most current version of SOP-1.02, “Sample Container and Preservation” as specified in the approved ACA work plan (LANL 2005, 88839). Samples remained in field-team custody until they were delivered to the SMO for shipment to off-site laboratories for analysis in accordance with the most current version of SOP-1.03, “Handling, Packaging, and Shipping of Samples.” All samples were field screened on-site by LANL’s Health Physics Operations (HSR-1) Group for alpha, beta, and gamma activity before transporting and releasing them to LANL’s SMO. To document sample handling, chain-of-custody (COC) forms were completed for all samples and are provided in Appendix C. Sample analyses were requested in accordance with the Laboratory’s statement of work for analytical services (LANL 2000, 71233).

Field screening for VOCs was conducted in conjunction with the confirmation sample collection at the site in accordance with SOP-06.33, “Headspace Vapor Screening with a Photo Ionization Detector.” Headspace VOC screening was performed for all confirmation samples using a HNU PI101 photoionization detector (PID) equipped with an 11.7-eV lamp; the results are recorded on SCLs provided in Appendix B.

Samples were also collected for QA/quality control (QC) purposes in accordance with the most current version of SOP-1.05, “Field Quality Control Samples.” Field duplicates were collected to evaluate the reproducibility of the sampling technique. Field trip blanks were used to evaluate sample exposure to other VOCs. Table 3.1-1 presents a summary of QA/QC samples collected during the ACA investigation of SWMU 33-013 by sample location, sample type, media, and the analyses requested. A postinvestigation geodetic survey was conducted to confirm the exact sampling locations (Appendix B). The postinvestigation geodetic surveys were performed in accordance with SOP-03.11, “Coordinating and Evaluating Geodetic Surveys” and are provided in Appendix B.

Results of the ACA confirmation sampling for SWMU 33-013 are provided in Appendix C and summarized in section 4.1. A detailed description of the ACA investigation and remediation activities conducted at SWMU 33-013 is provided below.

3.1.1 Detailed Description of the ACA

Before initiation of activities at SWMU 33-013, the footprint of the asphalt pad was surveyed, marked, and measured. No utilities were present under the footprint of the pad or within areas to be disturbed during activities associated with the removal, sampling, and restoration of SWMU 33-013. The undisturbed pad area was photographed before initiating the removal and sampling activities (Appendix A). The undisturbed pad area was also screened for beta/gamma and alpha radiation. Results of the radiation screening are provided in Appendix B. No radioactivity above twice the local (TA-33) background was measured during the screening. In accordance with NMED’s approval-with-modifications letter dated April 25, 2005 (NMED 2005, 90159), the following information is included to support use of twice the local background level as an action level during soil removal. The factor of two is used as a conservative indicator of the natural variability of background radiation across the laboratory. The LANL 2001 environmental surveillance report states that “thorium and uranium concentrations across the Pajarito Plateau range from 0.7 0 3.0 pCi/g and potassium-40 concentrations range from 12.0 to 30.0 pCi/g; these concentrations result in terrestrial radiation from 50 to 150 mrem/year,” (LANL 2001, 73876). This factor-of-three variation is also documented in the DOE report entitled “An Aerial Radiological Survey of LANL and Surrounding Area,” (DOE 1998, 91432). Therefore, HSR-1 determined that a factor of twice the local background would be a conservative environmental screening criterion and is the rule-of-thumb followed by radiation screening technicians throughout the Laboratory.

Remediation activities at SWMU 33-013 began on June 29, 2005, and included using a front-end loader to excavate and remove base coarse covering the pad that had been placed over the entire fenced area previously occupied by the tritium facility (Building 33-86). The base coarse layer ranged in depth from approximately 3 in. to 6 in. and consisted of what appeared to be a mixture of soil and recycled concrete and asphalt. The removed base coarse layer covering the asphalt pad was placed in Duraliner super sacks with a 6yd^3 capacity for transportation and disposal.

The asphalt pad had severely deteriorated and lacked any physical integrity. Over much of the site, the asphalt was distinguishable from the base coarse material placed on top of it and the soil beneath it by color only. The deterioration made the visual inspection of the pad difficult since it all appeared as discolored soil, but the discoloration was uniform throughout the pad. Photographs were taken of the pad after the base coarse was removed (Appendix A); the layer of base coarse was approximately 3 in. thick. The uncovered pad was radiologically screened and the results are provided in Appendix B. No radioactivity above local background was measured on the uncovered asphalt pad.

The asphalt pad (asphalt, discolored soil and aggregate) was excavated and placed in super sacks for transportation and disposal; the asphalt pad layer was approximately 6 in. thick. The excavated area was visually inspected for staining and none was observed. The soils under the pad were dry and there were no free liquids. An additional 6 in. of soil was then removed from beneath the discolored soil and also placed in super sacks for transportation and disposal. The waste bags were placed in the low-level waste (LLW) staging area to await disposal.

A radiation survey was performed on the bottom, sides and perimeter of the excavated area, and one location in the center quadrant of the excavation revealed activity slightly above two-times local background. An additional 2–3 in. of soil was removed from this area and placed in another super sack for transportation and disposal. The area was rescreened and was below two-times local background. Because a confirmation sample was already slated for this location (confirmation sample location 33-24734), none of the planned confirmation sampling locations were adjusted. The excavation activities continued until July 20, 2005, and resulted in a total excavated area of approximately 51 ft x 53 ft x 2 ft deep and approximately 540 yds^3 of removed soil, base coarse, and asphalt.

Since there was no visible evidence of staining, no bias was applied in locating the confirmation sampling locations. Sampling locations were laid out as specified in the approved ACA work plan (LANL 2005, 88839; NMED 2005, 90159). In accordance with comment #4 of NMED's notice of disapproval on the ACA work plan (NMED 2005, 88205), RFI sample locations AAA2036 and AAA2037 (LANL 2005, 88839) were surveyed in and were designated as confirmation sampling locations 33-24738 and 33-24739, respectively.

Confirmation samples collected at SWMU 33-013 were submitted to the SMO for shipment to off-site contract laboratories for analysis of VOCs, SVOCs, target analyte list (TAL) metals, PCBs, high explosives (HE), perchlorates, tritium, isotopic uranium, isotopic plutonium, gamma spectroscopy, alpha spectroscopy for americium-241, strontium-90, cyanide, and nitrates. In addition, field duplicates were collected and submitted for the same suite of analyses. Table 3.1-2 presents a summary of all confirmation samples collected during the ACA at SWMU 33-013 by location identification (ID), sample ID, sample type, corresponding sampled depths, media, and the requested analyses. All sample results are presented in Appendix C and summarized in section 4.1.

Immediately upon collection, soil from each sampled interval was placed in a closed glass container, and after 10 minutes the headspace was measured for VOCs, using a PID. No VOCs were detected using this field screening. All field-screening results obtained during the confirmation sampling at SWMU 33-013 are provided on SCLs (Appendix B). Before removing the samples from the site for shipping, the samples

were screened for alpha and beta/gamma radioactivity by HSR-1 to ensure that U.S. Department of Transportation shipping requirements were met (Appendix B).

On August 1, 2005, the excavation was backfilled with clean fill and base coarse brought in from an off-site source. The fill was compacted with heavy equipment and contoured to prevent stormwater from running off the former pad site onto the surrounding mesa. No reseeding of the area was required and all silt fencing placed during the ACA implementation was removed. Photos documenting remediation activities are provided in Appendix A.

A total of 13 super sacks were filled with base coarse, asphalt, and soil excavated from the site. The total volumes of solid media excavated and removed from SWMU 33-013 are presented in Appendix E, Table E.1-1. Appendix E, Table E.1-2 presents a summary of samples collected solely for the purpose of waste characterization before the initiation of the ACA remediation activities. All material excavated during the ACA was shipped off-site and disposed of as LLW at the Nevada Test Site in Nevada (Appendix E). One 30-gal. drum of personal protective equipment (PPE), paper towels, and sampling trash was disposed at Area G in TA-54. The waste manifests, tables of total waste volumes, and the waste characterization data are provided in Appendix E.

3.2 Regulatory Criteria and Target Cleanup Levels

This section describes the regulatory criteria used for screening COPCs and for evaluating the potential risk to ecological and human receptors. Regulatory screening criteria identified in the Consent Order include cleanup standards, risk-based screening levels, and risk-based cleanup goals, and are established by medium. These criteria are discussed in the following subsections and are included in tables in Appendix D.

3.2.1 Current and Future Land Use

Since 1947, TA-33 including the location of SWMU 33-013 has been used for industrial purposes only. Current land use remains industrial, and access control is maintained by the Laboratory. It is expected that the land use at this site will remain industrial in the reasonably foreseeable future, but the future industrial land use may also include the potential for construction activities.

3.2.2 Screening Levels and Cleanup Standards

The screening levels for chemicals in soil, sediment, and tuff are NMED's SSLs as presented in NMED's technical background document for the development of soil screening levels (NMED 2005, 90802). If a NMED SSL is unavailable for a chemical, the U.S. Environmental Protection Agency (EPA) Region 6 screening level is used (adjusted to 10^{-5} for carcinogens). As specified in Section VIII.B.1 of the Consent Order, the screening levels will be used as soil cleanup levels unless determined to be impracticable or unless SSLs do not exist for the current and reasonably foreseeable future land use. Because the current and reasonably foreseeable future land use for SWMU 33-013 is industrial, the industrial screening levels are cleanup levels for this site. Because the potential also exists for construction activities to take place at this site, COPCs were also screened against NMED's construction-worker SSLs to determine whether the chemical concentrations are protective of a construction worker.

Screening action levels (SALs) for radionuclides were derived according to the "Derivation and Use of Radionuclide Screening Action Levels, Revision 1" (LANL 2005, 88493) using the residual radioactive material (RESRAD) computer code, Version 6.21. The SALs were calculated for industrial and construction-worker exposures.

Ecological risk is screened using ecological screening levels (ESLs) established through the Laboratory's screening-level ecological risk assessment methods (LANL 2004, 87630). The ESLs used were obtained from LANL's ECORISK Database, Version 2.2 (LANL 2005, 90032),

3.2.3 Cleanup Goals

The cleanup goals specified in Section VIII of the Consent Order are a target risk level of 10^{-5} for carcinogens and a hazard index (HI) of 1 for noncarcinogens. The cleanup goal for radionuclides is a dose limit of 15 mrem/yr per DOE guidance (DOE 2000, 67489).

3.3 Deviations from the Accelerated Corrective Action Work Plan

The only deviation from the approved work plan (LANL 2005, 88839) relates to collecting photographs of confirmation sample locations. Photographs of the confirmation sample locations at SWMU 33-013 were lost by the remediation subcontractor and never recovered.

3.4 Final Site Conditions

The excavated area was backfilled with clean fill, covered with new base coarse, compacted in place with heavy equipment, and recontoured to prevent stormwater runoff and run-on. The site remains fenced with a locked gate to keep unauthorized personnel from the area.

4.0 REQUEST FOR CERTIFICATE OF COMPLETION

The review and evaluation of the 2005 analytical results for the confirmation samples collected from SWMU 33-013 demonstrate that the characterization and remediation of the site is complete. Results show that the nature and extent of contamination have been defined for SWMU 33-013. In addition, the results of the human health and ecological screening assessments for SWMU 33-013 indicate that there is no potential unacceptable risk posed to human health or the environment. Thus, the Laboratory requests that a Certificate of Completion "complete with controls" be granted for SWMU 33-013.

The following sections present a detailed evaluation of the nature and extent of radionuclide, inorganic and organic chemicals at SWMU 33-013; a discussion of the applicable and appropriate cleanup levels; recommended site controls; and the final conclusions and recommendations for the site. A summary of the results of the risk assessment is presented in section 4.2, and the detailed risk assessment results are presented in Appendix D.

4.1 Nature and Extent of Contamination

An evaluation of the nature and extent of contamination is presented below for SWMU 33-013. The 2005 confirmation data are used for (1) the evaluation of the nature and extent, discussed in the subsection that follows, (2) a comparison with appropriate target cleanup goals, as discussed in section 4.2, and (3) the risk screening assessment, discussed in Appendix D. The 2005 confirmation data represent current site conditions. The historical data evaluated in the approved ACA work plan are presented in their entirety in Appendix B of that document (LANL 2005, 88839; NMED 2005, 90159). Analytical data from the confirmation samples collected following the remediation of SWMU 33-013 are provided in Appendix C of this report.

4.1.1 Data-Quality Review

A total of 20 confirmation samples, plus two field duplicates, were collected from 10 locations following the 2005 remediation of SWMU 33-013. The data are of good quality and are representative of current site conditions. The data quality is briefly summarized in the paragraphs below.

Several inorganic chemical results were qualified as estimated (J) for one of the following reasons: the results were less than the practical quantitation limit but greater than the method detection limit (MDL); the duplicate relative percent difference (RPD) was greater than 35%; or the serial dilution sample RPD was greater than 10%, and the sampling result was greater than 50 times the MDL. Several inorganic chemical detected results were qualified as estimated and biased low (J-) because the continuous calibration verification was less than the lower warning limit but greater than the lower acceptance limit or the matrix spike percent recoveries were greater than 30% but less than 75% [non-detected results were qualified as estimated quantitation limits (UJ)]. Also several inorganic chemicals were detected in the preparation blanks. The associated sample results were detected at less than 5x the blank concentration and were qualified as undetected (U).

The tracer recoveries for uranium-234, uranium-235, and uranium-238 in two samples were less than 30% but greater than 10%. Non-detects were qualified as UJ and detects were qualified as J-. Uranium-234, uranium-235, uranium-238, and tritium were detected in the method banks. The associated sample results were detected at less than 5x the blank concentration and were qualified as U.

Several organic chemical results were qualified as J because the results were less than the practical quantitation limit but greater than the MDL. The continuous calibration verification percent differences were greater than 25% for several organic chemicals and were either qualified as J if results were detected or UJ if results were non-detects. Methylene chloride and trichloroethene were detected in the preparation blanks. All methylene chloride results and three trichloroethene results were qualified as U because the associated sample results were detected at less than 5x or 10x the blank concentration. Holding time for high explosives was exceeded by less than two times the published method holding time requirements; the sample results were qualified as UJ. The initial calibration for PETN and tetryl did not meet acceptance limits of percent relative standard deviation greater than 20% and results were qualified as UJ.

The results for pyrene, phenanthrene, and fluoranthene in one sample were rejected (R) because the initial analysis exceeded the calibration range. The sample was re-analyzed at a 5x dilution and the sample results were within range. The re-analysis results were not qualified.

The relative response factors for the initial calibration and the continuing calibration verification for acetone were less than 0.05. The acetone results were all non-detects and were rejected (R). Because no solvents (including acetone) were detected at SWMU 33-013, the lack of usable acetone data does not affect the site decision.

4.1.2 Confirmation Sampling

Sampling data from the six confirmation sampling locations identified after the removal of contaminated media at SWMU 33-013 represent current conditions. Samples from three of the ten confirmation sample locations were collected on the slope directly northeast of the site, just beyond the perimeter of SWMU 33-013; the final confirmation sample location was approximately 3 ft south and east of the excavated area. The data from the ten confirmation sample locations form the basis for the evaluation of the nature and extent of contamination (Figure 4.1-1). These data are summarized in the following paragraphs and are used in the human health and ecological risk assessment presented in Appendix D.

4.1.2.1 Evaluation of Inorganic Chemicals

Twenty soil samples and two field duplicates were collected from 10 locations at SWMU 33-013 and analyzed for inorganic chemicals. Inorganic chemical analyses included TAL metals, total cyanide, nitrates, and perchlorate. Table 3.1-2 summarizes the samples collected and the inorganic chemical analyses requested for each sample.

Five inorganic chemicals (cadmium, calcium, mercury, nitrate, and perchlorate) were detected or detected above BV in at least one soil sample (Table 4.1-1). Cadmium and calcium concentrations were within the range of soil background concentrations for each inorganic chemical. Cadmium was detected in one sample at 0.58 mg/kg, while the background concentrations range from 0.2 mg/kg to 2.6 mg/kg (LANL 1998, 59730). Calcium was detected in five samples at concentrations ranging from 6750 mg/kg to 10,600 mg/kg (compared with background concentrations from 500 mg/kg to 14,000 mg/kg) (LANL 1998, 59730). Neither of these inorganic chemicals was retained as a COPC. Mercury was detected in one confirmation sample (0.14 mg/kg) and had a detection limit in another characterization sample (0.12 mg/kg) at concentrations above the soil BV (0.1 mg/kg) (LANL 1998, 59730) and was retained as a COPC. Cyanide was not detected in any of the confirmation samples but had detection limits above the soil BV of 0.5 mg/kg and was therefore retained as a COPC. Nitrate and perchlorate were detected in 16 and two samples, respectively, but do not have background concentrations. Nitrate and perchlorate were retained as COPCs. Figure 4.1-2 presents the inorganic chemicals above background at SWMU 33-013.

4.1.2.2 Evaluation of Organic Chemicals

Twenty soil confirmation samples and two field duplicates were collected from 10 locations at SWMU 33-013 and analyzed for organic chemicals. Organic chemical analyses included SVOCs, VOCs, PCBs, and HE. Table 3.1-2 summarizes the soil samples collected and the organic chemical analyses requested for each sample.

Eighteen organic chemicals were detected in at least one sample (Table 4.1-2). Detected organic chemicals included 18 SVOCs (15 of which are polycyclic aromatic hydrocarbons [PAHs] typically associated with asphalt). All 18 organic chemicals were retained as COPCs. Figure 4.1-3 presents the detected organic chemicals at SWMU 33-013.

4.1.2.3 Evaluation of Radionuclides in Soil

Twenty soil confirmation samples and two field duplicates were collected from 10 locations at SWMU 33-013 and analyzed for radionuclides. Radionuclide analyses included americium-241, isotopic plutonium, isotopic uranium, gamma-emitting radionuclides, strontium-90, and tritium. Table 3.1-2 summarizes the samples collected and the analyses requested for each sample.

Three radionuclides were detected in one sample each (cobalt-60, plutonium-239, and strontium-90) and tritium was detected in all samples (Table 4.1-3). Cobalt-60 does not have a FV and was retained as a COPC. Plutonium-239 and strontium-90 were each detected at 2–2.5 ft below ground surface (bgs), where the FVs do not apply, and were retained as COPCs. Tritium was detected at 0–0.5 ft bgs and 2–2.5 ft bgs at all locations and was retained as a COPC. Figure 4.1-4 presents the radionuclides detected at SWMU 33-013.

4.1.2.4 Stormwater Data

In accordance with NMED's approval-with-modifications letter dated April 25, 2005 (NMED 2005, 90159), stormwater data from station E340 in the Chaquehui Canyon tributary at TA-33 are provided in

Table 4.1-4. Sampling station E340 is located approximately one-half mile south and east of SWMU 33-013. A single unfiltered stormwater sample was collected in 2003 and analyzed for three Multi-Sector General Permit benchmark pollutants-chemical oxygen demand (COD), cyanide (total), and mercury. Mercury and COD were detected in this sample, while cyanide (total) was not detected (Table 4.1-4). In the two years of stormwater monitoring under the Federal Facilities Compliance Agreement, stormwater flow at station E340 has been insufficient to collect a sample.

4.1.2.5 Spatial Distribution of COPCs at SWMU 33-013

The COPCs identified at SWMU 33-013 are summarized in Table 4.1-5. The spatial distribution of COPCs detected in confirmation samples at SWMU 33-013 is depicted in Figures 4.1-2 through 4.1-4.

A 1993 Phase I RFI was conducted and samples were collected immediately beneath the asphalt from 0–6 in. (LANL 1995, 71300). Several inorganic chemicals were detected above BVs, several PAHs were detected at trace levels (i.e., concentrations near or below the estimated quantitation limits [EQLs]), and tritium was detected as high as 3342 pCi/g in one sample. A Phase II RFI was conducted in 1996 that looked only at inorganic chemicals, including uranium in surface samples (LANL 1997, 57021). Sampling results indicated that several inorganic chemicals were detected above BVs.

The ACA samples at SWMU 33-013 were collected after the removal of the base coarse, asphalt pad, and 6 in. of soil beneath the asphalt pad. The sampling results for six locations (33-24730, -24732, -24733, -24734, -24738, and -24739) therefore reflect the concentrations of COPCs remaining at depth within the area of the former asphalt pad. The other four locations (33-24731, -24735, -24736, and -24737) are outside of this area. Sampling locations 33-24735, 33-24736, and 33-24737 are on the slope northeast of the former storage area where any runoff would have left the site (Figure 4.1-1).

The COPCs identified in confirmation samples collected following ACA remediation activities include inorganic chemicals (cyanide, mercury, nitrate, and perchlorate) (Figure 4.1-2 and Table 4.1-5); organic chemicals [PAHs, bis(2-ethylhexyl)phthalate, and dibenzofuran] (Figure 4.1-3 and Table 4.1-5); and radionuclides (cobalt-60, plutonium-239, strontium-90, and tritium) (Figure 4.1-4 and Table 4.1-5). The PAHs are likely related to the asphalt pad, while the other organic COPCs may be related to site activities. The tritium is likely from a combination of releases from the storage area and activities at the former TA-33 tritium facility.

Cyanide was never detected in the samples collected and analyzed, and the detection limits (0.52 mg/kg to 0.62 mg/kg) are similar to the soil BV of 0.5 mg/kg. However, the offsite contract analytical laboratory reported a method detection limit of 0.11 mg/kg total cyanide; therefore if cyanide had been present in any of the samples, the laboratory is required to report to the 0.11 mg/kg level. Mercury either had a detection limit (0.12 mg/kg) or detected concentration (0.14 mg/kg) slightly above the soil BV of 0.1 mg/kg at two locations; it was not detected above BV at any other sampling location. No further sampling for extent is warranted for cyanide and mercury. Nitrate was detected in 16 of 20 samples at relatively low concentrations (the maximum detected concentration was 3.6 mg/kg). Nitrate is naturally occurring in soil and the sampling results likely reflect naturally occurring levels of nitrate. Nitrate concentrations decrease (albeit slightly at some locations) with depth at all but three locations and decrease with distance down the slope northeast of the site. The extent for nitrate has been defined. Perchlorate was detected at one location and decreased with depth to below the EQL. The extent of perchlorate is defined.

Cobalt-60 was detected in one surface sample and decreased to non-detect in the 2-2.5-ft sample; cobalt-60 was not detected in any other samples, including the slope samples. Plutonium-239 and strontium-90 were detected in one 2–2.5-ft sample. Plutonium-239 and strontium-90 were not detected in

the surface sample at this location (33-24731) and were not detected in any other samples. The extent for these radionuclides is defined.

Tritium was detected at all locations and depths sampled. Tritium concentrations decreased or did not substantially change with depth at six of 10 locations and decreased with distance down the slope (locations 33-24735 to -24737). Concentrations increased with depth at three locations within the footprint of the asphalt pad. The Phase I RFI data reported tritium at a concentration of 3342 pCi/g just beneath the asphalt (0–0.5 ft bgs), while tritium's maximum detected concentration after the asphalt and soil removal was 855 pCi/g (2–3 ft bgs). Tritium concentrations will continue to decrease over time because of radioactive decay, i.e., the half-life for tritium is 12.6 years. Based on the Phase I and Phase II RFI and ACA data, tritium concentrations decreased with depth within the asphalt pad footprint and the vertical extent is defined. Similarly, the lateral extent of tritium is defined.

The PAH concentrations decreased with depth at all locations, except sampling location 33-24731. At this location, concentrations of anthracene; benzo(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; benzo(g,h,i)perylene; and indeno(1,2,3-cd)pyrene were not detected in the surface sample but were detected at trace levels (below the EQL) in the deeper sample. Benzo(k)fluoranthene and chrysene were detected in the surface and subsurface samples at this location, with concentrations increasing slightly with depth. However, all concentrations were at trace levels. Fluoranthene, phenanthrene, and pyrene were also detected in the surface and subsurface samples, with concentrations increasing slightly with depth, but the deeper concentrations were slightly above the EQLs (less than twice the EQLs of 0.38 mg/kg and 0.4 mg/kg). Concentrations also increased slightly (approximately a factor of two) down the slope northeast of the site. It is likely that PAH concentrations reflect pieces of asphalt in the collected samples rather than a release from the SWMU. Overall, the extent of PAHs is defined for the site, given the low levels and decreasing trends.

Bis(2-ethylhexyl)phthalate and dibenzofuran were detected in two and one surface samples, respectively. Concentrations of these two SVOCs decreased with depth. The extent is defined for bis(2-ethylhexyl)phthalate and dibenzofuran.

The only COPC detected in the stormwater sample collected at station E340 was mercury, which was below the New Mexico surface water standard for wildlife habitat. The extent of mercury is defined.

4.2 Cleanup Levels

The industrial SSLs/SALs were the target cleanup goals at this site because the current and reasonably foreseeable future use is industrial. Construction-worker SSLs/SALs were also evaluated because construction activity may occur in the near future. The evaluation compared the COPC concentrations from the 0.0–0.5-ft depth interval (the interval to which the industrial worker could be exposed) with industrial SSLs/SALs and the concentrations from the 0.0–4.5-ft depth interval with construction-worker SSLs/SALs.

The representative concentrations for noncarcinogenic COPCs were less than their respective industrial and construction-worker SSLs. The HIs for the noncarcinogenic COPCs are approximately 0.002 and 0.03, respectively (Tables D-1.1-4 and D-1.1-7), which are less than NMED's target HI of 1.0 (NMED 2005, 90802).

The representative concentrations for carcinogenic COPCs were less than their respective industrial and construction-worker SSLs. The total excess cancer risks from exposure to carcinogenic COPCs are approximately 3×10^{-6} and 1×10^{-6}, respectively (Tables D-1.1-5 and D-1.1-8), which are less than the NMED target level for carcinogenic risk of 1×10^{-5} (NMED 2005, 90802).

The representative concentrations for radionuclide COPCs were less than their respective industrial and construction-worker SALs. The total estimated radionuclide doses are approximately 0.005 mrem/yr and 1.3 mrem/yr, respectively (Tables D-1.1-6 and D-1.1-9), which are below the DOE target dose of 15 mrem/yr (DOE 2000, 67489).

Based on the ecological screening assessment for SWMU 33-013, several chemicals of potential ecological concern (COPECs) were identified, radionuclides were not retained as COPECs. The inorganic chemicals and organic chemicals were eliminated as COPECs in the uncertainty analysis by considering a number of factors, including background concentrations, the analysis for potential effects to populations (individuals for threatened and endangered species), the area of contamination, the relative toxicity to human receptors, and the infrequency of detected concentrations. The ecological screening assessment indicates that contamination at SWMU 33-013 does not pose a potential ecological risk to receptors.

4.3 Controls

The Laboratory is requesting a Certificate of Completion “complete with controls” from NMED for SWMU-33-013 based on results of the completed 2005 investigation and remediation activities. Although construction activities will be implemented at the site in the future for the TA-33 high bay complex and potentially for other projects, the current and long-term foreseeable-future land use for SWMU 33-013 is industrial. Therefore, the industrial-scenario site screening risk assessments are most appropriate for determining site controls.

Based on the results of the human health risk screening assessments, the only controls required at SWMU 33-013 are restrictions on residential use of the property. The Laboratory intends to retain ownership of the property indefinitely and will continue to restrict the property to industrial use only combined with TA-33 site access restrictions.

4.4 Conclusions and Recommendations

The site analytical data characterized the nature and extent of contamination at SWMU 33-013. In addition, the results of the human health risk assessments for industrial and construction workers show that the site does not pose an unacceptable human health risk or dose. The human-health screening assessment found that the risk, hazard, and dose were below the applicable NMED and DOE target levels. The ecological risk screening assessment found that no COPECs are retained for this SWMU. Therefore, no potential unacceptable risk to human and ecological receptors is present at the site.

Stormwater data indicated no exceedances of the New Mexico surface water standard by COPCs from SWMU 33-013.

The review and evaluation of the 2005 confirmation sample analytical data collected from SWMU 33-013 demonstrate that the ACA activities conducted at the site are complete. As a result, the Laboratory requests that SWMU 33-013 be approved as “complete with controls.” It is recommended that no further investigation or corrective action of SWMU 33-013 is warranted.

5.0 REFERENCES AND MAP DATA SOURCES

5.1 References

The following list includes all documents cited in this report, except for Appendix D. The references for Appendix D are located in section D-5.0 of that appendix. Parenthetical information following each reference provides the author(s), publication date, and ER ID number. This information is also included in

text citations. ER ID numbers are assigned by the ENV-ERS Program Records Processing Facility (RPF) and are used to locate the document at the RPF and, where applicable, in the ENV-ERS Program master reference set.

Copies of the master reference set are maintained at the NMED Hazardous Waste Bureau; the U.S. Department of Energy-Los Alamos Site Office; the U.S. Environmental Protection Agency, Region 6; and the ENV-ERS Program. The set was developed to ensure that the administrative authority has all material needed to review this document, and it is updated with every document submitted to the administrative authority. Documents previously submitted to the administrative authority are not included.

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LANL (Los Alamos National Laboratory), April 2005. “Accelerated Corrective Action Work Plan for Solid Waste Management Unit 33-013 at Technical Area 33, Revision 1,” Los Alamos National Laboratory document LA-UR-05-2601, Los Alamos, New Mexico. (LANL 2005, 88839)

LANL (Los Alamos National Laboratory), May 2005. “Derivation and Use of Radionuclide Screening Action Levels, Revision 1,” Los Alamos National Laboratory document LA-UR-05-1849, Los Alamos, New Mexico. (LANL 2005, 88493)

LANL (Los Alamos National Laboratory), August 8, 2005. “Proposed Format for Remedy Completion Reports for Accelerated Corrective Actions,” Los Alamos National Laboratory letter to J. Bearzi (NMED) from D. McInroy (ENV-ERS program director) and D. Gregory (DOE), Los Alamos, New Mexico. (LANL 2005, 89553)

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NMED (New Mexico Environment Department), March 24, 2005. “Notice of Disapproval—Accelerated Corrective Action Work Plan for Solid Waste Management Unit 33-013, A Former Storage Area at Technical Area 33, Los Alamos National Laboratory, NM0890010515, HWB-LANL-05-003,” New Mexico Environment Department document, Santa Fe, New Mexico. (NMED 2005, 88205)

NMED (New Mexico Environment Department), April 25, 2005. “Approval with Modifications—Accelerated Corrective Action Work Plan for Solid Waste Management Unit 33-013, A Former Storage Area at Technical Area 33, Los Alamos National Laboratory, NM0890010515, HWB-LANL-05-003,” New Mexico Environment Department document, Santa Fe, New Mexico. (NMED 2005, 90159)

NMED (New Mexico Environment Department), August 2005. “Technical Background Document for Development of Soil Screening Levels, Revision 3.0,” New Mexico Environment Department-Hazardous Waste Bureau and Ground Water Quality Bureau, Santa Fe, New Mexico. (NMED 2005, 90802)

5.2 Map Data Sources

1991 Hypsography; Los Alamos National Laboratory, ENV Environmental Remediation and Surveillance Program; NA; Unknown; 1991.

Communication Lines; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating, and Mapping Section; NA; Unknown; August 8, 2002.

Fences; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating, and Mapping Section; NA; Unknown; January 6, 2004.

Former Structures; Los Alamos National Laboratory, ENV Environmental Remediation and Surveillance Program; ER2004-0372; 1:24,000; July 11, 2002.

Gas Lines; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating, and Mapping Section; NA; Unknown; January 6, 2004.

Potential Release Sites; Los Alamos National Laboratory, ENV Environmental Remediation and Surveillance Program; ER2006-0578; 1:2,500; 24 January 2006.

Power Lines; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating, and Mapping Section; NA; Unknown; January 6, 2004.

Roads, Surfaced; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating, and Mapping Section; NA; Unknown; January 6, 2004.

Roads, Unsurfaced; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating, and Mapping Section; NA; Unknown; January 6, 2004.

Sewer Lines; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating, and Mapping Section; NA; Unknown; January 6, 2004.

Structures; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating, and Mapping Section; NA; Unknown; January 6, 2004.

Water Lines; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating, and Mapping Section; NA; Unknown; January 6, 2004.

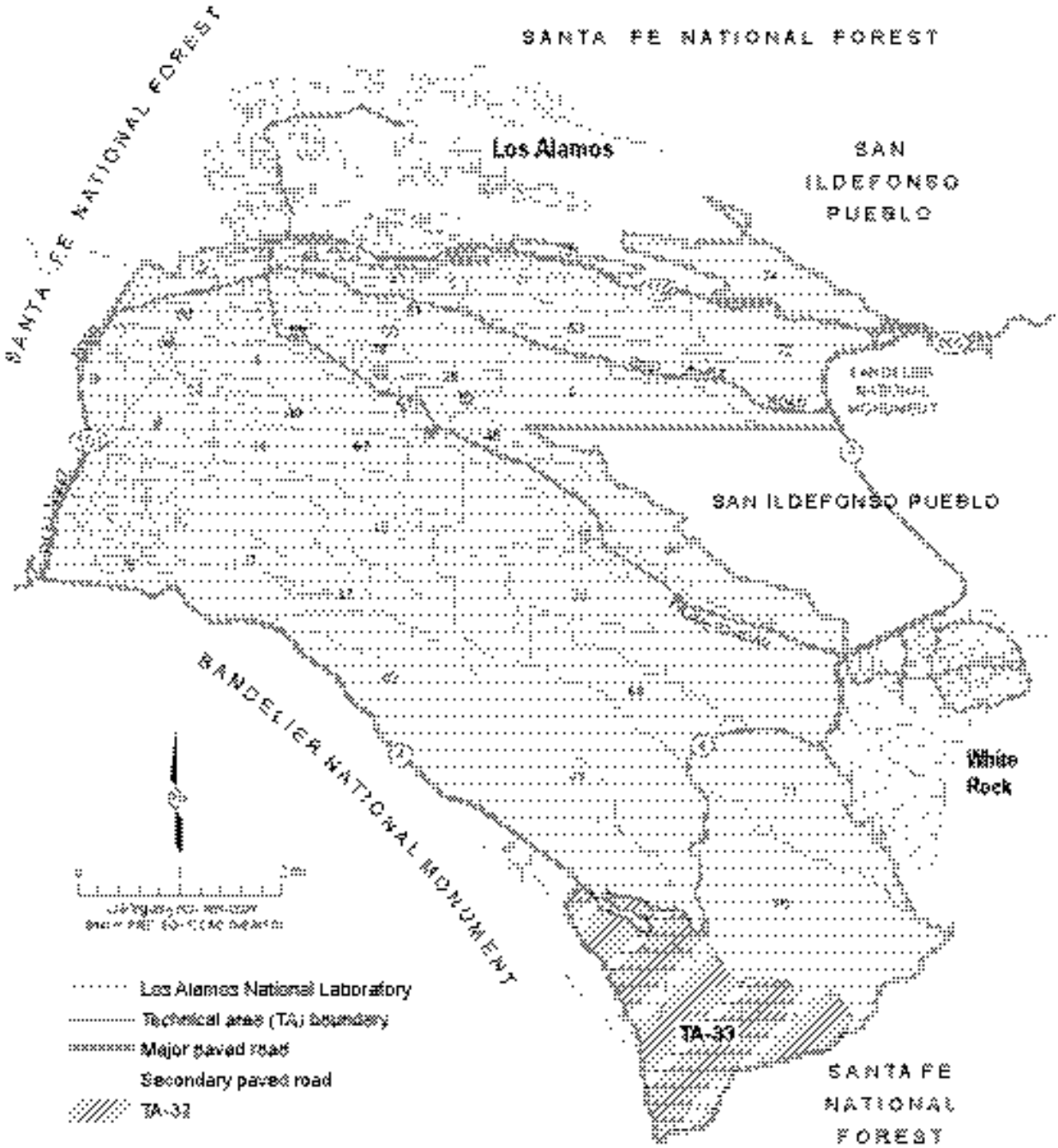

Figure 1.0-1. Location of TA-33 with respect to the Laboratory TAs and surrounding land holdings

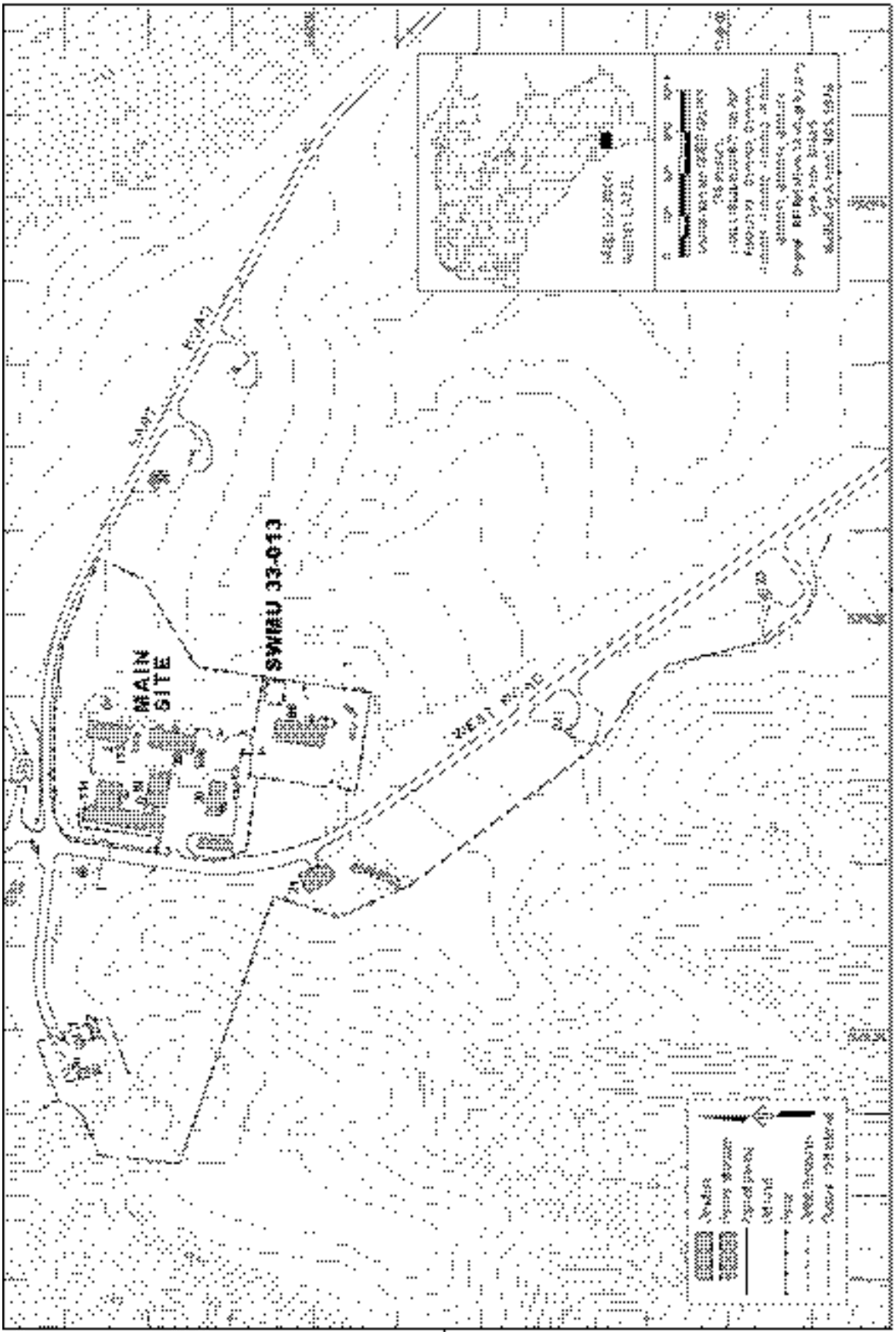

Figure 1.1-1. Location of Main Site at TA-33

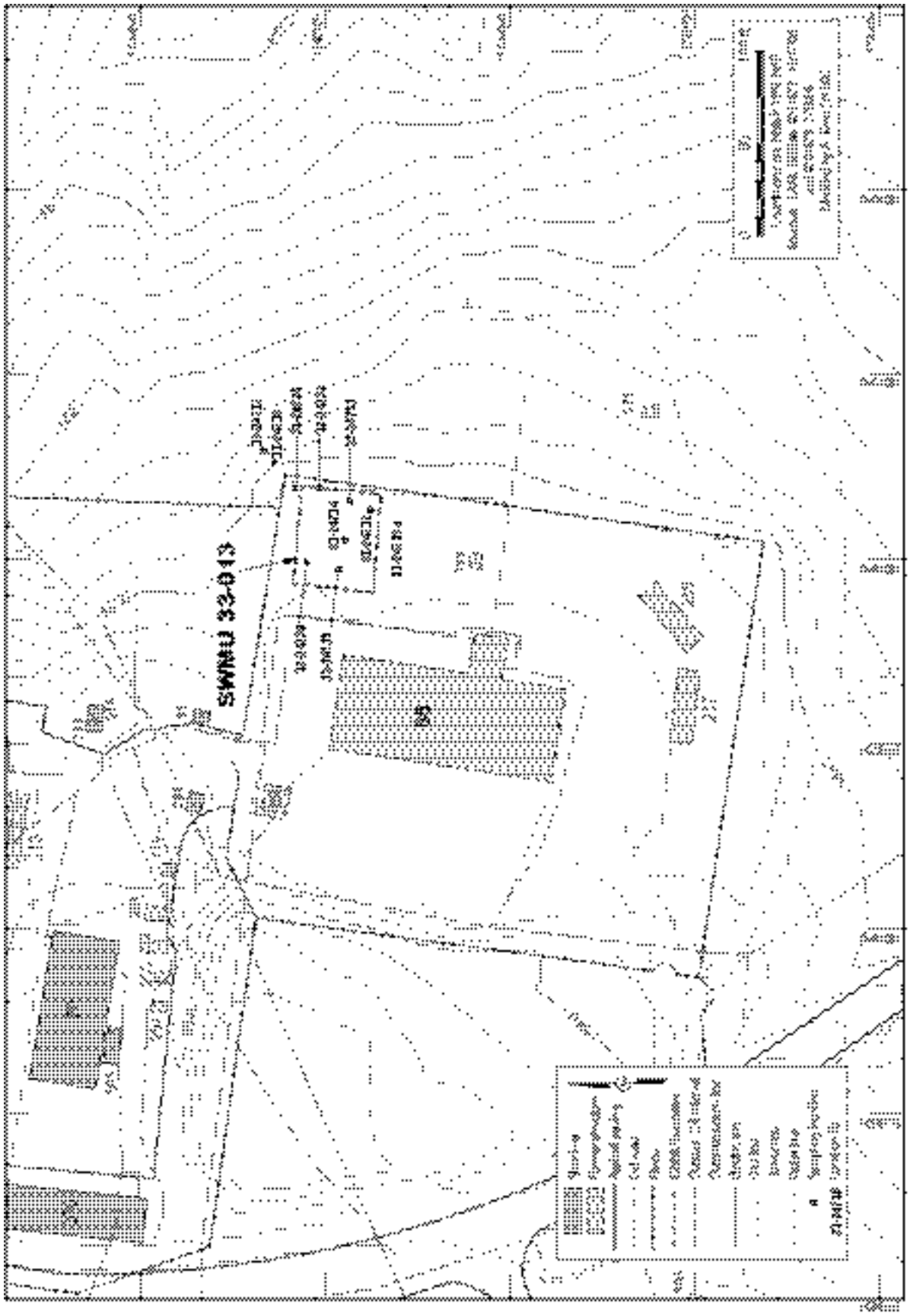

Figure 4.1-1. 2005 ACA sampling locations at SWMU 33-013, former drum storage area

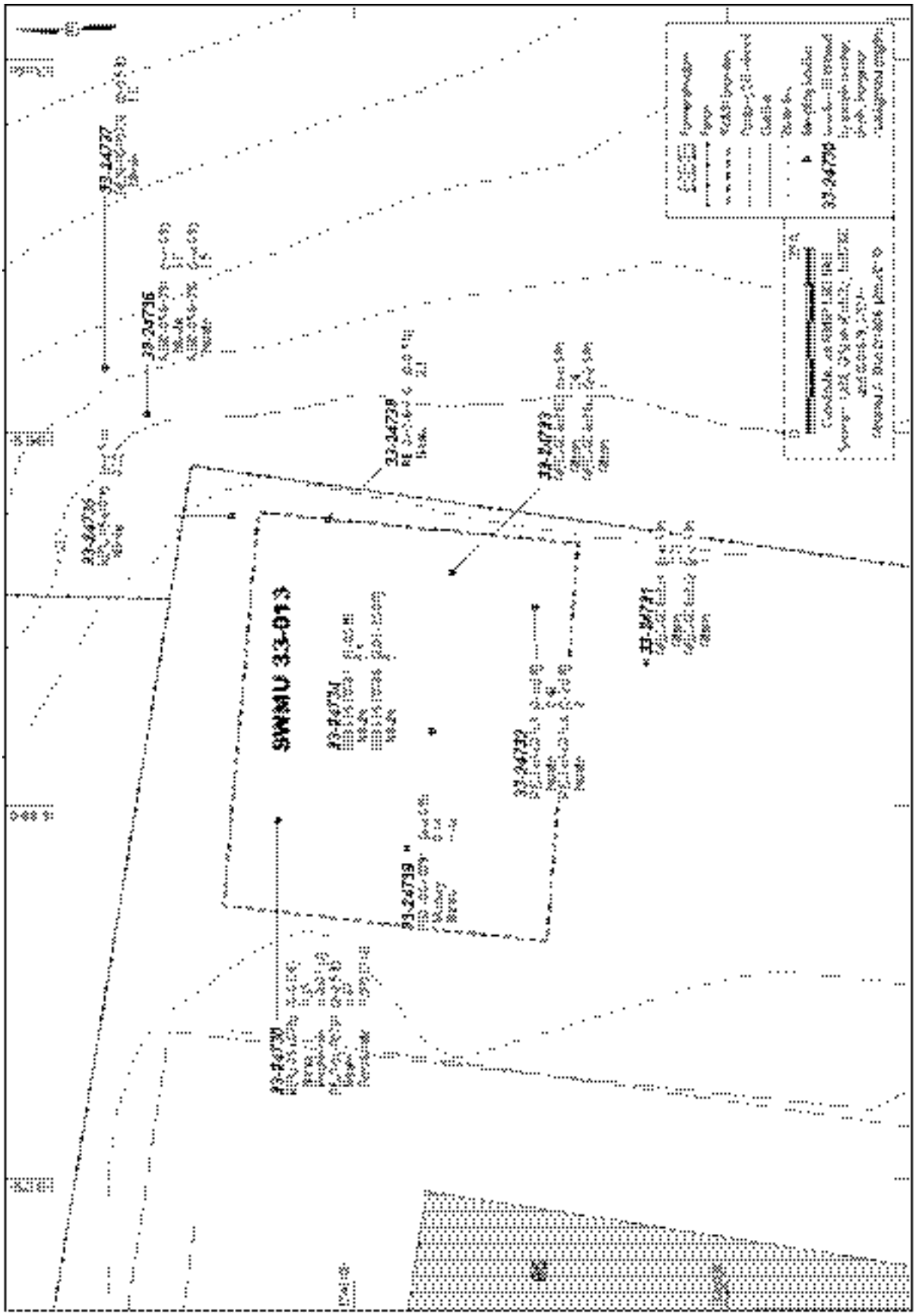

Figure 4.1-2. Inorganic chemicals detected or detected above background values at SWMU 33-013 (in mg/kg)

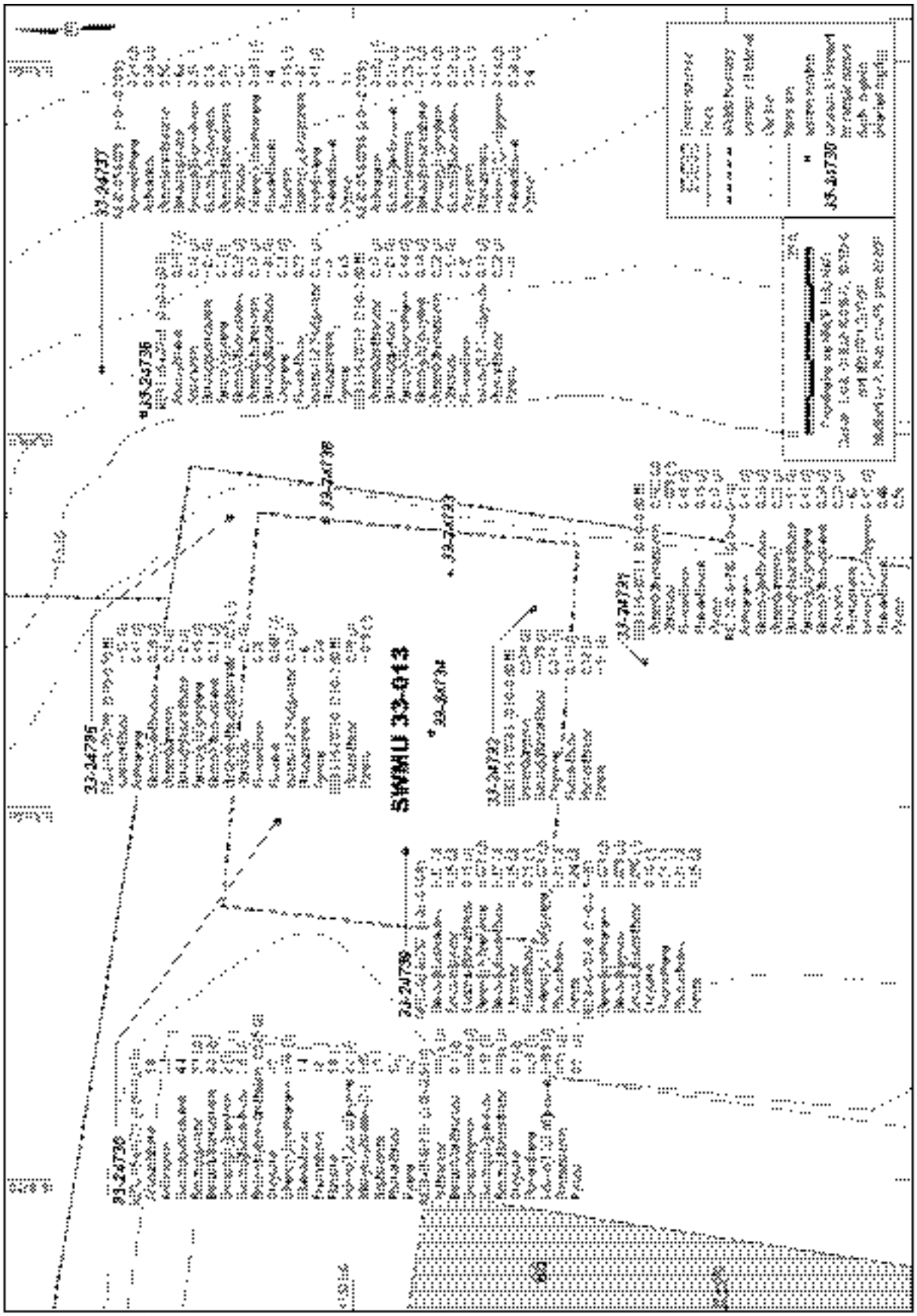

Figure 4.1-3. Organic chemicals detected at SWMU 33-013 (in mg/kg)

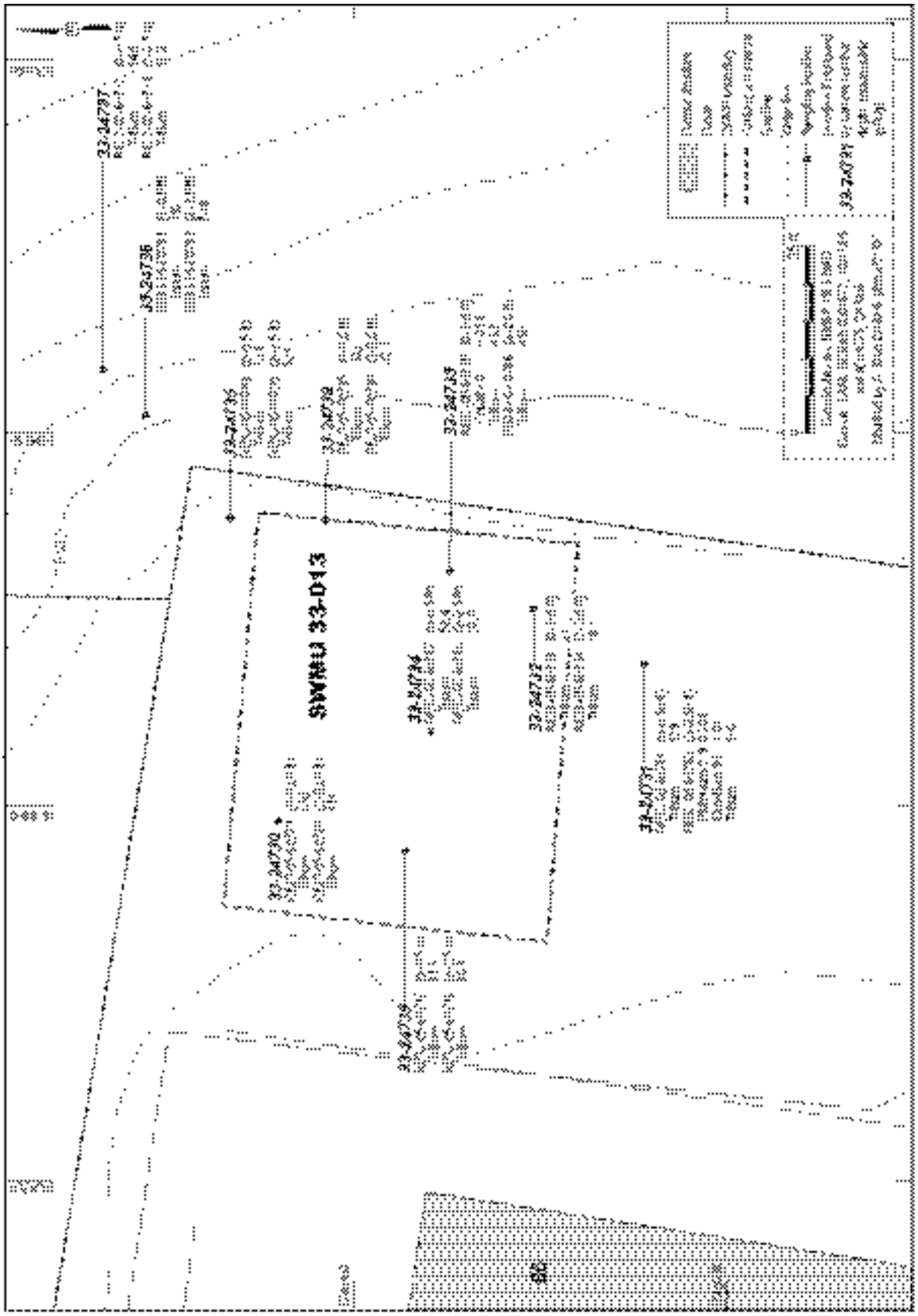

Figure 4.1-4. Radionuclides detected at SWMU 33-013 (in pCi/g)

Table 3.0-1
Summary of Investigation Methods for the
2005 Investigation and Remediation of SWMU 33-013

Method	Summary
Spade-and-Scoop Collection of Soil Samples	This method is typically used for collecting shallow (i.e., approximately 0–12 in.) soil or sediment samples. The “spade-and-scoop” method involves digging a hole to the desired depth, as prescribed in the sampling and analysis plan, and collecting a discrete grab sample. The sample is typically placed in a clean stainless-steel bowl for transfer into various sample containers.
Hand Auger Sampling	This method is typically used for sampling soil or sediment at depths of less than 10–15 ft but may, in some cases, be used for collecting samples of weathered or nonwelded tuff. The method involves hand-turning a stainless-steel bucket auger (typically with a 3–4-in. inner diameter), creating a vertical hole which can be advanced to the desired sample depth. When the desired depth is reached, the auger is decontaminated before advancing the hole through the sample depth. The sample material is transferred from the auger bucket to a stainless-steel sampling bowl before filling the various required sample containers.
Headspace Vapor Screening	Individual soil, rock, or sediment samples may be field-screened for volatile organic compounds by placing a portion of the sample in a plastic sample bag or in a glass container with a foil-sealed cover. The container is sealed and gently shaken, and allowed to equilibrate for 5 min. The sample is then screened by inserting a photoionization detector probe into the container and measuring and recording any detected vapors.
Radiological Screening	Samples may be continuously field-screened using an Eberline E-600/SHP380AB to detect both alpha and undifferentiated beta/gamma gross readings. Core samples are screened by holding the probe <1 in. away from the core. The core is screened immediately after removal from the ground before logging, sampling, etc. Measurements are determined by a quick scan to find the highest initial reading. After logging the core, a one-minute reading is performed to determine gross alpha and beta/gamma radiation levels. All screening data are then recorded on the radiation control technician field log and the lithologic boring logs.
Handling, Packaging, and Shipping of Samples	Field team members seal and label samples before packing, and they ensure that the sample and transport containers are free of external contamination. Field team members package all samples so as to minimize the possibility of breakage during transportation. After all environmental samples are collected, packaged, and preserved, a field team member transports them to either the Sample Management Office (SMO) or an SMO-approved radiation screening laboratory under chain-of-custody procedures. The SMO arranges to ship samples to analytical laboratories. The field team member must inform the SMO and/or the radiation screening laboratory coordinator when levels of radioactivity are in the action-level or limited-quantity ranges.
Sample Control and Field Documentation	The collection, screening, and transport of samples are documented on standard forms generated by the SMO. The forms include sample-collection logs, chain-of-custody forms, and sample-container labels. Collection logs are completed at the time of sample collection and are signed by the sampler and a reviewer who verifies the logs for completeness and accuracy. The corresponding labels are initialed and applied to each sample container, and custody seals are placed around container lids or openings. Chain-of-custody forms are completed and assigned to verify that the samples are not left unattended.

Table 3.0-1 (continued)

Method	Summary
Field Quality Control Samples	Field quality-control samples are collected as directed in the Consent Order as follows: Field Duplicate: At a frequency of 10%, collected at the same time as a regular sample and submitted for the same analyses. Equipment Rinsate Blank: At a frequency of 10%, collected by rinsing decontaminated sampling equipment with deionized water, which is collected in a sample container and submitted for laboratory analysis. Trip Blanks: Required for all field events that include the collection of samples for volatile organic compound analysis. Trip blanks containers of certified clean sand are opened and kept with the other sample containers during the sampling process.
Field Decontamination of Drilling and Sampling Equipment	Dry decontamination is the preferred method to minimize the generation of liquid waste. Dry decontamination may include using a wire brush or other tool to remove soil or other material adhering to the sampling equipment, followed by using a commercial cleaning agent (nonacid, waxless cleaners) and paper wipes. Dry decontamination may be followed by wet decontamination, if necessary. Wet decontamination may include washing with a nonphosphate detergent and water, followed by a water rinse and a second rinse with deionized water. Alternatively, steam cleaning may be used.
Containers and preservation of samples	Specific requirements/processes for sample containers, preservation techniques, and holding times are based on U.S. Environmental Protection Agency guidance for environmental sampling, preservation, and quality assurance. Specific requirements for each sample are printed on the sample collection logs provided by the SMO (size and type of container [e.g., glass, amber glass, polyethylene, preservative]) All samples are preserved by placing them in insulated containers with ice to maintain a temperature of 4˚C. Other requirements, such as nitric acid or other preservatives, may apply to different media or analytical requests.

Table 3.1-1
Summary of Quality-Assurance/Quality-Control Samples Collected and Analyses Performed during the 2005 Investigation and Remediation at SWMU 33-013

Part 1

Date Collected	Location ID	Sample ID	Depth (ft)	Sample Type[a]	Media[b]	Excavated during 2005 Field Activities	Analytical Suites Requested (by Request Number)						
							Anions	Cyanide	Metals	HE	Perchlorate	PCBs	SVOCs
07/25/05	33-24730	RE33-05-60778	0–0.5	FD	ALLH	No	3598S	3598S	3598S	3596S	3598S	3597S	3597S
07/25/05	33-24736	RE33-05-60801	2–2.5	FD	ALLH	No	3598S	3598S	3598S	3596S	3598S	3597S	3597S
07/25/05	n/a[c]	RE33-05-60804	n/a	FTB	ALLH	No	—[d]	—	—	—	—	—	—

Part 2

Date Collected	Location ID	Sample ID	Depth (ft)	Sample Type[a]	Media[b]	Excavated during 2005 Field Activities	Analytical Suites Requested (by Request Number)						
							VOCs	Nitrate	Americium-241	Gamma Spectroscopy	Tritium	Isotopic Plutonium	Isotopic Uranium
07/25/05	33-24730	RE33-05-60778	0–0.5	FD	ALLH	No	3597S	3598S	3598S	3598S	3598S	3598S	3598S
07/25/05	33-24736	RE33-05-60801	2–2.5	FD	ALLH	No	3597S	3598S	3598S	3598S	3598S	3598S	3598S
07/25/05	n/a[c]	RE33-05-60804	n/a	FTB	ALLH	No	3597S	—	—	—	—	—	—

[a] FD = Field duplicate. FTB = Field trip blank.
[b] ALLH = All-horizons soil sample.
[c] n/a = Not applicable.
[d] — = Not analyzed.

Table 3.1-2
Summary of Confirmation Samples Collected and Analyses
Performed during the ACA Investigation and Remediation at SWMU 33-013

Sample ID	Location ID	Depth (ft)	Media	Anions	Cyanide	Metals	HE	Perchlorate	PCBs	SVOCs	VOCs	Nitrate	Americium-241	Gamma Spectroscopy	Tritium	Isotopic Plutonium	Isotopic Uranium
RE33-05-60779	33-24730	0–0.5	Soil	3598S*	3598S	3598S	3596S	3598S	3597S	3597S	3597S	3598S	3598S	3598S	3598S	3598S	3598S
RE33-05-60780	33-24730	2–2.5	Soil	3598S	3598S	3598S	3596S	3598S	3597S	3597S	3597S	3598S	3598S	3598S	3598S	3598S	3598S
RE33-05-60781	33-24731	0–0.5	Soil	3598S	3598S	3598S	3596S	3598S	3597S	3597S	3597S	3598S	3598S	3598S	3598S	3598S	3598S
RE33-05-60782	33-24731	2–2.5	Soil	3598S	3598S	3598S	3596S	3598S	3597S	3597S	3597S	3598S	3598S	3598S	3598S	3598S	3598S
RE33-05-60783	33-24732	0–0.5	Soil	3598S	3598S	3598S	3596S	3598S	3597S	3597S	3597S	3598S	3598S	3598S	3598S	3598S	3598S
RE33-05-60784	33-24732	2–2.5	Soil	3598S	3598S	3598S	3596S	3598S	3597S	3597S	3597S	3598S	3598S	3598S	3598S	3598S	3598S
RE33-05-60785	33-24733	0–0.5	Soil	3598S	3598S	3598S	3596S	3598S	3597S	3597S	3597S	3598S	3598S	3598S	3598S	3598S	3598S
RE33-05-60786	33-24733	2–2.5	Soil	3598S	3598S	3598S	3596S	3598S	3597S	3597S	3597S	3598S	3598S	3598S	3598S	3598S	3598S
RE33-05-60787	33-24734	0–0.5	Soil	3598S	3598S	3598S	3596S	3598S	3597S	3597S	3597S	3598S	3598S	3598S	3598S	3598S	3598S
RE33-05-60788	33-24734	2–2.5	Soil	3598S	3598S	3598S	3596S	3598S	3597S	3597S	3597S	3598S	3598S	3598S	3598S	3598S	3598S
RE33-05-60789	33-24735	0–0.5	Soil	3598S	3598S	3598S	3596S	3598S	3597S	3597S	3597S	3598S	3598S	3598S	3598S	3598S	3598S
RE33-05-60790	33-24735	2–2.5	Soil	3598S	3598S	3598S	3596S	3598S	3597S	3597S	3597S	3598S	3598S	3598S	3598S	3598S	3598S
RE33-05-60791	33-24736	0–0.5	Soil	3598S	3598S	3598S	3596S	3598S	3597S	3597S	3597S	3598S	3598S	3598S	3598S	3598S	3598S
RE33-05-60792	33-24736	2–2.5	Soil	3598S	3598S	3598S	3596S	3598S	3597S	3597S	3597S	3598S	3598S	3598S	3598S	3598S	3598S
RE33-05-60793	33-24737	0–0.5	Soil	3598S	3598S	3598S	3596S	3598S	3597S	3597S	3597S	3598S	3598S	3598S	3598S	3598S	3598S
RE33-05-60794	33-24737	2–2.5	Soil	3598S	3598S	3598S	3596S	3598S	3597S	3597S	3597S	3598S	3598S	3598S	3598S	3598S	3598S
RE33-05-60795	33-24738	0–0.5	Soil	3598S	3598S	3598S	3596S	3598S	3597S	3597S	3597S	3598S	3598S	3598S	3598S	3598S	3598S
RE33-05-60796	33-24738	2–2.5	Soil	3598S	3598S	3598S	3596S	3598S	3597S	3597S	3597S	3598S	3598S	3598S	3598S	3598S	3598S
RE33-05-60797	33-24739	0–0.5	Soil	3598S	3598S	3598S	3596S	3598S	3597S	3597S	3597S	3598S	3598S	3598S	3598S	3598S	3598S
RE33-05-60798	33-24739	2–2.5	Soil	3598S	3598S	3598S	3596S	3598S	3597S	3597S	3597S	3598S	3598S	3598S	3598S	3598S	3598S

*Analytical data request numbers.

Table 4.1-1
Inorganic Chemical Concentrations above Background Values at SWMU 33-013

Sample ID	Location ID	Depth (ft)	Media	Cadmium	Calcium	Cyanide (total)	Mercury	Nitrate	Perchlorate
Soil Background Value[a]				**0.4**	**6120**	**0.5**	**0.1**	**na[b]**	**na**
Industrial Soil Screening Level[c]				**564**	**na**	**22,700**	**340[d]**	**1E-05**	**790[d]**
Construction-Worker Soil Screening Level[c]				**154**	**na**	**6190**	**927[e]**	**1E-05**	**na**
Residential Soil Screening Level[c]				**39**	**na**	**1560**	**23[d]**	**1E-05**	**55[d]**
RE33-05-60779	33-24730	0.00–0.50	Soil	—[f]	10600 (J)	0.55 (U)	—	0.85	0.0007 (J)
RE33-05-60780	33-24730	2.00–2.50	Soil	—	—	0.6 (U)	—	0.67	0.00019 (J)
RE33-05-60781	33-24731	0.00–0.50	Soil	—	—	0.62 (U)	—	2.7	—
RE33-05-60782	33-24731	2.00–2.50	Soil	—	7990 (J)	0.61 (U)	—	1.1	—
RE33-05-60783	33-24732	0.00–0.50	Soil	—	—	0.54 (U)	—	0.43	—
RE33-05-60784	33-24732	2.00–2.50	Soil	—	6850 (J)	0.6 (U)	—	2	—
RE33-05-60785	33-24733	0.00–0.50	Soil	—	—	0.56 (U)	—	2.4	—
RE33-05-60786	33-24733	2.00–2.50	Soil	—	6960 (J)	0.58 (U)	—	1	—
RE33-05-60787	33-24734	0.00–0.50	Soil	—	—	0.6 (U)	—	2.5	—
RE33-05-60788	33-24734	2.00–2.50	Soil	—	—	0.61 (U)	—	2.3	—
RE33-05-60789	33-24735	0.00–0.50	Soil	—	—	0.58 (U)	—	—	—
RE33-05-60790	33-24735	2.00–2.50	Soil	—	—	0.56 (U)	—	0.32	—
RE33-05-60791	33-24736	0.00–0.50	Soil	0.58	—	0.52 (U)	0.12 (U)	3.6	—
RE33-05-60792	33-24736	2.00–2.50	Soil	—	6750 (J)	0.53 (U)	—	1.5	—
RE33-05-60793	33-24737	0.00–0.50	Soil	—	—	0.52 (U)	—	1.5	—
RE33-05-60794	33-24737	2.00–2.50	Soil	—	—	0.52 (U)	—	-	—
RE33-05-60795	33-24738	0.00–0.50	Soil	—	—	0.58 (U)	—	2.1	—
RE33-05-60796	33-24738	2.00–2.50	Soil	—	—	0.58 (U)	—	—	—
RE33-05-60797	33-24739	0.00–0.50	Soil	—	—	0.56 (U)	—	—	—
RE33-05-60798	33-24739	2.00–2.50	Soil	—	—	0.57 (U)	0.14	0.42	—

Note: All units are mg/kg.

[a] Background values from LANL (1998, 59730).

[b] na = Not available.

[c] SSLs are from NMED (2005, 90802) unless noted otherwise.

[d] Screening values for outdoor worker from EPA Region 6 (2005, 91002).

[e] SSL for elemental mercury from NMED (2005, 90802).

[f] — = Not detected or detected below background value.

Table 4.1-2
Detected Concentrations of Organic Chemicals at SWMU 33-013

Sample ID	Location ID	Depth (ft)	Media	Acenaphthene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene[a]	Benzo(k)fluoranthene	Bis(2-ethylhexyl)phthalate	Chrysene
Industrial Soil Screening Level[b]				**31.9[c]**	**1.93[c]**	**23.4**	**2.34**	**23.4**	**21.3[c]**	**234**	**1370**	**0.955[c]**
Construction Worker Soil Screening Level[b]				**31.9[c]**	**1.93[c]**	**212**	**21.2**	**212**	**21.3[c]**	**2120**	**4660**	**0.955[c]**
Residential Soil Screening Level[b]				**31.9[c]**	**1.93[c]**	**6.21**	**0.621**	**6.21**	**21.3[c]**	**62.1**	**347**	**0.955[c]**
RE33-05-60779	33-24730	0.00–0.50	Soil	1.8	3.4	4.4	3.9 (J)	3.3 (J)	2 (J)	3.5(J)	0.085(J)	4.2
RE33-05-60780	33-24730	2.00–2.50	Soil	—[d]	0.076(J)	0.1(J)	0.094(J)	—	0.17(J)	0.096(J)	—	0.1(J)
RE33-05-60781	33-24731	0.00–0.50	Soil	—	—	—	—	—	—	0.082 (J)	—	0.079(J)
RE33-05-60782	33-24731	2.00–2.50	Soil	—	0.13(J)	0.23(J)	0.21(J)	0.18 (J)	0.13(J)	0.24(J)	—	0.24(J)
RE33-05-60783	33-24732	0.00–0.50	Soil	—	—	—	0.078(J)	—	—	0.079(J)	—	0.071(J)
RE33-05-60789	33-24735	0.00–0.50	Soil	0.12(J)	0.17(J)	0.29(J)	0.3(J)	0.2 (J)	0.15(J)	0.31(J)	0.078(J)	0.29(J)
RE33-05-60790	33-24735	2.00–2.50	Soil	—	—	—	—	—	—	—	—	—
RE33-05-60791	33-24736	0.00–0.50	Soil	0.076(J)	0.13(J)	0.29(J)	0.3(J)	0.22 (J)	0.17(J)	0.31(J)	—	0.31(J)
RE33-05-60792	33-24736	2.00–2.50	Soil	—	—	0.17(J)	0.21(J)	0.14 (J)	0.14(J)	0.22(J)	—	0.19(J)
RE33-05-60793	33-24737	0.00–0.50	Soil	0.21(J)	0.28(J)	0.55	0.62	0.45	0.36	0.62	—	0.57
RE33-05-60794	33-24737	2.00–2.50	Soil	—	0.073(J)	0.21(J)	0.26(J)	0.18(J)	0.15(J)	0.27(J)	—	0.23(J)
RE33-05-60795	33-24738	0.00–0.50	Soil	—	—	—	—	—	—	—	—	—
RE33-05-60797	33-24739	0.00–0.50	Soil	—	—	0.13 (J)	0.15(J)	0.11(J)	0.077(J)	0.17(J)	—	0.15(J)
RE33-05-60798	33-24739	2.00–2.50	Soil	—	—	0.079(J)	0.079(J)	—	—	0.085(J)	—	0.15(J)

Table 4.1-2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Dibenz(a,h)anthracene	Dibenzofuran	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Methylnaphthalene[2-][e]	Naphthalene	Phenanthrene	Pyrene
Industrial Soil Screening Level[b]				**2.34**	**36.6[c]**	**24,400**	**39.7[c]**	**23.4**	**92.5**	**92.5**	**20,500**	**21.3[c]**
Construction Worker Soil Screening Level[b]				**21.2**	**36.6[c]**	**8730**	**39.7[c]**	**212**	**82.5**	**82.5**	**6990**	**21.3[c]**
Residential Soil Screening Level[b]				**0.621**	**36.6[c]**	**2290**	**39.7[c]**	**6.21**	**25.2**	**25.2**	**1830**	**21.3[c]**
RE33-05-60779	33-24730	0.00–0.50	Soil	0.76(J)	1.4	12	1.8	2.2(J)	0.55	1.3	12	9.2
RE33-05-60780	33-24730	2.00–2.50	Soil	—	—	0.28(J)	—	0.099(J)	—	—	0.31(J)	0.23(J)
RE33-05-60781	33-24731	0.00–0.50	Soil	—	—	0.18(J)	—	—	—	—	0.15(J)	0.17(J)
RE33-05-60782	33-24731	2.00–2.50	Soil	—	—	0.62	—	0.12(J)	—	—	0.46	0.56
RE33-05-60783	33-24732	0.00–0.50	Soil	—	—	0.17(J)	—	—	—	—	0.12(J)	0.16(J)
RE33-05-60789	33-24735	0.00–0.50	Soil	—	—	0.78	0.085(J)	0.14(J)	—	—	0.6	0.74
RE33-05-60790	33-24735	2.00–2.50	Soil	—	—	0.09(J)	—	—	—	—	—	0.089(J)
RE33-05-60791	33-24736	0.00–0.50	Soil	—	—	0.72	—	0.15(J)	—	—	0.46	0.69
RE33-05-60792	33-24736	2.00–2.50	Soil	—	—	0.42	—	0.12(J)	—	—	0.22(J)	0.41
RE33-05-60793	33-24737	0.00–0.50	Soil	0.081(J)	—	1.4	0.16(J)	0.37	—	0.11(J)	1	1.1
RE33-05-60794	33-24737	2.00–2.50	Soil	—	—	0.49	—	0.14(J)	—	—	0.28(J)	0.4
RE33-05-60795	33-24738	0.00–0.50	Soil	—	—	—	—	—	—	—	—	—
RE33-05-60797	33-24739	0.00–0.50	Soil	—	—	0.31(J)	—	0.079(J)	—	—	0.21(J)	0.24(J)
RE33-05-60798	33-24739	2.00–2.50	Soil	—	—	0.21(J)	—	—	—	—	0.21(J)	0.15(J)

Note: All units are mg/kg.

[a] Pyrene used as a surrogate based on structural similarity.

[b] SSLs obtained from NMED (2005, 90802).

[c] SSLs are soil saturation limit (C_{sat}) values, not risk-based.

[d] — = Not detected.

[e] Naphthalene used as a surrogate based on structural similarity.

Table 4.1-3
Radionuclides Detected or Detected above Background/Fallout Values at SWMU 33-013

Sample ID	Location ID	Depth (ft)	Media	Cobalt-60	Plutonium-239	Strontium-90	Tritium
Soil Background/Fallout Value[a]				**na[b]**	**0.054**	**1.31**	**0.766**
Industrial Screening Action Level[c]				**5.1**	**210**	**1900**	**4.4×10^5**
Construction-Worker Screening Action Level[c]				**4.1**	**36**	**800**	**3.2×10^5**
Residential Screening Action Level[c]				**1.3**	**33**	**5.7**	**750**
RE33-05-60779	33-24730	0.00–0.50	Soil	—[d]	—	—	855
RE33-05-60780	33-24730	2.00–2.50	Soil	—	—	—	111
RE33-05-60781	33-24731	0.00–0.50	Soil	—	—	—	139
RE33-05-60782	33-24731	2.00–2.50	Soil	—	0.204	1.01	105
RE33-05-60783	33-24732	0.00–0.50	Soil	—	—	—	21.3
RE33-05-60784	33-24732	2.00–2.50	Soil	—	—	—	88.8
RE33-05-60785	33-24733	0.00–0.50	Soil	0.314	—	—	43.7
RE33-05-60786	33-24733	2.00–2.50	Soil	—	—	—	450
RE33-05-60787	33-24734	0.00–0.50	Soil	—	—	—	52.4
RE33-05-60788	33-24734	2.00–2.50	Soil	—	—	—	97.6
RE33-05-60789	33-24735	0.00–0.50	Soil	—	—	—	78.8
RE33-05-60790	33-24735	2.00–2.50	Soil	—	—	—	521
RE33-05-60791	33-24736	0.00–0.50	Soil	—	—	—	115
RE33-05-60792	33-24736	2.00–2.50	Soil	—	—	—	74.8
RE33-05-60793	33-24737	0.00–0.50	Soil	—	—	—	14.5
RE33-05-60794	33-24737	2.00–2.50	Soil	—	—	—	18.2
RE33-05-60795	33-24738	0.00–0.50	Soil	—	—	—	103
RE33-05-60796	33-24738	2.00–2.50	Soil	—	—	—	82.1
RE33-05-60797	33-24739	0.00–0.50	Soil	—	—	—	81.5
RE33-05-60798	33-24739	2.00–2.50	Soil	—	—	—	80.9

Note: All units are pCi/g.

[a] Fallout values from LANL (1998, 59730).

[b] na = Not available.

[c] SALs are from LANL (2005, 88493).

[d] — = Not detected or detected below fallout value.

Table 4.1-4
Summary of Stormwater Data Collected at Station E340

Analyte	Result (mg/L)
Chemical Oxygen Demand	352
Cyanide (total)	0.00172(U)
Mercury	0.000393

Table 4.1-5
Summary of COPCs at SWMU 33-013

COPCs	Rationale
Inorganic Chemicals	
Cyanide (total)	Detection limits above background value.
Mercury	Detected concentration and detection limit above background value; detected in stormwater sample.
Nitrate	Detected but no background data available.
Perchlorate	Detected but no background data available.
Radionuclides	
Cobalt-60	Detected in 1 surface sample but no fallout data available.
Plutonium-239	Detected in 1 near-surface sample, fallout value does not apply.
Strontium-90	Detected in 1 near-surface sample, fallout value does not apply.
Tritium	Detected in all samples.
Organic Chemicals	
Acenaphthene	Detected in 4 samples.
Anthracene	Detected in 7 samples.
Benzo(a)anthracene	Detected in 10 samples.
Benzo(a)pyrene	Detected in 11 samples.
Benzo(b)fluoranthene	Detected in 8 samples.
Benzo(g,h,i)perylene	Detected in 9 samples.
Benzo(k)fluoranthene	Detected in 12 samples.
Bis(2-ethylhexyl)phthalate	Detected in 2 samples.
Chrysene	Detected in 12 samples.
Dibenz(a,h)anthracene	Detected in 2 samples.
Dibenzofuran	Detected in 1 sample.
Fluoranthene	Detected in 13 samples.
Fluorene	Detected in 3 samples.
Indeno(1,2,3-cd)pyrene	Detected in 9 samples.
Methylnaphthalene[2-]	Detected in 1 sample.
Naphthalene	Detected in 2 samples.
Phenanthrene	Detected in 12 samples.
Pyrene	Detected in 13 samples.

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