

University of California
 Environmental Restoration Project, MS M992
 Los Alamos, New Mexico 87545
 505-667-0808/FAX 505-665-4747



SJA

U. S. Department of Energy
 Los Alamos Area Office, MS A316
 Environmental Restoration Program
 Los Alamos, New Mexico 87544
 505-667-7203/FAX 505-665-4504

Date: September 29, 1997
 Refer to: EM/ER:97-390



Mr. Benito Garcia
 NMED-HRMB
 P.O. Box 26110
 Santa Fe, NM 87502

SUBJECT: SUBMITTAL OF ADDENDUM TO THE RFI REPORT FOR PRSs AT TA-35 (FORMER OU 1129)

Dear Mr. Garcia:

Enclosed are two copies of the Los Alamos National Laboratory's Addendum to the Resource Conservation and Recovery Act Facility Investigation (RFI) Reports for Potential Release Sites (PRSs) in Technical Area 35 (TA-35). Specifically, this is an addendum to the RFI Report for TA-35 submitted in May 1996, covering PRSs 35-003(h,j,k), 35-004(b), 35-008, 35-009(a-d), 35-014(a,b,d,e1,e2,f), 35-015(b), and 35-016(e,f,i). This also addresses the RFI Report for TA-35 submitted in July 1996, covering PRSs 35-004(a,g,h,m), 35-009(e), 35-014(g1,g2), and 35-016(b,j,n,q). One copy of this addendum is for your information and the second should go to your technical branch.

If you have any questions, please contact Allyn Pratt at (505) 667-4308 or Mike Gilgosh at (505) 667-5794.

Sincerely,

Jorg Jansen

Jorg Jansen, Program Manager
 LANL/ER Project

Sincerely,

Theodore J. Taylor

Theodore J. Taylor, Program Manager
 DOE/LA00

JJ/TT/rfr

- Enclosures (1) Addendum to the RFI Report for PRSs in TA-35 (Former OU 1129)
- (2) Certification



5267

Cy (w/ enc.):

M. Gilgosh, LAAO, MS A316
D. Griswold, AL-ERD, MS A906
J. Harry, EES-5, MS M992
D. Neleigh, EPA, R.6, 6PD-N
A. Pratt, EES-13, MS J521
C. Rodriguez, CIO/ER, MS M769
T. Taylor, LAAO, MS A316
J. White, ESH-19, MS K490
S. Dinwiddie, NMED-HRMB
M. Leavitt, NMED-GWQB
J. Parker, NMED-HRMB
G. Saums, NMED-SWQB
S. Yanicak, NMED-AIP, MS J993
RPF, MS M707

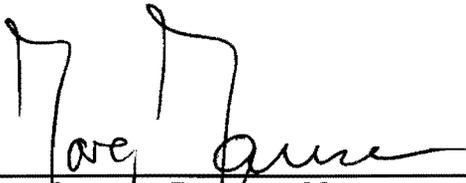
Informational Copy:

T. Baca, EM, MS J591
J. Canepa, EM/ER, MS M992
T. Glatzmaier, DDEES/ER, MS M992
D. McInroy, EM/ER, MS M992
J. Plum, LAAO, MS A316
S. Rae, ESH-18, MS K497
G. Rael, AL-ERD, MS A906
J. Vozella, LAAO, MS A316
EM/ER File, MS M992

CERTIFICATION

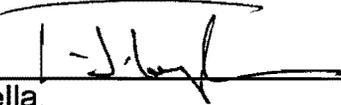
I certify under penalty of law that these documents and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage 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.

Document Title: Addendum to the RFI Report for PRSs in TA-35 (Former OU 1129)

Name:  Date: 9-29-97
Jorg Jansen, Program Manager
Environmental Restoration Project
Los Alamos National Laboratory

or

Tom Baca, Program Director
Environmental Management
Los Alamos National Laboratory

Name:  Date: 9/30/97
Joseph Vozella,
Acting Assistant Area Manager of
Environmental Projects
DOE-Los Alamos Area Office

or

Theodore J. Taylor, Program Manager
Environmental Restoration Program
DOE-Los Alamos Area Office

**Addendum to the
RFI Reports for
Potential Release Sites
at Technical Area 35**

(Located in former Operable Unit 1129)

Field Unit 4

**Environmental
Restoration
Project**

September 1997

**A Department of Energy
Environmental Cleanup Program**

*Stu -
need to
have call
HSA + design
of OK -
if not remain
to DOE/DOE
with reason to
return -
Gandy*

Los Alamos
NATIONAL LABORATORY

LA-UR-97-3567

TABLE OF CONTENTS

EXECUTIVE SUMMARY..... ES-1

ACRONYMS AND ABBREVIATIONS ACR-1

1.0 INTRODUCTION 1-1

 1.1 General Site History 1-1

 1.2 RFI Overview 1-5

 1.3 Field Activities 1-6

2.0 ENVIRONMENTAL SETTING..... 2-1

3.0 APPROACH TO SAMPLE ANALYSES AND DATA ASSESSMENT..... 3-1

 3.1 Sample Analyses 3-1

 3.1.1 Analytical Methods 3-1

 3.1.2 Data Validation 3-1

 3.2 Process for the Identification of COPCs..... 3-3

 3.2.1 Inorganic Chemicals..... 3-3

 3.2.2 Radionuclides..... 3-3

 3.2.3 Organic Chemicals..... 3-4

 3.2.4 Risk-Based Screening Assessment..... 3-5

 3.3 Human Health Assessment 3-5

 3.3.1 Risk Due to Naturally Occurring Inorganic Chemicals in Soils (Background)..... 3-5

 3.3.2 Risk Assessment..... 3-7

 3.4 Ecological Assessment..... 3-7

4.0 RESULTS OF QUALITY ASSURANCE/QUALITY CONTROL ACTIVITIES 4-1

 4.1 Inorganic Analyses..... 4-1

 4.2 Radiochemical Analyses..... 4-1

 4.2.1 Determination of Detection Status..... 4-2

 4.2.2 Gamma Spectroscopy Measurements..... 4-2

 4.2.3 Results of QC Activities..... 4-3

 4.3 Organic Analyses..... 4-4

5.0 SPECIFIC RESULTS, CONCLUSIONS, AND RECOMMENDATIONS 5-1

 5.1 PRS Nos. 35-004(a) and 35-009(e)..... 5-1

 5.1.1 History 5-1

 5.1.2 Description 5-2

 5.1.3 Previous Investigations..... 5-2

5.1.4	Field Investigation	5-2
5.1.4.1	Environmental and Engineering Surveys	5-3
5.1.4.2	Deviations from the Sampling and Analysis Plan	5-3
5.1.4.3	Sampling Activities	5-3
5.1.5	Evaluation of Inorganic Chemicals.....	5-3
5.1.6	Evaluation of Radionuclides	5-4
5.1.7	Evaluation of Organic Chemicals.....	5-6
5.1.8	Risk-Based Screening Assessment.....	5-6
5.1.9	Human Health Risk Assessment.....	5-6
5.1.10	Preliminary Ecological Assessment.....	5-6
5.1.11	Conclusions and Recommendations	5-7
5.2	PRS No. 35-004(b).....	5-7
5.2.1	History	5-7
5.2.2	Description	5-8
5.2.3	Previous Investigations.....	5-8
5.2.4	Field Investigation	5-8
5.2.4.1	Environmental and Engineering Surveys.....	5-8
5.2.4.2	Deviations from the Sampling and Analysis Plan	5-9
5.2.4.3	Sampling Activities	5-9
5.2.5	Evaluation of Inorganic Chemicals.....	5-9
5.2.6	Evaluation of Radionuclides	5-11
5.2.7	Evaluation of Organic Chemicals.....	5-11
5.2.8	Risk-Based Screening Assessment.....	5-11
5.2.9	Human Health Risk Assessment.....	5-11
5.2.9.1	Review of COPCs and Extent of Contamination.....	5-11
5.2.10	Preliminary Ecological Assessment.....	5-11
5.2.11	Conclusions and Recommendations	5-11
5.3	PRS No. 35-004(g).....	5-12
5.3.1	History	5-12
5.3.2	Description	5-12
5.3.3	Previous Investigation	5-12
5.3.4	Field Investigation	5-13
5.3.4.1	Environmental and Engineering Surveys.....	5-13
5.3.4.2	Deviations from the Sampling and Analysis Plan	5-14
5.3.4.3	Sampling Activities	5-14
5.3.5	Evaluation of Inorganic Chemicals.....	5-16
5.3.6	Evaluation of Radionuclides	5-16
5.3.7	Evaluation of Organic Chemicals.....	5-16
5.3.8	Risk-Based Screening Assessment.....	5-16

5.3.9	Human Health Risk Assessment.....	5-16
5.3.10	Preliminary Ecological Assessment.....	5-16
5.3.11	Conclusions and Recommendations	5-16
5.4	PRS No. 35-004(h).....	5-17
5.4.1	History.....	5-17
5.4.2	Description	5-18
5.4.3	Previous Investigations.....	5-18
5.4.4	Field Investigation	5-18
	5.4.4.1 Environmental and Engineering Surveys.....	5-20
	5.4.4.2 Deviations from the Sampling and Analysis Plan	5-20
	5.4.4.3 Sampling Activities	5-20
5.4.5	Evaluation of Inorganic Chemicals.....	5-22
5.4.6	Evaluation of Radionuclides	5-22
5.4.7	Evaluation of Organic Chemicals.....	5-22
5.4.8	Risk-Based Screening Assessment.....	5-22
5.4.9	Human Health Risk Assessment.....	5-22
	5.4.9.1 Review of COPCs and Extent of Contamination.....	5-22
5.4.10	Preliminary Ecological Assessment.....	5-23
5.4.11	Conclusions and Recommendations	5-23
5.5	PRS Nos. 35-014(e ₂) and 35-016(i).....	5-24
5.5.1	History.....	5-24
5.5.2	Description	5-25
5.5.3	Previous Investigations.....	5-25
5.5.4	Field Investigation	5-25
	5.5.4.1 Environmental and Engineering Surveys.....	5-26
	5.5.4.2 Deviations from the Sampling and Analysis Plan	5-26
	5.5.4.3 Sampling Activities	5-26
5.5.5	Evaluation of Inorganic Chemicals.....	5-28
5.5.6	Evaluation of Radionuclides	5-28
5.5.7	Evaluation of Organic Chemicals.....	5-28
5.5.8	Risk-Based Screening Assessment.....	5-30
5.5.9	Human Health Risk Assessment.....	5-30
	5.5.9.1 Review of COPCs and Extent of Contamination.....	5-30
5.5.10	Preliminary Ecological Assessment.....	5-30
5.5.11	Conclusions and Recommendations	5-30
5.6	PRS No. 35-016(e).....	5-30
5.6.1	History.....	5-31
5.6.2	Description	5-31
5.6.3	Previous Investigations.....	5-31

Contents

5.6.4	Field Investigation	5-31
5.6.4.1	Environmental and Engineering Surveys	5-32
5.6.4.2	Deviations from the Sampling and Analysis Plan	5-32
5.6.4.3	Sampling Activities	5-33
5.6.5	Evaluation of Inorganic Chemicals.....	5-33
5.6.6	Evaluation of Radionuclides.....	5-33
5.6.7	Evaluation of Organic Chemicals.....	5-33
5.6.8	Risk-Based Screening Assessment.....	5-33
5.6.9	Human Health Risk Assessment.....	5-35
5.6.9.1	Review of COPCs and Extent of Contamination.....	5-35
5.6.10	Preliminary Ecological Assessment.....	5-35
5.6.11	Conclusions and Recommendations	5-35
5.7	PRS No. 35-016(f).....	5-35
5.7.1	History	5-36
5.7.2	Description	5-36
5.7.3	Previous Investigations.....	5-36
5.7.4	Field Investigation	5-36
5.7.4.1	Environmental and Engineering Surveys.....	5-37
5.7.4.2	Deviations from the Sampling and Analysis Plan	5-37
5.7.4.3	Sampling Activities	5-37
5.7.5	Evaluation of Inorganic Chemicals.....	5-37
5.7.6	Evaluation of Radionuclides.....	5-37
5.7.7	Evaluation of Organic Chemicals.....	5-38
5.7.8	Risk-Based Screening Assessment.....	5-38
5.7.9	Human Health Risk Assessment.....	5-38
5.7.9.1	Review of COPCs and Extent of Contamination.....	5-38
5.7.10	Preliminary Ecological Assessment.....	5-40
5.7.11	Conclusions and Recommendations	5-40
REFERENCES.....		R-1
APPENDIXES		
Appendix A	Analytical Suites	A-1
Appendix B	Data Validation.....	B-1

FIGURES

1.1-1 Location of TA-35 within Los Alamos National Laboratory, Los Alamos County, New Mexico..... 1-2

1.1-2 Location of TA-35 with respect to Laboratory technical areas and surrounding land holdings..... 1-3

1.1-3 Approximate locations of PRS Nos. 35-004(a, b, g, and h); 35-009(e); 35-014(e₂); and 35-016(e, f, and i) at TA-35..... 1-4

2.2.1-1 Generalized stratigraphy of TA-35..... 2-2

2.3.1-1 Topography of TA-35..... 2-3

5.1.4-1 Locations of PRS Nos. 35-004(a) and 35-009(e) samples..... 5-5

5.2.4-1 Locations of PRS No. 35-004(b) samples..... 5-10

5.3.4-1 Locations of PRS No. 35-004(g) samples..... 5-15

5.4.1-1 Decommissioning work at PRS No. 35-004(h)..... 5-19

5.4.4-1 Location of PRS No. 35-004(h) sample 5-21

5.5.4-1 Locations of PRS Nos. 35-014(e₂) and 35-016(i) samples..... 5-29

5.6.4-1 Locations of PRS No. 35-016(e) samples..... 5-34

5.7.4-1 Locations of PRS No. 35-016(f) samples..... 5-39

TABLES

ES-1 Summary of Proposed Actions ES-2

3.1.1-1 Analytical Methods..... 3-1

3.1.2-1 Explanation of Data Qualifiers Used in the Baseline Data Validation Procedure..... 3-2

3.3.1-1 Risk Due to Background Concentrations of Inorganic Chemicals in Soil Assuming a Residential Scenario..... 3-6

4.2-1 Analyte List, Minimum Detectable Activities, and Analytical Methods for Radionuclide Constituents in TA-35 Soil Samples..... 4-2

4.2.2-1 Radionuclides Measured by Gamma Spectroscopy in TA-35 Soil Samples..... 4-3

5.1.4-1 Summary of Samples Taken at PRS Nos. 35-004(a) and 35-009(e) 5-4

5.1.6-1 Radionuclides with Concentrations at or above Background Screening Values for PRS Nos. 35-004(a) and 35-009(e)..... 5-6

5.1.8-1 Multiple Chemical Evaluation for Soil Samples at PRS Nos. 35-004(a) and 35-009(e)..... 5-7

5.2.4-1 Summary of Samples Taken at PRS No. 35-004(b)..... 5-9

5.3.4-1 Summary of Samples Taken at PRS No. 35-004(g)..... 5-14

5.4.4-1 Summary of Samples Taken at PRS No. 35-004(h)..... 5-20

5.5.4-1 Summary of Samples Taken at PRS Nos. 35-014(e₂) and 35-016(i) 5-27

5.6.4-1 Summary of Samples Taken at PRS No. 35-016(e)..... 5-33

5.7.4-1 Summary of Samples Taken at PRS No. 35-016(f)..... 5-38

This page intentionally left blank.

EXECUTIVE SUMMARY

This document is a radiological data and assessment addendum (hereafter referred to as "this addendum") to the *RFI Report for Potential Release Sites 35-003(h, j, and k) 35-004(b) 35-008 35-009(a through d) 35-014(a, b, d, e₁, e₂, and f) 35-015(b) 35-016(e, f, and i)* (LANL 1996, 54402) (hereafter referred to as "the May 1996 RFI report") and the *RFI Report for Potential Release Sites 35-004(a, g, h, and m) 35-009(e) 35-014(g, and g₂) 35-016(b, j, n, and q)* (LANL 1996, 54763) (hereafter referred to as "the July 1996 RFI report"). This addendum and the RFI reports describe the Phase I results of the Resource Conservation and Recovery Act (RCRA) facility investigation (RFI) to evaluate contamination at Technical Area (TA) -35. TA-35 is located in former Operable Unit (OU) 1129, which is part of Field Unit 4 in the Environmental Restoration Project at Los Alamos National Laboratory (hereafter referred to as "the Laboratory"). Included in this addendum are the results of investigations for Potential Release Site (PRS) Nos. 35-004(a, b, g, and h); 35-009(e); 35-014(e₂); and 35-016(e, f, and i).

TA-35 (also known as Ten Site) is currently used for nuclear safeguard studies, laser research and development, physical research, fusion work, and other experimental research. It is one of the largest technical areas at the Laboratory with approximately 300 designated structures. It is located on Ten Site Mesa between Mortandad Canyon and Ten Site Canyon.

Operations at TA-35 began in 1951 and include research operations; two experimental reactors (between 1956 and 1964); lasers and laser fusion research, including development, fabrication, and operation of lasers and laser targets; nuclear safeguards research and development of assay instrumentation; and research in ceramics, robotics, polymer synthesis, high-speed impact studies, and strain-rate measurements on a variety of materials. Other operations include the Ten Site Waste Treatment Facility (from 1951 to 1963).

Effluent routes from TA-35 include ventilation stacks, septic systems, storm sewer lines and discharge channels, industrial waste lines and outfalls, and leaking storage structures including underground and aboveground tanks and surface compounds. The chemicals and other constituents that contributed to the list of potential contaminants include metals, volatile organic compounds, semivolatile organic compounds, polychlorinated biphenyl compounds, and radionuclides.

The organic and inorganic data results were presented in the *RFI Report for Potential Release Sites 35-003(h, j, and k) 35-004(b) 35-008 35-009(a through d) 35-014(a, b, d, e₁, e₂, and f) 35-015(b) 35-016(e, f, and i)* (LANL 1996, 54402) and the *RFI Report for Potential Release Sites 35-004(a, g, h, and m) 35-009(e) 35-014(g, and g₂) 35-016(b, j, n, and q)* (LANL 1996, 54763). Those reports did not include radionuclide data because the data were not available at the time the reports were prepared.

The Field Unit 4 response to a notice of deficiency (LANL 1996, 54448) stated that problems had been encountered with radionuclide analytical data and that all radionuclide data collected for former OU 1129 would be reviewed to determine if additional sampling was needed. A sampling and analysis plan (SAP) was prepared for those PRSs at TA-35 that required additional data or for which radionuclide data needed to be replaced (LANL 1997, 56293). This addendum includes only those PRSs for which additional sampling was not necessary and recommendations for the radionuclide component could be made.

Although radionuclides are regulated by the Department of Energy and are not regulated under RCRA, it is more efficient and cost effective to investigate all types of potential contamination during a single site characterization. Therefore, radiochemical concerns are addressed in this addendum.

The purpose of the Phase I RFI was to determine whether chemicals of potential concern (COPCs) are present in the PRSs at TA-35. Field activities followed SAPs that were designed to confirm the presence or absence of COPCs. These SAPs were submitted as part of the *RFI Work Plan for Operable Unit 1129*

Executive Summary

(LANL 1992, 7666) and the June 1994 addendum to the work plan (Pratt 1994, 43475), except as noted in Chapter 5 of this addendum.

Field activities for the PRSs described in this addendum began on January 6, 1994, and ended on March 27, 1995.

The data analysis process consisted of using a decision approach that involved a series of qualitative and quantitative steps. First, analytical data are verified and validated, then the data undergo a data quality assessment, and finally the data are compared with appropriate site-specific background values. A human health screening assessment was performed to determine if COPCs are present. Ecological risk assessment will be deferred until the site can be assessed as part of the overall ecological risk assessment methodology.

No significant concerns are associated with the quality of the data; data quality evaluation is presented in Chapter 4 of this addendum.

For the purposes of the screening assessments reported in this addendum, some PRSs at TA-35 have been organized into the decision units listed in Table ES-1. However, most PRSs are reported individually.

All PRSs in this addendum (PRS Nos. 35-004[a, b, g, and h]; 35-009[e]; 35-014[e₂]; and 35-016[e, f, and i]) are recommended for no further action (NFA) based on human health concerns. The results of the RFI for each PRS are summarized in Table ES-1.

**TABLE ES-1
SUMMARY OF PROPOSED ACTIONS**

PRS No.	HSWA ^a	Radionuclide Component ^b	Proposed Action			Section No.
			NFA Criterion	Further Action	Rationale	
35-004(a) 35-009(e)	X X	X	5		RCRA chemicals ^c were determined to pose a negligible threat to human health, radionuclides below SALs	5.1.9 ^d 5.1.11 ^e
35-004(b)	X		5		RCRA chemicals ^c below SALs, no COPCs identified in human health screening assessment, radionuclides not of concern	5.6.10 ^f 5.2.11 ^e
35-004(g)	X	X	5		RCRA chemicals ^c and radionuclides below SALs, no COPCs identified in human health screening assessment	5.2.9 ^d 5.3.11 ^e
35-004(h)	X	X	5		RCRA chemicals ^c and radionuclides below SALs, no COPCs identified in human health screening assessment	5.3.9 ^d 5.4.11 ^e
35-014(e ₂) 35-016(i)	X X		5		RCRA chemicals ^c below SALs, no COPCs identified in human health screening assessment, radionuclides not of concern	5.14.10 ^f 5.5.11 ^e
35-016(e)			5		RCRA chemicals ^c below SALs, no COPCs identified in human health screening assessment, radionuclides not of concern	5.7.10 ^f 5.6.11 ^e
35-016(f)			5		RCRA chemicals ^c below SALs, no COPCs identified in human health screening assessment, radionuclides not of concern	5.16.10 ^f 5.7.11 ^e

a. An X in this column indicates that the site is listed on the Hazardous and Solid Waste Amendments (HSWA) Module (Module VIII) of the Laboratory's RCRA operating permit.
b. An X in this column indicates that the site has a radionuclide component.
c. Results of analyses for RCRA chemicals are presented in the RFI reports (LANL 1996, 54402; LANL 1996, 54763).
d. Section of July 1996 RFI report (LANL 1996, 54763) where NFA recommendation for RCRA chemicals is located
e. Section of this addendum where NFA recommendation for the radionuclide component is located
f. Section of May 1996 RFI report (LANL 1996, 54402) where NFA recommendation for RCRA chemicals is located

ACRONYMS AND ABBREVIATIONS

CMP	corrugated metal pipe
COC	chemical of concern
COPC	chemical of potential concern
cpm	counts per minute
D&D	decontamination and decommissioning
EPA	Environmental Protection Agency
ER	Environmental Restoration
FIMAD	Facility for Information Management, Analysis, and Display
H&S	health and safety
HSWA	Hazardous and Solid Waste Amendments
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 reported value is an estimate and likely to be biased high.
J-	The analyte was positively identified, and the reported value is an estimate and likely to be biased low.
LAPRE	Los Alamos Power Reactor Experiment
LCS	laboratory control sample
MCE	multiple chemical evaluation
MDA	minimum detectable activity
N.A.	not available
NC	noncarcinogen
NFA	no further action
NMED	New Mexico Environment Department
NR	not requested
OU	operable unit
OVA	organic vapor analyzer
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PE	performance evaluation
PRS	potential release site
QAPP	Quality Assurance Project Plan
Qbt3	cooling unit 3 of the Tshirege Member of the Bandelier Tuff
QC	quality control
R	The sample results are rejected because of serious deficiencies in the ability to analyze the sample and meet quality control criteria; presence or absence cannot be verified.
RCRA	Resource Conservation and Recovery Act
RFI	RCRA facility investigation
RPD	relative percent difference

Acronyms and Abbreviations

SAL	screening action level
SAP	sampling and analysis plan
SVOC	semivolatile organic compound
TA	Technical Area
TPU	total propagated uncertainty
U	The analyte was analyzed for but not detected. Reported value is the sample-specific estimated quantitation limit or detection limit.
UJ	The analyte was analyzed for but not detected. Reported value is an estimate of the sample-specific quantitation limit or detection limit.
UTL	upper tolerance limit
VOC	volatile organic compound
XRF	x-ray fluorescence

1.0 INTRODUCTION

This document is a radiological data and assessment addendum (hereafter referred to as "this addendum") to the *RFI Report for Potential Release Sites 35-003(h, j, and k) 35-004(b) 35-008 35-009(a through d) 35-014(a, b, d, e₁, e₂, and f) 35-015(b) 35-016(e, f, and i)* (LANL 1996, 54402) (hereafter referred to as "the May 1996 RFI report") and the *RFI Report for Potential Release Sites 35-004(a, g, h, and m) 35-009(e) 35-014(g, and g₂) 35-016(b, j, n, and q)* (LANL 1996, 54763) (hereafter referred to as "the July 1996 RFI report"). This addendum and the RFI reports describe the Phase I radionuclide data results of the Resource Conservation and Recovery Act (RCRA) facility investigation (RFI) in portions of Technical Area (TA) -35 at Los Alamos National Laboratory (hereafter referred to as "the Laboratory"). The organic and inorganic data results were presented in the May 1996 RFI report (LANL 1996, 54402) and the July 1996 RFI report (LANL 1996, 54763). The purpose of the investigation was to evaluate contamination at former Operable Unit (OU) 1129 in Field Unit 4 of the Laboratory's Environmental Restoration (ER) Project. Sampling activities were conducted under the guidelines described in the *RFI Work Plan for Operable Unit 1129* (LANL 1992, 7666) (hereafter referred to as "the work plan") and the June 1994 addendum to the work plan (Pratt 1994, 43475). The work plan was approved by the Environmental Protection Agency (EPA) on November 3, 1993, and the addendum was approved by EPA on May 22, 1995. Included in this addendum are Potential Release Site (PRS) Nos. 35-004(a, b, g, and h), 35-009(e), 35-014(e₂), and 35-016(e, f, and i).

1.1 General Site History

Details of the history of TA-35 are discussed more completely in Section 3.3 of the work plan (LANL 1992, 7666). See Figure 1.1-1 and Figure 1.1-2 for the location of TA-35; see Figure 1.1-3 for the locations of the PRSs.

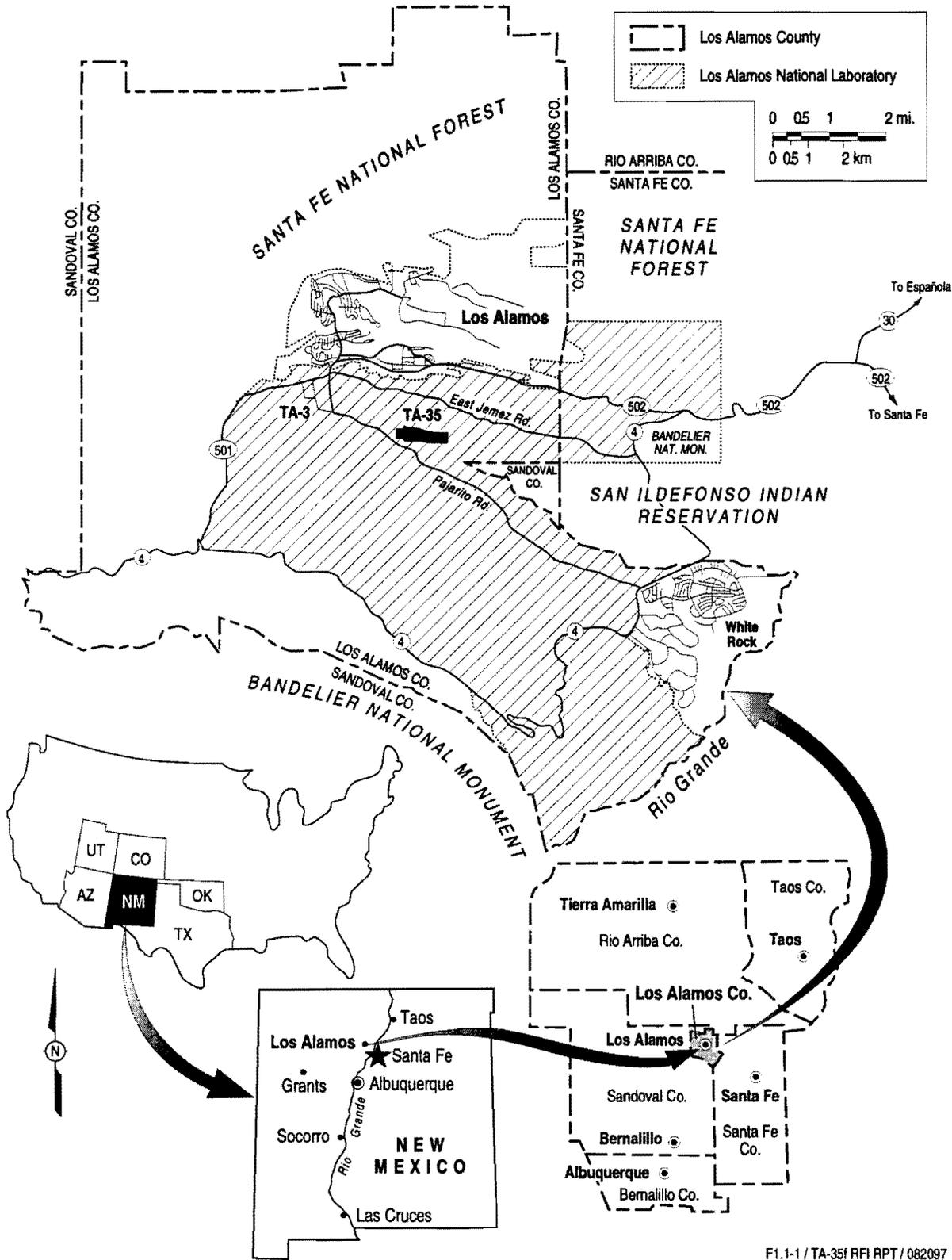
TA-35 (also known as Ten Site) is one of the largest technical areas at the Laboratory with approximately 300 designated structures. It is currently used for laser and laser fusion research, which consists of development, fabrication, and operation of lasers and laser targets; nuclear safeguards research and the development of assay instrumentation; and research in ceramics, robotics, polymer synthesis, high-speed impact studies, and strain-rate measurements on a variety of materials.

Operations at TA-35 began in 1951 with the completion of the original Ten Site Laboratory and office building (TA-35-2). The building has been used for a wide variety of research operations and housed two experimental reactors between 1956 and 1964: the Los Alamos Power Reactor Experiment (LAPRE) -I and the Los Alamos Molten Plutonium Reactor Experiment. The building also housed a hot cell, which was used for preparing kilocurie sources of radioactive lanthanum (¹⁴⁰La), for plutonium research, and as a laboratory in which lithium tritide components were developed and handled (DOE 1987, 8663).

The TA-35 wastewater treatment plant was operated from 1951 to 1963. Waste liquids, which were generated by washings of the hot cell, were stored in four tanks to allow decay of short-lived ¹⁴⁰La. When concentrations of other radionuclides with longer half-lives, such as ⁹⁰Sr, were discovered in the stored liquid wastes, a wastewater treatment plant with ion-exchange capabilities was constructed. The wastewater treatment plant was constantly beset with problems and required numerous retrofittings and additional equipment.

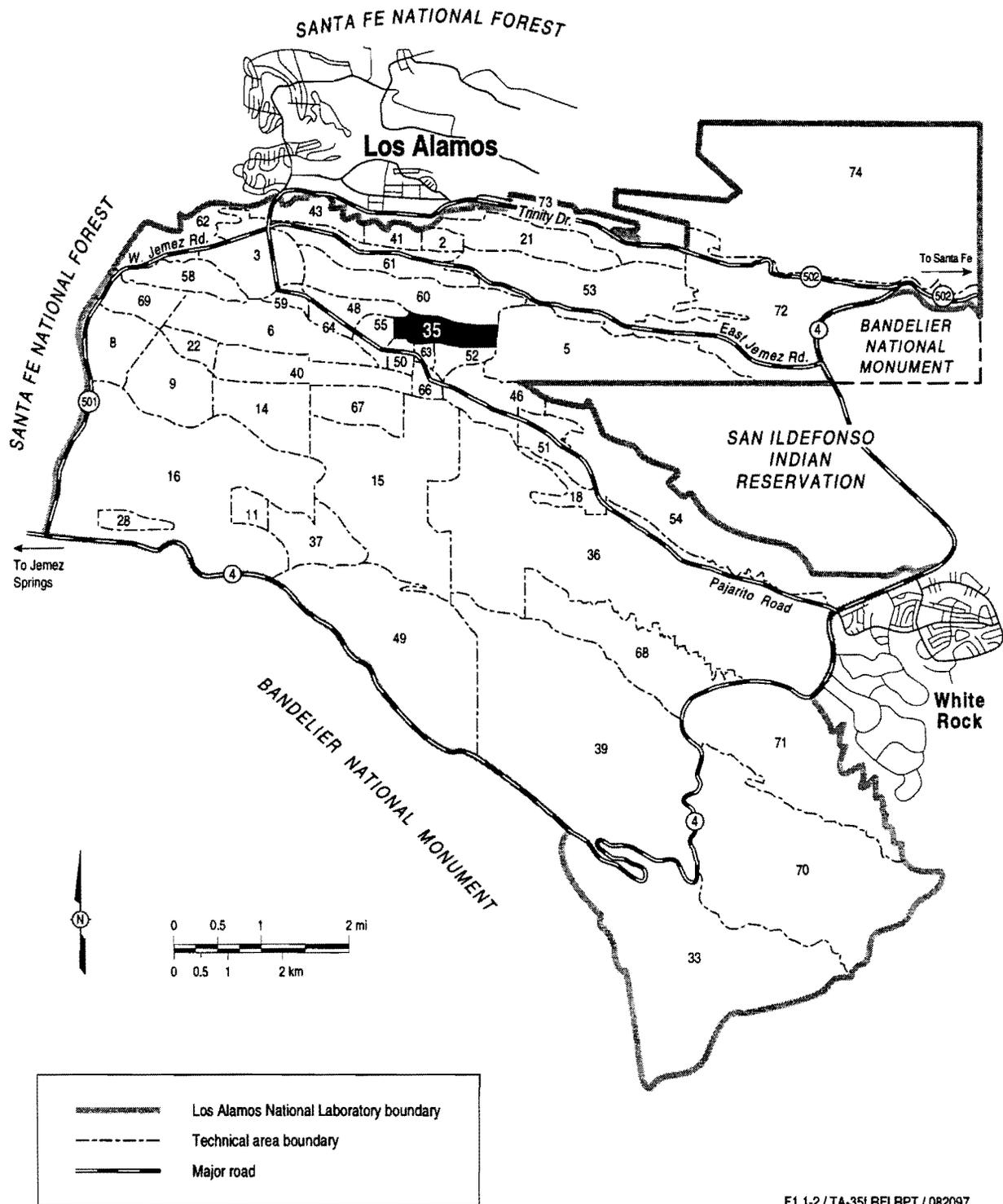
Other major buildings at TA-35 include the following:

- Fast Reactor Core Test Building (TA-35-27) built in 1968 to house the LAPRE-II reactor, which was never completed;



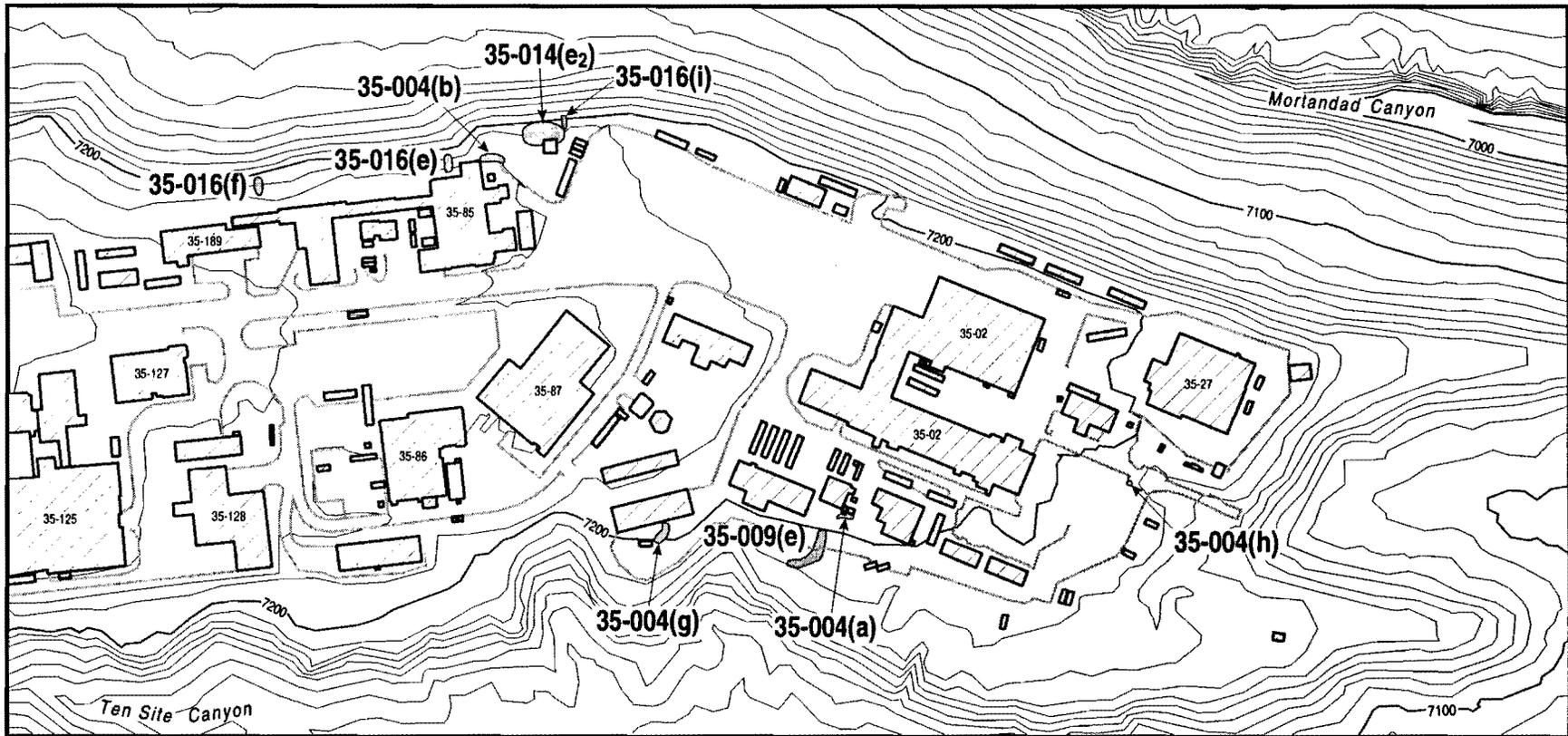
F1.1-1 / TA-35f RFI RPT / 082097

Figure 1.1-1. Location of TA-35 within Los Alamos National Laboratory, Los Alamos County, New Mexico.



F1.1-2 / TA-35I RFI RPT / 082097

Figure 1.1-2. Location of TA-35 with respect to Laboratory technical areas and surrounding land holdings.



Source: FIMAD G105318

F1.1-3 / TA-35 RFI RPT / 082297

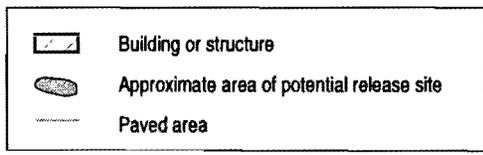
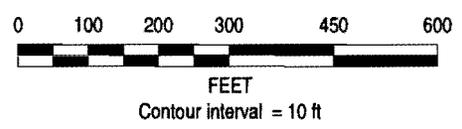


Figure 1.1-3. Approximate locations of PRS Nos. 35-004(a, b, g, and h); 35-009(e); 35-014(e₂); and 35-016(e, f, and i) at TA-35.

Although radionuclides are regulated by the Department of Energy and are not regulated under RCRA, it is more efficient and cost effective to investigate all types of potential contamination during a single site characterization. Therefore, radiochemical concerns are addressed in this addendum.

The purpose of the Phase I investigation was to determine whether chemicals of concern (COCs) are present in the PRSs at TA-35. Results of the investigation are used to determine if a site

- requires additional investigation,
- may be recommended for no further action and removed from the RCRA Hazardous and Solid Waste Amendments Module VIII Permit, or
- is a candidate for accelerated cleanup.

A complete description of the conceptual model is presented in Chapter 4 of the work plan (LANL 1992, 7666). The conceptual model was based on three contaminant transport scenarios: resuspension and possible transport of soil particles by the action of wind, vapor- or liquid-phase transport in the vadose zone, and surface water runoff and erosion.

Site-specific factors such as contaminant type(s), contaminant volume(s), release history, and physical conditions also govern the movement of contaminants from a release. Primary release mechanisms consist of two types: operational and accidental. An operational loss of contaminants includes the release of constituents through either routine process operations or intentional but unplanned releases. These release mechanisms include system discharges, outfalls, septic systems, air emissions, and test procedures. An accidental loss of contaminants may include unintentional releases such as leaks, surface overflows, spills, and operational accidents. Secondary release mechanisms are those processes that mobilize contaminants within a medium or among media. Mobilizing processes for contaminants in water include surface water bulk flow, percolation and migration in the vadose zone, groundwater transport, and volatilization. Mobilizing processes for soil include aeolian processes, biotic uptake, and soil erosion. Aeolian processes are the mobilizing processes for airborne particulates or vapor phase contamination.

Because the purpose of the Phase I investigation was to determine whether COCs are present, the conceptual model used site-specific information for the above processes to determine a potential worst-case contaminant migration as the basis for developing a sampling and analysis plan (SAP). Judgmental sampling combined with search sampling was the method chosen to select the number and location of samples to be collected for most PRSs at TA-35.

1.3 Field Activities

Field activities followed the SAPs that were submitted as part of the work plan, except as noted in Chapter 5 of this addendum. Field activities began on January 6, 1994, and ended on March 27, 1995. The SAPs called for field surveys to be performed at the PRSs before collecting samples. These surveys included site engineering surveys to locate the PRSs and associated features, and environmental surveys to initially screen for environmental concerns at each site. All survey and sampling activities followed applicable ER Project standard operating procedures (LANL 1991, 21556) unless otherwise noted in Chapter 5.

Site engineering surveys generally included a review of archival data, engineering drawings provided by the Laboratory's Facility Project Delivery group (FSS-6), aerial photographs, and site visits. These engineering surveys were conducted by the field team leader, geologists, and environmental scientists

with support from the field team sampling technicians. During the surveys, the PRSs were located, staked, and documented. If the results of these reviews corresponded accurately to the original SAPs, then predetermined sample locations were staked. However, if the engineering surveys found discrepancies between actual site conditions and the original SAPs, then environmental surveys, geophysical surveys, and other field surveys were used to determine appropriate sample locations. These discrepancies and changes to the original SAPs were documented through memoranda to file. The results of the engineering surveys were documented in daily activity logs, and when appropriate the changes were incorporated into the database at the Laboratory's Facility for Information Management, Analysis, and Display (FIMAD).

Environmental surveys and health and safety surveys were conducted at each PRS and usually consisted of walking surveys using field screening instruments to screen for radiation and organic compounds. These surveys were performed by the field team health and safety officer or radiation control technician with support from field team geologists, environmental scientists, and sampling technicians. Preliminary health and safety radiological surveys were conducted at each site using an Eberline ESP-1 meter with beta/gamma probe model HP-260 and the Ludlum model 139 meter with an air-proportional alpha probe. Radiation grid surveys were conducted using an Eberline ESP-1 meter with beta/gamma probe model HP-260 following the grid pattern specified in the SAP or by the engineering survey. If warranted by the topography of a specific site, environmental surveys were also conducted in erosion cuts or outfalls to complement the data collected using grid patterns. Some SAPs required that environmental survey results be used to select sample locations for biased sampling at a specific PRS. In those cases, the sample sites were located, staked, mapped, and documented in daily activity logs. Information obtained as a result of the engineering and environmental surveys allowed for directed sampling, when appropriate.

As described in the work plan (LANL 1992, 7666), judgmental sampling combined with search sampling was used as the primary method for determining the quantity and location of samples. Judgmental sampling is the subjective selection of sample locations based on professional knowledge of contaminant behavior in the media being sampled. Search sampling is the selection of strategic sampling locations based on archival information and the results of surveys that indicate where potential contamination may be located.

Chapter 5 of this addendum describes in detail the specific field activities performed for each PRS. Deviations from the SAP, if any, are discussed in the appropriate section of Chapter 5 for each PRS.

This page intentionally left blank.

2.0 ENVIRONMENTAL SETTING

The environmental setting is described in the *RFI Report for Potential Release Sites 35-003(h, j, and k) 35-004(b) 35-008 35-009(a through d) 35-014(a, b, d, e₁, e₂, and f) 35-015(b) 35-016(e, f, and i)* (LANL 1996, 54402) and the *RFI Report for Potential Release Sites 35-004(a, g, h, and m) 35-009(e) 35-014(g₁ and g₂) 35-016(b, j, n, and q)* (LANL 1996, 54763). Therefore, this chapter is excluded except Figure 2.2.1-1, which shows an updated cross section of the stratigraphy of Technical Area (TA) -35, and Figure 2.3.1-1, which shows the topography of TA-35 and physical features around the area.

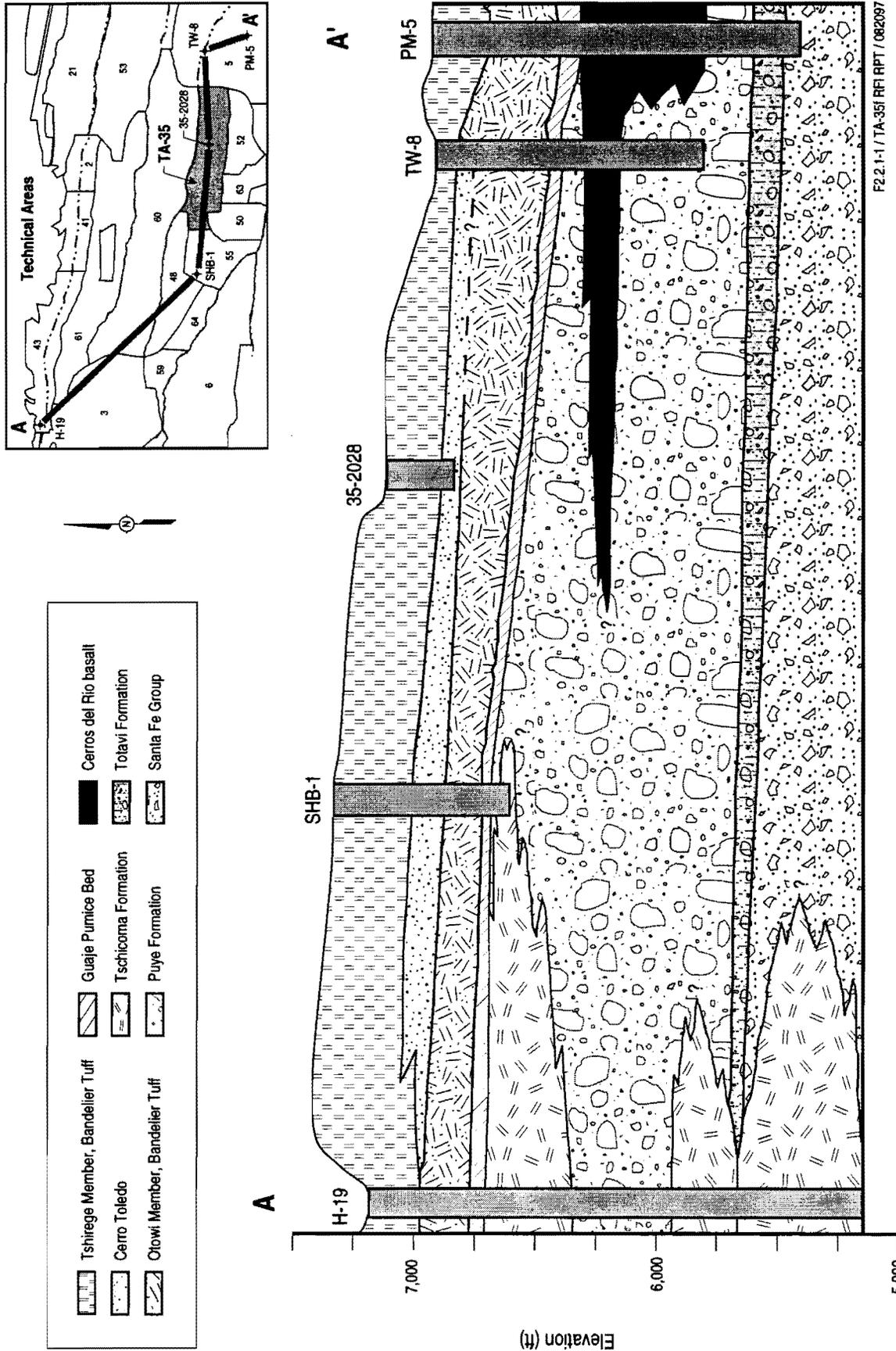
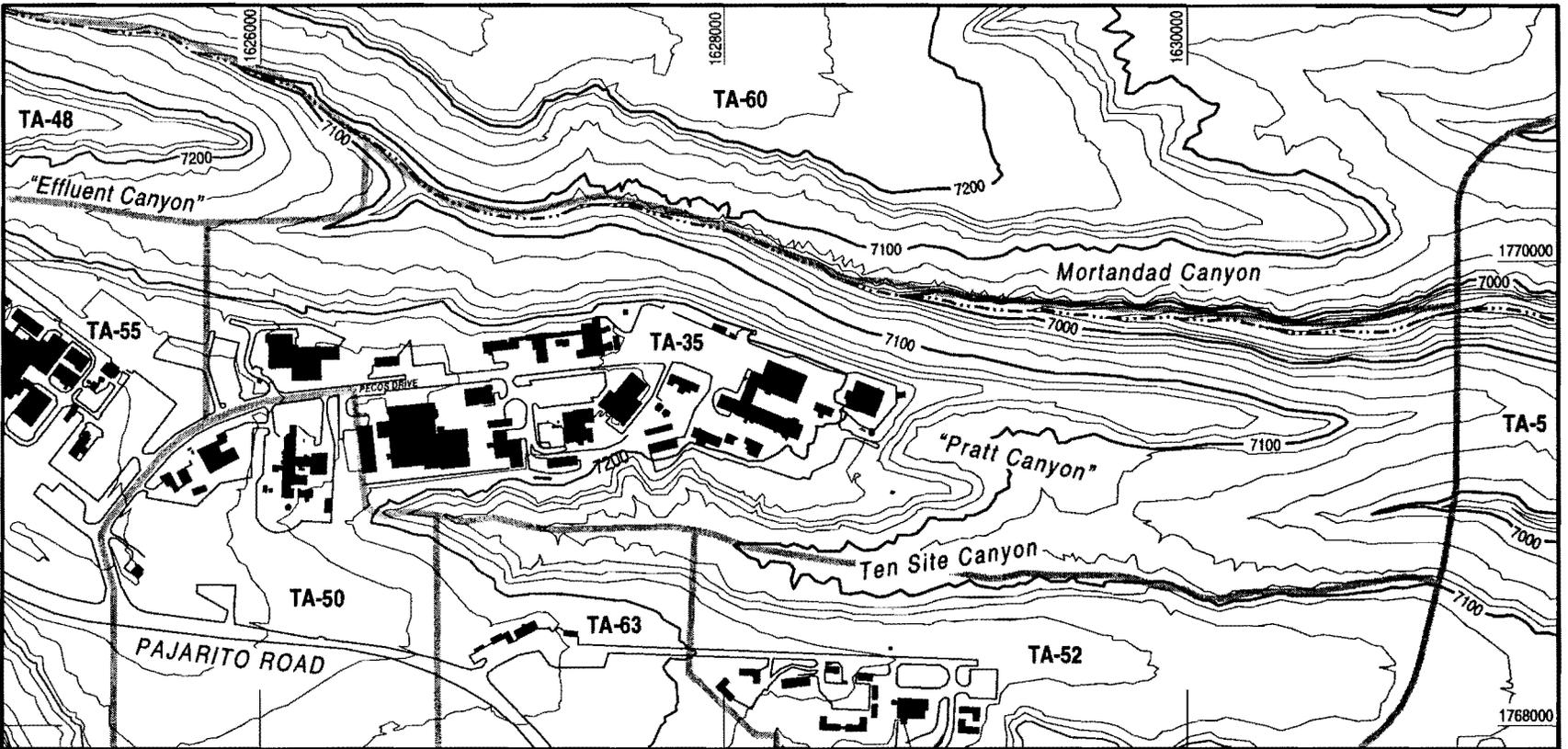
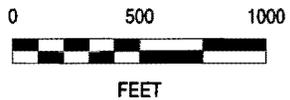


Figure 2.2.1-1. Generalized stratigraphy of TA-35.



Source: FIMAD G104171

F2.3.1-1 / TA-35I RFI RPT / 082097



Coordinates are NMSP NAD-83
Contour interval = 20 ft

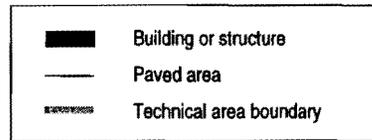


Figure 2.3.1-1. Topography of TA-35.

This page intentionally left blank.

3.0 APPROACH TO SAMPLE ANALYSES AND DATA ASSESSMENT

This document (hereafter referred to as "this addendum") is an addendum to the *RFI Report for Potential Release Sites 35-003(h, j, and k) 35-004(b) 35-008 35-009(a through d) 35-014(a, b, d, e₁, e₂, and f) 35-015(b) 35-016(e, f, and i)* (LANL 1996, 54402) (hereafter referred to as "the May 1996 RFI report") and the *RFI Report for Potential Release Sites 35-004(a, g, h, and m) 35-009(e) 35-014(g, and g₂) 35-016(b, j, n, and q)* (LANL 1996, 54763) (hereafter referred to as "the July 1996 RFI report").

Therefore, the only sections of Chapter 3 that will be included are those for which the information has changed since the RFI reports were published or for which specific applicable information is available.

3.1 Sample Analyses

See the May 1996 RFI report (LANL 1996, 54402) and the July 1996 RFI report (LANL 1996, 54763) for a complete discussion of sample analysis.

3.1.1 Analytical Methods

This addendum contains only the results for radiochemical analyses. A list of the target analytes for which analyses were performed can be found in Appendix A. Table 3.1.1-1 summarizes the analytical methods employed by the internal and external fixed-site laboratories for the radiological analytical suites.

TABLE 3.1.1-1
ANALYTICAL METHODS

Analyte Suite	Fixed-Site Laboratory Analytical Method
²³⁸ Pu, ^{239,240} Pu	Alpha spectrometry
²³⁴ U, ²³⁵ U, ²³⁸ U	Alpha spectrometry
Gamma spectroscopy analytes (²⁴¹ Am, ⁶⁰ Co, ¹³⁷ Cs, and others)	Gamma spectroscopy

The analytical protocols employed by the internal fixed-site laboratories are described in the Laboratory health and environmental chemistry manual (LANL 1993, 31794). Analyses performed by external subcontractor laboratories use methods specified in the Environmental Restoration (ER) Project Sample Management Office analytical subcontracts (LANL 1995, 49738). The analytical subcontracts specify Laboratory-approved methods for radiochemical analyses according to the technologies identified in the subcontract (for example, ²⁴¹Am by alpha spectrometry, tritium by liquid scintillation, or multiple isotopes by gamma spectroscopy). Analytical method selection is described in Appendix IV of the ER Project *Quality Assurance Project Plan Requirements for Sampling and Analysis* (QAPP) (LANL 1996, 53450). For each analyte, quantitation or detection limits are specified as contract-required estimated quantitation limits for radionuclides. These limits are included in Appendix III of the ER Project QAPP along with the target analytes for each analytical suite.

3.1.2 Data Validation

Data verification and baseline validation procedures were used to determine whether data packages received from the analytical laboratory were generated according to specifications and contain the

information necessary to determine data sufficiency for decision-making. The data verification procedure assured that

- analytical results had been received for all samples submitted for analysis,
- the correct analysis had been performed for each sample,
- the analytical data had been reported correctly, and
- all analytical data had been correctly transmitted to the Facility for Information Management, Analysis, and Display (FIMAD).

Appropriate corrective actions were initiated to obtain missing analytical data and to correct errors in the data reporting.

The baseline data validation procedure involves the comparison of quality indicators with clearly defined criteria or limits. Data were qualified (that is, a flag was attached to the data results) for a variety of reasons during the baseline validation procedure. Radiochemistry data were validated according to the acceptance criteria defined in the ER Project statement of work for analytical services (LANL 1995, 49738). During the validation procedure, data that did not meet quality criteria were designated by appropriate qualifier flags.

Qualifiers resulting from the baseline validation procedure are shown for the analytical data presented in the tables included in Chapter 5 of this addendum. An explanation of the data qualifiers is given in Table 3.1.2-1.

TABLE 3.1.2-1

EXPLANATION OF DATA QUALIFIERS USED IN THE BASELINE DATA VALIDATION PROCEDURE

Qualifier	Explanation
U	The analyte was analyzed for but not detected. Reported value is the sample-specific estimated quantitation limit or detection limit.
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 reported value is an estimate and likely to be biased high.
J-	The analyte was positively identified, and the reported value is an estimate and likely to be biased low.
UJ	The analyte was analyzed for but not detected. Reported value is an estimate of the sample-specific quantitation limit or detection limit.
R	The sample results are rejected because of serious deficiencies in the ability to analyze the sample and meet quality control criteria; presence or absence cannot be verified.

A focused data validation may be required as a follow-up to the baseline validation. The purpose of a focused validation is to determine the technical adequacy of measurement data when

- the data are qualified as deficient or as requiring professional judgment during the verification and baseline validation process. For example, when holding times are exceeded or interferences are

present, a focused validation may be required to assist in determining data adequacy for the intended use.

- additional information is required about the
 - variability or uncertainty of the reported data or
 - data quality before making a data use decision because of anomalies detected in a data set.

Details of quality assurance/quality control activities are presented in Chapter 4 of this addendum. Qualifiers resulting from baseline and focused validation are shown in the analytical results tables included in Chapter 5 of this addendum. Summaries of data quality evaluations and focused validation of analytical data relevant to this addendum are given in Appendix B. Rejected data do not appear in the Chapter 5 data tables.

3.2 Process for the Identification of COPCs

After the data validation procedure is complete and the site data are finalized, the next step in the process is to compare site data with available background data to determine whether detected chemicals may be of anthropogenic or natural origin. The results of a focused data validation should exclude from consideration for background comparison any contaminant that is identified as an artifact of an analytical laboratory or field contamination, analytical interference, or improper analyte identification or quantitation. The purpose of this decision step is to determine if chemicals for which natural or anthropogenic background distributions are available should be retained as chemicals of potential concern (COPCs) or eliminated from further consideration.

3.2.1 Inorganic Chemicals

This addendum contains radioisotope data only. Therefore, this section is not applicable.

3.2.2 Radionuclides

Comparing reported radiochemical results to minimum detectable activities (MDAs) and background data is necessary to determine the presence of radionuclides and to distinguish concentrations of radionuclides associated with Laboratory operations from those attributable to global fallout or to naturally occurring background levels.

The ER Project requires that radiochemical data be reported by a laboratory on the basis of a detection test. Therefore, as part of the data validation and data assessment processes, reported results must be evaluated to ensure that only those results that represent detections be used to classify a radionuclide as a COPC. This is typically done by comparing the reported value with the associated MDA if one is reported. When the MDA is not available or does not meet the data quality needs of the ER Project, the reported value will be tested against an estimated MDA. This estimated value is based on the instrument counting error. The counting error is typically reported as the analytical uncertainty at a value of 1-sigma (that is, one standard deviation around the measured value), and the estimated MDA is computed as 3-sigma around the measured value.

Detected radionuclides are retained as COPCs or eliminated from further consideration based on a comparison with natural or anthropogenic background distributions. As discussed in Section 4.2 in

Chapter 4 of this addendum, short-lived isotopes included in the gamma spectroscopy suite for quality assurance purposes are not evaluated as possible contaminants. The radionuclide background data used in this addendum are from the following sources:

- tuff samples collected throughout Los Alamos County for which chemical analyses were performed for certain naturally occurring radioactive chemicals (Longmire et al. 1995, 52227) and
- background soil and sediment concentrations of radioactive chemicals associated with global fallout from atmospheric nuclear testing (^{241}Am , ^{137}Cs , ^{238}Pu , $^{239,240}\text{Pu}$, ^{90}Sr , and tritium) and of certain naturally occurring radioactive chemicals (Ryti et al. 1997, 56186).

Soil samples were not collected from identifiable soil horizons at Technical Area 35 and were often collected from backfill of unknown origin. As recommended in Ryti et al. (1997, 56186), upper tolerance limit (UTL) values calculated using data obtained from canyons sediments were used for background comparison of naturally occurring radionuclides (^{234}U , ^{235}U , and ^{238}U) in soil media. The surface UTL values for fallout radionuclides (^{241}Am , ^{137}Cs , ^{238}Pu , and $^{239,240}\text{Pu}$) were used for soil samples collected in the 0 to 0.5-ft intervals. Fallout radionuclide concentrations in deeper sample intervals were not compared with the surface UTLs because fallout activity is limited to surface soils. However, any fallout radionuclide detected at depths below 0.5 ft is considered to be present above background levels.

The use of UTL values for fallout radionuclides is subject to two qualifications. First, the data set for fallout radionuclides includes data from sampling locations at the perimeter of the Laboratory, which have slightly higher radionuclide levels than regional observations away from the Laboratory. Therefore, these UTLs represent baseline levels that include some contribution from Laboratory operations in addition to atmospheric fallout. In particular, the difference between the perimeter and regional ^{239}Pu concentrations is statistically significant.

Second, the UTLs for fallout radionuclides should apply only to the 0 to 0.5-ft interval of undisturbed soils. However, the UTLs have been applied to the 0 to 0.5-ft intervals of disturbed soils as well, including possible fill materials and sediments. Depending on the origin of current surface soils, fallout radionuclide concentrations below UTL values in the 0 to 0.5-ft interval could be the result of site processes or other Laboratory activities. Conversely, fallout radionuclide concentrations below UTL values in sediments deeper than 0.5 ft could be the result of redeposition of surface soils rather than site releases. Site-specific information regarding soil disturbance and sedimentary processes is generally either unavailable or inconclusive. Applying UTLs for fallout radionuclides to any surface soil is justified from a practical standpoint because the UTL comparison is performed within the context of risk-based decision-making. The origin of a particular radionuclide is not relevant if the concentration is below the baseline value.

Comparisons between site data and background data are initially performed by comparing each observed concentration datum with a radionuclide-specific background screening value that is either the UTL or the maximum reported concentration. These background screening values are derived from Laboratory-wide soil, sediment, and tuff background data, and details on the calculation of these values are presented in Longmire et al. (1995, 52227) and Ryti et al. (1997, 56186). Certain radionuclides in certain media have no Laboratory-wide background data. For these exceptions, potential release site (PRS) sample-specific MDAs are used as nominal background screening values. In this addendum, no detected radionuclides lack background data.

3.2.3 Organic Chemicals

This addendum contains radioisotope data only. Therefore, this section is not applicable.

3.2.4 Risk-Based Screening Assessment

Radionuclides that exceed background levels are compared with screening action levels (SALs) to evaluate the potential for adverse health impacts. SALs for radionuclides are based on residential exposure assumptions and an annual dose limit of 10 mrem. The decision to identify a chemical as a COPC when a SAL is not available is made on a case-by-case basis, taking into account the availability of process knowledge and toxicological information.

If more than one COPC is present at the site, a multiple chemical evaluation (MCE) is performed to determine if the potentially additive effect of chemicals detected below SALs warrants additional investigation. The method for performing an MCE is summarized in the policy document *Risk-Based Corrective Action Process* (Dorries 1996, 55575). These comparisons are the last quantitative steps in the screening assessment process for human health concerns. If COPCs remain after this step, then further evaluation is required. If no COPCs remain after this step and the data set is adequate to support the decision, a recommendation of no further action may be proposed based on human health concerns.

If COPCs remain after the screening assessment, several options exist for the PRS. Additional evaluation may lead to eliminating one or more COPCs without going into a formal risk assessment. The site may be proposed for further sampling to more completely characterize the nature and/or extent of site contamination. A risk assessment may be conducted to determine whether the remaining COPCs present an unacceptable human health risk. The site may be proposed for remediation if it is cost effective to proceed without additional evaluation.

3.3 Human Health Assessment

3.3.1 Risk Due to Naturally Occurring Inorganic Chemicals in Soils (Background)

This section is included in this addendum because it was not included in either the May 1996 RFI report (LANL 1996, 54402) or the July 1996 RFI report (LANL 1996, 54763).

Risk is associated with exposure to inorganic chemicals occurring naturally in soil. Calculation of background risks using the same methodology as site risk estimates provides a frame of reference for risk levels calculated at a site. This information provides a basis for determining risk-based remediation goals, which in some circumstances may be set at target risks comparable to background rather than default values (that is, a cancer risk of 10^{-6} or a hazard index of 1). Background risks can also affect decisions at sites that have chemicals for which there is a toxicity threshold. For some inorganic chemicals, background intakes may be near a toxicity threshold such that incremental intakes associated with contamination may be unacceptable.

Background risk estimates provided in Table 3.3.1-1 were calculated using the same exposure assumptions by which SALs are calculated. SALs are based on EPA Region IX preliminary remediation goal values that employ health-protective assumptions for a residential scenario (EPA 1996, 54899). For soil exposure, the pathways include incidental soil ingestion, inhalation of resuspended dust, and dermal contact with soil. The background soil data used for these calculations were collected from several soil horizons at geographically diverse locations. Background risks are estimated for two statistics. One statistic is the median, which represents the midpoint in the concentration range (technically, the median is the concentration value that divides the results into two equal groups or where half of the data are above and half are below this value). The second statistic represents the upper range on background concentration values and is either a calculated UTL or a maximum concentration value.

TABLE 3.3.1-1

RISK DUE TO BACKGROUND CONCENTRATIONS OF INORGANIC CHEMICALS IN SOIL ASSUMING A RESIDENTIAL SCENARIO^a

Inorganic Chemical	Background Soil Concentration ^b (mg/kg)		Hazard Quotient		Lifetime Cancer Risk	
	Median	UTL	Median	UTL	Median	UTL
Aluminum	10,000	38,700	0.1	0.5	NC ^c	NC
Antimony	0.6	1 ^d	0.02	0.03	NC	NC
Arsenic	4	7.82	0.2	0.4	1x10 ⁻⁵	2x10 ⁻⁵
Barium	130	315	0.03	0.06	NC	NC
Beryllium	0.895	1.95	0.003	0.006	6x10 ⁻⁶	1x10 ⁻⁵
Cadmium ^e	0.2	2.6 ^d	0.005	0.07	1x10 ⁻¹⁰	2x10 ⁻⁹
Chromium ^f	8.6	19.3	0.00009	0.0002	NC	NC
Cobalt	6	19.2	0.001	0.004	NC	NC
Copper	5.75	15.5	0.002	0.01	NC	NC
Lead ^g	12	23.3	0.03	0.06	NC	NC
Manganese	320	714	0.01	0.2	NC	NC
Mercury	0.05	0.1 ^d	0.002	0.004	NC	NC
Nickel	7	15.2	0.005	0.01	NC	NC
Selenium	0.3	1.7 ^d	0.0008	0.005	NC	NC
Thallium	0.2	1 ^d	0.03	0.2	NC	NC
Uranium	0.9	1.87	0.004	0.008	NC	NC
Vanadium	21	41.9	0.04	0.08	NC	NC
Zinc	30.7	50.8	0.001	0.002	NC	NC

a. Risk estimates are based on reference doses, slope factors, and EPA Region 9 default exposure assumptions effective August 1996 (EPA 1996, 54899).
 b. Background concentrations taken from the Longmire et al. all-soils horizon data set (1995, 48818)
 c. NC = noncarcinogen
 d. Maximum detected background value
 e. Cancer risks for cadmium are based solely on inhalation of resuspended dust.
 f. Naturally occurring chromium is assumed to exist in a trivalent state.
 g. Hazard quotient based on biokinetic uptake model

The background risks based on the Laboratory SAL residential exposure model are provided in Table 3.3.1-1. Risks due to background concentration are presented for both noncarcinogenic and carcinogenic outcomes. The potential for adverse noncarcinogenic health effects is estimated by a hazard quotient. A chemical intake leading to a hazard quotient of up to 1 is not associated with adverse health effects. None of the median or UTL background concentrations result in hazard quotients greater than 1.

Three of the background inorganic chemicals provided in Table 3.3.1-1 are also carcinogens. Applying the default exposure assumptions used for SALs, the lifetime cancer risks due to residential soil exposure to background concentrations (UTL column) are estimated at approximately 1 excess case of cancer in 100,000 people for beryllium, 2 in 100,000 for arsenic, and 2 in 1,000,000,000 for cadmium (carcinogenic only by inhalation). EPA uses a range of 1 excess case of cancer in 10,000 people to 1 in 1,000,000 as a guidance for an acceptable range of cancer risk (EPA 1990).

These background risk estimates provide a frame of reference for a risk-based screening assessment and site decisions. If a site-specific risk assessment is necessary to further evaluate risks, background risks can also be calculated using site/scenario-specific assumptions to assist in any remedial action decisions for the site.

3.3.2 Risk Assessment

No human health risk assessments were performed for the PRSs included in this addendum.

3.4 Ecological Assessment

In cooperation with the New Mexico Environment Department and EPA Region 6, the Laboratory ER Project is developing an approach for ecological risk assessment. Further discussion of ecological risk assessment methodology will be deferred until the ecological exposure unit methodology being developed has been approved.

This page intentionally left blank.

4.0 RESULTS OF QUALITY ASSURANCE/QUALITY CONTROL ACTIVITIES

The objective of the Technical Area (TA) -35 Resource Conservation and Recovery Act facility investigation (RFI) is to determine if any chemicals of potential concern are present at a potential release site (PRS). To meet this objective, the radiochemical analytical methods that are summarized in Table 3.1.1-1 in Chapter 3 of this addendum were applied; results for inorganic and organic chemicals are not included. Quality control (QC) procedures were implemented in the analytical laboratory to provide estimates of the bias and precision of the radiochemical measurements. The following specific QC samples and procedures were used to assess bias: laboratory blank samples, tracer recovery, performance evaluation (PE) samples, and laboratory control samples (LCSs). The specific QC samples and procedures used to assess precision were laboratory duplicate samples.

QC samples were also collected in the field to provide information regarding sampling procedure bias. Field QC samples included bottle blanks and equipment rinse blanks. The results of analysis of the field QC samples indicated that no bias or false positive results were introduced because of field sampling procedures.

This addendum presents the results of radiochemical analyses performed for PRS Nos. 35-004(a, g, and h) and 35-009(e); the other PRSs are not included because radiochemical analyses were not performed for those PRSs. A specific discussion of the sample results presented in this addendum appears in Section 4.2. The results for individual samples were qualified by evaluation of the above listed QC parameters as described in Section 3.1.2 in Chapter 3 of this addendum. Qualifiers resulting from the validation process are defined in Table 3.1.2-1 and are shown in the analytical tables in Chapter 5 of this addendum.

Details regarding the qualification of analytical results for individual samples are given in Appendix B of this addendum.

4.1 Inorganic Analyses

Results for inorganic analyses are not presented in this addendum. A discussion of QC activities for inorganic analyses associated with the PRSs included in this addendum can be found in the May 1996 RFI report (LANL 1996, 54402) and the July 1996 RFI report (LANL 1996, 54763).

4.2 Radiochemical Analyses

Soil samples collected at TA-35 underwent one or more of the radiochemical analyses listed in Table 3.1.1-1 in Chapter 3 of this addendum. The results for the analysis of 12 soil samples by alpha spectrometry and 24 soil samples by gamma spectroscopy (collected at PRS Nos. 35-004[a, g, and h] and 35-009[e]) were evaluated for this addendum. Gamma spectroscopy and alpha spectrometry were performed at both internal and external fixed-site laboratories. The radionuclides analyzed by alpha spectrometry were ^{238}Pu , $^{239,240}\text{Pu}$ (unresolved isotopes), ^{234}U , ^{235}U , and ^{238}U .

The analyte list, minimum detectable activities (MDAs), and analytical methods employed for the fixed-site laboratory radiochemical analyses are given in Table 4.2-1. A comparison of the MDAs and Laboratory soil screening action levels (SALs) indicates that the radiochemical methods employed were sufficiently sensitive to detect potential radiological contaminants in soil at concentrations below SAL values. The required QC procedures and acceptance criteria are given in the Environmental Restoration (ER) Project analytical services statement of work (LANL 1995, 49738). The analytical protocols used were either Laboratory internal protocols (LANL 1993, 31794) or external protocols, which have much in common with

the Laboratory radiochemistry methods. The radiochemistry procedures will vary somewhat from laboratory to laboratory because of the lack of promulgated radiological protocols. No holding time requirements exist for the radiochemical analyses.

TABLE 4.2-1
ANALYTE LIST, MINIMUM DETECTABLE ACTIVITIES, AND
ANALYTICAL METHODS FOR RADIONUCLIDE CONSTITUENTS IN TA-35 SOIL SAMPLES

Analyte	Half-Life (yr)	Detected Emission	MDA (pCi/g)	Soil SAL (pCi/g)	Analytical Method
^{239}Pu	87.7	α	0.05	27	α -Spectrometry
$^{239,240}\text{Pu}^a$	2.410×10^4	α	0.05	24	α -Spectrometry
^{234}U	2.46×10^5	α	0.05	13	α -Spectrometry
^{235}U	7.04×10^8	α	0.05	10	α -Spectrometry
^{238}U	4.47×10^9	α	0.05	67	α -Spectrometry
Gamma spectroscopy analytes	Varies ^b	γ	0.2 ^c	Varies ^b	γ -Spectroscopy

a. The ^{239}Pu and ^{240}Pu isotopes cannot be distinguished by alpha spectrometry. The half-life of ^{239}Pu is given.
 b. Gamma spectroscopy analytes measured in TA-35 soils are listed in Table 4.2.2-1.
 c. The MDA for ^{241}Am and ^{137}Cs is 0.2 pCi/g; the value for other analytes will vary.

4.2.1 Determination of Detection Status

Reporting formats for radiochemical data vary from laboratory to laboratory. All radiochemical data evaluated for this addendum were generated by external fixed-site laboratories before April 1995. The total propagated uncertainty (TPU), which includes all sources of variability arising from sample preparation and measurement error, is reported with the sample results. The 1-sigma TPU values are reported as the analytical uncertainty and can be used to estimate the detection status. Following the recommendation given in Rytí et al. (1997, 56186), the MDA is estimated as three times the reported uncertainty value. Therefore, detection status was estimated from the uncertainty values reported with the sample results. Any result less than or equal to three times the reported 1-sigma TPU value is considered to be nondetected. Nondetected values are indicated by the U flag in the data tables in Chapter 5 of this addendum.

If the measured activity of a particular radionuclide is at or near background levels, the analytical results will exhibit a statistical distribution of both positive and negative numbers near zero activity. Negative values may result when the measured background value, usually determined by analysis of a blank sample, is subtracted from the measured value for the sample. Both the blank (background) value and the sample value have an associated uncertainty; therefore, a finite probability exists that a negative value may result when the background correction is performed. A negative value has no physical significance for an individual measurement but may be included in a larger data set to establish the distribution of values. The data set for TA-35 includes some negative activity values; however, in many cases negative values were simply reported as zero activity.

4.2.2 Gamma Spectroscopy Measurements

During the initial Phase I RFI sample collection effort, gamma spectroscopy measurements were performed at a mobile laboratory. A small percentage of the samples were also analyzed at a fixed-site

laboratory. It was subsequently determined that the mobile laboratory gamma spectroscopy results are unusable to determine the nature of gamma-emitting radionuclide contamination (Pratt 1997, 55802). No mobile laboratory data are presented in Chapter 5 of this addendum.

Gamma spectroscopy was performed at fixed-site laboratories for the limited suite of analytes summarized in Table 4.2.2-1. The analytical suite consisted of the following nine radionuclides: ^{241}Am , ^{60}Co , ^{22}Na , and ^{237}Np (activation products) and ^{140}Ba , ^{144}Ce , ^{137}Cs , ^{152}Eu , and ^{106}Ru (fission products). These nine radionuclides were chosen to be representative of the activation and fission products that may be present as a result of Laboratory operations at TA-35. Two of these radionuclides, ^{140}Ba and ^{144}Ce , have half-lives less than 365 days. These short-lived radionuclides are not evaluated as primary radionuclides because they decay to unmeasurable concentrations within the span of several years or less.

TABLE 4.2.2-1

RADIONUCLIDES MEASURED BY GAMMA SPECTROSCOPY IN TA-35 SOIL SAMPLES

Radionuclide	Half-Life *	Emissions	SAL (pCi/g)
Activation products (and their decay products)			
^{241}Am	432.7 y	α, γ	22
^{60}Co	5.271 y	β, γ	1.1
^{22}Na	2.605 y	β, γ	1.3
^{237}Np	2.14×10^6 y	α, γ	1.9
Fission products			
^{140}Ba	12.75 d	β, γ	N.A.
^{144}Ce	284.6 d	β, γ	56
^{137}Cs	30.17 y	β, γ	5.1
^{152}Eu	13.48 y	β, γ	2.6
^{106}Ru	372.6 d	β	13
*d = days, y = years			

The gamma spectroscopy results for one soil sample collected at Location ID No. 35-2100 in PRS No. 35-004(g) have been qualified as estimated and biased high (J+ flag) because there was insufficient sample to completely fill the calibrated container used for the gamma spectroscopy measurement.

4.2.3 Results of QC Activities

The accuracy of the radiochemical measurements was monitored for each analytical batch by the analysis of single-blind PE samples (submitted by the ER Project Sample Management Office for samples collected before 1995) or LCSs traceable to the National Institute of Standards and Technology (supplied by the analytical laboratory). For individual samples, if the recovery from the LCS or PE sample was not within 20% of the true value, the associated sample results were qualified as estimated (J flag). For sample results included in this addendum, recoveries from both the PE samples and LCSs were all within 20% of the true value.

The precision of the measurements was monitored by the analysis of laboratory duplicate samples. The Environmental Protection Agency (EPA) guidelines for inorganic data review (EPA 1994, 48639) were

applied to the evaluation of the radiochemical duplicate samples. The EPA guidelines suggest a control criteria of $\pm 35\%$ relative percent difference (RPD) for the assessment of duplicate sample results because laboratory variability arising from the subsampling of heterogeneous soil samples is a common occurrence. If the RPD between the regular and duplicate sample results exceeded 35%, the sample results were qualified as estimated (J flag). For the soil sample collected at Location ID No. 35-2024 in PRS No. 35-004(h), the RPD for the duplicate analysis of ^{235}U was 39%. Therefore, the ^{235}U result for this sample should be regarded as estimated (J flag).

The accuracy of the alpha spectrometry measurements was monitored by the addition of tracer isotopes during the sample preparation steps. The reported sample results are corrected for the chemical yield of the tracer isotope to account for matrix effects and losses during sample preparation. Sample results were qualified as estimated and biased low (J- flag) if the tracer recovery was less than 30% because a very low tracer recovery may indicate an unusual occurrence during analysis. If the tracer recovery was less than 10%, the sample results were rejected (R flag). The tracer recoveries for samples evaluated for this addendum were all greater than 30%.

The analytical protocols for measuring alpha-emitting radionuclides require that a method blank be prepared and analyzed concurrently with each analytical batch. Blank contamination should not exceed the MDA value. In keeping with guidance given in *Risk Assessment Guidance for Superfund, Volume I* (EPA 1989, 8021), the sample results were qualified as estimated and biased high (J+ flag) if blank contamination was present. No blank contamination was observed in the analysis of the samples evaluated for this addendum.

4.3 Organic Analyses

Results for organic analyses are not presented in this addendum. A discussion of QC activities for organic analyses associated with the PRSs included in this addendum can be found in the May 1996 RFI report (LANL 1996, 54402) and the July 1996 RFI report (LANL 1996, 54763).

5.0 SPECIFIC RESULTS, CONCLUSIONS, AND RECOMMENDATIONS

This document is an addendum to the *RFI Report for Potential Release Sites 35-003(h, j, and k) 35-004(b) 35-008 35-009(a through d) 35-014(a, b, d, e₁, e₂, and f) 35-015(b) 35-016(e, f, and i)* (LANL 1996, 54402) (hereafter referred to as "the May 1996 RFI report") and the *RFI Report for Potential Release Sites 35-004(a, g, h, and m) 35-009(e) 35-014(g₁ and g₂) 35-016(b, j, n, and q)* (LANL 1996, 54763) (hereafter referred to as "the July 1996 RFI report"). Because those reports followed previous guidance, all applicable sections of Chapter 5 have been included in this addendum to ensure compliance with the current *Resource Conservation and Recovery Act Facility Investigation (RFI) Report Framework Policy* (LANL 1996, 56386).

5.1 PRS Nos. 35-004(a) and 35-009(e)

Potential Release Site (PRS) No. 35-004(a) is a former container storage area located at the southeast corner of the Sodium Building (TA-35-25). PRS No. 35-009(e) is a drain line from TA-35-25 that discharged to an outfall in Ten Site Canyon. These PRSs are included in the same decision set because they are located in such close proximity that contaminants associated with the container storage area, if any, would intermingle with contaminants below the outfall discharge area. Therefore, they cannot be evaluated independently.

No radionuclide chemicals of potential concern (COPCs) were identified during the human health screening assessment. However, ²³⁸Pu and ^{239,240}Pu were measured at concentrations greater than or equal to the background upper tolerance limit (UTL) values. These radionuclides are discussed in Section 5.1.6. A summary of samples submitted for radiological analyses is shown in Section 5.1.4.

PRS Nos. 35-004(a) and 35-009(e) are recommended for no further action (NFA) for human health based on NFA Criterion 5 (LANL 1996, 54943).

5.1.1 History

PRS Nos. 35-004(a) and 35-009(e) are discussed in detail in Section 3.3.2 of the *RFI Work Plan for Operable Unit 1129* (LANL 1992, 7666) (hereafter referred to as "the work plan") and Section 7.24 of the June 1994 addendum to the work plan (Pratt 1994, 43475). Results of the Phase I investigation are presented in the July 1996 RFI report (LANL 1996, 54763).

PRS No. 35-004(a) reportedly stored solvents (including Stoddard solvent) and oil (LANL 1990, 7511). Releases were apparent during the 1990 site inspection; however, it has been reported that this area was cleaned up (LANL 1992, 7666).

PRS No. 35-009(e) is a drain line from TA-35-25 that discharged to an outfall in Ten Site Canyon, which was located 30 ft south of the building (LANL 1990, 7511). However, the location of the outfall is covered with asphalt, and the status of the drain line is unknown.

The potential contaminants evaluated during the activities described in this addendum included alpha- and gamma-emitting radionuclides.

Historical information indicates that radiological contamination associated with these PRSs is unlikely. TA-35-25 did not process radioactive materials, and no historical evidence exists to suggest that any radioactive materials were ever stored at the container storage area. The existing sample locations at the container storage area were biased to areas where contamination would be expected to accumulate. It is

also unlikely that radionuclide contamination is associated with the outfall. The existing sample locations at the outfall were placed at the locations most likely to contain residual contamination based on historical drawings and current site drainage. Additional sampling for the outfall and drainage path from the storage area was not proposed because there is no basis for selecting additional locations.

5.1.2 Description

Several obvious oil spills are present on the asphalt. At the time of the RFI, no storage containers were present; however, a temporary, metal, hazardous storage building (TA-35-386) was present. Oil stains on the asphalt protrude from beneath TA-35-386, which is located adjacent to the site of PRS No. 35-004(a).

Engineering drawings show that the drain line associated with PRS No. 35-009(e) exited southward from the center of TA-35-25 perpendicular to the building. The area south of TA-35-25 is now completely paved for a distance of 50 ft with asphalt that serves as a small parking area and access road. At a distance of 30 ft south of TA-35-25, a 3-ft vertical slope separates the parking area from the access road. This slope may have been the area of the outfall.

A natural drainage is present at the edge of the asphalt-paved access road approximately 50 ft south of TA-35-25. The drainage handles storm water runoff from the parking area and container storage area, which is discharged southward into Ten Site Canyon. Flow through the drainage is intermittent and sourced by natural precipitation. The area is heavily vegetated with thick shrubs, a few pine trees, pine needles, and leaves. The vegetation appears to be normal and healthy.

5.1.3 Previous Investigations

No previous investigations have been performed at this site.

5.1.4 Field Investigation

The objective of the Phase I RFI was to characterize the nature of potential contamination associated with the container storage area and outfall.

The conceptual model for the RFI predicted that (1) spilled material would have flowed downslope on the asphalt pad and infiltrated surface soils at the edge of the storage area through cracks in the asphalt and (2) the outfall discharge would have flowed southward over surface soils. Potential contaminants present could be mobilized by surface runoff into the drainage toward the edge of the mesa.

A judgmental sampling approach was used, and the sampling activities were biased toward areas where residual contamination was expected to collect. One hand-auger hole was drilled, and two surface samples were collected in stained areas at discontinuities in the asphalt near PRS No. 35-004(a). One hand-auger hole was situated to sample beneath the asphalt at PRS No. 35-009(e), and two surface samples were collected within the drainage channel located south of the asphalt-paved access road in the pathway of storm water runoff.

Field activities included a health and safety (H&S) radiation survey, engineering surveys, and environmental surveys including a radiation grid survey.

Field screening during site surveys and sample collection activities was performed using a Foxboro 128 GC organic vapor analyzer (OVA), a Ludlum Model 139 meter with an air-proportional alpha probe, and an Eberline ESP-1 meter with beta/gamma probe model HP-260. Using this instrumentation, background

radiation measurements for Technical Area (TA) -35 typically range from 200 to 500 counts per minute (cpm) beta/gamma radiation depending on the location and substrate rock type. Field screening measurements greater than 500 cpm beta/gamma radiation were generally considered to be above background levels. No beta/gamma radiation measurements above background levels were obtained during field screening at this site, and no alpha radiation or organic vapors were detected.

5.1.4.1 Environmental and Engineering Surveys

The H&S radiation survey was performed on June 2, 1994. Beta/gamma radiation measurements at these PRSs ranged from 215 to 247 cpm, and the average was 231 cpm, which is within background levels.

Engineering surveys were performed on June 2, 1994, June 8, 1994, and January 18, 1995. The surveys consisted of reviews of archival information and engineering drawings of TA-35 as well as field site inspections. The container storage area and the suspected location of the outfall were located, and the conditions at the sites were documented. During the site inspection, several oil stains were noted at the container storage area. A surface drainage pathway from the outfall area and container storage area was located. Sample sites were staked in the surface drainage pathways at the edge of the asphalt, at the suspected location of the outfall, and within stained areas at the container storage area.

The radiation grid survey was performed on September 7, 1994. The radiation grid locations included Location ID Nos. 35-7614 through 35-7636, which were spaced at approximately 20-ft intervals. Beta/gamma radiation measurements ranged from 169 to 279 cpm, and the average was 212 cpm, which is within background levels.

5.1.4.2 Deviations from the Sampling and Analysis Plan

Sampling activities for PRS No. 35-004(a) followed the original sampling and analysis plan (SAP), which is described in the June 1994 addendum to the work plan (Pratt 1994, 43475). The SAP for PRS No. 35-009(e), also described in the June 1994 addendum to the work plan (Pratt 1994, 43475), specifies that one hand-auger hole and two surface samples would be collected. However, the SAP does not specify sample locations. The hand-auger hole was located in the former outfall area, and the two surface samples were located in the drainage area beneath the former outfall.

5.1.4.3 Sampling Activities

Phase I sampling was performed on March 3, 1995. Six locations were sampled, and 10 soil samples were collected. Four surface samples were collected (Location ID Nos. 35-2097, 35-2098, 35-2103, and 35-2104), and two hand-auger holes were drilled to a depth of 3 ft (Location ID Nos. 35-2099 and 35-2105). The sample collection intervals are shown in Table 5.1.4-1. Beta/gamma radiation measurements obtained during field screening of the samples ranged from 190 to 255 cpm, which are within background levels.

Table 5.1.4-1 summarizes all sampling for PRS Nos. 35-004(a) and 35-009(e); Figure 5.1.4-1 shows the sample locations.

5.1.5 Evaluation of Inorganic Chemicals

The results of inorganic chemical analyses for PRS Nos. 35-004(a) and 35-009(e) are presented in the July 1996 RFI report (LANL 1996, 54763).

TABLE 5.1.4-1
SUMMARY OF SAMPLES TAKEN AT PRS Nos. 35-004(a) AND 35-009(e)*

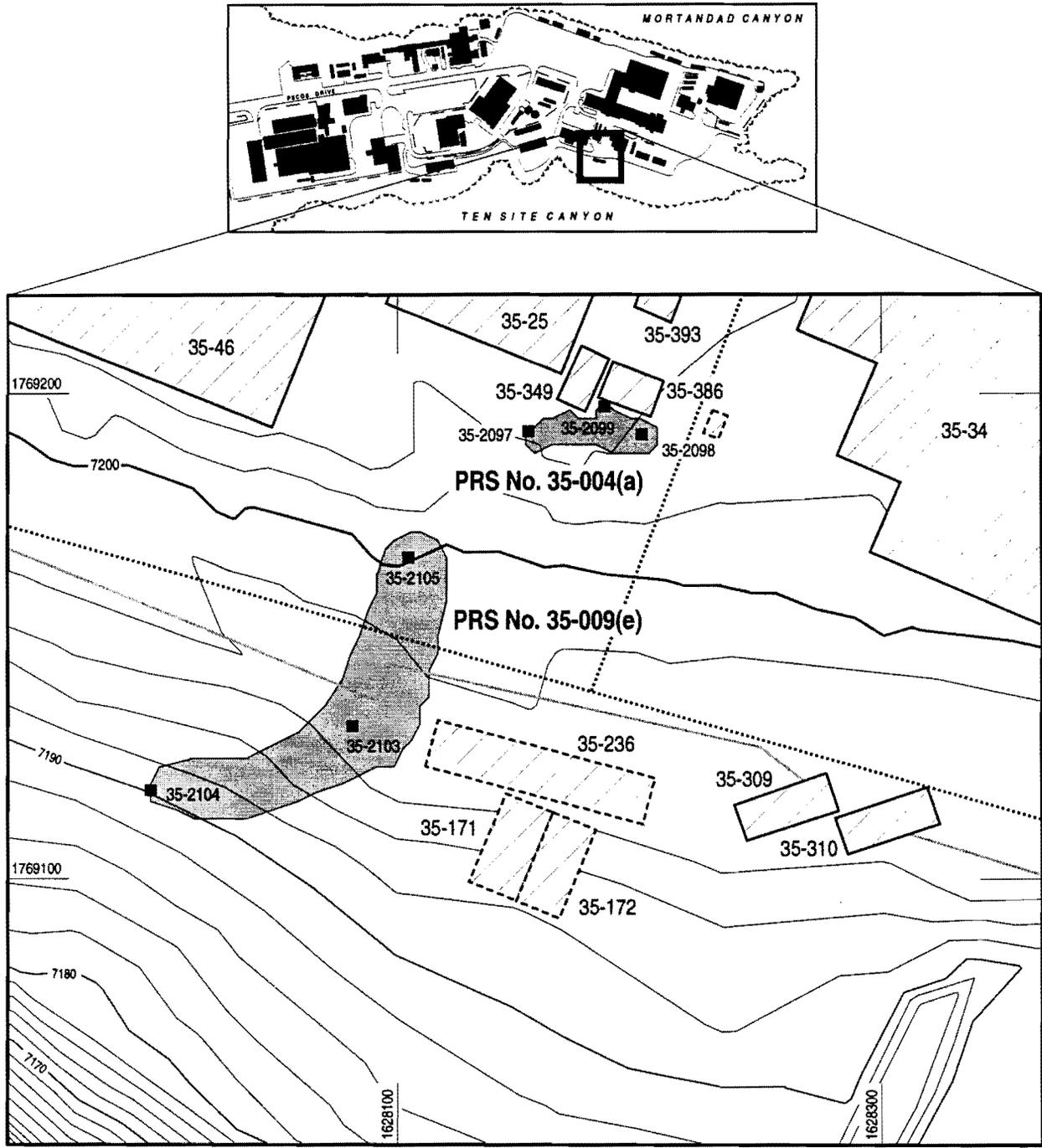
Part 1										
PRS	Location ID	Sample ID	Depth (ft)	Media	VOCs Mobile Lab	VOCs Fixed Lab	SVOCs Fixed Lab	PAHs Mobile Lab	PCBs Mobile Lab	Pesticides/ PCBs Fixed Lab
35-004(a)	35-2097	AAC1153	0-0.5	Soil	21483	NR	NR	21483	21483	NR
35-004(a)	35-2098	AAC1154	0-0.5	Soil	21483	NR	NR	21483	21483	NR
35-004(a)	35-2099	AAC1155	0-1	Soil	21483	NR	NR	21483	21483	NR
35-004(a)	35-2099	AAC1156	1-2	Soil	21483	NR	NR	21483	21483	NR
35-004(a)	35-2099	AAC1157	2-3	Soil	21483	NR	NR	21483	21483	NR
35-009(e)	35-2103	AAC1158	0-0.5	Soil	21483	21466	NR	21483	21483	NR
35-009(e)	35-2104	AAC1159	0-0.5	Soil	21483	NR	NR	21483	21483	NR
35-009(e)	35-2105	AAC1160	0-1	Soil	21483	NR	NR	21483	21483	NR
35-009(e)	35-2105	AAC1161	1-2	Soil	21483	NR	NR	21483	21483	NR
35-009(e)	35-2105	AAC1162	2-3	Soil	21483	NR	21466	21483	21483	21466
Part 2										
PRS	Location ID	Sample ID	Depth (ft)	Media	XRF Mobile Lab	Inorganic Fixed Lab	Gamma Spec	Iso-Pu	Iso-U	
35-004(a)	35-2097	AAC1153	0-0.5	Soil	21484	NR	NR	21468	21468	
35-004(a)	35-2098	AAC1154	0-0.5	Soil	21484	NR	NR	21468	21468	
35-004(a)	35-2099	AAC1155	0-1	Soil	21484	NR	NR	NR	NR	
35-004(a)	35-2099	AAC1156	1-2	Soil	21484	NR	NR	NR	NR	
35-004(a)	35-2099	AAC1157	2-3	Soil	21484	NR	NR	NR	NR	
35-009(e)	35-2103	AAC1158	0-0.5	Soil	21484	NR	21648	21468	21468	
35-009(e)	35-2104	AAC1159	0-0.5	Soil	21484	NR	NR	21468	21468	
35-009(e)	35-2105	AAC1160	0-1	Soil	21484	21467	NR	NR	NR	
35-009(e)	35-2105	AAC1161	1-2	Soil	21484	NR	NR	NR	NR	
35-009(e)	35-2105	AAC1162	2-3	Soil	21484	NR	NR	NR	NR	

*The numbers in the analytical suite columns are analytical request numbers.

5.1.6 Evaluation of Radionuclides

The radionuclides analyzed for at PRS Nos. 35-004(a) and 35-009(e) include isotopic plutonium, isotopic uranium, and gamma-emitting radionuclides. Mobile laboratory gamma spectroscopy analyses were performed for every sample shown in Table 5.1.4-1; however, they were determined unusable to establish the nature of gamma-emitting radionuclide contamination (Pratt 1997, 55802). One surface soil sample (Location ID No. 35-2103) was analyzed using gamma spectroscopy at a fixed-site laboratory, and four surface soil samples (Location ID Nos. 35-2097, 35-2098, 35-2103, and 35-2104) were analyzed for isotopic plutonium and isotopic uranium at a fixed-site laboratory. No data quality concerns were noted in the validation process for the radionuclide data set.

Background comparisons were performed for radionuclides for which UTL values are available, as discussed in Section 3.2 in Chapter 3 of this addendum. The only radionuclides detected at values greater than or equal to UTL values are ²³⁸Pu and ^{239,240}Pu. The outlined boxes in Table 5.1.6-1 show isotopic plutonium values that are greater than or equal to their UTL values.



Source: FIMAD G104689

F5.1.4-1 / TA-35I RFI RPT / 092297



Coordinates are NMSP NAD-83
Contour interval = 2 ft

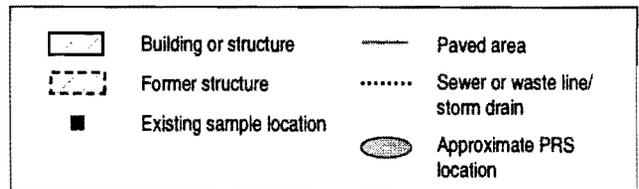


Figure 5.1.4-1. Locations of PRS Nos. 35-004(a) and 35-009(e) samples.

TABLE 5.1.6-1
RADIONUCLIDES WITH CONCENTRATIONS AT OR ABOVE
BACKGROUND SCREENING VALUES FOR PRS Nos. 35-004(a) AND 35-009(e)*

PRS	Location ID	Sample ID	Depth (ft)	Media	Pu-238 (pCi/g)	Pu-239,240 (pCi/g)
Soil SAL	N/A	N/A	N/A	N/A	27	24
Surface UTL	N/A	N/A	N/A	N/A	0.023	0.054
35-004(a)	35-2097	AAC1153	0-0.5	Soil	0.0 U	0.01 U
35-004(a)	35-2098	AAC1154	0-0.5	Soil	0.02	0.02
35-009(e)	35-2103	AAC1158	0-0.5	Soil	-0.02 U	0.01 U
35-009(e)	35-2104	AAC1159	0-0.5	Soil	0.0 U	0.06

*Qualifiers used in table are defined in Section 3.1.2.

Table 5.1.6-1 shows that ^{238}Pu was detected at a concentration of 0.02 pCi/g (Location ID No. 35-2103), which is considered equal to the UTL of 0.023 pCi/g because of the number of significant digits reported in the site data. The table also shows that $^{239,240}\text{Pu}$ was detected at a concentration of 0.06 pCi/g (Location ID No. 2104), which exceeds its UTL value of 0.054 pCi/g.

5.1.7 Evaluation of Organic Chemicals

The results of organic chemical analyses for PRS Nos. 35-004(a) and 35-009(e) are presented in the July 1996 RFI report (LANL 1996, 54763).

5.1.8 Risk-Based Screening Assessment

Two radionuclides were carried forward from the background comparison. Both radionuclides carried forward from the background comparison in Section 5.1.6 have soil screening action level (SAL) values for comparison. Each detected radionuclide was measured at concentrations below its respective SAL value. The multiple chemical evaluation (MCE) calculation for ^{238}Pu and $^{239,240}\text{Pu}$ yielded a result of 0.003, well below the threshold of 1.0 at which additive effects may be a concern. The normalized values for the MCE are shown in Table 5.1.8-1.

5.1.9 Human Health Risk Assessment

A human health risk assessment was not performed for PRS Nos. 35-004(a) and 35-009(e) because no radionuclide COPCs were identified during the human health risk-based screening assessment.

5.1.10 Preliminary Ecological Assessment

In cooperation with the New Mexico Environment Department (NMED) and Environmental Protection Agency (EPA) Region 6, the Laboratory Environmental Restoration (ER) Project is developing an approach for ecological risk assessment. Further ecological risk assessment at these sites will be deferred until the sites can be assessed as part of the ecological exposure unit methodology currently being developed.

TABLE 5.1.8-1**MULTIPLE CHEMICAL EVALUATION FOR SOIL SAMPLES AT PRS Nos. 35-004(a) AND 35-009(e)^a**

Carcinogenic Effects of Radionuclides					
Analyte	Location ID	Sample ID	Maximum Sample Value	Soil SAL	Normalized Value
Plutonium-238	35-2098	AAC1154	0.02	27	0.0007
Plutonium-239/240	35-2104	AAC1159	0.06	24	0.003
Normalized Sum^b					0.003
a. pCi/g					
b. May not equal sum of tabulated values due to rounding.					

5.1.11 Conclusions and Recommendations

The objective of the Phase I RFI at PRS Nos. 35-004(a) and 35-009(e) was to determine the presence or absence of contamination associated with the container storage area and drain line at TA-35-25. Radionuclides were not identified as COPCs at these PRSs, as discussed in Section 5.1.8. Radiological sample data indicate that these sites are not likely to pose a significant human health risk now or in the foreseeable future.

PRS Nos. 35-004(a) and 35-009(e) are proposed for NFA based on NFA Criterion 5 (LANL 1996, 54943). A Class III permit modification will be requested to remove these sites from the Hazardous and Solid Waste Amendments (HSWA) Module of the Laboratory's Resource Conservation and Recovery Act (RCRA) operating permit.

Further ecological risk assessment will be deferred, as stated in Section 5.1.10.

5.2 PRS No. 35-004(b)

PRS No. 35-004(b) is a former container storage area located at the northeast corner of the Chemical Laser Facility (TA-35-85). Containers including drums, buckets, gas cylinders, and pallets were stored at the site.

The May 1996 RFI report (LANL 1996, 54402) stated that the potential for radionuclide contamination would be evaluated in a later report; therefore, PRS No. 35-004(b) is included in this addendum. Radiochemical analyses were not performed because radionuclide contaminants were determined to be of no potential concern at this PRS based on the historical information presented in the work plan (LANL 1992, 7666), the June 1994 addendum to the work plan (Pratt 1994, 43475), and additional archival research.

PRS No. 35-004(b) is recommended for NFA for human health based on NFA Criterion 5 (LANL 1996, 54943).

5.2.1 History

PRS No. 35-004(b) is discussed in detail in Section 3.3.2 of the work plan and Section 7.25 of the June 1994 addendum to the work plan (LANL 1992, 7666; Pratt 1994, 43475). Results of the Phase I investigation are presented in the May 1996 RFI report (LANL 1996, 54402).

Archival photographs from 1974 show that the pad for TA-35-85 was being put in place at that time. The container storage area has been used to store acetone, alcohol, solvents, oils, and rags. It has probably been in use since the completion of TA-35-85 in 1977. During an ER Project site reconnaissance in 1988, oil stains were reported at this PRS, which were probably located on the asphalt (LANL 1992, 7666).

The potential contaminants evaluated during the activities described in this addendum included radionuclides.

5.2.2 Description

PRS No. 35-004(b) is an asphalt-paved area approximately 25 ft wide and 35 ft long located approximately 10 ft from the northern edge of Ten Site Mesa where a container storage area was located. The PRS is adjacent to a loading door on the east exterior wall of TA-35-85. A temporary metal storage building (TA-35-412), which houses a compressor, is located at the site. Photographs from 1986 confirm the presence of the asphalt-covered container storage and loading area where this PRS is located. Because the area is used for loading and thus receives truck traffic, it is likely that the asphalt has been in place since the building was first erected. The topography of the area is relatively flat and drains northward onto backfill soil material at the edge of the mesa.

5.2.3 Previous Investigations

No previous investigations have been performed at this site.

5.2.4 Field Investigation

The objective of the Phase I RFI was to determine the nature of potential contamination associated with the container storage area.

The conceptual model for the RFI predicted that spilled material would have flowed downgradient on the asphalt pad and infiltrated surface soils at the edge of the storage area. Potential contaminants present could be mobilized by surface runoff toward the edge of the mesa. A judgmental sampling approach was used, and the sampling activities were biased toward areas where residual contamination was expected to collect. Two hand-auger holes were located in soil materials at the edge of the asphalt in the path of the surface storm water runoff.

Field activities included an H&S radiation survey, engineering surveys, and environmental surveys including a radiation grid survey.

Field screening during site surveys and sample collection activities was performed using a Foxboro 128 GC OVA, a Ludlum Model 139 meter with an air-proportional alpha probe, and an Eberline ESP-1 meter with beta/gamma probe model HP-260. Using this instrumentation, background radiation measurements for TA-35 typically range from 200 to 500 cpm beta/gamma radiation depending on the location and substrate rock type. Field screening measurements greater than 500 cpm beta/gamma radiation were generally considered to be above background levels. No beta/gamma radiation measurements above background levels were obtained during field screening at this site, and no alpha radiation or organic vapors were detected.

5.2.4.1 Environmental and Engineering Surveys

The H&S radiation survey was performed on September 8, 1994. Beta/gamma radiation measurements at this PRS ranged from 206 to 210 cpm, and the average was 207 cpm, which is within background levels.

Engineering surveys were performed from September 8, 1994, through September 12, 1994, and on March 10, 1995. The surveys consisted of reviews of archival information, oblique photographs, aerial photographs, and engineering drawings of TA-35 as well as field site inspections. The container storage area was located, and the conditions at the site were documented. During the site inspection, a few 6-in.-diameter oil stains were observed on the asphalt, but no significant spills or stains were noted. Several empty 42-gal. and 55-gal. drums were present, and a compressor was noted in TA-35-412. Two surface drainage pathways from the storage site were located, and the sample sites were staked in the surface drainage pathways at the edge of the asphalt.

The radiation grid survey was performed on September 9, 1994. The radiation grid locations included Location ID Nos. 35-7637 through 35-7660, which were spaced at approximately 20-ft intervals. Beta/gamma radiation measurements ranged from 182 to 304 cpm, and the average was 228 cpm, which is within background levels.

5.2.4.2 Deviations from the Sampling and Analysis Plan

Sampling activities followed the original SAP, which is described in the June 1994 addendum to the work plan (Pratt 1994, 43475).

5.2.4.3 Sampling Activities

Phase I sampling was performed on March 27, 1995. Six soil samples were collected. Two hand-auger holes (Location ID Nos. 35-2120 and 35-2121) were drilled to a depth of 3 ft. The sample collection intervals are shown in Table 5.2.4-1. Beta/gamma radiation measurements obtained during field screening of the samples ranged from 186 to 282 cpm, which are within background levels.

TABLE 5.2.4-1
SUMMARY OF SAMPLES TAKEN AT PRS No. 35-004(b)*

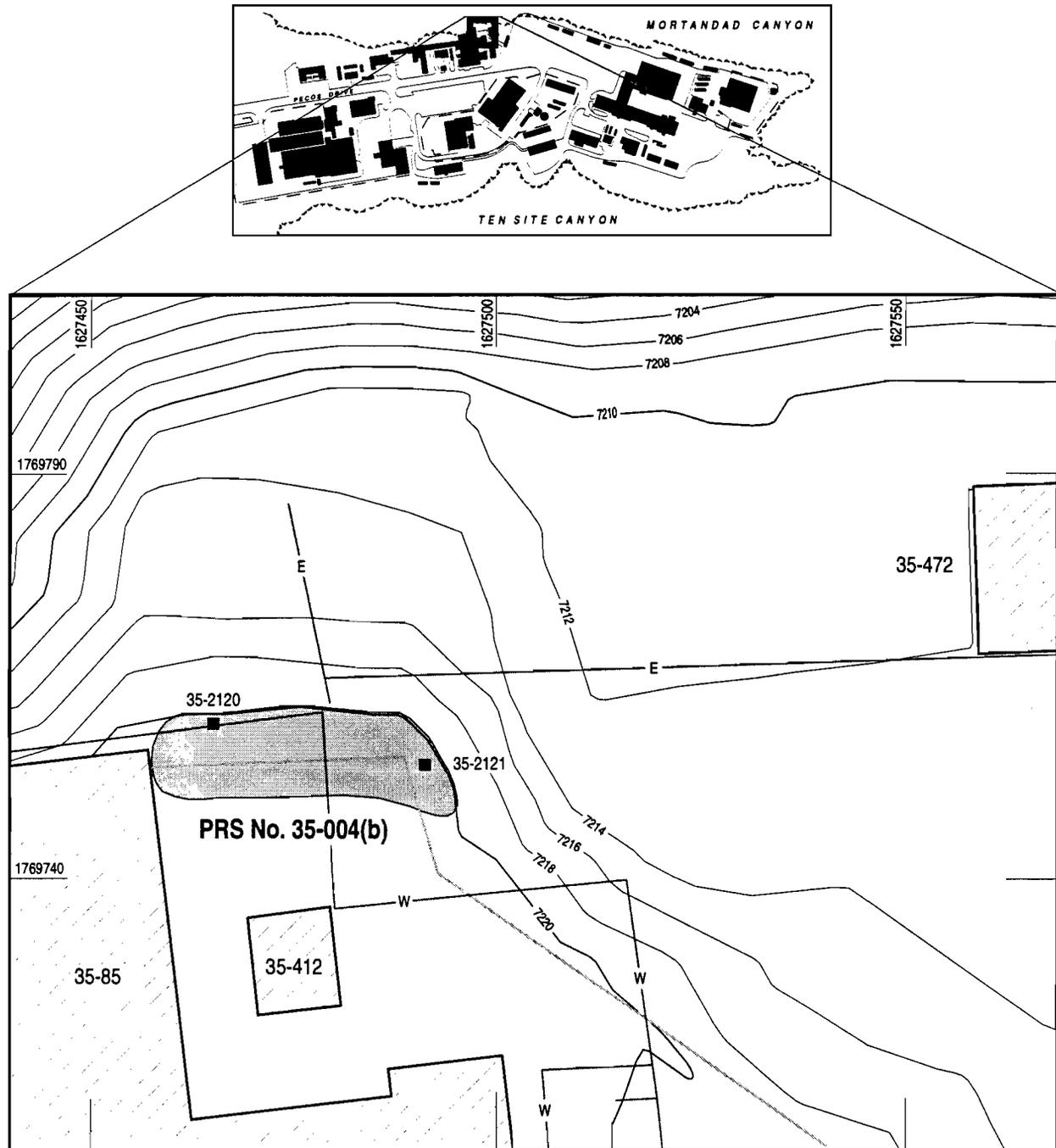
Location ID	Sample ID	Depth (ft)	Media	VOCs Mobile Lab	VOCs Fixed Lab	SVOCs Fixed Lab	PAHs Mobile Lab	PCBs Mobile Lab	XRF Mobile Lab	Inorganic Fixed Lab
35-2120	AAC1285	0-1	Soil	21673	NR	NR	21673	21675	21673	NR
35-2120	AAC1286	1-2	Soil	21673	NR	NR	21673	21675	21673	NR
35-2120	AAC1287	2-3	Soil	21673	NR	NR	21673	21675	21673	NR
35-2121	AAC1288	0-1	Soil	21675	NR	NR	21675	21675	21675	21675
35-2121	AAC1289	1-2	Soil	21673	NR	NR	21673	21675	21675	NR
35-2121	AAC1290	2-3	Soil	21673	21673	21673	21673	21673	21673	NR

*The numbers in the analytical suite columns are analytical request numbers.

Table 5.2.4-1 summarizes all sampling for PRS No. 35-004(b); Figure 5.2.4-1 shows the sample locations.

5.2.5 Evaluation of Inorganic Chemicals

The results of inorganic chemical analyses for PRS No. 35-004(b) are presented in the May 1996 RFI report (LANL 1996, 54402).



Source: FIMAD G104144

F5.2.4-1 / TA-35I RFI RPT / 092597



Coordinates are NMSP NAD-83
Contour interval = 2 ft

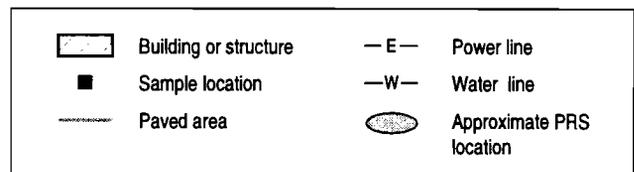


Figure 5.2.4-1. Locations of PRS No. 35-004(b) samples.

5.2.6 Evaluation of Radionuclides

Radionuclides were not analyzed for at PRS No. 35-004(b) in accordance with the original SAP, which is described in the June 1994 addendum to the work plan (Pratt 1994, 43475). As described in Section 5.2.1 and Section 5.2.2, the specific source of contamination associated with this PRS is the items that were stored in the container storage area: acetone, alcohol, solvents, oils, volatile organic chemicals (VOCs), and rags. The container storage area is not known or suspected of storing radioactive materials. Because the PRS is not reasonably associated with a potential release of radionuclides, radionuclide sampling was not proposed in either the June 1994 addendum to the work plan (Pratt 1994, 43475) or the *Sampling and Analysis Plan for Potential Release Sites 35-003(h, j, and k), 35-004(m), 35-009(a through d), 35-014(a, b, d, g₁, and g₂), 35-015(b) and 35-016(b, j, n, p, and q)* (LANL 1997, 56293) (hereafter referred to as "the 1997 SAP").

5.2.7 Evaluation of Organic Chemicals

The results of organic chemical analyses for PRS No. 35-004(b) are presented in the May 1996 RFI report (LANL 1996, 54402).

5.2.8 Risk-Based Screening Assessment

The results of the risk-based screening assessment for inorganic and organic chemicals are presented in the May 1996 RFI report (LANL 1996, 54402). No COPCs were identified.

5.2.9 Human Health Risk Assessment

A human health risk assessment was not performed for PRS No. 35-004(b) because no COPCs were identified during the human health risk-based screening assessment.

5.2.9.1 Review of COPCs and Extent of Contamination

Radiochemical analyses were not performed because radionuclide contaminants were determined to be of no potential concern at this PRS based on the historical information presented in the work plan (LANL 1992, 7666), the June 1994 addendum to the work plan (Pratt 1994, 43475), and additional archival research. Field screening data collected during the Phase I RFI indicated that radiological contamination was not present at the site. All field screening measurements for radioactivity were within background levels for TA-35. Therefore, no radionuclide COPCs were identified for this PRS.

5.2.10 Preliminary Ecological Assessment

In cooperation with the NMED and EPA Region 6, the Laboratory ER Project is developing an approach for ecological risk assessment. Further ecological risk assessment at this site will be deferred until the site can be assessed as part of the ecological exposure unit methodology currently being developed.

5.2.11 Conclusions and Recommendations

The objective of the Phase I RFI at PRS No. 35-004(b) was to determine the presence or absence of contamination associated with the container storage area adjacent to TA-35-85. Radionuclide contaminants were determined to be of no potential concern at this PRS. The sample data indicate that these sites are not likely to pose a significant human health risk now or in the foreseeable future.

The sample locations are adequate to determine the extent of potential contamination. Samples for specific analytes were collected where contaminants would be most likely to be observed in site soils today.

PRS No. 35-004(b) is proposed for NFA based on NFA Criterion 5 (LANL 1996, 54943). A Class III permit modification will be requested to remove this site from the HSWA Module of the Laboratory's RCRA operating permit.

Further ecological risk assessment will be deferred, as stated in Section 5.2.10.

5.3 PRS No. 35-004(g)

PRS No. 35-004(g) is a former container storage area (approximately 10 ft by 5 ft) located at the south wall of warehouse TA-35-67, which is situated near the southern edge of Ten Site Mesa.

No radionuclide COPCs were identified during the human health screening assessment in this addendum. A summary of samples submitted for radiological analyses is shown in Section 5.3.4.

PRS No. 35-004(g) is recommended for NFA for human health based on NFA Criterion 5 (LANL 1996, 54943).

5.3.1 History

PRS No. 35-004(g) is discussed in detail in Section 3.3.2 of the work plan and Section 7.24 of the June 1994 addendum to the work plan (LANL 1992, 7666; Pratt 1994, 43475). Results of the Phase I investigation are presented in the July 1996 RFI report (LANL 1996, 54763).

This PRS reportedly stored oils, solvents, Freon, and vacuum pumps (LANL 1990, 7511). Staining was observed during an ER Program site reconnaissance in 1988 (LANL 1992, 7666).

The potential contaminants evaluated during the activities described in this addendum included alpha- and gamma-emitting radionuclides.

Historical information indicates that radionuclide contamination is unlikely. This PRS is an inactive container storage area for a warehouse that did not house radioactive compounds. The storage area housed oils, solvents, Freon, and vacuum pumps, none of which are expected to have been radioactively contaminated.

5.3.2 Description

The site of the former container storage area is an asphalt-paved area adjacent to a concrete pad that houses an air filter structure. Several small oil spills and stains are present on the asphalt. At the corner of TA-35-67 and the concrete pad is a small spill of what appears to be iron pellets. At the time of the RFI, no storage containers were present; however, several piles of debris were present, which contained electrical cables, pallets, and other scrap. The asphalt-paved area extends southward approximately 20 ft. The asphalt then slopes abruptly 5 to 6 ft onto another flat asphalt-paved area that extends approximately 40 ft toward the southern edge of Ten Site Mesa.

5.3.3 Previous Investigation

PRS No. 35-004(g) was investigated as part of "Environmental Problem 19" in the Department of Energy Environmental Survey (DOE 1987, 5622). Three soil samples were collected and analyzed for alpha and

gamma activities, metals, pesticides/polychlorinated biphenyls (PCBs), and VOCs. The samples had low alpha and gamma activities; the only chemicals detected were some unspecified metals and acetone.

5.3.4 Field Investigation

The objective of the Phase I RFI was to characterize the nature of potential contamination associated with the container storage area.

The conceptual model for the RFI predicted that spilled material could potentially infiltrate surface soils through discontinuities in the asphalt at the location of the container storage area. Potential contaminants released onto the asphalt could also be mobilized by surface water runoff southward toward Ten Site Canyon.

A judgmental sampling approach was used, and the sampling activities were biased toward areas where residual contamination was expected to be observed. A hand-auger hole was drilled in a stained area at a discontinuity in the asphalt, and three samples were collected in 1-ft vertical intervals. One surface sample was collected beneath the asphalt just south of the location of the hand-auger hole, and a second surface sample was collected beneath the asphalt approximately 20 ft southeast of the container storage area and just above the steep drop-off described in Section 5.3.2.

Field activities included an H&S radiation survey, engineering surveys, and environmental surveys including a radiation grid survey.

Field screening during site surveys and sample collection activities was performed using a Foxboro 128 GC OVA, a Ludlum Model 139 meter with an air-proportional alpha probe, and an Eberline ESP-1 meter with beta/gamma probe model HP-260. Using this instrumentation, background radiation measurements for TA-35 typically range from 200 to 500 cpm beta/gamma radiation depending on the location and substrate rock type. Field screening measurements greater than 500 cpm beta/gamma radiation were generally considered to be above background levels. No beta/gamma radiation measurements above background levels were obtained during field screening at this site, and no alpha radiation or organic vapors were detected.

5.3.4.1 Environmental and Engineering Surveys

The H&S radiation survey was performed on June 2, 1994. Beta/gamma radiation measurements at this PRS ranged from 121 to 199 cpm, and the average was 160 cpm, which is below background levels.

Engineering surveys were performed on June 2, 1994, and January 18, 1995. The surveys consisted of reviews of archival information and field site inspections. The site of the former container storage area was located, and the conditions at the site were documented. During the site inspection, several oil stains were noted at the container storage area. Sample locations were staked within the stained areas and in the path of surface water runoff from the area.

The radiation grid survey was performed on September 21, 1993. The radiation grid locations included Location ID Nos. 35-6077 through 35-6098, which were spaced at approximately 20-ft intervals. Beta/gamma radiation measurements ranged from 180 to 300 cpm, and the average was 232 cpm, which is within background levels.

5.3.4.2 Deviations from the Sampling and Analysis Plan

The SAP for PRS No. 35-004(g), which is described in the June 1994 addendum to the work plan (Pratt 1994, 43475), specifies that one hand-auger hole would be drilled at the container storage area and two surface samples would be collected at the edge of the asphalt in the drainage area below the container storage area. However, the two surface samples were collected from the revised locations described in Section 5.3.4.

The asphalt-paved area was found to extend near the edge of the mesa. Samples associated with PRS No. 35-009(b) were collected in the lower asphalt-paved area below the drop-off, and samples associated with PRS No. 35-016(c) were collected at and below the mesa edge where surface water runoff from PRS No. 35-004(g) drains into Ten Site Canyon. Because these areas had already been sampled as part of other investigations, the two surface samples were relocated.

These changes to the SAP did not adversely impact the success of the field activities.

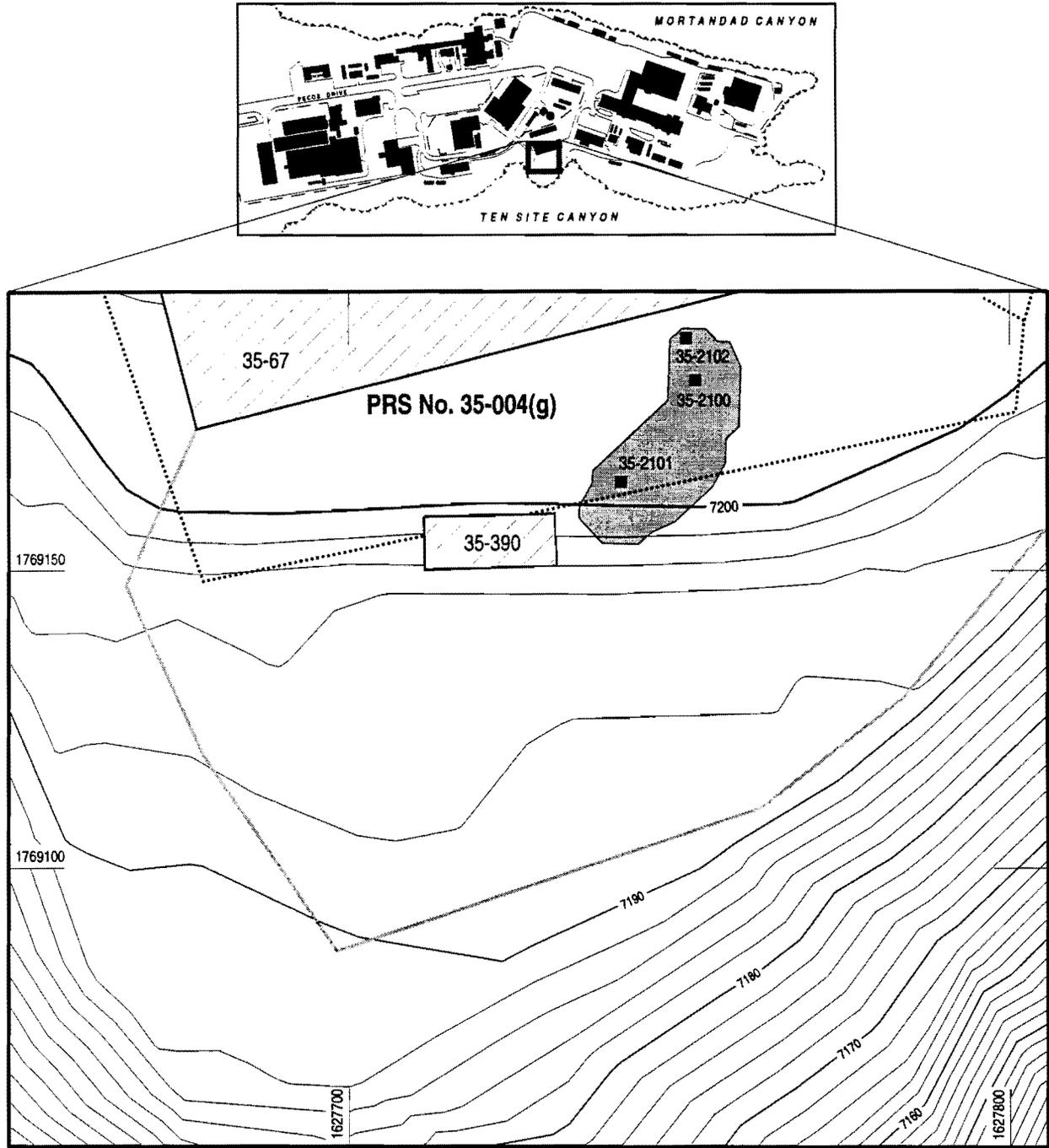
5.3.4.3 Sampling Activities

Phase I sampling was performed on March 3, 1995. Three locations were sampled, and five soil samples were collected. Two surface samples were collected (Location ID Nos. 35-2100 and 35-2101), and one hand-auger hole was drilled to a depth of 3 ft (Location ID No. 35-2102). The sample collection intervals are shown in Table 5.3.4-1. Beta/gamma radiation measurements obtained during field screening of the samples ranged from 184 to 243 cpm, which are within background levels.

TABLE 5.3.4-1
SUMMARY OF SAMPLES TAKEN AT PRS No. 35-004(g)*

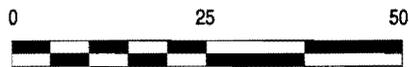
Part 1									
Location ID	Sample ID	Depth (ft)	Media	VOCs Mobile Lab	VOCs Fixed Lab	SVOCs Fixed Lab	PAHs Mobile Lab	PCBs Mobile Lab	Pesticides/PCBs Fixed Lab
35-2100	AAC1177	0-0.5	Soil	21500	21476	NR	21500	21500	NR
35-2101	AAC1178	0-0.5	Soil	21500	NR	NR	21500	21500	NR
35-2102	AAC1179	0-1	Soil	21500	NR	21476	21500	21500	21476
35-2102	AAC1180	1-2	Soil	21500	NR	NR	21500	21500	NR
35-2102	AAC1181	2-3	Soil	21500	NR	NR	21500	21500	NR
Part 2									
Location ID	Sample ID	Depth (ft)	Media	XRF Mobile Lab	Inorganic Fixed Lab	Gamma Spec	Iso-Pu	Iso-U	
35-2100	AAC1177	0-0.5	Soil	21503	NR	21478	21478	21478	
35-2101	AAC1178	0-0.5	Soil	21503	NR	NR	21478	21478	
35-2102	AAC1179	0-1	Soil	21503	21477	NR	NR	NR	
35-2102	AAC1180	1-2	Soil	21503	NR	NR	NR	NR	
35-2102	AAC1181	2-3	Soil	21503	NR	NR	NR	NR	
*The numbers in the analytical suite columns are analytical request numbers.									

Table 5.3.4-1 summarizes all sampling for PRS No. 35-004(g); Figure 5.3.4-1 shows the sample locations.



Source: FIMAD G104688

F5.3.4-1 / TA-35f RFI RPT / 092297



Coordinates are NMSP NAD-83
Contour interval = 2 ft

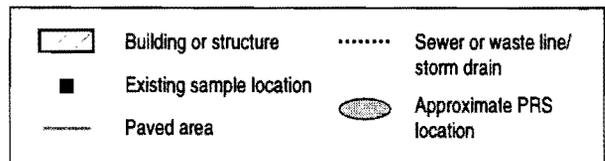


Figure 5.3.4-1. Locations of PRS No. 35-004(g) samples.

5.3.5 Evaluation of Inorganic Chemicals

The results of inorganic chemical analyses for PRS No. 35-004(g) are presented in the July 1996 RFI report (LANL 1996, 54763).

5.3.6 Evaluation of Radionuclides

The radionuclides analyzed for at PRS No. 35-004(g) include isotopic plutonium, isotopic uranium, and gamma-emitting radionuclides. Mobile laboratory gamma spectroscopy analyses were performed for every sample shown in Table 5.3.4-1; however, they were determined unusable to establish the nature of gamma-emitting radionuclide contamination (Pratt 1997, 55802). One surface soil sample (Location ID No. 35-2100) was analyzed using gamma spectroscopy at a fixed-site laboratory, and two surface soil samples (Location ID Nos. 35-2100 and 35-2101) were analyzed for isotopic plutonium and isotopic uranium at a fixed-site laboratory.

Gamma spectroscopy results for the soil sample collected at Location ID No. 35-2100 have been qualified as estimated and potentially biased high (J+ flag) because there was insufficient sample to completely fill the calibrated gamma spectroscopy container. These data are usable for the screening assessment because isotope concentrations may be overestimated; therefore, a false negative result is not likely. No gamma-emitting radionuclides in the target analyte suite were detected in the sample.

Background comparisons were performed for radionuclides for which UTL values are available, as discussed in Section 3.2 in Chapter 3 of this addendum. No radionuclides were detected at values greater than or equal to UTL values; therefore, no radionuclide COPCs are identified.

5.3.7 Evaluation of Organic Chemicals

The results of organic chemical analyses for PRS No. 35-004(g) are presented in the July 1996 RFI report (LANL 1996, 54763).

5.3.8 Risk-Based Screening Assessment

No radionuclide COPCs are identified in this addendum because no radiological chemicals are identified as having concentrations greater than or equal to background UTLs, as described in Section 5.3.6.

5.3.9 Human Health Risk Assessment

A human health risk assessment was not performed for PRS No. 35-004(g) because no COPCs were identified during the human health risk-based screening assessment.

5.3.10 Preliminary Ecological Assessment

In cooperation with the NMED and EPA Region 6, the Laboratory ER Project is developing an approach for ecological risk assessment. Further ecological risk assessment at this site will be deferred until the site can be assessed as part of the ecological exposure unit methodology currently being developed.

5.3.11 Conclusions and Recommendations

The objective of the Phase I RFI at PRS No. 35-004(g) was to determine the presence or absence of contamination associated with the container storage area near TA-35-67. Radionuclides were not identified as COPCs at this PRS, as discussed in Section 5.3.6.

Process information indicates that radionuclide contamination is unlikely because the container storage area was used to store oils, solvents, Freon, and vacuum pumps but not radioactive materials. Also, in the unlikely event that radionuclides were present, not found in the sample collected at the site, but migrated downgradient from the PRS, this site is bound by PRS No. 35-009(b) where additional radionuclide data will be collected in accordance with the 1997 SAP (LANL 1997, 56293). PRS No. 35-009(b) is an abandoned septic system, which included a leach field located beneath the lower portion of the paved area southwest of the container storage area. Additional samples will be collected from the leach field and from the natural drainages on the canyon hillside. Because PRS No. 35-004(g) drains toward PRS No. 35-009(b), the proposed sampling for PRS No. 35-009(b) will encompass any radiological contamination, if any, that may have originated at PRS No. 35-004(g).

PRS No. 35-004(g) is proposed for NFA based on NFA Criterion 5 (LANL 1996, 54943). A Class III permit modification will be requested to remove this site from the HSWA Module of the Laboratory's RCRA operating permit.

Further ecological risk assessment will be deferred, as stated in Section 5.3.10.

5.4 PRS No. 35-004(h)

PRS No. 35-004(h) is the site of a container storage area that was located at the northeast corner of the former Air Filter Building (TA-35-7) at the eastern end of Ten Site Mesa.

No radionuclide COPCs were identified during the human health screening assessment. No radionuclides were detected above background values. A summary of samples submitted for radiological analyses is shown in Section 5.3.4.

PRS No. 35-004(h) is recommended for NFA for human health based on NFA Criterion 5 (LANL 1996, 54943).

5.4.1 History

PRS No. 35-004(h) is discussed in detail in Section 3.3.2 of the work plan and Section 7.24 of the June 1994 addendum to the work plan (LANL 1992, 7666; Pratt 1994, 43475). Results of the Phase I investigation are presented in the July 1996 RFI report (LANL 1996, 54763).

This PRS reportedly handled oils, capacitors, solvents, and Freon (LANL 1990, 7511). The PRS is located near a former manhole (TA-35-11) at the northeast corner of former TA-35-7. TA-35-7 was associated with the former TA-35 wastewater treatment plant that operated during the 1950s and early 1960s. Oblique photographs from 1979 show what appears to be a small storage container located on asphalt pavement adjacent to the north end of the east wall of former TA-35-7. Oblique photographs from 1983 show that the container was removed and replaced by a small rectangular storage cabinet, which appears to be similar to a file cabinet.

In 1985 decontamination and decommissioning (D&D) activities at the TA-35 wastewater treatment plant included the removal of underground liquid waste lines during the Radioactive Liquid Waste Lines Removal Project (Elder et al. 1986, 3089). Line 90-A, located in the subsurface and oriented north-south along the east wall of former TA-35-7, was removed in January 1985. TA-35-11, an access manhole to a storm drain system located near the north end of Line 90-A, was also removed at this time. Before it was removed, storm water runoff from PRS No. 35-004(h) entered the storm drain system at TA-35-11. TA-35-11 was surrounded by a surface storm water drainage berm that emptied into a 12-in.-diameter corrugated metal pipe (CMP), which extended 80 ft southeast and discharged into a storm water diversion channel. During the removal of Line 90-A, soil was excavated to a distance of approximately 9 ft east of

former TA-35-7 and to a depth of 8 ft (Cox 1985, 781). After Line 90-A was removed, the excavation was filled with clean backfill material, and the surface was repaved with asphalt. No evidence exists to suggest that a container storage area has occupied this site since the 1985 D&D activities.

In 1996 a second phase of decommissioning activities at the former wastewater treatment plant resulted in the removal of the structure and foundation of TA-35-7. Soil was excavated during the removal of the building footings and inactive buried waste lines (see Figure 5.4.1-1). On the north side of TA-35-7 soil was excavated to a distance of 15 ft from the building and to depths ranging from approximately 15 to 18 ft. On the east side of TA-35-7 soil was excavated to a distance of 10 ft from the building and to depths ranging from approximately 5 to 10 ft. Then the excavation area was backfilled and regraded.

The potential contaminants evaluated during the activities described in this addendum included alpha- and gamma-emitting radionuclides.

5.4.2 Description

At the time of the RFI, no containers were present at the site. An asphalt cutout was visible, which denotes the areal extent of excavation conducted during the 1985 D&D activities. The 1996 decommissioning activities resulted in the complete removal of the asphalt and underlying soil to a depth of approximately 15 ft. After building TA-35-7 was removed, the entire area was backfilled and extensively regraded (see Figure 5.4.1-1). The topography of the site is relatively flat with a gentle southeastern slope toward the edge of the mesa.

5.4.3 Previous Investigations

No previous investigations have been performed at this site.

5.4.4 Field Investigation

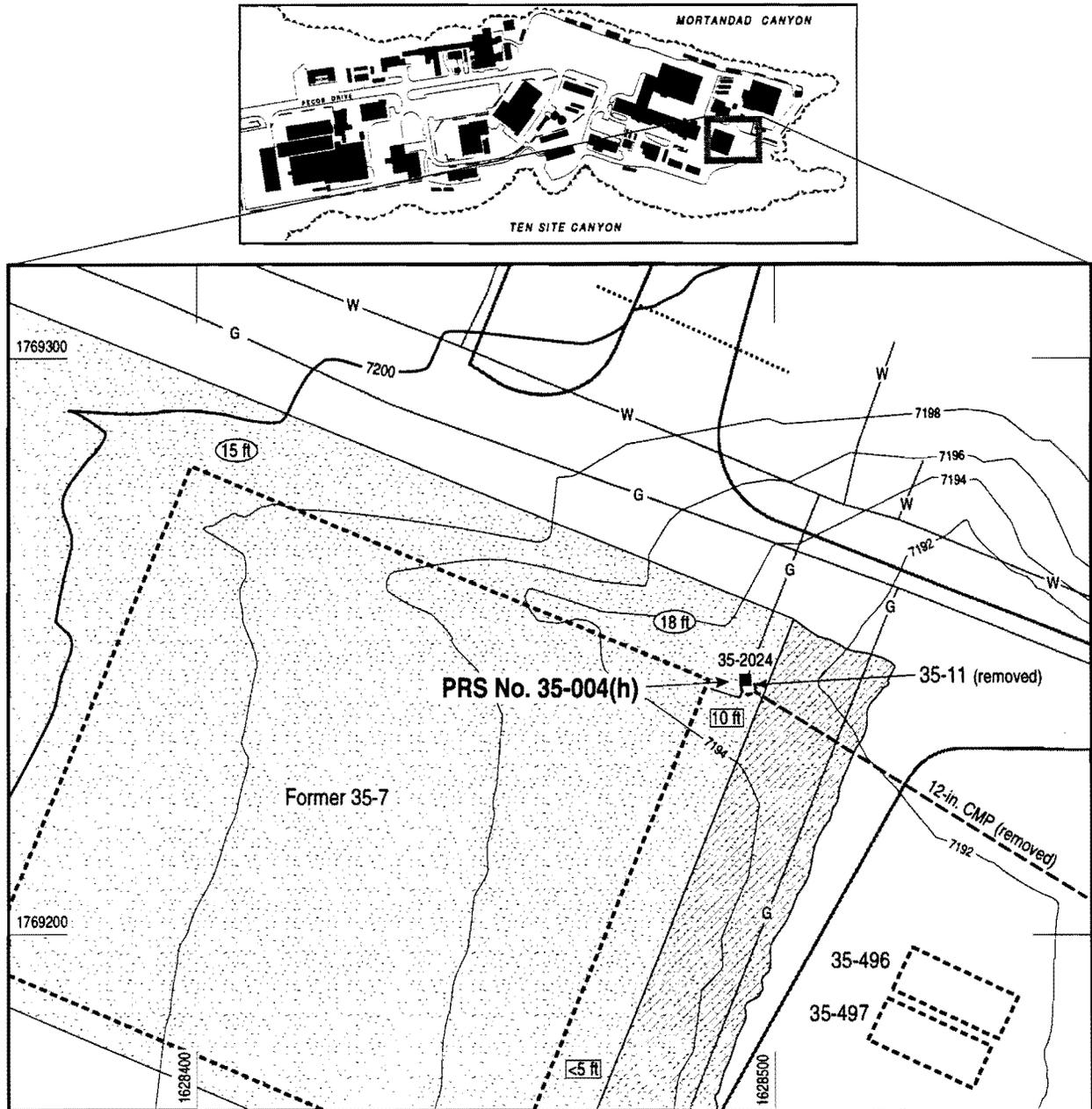
The objective of the Phase I RFI was to characterize the nature of potential contamination associated with the container storage area.

The conceptual model for the RFI did not predict that hazardous chemicals were released to the environment. However, if hazardous materials were present, the conceptual model shows that the most likely mechanism of movement beyond the PRS boundary is associated with hydrologic movement in the soil and surface water transport of contaminants infiltrating into the bedrock tuff.

A judgmental sampling approach was used, and the sampling activities were biased toward areas where residual contamination would likely be found. To sample potential contamination, a subsurface sample was collected at the northeast corner of former TA-35-7.

Field activities included an H&S radiation survey, engineering surveys, and environmental surveys including a radiation grid survey and an organic vapor survey.

Field screening during site surveys and sample collection activities was performed using a Foxboro 128 GC OVA, a Ludlum Model 139 meter with an air-proportional alpha probe, and an Eberline ESP-1 meter with beta/gamma probe model HP-260. Using this instrumentation, background radiation measurements for TA-35 typically range from 200 to 500 cpm beta/gamma radiation depending on the location and substrate rock type. Field screening measurements greater than 500 cpm beta/gamma radiation were generally considered to be above background levels. No beta/gamma radiation measurements above background levels were obtained during field screening at this site, and no alpha radiation or organic vapors were detected.



Source: FIMAD G104692

F5.4.1-1 / TA-351 RFI RPT / 092597

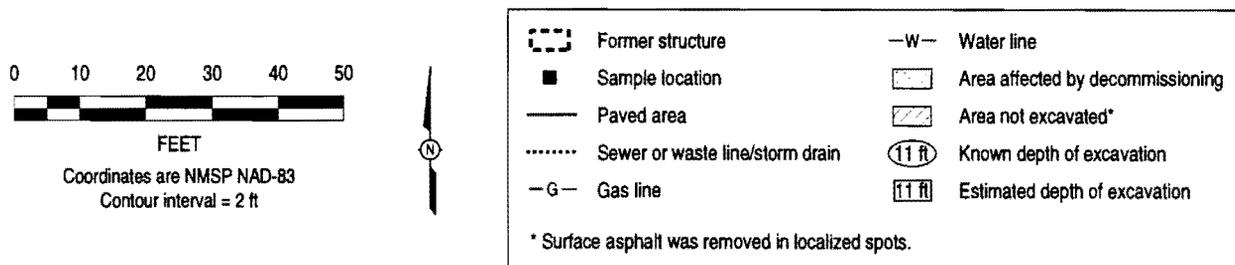


Figure 5.4.1-1. Decommissioning work at PRS No. 35-004(h).

5.4.4.1 Environmental and Engineering Surveys

The H&S radiation survey was performed on January 6, 1994, and January 12, 1994. Beta/gamma radiation measurements at this PRS ranged from 200 to 270 cpm, which are within background levels.

Engineering surveys were performed on January 6, 1994, January 13, 1994, and January 24, 1994. The surveys consisted of reviews of archival information, oblique photographs, aerial photographs, and engineering drawings of TA-35 as well as a field site inspection and a description of the PRS. The PRS site was located, and the condition of the site was described.

Based on the results of the engineering surveys and on the SAP, the sample point was located at the northeast corner of TA-35-7. Based on the history of PRS No. 35-004(h), clean backfill was the anticipated sample material.

The radiation grid survey was performed on January 12, 1994. The radiation grid locations included Location ID Nos. 35-6263 through 35-6265 and 35-6280 through 35-6282, which were spaced at approximately 20-ft intervals. Beta/gamma radiation measurements ranged from 200 to 270 cpm, and the average was 243 cpm, which is within background levels.

5.4.4.2 Deviations from the Sampling and Analysis Plan

The SAP for PRS No. 35-004(h), which is described in the June 1994 addendum to the work plan (Pratt 1994, 43475), specifies that the sampling effort be incorporated with Aggregate D (see Section 7.8 of the work plan [LANL 1992, 7666]). Therefore, the first interval from Location ID No. 35-2024 (associated with the investigation of PRS Nos. 35-003[e, f, g, m, and o]) was collected to satisfy the requirements for sampling PRS No. 35-004(h). The analytical suite planned for Location ID No. 35-2024 is appropriate for PRS No. 35-004(h).

These changes to the SAP did not adversely impact the success of the field activities.

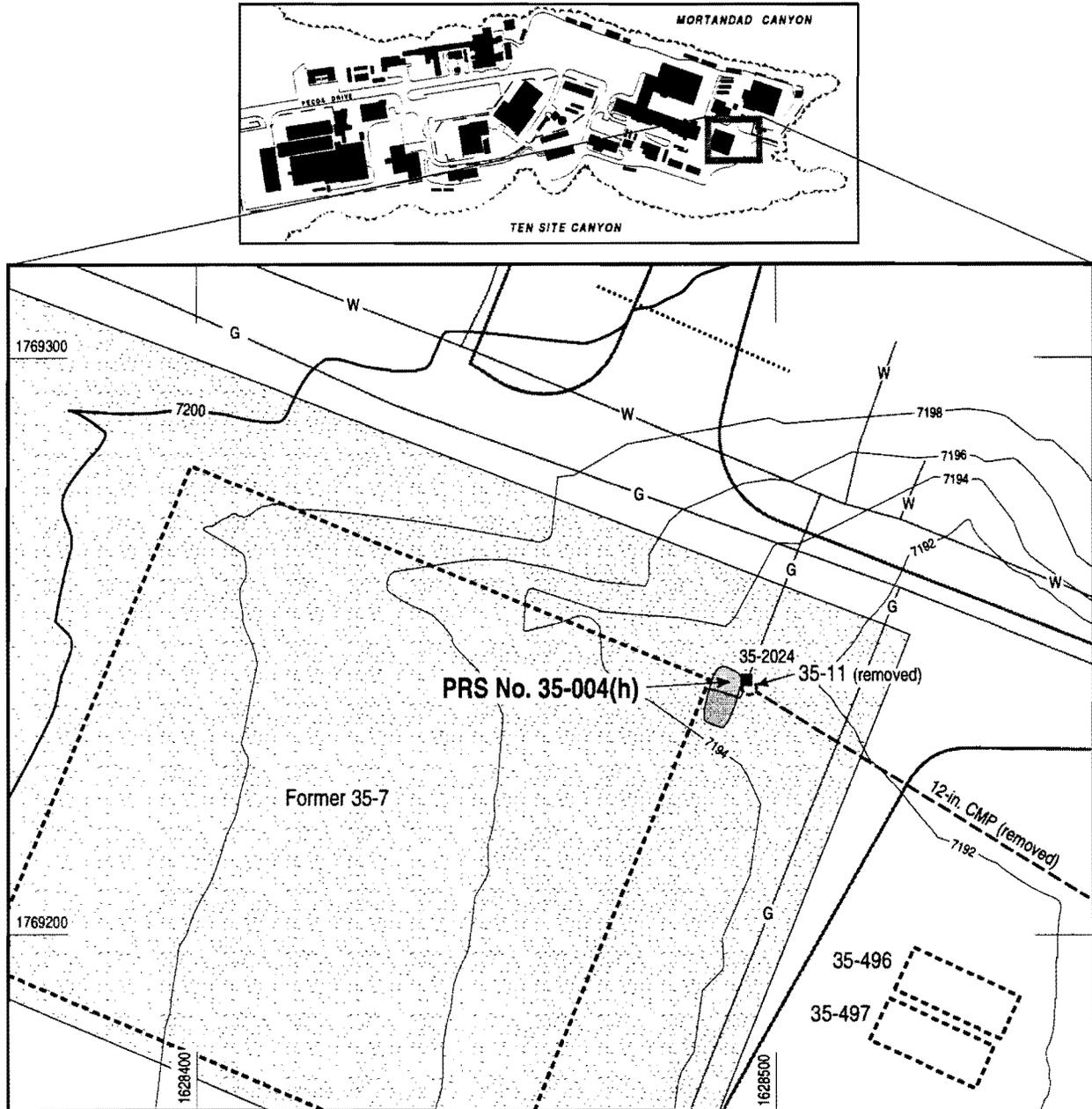
5.4.4.3 Sampling Activities

Phase I sampling was performed on March 21, 1994. One soil sample was collected to satisfy the requirements for PRS No. 35-004(h). One subsurface soil sample was collected from the first interval of Location ID No. 35-2024 to satisfy the SAP requirements for this PRS. The sample collection interval is shown in Table 5.4.4-1. A beta/gamma radiation measurement obtained during field screening of the PRS No. 35-004(h) sample was 190 cpm, which is below background levels.

TABLE 5.4.4-1
SUMMARY OF SAMPLES TAKEN AT PRS No. 35-004(h)*

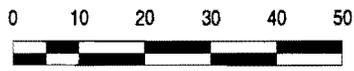
Location ID	Sample ID	Depth (ft)	Media	SVOCs Fixed Lab	PAHs Mobile Lab	PCBs Mobile Lab	PCBs Fixed Lab	XRF Mobile Lab	Iso-Pu	Iso-U
35-2024	AAA6601	1-2	Soil	17052	17051	17051	17052	17231	17293	17293
*The numbers in the analytical suite columns are analytical request numbers.										

Table 5.4.4-1 summarizes all sampling for PRS No. 35-004(h); Figure 5.4.4-1 shows the sample location.



Source: FIMAD G104692

F5.4.4-1 / TA-35f RFI RPT / 092297



Coordinates are NMSP NAD-83
Contour interval = 2 ft



	Former structure		Paved area
	Existing sample location		Gas line
	Area affected by decommissioning		Water line
	Sewer or waste line/storm drain		Approximate PRS location

Figure 5.4.4-1. Location of PRS No. 35-004(h) sample.

5.4.5 Evaluation of Inorganic Chemicals

The results of inorganic chemical analyses for PRS No. 35-004(h) are presented in the July 1996 RFI report (LANL 1996, 54763).

5.4.6 Evaluation of Radionuclides

Background comparisons were performed for radionuclides for which UTL values are available, as discussed in Section 3.2 in Chapter 3 of this addendum. Only one soil sample was collected from the first interval of the borehole at Location ID No. 35-2024 to satisfy the SAP requirements for this PRS. The soil sample was analyzed by alpha spectrometry at a fixed-site laboratory for an analyte suite that included ^{238}Pu , $^{239,240}\text{Pu}$, ^{234}U , ^{235}U , and ^{238}U . The sample was analyzed by gamma spectroscopy at the mobile laboratory but was not analyzed by gamma spectroscopy at a fixed-site laboratory. Mobile laboratory gamma spectroscopy results from the Phase I RFI were determined to be unusable to determine the nature of gamma-emitting radionuclide contamination (Pratt 1997, 55802).

The ^{235}U result for the soil sample collected at Location ID No. 35-2024 has been qualified as estimated (J flag) because the relative percent difference for the laboratory duplicate sample analysis was 39%, which exceeds the quality control limit of 35%. The sample result is usable for the screening assessment because the ^{235}U results for both the regular and duplicate samples (0.034 and 0.023 pCi/g, respectively) are well below the sediment UTL value of 0.16 pCi/g.

The highest detected value for each analyte was used for the background comparison. The sediment UTL values were used for background comparison of the naturally occurring radionuclides ^{234}U , ^{235}U , and ^{238}U in soil (Ryti et al. 1997, 56186). All three uranium isotopes were detected in the soil sample, but none were measured at concentrations exceeding the background UTL values. The fallout radionuclides ^{238}Pu and $^{239,240}\text{Pu}$ were not detected in the soil sample. Therefore, no radionuclide COPCs are identified as a result of the comparison with background values.

5.4.7 Evaluation of Organic Chemicals

The results of organic chemical analyses for PRS No. 35-004(h) are presented in the July 1996 RFI report (LANL 1996, 54763).

5.4.8 Risk-Based Screening Assessment

No radionuclides were carried forward from the background comparison. Because no radionuclides were carried forward, MCE calculations were not performed.

No radionuclide COPCs were identified as a result of the human health risk-based screening assessment.

5.4.9 Human Health Risk Assessment

A human health risk assessment was not performed for PRS No. 35-004(h) because no COPCs were identified during the human health risk-based screening assessment.

5.4.9.1 Review of COPCs and Extent of Contamination

No radionuclides were identified above UTL values. As described in Section 5.4.1, 1985 D&D activities resulted in the removal of soil to a depth of 8 ft in the container storage area. In 1996 soil was removed to a

depth of 15 ft during the second phase of decommissioning activities. Therefore, possible soil contamination from activities before this date has been largely or entirely removed. The area was backfilled after the 1985 D&D and 1996 decommissioning activities and was subsequently covered with gravel. Although no evidence exists to suggest that the area was used for container storage after 1985, any liquid contamination associated with such activities would be expected to be carried with surface water runoff into Pratt Canyon. The area north and east of TA-35-7 is the subject of an ongoing RFI associated with PRS No. 35-003(misc.). Further sampling will also be conducted in areas associated with PRS Nos. 35-003(d, e, l, o, q, and r), which will investigate Pratt Canyon and the area of surface water drainage (LANL 1996, 54422). Therefore, if significant quantities of contamination were mobilized from PRS No. 35-004(h), it is likely that such contamination will be addressed during the ongoing investigations.

The nature and extent of contamination cannot be described with certainty because the precise location, or locations, of container storage associated with this PRS cannot be defined in the present day and because any soil potentially impacted by contaminants from the container storage area was removed by the decommissioning activities. Also, the existing sample was taken in backfill material dating from 1985 and cannot provide information on potential releases before that date. However, it is highly unlikely that leakage from portable storage containers could have migrated to a depth of 8 ft because such containers are limited in size, have a small volume, and would have leaked sporadically.

It has been determined that mobile laboratory radionuclide results from the Phase I RFI were unusable to establish the nature of gamma-emitting radionuclide contamination (Pratt 1997, 55802). A review of the existing data for radionuclides and the sampling requirements set forth in the work plan indicates that insufficient fixed-site laboratory gamma spectroscopy data were available to determine the presence or absence of gamma-emitting radionuclide contamination at PRS No. 35-004(h). However, the second phase of decommissioning activities in 1996 at the former wastewater treatment plant resulted in the removal of the structure and foundation of TA-35-7. As shown in Figure 5.4.1-1, extensive soil excavation during the decommissioning of TA-35-7 has resulted in the removal of all the original soil material in the area of Location ID No. 35-2024. Soil was excavated to a depth of approximately 15 ft on the north side of TA-35-7 to remove the building footings and inactive buried waste lines. Then the excavation area was backfilled and regraded. No further sampling will be performed for PRS No. 35-004(h) because any contaminants would have been removed by the decommissioning activities.

5.4.10 Preliminary Ecological Assessment

In cooperation with the NMED and EPA Region 6, the Laboratory ER Project is developing an approach for ecological risk assessment. Further ecological risk assessment at this site will be deferred until the site can be assessed as part of the ecological exposure unit methodology currently being developed.

5.4.11 Conclusions and Recommendations

The objective of the Phase I RFI at PRS No. 35-004(h) was to determine the presence or absence of contamination associated with a former container storage area. No COPCs were identified during the human health screening assessment. The sample data indicate that this site is not likely to pose a significant human health risk now or in the foreseeable future.

Samples for specific analytes were collected from the 1- to 2-ft interval of a single borehole. The nature of contamination associated with the container storage area has not been adequately determined relative to potential human health risk because of data quality concerns with the gamma spectroscopy analysis performed at the mobile laboratory. However, further sampling is not proposed for PRS No. 35-004(h) because any contaminants released from the container storage area would have been removed by the

decommissioning activities. The extent of contamination associated with the container storage area cannot be conclusively determined because all soil potentially impacted by contaminants from the storage area was removed by the decommissioning activities. Sample activities associated with ongoing RFI activities for other PRSs will address possible migration of contamination before 1985.

PRS No. 35-004(h) is proposed for NFA based on NFA Criterion 5 (LANL 1996, 54943). A Class III permit modification will be requested to remove this site from the HSWA Module of the Laboratory's RCRA operating permit.

Further ecological risk assessment will be deferred, as stated in Section 5.4.10.

5.5 PRS Nos. 35-014(e₂) and 35-016(i)

PRS No. 35-014(e₂) is the site of an oil spill that originated from overflows of a waste-oil impoundment. PRS No. 35-016(i) is an active storm water outfall that handles storm water runoff from the area east of the impoundment. The two PRSs are included in the same decision set because they are in such close proximity that contamination from overflows from the impoundment, which went over the mesa edge, would intermingle with contaminants in the outfall area. Therefore, these PRSs cannot be evaluated independently.

The May 1996 RFI report (LANL 1996, 54402) stated that potential radionuclide contamination would be evaluated in a later report; therefore, these PRSs are included in this addendum. Radiochemical analyses were not performed because radionuclide contaminants were determined to be of no potential concern at these PRSs based on the historical information presented in the work plan (LANL 1992, 7666), the June 1994 addendum to the work plan (Pratt 1994, 43475), and additional archival research.

PRS Nos. 35-014(e₂) and 35-016(i) are recommended for NFA for human health based on NFA Criterion 5 (LANL 1996, 54943).

5.5.1 History

PRS Nos. 35-014(e₂) and 35-016(i) are discussed in detail in Section 3.3.2 of the work plan and Section 7.25 of the June 1994 addendum to the work plan (LANL 1992, 7666; Pratt 1994, 43475). Results of the Phase I investigation are presented in the May 1996 RFI report (LANL 1996, 54402).

The contamination source for PRS No. 35-014(e₂) was oil spills from a gunite-lined, surface waste-oil impoundment (designated as PRS No. 35-005[a]) that was used to store waste dielectric oil. The impoundment was constructed in 1985 to replace an impoundment that had previously existed at the same location. The impoundment was built to collect oil spills from the oil-handling equipment adjacent to building TA-35-85; liquid wastes (such as solvents and oils) from drains that serviced oil-handling equipment (such as Marx tanks) in TA-35-85; and precipitation runoff. When the impoundment was operative, the oil was periodically pumped out of the impoundment and recycled. The impoundment was drained in 1988 and decommissioned in 1989.

PRS No. 35-016(i) is a storm water outfall that originates from storm water drains south of TA-35-85. The outfall was probably installed around 1977 when TA-35-85 was constructed. The discharge area below the outfall also receives surface runoff from the eastern part of PRS No. 35-014(e₂) and may have provided a pathway for oil spills associated with the former waste-oil impoundment.

The potential contaminants evaluated during the activities described in this addendum included alpha-, beta-, and gamma-emitting radionuclides.

5.5.2 Description

These PRSs are located approximately 150 ft northeast of TA-35-85 at the northern edge of Ten Site Mesa. PRS No. 35-014(e₂) is an area approximately 30 ft by 50 ft between an existing inactive oil storage tank and the edge of the mesa. The surface materials are composed of backfill soil that is several feet thick. A small soil berm approximately 1 ft high extends in an arc around the outlet valve from the containment structure for the existing oil tank. A small amount of oil-stained soil is present near the outlet valve, but no obvious oil staining is apparent in the area. The topography of the site is relatively flat with a gentle slope northward toward the edge of the mesa. The edge of the mesa is very steep (the estimated slope is greater than 80%) and is covered with bushes and trees.

The outfall associated with PRS No. 35-016(i) is an 18-in.-diameter CMP located approximately 30 ft northeast of an existing oil storage tank. The source of the outfall is surface storm water collection drains that are located along Pecos Drive south of TA-35-85. The backfill soil material at the edge of the mesa below the outfall has eroded to form a small erosional channel down the side of the mesa where bedrock tuff is exposed to approximately 3 ft below the outfall. The erosional channel also collects surface runoff from the area, including a portion of PRS No. 35-014(e₂). The surface runoff has caused erosion of backfill material around the CMP outfall. Surface runoff and discharge from the outfall are intermittent and sourced by natural precipitation. Vegetation on the side of the mesa below the outfall appears to be normal and healthy.

5.5.3 Previous Investigations

Previous investigations were performed at PRS No. 35-005(a), which was the source of contamination for PRS No. 35-014(e₂) as described in the May 1996 RFI report (LANL 1996, 54402). In 1990 investigations were performed after decommissioning and removal of the impoundment. To verify the cleanup, soil samples were collected at the surface and from 5-ft intervals in a borehole that was drilled to a depth of 45 ft. All samples were within background levels for gross-alpha, -beta, and -gamma radiation (Fresquez 1991, 823).

5.5.4 Field Investigation

Field activities included an H&S radiation survey, engineering surveys, and environmental surveys including a radiation grid survey.

Field screening during site surveys and sample collection activities was performed using a Foxboro 128 GC OVA, a Ludlum Model 139 meter with an air-proportional alpha probe, and an Eberline ESP-1 meter with beta/gamma probe model HP-260. Using this instrumentation, background radiation measurements for TA-35 typically range from 200 to 500 cpm beta/gamma radiation depending on the location and substrate rock type. Field screening measurements greater than 500 cpm beta/gamma radiation were generally considered to be above background levels. No beta/gamma radiation measurements above background levels were obtained during field screening at these sites, and no alpha radiation or organic vapors were detected.

5.5.4.1 Environmental and Engineering Surveys

The H&S radiation survey was performed on September 8, 1994. Beta/gamma radiation measurements at these PRSs ranged from 157 to 226 cpm, and the average was 197 cpm, which is within background levels.

Engineering surveys were performed on March 10, 1994, and from September 8, 1994, through September 12, 1994. The surveys consisted of a review of archival information, oblique photographs, aerial photographs, and engineering drawings of TA-35 as well as field site inspections. The work plan describes PRS No. 35-016(i) as an active daylight discharge channel that handles storm water runoff from the area between the east end of TA-35-85 and the TA-35 parking area. However, during the engineering survey performed on September 8, 1994, the drainage was found to be an 18-in. CMP, and no evidence was found to indicate that the CMP is the outfall that drains the parking area. The CMP is buried approximately 4 ft below the surface and protrudes approximately 3 ft from the backfill material at the edge of the mesa. The CMP was found to extend approximately 30 ft southward from the discharge point and then bend southwesterly toward TA-35-85. Potential sources of the outfall were investigated inside TA-35-85. The probable source for the outfall was determined to be storm water drains along Pecos Drive south of TA-35-85. The point of discharge was found to be the same as described in the work plan (LANL 1992, 7666).

The former location of the impoundment associated with PRS No. 35-014(e₂) was identified through review of historical site aerial photographs. The backfill soil material observed in the historical photographs at the edge of the mesa adjacent to the former impoundment also appears to be present in recent aerial photographs taken after the impoundment was removed. Therefore, the sample locations for this PRS were located in the backfill material at the edge of the mesa. The six hand-auger holes were located on a grid at approximately 20-ft intervals.

A radiation grid survey was performed on September 9, 1994. The radiation grid locations included Location ID Nos. 35-7637 through 35-7660, which were spaced at approximately 10-ft intervals. Beta/gamma radiation measurements ranged from 182 to 304 cpm, and the average was 228 cpm, which is within background levels.

5.5.4.2 Deviations from the Sampling and Analysis Plan

Sampling activities followed the original SAP, which is described in the June 1994 addendum to the work plan (Pratt 1994, 43475).

5.5.4.3 Sampling Activities

Phase I sampling was performed on March 25 and March 27, 1995. Eight locations were sampled, and 22 samples were collected (not including field duplicate samples): 1 surface soil sample and 21 subsurface soil samples.

At PRS No. 35-014(e₂) six hand-auger holes were drilled to a depth of 3 ft (Location ID Nos. 35-2144 through 35-2149). The sample collection intervals are shown in Table 5.5.4-1. Backfill soil material was sampled from each of the hand-auger holes. Beta/gamma radiation measurements obtained during field screening of the samples ranged from 186 to 282 cpm, which are within background levels.

At PRS No. 35-016(i) one surface sample was collected (Location ID No. 35-2165); one hand-auger hole was drilled to a depth of 3 ft (Location ID No. 35-2166). Three samples were collected from the hand-auger

hole, one from each 1-ft interval. Beta/gamma radiation measurements obtained during field screening of the samples ranged from 196 to 253 cpm, which are within background levels.

TABLE 5.5.4-1**SUMMARY OF SAMPLES TAKEN AT PRS Nos. 35-014(e₂) AND 35-016(i)***

Part 1								
PRS	Location ID	Sample ID	Depth (ft)	Media	VOCs Mobile Lab	VOCs Fixed Lab	PAHs Mobile Lab	SVOCs Fixed Lab
35-014(e ₂)	35-2144	AAC1309	0-1	Soil	NR	NR	NR	NR
35-014(e ₂)	35-2144	AAC1310	1-2	Soil	NR	NR	NR	NR
35-014(e ₂)	35-2144	AAC1311	2-3	Soil	21673	21673	21673	NR
35-014(e ₂)	35-2145	AAC1312	0-1	Soil	NR	NR	NR	NR
35-014(e ₂)	35-2145	AAC1185	1-2	Soil	NR	NR	NR	NR
35-014(e ₂)	35-2145	AAC1186	2-3	Soil	NR	NR	NR	NR
35-014(e ₂)	35-2146	AAC1187	0-1	Soil	21673	NR	21673	21673
35-014(e ₂)	35-2146	AAC1188	1-2	Soil	NR	NR	NR	NR
35-014(e ₂)	35-2146	AAC3353	2-3	Soil	NR	NR	NR	NR
35-014(e ₂)	35-2147	AAC3354	0-1	Soil	NR	NR	NR	NR
35-014(e ₂)	35-2147	AAC3355	1-2	Soil	NR	NR	NR	NR
35-014(e ₂)	35-2147	AAC3356	2-3	Soil	NR	NR	NR	NR
35-014(e ₂)	35-2148	AAC3357	0-1	Soil	NR	NR	NR	NR
35-014(e ₂)	35-2148	AAC3358	1-2	Soil	21673	NR	21673	NR
35-014(e ₂)	35-2148	AAC3359	2-3	Soil	NR	NR	NR	NR
35-014(e ₂)	35-2149	AAC3360	0-1	Soil	NR	NR	NR	NR
Part 2								
PRS	Location ID	Sample ID	Depth (ft)	Media	PCBs Mobile Lab	PCBs Fixed Lab	Inorganic Mobile Lab	
35-014(e ₂)	35-2144	AAC1309	0-1	Soil	21673	NR	NR	
35-014(e ₂)	35-2144	AAC1310	1-2	Soil	21673	NR	NR	
35-014(e ₂)	35-2144	AAC1311	2-3	Soil	21673	NR	NR	
35-014(e ₂)	35-2145	AAC1312	0-1	Soil	21673	NR	NR	
35-014(e ₂)	35-2145	AAC1185	1-2	Soil	21673	NR	NR	
35-014(e ₂)	35-2145	AAC1186	2-3	Soil	21673	NR	NR	
35-014(e ₂)	35-2146	AAC1187	0-1	Soil	21673	21673	NR	
35-014(e ₂)	35-2146	AAC1188	1-2	Soil	21673	NR	NR	
35-014(e ₂)	35-2146	AAC3353	2-3	Soil	21673	NR	NR	
35-014(e ₂)	35-2147	AAC3354	0-1	Soil	21673	NR	NR	
35-014(e ₂)	35-2147	AAC3355	1-2	Soil	21673	NR	NR	
35-014(e ₂)	35-2147	AAC3356	2-3	Soil	21673	NR	NR	
35-014(e ₂)	35-2148	AAC3357	0-1	Soil	21673	NR	NR	
35-014(e ₂)	35-2148	AAC3358	1-2	Soil	21673	NR	NR	
35-014(e ₂)	35-2148	AAC3359	2-3	Soil	21673	NR	NR	
35-014(e ₂)	35-2149	AAC3360	0-1	Soil	21673	NR	NR	
*The numbers in the analytical suite columns are analytical request numbers.								

TABLE 5.5.4-1 (continued)
SUMMARY OF SAMPLES TAKEN AT PRS Nos. 35-014(e₂) AND 35-016(i)^a

Part 1								
PRS	Location ID	Sample ID	Depth (ft)	Media	VOCs Mobile Lab	VOCs Fixed Lab	PAHs Mobile Lab	SVOCs Fixed Lab
35-014(e ₂)	35-2149	AAC3361	1-2	Soil	NR	NR	NR	NR
35-014(e ₂)	35-2149	AAC3362	2-3	Soil	NR	NR	NR	NR
35-016(i)	35-2165	AAC1295	0-0.5	Soil	21665	NR	21665	NR
35-016(i)	35-2166	AAC1296	0-1	Qbt3	21673	NR	21673	NR
35-016(i)	35-2166	AAC1297	1-2	Qbt3	21673	NR	21673	NR
35-016(i)	35-2166	AAC1300	1-2 (dup) ^b	Qbt3	21673	NR	NR	NR
35-016(i)	35-2166	AAC1298	2-3	Qbt3	21673	NR	21673	NR
Part 2								
PRS	Location ID	Sample ID	Depth (ft)	Media	PCBs Mobile Lab	PCBs Fixed Lab	Inorganic Mobile Lab	
35-014(e ₂)	35-2149	AAC3361	1-2	Soil	21673	NR	NR	
35-014(e ₂)	35-2149	AAC3362	2-3	Soil	21673	NR	NR	
35-016(i)	35-2165	AAC1295	0-0.5	Soil	21665	NR	21666	
35-016(i)	35-2166	AAC1296	0-1	Qbt3	21673	NR	21675	
35-016(i)	35-2166	AAC1297	1-2	Qbt3	21673	NR	21675	
35-016(i)	35-2166	AAC1300	1-2 (dup) ^b	Qbt3	NR	NR	21675	
35-016(i)	35-2166	AAC1298	2-3	Qbt3	21673	NR	21675	
a. The numbers in the analytical suite columns are analytical request numbers. b. Field duplicate								

Table 5.5.4-1 summarizes all sampling for PRS Nos. 35-014(e₂) and 35-016(i). Figure 5.5.4-1 shows the sample locations.

5.5.5 Evaluation of Inorganic Chemicals

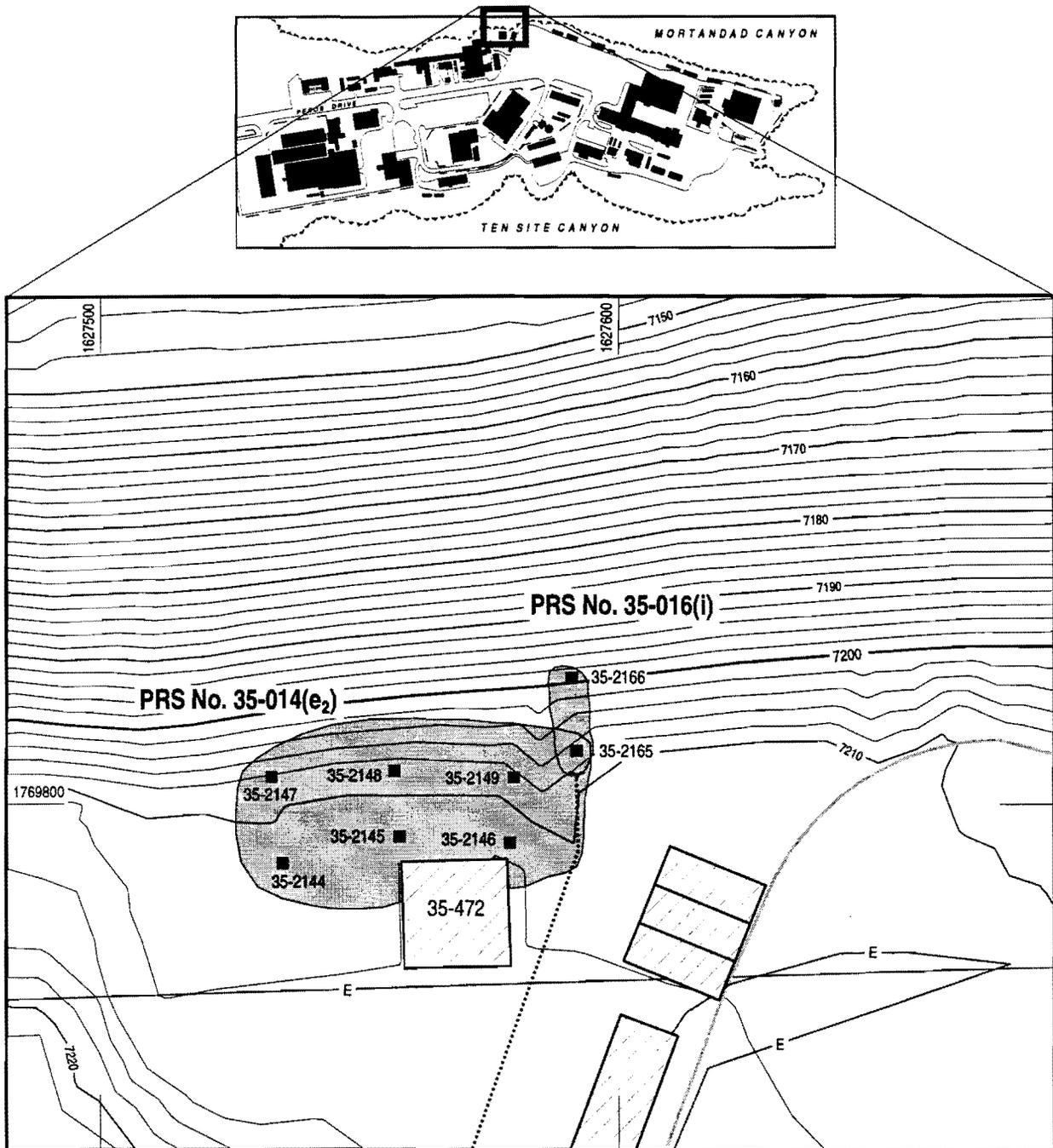
The results of inorganic chemical analyses for PRS Nos. 35-014(e₂) and 35-016(i) are presented in the May 1996 RFI report (LANL 1996, 54402).

5.5.6 Evaluation of Radionuclides

As described in Section 5.5.1 and Section 5.5.2, the specific source of contamination associated with these PRSs is oil spills from a surface waste-oil impoundment. PRS No. 35-016(i) is a storm water outfall for runoff originating from a paved area south of TA-35-85, which does not house operations that are known or suspected of employing radioactive materials. Because these PRSs are not reasonably associated with potential releases of radionuclides, radionuclide sampling was not proposed in the June 1994 addendum to the work plan (Pratt 1994, 43475) or the 1997 SAP (LANL 1997, 56293).

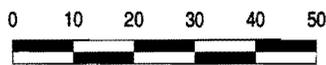
5.5.7 Evaluation of Organic Chemicals

The results of organic chemical analyses for PRS Nos. 35-014(e₂) and 35-016(i) are presented in the May 1996 RFI report (LANL 1996, 54402).



Source: FIMAD G104151

F5.5.4-1 / TA-35f RFI RPT / 092697



Coordinates are NMSP NAD-83
Contour interval = 2 ft

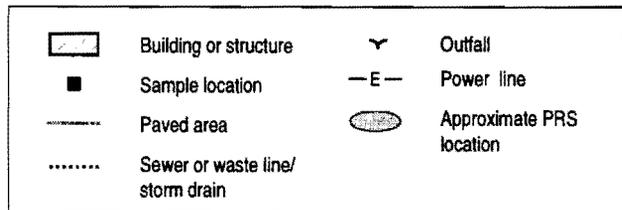


Figure 5.5.4-1. Locations of PRS Nos. 35-014(e₂) and 35-016(i) samples.

5.5.8 Risk-Based Screening Assessment

The results of the risk-based screening assessment for inorganic and organic chemicals are presented in the May 1996 RFI report (LANL 1996, 54402). No COPCs were identified.

5.5.9 Human Health Risk Assessment

A human health risk assessment was not performed for PRS Nos. 35-014(e₂) and 35-016(i) because no COPCs were identified during the human health risk-based screening assessment.

5.5.9.1 Review of COPCs and Extent of Contamination

Radiochemical analyses were not performed because radionuclide contaminants were determined to be of no potential concern at these PRSs based on the historical information presented in the work plan (LANL 1992, 7666), the June 1994 addendum to the work plan (Pratt 1994, 43475), and additional archival research. Field screening data collected during the Phase I RFI indicated that radiological contamination was not present at these sites. All field screening measurements for radioactivity were within background levels for TA-35. Therefore, no radionuclide COPCs were identified for these PRSs.

5.5.10 Preliminary Ecological Assessment

In cooperation with the NMED and EPA Region 6, the Laboratory ER Project is developing an approach for ecological risk assessment. Further ecological risk assessment at these sites will be deferred until the sites can be assessed as part of the ecological exposure unit methodology currently being developed.

5.5.11 Conclusions and Recommendations

The objective of the Phase I RFI at PRS Nos. 35-014(e₂) and 35-016(i) was to determine the presence or absence of contamination associated with the waste-oil impoundment and the storm water outfall. Radionuclide contaminants were determined to be of no potential concern at this PRS, as discussed in Section 5.5.6. The sample data indicate that these sites are not likely to pose a significant human health risk now or in the foreseeable future.

PRS Nos. 35-014(e₂) and 35-016(i) are proposed for NFA based on NFA Criterion 5 (LANL 1996, 54943). A Class III permit modification will be requested to remove these sites from the HSWA Module of the Laboratory's RCRA operating permit. In addition, these PRSs are to be closed under 40 CFR 265 closure requirements.

Further ecological risk assessment will be deferred, as stated in Section 5.5.10.

5.6 PRS No. 35-016(e)

PRS No. 35-016(e) is the site of an inactive, noncontact cooling water outfall located north of the Chemical Laser Facility (TA-35-85) on the north edge of Ten Site Mesa.

The May 1996 RFI report (LANL 1996, 54402) stated that the potential for radionuclide contamination would be evaluated in a later report; therefore, PRS No. 35-016(e) is included in this addendum. Radiochemical analyses were not performed because radionuclide contaminants were determined to be of no potential concern at this PRS based on the historical information presented in the work plan (LANL

1992, 7666), the June 1994 addendum to the work plan (Pratt 1994, 43475), and additional archival research.

PRS No. 35-016(e) is recommended for NFA for human health based on NFA Criterion 5 (LANL 1996, 54943).

5.6.1 History

PRS No. 35-016(e) is discussed in detail in Section 3.3.2 of the work plan and Section 7.25 of the June 1994 addendum to the work plan (LANL 1992, 7666; Pratt 1994, 43475). Results of the Phase I investigation are presented in the May 1996 RFI report (LANL 1996, 54402).

The two pipes that compose the outfall were installed in 1977 when TA-35-85 was constructed. The exact dates of discharge from the outfall are not known, but TA-35-85 operated from approximately 1977 until the early 1990s. The outfall, which formerly had National Pollutant Discharge Elimination System Permit No. 04A 090, was still listed on the permit as an active outfall in 1985 (LANL 1985, 853). The volume of water that was discharged from the outfall is not known, but erosion of the backfill material near the edge of the mesa suggests that the outfall discharged enough water to cause significant erosion.

The potential contaminants evaluated during the activities described in this addendum included radionuclides.

5.6.2 Description

The outfall consists of two adjacent 2-in.-diameter pipes that originate 4 ft below the roof line of TA-35-85. The pipes extend down the exterior side of the building, below the surface of the backfill material adjacent to the building, to the edge of Ten Site Mesa approximately 15 ft north of the building.

The PRS is located on the very steep north side of Ten Site Mesa (which has a slope of approximately 70%) and extends down the mesa slope for 20 to 50 ft. The upper mesa edge is composed of backfill material of cobble-sized tuff that extends from the edge of the mesa down the slope approximately 30 ft. Bedrock tuff is present on the edge of the mesa below the backfill material. The ground surface is covered with grasses and shrubs, a few pine trees, pine needle debris, and leaves. Drainage from the outfall and from the surface area around the outfall flows northward into Mortandad Canyon. Vegetation below the outfall appears to be normal and healthy.

5.6.3 Previous Investigations

No previous investigations have been performed at this site.

5.6.4 Field Investigation

The objective of the Phase I RFI was to characterize the nature of potential contamination associated with the outfall and discharge area.

The conceptual model for the RFI did not predict that hazardous constituents were released to the environment. However, if hazardous materials were present, the conceptual model shows that the most likely mechanism of movement beyond the PRS boundary is associated with hydrologic movement in the soil and surface water transport of contaminants over and into the bedrock tuff. A judgmental sampling approach was used, and the sampling activities were biased toward areas where residual contamination

would likely be found. To sample potential contamination associated with this PRS, samples were collected from the drainage channel below the outfall.

Field activities included an H&S radiation survey, engineering surveys, and environmental surveys including a radiation grid survey and an organic vapor survey.

Field screening during site surveys and sample collection activities was performed using a Foxboro 128 GC OVA, a Ludlum Model 139 meter with an air-proportional alpha probe, and an Eberline ESP-1 meter with beta/gamma probe model HP-260. Using this instrumentation, background radiation measurements for TA-35 typically range from 200 to 500 cpm beta/gamma radiation depending on the location and substrate rock type. Field screening measurements greater than 500 cpm beta/gamma radiation were generally considered to be above background levels. No beta/gamma radiation measurements above background levels were obtained during field screening at this site, and no alpha radiation or organic vapors were detected.

5.6.4.1 Environmental and Engineering Surveys

The H&S radiation survey was performed on June 1, 1994, over the area of PRS Nos. 35-008, 35-014(e₁), and 35-016(e). A site-specific H&S survey was performed for PRS No. 35-016(e) on September 8, 1994. Beta/gamma radiation measurements ranged from 157 to 218 cpm, which are within background levels.

The engineering surveys were performed from September 8, 1994, through September 12, 1994, and on March 10, 1995. The surveys consisted of reviews of archival information, oblique photographs, aerial photographs, and engineering drawings of TA-35 as well as a field site inspection and a description of the PRS. The PRS site was located, and the condition of the site was described.

Based on the results of the engineering surveys and on the SAP, the sample points were located in the drainage channel below the outfall. The surface soil sample was located directly below the outfall, and the hand-auger hole was located approximately 15 ft below the outfall.

The results of the engineering surveys revealed that the outfall comprises two steel pipes that are insulated with fiberglass and wrapped with a protective aluminum coating. The pipes extend to the edge of the canyon slope just beneath the surface of the mesa. The flow from the pipes has eroded the backfill material at the edge of the mesa into a small washout, and the edge of the mesa has retreated approximately 6 ft at the outfall. Several lengths of insulated pipe lie in the bottom of the washout, which is evidence that the pipes once extended farther to the former mesa edge. Asphalt riprap has been placed in the washout to deter additional erosion of the channel.

The radiation grid survey was performed on June 8, 1994, through June 10, 1994. The radiation grid locations included Location ID Nos. 35-7172 through 35-7362, which were spaced at approximately 20-ft intervals. Beta/gamma radiation measurements ranged from 137 to 295 cpm, and the average was 210 cpm, which is within background levels. An environmental survey was performed on June 17, 1994. As part of the environmental survey, an OVA survey was performed using the grid locations established for the radiation grid survey.

5.6.4.2 Deviations from the Sampling and Analysis Plan

Sampling activities followed the original SAP, which is described in the June 1994 addendum to the work plan (Pratt 1994, 43475).

5.6.4.3 Sampling Activities

Phase I sampling was performed on March 24, 1995. Four soil samples were collected. One surface soil sample was collected (Location ID No. 35-2152), and one hand-auger hole was drilled (Location ID No. 35-2153). The hand-auger hole was drilled to a depth of 3 ft, and three soil samples were collected. The sample collection intervals are shown in Table 5.6.4-1. Beta/gamma radiation measurements obtained during field screening of the samples ranged from 159 to 282 cpm, which are within background levels.

TABLE 5.6.4-1

SUMMARY OF SAMPLES TAKEN AT PRS No. 35-016(e)*

Location ID	Sample ID	Depth (ft)	Media	VOCs Mobile Lab	VOCs Fixed Lab	PAHs Mobile Lab	PCBs Mobile Lab	XRF Mobile Lab
35-2152	AAC1291	0-0.5	Soil	21665	NR	21665	21665	21666
35-2153	AAC1292	0-1	Soil	21665	NR	21665	21665	21666
35-2153	AAC1293	1-2	Soil	21665	NR	21665	21665	21666
35-2153	AAC1294	2-3	Soil	21655	21659	21665	21665	21666

*The numbers in the analytical suite columns are analytical request numbers.

Table 5.6.4-1 summarizes all sampling for PRS No. 35-016(e); Figure 5.6.4-1 shows the sample locations.

5.6.5 Evaluation of Inorganic Chemicals

The results of inorganic chemical analyses for PRS No. 35-016(e) are presented in the May 1996 RFI report (LANL 1996, 54402).

5.6.6 Evaluation of Radionuclides

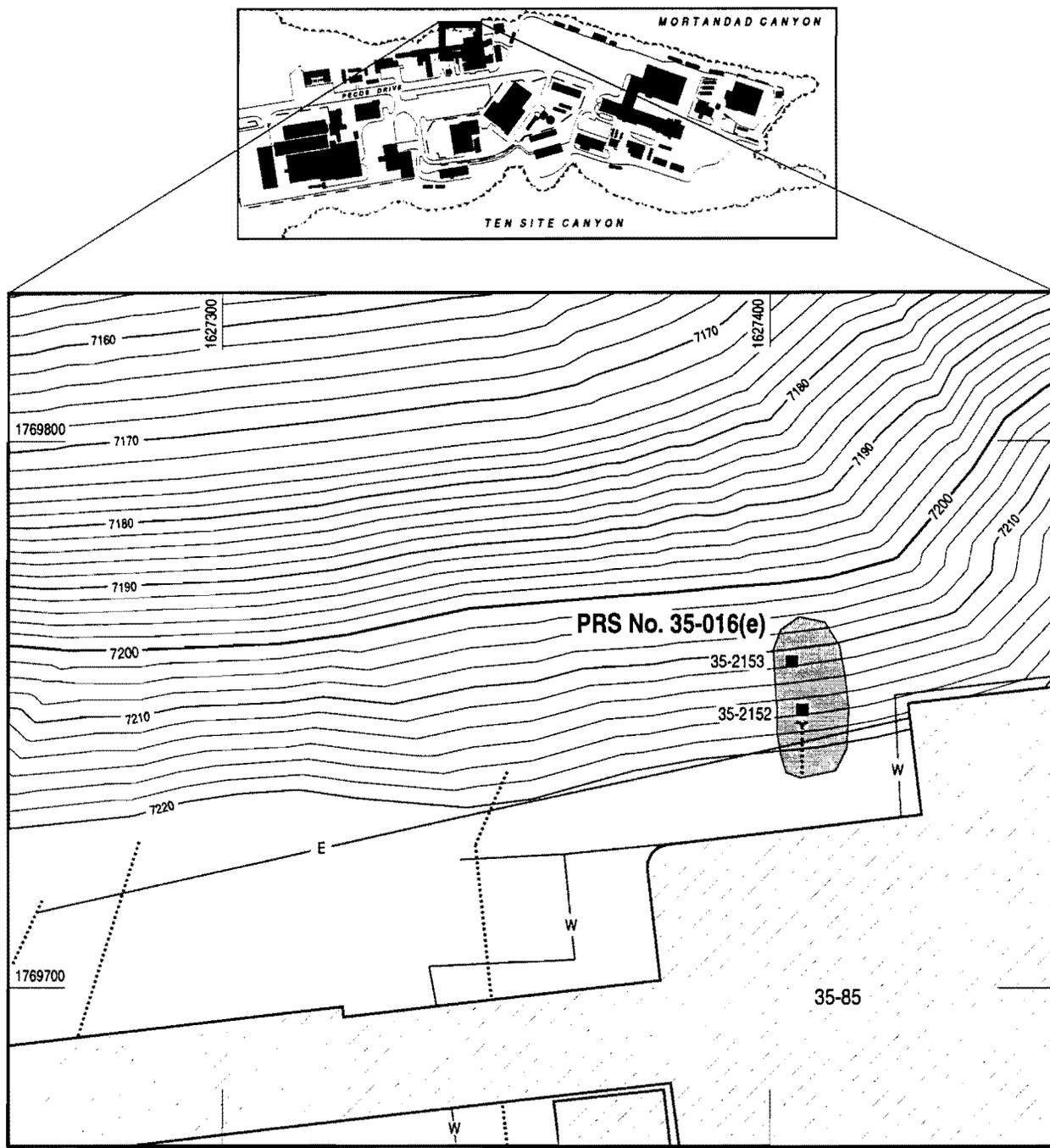
Radionuclides were not analyzed for at PRS No. 35-016(e) in accordance with the original SAP, which is described in the June 1994 addendum to the work plan (Pratt 1994, 43475). As described in Section 5.6.1 and Section 5.6.2, PRS No. 35-016(e) is defined as a noncontact cooling water outfall originating from TA-35-85, which does not house operations that are known or suspected of employing radioactive materials. Because this PRS is not reasonably associated with potential releases of radionuclides, radionuclide sampling was not proposed in the June 1994 addendum to the work plan (Pratt 1994, 43475) or the 1997 SAP (LANL 1997, 56293).

5.6.7 Evaluation of Organic Chemicals

The results of organic chemical analyses for PRS No. 35-016(e) are presented in the May 1996 RFI report (LANL 1996, 54402).

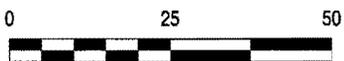
5.6.8 Risk-Based Screening Assessment

The results of the risk-based screening assessment for inorganic and organic chemicals are presented in the May 1996 RFI report (LANL 1996, 54402). No COPCs were identified.



Source: FIMAD G104145

F5.6.4-1 / TA-35f RFI RPT / 092297



Coordinates are NMSP NAD-83
Contour interval = 2 ft

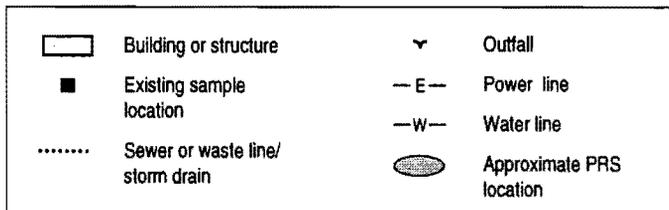


Figure 5.6.4-1. Locations of PRS No. 35-016(e) samples.

5.6.9 Human Health Risk Assessment

A human health risk assessment was not performed for PRS No. 35-016(e) because no COPCs were identified during the human health risk-based screening assessment.

5.6.9.1 Review of COPCs and Extent of Contamination

Radiochemical analyses were not performed because radionuclide contaminants were not of potential concern at this PRS based on the historical information presented in the work plan (LANL 1992, 7666), the June 1994 addendum to the work plan (Pratt 1994, 43475), and additional archival research. Field screening data collected during the Phase I RFI indicated that radiological contamination was not present at the site. All field screening measurements for radioactivity were within background levels for TA-35. Therefore, no radionuclide COPCs were identified for this PRS.

5.6.10 Preliminary Ecological Assessment

In cooperation with the NMED and EPA Region 6, the Laboratory ER Project is developing an approach for ecological risk assessment. Further ecological risk assessment at this site will be deferred until the site can be assessed as part of the ecological exposure unit methodology currently being developed.

5.6.11 Conclusions and Recommendations

The objective of the Phase I RFI at PRS No. 35-016(e) was to determine the presence or absence of contamination associated with the inactive outfall that discharged noncontact cooling water from TA-35-85. No COPCs were identified during the human health screening assessment. Radionuclide contaminants were determined to be of no potential concern at this PRS. The sample data indicate that this site is not likely to pose a significant human health risk now or in the foreseeable future.

Samples for specific analytes were collected from a 3-ft hand-auger hole and a surface sample. The extent of contamination cannot be conclusively determined based on the numbers of samples, but the weight of evidence suggests that widespread contamination at concentrations of human health concern has not occurred.

Based on NFA Criterion 5 (LANL 1996, 54943), PRS No. 35-016(e) does not need to be added to the HSWA Module of the Laboratory's RCRA operating permit, and it is proposed for removal from the ER Project list of PRSs.

Further ecological risk assessment will be deferred, as stated in Section 5.6.10.

5.7 PRS No. 35-016(f)

PRS No. 35-016(f) is an active storm water outfall at the edge of Ten Site Mesa north of building TA-35-85.

The May 1996 RFI report (LANL 1996, 54402) stated that the potential for radionuclide contamination would be evaluated in a later report; therefore, PRS No. 35-016(f) is included in this addendum. Radiochemical analyses were not performed because radionuclide contaminants were determined to be of no potential concern at this PRS based on the historical information presented in the work plan (LANL 1992, 7666), the June 1994 addendum to the work plan (Pratt 1994, 43475), and additional archival research.

PRS No. 35-016(f) is recommended for NFA for human health based on NFA Criterion 5 (LANL 1996, 54943).

5.7.1 History

PRS No. 35-016(f) is discussed in detail in Section 3.3.2 of the work plan and Section 7.25 of the June 1994 addendum to the work plan (LANL 1992, 7666; Pratt 1994, 43475). Results of the Phase I investigation are presented in the May 1996 RFI report (LANL 1996, 54402).

The western laser corridor of TA-35-85 was constructed around 1985 to house laser experiments. The storm water drain system and the outfall were probably installed at that time to drain the area south of the laser corridor and east of building TA-35-189. Roof drains from the laser corridor and the southern extension of TA-35-85 discharge to the storm sewer system. Any potential contamination at this PRS may have originated from the roofs of TA-35-85 and TA-35-189 and from the parking and driveway areas east of TA-35-189.

The potential contaminants evaluated during the activities described in this addendum included radionuclides.

5.7.2 Description

The outfall is located at the edge of Ten Site Mesa approximately 30 ft north of TA-35-85; it discharges to the north side of the mesa. The outfall is an 18-in.-diameter CMP that originates from several storm water collection grates south of the west corridor of TA-35-85 and east of TA-35-189. The storm water collection grates are located in bare soil and in asphalt paved areas and collect both surface storm water flow and discharge from roof drains from TA-35-85 and TA-35-189.

The mesa edge is composed primarily of backfill material that has eroded into a small discharge channel below the outfall. Discharge from the outfall is intermittent and sourced by natural precipitation. The topography below the outfall is a steep mesa side (the estimated slope is greater than 70%). Vegetation below the outfall appears to be normal and healthy.

5.7.3 Previous Investigations

No previous investigations have been performed at this site.

5.7.4 Field Investigation

The objective of the Phase I RFI was to characterize the nature of potential contamination associated with the storm water outfall and discharge area.

The conceptual model for the RFI took into account the potential for hazardous material spills in the source area of the storm water outfall. Any spill material was expected to be mobilized by surface runoff through the storm drain system to the adjacent mesa edge. The conceptual model did not predict that hazardous constituents were released to the environment. A judgmental sampling approach was used, and the sampling activities were biased toward the area below the storm water outfall discharge where residual contamination was expected.

Field activities included an H&S radiation survey, engineering surveys, and environmental surveys including a radiation grid survey.

Field screening during site surveys and sample collection activities were performed using a Foxboro 128 GC OVA, a Ludlum Model 139 meter with an air-proportional alpha probe, and an Eberline ESP-1 meter with beta/gamma probe model HP-260. Using this instrumentation, background radiation measurements for TA-35 typically range from 200 to 500 cpm beta/gamma radiation depending on the location and substrate rock type. Field screening measurements greater than 500 cpm beta/gamma radiation were generally considered to be above background levels. No beta/gamma radiation measurements above background levels were obtained during field screening at this site, and no alpha radiation or organic vapors were detected.

5.7.4.1 Environmental and Engineering Surveys

The H&S radiation survey was performed on September 8, 1994. A beta/gamma radiation measurement of 292 cpm was obtained from the discharge channel below the outfall, and a measurement of 182 cpm was obtained from inside the CMP at the outfall, which are within background levels.

Engineering surveys were performed on September 8, 1994, September 12, 1994, and March 10, 1995. Surveys consisted of a review of archival information, oblique photographs, aerial photographs, and engineering drawings of TA-35 as well as a field inspection. The source of the outfall was determined, the drainage system associated with the outfall was documented, and the sample locations were established.

A radiation grid survey was performed on September 12, 1994. The radiation grid locations included Location ID Nos. 35-7661 through 35-7675, which were spaced at approximately 5-ft intervals. Beta/gamma radiation measurements ranged from 198 to 275 cpm, and the average was 250 cpm, which is within background levels.

5.7.4.2 Deviations from the Sampling and Analysis Plan

Sampling activities followed the original SAP, which is described in the June 1994 addendum to the work plan (Pratt 1994, 43475).

5.7.4.3 Sampling Activities

Phase I sampling was performed on March 14, 1995. Two locations were sampled, and four samples were collected (not including duplicate quality assurance/quality control samples). One surface soil sample (Location ID No. 35-2154) was collected directly below the outfall. Three subsurface soil samples were collected from a 3-ft-deep hand-auger hole (Location ID No. 35-2155) located in the drainage channel approximately 10 ft below the outfall. The sample collection intervals are shown in Table 5.7.4-1. Beta/gamma radiation measurements obtained during field screening of the samples ranged from 255 to 361 cpm, which are within background levels.

Table 5.7.4-1 summarizes all sampling for PRS No. 35-016(f); Figure 5.7.4-1 shows the sample locations.

5.7.5 Evaluation of Inorganic Chemicals

The results of inorganic chemical analyses for PRS No. 35-016(f) are presented in the May 1996 RFI report (LANL 1996, 54402).

5.7.6 Evaluation of Radionuclides

Radionuclides were not analyzed for at PRS No. 35-016(f) in accordance with the original SAP, which is described in the June 1994 addendum to the work plan (Pratt 1994, 43475).

TABLE 5.7.4-1
SUMMARY OF SAMPLES TAKEN AT PRS No. 35-016(f)^a

Part 1							
Location ID	Sample ID	Depth (ft)	Media	VOCs Mobile Lab	VOCs Fixed Lab	SVOCs Fixed Lab	PAHs Mobile Lab
35-2154	AAC1207	0-0.5	Soil	21598	21576	NR	21598
35-2155	AAC1208	0-1	Soil	21598	NR	NR	21598
35-2155	AAC1209	1-2	Soil	21598	NR	21576	21598
35-2155	AAC1210	2-3	Qbt3	21598	NR	NR	21598
35-2155	AAC1211	2-3 (dup) ^b	Qbt3	NR	NR	NR	NR
35-2284	0435-95-0205	0-1	Soil	NR	NR	1678	NR
Part 2							
Location ID	Sample ID	Depth (ft)	Media	PCBs Mobile Lab	PCBs Fixed Lab	XRF Mobile Lab	Inorganic Fixed Lab
35-2154	AAC1207	0-0.5	Soil	21598	NR	21600	NR
35-2155	AAC1208	0-1	Soil	21598	NR	21600	21579
35-2155	AAC1209	1-2	Soil	21598	21576	21600	NR
35-2155	AAC1210	2-3	Qbt3	21598	NR	21600	NR
35-2155	AAC1211	2-3 (dup) ^b	Qbt3	NR	NR	21600	NR
35-2284	0435-95-0205	0-1	Soil	NR	NR	NR	NR

a. The numbers in the analytical suite columns are analytical request numbers.
b. Field duplicate

5.7.7 Evaluation of Organic Chemicals

The results of organic chemical analyses for PRS No. 35-016(f) are presented in the May 1996 RFI report (LANL 1996, 54402).

5.7.8 Risk-Based Screening Assessment

The results of the risk-based screening assessment for inorganic and organic chemicals are presented in the May 1996 RFI report (LANL 1996, 54402). No COPCs were identified.

5.7.9 Human Health Risk Assessment

A human health risk assessment was not performed for PRS No. 35-016(f) because no COPCs were identified during the human health risk-based screening assessment.

5.7.9.1 Review of COPCs and Extent of Contamination

Radiochemical analyses were not performed because radionuclide contaminants were determined to be of no potential concern at this PRS based on the historical information presented in the work plan (LANL 1992, 7666), the June 1994 addendum to the work plan (Pratt 1994, 43475), and additional archival research. Field screening data collected during the Phase I RFI indicated that radiological contamination was not present at the site. All field screening measurements for radioactivity were within background levels for TA-35. Therefore, no radionuclide COPCs were identified for this PRS.

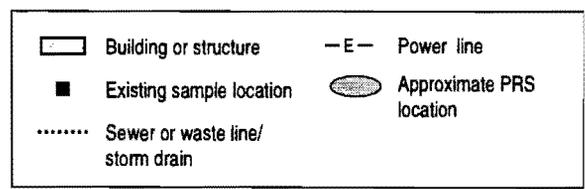
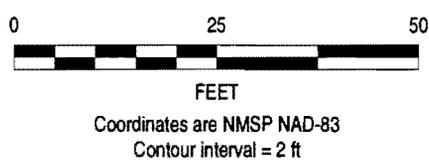
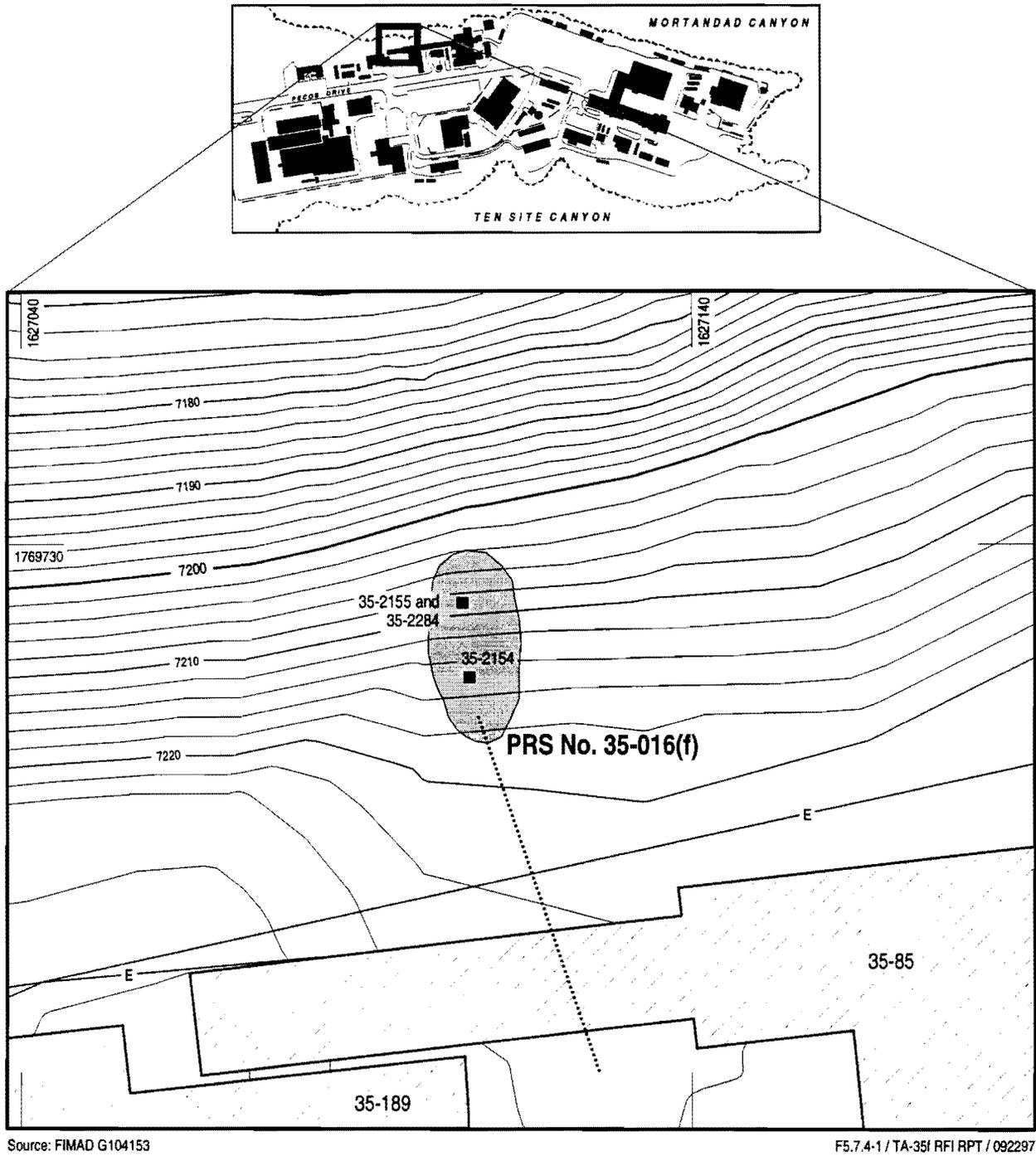


Figure 5.7.4-1. Locations of PRS No. 35-016(f) samples.

5.7.10 Preliminary Ecological Assessment

In cooperation with the NMED and EPA Region 6, the Laboratory ER Project is developing an approach for ecological risk assessment. Further ecological risk assessment at this site will be deferred until the site can be assessed as part of the ecological exposure unit methodology currently being developed.

5.7.11 Conclusions and Recommendations

The objective of the Phase I RFI at PRS No. 35-016(f) was to determine the presence or absence of contamination associated the outfall. No COPCs were identified during the human health screening assessment. Radionuclide contaminants were determined to be of no potential concern at this PRS. The sample data indicate that this site is not likely to pose a significant human health risk now or in the foreseeable future.

The extent of contamination cannot be conclusively determined based on the sample data, but the weight of evidence suggests that environmental contamination at concentrations of human health concern has not occurred.

Based on NFA Criterion 5 (LANL 1996, 54943), PRS No. 35-016(f) will not be added to the HSWA Module of the Laboratory's RCRA operating permit, and it is proposed for removal from the ER Project list of PRSs.

Further ecological risk assessment will be deferred, as stated in Section 5.7.10.

→ To D.
Please let me know if
you concur based on this report
Amanda
10/02/97

REFERENCES

- Bowen, B. M., May 1990. "Los Alamos Climatology," Los Alamos National Laboratory Report LA-11735-MS, Los Alamos, New Mexico. **(Bowen 1990, ER ID Number 6899)**
- Cox, J., January 28, 1985. "Contaminated Soil and Concrete Left of the Excavation of MH-TLS-12 and Line 90A, Work Package II.5, TA-35," Los Alamos National Laboratory Memorandum HSE-1-SS-5 to Allen Valentine (Radiation Protection Group) from Jim Cox (HSE-1), Los Alamos, New Mexico. **(Cox 1985, ER ID Number 781)**
- Devaurs, M., and W. D. Purtymun, 1985. "Hydrologic Characteristics of the Alluvial Aquifers in Mortandad, Cañada del Buey, and Pajarito Canyons," Los Alamos National Laboratory Report LA-UR-85-4002, Los Alamos, New Mexico. **(Devaurs and Purtymun 1985, ER ID Number 7415)**
- DOE (US Department of Energy), March 7, 1979. "Compliance with Floodplain/ Wetlands Environmental Review Requirements," Final Rule, 10 CFR Part 1022, Vol. 44, No. 46, p. 12594. **(DOE 1979)**
- DOE (US Department of Energy), April 27, 1987. DOE Environmental Problem 19, Los Alamos, New Mexico. **(DOE 1987, ER ID Number 5622)**
- DOE (US Department of Energy), October 1987. "Phase I: Installation Assessment, Los Alamos National Laboratory," Vol. I (draft), Comprehensive Environmental Assessment and Response Program, Albuquerque Operations Office, Albuquerque, New Mexico. **(DOE 1987, ER ID Number 8663)**
- DOE (US Department of Energy), November 9, 1988. "General Environmental Protection Program," DOE Order 5400.1, Washington, DC. **(DOE 1988)**
- Dorries, A. M. (Comp.), June 1, 1996. "Risk-Based Corrective Action Process," Revision 1, Los Alamos National Laboratory Report LA-UR-96-2811, Los Alamos, New Mexico. **(Dorries 1996, 55575)**
- Dransfield, B. J., and J. N. Gardner, May 1985. "Subsurface Geology of the Pajarito Plateau, Española Basin, New Mexico," Los Alamos National Laboratory Report LA-10455-MS, Los Alamos, New Mexico. **(Dransfield and Gardner 1985, ER ID Number 6612)**
- Dunham, D. A., December 17, 1992. "Biological and Floodplain/Wetlands Assessment for Environmental Restoration Program, Operable Unit 1129, TA-4, -5, -35, -42, -48, -52, -55, -63, -66 and Operable Unit 1147, TA-50" (draft), Environmental Protection Group (EM-8), Los Alamos National Laboratory, Los Alamos, New Mexico. **(Dunham 1992, ER ID Number 31276)**
- Elder, J. C., E. J. Cox, D. P. Hohner, and A. M. Valentine, September 1986. "Radioactive Liquid Waste Lines Removal Project at Los Alamos (1981-1986)," Los Alamos National Laboratory Report LA-10821-MS, Los Alamos, New Mexico. **(Elder et al. 1986, ER ID Number 3089)**
- EPA (US Environmental Protection Agency), December 1989. "Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A)," Interim Final, EPA 540/1-89/002, Office of Emergency and Remedial Response, Washington, DC. **(EPA 1989, ER ID Number 8021)**
- EPA (US Environmental Protection Agency), March 8, 1990. "National Oil and Hazardous Substances Pollution Contingency Plan," Final Rule, 40 CFR Part 300, *Federal Register*, Vol. 55, No. 46, p. 8666. **(EPA 1990)**

References

EPA (US Environmental Protection Agency), February 1994. "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review," EPA-540/R-94-013, Office of Solid Waste and Emergency Response, Washington, DC. **(EPA 1994, ER ID Number 48639)**

EPA (US Environmental Protection Agency), August 1, 1996. "Region 9 Preliminary Remediation Goals (PRGs) 1996," EPA Region IX, Technical Support Team, San Francisco, California. **(EPA 1996, ER ID Number 54899)**

Fresquez, P., July 9, 1991. "Results of an Environmental Restoration Verification Survey of a Former Waste Oil Surface Impoundment (TSL-85) at TA-35," Los Alamos National Laboratory Memorandum HSE-8:91-1181 to John Krueger (HSE-13) from Phil Fresquez (HSE-8), Los Alamos, New Mexico. **(Fresquez 1991, ER ID Number 823)**

Gardner, J. N., F. Goff, S. Garcia, and R. C. Hagan, February 10, 1986. "Stratigraphic Relations and Lithologic Variations in the Jemez Volcanic Field, New Mexico," in *Journal of Geophysical Research*, Vol. 91, No. B2, pp. 1763–1778. **(Gardner et al. 1986, ER ID Number 21527)**

Gardner, J. N., T. Kolbe, and S. Chang, January 1993. "Geology, Drilling, and Some Hydrologic Aspects of Seismic Hazards Program Core Holes, Los Alamos National Laboratory, New Mexico," Los Alamos National Laboratory Report LA-12460-MS, Los Alamos, New Mexico. **(Gardner et al. 1993, ER ID Number 12582)**

Heiken, G., F. Goff, J. Stix, S. Tamanyu, M. Shafiqullah, S. Garcia, and R. Hagan, February 10, 1986. "Intracaldera Volcanic Activity, Toledo Caldera and Embayment, Jemez Mountains, New Mexico," in *Journal of Geophysical Research*, Vol. 91, No. B2, pp. 1799–1815. **(Heiken et al. 1986, ER ID Number 48638)**

Izett, G. A., and J. D. Obradovich, February 10, 1994. "⁴⁰Ar/³⁹Ar Age Constraints for the Jaramillo Normal Subchron and the Matuyama-Brunhes Geomagnetic Boundary," in *Journal of Geophysical Research*, Vol. 99, No. B2, pp. 2925–2934. **(Izett and Obradovich 1994, ER ID Number 48817)**

LANL (Los Alamos National Laboratory), November 25, 1985. "Cross Index of NPDES Serial #s to Technical Areas and Types of Discharge," Los Alamos, New Mexico. **(LANL 1985, ER ID Number 853)**

LANL (Los Alamos National Laboratory), November 1990. "Solid Waste Management Units Report," Vol. I–IV, Los Alamos National Laboratory Report LA-UR-90-3400, prepared by International Technology Corporation, Contract No. 9-XS8-0062R-1, Los Alamos, New Mexico. **(LANL 1990, ER ID Number 7511)**

LANL (Los Alamos National Laboratory), May 1991. "Environmental Restoration Standard Operating Procedures," Vol. I–II, Los Alamos, New Mexico. **(LANL 1991, ER ID Number 21556)**

LANL (Los Alamos National Laboratory), May 1992. "RFI Work Plan for Operable Unit 1129," Los Alamos National Laboratory Report LA-UR-92-800, Los Alamos, New Mexico. **(LANL 1992, ER ID Number 7666)**

LANL (Los Alamos National Laboratory), July 1993. "Health and Environmental Chemistry: Analytical Techniques, Data Management, and Quality Assurance," Los Alamos National Laboratory Report LA-10300-M, Vol. II, Los Alamos, New Mexico. **(LANL 1993, ER ID Number 31794)**

LANL (Los Alamos National Laboratory), July 1995. "Statement of Work – Analytical Support," Revision 2, RFP No. 9-XS1-Q4257, Los Alamos, New Mexico. **(LANL 1995, ER ID Number 49738)**

LANL (Los Alamos National Laboratory), March 1996. "Quality Assurance Project Plan Requirements for Sampling and Analysis," Los Alamos National Laboratory Report LA-UR-96-441, Los Alamos, New Mexico. **(LANL 1996, ER ID Number 53450)**

LANL (Los Alamos National Laboratory), May 1996. "RFI Report for Potential Release Sites 35-003(h, j, and k) 35-004(b) 35-008 35-009(a through d) 35-014(a, b, d, e₁, e₂, and f) 35-015(b) 35-016(e, f, and i)," Los Alamos National Laboratory Report LA-UR-96-1293, Los Alamos, New Mexico. **(LANL 1996, ER ID Number 54402)**

LANL (Los Alamos National Laboratory), May 6, 1996. "Response to the Notice of Deficiency (NOD) for Technical Area (TA) 48 Resource Conservation and Recovery Act Facility Investigation (RFI) Report," Los Alamos National Laboratory Letter EM/ER:96-231 to Benito Garcia (NMED-HRMB) from Jorg Jansen (Program Manager, Environmental Restoration) and Theodore J. Taylor (Program Manager, Los Alamos Area Office), Los Alamos, New Mexico. **(LANL 1996, ER ID Number 54448)**

LANL (Los Alamos National Laboratory), June 1996. "RFI Report for Potential Release Sites 35-003(d, e, f, g, l, o, q, and r) 35-016(g and h)," Los Alamos National Laboratory Report LA-UR-96-1605, Los Alamos, New Mexico. **(LANL 1996, ER ID Number 54422)**

LANL (Los Alamos National Laboratory), July 1996. "RFI Report for Potential Release Sites 35-004(a, g, h, and m) 35-009(e) 35-014(g₁ and g₂) 35-016(b, j, n, and q)," Los Alamos National Laboratory Report LA-UR-96-2082, Los Alamos, New Mexico. **(LANL 1996, ER ID Number 54763)**

LANL (Los Alamos National Laboratory), September 20, 1996. "No Further Action Criteria Policy," Los Alamos National Laboratory Memorandum EM/ER:95-PCT-015, R1 to Distribution, Los Alamos, New Mexico. **(LANL 1996, ER ID Number 54943)**

LANL (Los Alamos National Laboratory), October 17, 1996. "Response to Request for Additional Information for TA-48 RFI Report," Los Alamos National Laboratory Letter EM/ER:96-533 to Benito Garcia (NMED-HRMB) from Jorg Jansen (Program Manager, LANL/ER Project) and Theodore J. Taylor (Program Manager, DOE/LAAO), Los Alamos, New Mexico. **(LANL 1996, ER ID Number 55064)**

LANL (Los Alamos National Laboratory), December 1996. "Installation Work Plan for Environmental Restoration," Revision 6, Los Alamos National Laboratory Report LA-UR-96-4629, Los Alamos, New Mexico. **(LANL 1996, ER ID Number 55574)**

LANL (Los Alamos National Laboratory), June 1997. "Sampling and Analysis Plan for Potential Release Sites 35-003(h, j, and k) 35-004(m) 35-009(a through d) 35-014(a, b, d, g₁, and g₂) 35-015(b) 35-016(b, j, n, p, and q)," Los Alamos National Laboratory Report LA-UR-97-2052, Los Alamos, New Mexico. **(LANL 1997, ER ID Number 56293)**

Longmire, P. A., D. E. Broxton, and S. L. Reneau, October 1995. "Natural Background Geochemistry and Statistical Analysis of Selected Soil Profiles, Sediments, and Bandelier Tuff, Los Alamos, New Mexico," Los Alamos National Laboratory Report LA-UR-95-3468, Los Alamos, New Mexico. **(Longmire et al. 1995, ER ID Number 52227)**

Longmire, P., S. Reneau, P. Watt, L. McFadden, J. Gardner, C. Duffy, and R. Rytli, January 1995. "Natural Background Geochemistry, Geomorphology, and Pedogenesis of Selected Soil Profiles and Bandelier Tuff, Los Alamos, NM" (draft), Los Alamos National Laboratory Report LA-12913-MS, Los Alamos, New Mexico. **(Longmire et al. 1995, ER ID Number 48818)**

References

Manz, K. L., M. D. Hannaford, E. D. McGhehee, and T. L. Binzen, 1994. Environmental restoration program operable units (OU) 1129 and 1147 cultural resource survey report, Cultural Resource Management Team Report No. 72, Environmental Protection Group, Los Alamos National Laboratory, Los Alamos, New Mexico. **(Manz et al. 1994, ER ID Number 49508)**

Pratt, A., June 2, 1994. "Addendum to the OU 1129 RFI Work Plan," Los Alamos National Laboratory Memorandum EES-13-ER-05-94-011 to Tracy Glatzmaier (EES-5) from Allyn Pratt (EES-13), Los Alamos, New Mexico. **(Pratt 1994, ER ID Number 43475)**

Pratt, A., May 27, 1997. "Mobile Laboratory Gamma Spectroscopy Measurements," Los Alamos National Laboratory Memorandum EES-13-ER-04-97-004 to Field Unit 4 File from Allyn Pratt (EES-13), Los Alamos, New Mexico. **(Pratt 1997, ER ID Number 55802)**

Purtymun, W. D., January 1995. "Geologic and Hydrologic Records of Observation Wells, Test Holes, Test Wells, Supply Wells, Springs, and Surface Water Stations in the Los Alamos Area," Los Alamos National Laboratory Report LA-12883-MS, Los Alamos, New Mexico. **(Purtymun 1995, ER ID Number 45344)**

Ryti, R., P. Longmire, and E. McDonald, June 30, 1997. "Application of LANL Background Data to ER Project Decision-Making, Part II: Radionuclides in Soils, Sediments, and Tuff" (draft), Los Alamos National Laboratory Report, Los Alamos, New Mexico. **(Ryti et al. 1997, ER ID Number 56186)**

Vaniman, D. and K Wohletz, November 16, 1993. "Reconnaissance Geology of North-Central LANL," Facility for Information Management, Analysis, and Display Map G101599, Los Alamos National Laboratory, Los Alamos, New Mexico. **(Vaniman and Wohletz 1993, ER ID Number 48822)**

Wolff, J. A. and J. N. Gardner, May 1995. "Is the Valles caldera entering a new cycle of activity?" in *Geology*, Vol. 23, No. 5, pp. 411-414. **(Wolff and Gardner 1995, ER ID Number 48821)**

Appendix A

Analytical Suites

APPENDIX A. ANALYTICAL SUITES

Results of analyses can be found in FIMAD. Hard copies of supporting information will be provided upon request.

Chemicals that are reported by analytical laboratories as nondetects have not been included in the tables of this addendum. Nonetheless, nondetected chemicals are often part of the decision-making process, and it is important to note that analyses for these chemicals were performed. This appendix provides a list of the target analytes in each analytical suite for which samples were taken.

Radiochemical Suite**Alpha-emitting radionuclides**

Plutonium-238	Uranium-234
Plutonium-239,240	Uranium-235
	Uranium-238

Gamma-emitting radionuclides

Americium-241	Europium-152
Barium-140	Neptunium-237
Cerium-144	Ruthenium-106
Cesium-137	Sodium-22
Cobalt-60	

This page intentionally left blank.

Appendix B

Data Validation

APPENDIX B. DATA VALIDATION

This appendix contains the sample-specific data validation. Data validation tables are presented for potential release sites (PRSs) evaluated for this addendum. Only radiochemical data were evaluated for this addendum; therefore, the data validation tables include only the radiological analytical suites. No data validation tables are necessary for PRS Nos. 35-004(b); 35-014(e₂); and 35-016(e, f, and i) because radiochemical analyses were not performed for these sites. No data validation tables are necessary for PRS Nos. 35-004(a) and 35-009(e) because qualification of the radiochemical analytical data was not required. Data quality for the radionuclide data set is discussed in Chapter 4 of this addendum.

TABLE B-1**DATA VALIDATION TABLE FOR PRS No. 35-004(g) SAMPLES**

Request No.	Location ID	Sample ID	Analytical Suite	QC Parameter	Comments
21478	35-2100	AAC1177	Gamma spectroscopy	Bias	Because of insufficient sample to fill the calibrated gamma spectroscopy container, sample results should be regarded as estimates and biased high (J+).

TABLE B-2**DATA VALIDATION TABLE FOR PRS No. 35-004(h) SAMPLES**

Request No.	Location ID	Sample ID	Analytical Suite	QC Parameter	Comments
17293	35-2024	AAA6601	Isotopic uranium	Precision	Relative percent difference for duplicate sample analysis of ²³⁵ U was 39%; therefore, sample results for ²³⁵ U should be regarded as estimated.

This page intentionally left blank.