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

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 30, 1997
Refer to: EM/ER:97-395

RECEIVED
SEP 30 1997

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

Steve/Terri
need to do fatal flaw review on these documents + then remand to LANL/DOE or assign to appropriate staff. Please let me know by mid-your result of fatal flaw review — Benito 10/3/97

SUBJECT: SUBMITTAL OF RFI REPORTs FOR PRSs IN TAs 0, 1, 3, 10, 11, 13, 15, 16, 19, 33, 36, AND 73

Dear Mr. Garcia:

Enclosed are two copies of each of the Los Alamos National Laboratory's Resource Conservation and Recovery Act Facility Investigation Reports for Potential Release Sites in Technical Areas 0, 1, 3, 10, 11, 13, 15, 16, 19, 33, 36, and 73. One copy of each report is for your information and the second copy of each should go to your technical branch. The list of reports submitted is itemized on the following page.

If you have any questions, please contact Dave McInroy at (505) 667-0819 or Joe Mose at (505) 667-5808.

Sincerely,

Jorg Jansen, Program Manager
LANL/ER Project

Sincerely,

Theodore J. Taylor, Program Manager
DOE/LAAO

JJ/TT/ss

Enclosures (1) RFI Reports for PRSs in TAs 0, 1, 3, 10, 11, 13, 15, 16, 19, 33, 36, and 73
(2) Certifications

6078

TV

Reports
RFI RPT TA 0: PRS 0-003, 0-012
NFA RPT TAs 0, 73: PRS 0-034(a,b), 73-001(b), 73-004(c,d)
RFI RPT TA 1: PRS 1-001(s,u), 1-007(l)
RFI RPT TA 3: PRS 3-004(c,d),3-007, 3-014(o), 3-049(b), 3-052(b), 3-056(k), C-03-014, 3-014(k,l,m)
RFI RPT TA 3, PRS 3-054(e), C-3-006, CMR
RFI RPT TA 10: 10-008
Addendum RFI RPT TA 15: PRS C-15-001, C-15-007
RFI RPT TA 19: 19-001, 19-003, C-19-001
Addendum RFI RPT TA 36: PRS 36-005
RFI RPT TA 16: 16-024(c,d,f,g,k,m,o,p-s) 16-025(b2,d,g,h,j,k,m,n,o,y), 16-034(c,d,e,f,l,m), C-16-005, C-16-017
RFI RPT TAs 11, 13, 16: PRSs 11-012(a,b), 13-003(a), 16-006(c,d), 16-010(a), 16-021(a), 16-026(c,d,v), 16-028(a), 16-030(g)
RFI RPT TA 33: PRSs 33-002(b,c), 33-003(b), 33-004(k), 33-006(a), 33-008(a,b), 33-011(d), 33-013, 33-017

Cy (w/ encs.):
G. Allen, CST-7, MS E525
M. Gilgosch, LAAO, MS A316
G. Gould, EES-15, MS J495
D. Griswold, AL-ERD, MS A906
J. Harry, EES-5, MS M992
B. Koch, LAAO, MS A316
D. Krier, EES-1, MS D462
R. Michelotti, CST-7, MS E525
J. Mose, LAAO, MS A316
D. Neleigh, EPA, R.6, 6PD-N
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-OB
G. Saums, NMED-SWQB
S. Yanicak, NMED-AIP, MS J993
RPF, MS M707

Information Copy:
T. Baca, EM, MS J591
D. Bradbury, EM/ER, MS M992
J. Canepa, EM/ER, MS M992
T. Glatzmaier, DDEES/ER, MS M992
T. Longo, DOE-HQ, EM-453
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: RFI Report for PRSs 16-024(c, d, f, g, k, m, o, p, q, r, s), 16-025(b2, d, g, h, j, k, m, n, o, y), 16-034(c, d, e, f, l, m), C-16-005, C-16-017 in TA-16

Name: _____ Date: 9-30-97

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

LIBRARY COPY

RFI Report for Potential Release Sites at TA-16

16-024(c,d,f,g,k,m,o,p–s)
16-025(b2,d,g,h,j,k,m–o,y)
16-034(c–f,l,m)
C-16-005
C-16-017

RECEIVED
OCT 1 1997

Field Unit 3

Environmental Restoration Project

September 1997

A Department of Energy
Environmental Cleanup Program

Los Alamos
NATIONAL LABORATORY

LA-UR-97-3770

LANL
3 / 1082 / 16

EXECUTIVE SUMMARY

This Resource Conservation and Recovery Act (RCRA) facility investigation (RFI) report discusses Phase I investigations, results, and recommendations for 29 potential release sites (PRSs) within Technical Area 16 (TA-16), which is located in the southwestern quadrant of Los Alamos National Laboratory (LANL). This site has been used from 1944 to the present. Past and present activities at this site have centered around the development, fabrication, and testing of explosive components used in the United States' nuclear weapons program.

The 29 PRSs consist of the soil beneath the footprints of former structures: equipment and control buildings 16-025(d) and 16-034(l)); high explosive (HE) machining buildings 16-025(g), 16-025(h), 16-025(j), and C-16-005; HE casting buildings 16-025(b2), a barium nitrate grinding facility 16-025(y), HE magazines 16-024(c), 16-024(d), 16-024(f), 16-024(g), 16-024(k), 16-024(m), 16-024(o), 16-024(p), 16-024(q), 16-024(r), 16-024(s); machine shop 16-034(d); a radiography building 16-025(m); a storage building 16-034(e); a steam plant C-16-017; an HE inspection building 16-025(k); warehouse huts 16-034(c); laboratories 16-034(f), 16-034(m); and source hutments (storage areas)16-025(n) and 16-025(o).

The RFI work plan for Operable Unit (OU) 1082 Addendum 1 (LANL 1994, 1160), which includes sampling and analysis plans for all but one of the above PRSs, was approved by the Environmental Protection Agency (EPA) Region 6 in January 1995 (Taylor 1995, 15-16-645). The sampling and analysis plan for PRS 16-024(s) is in the RFI Work Plan for Operable Unit 1082 Addendum II (LANL 1995, 1342).

Phase I sampling for these PRSs was conducted from July 2 through August 8, 1997. Surface and near-surface soil samples were collected at each PRS. Samples were collected using a manually operated hand-auger. Locations were sampled to either 1 or 2 ft depths. Analyses were performed for HE, inorganic chemicals, cyanide, semivolatile organic compounds (SVOCs), and radionuclides as prescribed in the approved work plan. Although radionuclides are regulated by the Department of Energy (DOE) 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 report.

Appendix B lists the details of the data analysis, including any problems that arose during analysis. Overall the quality of the analytical results is adequate to address the decisions discussed in Section 5 of this report, which concern the presence or absence of contaminants at or above background levels and human health risk-based screening action levels.

The objective of Phase I investigation at these sites was use biased sampling to determine if releases had occurred at the PRSs using. Analytical results were used to determine if releases had caused contamination at levels above screening action levels (SALs), upper tolerance limits (UTLs), or estimated quantitation limits (EQLs). Phase I investigations at the 29 PRSs resulted in recommendation for no further action (NFA) for human health concerns.

A brief description and site recommendation for each PRS is presented below and summarized in Table ES-1. This table also identifies the section of this report in which each PRS is discussed in detail. All decisions assume a continued industrial scenario for this area.

PRS 16-024(c) is the footprint of HE magazine TA-16-30. Ten surface and near-surface soil samples were collected for screening from the door location and quadrants of the former building to support the human health decision. One sample was submitted for laboratory analysis of inorganics, SVOCs, and HE. No contamination was detected above SALs. This PRS is recommended for human-health NFA because contamination is not present at levels that present a potential risk to human health.

PRS 16-024(d) is the footprint of HE magazine TA-16-34. Ten surface and near-surface soil samples were collected for screening from the door location and quadrants of the former building to support the human health decision. One sample was submitted for laboratory analysis of inorganics, SVOCs, and HE. No contamination was detected above SALs. This PRS is recommended for human-health NFA because contamination is not present at levels that present a potential risk to human health.

PRS 16-024(f) is the footprint of HE magazine TA-16-493. Six surface and near-surface soil samples were collected for screening from the door location, building center, and quadrants of the former building to support the human health decision. Two samples were submitted for laboratory analysis of inorganics, SVOCs, and HE. No contamination was detected above SALs. This PRS is recommended for human-health NFA because contamination is not present at levels that present a potential risk to human health.

PRS 16-024(g) is the footprint of HE magazine TA-16-494. Six surface and near-surface soil samples were collected for screening from the door location, building center, and quadrants of the former building to support the human health decision. Two samples were submitted for laboratory analysis of inorganics, SVOCs, and HE. No contamination was detected above SALs. This PRS is recommended for human-health NFA because contamination is not present at levels that present a potential risk to human health.

PRS 16-024(k) is the footprint of HE magazine TA-16-57. Four surface and near-surface soil samples were collected for screening from the door location and quadrants of the former building to support the human health decision. One sample was submitted for laboratory analysis of inorganics, SVOCs, and HE. No contamination was detected above SALs. This PRS is recommended for human-health NFA because contamination is not present at levels that present a potential risk to human health.

PRS 16-024(m) is the footprint of HE magazine TA-16-66. Four surface and near-surface soil samples were collected for screening from the quadrants and downgradient from the door location of the former building to support the human health decision. One sample was submitted for laboratory analysis of inorganics, SVOCs, and HE. No contamination was detected above SALs. This PRS is recommended for human-health NFA because contamination is not present at levels that present a potential risk to human health.

PRS 16-024(o) is the footprint of HE magazine TA-16-67. Four surface and near-surface soil samples were collected for screening from the quadrants and downgradient from the door location of the former building to support the human health decision. One sample was submitted for laboratory analysis of inorganics, SVOCs, and HE. No contamination was detected above SALs. This PRS is recommended for human-health NFA because contamination is not present at levels that present a potential risk to human health.

PRS 16-024(p) is the footprint of HE magazine TA-16-70. Four surface and near-surface soil samples were collected for screening from the quadrants and downgradient from the door location of the former building to support the human health decision. One sample was submitted for laboratory analysis of inorganics, SVOCs, and HE. No contamination was detected above SALs. This PRS is recommended for human-health NFA because contamination is not present at levels that present a potential risk to human health.

PRS 16-024(q) is the footprint of HE magazine TA-16-71. Four surface and near-surface soil samples were collected for screening from the quadrants and downgradient from the door location of the former building to support the human health decision. One sample was submitted for laboratory analysis of inorganics, SVOCs, and HE. No contamination was detected above SALs. This PRS is recommended for human-health NFA because contamination is not present at levels that present a potential risk to human health.

PRS 16-024(r) is the footprint of HE magazine TA-16-68. Four surface and near-surface soil samples were collected for screening from the quadrants and downgradient from the door location of the former building to support the human health decision. One sample was submitted

for laboratory analysis of inorganics, SVOCs, and HE. No contamination was detected above SALs. This PRS is recommended for human-health NFA because contamination is not present at levels that present a potential risk to human health.

PRS 16-024(s) is the footprint of HE magazine TA-16-60. Eight surface and near-surface soil samples were collected for screening from the door location and quadrants of the former building to support the human health decision. One sample was submitted for laboratory analysis of inorganics, SVOCs, and HE. No contamination was detected above SALs. This PRS is recommended for human-health NFA because contamination is not present at levels that present a potential risk to human health.

PRS 16-025(b2) is the footprint of HE casting building TA-16-52. Twelve surface and near-surface soil samples were collected for screening from the door locations, building center, and quadrants of the former building to support the human health decision. Two samples were submitted for laboratory analysis of inorganics, SVOCs, and HE. No contamination was detected above SALs. This PRS is recommended for human-health NFA because contamination is not present at levels that present a potential risk to human health.

PRS 16-025(d) is the footprint of equipment and control building TA-16-94. Eight surface and near-surface soil samples were collected for screening from quadrants of the former building to support the human health decision. One sample was submitted for laboratory analysis of inorganics, SVOCs, and HE. No contamination was detected above SALs. This PRS is recommended for human-health NFA because contamination is not present at levels that present a potential risk to human health.

PRS 16-025(g) is the footprint of HE machining building TA-16-95. Twelve surface and near-surface soil samples were collected for screening from the door location, building center, and quadrants of the former building to support the human health decision. Three samples were submitted for laboratory analysis of inorganics, SVOCs, and HE. No contamination was detected above SALs. This PRS is recommended for human-health NFA because contamination is not present at levels that present a potential risk to human health.

PRS 16-025(h) is the footprint of HE machining building TA-16-96. Eleven surface and near-surface soil samples were collected for screening from the door location, building center, and quadrants of the former building to support the human health decision. Three samples were submitted for laboratory analysis of inorganics, SVOCs, and HE. No contamination was detected above levels of concern. This PRS is recommended for human-health NFA because contamination is not present at levels that present a potential risk to human health.

PRS 16-025(j) is the footprint of HE machining building TA-16-98. Ten surface and near-surface soil samples were collected for screening from the door location and quadrants of the former building to support the human health decision. Three samples were submitted for laboratory analysis of inorganics, SVOCs, and HE. No contamination was detected above SALs. This PRS is recommended for human-health NFA because contamination is not present at levels that present a potential risk to human health.

PRS 16-025(k) is the footprint of HE inspection building TA-16-25. Twelve surface and near-surface soil samples were collected for screening from the door locations and quadrants of the former building to support the human health decision. Three samples were submitted for laboratory analysis of inorganics, SVOCs, and HE. No contamination was detected above SALs. This PRS is recommended for human-health NFA because contamination is not present at levels that present a potential risk to human health.

PRS 16-025(m) is the footprint of x-ray and gamma-ray radiography building TA-16-495. Ten surface and near-surface soil samples were collected for screening from the building center and quadrants of the former building to support the human health decision. Two samples were submitted for laboratory analysis of inorganics, SVOCs, HE, isotopic uranium, radium-226, strontium-90, cobalt-60, and radionuclides by gamma spectroscopy. No contamination was detected above SALs. This PRS is recommended for human-health NFA because contamination is not present at levels that present a potential risk to human health.

PRS 16-025(n) is the footprint of storage hutment TA-16-499. Ten surface and near-surface soil samples were collected for screening from the building center and quadrants of the former building to support the human health decision. Two samples were submitted for laboratory analysis of inorganics, SVOCs, HE, isotopic uranium, radium-226, strontium-90, cobalt-60, and radionuclides by gamma spectroscopy. No contamination was detected above SALs. This PRS is recommended for human-health NFA because contamination is not present at levels that present a potential risk to human health.

PRS 16-025(o) is the footprint of source hutment TA-16-500. Ten surface and near-surface soil samples were collected for screening from the building center and quadrants of the former building to support the human health decision. Two samples were submitted for laboratory analysis of inorganics, SVOCs, HE, isotopic uranium, radium-226, strontium-90, cobalt-60, and radionuclides by gamma spectroscopy. No contamination was detected above SALs. This PRS is recommended for human-health NFA because contamination is not present at levels that present a potential risk to human health.

PRS 16-025(y) is the footprint of barium nitrate grinding facility TA-16-55. Ten surface and near-surface soil samples were collected for screening from the door location, building center, and quadrants of the former building to support the human health decision. Two samples were submitted for laboratory analysis of inorganics, SVOCs, and HE. No contamination was detected above SALs. This PRS is recommended for human-health NFA because contamination is not present at levels that present a potential risk to human health.

PRS 16-034(c) is the footprint of warehouse hut TA-16-491. Five surface and near-surface soil samples were collected for screening from the building center and quadrants of the former building to support the human health decision. Two samples were submitted for laboratory analysis of inorganics, SVOCs, and HE. No contamination was detected above SALs. This PRS is recommended for human-health NFA because contamination is not present at levels that present a potential risk to human health.

PRS 16-034(d) is the footprint of machine shop TA-16-492 where HE was not machined. Five surface and near-surface soil samples were collected for screening from the building center and quadrants of the former building to support the human health decision. Two samples were submitted for laboratory analysis of inorganics, SVOCs, and HE. No contamination was detected above SALs. This PRS is recommended for human-health NFA because contamination is not present at levels that present a potential risk to human health.

PRS 16-034(e) is the footprint of storage building TA-16-496. Five surface and near-surface soil samples were collected for screening from the building center and quadrants of the former building to support the human health decision. Two samples were submitted for laboratory analysis of inorganics, SVOCs, total uranium, and HE. No contamination was detected above SALs. This PRS is recommended for human-health NFA because contamination is not present at levels that present a potential risk to human health.

PRS 16-034(f) is the footprint of laboratory building TA-16-498. Five surface and near-surface soil samples were collected for screening from the building center and quadrants of the former building to support the human health decision. Two samples were submitted for laboratory analysis of inorganics, SVOCs, isotopic uranium, isotopic plutonium, cyanide, and HE. No contamination was detected above SALs. This PRS is recommended for human-health NFA because contamination is not present at levels that present a potential risk to human health.

PRS 16-034(l) is the footprint of equipment and control building TA-16-47. Eight surface and near-surface soil samples were collected for screening from quadrants of the former building to support the human health decision. One sample was submitted for laboratory analysis of

inorganics, SVOCs, and HE. No contamination was detected above SALs. This PRS is recommended for human-health NFA because contamination is not present at levels that present a potential risk to human health.

PRS 16-034(m) is the footprint of laboratory building TA-16-86. Five surface and near-surface soil samples were collected for screening from the building center and quadrants of the former building to support the human health decision. Two samples were submitted for laboratory analysis of inorganics, SVOCs, and HE. No contamination was detected above SALs. This PRS is recommended for human-health NFA because contamination is not present at levels that present a potential risk to human health.

PRS C-16-005 is the footprint of storage and HE machining building TA-16-53. Twelve surface and near-surface soil samples were collected for screening from the door location, building center, and quadrants of the former building to support the human health decision. Two samples were submitted for laboratory analysis of inorganics, SVOCs, and HE. No contamination was detected above SALs. This PRS is recommended for human-health NFA because contamination is not present at levels that present a potential risk to human health.

PRS C-16-017 is the footprint of steam plant TA-16-502. Seven surface and near-surface soil samples were collected for screening from the building center and quadrants of the former building to support the human health decision. One sample was submitted for laboratory analysis of inorganics and SVOCs. No contamination was detected above SALs. This PRS is recommended for human-health NFA because contamination is not present at levels that present a potential risk to human health.

TABLE ES-1
SUMMARY OF PRSS

PRS NO.	HSWA[A]	RAD COMPONENT[B]	NFA CRITERIA*	FURTHER ACTION[C]	ADD TO HSWA MODULE[D]	RATIONALE	SECTION
16-024(c)			5	NFA		No analytes above SALs	5.1
16-024(d)			5	NFA		No analytes above SALs	5.2
16-024(f)			5	NFA		No analytes above SALs	5.3
16-024(g)			5	NFA		No analytes above SALs	5.4
16-024(k)			5	NFA		No analytes above SALs	5.5
16-024(m)			5	NFA		No analytes above SALs	5.6
16-024(o)			5	NFA		No analytes above SALs	5.7
16-024(p)			5	NFA		No analytes above SALs	5.8
16-024(q)			5	NFA		No analytes above SALs	5.9
16-024(r)			5	NFA		No analytes above SALs	5.10
16-024(s)			5	NFA		No analytes above SALs	5.11
16-025(b2)	x		5	NFA		No analytes above SALs	5.12
16-025(d)	x		5	NFA		No analytes above SALs	5.13
16-025(g)	x		5	NFA		No analytes above SALs	5.14
16-025(h)	x		5	NFA		No analytes above SALs	5.15
16-025(j)	x		5	NFA		No analytes above levels of concern	5.16
16-025(k)	x		5	NFA		No analytes above SALs	5.17
16-025(m)	x		5	NFA		No analytes above SALs	5.18
16-025(n)	x		5	NFA		No analytes above SALs	5.19
16-025(o)	x		5	NFA		No analytes above SALs	5.20
16-025(y)	x		5	NFA		No analytes above SALs	5.21
16-034(c)	x		5	NFA		No analytes above SALs	5.22
16-034(d)	x		5	NFA		No analytes above SALs	5.23
16-034(e)	x		5	NFA		No analytes above SALs	5.24

16-034(f)	x		5	NFA		No analytes above SALs	5.25
16-034(l)	x		5	NFA		No analytes above SALs	5.26
16-034(m)	x		5	NFA		No analytes above SALs	5.27
C-16-005			5	NFA		No analytes above SALs	5.28
C-16-017			5	NFA		No analytes above SALs	5.29

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 (EPA 1994, 1185).
b. An x in this column indicated that the site has a radionuclide that was detected
c. VCA, EC, further investigation, CMS, or NFA.
d. An x in this column indicates that hazardous constituents were confirmed at a site not already listed on the HSWA Module. The site requires further action; therefore, the site needs to be added to the Module.
*NFA Criterion (See No Further Action Criteria Policy, EM/ER:95-PCT-015, R1, August 30, 1996 (Project Consistency Team, 1210).

TABLE OF CONTENTS

EXECUTIVE SUMMARY I

TABLE OF CONTENTS X

TABLE OF FIGURES XVIII

LIST OF TABLES XX

1.0 INTRODUCTION 1

1.1 General Site History 1

1.2 RFI Overview 4

1.3 Field Activities 6
1.3.1 Land Surveys 6
1.3.2 Screening Surveys 7
1.3.3 Field Sampling Activities 8

2.0 ENVIRONMENTAL SETTING 9

2.1 Climate 9

2.2 Geology 9
2.2.1 Geologic Setting 9
2.2.2 Soils 10
2.3 Hydrology 11
2.3.1 Surface Water 11
2.3.2 Groundwater 13

2.4 Biological Surveys 14

2.5 Cultural Surveys 14

3.0 APPROACH TO SAMPLE ANALYSES AND DATA ASSESSMENT 15

3.1 Sample Analyses 15
3.1.1 Analytical Methods 16
3.1.2 Data Verification and Validation 16

3.2 Process for Identification of COPCs 19
3.2.1 Inorganic Chemicals 19
3.2.2 Radionuclides 19
3.2.3 Organic Chemicals 20
3.2.4 Risk-Based Screening Assessment 21

3.3 Human Health Assessment 21
3.3.1 Risk Due to Naturally Occurring Inorganic Chemicals in Soils (Background) 21
3.3.2 Risk Assessment 23

3.4 Ecological Assessment 23

4.0 RESULTS OF QUALITY ASSURANCE/QUALITY CONTROL ACTIVITIES 24

4.1 Inorganic Analysis 26

4.2 Radiochemistry Analysis 29

4.3 Organic Analyses 32
4.3.1 Semivolatile Organic Analyses 32
4.3.2 Field Screening for High Explosives 34
4.3.3 Laboratory Analyses for High Explosives 34

5.0 SPECIFIC RESULTS, CONCLUSIONS, AND RECOMMENDATIONS 35
5.0.1 Polynuclear aromatic hydrocarbons without SALs 35

5.1 PRS 16-024(c) 38
5.1.1 History 38
5.1.2 Description 38
5.1.3 Previous Investigation(s) 38
5.1.4 Field Investigation 38
5.1.5 Evaluation of Inorganic Chemicals 42
5.1.6 Evaluation of Radionuclides 42
5.1.7 Evaluation of Organic Chemicals 43
5.1.8 Risk-Based Screening Assessment 43
5.1.9 Preliminary Human Health Assessment 43
5.1.10 Preliminary Ecological Assessment 43
5.1.11 Conclusions and Recommendations 43

5.2 PRS 16-024(d) 44
5.2.1 History 44
5.2.2 Description 44
5.2.3 Previous Investigation(s) 44
5.2.4 Field Investigation 45
5.2.5 Evaluation of Inorganic Chemicals 49
5.2.6 Evaluation of Radionuclides 49
5.2.7 Evaluation of Organic Chemicals 49
5.2.8 Risk-Based Screening Assessment 50
5.2.9 Preliminary Human Health Assessment 50
5.2.10 Preliminary Ecological Assessment 50
5.2.11 Conclusions and Recommendations 50

5.3 PRS 16-024(f) 51
5.3.1 History 51
5.3.2 Description 51
5.3.3 Previous Investigation(s) 51
5.3.4 Field Investigation 51
5.3.5 Evaluation of Inorganic Chemicals 55
5.3.6 Evaluation of Radionuclides 55
5.3.7 Evaluation of Organic Chemicals 55
5.3.8 Risk-Based Screening Assessment 55
5.3.9 Preliminary Human Health Assessment 56
5.3.10 Preliminary Ecological Assessment 56
5.3.11 Conclusions and Recommendations 56

5.4 PRS 16-024(g) 56
5.4.1 History 57

5.4.2 Description 57
5.4.3 Previous Investigation(s) 57
5.4.4 Field Investigation 57
5.4.5 Evaluation of Inorganic Chemicals 61
5.4.6 Evaluation of Radionuclides 61
5.4.7 Evaluation of Organic Chemicals 61
5.4.8 Risk-Based Screening Assessment 61
5.4.9 Preliminary Human Health Assessment 61
5.4.10 Preliminary Ecological Assessment 61
5.4.11 Conclusions and Recommendations 62

5.5 PRS 16-024(k) 62
5.5.1 History 62
5.5.2 Description 63
5.5.3 Previous Investigation(s) 63
5.5.4 Field Investigation 63
5.5.5 Evaluation of Inorganic Chemicals 66
5.5.6 Evaluation of Radionuclides 67
5.5.7 Evaluation of Organic Chemicals 67
5.5.8 Risk-Based Screening Assessment 67
5.5.9 Preliminary Human Health Assessment 67
5.5.10 Preliminary Ecological Assessment 67
5.5.11 Conclusions and Recommendations 68

5.6 PRS 16-024(m) 68
5.6.1 History 68
5.6.2 Description 69
5.6.3 Previous Investigation(s) 69
5.6.4 Field Investigation 69
5.6.5 Evaluation of Inorganic Chemicals 72
5.6.6 Evaluation of Radionuclides 72
5.6.7 Evaluation of Organic Chemicals 73
5.6.8 Risk-Based Screening Assessment 73
5.6.9 Preliminary Human Health Assessment 73
5.6.10 Preliminary Ecological Assessment 73
5.6.11 Conclusions and Recommendations 74

5.7 PRS 16-024(o) 74
5.7.1 History 74
5.7.2 Description 75
5.7.3 Previous Investigation(s) 75
5.7.4 Field Investigation 75
5.7.5 Evaluation of Inorganic Chemicals 78
5.7.6 Evaluation of Radionuclides 79
5.7.7 Evaluation of Organic Chemicals 79
5.7.8 Risk-Based Screening Assessment 79
5.7.9 Preliminary Human Health Assessment 79
5.7.10 Preliminary Ecological Assessment 79
5.7.11 Conclusions and Recommendations 79

5.8 PRS 16-024(p) 80
5.8.1 History 80
5.8.2 Description 80
5.8.3 Previous Investigation(s) 81
5.8.4 Field Investigation 81
5.8.5 Evaluation of Inorganic Chemicals 84
5.8.6 Evaluation of Radionuclides 84
5.8.7 Evaluation of Organic Chemicals 84

5.8.8 Risk-Based Screening Assessment 84
5.8.9 Preliminary Human Health Assessment 84
5.8.10 Preliminary Ecological Assessment 85
5.8.11 Conclusions and Recommendations 85

5.9 PRS 16-024(q) 85
5.9.1 History 85
5.9.2 Description 86
5.9.3 Previous Investigation(s) 86
5.9.4 Field Investigation 86
5.9.5 Evaluation of Inorganic Chemicals 89
5.9.6 Evaluation of Radionuclides 90
5.9.7 Evaluation of Organic Chemicals 90
5.9.8 Risk-Based Screening Assessment 90
5.9.9 Preliminary Human Health Assessment 91
5.9.10 Preliminary Ecological Assessment 91
5.9.11 Conclusions and Recommendations 91

5.10 PRS 16-024(r) 92
5.10.1 History 92
5.10.2 Description 92
5.10.3 Previous Investigation(s) 92
5.10.4 Field Investigation 92
5.10.5 Evaluation of Inorganic Chemicals 96
5.10.6 Evaluation of Radionuclides 96
5.10.7 Evaluation of Organic Chemicals 96
5.10.8 Risk-Based Screening Assessment 96
5.10.9 Preliminary Human Health Assessment 96
5.10.10 Preliminary Ecological Assessment 96
5.10.11 Conclusions and Recommendations 97

5.11 PRS 16-024(s) 97
5.11.1 History 97
5.11.2 Description 98
5.11.3 Previous Investigation(s) 98
5.11.4 Field Investigation 98
5.11.5 Evaluation of Inorganic Chemicals 102
5.11.6 Evaluation of Radionuclides 103
5.11.7 Evaluation of Organic Chemicals 103
5.11.8 Risk-Based Screening Assessment 103
5.11.9 Preliminary Human Health Assessment 103
5.11.10 Preliminary Ecological Assessment 103
5.11.11 Conclusions and Recommendations 104

5.12 PRS 16-025(b2) 104
5.12.1 History 104
5.12.2 Description 105
5.12.3 Previous Investigation(s) 105
5.12.4 Field Investigation 105
5.12.5 Evaluation of Inorganic Chemicals 109
5.12.6 Evaluation of Radionuclides 110
5.12.7 Evaluation of Organic Chemicals 110
5.12.8 Risk-Based Screening Assessment 110
5.12.9 Preliminary Human Health Assessment 111
5.12.10 Preliminary Ecological Assessment 112
5.12.11 Conclusions and Recommendations 112

5.13 PRS 16-025(d) 112

5.13.1 History 113
5.13.2 Description 113
5.13.3 Previous Investigation(s) 113
5.13.4 Field Investigation 113
5.13.5 Evaluation of Inorganic Chemicals 116
5.13.6 Evaluation of Radionuclides 117
5.13.7 Evaluation of Organic Chemicals 117
5.13.8 Risk-Based Screening Assessment 117
5.13.9 Preliminary Human Health Assessment 117
5.13.10 Preliminary Ecological Assessment 117
5.13.11 Conclusions and Recommendations 117

5.14 PRS 16-025(g) 118
5.14.1 History 118
5.14.2 Description 118
5.14.3 Previous Investigation(s) 119
5.14.4 Field Investigation 119
5.14.5 Evaluation of Inorganic Chemicals 123
5.14.6 Evaluation of Radionuclides 123
5.14.7 Evaluation of Organic Chemicals 123
5.14.8 Risk-Based Screening Assessment 123
5.14.9 Preliminary Human Health Assessment 123
5.14.10 Preliminary Ecological Assessment 124
5.14.11 Conclusions and Recommendations 124

5.15 PRS 16-025(h) 125
5.15.1 History 125
5.15.2 Description 125
5.15.3 Previous Investigation(s) 125
5.15.4 Field Investigation 125
5.15.5 Evaluation of Inorganic Chemicals 129
5.15.6 Evaluation of Radionuclides 130
5.15.7 Evaluation of Organic Chemicals 130
5.15.8 Risk-Based Screening Assessment 131
5.15.9 Preliminary Human Health Assessment 133
5.15.10 Preliminary Ecological Assessment 133
5.15.11 Conclusions and Recommendations 133

5.16 PRS 16-025(j) 134
5.16.1 History 134
5.16.2 Description 134
5.16.3 Previous Investigation(s) 134
5.16.4 Field Investigation 135
5.16.5 Evaluation of Inorganic Chemicals 138
5.16.6 Evaluation of Radionuclides 139
5.16.7 Evaluation of Organic Chemicals 139
5.16.8 Risk-Based Screening Assessment 139
5.16.9 Preliminary Human Health Assessment 139
5.16.10 Preliminary Ecological Assessment 139
5.16.11 Conclusions and Recommendations 139

5.17 PRS 16-025(k) 140
5.17.1 History 140
5.17.2 Description 141
5.17.3 Previous Investigation(s) 141
5.17.4 Field Investigation 141
5.17.5 Evaluation of Inorganic Chemicals 145
5.17.6 Evaluation of Radionuclides 146

5.17.7 Evaluation of Organic Chemicals 146
5.17.8 Risk-Based Screening Assessment 146
5.17.9 Preliminary Human Health Assessment 146
5.17.10 Preliminary Ecological Assessment 147
5.17.11 Conclusions and Recommendations 147

5.18 PRS 16-025(m) 148
5.18.1 History 148
5.18.2 Description 148
5.18.3 Previous Investigation(s) 148
5.18.4 Field Investigation 148
5.18.5 Evaluation of Inorganic Chemicals 152
5.18.6 Evaluation of Radionuclides 153
5.18.7 Evaluation of Organic Chemicals 153
5.18.8 Risk-Based Screening Assessment 153
5.18.9 Preliminary Human Health Assessment 153
5.18.10 Preliminary Ecological Assessment 153
5.18.11 Conclusions and Recommendations 154

5.19 PRS 16-025(n) 154
5.19.1 History 154
5.19.2 Description 155
5.19.3 Previous Investigation(s) 155
5.19.4 Field Investigation 155
5.19.5 Evaluation of Inorganic Chemicals 159
5.19.6 Evaluation of Radionuclides 159
5.19.7 Evaluation of Organic Chemicals 159
5.19.8 Risk-Based Screening Assessment 160
5.19.9 Preliminary Human Health Assessment 161
5.19.10 Preliminary Ecological Assessment 161
5.19.11 Conclusions and Recommendations 161

5.20 PRS 16-025(o) 162
5.20.1 History 162
5.20.2 Description 162
5.20.3 Previous Investigation(s) 162
5.20.4 Field Investigation 162
5.20.5 Evaluation of Inorganic Chemicals 166
5.20.6 Evaluation of Radionuclides 167
5.20.7 Evaluation of Organic Chemicals 167
5.20.8 Risk-Based Screening Assessment 167
5.20.9 Preliminary Human Health Assessment 168
5.20.10 Preliminary Ecological Assessment 168
5.20.11 Conclusions and Recommendations 168

5.21 PRS 16-025(y) 169
5.21.1 History 169
5.21.2 Description 169
5.21.3 Previous Investigation(s) 169
5.21.4 Field Investigation 169
5.21.5 Evaluation of Inorganic Chemicals 174
5.21.6 Evaluation of Radionuclides 174
5.21.7 Evaluation of Organic Chemicals 175
5.21.8 Risk-Based Screening Assessment 175
5.21.9 Preliminary Human Health Assessment 175
5.21.10 Preliminary Ecological Assessment 175
5.21.11 Conclusions and Recommendations 175

5.22 PRS 16-034(c) 176
5.22.1 History 176
5.22.2 Description 176
5.22.3 Previous Investigation(s) 177
5.22.4 Field Investigation 177
5.22.5 Evaluation of Inorganic Chemicals 180
5.22.6 Evaluation of Radionuclides 180
5.22.7 Evaluation of Organic Chemicals 181
5.22.8 Risk-Based Screening Assessment 181
5.22.9 Preliminary Human Health Assessment 182
5.22.10 Preliminary Ecological Assessment 182
5.22.11 Conclusions and Recommendations 182

5.23 PRS 16-034(d) 183
5.23.1 History 183
5.23.2 Description 183
5.23.3 Previous Investigation(s) 184
5.23.4 Field Investigation 184
5.23.5 Evaluation of Inorganic Chemicals 187
5.23.6 Evaluation of Radionuclides 187
5.23.7 Evaluation of Organic Chemicals 187
5.23.8 Risk-Based Screening Assessment 188
5.23.9 Preliminary Human Health Assessment 188
5.23.10 Preliminary Ecological Assessment 188
5.23.11 Conclusions and Recommendations 188

5.24 PRS 16-034(e) 189
5.24.1 History 189
5.24.2 Description 189
5.24.3 Previous Investigation(s) 189
5.24.4 Field Investigation 189
5.24.5 Evaluation of Inorganic Chemicals 193
5.24.6 Evaluation of Radionuclides 193
5.24.7 Evaluation of Organic Chemicals 193
5.24.8 Risk-Based Screening Assessment 194
5.24.9 Preliminary Human Health Assessment 194
5.24.10 Preliminary Ecological Assessment 194
5.24.11 Conclusions and Recommendations 194

5.25 PRS 16-034(f) 195
5.25.1 History 195
5.25.2 Description 196
5.25.3 Previous Investigation(s) 196
5.25.4 Field Investigation 196
5.25.5 Evaluation of Inorganic Chemicals 199
5.25.6 Evaluation of Radionuclides 200
5.25.7 Evaluation of Organic Chemicals 200
5.25.8 Risk-Based Screening Assessment 200
5.25.9 Preliminary Human Health Assessment 201
5.25.10 Preliminary Ecological Assessment 201
5.25.11 Conclusions and Recommendations 201

5.26 PRS 16-034(l) 202
5.26.1 History 202
5.26.2 Description 202
5.26.3 Previous Investigation(s) 202
5.26.4 Field Investigation 202
5.26.5 Evaluation of Inorganic Chemicals 206

5.26.6 Evaluation of Radionuclides 206
5.26.7 Evaluation of Organic Chemicals 206
5.26.8 Risk-Based Screening Assessment 207
5.26.9 Preliminary Human Health Assessment 207
5.26.10 Preliminary Ecological Assessment 207
5.26.11 Conclusions and Recommendations 207

5.27 PRS 16-034(m) 208
5.27.1 History 208
5.27.2 Description 208
5.27.3 Previous Investigation(s) 208
5.27.4 Field Investigation 208
5.27.5 Evaluation of Inorganic Chemicals 211
5.27.6 Evaluation of Radionuclides 212
5.27.7 Evaluation of Organic Chemicals 212
5.27.8 Risk-Based Screening Assessment 213
5.27.9 Preliminary Human Health Assessment 213
5.27.10 Preliminary Ecological Assessment 213
5.27.11 Conclusions and Recommendations 213

5.28 PRS C-16-005 214
5.28.1 History 214
5.28.2 Description 215
5.28.3 Previous Investigation(s) 215
5.28.4 Field Investigation 215
5.28.5 Evaluation of Inorganic Chemicals 218
5.28.6 Evaluation of Radionuclides 219
5.28.7 Evaluation of Organic Chemicals 219
5.28.8 Risk-Based Screening Assessment 219
5.28.9 Preliminary Human Health Assessment 219
5.28.10 Preliminary Ecological Assessment 219
5.28.11 Conclusions and Recommendations 220

5.29 PRS C-16-017 220
5.29.1 History 220
5.29.2 Description 221
5.29.3 Previous Investigation(s) 221
5.29.4 Field Investigation 221
5.29.5 Evaluation of Inorganic Chemicals 225
5.29.6 Evaluation of Radionuclides 225
5.29.7 Evaluation of Organic Chemicals 225
5.29.8 Risk-Based Screening Assessment 226
5.29.9 Preliminary Human Health Assessment 226
5.29.10 Preliminary Ecological Assessment 226
5.29.11 Conclusions and Recommendations 226

6.0 REFERENCES 228

APPENDIX A ANALYTICAL SUITES 235

APPENDIX B DATA VALIDATION 237

TABLE OF FIGURES

FIGURE 1.1-1 LOCATION OF OPERABLE UNIT 1082 2

FIGURE 1.1-2 LOCATION OF OPERABLE UNIT 1082 WITH RESPECT TO LABORATORY TAS 3

FIGURE 2.3.1-1 TOPOGRAPHY OF TA-16 SHOWING SPRINGS, SEEPS, AND WETLANDS... 12

FIGURE 5.0-1 LOCATION OF PRS IN THIS RFI REPORT 37

FIGURE 5.1.4-1 LOCATIONS OF PRS 16-024(C) SAMPLES 41

FIGURE 5.2.4-1 LOCATIONS OF PRS 16-024(D) SAMPLES 48

FIGURE 5.3.4-1. LOCATIONS OF PRS 16-024(F) SAMPLES 54

FIGURE 5.4.4-1. LOCATIONS OF PRS 16-024(G) SAMPLES. 59

FIGURE 5.5.4-1. LOCATIONS OF PRS 16-024(K) SAMPLES. 65

FIGURE 5.6.4-1. LOCATIONS OF PRS 16-024(M) SAMPLES. 71

FIGURE 5.7.4-1. LOCATIONS OF PRS 16-024(O) SAMPLES. 77

FIGURE 5.8.4-1. LOCATIONS OF PRS 16-024(P) SAMPLES. 83

FIGURE 5.9.4-1. LOCATIONS OF PRS 16-024(Q) SAMPLES. 88

FIGURE 5.10.4-1. LOCATIONS OF PRS 16-024(R) SAMPLES. 94

FIGURE 5.11.4-1. LOCATIONS OF PRS 16-024(S) SAMPLES. 100

FIGURE 5.12.4-1. LOCATIONS OF PRS 16-025(B2) SAMPLES. 107

FIGURE 5.13.4-1. LOCATIONS OF PRS 16-025(D) SAMPLES. 115

FIGURE 5.14.4-1. LOCATIONS OF PRS 16-025(G) SAMPLES. 121

FIGURE 5.15.4-1. LOCATIONS OF PRS 16-025(H) SAMPLES. 127

FIGURE 5.16.4-1. LOCATIONS OF PRS 16-025(J) SAMPLES. 137

FIGURE 5.17.4-1. LOCATIONS OF PRS 16-025(K) SAMPLES. 143

FIGURE 5.18.4-1. LOCATIONS OF PRS 16-025(M) SAMPLES. 151

FIGURE 5.19.4-1. LOCATIONS OF PRS 16-025(N) SAMPLES. 157

FIGURE 5.20.4-1. LOCATIONS OF PRS 16-025(O) SAMPLES. 165

FIGURE 5.21.4-1. LOCATIONS OF PRS 16-025(Y) SAMPLES. 171

FIGURE 5.22.4-1. LOCATIONS OF PRS 16-034(C) SAMPLES. 179

FIGURE 5.23.4-1. LOCATIONS OF PRS 16-034(D) SAMPLES. 186

FIGURE 5.24.4-1. LOCATIONS OF PRS 16-034(E) SAMPLES. 191

FIGURE 5.25.4-1. LOCATIONS OF PRS 16-034(F) SAMPLES..... 198

FIGURE 5.26.4-1. LOCATIONS OF PRS 16-034(L) SAMPLES..... 204

FIGURE 5.27.4-1. LOCATIONS OF PRS 16-034(M) SAMPLES..... 210

FIGURE 5.28.4-1. LOCATIONS OF PRS C-16-005 SAMPLES. 217

FIGURE 5.29.4-1. LOCATIONS OF PRS C-16-017 SAMPLES. 223

LIST OF TABLES

TABLE ES-1 VIII
SUMMARY OF PRSS .....
TABLE 3.1.2-1 18
DEFINITION OF DATA QUALIFIERS .....
TABLE 3.3.1-1 23
RISK DUE TO BACKGROUND CONCENTRATIONS .....
TABLE 4.0-1 24
FIELD DUPLICATE SAMPLES .....
TABLE 4.2-1 30
SHORT-LIVED NATURALLY OCCURRING RADIONUCLIDES .....
TABLE 4.2-2 31
ANALYTES, MDA AND ANALYTICAL METHODS FOR LONG-LIVED RADIONUCLIDES .....
TABLE 5.1.4-1 42
SUMMARY OF FIELD SCREENING RESULTS - PRS 16-024(C) .....
TABLE 5.1.4-2 42
SUMMARY OF REQUEST NUMBERS FOR PRS 16-024(C) .....
TABLE 5.2.4-1 47
SUMMARY OF FIELD SCREENING RESULTS - PRS 16-024(D) .....
TABLE 5.2.4-2 49
SUMMARY OF REQUEST NUMBERS FOR PRS 16-024(D) .....
TABLE 5.2.5-1 49
INORGANIC CHEMICALS AT OR ABOVE SCREENING VALUES FOR PRS 16-024(D) .....
TABLE 5.3.4-1 53
SUMMARY OF FIELD SCREENING RESULTS - PRS 16-024(F) .....
TABLE 5.3.4-2 55
SUMMARY OF REQUEST NUMBERS FOR PRS 16-024(F) .....
TABLE 5.4.4-1 60
SUMMARY OF FIELD SCREENING RESULTS - 16-024(G) .....
TABLE 5.4.4-2 60
SUMMARY OF REQUEST NUMBERS FOR PRS 16-024(G) .....
TABLE 5.5.4-1 66
SUMMARY OF FIELD SCREENING RESULTS - 16-024(K) .....
TABLE 5.5.4-2 66
SUMMARY OF REQUEST NUMBERS FOR PRS 16-024(K) .....
TABLE 5.5.5-1 67
INORGANIC CHEMICALS AT OR ABOVE SCREENING VALUES FOR PRS 16-024(K) .....
TABLE 5.6.4-1 72
SUMMARY OF FIELD SCREENING RESULTS - 16-024(M) .....
TABLE 5.6.4-2 72
SUMMARY OF REQUEST NUMBERS FOR PRS 16-024(M) .....
TABLE 5.6.7-1 73
DETECTED ORGANIC CHEMICALS FOR PRS 16-024(M) .....
TABLE 5.7.4-1 78
SUMMARY OF FIELD SCREENING RESULTS - 16-024(O) .....
TABLE 5.7.4-2 78
SUMMARY OF REQUEST NUMBERS FOR PRS 16-024(O) .....
TABLE 5.7.5-1 78
INORGANIC CHEMICALS AT OR ABOVE SCREENING VALUES FOR PRS 16-024(O) .....
TABLE 5.8.4-1 82
SUMMARY OF FIELD SCREENING RESULTS - 16-024(P) .....
TABLE 5.8.4-2 84
SUMMARY OF REQUEST NUMBERS FOR PRS 16-024(P) .....
TABLE 5.9.4-1 89
SUMMARY OF FIELD SCREENING RESULTS - 16-024(Q) .....
TABLE 5.9.4-2 89
SUMMARY OF REQUEST NUMBERS FOR PRS 16-024(Q) .....

TABLE 5.9.5-1 90
INORGANIC CHEMICALS AT OR ABOVE SCREENING VALUES FOR PRS 16-024(Q) .....
TABLE 5.9.7-1 90
DETECTED ORGANIC CHEMICALS FOR PRS 16-024(Q) .....
TABLE 5.10.4-1 95
SUMMARY OF FIELD SCREENING RESULTS - 16-024(R) .....
TABLE 5.10.4-2 95
SUMMARY OF REQUEST NUMBERS FOR PRS 16-024(R) .....
TABLE 5.11.4-1 101
SUMMARY OF FIELD SCREENING RESULTS - 16-024(S) .....
TABLE 5.11.4-2 101
SUMMARY OF FIELD SCREENING RESULTS FOR QA/QC SAMPLES - 16-024(S) .....
TABLE 5.11.4-3 102
SUMMARY OF REQUEST NUMBERS FOR PRS 16-024(S) .....
TABLE 5.11.5-1 102
INORGANIC CHEMICALS AT OR ABOVE SCREENING VALUES FOR PRS 16-024(S) .....
TABLE 5.12.4-1 108
SUMMARY OF FIELD SCREENING RESULTS - 16-025(B2) .....
TABLE 5.12.4-2 109
SUMMARY OF REQUEST NUMBERS FOR PRS 16-025(B2) .....
TABLE 5.12.5-1 109
INORGANIC CHEMICALS AT OR ABOVE SCREENING VALUES FOR PRS 16-025(B2) .....
TABLE 5.12.7-1 110
DETECTED ORGANIC CHEMICALS FOR PRS 16-025(B2) .....
TABLE 5.12.8-1 111
MCE CALCULATION FOR PRS 16-025(B2) .....
TABLE 5.13.4-1 116
SUMMARY OF FIELD SCREENING RESULTS - 16-025(D) .....
TABLE 5.13.4-2 116
SUMMARY OF REQUEST NUMBERS FOR PRS 16-025(D) .....
TABLE 5.14.4-1 122
SUMMARY OF FIELD SCREENING RESULTS - 16-025(G) .....
TABLE 5.14.4-2 122
SUMMARY OF REQUEST NUMBERS FOR FOR PRS 16-025(G) .....
TABLE 5.14.5-1 123
INORGANIC CHEMICALS AT OR ABOVE SCREENING VALUES FOR PRS 16-025(G) .....
TABLE 5.15.4-1 129
SUMMARY OF FIELD SCREENING RESULTS - 16-025(H) .....
TABLE 5.15.4-2 129
SUMMARY OF REQUEST NUMBERS FOR PRS 16-025(H) .....
TABLE 5.15.5-1 130
INORGANIC CHEMICALS AT OR ABOVE SCREENING VALUES FOR PRS 16-025(H) .....
TABLE 5.15.7-1 131
DETECTED ORGANIC CHEMICALS FOR PRS 16-025(H) .....
TABLE 5.15.8-1 132
MCE CALCULATION FOR PRS 16-025(H) .....
TABLE 5.16.4-1 138
SUMMARY OF FIELD SCREENING RESULTS - 16-025(J) .....
TABLE 5.16.4-2 138
SUMMARY OF REQUEST NUMBERS FOR PRS 16-025(J) .....
TABLE 5.16.5-1 139
INORGANIC CHEMICALS AT OR ABOVE SCREENING VALUES FOR PRS 16-025(J) .....
TABLE 5.17.4-1 144
SUMMARY OF FIELD SCREENING RESULTS - 16-025(K) .....
TABLE 5.17.4-2 144
SUMMARY OF REQUEST NUMBERS FOR PRS 16-025(K) .....
TABLE 5.17.5-1 145
INORGANIC CHEMICALS AT OR ABOVE SCREENING VALUES FOR PRS 16-025(K) .....

TABLE 5.18.4-1 150
SUMMARY OF FIELD SCREENING RESULTS - 16-025(M) .....
TABLE 5.18.4-2 152
SUMMARY OF REQUEST NUMBERS FOR PRS 16-025(M) .....
TABLE 5.18.5-1 152
INORGANIC CHEMICALS AT OR ABOVE SCREENING VALUES FOR PRS 16-025(M) .....
TABLE 5.19.4-1 158
SUMMARY OF FIELD SCREENING RESULTS - 16-025(N) .....
TABLE 5.19.4-2 158
SUMMARY OF REQUEST NUMBERS FOR PRS 16-025(N) .....
TABLE 5.19.5-1 159
INORGANIC CHEMICALS AT OR ABOVE SCREENING VALUES FOR PRS 16-025(N) .....
TABLE 5.19.8-1 160
MCE CALCULATION FOR PRS 16-025(N) .....
TABLE 5.20.4-1 164
SUMMARY OF FIELD SCREENING RESULTS - 16-025(O) .....
TABLE 5.20.4-2 166
SUMMARY OF REQUEST NUMBERS FOR PRS 16-025(O) .....
TABLE 5.20.5-1 167
INORGANIC CHEMICALS AT OR ABOVE SCREENING VALUES FOR PRS 16-025(O) .....
TABLE 5.21.4-1 173
SUMMARY OF FIELD SCREENING RESULTS - 16-025(Y) .....
TABLE 5.21.4-2 173
SUMMARY OF FIELD SCREENING RESULTS FOR QA/QC SAMPLES - 16-025(Y) .....
TABLE 5.21.4-3 174
SUMMARY OF REQUEST NUMBERS FOR PRS 16-025(Y) .....
TABLE 5.21.5-1 174
INORGANIC CHEMICALS AT OR ABOVE SCREENING VALUES FOR PRS 16-025(Y) .....
TABLE 5.22.4-1 178
SUMMARY OF FIELD SCREENING RESULTS - 16-034(C) .....
TABLE 5.22.4-2 180
SUMMARY OF REQUEST NUMBERS FOR PRS 16-034(C) .....
TABLE 5.22.5-1 180
INORGANIC CHEMICALS AT OR ABOVE SCREENING VALUES FOR PRS 16-034(C) .....
TABLE 5.22.7-1 181
DETECTED ORGANIC CHEMICALS FOR PRS 16-034(C) .....
TABLE 5.22.7-1 182
MCE CALCULATION FOR PRS 16-034(C) .....
TABLE 5.23.4-1 185
SUMMARY OF FIELD SCREENING RESULTS - 16-034(D) .....
TABLE 5.23.4-2 187
SUMMARY OF REQUEST NUMBERS FOR PRS 16-034(D) .....
TABLE 5.23.5-1 187
INORGANIC CHEMICALS AT OR ABOVE SCREENING VALUES FOR PRS 16-034(D) .....
TABLE 5.24.4-1 192
SUMMARY OF FIELD SCREENING RESULTS - 16-034(E) .....
TABLE 5.24.4-2 193
SUMMARY OF REQUEST NUMBERS FOR PRS 16-034(E) .....
TABLE 5.24.5-1 193
INORGANIC CHEMICALS AT OR ABOVE SCREENING VALUES FOR PRS 16-034(E) .....
TABLE 5.24.7-1 194
DETECTED ORGANIC CHEMICALS FOR PRS 16-034(E) .....
TABLE 5.25.4-1 199
SUMMARY OF FIELD SCREENING RESULTS - 16-034(F) .....
TABLE 5.25.4-2 199
SUMMARY OF REQUEST NUMBERS FOR PRS 16-034(F) .....
TABLE 5.25.5-1 200
INORGANIC CHEMICALS AT OR ABOVE SCREENING VALUES FOR PRS 16-034(F) .....

TABLE 5.25.7-1 200
DETECTED ORGANIC CHEMICALS FOR PRS 16-034(F)
TABLE 5.26.4-1 205
SUMMARY OF FIELD SCREENING RESULTS - 16-034(L)
TABLE 5.26.4-2 206
SUMMARY OF REQUEST NUMBERS FOR PRS 16-034(L)
TABLE 5.26.5-1 206
INORGANIC CHEMICALS AT OR ABOVE SCREENING VALUES FOR PRS 16-034(L)
TABLE 5.27.4-1 211
SUMMARY OF FIELD SCREENING RESULTS - 16-034(M)
TABLE 5.27.4-2 211
SUMMARY OF REQUEST NUMBERS FOR PRS 16-034(M)
TABLE 5.27.5-1 212
INORGANIC CHEMICALS AT OR ABOVE SCREENING VALUES FOR PRS 16-034 (M)
TABLE 5.27.7-1 213
DETECTED ORGANIC CHEMICALS FOR PRS 16-034(M)
TABLE 5.28.4-1 218
SUMMARY OF FIELD SCREENING RESULTS - C-16-005
TABLE 5.28.4-2 218
SUMMARY OF REQUEST NUMBERS FOR PRS C-16-005
TABLE 5.28.5-1 219
INORGANIC CHEMICALS AT OR ABOVESCREENING VALUES FOR PRS C-16-005
TABLE 5.29.4-1 224
SUMMARY OF FIELD SCREENING RESULTS - C-16-017
TABLE 5.29.4-2 225
SUMMARY OF FIELD SCREENING RESULTSFOR QA/QC SAMPLES - C-16-017
TABLE 5.29.4-3 225
SUMMARY OF REQUEST NUMBERS FOR PRS C-16-017
TABLE B-1 237
DATA QUALITY EVALUATION FOR RADIOCHEMISTRY ANALYSES AT TA-16
TABLE B-2 238
DATA QUALITY EVALUATION FOR HIGH EXPLOSIVES ANALYSES AT TA-16
TABLE B-3 238
DATA QUALITY EVALUATION FOR INORGANIC ANALYSES AT TA-16
TABLE B-4 240
DATA QUALITY EVALUATION FOR SVOC ANALYSES AT TA-16
TABLE B-5 241
DATA QUALITY EVALUATION FOR TOTAL URANIUM ANALYSES AT TA-16

THIS PAGE LEFT INTENTIONALLY BLANK

1.0 INTRODUCTION

This report presents the results of the Phase I RFI for 29 PRSs at Technical Area (TA) 16 at Los Alamos National Laboratory (LANL). The 29 PRSs represent soils associated with building footprints in the World War II era TA-16 complex. This report describes the sampling conducted during Phase I, examines the analytical results, and proposes NFA for human health.

1.1 General Site History

TA -16 is located in the southwestern corner of the Laboratory (Figs. 1.1-1 and 1.1-2). It contains 2 410 acres or 3.8 square miles. The land is a portion of that which was acquired by the Department of Army for the Manhattan Project in 1943. It was used prehistorically by the ancestral Indians of the Pajarito Plateau and before World War II for farming and a sawmill operation. TA-16 is bordered by Bandelier National Monument along New Mexico (NM) state road 4 to the south and the Santa Fe National Forest along NM state road 501 to the west. To the north and east, it is bordered by TAs 8, 9, 14, 15, and 49. TA-16 is fenced and posted along NM State Road 4. Water Canyon, a 200-ft-deep ravine with steep walls, separates State Road 4 from active sites at TA-16. Cañon de Valle forms the northern border of TA-16. Security fences surround the HE production facilities.

TA-16 was established to develop explosive formulations, cast and machine explosive charges, and to assemble and test explosive components for the US nuclear weapons program. Almost all of the work was conducted in support of the development, testing, and production of explosive charges for the implosion method. Present-day use of this site is essentially unchanged, although facilities have been upgraded and expanded as explosive and manufacturing technologies have advanced.

All of the PRSs included in this report are footprints of former buildings. These buildings included HE magazines, HE machining buildings, HE casting buildings, HE inspection buildings, radiography buildings, barium nitrate grinding facilities, steam plants, laboratories, equipment and control buildings, warehouse and source hutments, machining buildings, and storage buildings. The buildings were used in the 1940s and 1950s and most of them were decommissioned by intentional burning in the late 1950s and early 1960s. Significant contamination was not anticipated at these sites. However, contamination at these sites could include inorganic chemicals, cyanide, organics (particularly HE), and radionuclides. Although radionuclides are regulated by the DOE and are not regulated under

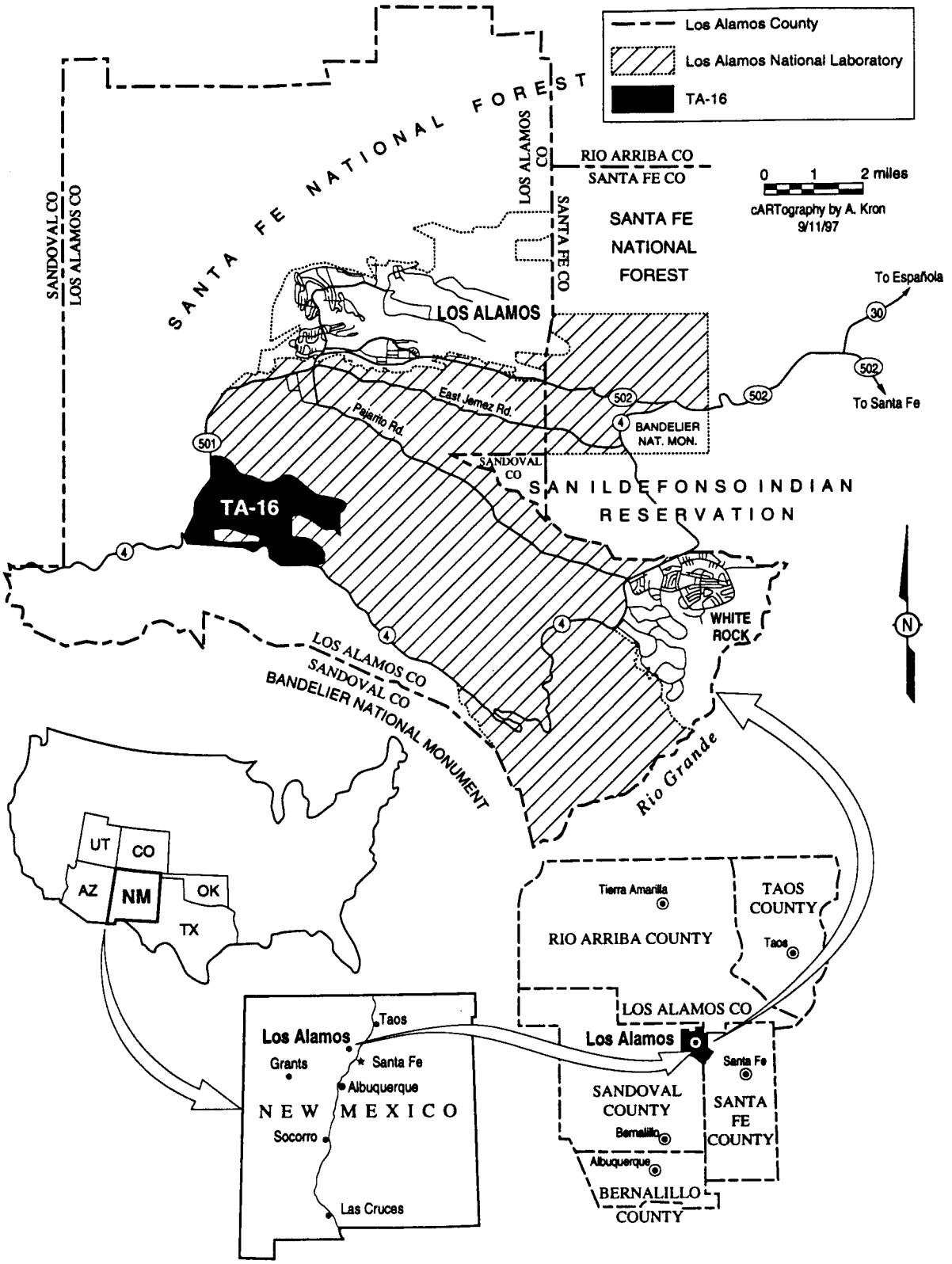

Fig. 1.1-1 Location of TA-16 within Los Alamos National Laboratory, Los Alamos County, NM.

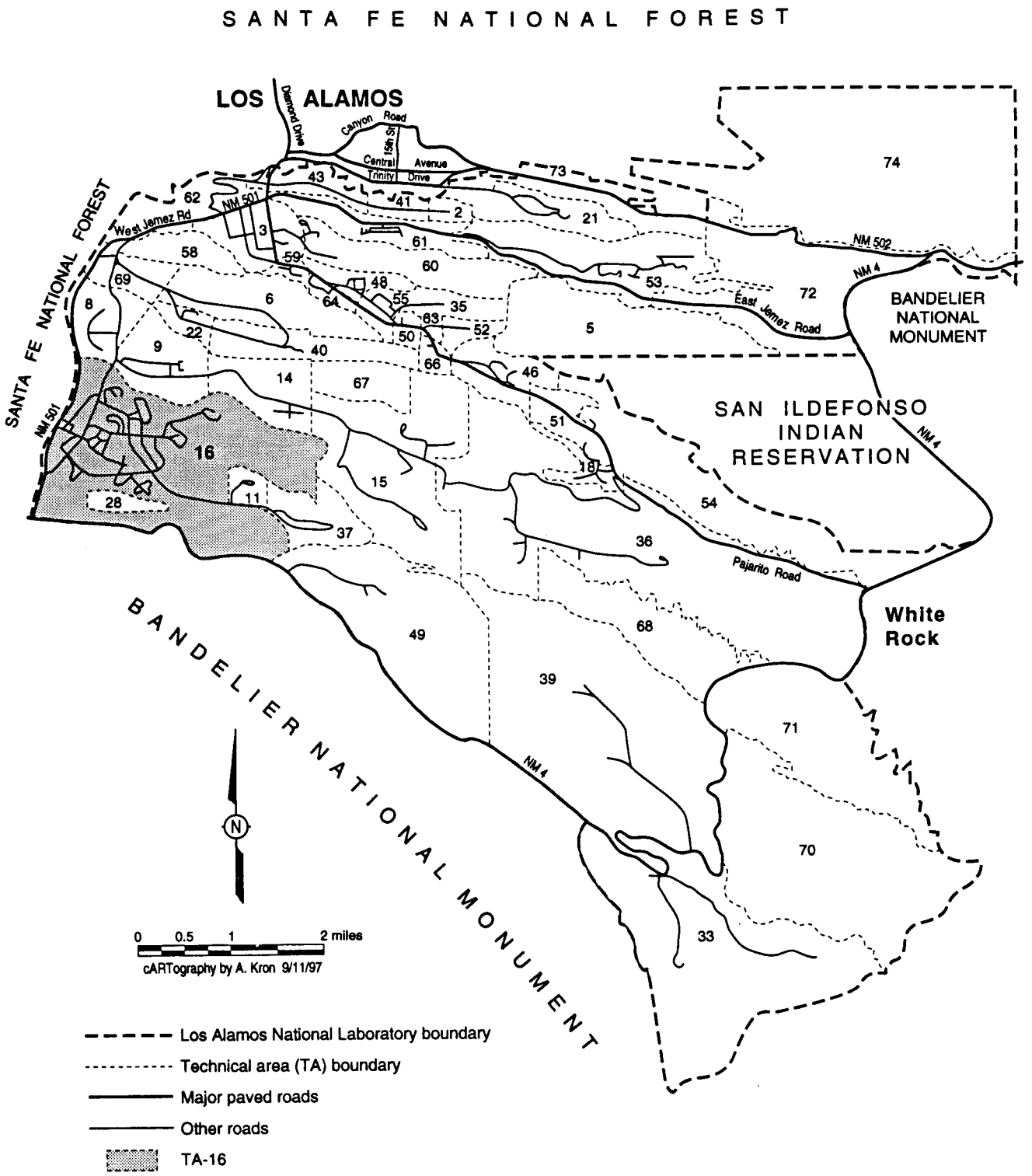

Fig. 1.1-2 Location of TA-16 with respect to Laboratory TAs and surrounding landholdings.

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 report.

A comprehensive table of the contaminants of potential concern (COPCs) that were expected at these sites is contained in Section 4 of the RFI Work Plan for Operable Unit 1082, Addendum II (LANL 1995, 1342). This table includes a wide range of HE used at LANL over the years, as well as standard industrial solvents, inorganic chemicals, and a few radionuclides.

1.2 RFI Overview

The RFI work plan that describes the 29 PRSs included in this report was submitted to the EPA Region 6 in July 1994 and was approved by EPA with minor modifications in 1995 (Taylor 1995, 15-16-645). The technical approach of the plan utilized phased sampling to locate the sources of any contamination associated with past LANL activities. This Phase I reconnaissance sampling and investigation is in compliance with the HSWA Module VIII of the LANL RCRA Facility Permit (EPA 1990, 0306).

The objective of the sampling activities at the 29 PRSs was to ascertain whether potential contaminants were present at levels of concern. Biased sampling was utilized to ensure that a release would be detected if it had occurred at a PRS. Analytical results were used to determine if releases had caused contamination at levels above SALs, UTLs, or EQLs.

The sampling design was based on the conceptual model described in Section 4.3 of the RFI Work Plan for Operable Unit 1082 (LANL 1994, 1160). The conceptual model was developed to identify potential contamination release and migration pathways and any potential human receptors. The PRSs represent decommissioned buildings that have been removed or destroyed by intentional burning (all ashes and remnants from the burning were removed from the sites).

The potential contamination mechanism at the PRSs is hypothesized to be from either: (1) leaks and spills from the past operations; or (2) ash, debris, or contamination left behind after the former buildings were burned and remnants removed. The potential release mechanisms are hypothesized to be via either: (1) infiltration of potential contamination into the near-surface soil; or (2) mechanical movement and mixing of potentially contaminated surface soil during the removal of the former buildings. There were no intrusive activities at the PRSs. Because all of the sites lie within relatively level mesa-top areas, there are few surface water collection points or drainages present that would evaluate lateral spreading and vertical infiltration of contaminants.

The conceptual model guided the selection of screening sample locations that were used to characterize the PRSs. These locations were within or adjacent to the former buildings and included: (1) building quadrants; (2) building centers; and (3) door locations.

Quadrant sample locations were either within or near the corners of the former buildings. The criteria for selecting quadrant locations were as follows.

- If the former building foundation and floor were constructed of concrete, the quadrant sample locations were biased to the building corners. This selection was made because the contaminant dispersal mechanism for concrete floors is hypothesized to be from leakage at the floor/wall joints.

- If the former floor was constructed of wood, the quadrant sample locations were biased within the quadrant. This selection was made because the contaminant dispersal mechanism for wooden floors is hypothesized to be from leakage from cracks within the wooden structure. Because leaks could have occurred anywhere within the structure, the samples were collected within the quadrants.

Screening samples were collected at door locations (and downgradient from door locations) where operations at the former building may have resulted in release of material. Door locations are likely areas for spills to have occurred or for material to have been swept out of the structures.

Screening samples were collected at center locations where operations at the former building may have resulted in release of material near the center of the structure. The buildings that had center pits for radioactive sources were likely to have had contamination at the building center.

The conceptual model also guided the screening sample depths that were used to characterize the PRSs. Potential contaminants from possible leaks and spills are hypothesized to have infiltrated into the near-surface and not to have been transported to depths greater than 1 ft. Samples collected from 0 to 1 ft depths were believed to capture potential contaminants from leaks and spills.

The possible dispersal of soil during removal of the former buildings is hypothesized to differ between concrete floored and wood foundation buildings. The criteria for selecting sample depths is therefore dependent on the type of building foundation. Decommissioning of buildings with concrete foundations was likely to have resulted in movement and disturbances of soil at near-surface depths beneath the structures. Screening samples from PRSs with concrete foundations were collected at 0 to 1 ft and 1 to 2 ft intervals to confirm that the contamination beneath the concrete-floored buildings had not been mixed to depths greater than 1 ft. Decommissioning of buildings with wood foundations was likely to have disturbed soils at the

surface and not at depths greater than 1 ft. Screening samples from PRSs with wood foundations were collected at 0 to 1 ft intervals because contamination is most likely present directly below the former structure. In all cases, however, contamination in the 0 to1 ft interval is deemed to be much more likely than in the 1 to 2 ft interval.

Laboratory samples were selected from the screening samples based on site-specific prioritization schemes that are discussed in Section 5 of this report. The majority of the laboratory samples were collected from the 0 to 1 ft depth intervals. This depth interval was selected for three reasons: (1) contamination is most likely present at shallow depths directly beneath the structures (in accordance with the conceptual model); (2) sample logs confirm that the samples at depths of 1 to 2 ft were undisturbed; and (3) results for screening samples at the deeper intervals (at all locations) indicated little contamination was present at depths greater than 1 ft.

Eight laboratory samples collected from the 1 to 2-ft depth intervals were quality assurance/quality control (QA/QC) samples which were collected to confirm no contamination was present at depth.

1.3 Field Activities

Fieldwork was performed at TA-16 from July 2 through August 8, 1997. The following field activities were completed at each PRS.

- Land survey
- Screening survey
- Field sampling activities

1.3.1 Land Surveys

A land survey was conducted to locate positions of former buildings at each PRS. The center of each building was surveyed, and screening sample locations were further surveyed relative to the center point of each former building. A Trimble™ global positioning system (GPS) total station was used to perform the survey to an estimated accuracy of $\pm$ 2 ft.

The land survey consisted of the following:

- Aerial photos were used to determine the positions of the former buildings. The primary aerial photo used in the survey was taken June 28, 1965. Photos taken November 15, 1956, and October 10, 1951, were used to locate buildings that had been destroyed before 1965.
- Corrections were made for the distortions in the aerial photos by deriving a scale based on known structures. Structures that exist today and were present in the aerial photos, were

used as photo control points. These photo control points (manholes and fire hydrants) were surveyed in the field, and the actual distances between these control points were compared with scaled distances on the aerial photos.

- Former buildings were located on the aerial photos. Distances were scaled from three photo control points to the center of each former building.
- Drawings were created for each former building using Softdesk Civil™ software. Three circles were drawn using the photo control points as radius points and the scaled distance as the radius of each circle. If all of the circles intersected at the same point, the position was accepted. Planar coordinates for the former buildings were calculated.
- If the three circles did not intersect at the same point, additional distances were scaled from other photo control points until acceptable positions were determined.
- The center of the former buildings was surveyed in from existing control points, and final checks were performed.
- The screening sample locations were determined and surveyed relative to the center of the former buildings.

1.3.2 Screening Surveys

Field screening was used to bias sample collection to the locations of greatest potential contamination. Soil samples were screened for HE, inorganic chemicals, radioactivity, and organics (depending on the chemicals potentially present). Screening results were used to bias the selection of samples that were submitted to the off-site laboratories for further analysis. Field screening was conducted both in place and at the field chemistry trailer.

All soil samples were screened in place for HE using an HE spot test kit with modified Griess™ reagents , for beta/gamma radiation (using an Eberline ESP1™ radiological meter with HP-260™ probe), and for volatile organics (using an HNu photoionization detector).

Soil samples collected from the 0 to 1 ft depth intervals were brought back to the field chemistry trailer for more detailed screening analysis. The soil was analyzed for hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX), trinitrotoluene (TNT), metals, and benzene, toluene, ethylbenzene, and xylene (BTEX) as appropriate. RDX and TNT were measured using a D-Tech™ analysis kit. Metals were measured using a Tracor Northern Spectrace 9000 energy dispersive x-ray fluorescence spectrometer (XRF). BTEX was measured using a D-Tech™ immunoassay analysis kit.

1.3.3 Field Sampling Activities

Field sampling activities at TA-16 were conducted from July 2 through August 8, 1997. Soil samples were collected and analyzed for screening purposes. Laboratory samples were selected from the screening samples based on site specific prioritization schemes which are discussed in Section 5. The screening samples were taken from 0 to 1-ft depth intervals at PRSs that had had wood floorss and from 0 to 1-ft and 1 to 2-ft depth intervals at PRSs that had had concrete floors.

The samples were collected using a manually operated hand-auger. All of the soil was screened in place as discussed in Section 1.3.2 of this report. The soil types and locations were described, photographed, and information logged. The samples that screened positive for any potential contaminant were placed in sealable plastic bags on ice in a cooler and transported to the field chemistry trailer for further analysis as discussed in Section 1.3.2. If no samples screened positive at any given location, then the 0 to 1 ft depth interval samples were brought back to the field chemistry trailer for further screening analysis. The 1 to 2 ft depth interval soils that were not used for further analysis were placed back into the holes from which they originated.

The 0 to 1-ft soil depth intervals were selected for further screening and laboratory analysis (rather than the 1 to 2-ft depth intervals) because contamination is most likely present at shallow depths directly beneath the structures (in accordance with the conceptual model).

All ER activities were conducted using appropriate LANL Environmental Restoration (ER) Standard Operating Procedures (SOPs). Subsurface soil samples were collected according to LANL-ER-SOP-06.10, Hand Auger and Thin-Wall Tube Sampler. Sample handling procedures conformed to LANL-ER-SOP-1.01, R0, General Instructions for Field Investigations, LANL-ER-SOP-1.02, R0, Sample Containers and Preservation, and LANL-ER-SOP 1.03, R1, Handling, Packaging, and Shipping of Samples. Sample control and documentation procedures conformed to LANL-ER-SOP-1.04, R3, Sample Control and Field Documentation.

2.0 ENVIRONMENTAL SETTING

The environmental setting of the Laboratory is described in Subsection 2.4 of the Installation Work Plan (IWP) for Environmental Restoration Revision 4 (LANL 1995, 1164). A discussion of the environmental setting, including climate, geology, hydrology, and a conceptual hydrogeologic model for the area and surroundings, is presented in Chapter 3 of the RFI Work Plan for Operable Unit 1082 (LANL 1993, 1094). A summary of that and new data collected since 1993 are presented in the following sections.

2.1 Climate

Los Alamos County has a semiarid, temperate, mountain climate. Summers are generally sunny with moderate, warm days and cool nights. High altitude, light winds, clear skies, and dry atmosphere allow mean summer temperatures to range from 60° F to 68° F at TA-16. Winter mean temperatures typically range from 30° F to 37° F. The average annual rainfall in the area of TA-16 is estimated to range from 18 to 20 in. (Bowen 1990, 0333). Of this total, 40% occurs as brief, intense thunderstorms during July and August

2.2 Geology

2.2.1 Geologic Setting

A detailed discussion of the geology of the entire Los Alamos area can be found in Subsection 2.5.1 of the IWP (LANL 1995, 1164). The geology of TA-16 is described in Subsection 3.4 of the RFI Work Plan for Operable Unit 1082 (LANL 1993, 1094). However, significant additional information on the geology of TA-16 has become available during the last four years. These new data are described below.

The operations area at TA-16 is bounded on the south by Water Canyon and on the north by Cañon de Valle. Cañon de Valle is a tributary to Water Canyon; they join at the east end of TA-16. Water Canyon drains into the Rio Grande approximately 7 miles east of the easternmost boundary of TA-16.

Operational areas at TA-16 are located on the mesa tops, composed of Unit 4 (Qbt4) of the Tshirege Member of the Bandelier Tuff. Unit 3 (Qbt3) of the Tshirege Member of the Bandelier Tuff crops out on the mesa tops at the east end of TA-16 and in the bottoms and walls of Cañon de Valle and Water Canyon. Correlation of recent mapping at Material Disposal Area-P with the recently-released bedrock geologic map of Rogers (Rogers 1995, 1353) suggests that mesa top

portions of TA-16 are underlain by approximately 80-110 ft of Unit 4 of the Tshirege Member of the Bandelier Tuff.

At Material Disposal Area-P, Qbt4 is a lithologically complex unit consisting of in ascending order: (1) a poorly indurated, white to light-gray, nonwelded ignimbrite, (2) an indurated light tan, nonwelded, cliff-forming tuff overlain by a broad bench, (3) a varicolored, nonwelded cliff-forming tuff with devitrified base and a 10-ft thick glassy upper part, (4) a crystal-rich surge bed up to 1-ft thick, and (5) a hard, densely-welded tuff that forms the caprock for the mesa (Broxton et al. 1996, 1305). The latter subunit correlates with Unit Qbtf and the first 3 units correlate with Unit Qbte of Rogers (Rogers 1995, 1353). The crystal-rich surge bed was mapped by Rogers as the boundary between the units Qbte and Qbtf. This high-permeability sandy parting may represent a possible perched zone - provided it also overlies a low-permeability zone. Examination of this contact in the walls of Cañon de Valle suggests that the surge bed is discontinuous. Rogers subunit Qbte contains a unit characterized by horizontal fractures that also may represent a possible perched-flow pathway. Recent drilling behind building TA-16-260 suggests that lithologic units in the subsurface at TA-16 are heterogeneous.

Qbt3 in Cañon de Valle adjacent to Material Disposal Area-P consists of two hard, pinkish-brown, partially to moderately welded, cliff-forming ignimbrites that are separated by a soft, pinkish-orange, nonwelded, slope-forming tuff. The uppermost subunit within Unit 3 contains significant horizontal fractures.

Detailed information on the mineralogy, modes, whole-rock chemistry, and outcrop characteristics of Unit 3 and Unit 4 at TA-16 are provided in Broxton et al. (Broxton et al. 1996, 1305).

A large, near-vertical fault, the Frijoles segment of the Pajarito fault zone, has been mapped to the west of TA-16. This fault is the largest segment of the Pajarito fault system in the Los Alamos area, with down-to-the-east displacement ranging up to 400 ft during the last 1.1 million years. Fault zones may provide pathways for water flow.

2.2.2 Soils

A discussion of soils in the Los Alamos area can be found in Subsection 2.5.1.3 of the IWP (LANL 1995, 1164). Soil at TA-16 is described in Subsection 3.4.3.2 of the RFI Work Plan for Operable Unit 1082 (LANL 1993, 1094). A recent study of background soils on the north and south slopes of Cañon de Valle near the TA-16 burning ground suggests that: (1) soil horizons ranged from 40 to 237 cm in depth, (2) soils are poorly developed and consist of A-R, A-Bw-R, or A-Bw-C soil profiles, and (3) soils are classified as Lithic Ustorthents, Typic Haplumbredt, Cumulic Haplumbredt, Typic Ustochrept, and Udic Paleoustalf soils (McDonald et al. 1996, 1354). No

detailed site specific soil surveys have been completed in the area where the PRSs covered in this report are located.

2.3 Hydrology

The hydrology of the Pajarito Plateau is summarized in Subsection 2.5.2 of the IWP (LANL 1995, 1164). The shallowest depth to groundwater at TA-16 is unknown. Shallow perched aquifers at TA-16 are quite heterogeneous. Several moderate depth (up to 200 ft) boreholes drilled at the TA-16 burning ground near Material Disposal Area-P did not intersect a saturated zone. Shallow (less than 100 ft) boreholes drilled at TA-16-260 between October 1996 and August 1997 do not contain saturated zones. The depth to the regional aquifer at TA-16 is estimated to be greater than 1000 ft. Four deep groundwater wells to the regional aquifer are scheduled in and around TA-16 as part of sitewide hydrogeologic studies scheduled for FY98 to FY05. These wells are proposed to be located: (1) in Cañon de Valle near Material Disposal Area-P (2) at the confluence of Cañon de Valle and Water Canyon (3) at New Mexico State Road 501 and Cañon de Valle, and (4) at New Mexico 501 and Water Canyon.

2.3.1 Surface Water

Surface water issues at TA-16 are described in Subsection 3.5.1 of the RFI Work Plan (LANL 1993, 1094). Additional information on surface waters at TA-16, collected since 1993, is summarized below.

Perennial and intermittent surface water exist at many locations at TA-16, due both to natural and anthropogenic sources. Cañon de Valle contains what appears to be a perennial reach, the surface water between TA-16-260 outfall and a location beyond Material Disposal Area-P has flowed continuously since initial investigations in 1992. Several intermittent saturated areas are present in small, tributary, drainages to Cañon de Valle and Water Canyon. Many of these zones are due to the discharge of process waters from TA-16 operations (Fig 2.3.1-1).

Surface waters in many of these locations have been analyzed as part of Framework Studies surface water characterization activities by New Mexico Environment Department (NMED) Agreement-in-Principle (AIP) personnel as part of their surveillance activities, and as part of non-RFI hydrogeologic sampling at TA-16. Information on constituents above background in surface waters is summarized below.

Surface waters in Cañon de Valle are contaminated with several constituents at levels above drinking water standards and above background levels. Barium in Cañon de Valle is up to 6 mg/kg,

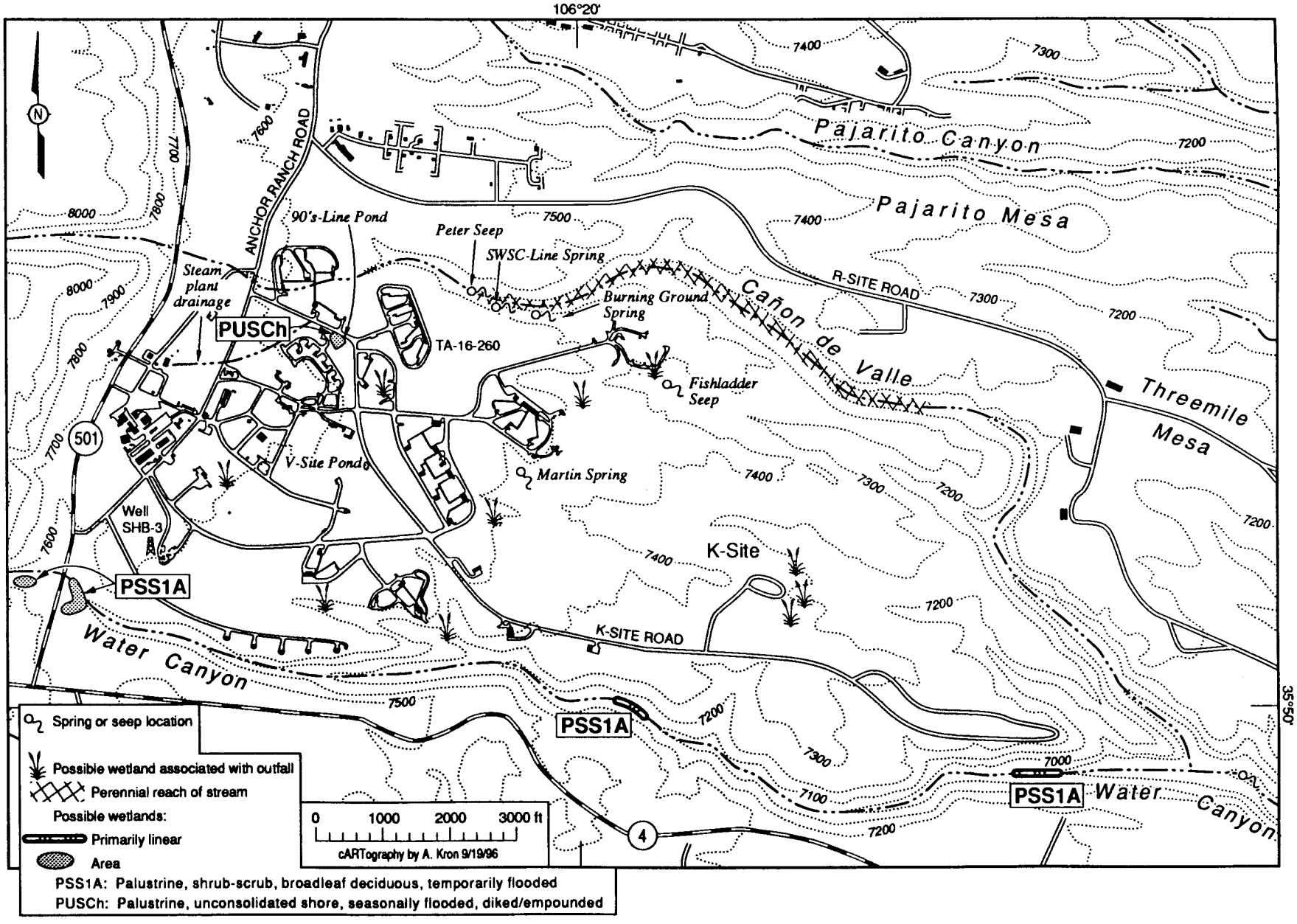

Fig. 2.3.1-1. Topography, springs, seeps, National Wetlands Inventory, and LANL-defined wetlands associated with National Pollution Discharge Elimination System (NPDES) HE outfalls (active and inactive) at TA-16.

which is above the New Mexico maximum concentration level (MCL) of 1 mg/kg. The high explosive RDX is also consistently at levels above 100 ppb, which is greater than the New Mexico MCL for that constituent. Several other constituents in Cañon de Valle are at levels above regional spring background including HMX, chlorine, sodium, and manganese. A detailed discussion of constituents in surface waters at TA-16 is provided in Appendix C to the RFI Report for Potential Release Sites in TA-16 - 16-003(k) and 16-021(c) (Environmental Restoration Project 1996, 1419).

Other surface waters at TA-16 that have anomalously high levels of constituents include the pond behind the 90s-Line, which contains barium at levels above the drinking water MCL and a surface water zone at potassium-Site, which contains barium and boron above background (Environmental Restoration Project 1996, 1419).

The PRSs described in this report are all located on level terrain in the west-central portion of TA-16. Most show no evidence of surface water runoff channels and most are vegetated with grasses.

2.3.2 Groundwater

Groundwater issues at TA-16 are described in Subsection 3.5.2 of the RFI Work Plan for Operable Unit 1082 (LANL 1993, 1094). Additional information on groundwaters, collected or reinterpreted since 1993, is summarized below.

Seismic Hazards Well SHB-3 drilled in November 1991, encountered groundwater, hypothesized to have been derived from a depth of between 350 to 750 ft (Gardner et al. 1993, 0848). This water may represent a perched zone or it could represent the regional aquifer. Water samples were taken from SHB-3 during the summer of 1993. These data show sporadic elevated values of lead, phosphate, rubidium, and ammonium relative to background spring data (Blake et al. 1995, 1355). Static water depth in SHB-3 was roughly 664 ft during 1992 (Environmental Restoration Group 1994, 1179)

Several springs and seeps have been identified at TA-16 during the past five years (Fig. 2.3-1). SWSC Line and Burning Ground spring discharge from within the uppermost, platy, subunit of Tshirege Unit 3. Martin spring apparently discharges from the lower portion of Tshirege Unit 4. All of the springs and seeps are contaminated with constituents (e.g. barium, boron, HE, solvents) at levels above background (Environmental Restoration Project 1996, 1419). All of these springs are also contaminated at levels above human health criteria for RDX. Martin spring appears to be most highly contaminated. The presence of these springs suggests the existence of one or more

perched zones at a shallow level beneath TA-16 (Environmental Restoration Project 1996, 1419). Most of the constituents in these springs are currently hypothesized to be derived from the significant contamination present at the TA-16-260 outfall, PRSs 16-003(k) and 16-021(c).

2.4 Biological Surveys

Biological surveys were performed at TA-16 before sampling. Appendix B of the RFI Work Plan for Operable Unit 1082 and Raymer (1996, 15-16-621) describes the results of field surveys for threatened, endangered, and sensitive species (LANL 1993, 1094). Ten plant and animal species of concern were identified in those surveys. These species were: the Jemez Mountain salamander, northern goshawk, peregrine falcon, Mexican spotted owl, broad billed hummingbird, pine marten, meadow jumping mouse, spotted bat, checker lily, and wood lily. Appropriate notifications and mitigation measures for each species were also identified in Appendix B of the RFI Work Plan for Operable Unit 1082. One of these species is known to reside in Cañon de Valle (Dunham 1996, 15-16-622; Raymer 1996 15-16-621).

Additional results of biological surveys and the habitat description for the PRSs described in this report will be included in the ecological RFI report prepared by the Decision Support Council Ecological Risk Assessment Team for the ecological exposure units in which these PRSs are located.

2.5 Cultural Surveys

As required by the National Historic Preservation Act of 1966 (as amended), a cultural resource survey was conducted during the summer of 1992 at Operable Unit 1082. The methods and techniques used for this survey conform to those specified in "Archeology and Historic Preservation, the Secretary of the Interior's Standards and Guidelines" (National Park Service 1983, 0632). A cultural resource survey has also been conducted in the area of the PRSs in this RFI report, as required by the National Historic Preservation Act (amended).

Thirty-three archaeological sites eligible for inclusion on the National Register of Historic Places under Criterion D are located within the survey area.

The attributes that make these sites eligible for inclusion on the National Register of Historic Places will not be affected by any ER Program sampling activities proposed at Operable Unit 1082.

3.0 APPROACH TO SAMPLE ANALYSES AND DATA ASSESSMENT

The approach to data assessment used by the ER Project is described in the "Technical Approach to Data Assessment for ER Project Site Characterization Decisions" (Knudsen et al. 1996, 1299). The approach includes:

- sampling and analysis design,
- field investigation and collection of field and QA samples,
- chemical and radiological analyses of samples and reporting of analytical data,
- routine verification and validation of analytical data,
- organization of field and analytical data into PRS-specific data packages,
- exploratory data analysis,
- focused validation when necessary to further assess questionable data,
- comparison of validated analytical results with LANL background data,
- comparison of validated analytical results with SALs,
- assessment of human health risk, and
- formulation of decisions

The following subsections provide overviews of the methods used to complete these steps for the PRSs discussed in this RFI report.

3.1 Sample Analyses

Samples were collected in accordance with sample design specified in the RFI Work Plan for Operable Unit 1082, Addendum 1 (LANL 1994, 1160) as modified in response to the EPA Notice of Deficiency (NOD) (EPA 1994, 15-16-644) and based on other issues raised by NMED comments on related ER Project work. During the sampling activities, field data were collected for each sample. This data includes unique sample identification number, location number, time and date of collection, soil type, sampling anomalies, etc. Field screening analyses were completed using photoionization detectors (PID), radiological screening instruments, the HE spot test, D-Tech™ immunoassay kits, and portable XRF. All samples requiring laboratory chemical and radio-chemical analyses and chain-of-custody documentation were submitted to the Sample Management Office (SMO) for analyses. Samples with radionuclides as potential contaminants

were submitted to TA-21 for radioactivity screening, and screening results were submitted to the SMO before sending samples to off site laboratories.

3.1.1 Analytical Methods

High explosives are the principle chemicals potentially present at the sites included in this report. A minimum of four HE screening samples were analyzed using the D-Tech™ immunoassay kits at each PRS with the exception of PRS C-16-017. Two types of kits were used, one for RDX and one for TNT. Both have nominal detection limits of 0.5 mg/kg.

The following laboratory analytical suites were used for the sample analyses in this RFI report: inorganic chemicals, VOCs, SVOCs, HE, and radionuclides. A list of target analytes for which analyses were performed for this report can be found in Appendix A.

All samples were analyzed by contract analytical laboratories using methods specified in ER SMO analytical subcontracts (LANL 1995, 1278). The allowed methods are current EPA SW-846 and Contract Laboratory Program (CLP) methods or equivalent. All solid samples for inorganic and organic analyses were digested using EPA's 3050 digestion procedure (EPA 1992, 1207) or equivalent. The subcontracts require the use of LANL-approved methods for radiochemical analyses for each of the technologies identified in the subcontract (e.g. multiple isotopes by gamma spectroscopy). Samples for uranium analysis were prepared by a total digestion procedure comparable to LANL/CST method ER 320, "Uranium in Environmental Matrices-KPA" (Gautier 1417).

Analytical method selection is described in Appendix II of the ER Project Quality Assurance Project Plan (QAPP) Requirements for Sampling and Analysis (LANL 1996, 1292). For each analyte, quantitation or detection limits are specified as contract required EQLs for organic chemicals and radionuclides and estimated detection limits (EDLs) for inorganic chemicals. These limits are included in Appendix III of the ER Project QAPP along with the target analytes for each analytical suite, and their appropriateness for the investigations described in this report is discussed in Section 4.

3.1.2 Data Verification and Validation

Data verification and baseline validation procedures are used to determine whether analytical data packages have been generated according to specifications and contain the information necessary to determine data sufficiency for decision-making. Data verification includes ascertaining that data packages are complete, including results for all requested analyses and all supporting information such as chromatograms. It also includes the comparison of results

reported in the hard-copy data package with those delivered electronically and uploaded into the Facility for Information Management and Display (FIMAD). All field data and some (but not all) of the QC results in FIMAD have been verified by comparing electronic data with hard copy reports. Discrepancies are resolved in favor of the hard copy reports. All sample results presented in this report are in FIMAD.

For analytical data used for decisions discussed in this RFI report, baseline data validation was performed under the auspices of the SMO as described in the ER Project Quality Assurance Project Plan Requirements for Sampling and Analysis (QAPP) (LANL 1996, 1292). The product of this process is a validation report, including data qualifiers that designate potential deficiencies for affected results. Each data qualifier is accompanied by a reason code that provides information about how the deficiency might impact data use. Data qualifiers assigned by baseline validation, together with their reason codes, are also recorded in FIMAD. The validation report is used in the decision-making process, and it may also be used to direct a focused validation for evaluating the usability of the data of interest.

Data may be qualified for a variety of reasons during the baseline validation process, each of which may or may not limit the use of data for a specific purpose. It is important to recognize that qualified data (i.e., a result together with its assigned data qualifiers) generally have great utility. The baseline validation procedure is designed to provide information about the reason the qualifier has been applied and what its potential impact is on the effected data. The object is not to reject data but rather to ensure that its merit is understood and that the data are used appropriately. The use of qualified data in this report is consistent with EPA guidance (EPA 1992, 1166) and is further discussed in Section 4.0 of this report.

Data qualifiers used in the LANL ER Project baseline validation process are defined in Table 3.1.2-1.

TABLE 3.1.2-1
DEFINITION OF DATA QUALIFIERS ASSIGNED DURING BASELINE VALIDATION

U	Analyte was not detected above the reported EQL.
J	Analyte was positively identified, but the result is estimated to be more uncertain than would normally be expected for that analysis.
UJ	Analyte was not detected; the associated value is an estimate of the detection limit or quantitation limit.
J+	Analyte was positively identified, result is likely biased high.
J-	Analyte was positively identified, result is likely biased low.
P	Professional judgment should be applied, depending on proposed use of the data.
PM	Professional judgment should be applied before using the data. Manual review of the raw data is recommended.
R	Sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. Any results qualified as "R" should be further evaluated for relevance for data use. Thus "R" implies "PM".
RPM	Sample results should not be used without further review of the raw data.
A	Missing required QC data, or QC results not available to the baseline validator.

Focused validation was performed on several data packages as a follow-up to the baseline validation. The purpose of a focused validation is to determine the adequacy of reported results for their intended use when

- the data have been qualified as deficient or as requiring professional judgment during the verification/baseline validation process, or
- the data quality assessment process requires additional information about the variability or uncertainty of the reported data or data quality before making a data use decision

Results of the data quality assessment process, including a review of baseline and focused validation results, are presented in Section 4 of this RFI report. Qualifiers assigned by baseline and focused validation are shown in the analytical results tables included in Section 5 of this RFI report. Summaries of data quality evaluations and focused validation of analytical data relevant to this RFI report are given in Appendix B.

3.2 Process for Identification of COPCs

3.2.1 Inorganic Chemicals

Detected inorganic chemicals are compared with natural background distributions to determine if they should be retained as COPCs or eliminated from further consideration. The inorganic background data used in this RFI report are from the following sources:

- Background comparison geochemistry issues, field identification of soil horizons, and statistical tests for background comparisons are discussed by Ryti et al. (1996, 1298)
- The most recent screening values for use in the "hot measurement comparison" (Ryti et al., 1996, 1298) were used. The UTLs are updated as more background information becomes available; the current values are available in FIMAD. The "all horizons" background soil screening values were used because the soil master horizon could not be identified in the disturbed material sampled for the investigations described herein.
- The FIMAD screening value for mercury was not used because it represents only the contract-required detection limit that was in effect when the background samples were analyzed. Background screening decisions for data in this report are based on results reported by Ferenbaugh et al. (1990, 0099).

In this report, comparisons between site data and background data are performed by comparing each observed concentration datum with a chemical-specific background screening value that is either an UTL or the maximum reported concentration in the background data sets. The maximum reported concentration is used only for chemicals that are reported as undetected in most background samples (including mercury, antimony, cadmium, and selenium). The derivation of these background screening levels is discussed by Ryti et al. (1996, 1298). Inorganic chemicals below these background screening levels are not reported in the Section 5 data tables.

In the case of analytes that were never detected in background samples (such as silver), all detected results are considered to be above background and are reported in Section 5.

3.2.2 Radionuclides

Comparing reported radiochemical results with minimum detectable activities 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 radionuclides and those used as indicators of the quality of the radiological measurement process. Determination of detection status by comparison with minimum detectable activities and other criteria is discussed in Section 4.2 of this report.

Detected radionuclides are retained as COPCs or eliminated from further consideration based on a comparison with natural or anthropogenic background distributions. Methods for these comparisons together with radionuclide background data are provided in (Environmental Restoration Decision Support Council and Earth Science Council 1997, 1414) and reviewed in Section 4. Sources of background data cited in that document include Longmire et al. (1995, 1266) and Fresquez et al. (1996, 1360).

In this report, comparisons between site data and background data are performed by comparing each observed concentration datum with a radionuclide-specific background screening value calculated as an UTL for the background data. Radionuclides detected below these background screening levels are not reported in the Section 5 data tables. In the case of radionuclides for which there are no applicable background data and no other guidance (as defined in Section 4.2), all detected results are considered to be above background and are reported in Section 5.

3.2.3 Organic Chemicals

Background data are not available for organic chemicals. Organic chemicals positively identified in one or more samples have been carried forward to the screening assessment process for the PRSs in this RFI report. Chemicals not detected in any sample have been removed from further consideration.

Based on previous investigations conducted by the ER Project, polycyclic aromatic hydrocarbons (PAHs) have been detected at multiple PRSs across the Laboratory and its surrounding area. In most cases, the presence of PAHs is not related to historical PRS operations, but rather is attributable to non-PRS activities such as runoff from asphalt roads, parking lots, or roofs, combustion of fossil fuels, or forest fires (ATSDR 1995, 1408; Bradley et al. 1994, 1144; Edwards 1983, 1407). In this report, PAHs are not attributed to historical PRS operations. Archival information regarding historical PRS operations, indicates non-PRS-related sources for these PAHs are asphalt and also forest fires, one of which burned within two miles of these sites in 1977). Also the low levels at which the PAHs are detected indicate these contaminants are not a result of historical operations.

In particular, at the one site where one PAH was detected above its SAL (benzo[a]pyrene), which has an extremely low SAL of 0.061 mg/kg, and was detected at 0.08 mg/kg, an entire suite of 11 PAHs were detected at low levels. This site, PRSs 16-025 (h), is in the highly disturbed 40s/90s line area and close to one of the main roads leading to the modern TA-16 operational areas.

3.2.4 Risk-Based Screening Assessment

Inorganic chemicals and radionuclides that exceed background, and organic chemicals positively identified in one or more samples and potentially attributable to PRS operations, require further evaluation if they also exceed SALs. SALs for nonradioactive chemicals are based on EPA Region 9 preliminary remediation goals (PRGs) for residential soil (EPA 1995, 1307). 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, the potential for additive effects of chemicals present below SALs must be considered, and a multiple chemical evaluation (MCE) is performed. The ratio of each chemical detected above background to its SAL is estimated. If the sum of these ratios exceeds one, then there could be a potential for additive effects even if no individual chemical was reported above its SAL. The method for performing this MCE calculation is summarized in the policy document Risk-Based Corrective Action Process (Dorries 1996, 1297). No PRS in this report contained ratios which approached one, and as a result, no COPCs remain after screening assessment. Because no COPCs remained after inspection of the data, NFA recommendations are proposed for the PRSs based on human health concerns.

3.3 Human Health Assessment

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

Background risks can result from inorganics that are naturally occurring for a site. 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, i.e., cancer risk of 1E-6 or hazard index of 1. Background risks can also affect decisions at sites that have constituents for which there is a threshold of toxicity. For some inorganics, background intakes may be near a toxicity threshold such that incremental intakes associated with contamination may be unacceptable.

Background risks calculated here use the same exposure assumptions by which SALs are calculated. SALs are based on health-protective assumptions for a residential scenario (EPA 1995, 1307). For soil exposure, the pathways include incidental soil ingestion, inhalation of resuspended dust, and dermal contact with soil. Because background soil data represent geographically diverse locations, background risks are estimated for both a median concentration and the UTL from the entire background data set to present the range of potential risk associated

with different soil constituent concentrations found in and around Los Alamos. The background risks based on the SAL residential exposure model are provided in Table 3.3.1-1.

Risks due to background are presented for both noncarcinogenic and carcinogenic outcomes. The potential for adverse noncarcinogenic health effects is estimated by a hazard quotient. Intakes leading to a hazard quotient up to 1 are not associated with adverse health effects. None of the median background concentrations result in hazard quotients greater than 1. The hazard quotient of the UTL concentration for manganese exceeds 1 (1.9). However, given the unlikely occurrence of this concentration, the conservative assumptions in the exposure assessment, the margin of safety in the reference dose, and the exceedance of less than a factor of two, this intake estimate is not expected to be associated with adverse health effects.

Four of the background inorganics are also carcinogens. According to the default exposure assumptions used for SALs, the lifetime cancer risks due to background residential soil exposure are estimated at 1 to 2 in 100 000 for each arsenic and beryllium.

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

TABLE 3.3.1-1
RISK DUE TO BACKGROUND CONCENTRATIONS OF INORGANIC CHEMICALS IN Soil ASSUMING A RESIDENTIAL SCENARIO[a]

Soil Inorganic	Soil Concentration[b] mg/kg		Hazard Quotient		Lifetime Cancer Risk	
	Median	UTL	Median	UTL	Median	UTL
Aluminum	10 000	38 700	0.13	0.5	nc[c]	nc
Antimony	0.6	1.0[d]	0.019	0.032	nc	nc
Arsenic	4.0	7.82	0.18	0.36	1E-5	2E-5
Barium	130	315	0.025	0.059	nc	nc
Beryllium	0.895	1.95	0.0027	0.0059	6E-6	1E-5
Cadmium[e]	0.20	2.6[d]	0.0053	0.071	1E-10	2E-9
Chromium[f]	8.6	19.3	0.00009	0.0002	nc	nc
Cobalt	6.0	19.2	0.0013	0.0042	nc	nc
Copper	5.75	15.5	0.0021	0.011	nc	nc
Lead[g]	12	23.3	0.03	0.058	nc	nc
Manganese	320	714	0.84	1.9	nc	nc
Mercury	0.05	0.1[d]	0.0022	0.0043	nc	nc
Nickel	7.0	15.2	0.0047	0.01	nc	nc
Selenium	0.3	1.7[d]	0.00078	0.0045	nc	nc
Thallium	0.2	1.0[d]	0.033	0.16	nc	nc
Uranium	0.9	1.87	0.0039	0.0081	nc	nc
Vanadium	21	41.9	0.039	0.078	nc	nc
Zinc	30.7	50.8	0.0013	0.0022	nc	nc

nc = Noncarcinogen

a. Risk estimates are based on reference doses, slope factors, and EPA Region IX default exposure assumptions effective in April 1996.
b. Cancer risks for cadmium are based solely on inhalation of resuspended dust.
c. Not calculated
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.

3.3.2 Risk Assessment

No human health risk assessments were performed for these PRSs.

3.4 Ecological Assessment

In cooperation with the NMED 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.

4.0 RESULTS OF QUALITY ASSURANCE/QUALITY CONTROL ACTIVITIES

This section reviews the impact on data usability of laboratory QC results summarized in Appendix B of this report, as well as results from field QA samples and the overall performance of the HE field screening methods.

A total of 77 laboratory samples were collected from 29 PRSs in the decommissioned World War I area of TA-16 during summer of 1997. All samples were surface or near-surface (not more than 2 ft deep) soil samples. Fifty-six of these samples from 29 PRSs are discussed in Section 5 of this report. This section discusses results and associated QA/QC indicators for all 77 samples.

Four pairs of duplicate (field split) samples were collected. These are listed in Table 4.0-1.

TABLE 4.0-1
FIELD DUPLICATE SAMPLES

SAMPLE ID	SITE ID	DEPTH (ft)	PRS	DUPLICATE SAMPLE ID
0316-97-0592	16-4193	1-2	C-16-017	0316-97-0593
0316-97-0594	16-4012	1-2	16-025(p)*	0316-97-0595
0316-97-0596	16-4020	1-2	16-025(y)	0316-97-0597
0316-97-0598	16-4093	1-2	16-024(s)	0316-97-0599

* sample was collected from TA-16, however is not included in this report

LANL QC requirements for all routine sample analyses performed by external subcontractor laboratories are given in the Environmental Restoration Project analytical services statement of work (SOW) (LANL 1995, 1278). For routine organic and inorganic analyses, the LANL requirements are based either on requirements contained in the EPA CLP SOW or guidance provided in the EPA SW-846 guidelines. LANL requirements for the routine radiochemical analyses have been adapted from the EPA requirements for organic and inorganic analyses. Batch-specific QC samples, such as blank, matrix spike, and duplicate samples, must be analyzed at a frequency of one QC sample for each instrumental method, each sample matrix, and/or each analytical batch, whichever is more frequent. The inorganic and radiochemical methods also require the analysis of a laboratory control sample with each analytical batch. Known amounts of surrogates are added to most organic analyses, and their recovery during analysis provides a sample-specific QC measure. Tracers and carriers play a similar role for some radiochemical analyses, such as alpha spectrometry for uranium and plutonium isotopes. The LANL

requirements for the frequency of QC procedures that are not batch-specific, such as initial calibration and continuing calibration verification, adhere to EPA requirements for each specific organic and inorganic instrumental technique.

In addition to reporting results for QC samples and other QC procedures, analytical laboratories routinely supply qualifier codes with their results indicating which results may be affected by problems indicated by out-of-control QC results. These laboratory qualifiers, included in FIMAD, are to be distinguished from data qualifiers added by baseline or focused validation, which are discussed below. QC indicators that are not batch-specific (e.g., results for duplicate, blank, spike, and laboratory control samples), surrogate and tracer recoveries, and laboratory qualifiers are also available in FIMAD. Batch-specific QC indicators are not provided electronically in LANL's current electronic deliverable.

All of the data discussed in this report have also undergone baseline validation by data validators, who have access to all of the QA/QC indicators reported by the analytical laboratories including indicators that are not batch-specific such as initial and continuing calibration results. Where these indicators suggest that a result is of less than expected accuracy or precision, this is communicated to the data user both in hard copy validation reports and also by the assignment of data qualifiers that are recorded in the FIMAD database. Table 3.1.2-1 provides definitions of data qualifiers. As discussed in Section 3.1.2, the purpose of data qualification is not to reject data but rather to ensure that its merit is understood and that the data are used appropriately.

"U", meaning that the analyte was analyzed for but not detected, is the most common laboratory qualifier. For the sake of efficiency, baseline validators do not copy a laboratory "U" qualifier into the data qualifier field in FIMAD. If they agree with the laboratory "U", they leave the data qualifier field blank. Therefore, where the data qualifier field is empty and the laboratory qualifier is "U", the result is accepted as a nondetect.

After "U", the most commonly occurring laboratory and data qualifier is "J", indicating that the result is "estimated" (see Table 3.1.2-1). While there are other reasons why a result may be "J" qualified, by far the most common one is that the result lies between the instrument detection limit (IDL) and the EQL. Below the EQL, quantitation is less precise than above the EQL. Thus, the "J" qualifier most often indicates that a chemical has been detected, but at levels so low that it cannot be well quantified. This is not an indication of any deficiency in the data beyond the limitations inherent in the analytical method. "J"-qualified results are used freely in this report. Where the "J" qualifier has been assigned for some other reason, that is noted both in Appendix B and in the appropriate section of Section 5.

Where baseline validation or preliminary review of the data has indicated a need, additional focused data validation has been performed on some of the data discussed in this report. The purpose of focused data validation is specifically to assess the implications (if any) of identified deficiencies in the data for the decisions considered in this report. The results of focused data validation and consequent modifications to the data qualifiers assigned by the baseline validators are discussed in detail in the following subsections.

4.1 Inorganic Analysis

A total of 76 samples were submitted for inorganic analyses, including cyanide for four of the samples. Analyses were performed by four different laboratories. Batch-specific QC samples include at least one matrix spike and duplicate analysis per batch (for which material from one of the customer's samples is used), plus preparation blanks and in some cases laboratory control samples prepared by the analytical laboratory.

QA/QC results for these analytical requests are summarized in Appendix B. The methods used were adequate to detect all analytes at concentrations below their SALs, and most within background concentration levels. The QA/QC results were satisfactory for most requests. Exceptions are itemized in Table B-3 and further discussed below. Overall, the data are judged to be of adequate quality for their uses in Section 5 of this report. The remainder of this subsection discusses the results of focused validation and problematic areas in more detail.

Baseline data validation indicated that QA/QC information was unavailable for all analytes in requests 3334R, 3339R, 3343R and 3528R, for mercury in 3352R, and for a few of analytes in a few samples in 3334R. In all cases, this was because the matrix spike and duplicate analyses for the analytical batch were performed on a sample from a different request number, which is permissible under the terms of LANL's contracts with the analytical laboratories. In all but one case, the sample selected for these QC analyses was another of the samples associated with the investigations described in this report. In the exceptional case the selected sample was another field unit 3 TA-16 soil sample from the LANL ER Project. Therefore, the quality of the data is unaffected and the qualifier assigned by baseline validation ("A") has been removed from results in the four requests listed above.

Inorganic chemicals that are not readily detected at background concentrations by the methods used are antimony, cadmium, mercury, selenium, silver, and thallium. Other chemicals that cannot be well quantified over at least part of their background range are beryllium, nickel, cobalt, and sodium. When not reported as undetected, these chemicals are frequently qualified as "B" (estimated) by the analytical laboratory. Another common baseline data qualifier in these cases is

"P", often applied because the duplicate analysis was not within control limits (indicated by a laboratory qualifier of "*"). Duplicate recoveries outside control limits are not surprising when the chemical is present at background concentrations and these background levels are near the detection limit for the analytical methods. These "P" qualifiers have been replaced by "J" during focused validation (for example, silver in request number 3419R).

Antimony analyses were generally problematic throughout these investigations. Detection limits varied by more than an order of magnitude, from 0.7 to 11 mg/kg, depending on the instrumental method used by the laboratory. Background levels of antimony are less than 1 mg/kg, infrequently detectable by atomic absorption methods and not detectable by inductively coupled plasma emission spectroscopy (ICPES). Either method is acceptable under the terms of the LANL SOW (LANL 1995, 1278).

- Thirty-eight samples were analyzed by one laboratory providing a detection limit in the range of 0.7 to 0.75 mg/kg (requests 3334R, 3352R, 3440R, 3443R and 3528R). No antimony was detected in these samples, although some results were qualified as estimated undetected by baseline validation because matrix spike recoveries were low (48 to 53%). However, because the reported detection limit is less than 3% of SAL (which is 31 mg/kg), the potential negative bias is insignificant. Because the reported detection limit is also below the UTL for antimony, no results from these 30 samples appear in the data tables of Section 5.

- A second laboratory provided detection limits of 4 to 5 mg/kg for six samples (request 3320R), in which no antimony was detected and for which all QC indicators were satisfactory.

- A third laboratory, which analyzed 20 samples in requests 3419R and 3459R, had detection limits from 6 to 9 mg/kg. Antimony was detected at 14.2 mg/kg in one sample (0316-97-0566 from PRS 16-025(n). The remaining, non-detect results were qualified UJ by baseline validation because matrix spike recovery was below 75% (52% for 3419R and 68% for 3459R). Again, the reported detection limits are far enough below the SAL that the potential negative bias is not significant.

EPA guidance (EPA 1992, 1166) states that " 'UJ' qualified data can be used to represent background concentrations for establishing an observed release when there is confidence that the background concentration is not detectable above the contract required quantitation limits (CRQL)". This is the case for antimony, for which the CRQL in soil is 12 mg/kg. Based on this guidance, all reported antimony data from this laboratory, including non detects at all levels as well as estimated results, are used in this report. The undetected values are excluded from Section 5 tables.

- Finally, all antimony data from the fourth laboratory (13 samples from request 3403R) were provisionally rejected ("RPM") by baseline validation because of a problem with the continuing calibration. These results were uniformly reported as undetected with a detection limit of 10 to 11 mg/kg. Also in this laboratory batch, recovery for the matrix spike was 26.4%, while recovery for the laboratory control sample was 48.3%. Following focused validation, these results were rejected as unusable for this report.

Antimony has not been implicated by historical information as a likely contaminant for the sites under investigation in this report. In addition, more than 700 samples from TA-16 have been analyzed for antimony, and antimony has been detected in only about 1% of the sample, and never at more than 50% of SAL. Based on these considerations, the lack of antimony data for PRSs 16-025(h) and 16-034(c,d,e,f) is not considered critical.

Mercury is problematic primarily because of the lack of comparable background data. Existing background data for soils (Ryti et al., 1996, 1298) is reported at or below an estimated quantitation level (EQL) of 0.1 mg/kg, while current data are being reported (usually as "estimated" or "B" qualified) as low as 0.01 mg/kg. In this report we use the only other available local background data, that of Ferenbaugh et al. (1990, 0099) to determine whether the data indicate the presence of mercury above background levels. Their data, all of which was collected from an undeveloped part of Sigma Mesa in 0-2" soil samples, indicate a range of up to 0.029 mg/kg of mercury. Only detected results at or above 0.03 mg/kg are reported in Section 5.

Many of the selenium results were qualified by baseline validation, usually because of low matrix spike recoveries. However, all reported detection limits and detected results were within the background range and below the SAL. Selenium has not been implicated by historical information as a likely contaminant for the sites under investigation in this report. It has been detected above background levels in fewer than 1% of TA-16 samples to date, and then only at levels that are less than 2% of the SAL. Therefore the results for these analytes are accepted as reported. In particular, results qualified by baseline data validation as "UJ" (estimated undetected) are evaluated as non-detects for the purposes of decision making in Section 5. No selenium results appear in the Section 5 data tables because all are below the UTL for selenium in soils.

Inorganic results for the field duplicate pairs listed in Table 4.0-1 were within 15% of each other in all cases except for the copper and lead results for samples 0316-97-0594 and 0316-97-0595, in which the relative standard deviations were up to 30%. These results are comparable to, or better than, results for laboratory duplicates, for which the relative standard deviations for lead and copper exceeded 15% in two of nine laboratory duplicate analyses provided with the samples discussed in this report. Thus sample collection, handling and shipping have not increased the

variability in the results over what would naturally be obtained from heterogeneity within the sites and analytical error.

In summary, the quality of the inorganic analyses provided is adequate to support the decisions described in Section 5.

4.2 Radiochemistry Analysis

A total of 10 samples were submitted for gamma spectroscopy plus radium-226 analysis by alpha spectroscopy. Nine samples were submitted for strontium-90 analysis, 10 for isotopic uranium analysis, three for total uranium, and two for isotopic plutonium. Radiochemistry analyses were performed by two different laboratories. Batch-specific QC samples for isotopic analyses include at least one matrix spike and duplicate analysis per batch (for which material from one of the customer's samples is used), plus preparation blanks, blank spikes, and laboratory control samples prepared by the analytical laboratory. Tracers are used in the isotopic uranium and plutonium analyses, and carriers in the strontium-90 and radium-226 analyses. Batch-specific QC for total uranium is similar to that used for inorganic analyses.

The methods used were adequate to detect all analytes implicated by historical information below their screening action levels and most within background concentration levels. The QA/QC results were satisfactory for most requests. Exceptions are itemized in Appendix B and further discussed below. Overall the data are judged to be of adequate quality for the uses to which it is put in Section 5 of this report. The remainder of this subsection discusses use of these data and the results of focused validation in more detail.

Activities of radium-226 and uranium-235 can be measured by both alpha and gamma spectrometry. Where results are reported by both gamma and alpha spectrometry for a given sample, only the more accurate alpha spectrometry result is used. Thus no radium-226 gamma spectrometry results, and only two uranium-235 gamma spectrometry results, are retained for use in Section 5.

Gamma spectrometry measures a very large number of analytes, many of which are of no interest for this investigation although they are important in evaluating the overall quality of the analysis. Gamma emitters identified on the basis of historical evidence for the sites under investigation were cobalt-60, radium-226 and uranium-235, but as explained above alpha spectroscopy is the preferred analytical method for the latter two of these.

Several gamma-emitting isotopes are used solely as radiological process indicators (ER DSC and ESC 1997, 1414). These include potassium-40, strontium-85, cadmium-109, and annihilation

radiation, all of which were detected above minimum detectable activity (MDA) levels in at least one analysis of the samples discussed in this report. These radiological indicators are not considered further. In addition, several short-lived isotopes in the decay chains of uranium-238, uranium-235 and thorium-232 are observed at the levels that are consistent with the presence of uranium and thorium in these soils at background levels. As daughters of the longer-lived radionuclides that head these decay chains, they are expected to be in approximate secular equilibrium with the latter, that is, to be found at approximately the same levels of activity, although because they are so short-lived they are measured with greater statistical variability. Thus these results also serve as indicators that the measurement process is under control. Table 4.2-1 lists these analytes if they were detected above MDAs, together with the maximum reported value (with the qualifier applied by baseline validation, if appropriate). These analytes are excluded from Section 5 tables.

TABLE 4.2-1
SHORT-LIVED NATURALLY OCCURRING RADIONUCLIDES

Isotope	Decay chain	Half-life[a]	Maximum (pCi/g)	UTL (pCi/g)[b]
Actinium-228	Thorium-232	6.13 h	1.71	3.3
Bismuth-211	Uranium-235	2.16 m	2.8(J)	NA
Bismuth -212	Thorium-232	60 m	2.96(U)	NA
Bismuth -214	Uranium-238	19.7 m	1.61	1.39
Lead-212	Thorium-232	10.6 h	2.28	2.36
Lead-214	Uranium-238	26.8 m	1.43	1.97
Radium-224	Thorium-232	3.64 d	3.88	NA

a m = minutes, h = hours, d = days

b These values are based on sediment, not soil samples. NA indicates that no UTL has been calculated. (ER DSC and ESC 1997, 1414)

The remaining detected isotopes, together with the analytical methods used, SALs, and MDAs, are given in Table 4.2-2. A comparison of the MDAs with the SALs indicates that the radiochemical methods employed were sufficiently sensitive to detect all potential radiological contaminants in soil at concentrations below SALs, except for radium-226. However, the soil SAL for radium-226 is well below the background levels of this radioisotope, which is in the decay chain of uranium-238 and is observed in uncontaminated soils at approximately the same levels of activity as uranium-238 and uranium-234 (i.e., up to about 2.3 pCi/g). Alpha spectrometry can detect radium-226 well below this level.

TABLE 4.2-2.
ANALYTES, MDA AND ANALYTICAL METHODS FOR LONG-LIVED RADIONUCLIDES

Analyte	Half-Life (yr)	Soil SAL (pCi/g)	MDA (pCi/g)[a]	Analytical Method
Americium-241	432.2	22	0.35	Gamma-Spectrometry
Cobalt-60	5.27	1.1	0.06	Gamma-Spectrometry
Cesium-137	30.17	5.1	0.05	Gamma-Spectrometry
Neptunium-237	2.14×10^6	1.9	0.33	Gamma-Spectrometry
Plutonium-238	87.7	27	0.1	Alpha-Spectrometry
Plutonium-239/240[b]	2.4×10^4	24	0.1	Alpha-Spectrometry
Radium-226	1602	0.1	0.25	Alpha-Spectrometry
Strontium-90	28.8	4.4	1.0	Gas proportional counter
Uranium-234	2.46×10^5	13	0.04	Alpha-Spectrometry
Uranium-235	7.04×10^8	10	0.04	Alpha-Spectrometry
			0.06	Gamma-Spectrometry
Uranium-238	4.47×10^9	67	0.03	Alpha-Spectrometry
Total uranium[c]	NA	29	0.5	KPA with total digestion

a Reported MDAs are sample specific. Some laboratories report MDLs (method detection limits based on a blank sample) instead of MDAs. Typical figures for the data in this report are provided.

b The plutonium-239 and plutonium-240 isotopes cannot be distinguished by alpha spectrometry. The half-life of plutonium-239 is given.

c The SAL and MDA for total uranium are reported in mg/kg. Natural uranium is a mixture of uranium-234, uranium-235 and uranium-238, in which uranium-238 predominates by weight (about 99.3%) but uranium-234 and uranium-238 are present at about equal levels of activity.

In evaluating results for the analytes included in Table 4.2-2, detection status was determined first by comparison with the MDA, if an MDA was reported. Baseline validation further qualified many analytes as undetected when the result was less than five times the amount found in the blank, or when it was less than the EQL (provided for isotopic uranium results only). Because gamma spectrometry is subject to interferences from sources from which the instrument can not be

shielded, the detection of analytes in a blank does not indicate a problem with the analysis. Rather, blank analyses are used for calibration of the gamma spectrometry process.

Only results above the MDA for analytes that are not radiological indicators, are not one of the short-lived naturally occurring radionuclides in Table 4.2-1, and were not qualified as undetected by baseline validation, are reported in Section 5. These may include a few analytes in addition to those listed in Table 4.2-2 for which SALs are not calculated because their half-lives are less than half a year (for example, lanthanum-140 has a half-life of 40.3 hours).

The only laboratory QC problem affecting the analytes in Table 4.2-2 that was identified by baseline validation is the high bias imputed to sample 0316-97-0572 from PRS 16-034(f) for uranium-235 in request number 3404R, because recovery in the laboratory control sample was reported above the acceptable limit. In addition, there was no information available to baseline validators to assess the radium-226 analyses in request number 3420R. However, all radium-226 results reported in request number 3420R are within the background range.

In summary, the quality of the radiochemical analyses provided is adequate to support the decisions described in Section 5.

4.3 Organic Analyses

4.3.1 Semivolatile Organic Analyses

A total of 77 samples were submitted for semivolatile organic analyses. Analyses were performed by four different laboratories. QA/QC results for these analytical requests are summarized in Appendix B. Batch-specific QC samples vary among laboratories. Most include at least a blank, and often a blank spike and spike duplicate analysis (samples prepared by the analytical laboratory). Some use customer samples for matrix spike or duplicate analyses. Several surrogates are analyzed in each sample.

The methods used were adequate to detect most analytes below their SALs. The QA/QC results were satisfactory for most samples; exceptions are itemized in Appendix B and discussed below. Overall, the data are judged to be of adequate quality for the uses to which it is put in Section 5 of this report. The remainder of this subsection discusses the results of focused validation and problematic areas in more detail.

Detected semivolatile organic chemicals include:

- phthalates, a common laboratory contaminant, detected at 5% of their SALs or less;

- PAHs, which are common in industrialized areas especially in association with asphalt, at levels of less than 2 mg/kg (see Section 3.2.3); and
- a small number of other chemicals, benzoic acid, chloronaphthalene(2-), methyl-napthalene(2-), phenol and chorophenol(2-), none of which were detected above 2% of their SALs.

Many undetected analytes were requalified "UJ" by baseline validation, most often because an internal standard was out of control (see Table B-4). Based on focused validation, which looked at other available indicators, and examination of unqualified data from the same or nearby sites, it was determined that these analytes were unlikely to have been present in the sample, and the non detect status indicated by the laboratory is accepted for the purposes of Section 5. Detected chemicals for these samples were qualified as estimated ("J").

In the case of request number 3401R, five samples were reanalyzed because an internal standard was out of control. There are no differences in the reported results except for the single detected result, a J-qualified result of 0.097 mg/kg bis(2-ethylhexyl)phthalate in the reanalysis of sample 0316-97-0561 from PRS 16-034(f), slightly higher than the original detected result of 0.091 mg/kg.

Extraction holding times were missed by one or two days for nine of the eleven samples in request number 3457R. Recent EPA findings indicate that minor deviations from the extraction holding times have little effect on sample results for solid samples (West et al. 1997, 1416). The data were accepted as reported, but qualified as "J" if detected and "UJ" if undetected. The nine samples come from PRSs 16-025(b2 and k).

Low-level PAHs were detected in one pair of field duplicate samples (0316-97-0594 and 0316-97-0595). Relative standard deviations were less than 10% except for phenanthrene, which was reported at 0.28 and 0.19 mg/kg, respectively. Except for pyrene, all results were below the EQL. Thus sample collection, handling and shipping have not increased the variability in the results over what would naturally be obtained from heterogeneity within the sites and analytical error.

In summary, no semivolatile organic chemicals were reported at levels of concern in any of the samples discussed in this report, and a review of the data suggests no reason to suspect that they were present in any samples at such levels despite a number of minor problems with the analyses.

4.3.2 Field Screening for High Explosives

The majority of samples selected for laboratory analysis at the sites evaluated in this report were selected based on low but positive field screening results for RDX (a nitramine/nitrate ester) or TNT (a nitroaromatic) obtained using D-Tech™ immunoassay kits. In spite of this, HE (specifically, RDX) was detected in only two of these laboratory samples. This finding is in agreement with published studies of these kits. One such comparative study of HE field screening kits, such as D-Tech™, indicated that at levels of approximately 1 ppm, these kits "... had significant positive bias...sometimes resulting in false positives..." (Crockett et al. 1997, 1411). This positive bias has been attributed to the presence of humic substances, naturally occurring colored compounds, which are present in soil and which are extracted along with the HE, interfering with visual or colorimetric evaluation of the extract. As a result, "... on-site method results are biased high as compared to laboratory results." (Crockett et al. 1996, 1412). No false negatives were reported in this comparative study. Thus the field screening methods used in these investigations tend to err in the direction of incorrectly identifying the presence of HE.

The D-Tech™ kits have a detection range of 0.5 to 5 mg/kg, and produce semiquantitative results (concentration ranges) as reported in Section 5. This range is appropriate for the samples at the sites under investigation here, at which high levels of HE were not anticipated, and are below their SALs for RDX and TNT (4 and 15 mg/kg, respectively). Higher detection ranges are achievable via sample dilutions.

4.3.3 Laboratory Analyses for High Explosives

A total of 74 samples were submitted for HE analyses. Analyses were performed by two different laboratories. Batch QC samples include a method blank and a blank spike (laboratory control sample), and one laboratory also includes matrix spikes and matrix spike duplicates. One surrogate was analyzed in each sample.

The methods used were adequate to detect all analytes below their screening action levels. No data were qualified by baseline validation (Appendix B). There were only two detected results, RDX in sample 0316-97-0530 from PRS 16-015(c) and RDX and HMX in sample 0316-97-0538 from PRS 16-025(a2). (These PRSs are not discussed in Section 5.)

No HE was detected in any of the field duplicate samples (Table 4.0-1).

Overall the data are judged to be of adequate quality for the uses to which it is put in Section 5 of this report.

5.0 SPECIFIC RESULTS, CONCLUSIONS, AND RECOMMENDATIONS

This RFI report discusses the Phase I sampling and analysis for 29 PRSs (Fig 5.0-1). Site information, results and analyses, and evaluation of contamination are presented in this section. All samples were screened in place for radioactivity and volatile organic compounds and were within background levels. All of the samples screened low or no detect for RDX, TNT, metals, and BTEX when such screening was performed. The screening results were used to bias the samples that were submitted to the laboratory for confirmation sampling.

All of the PRSs in this report were evaluated for surface water concerns during FY 1997 in accordance with LANL-ER-AP-4.5, "Evaluation and Notification of Potential Surface and Ground Water Concerns at Environmental Restoration Sites". All of these sites are located on level ground, none exhibit evidence for significant runoff channels. Thus, none of the sites were ranked as high-priority surface-water sites based on the AP 4.5 review.

No contamination was present above SALs in 28 PRSs. Contamination was present above one SAL in 16-025(h), however not at levels that a present risk to human health. All of the PRSs are recommended for human-health NFA based on NFA Criterion 5 because contamination is not present at levels that present risks to human health. NFA Criterion 5 is: "The PRS has been characterized or remediated in accordance with current applicable state or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use" (Project Consistency Team 1996, 1210).

5.0.1 Polynuclear aromatic hydrocarbons without SALs

A select group of Polynuclear aromatic hydrocarbons (PAHs) without SALs were detected at the PRSs presented in this report at low detection frequencies, and at low concentrations (low parts per million). Infrequent detections of these compounds at low concentrations do not represent a contamination problem posing a potential risk to human health or the environment. SALs are not available for these compounds due to the absence of EPA-accepted toxicity criteria to calculate screening values. In general, the potential impacts from the low detections of these compounds is addressed during the evaluation of the PAHs that do have toxicity criteria and SALs. The PAHs consist of a large family of compounds with a rather large range of toxic potency. In calculating site risks, EPA and most state agencies separate the PAH into two categories: carcinogens and noncarcinogens. Carcinogenic PAH are evaluated by considering the available data on the carcinogenic potency of different PAHs to develop toxicity equivalency factors (TEFs) for the individual PAHs. These TEFs indicate the carcinogenic potency of each compound relative to

benzo(a)pyrene (BaP). Consequently, the PAHs analyzed that do have SALs encompass a substantial portion of the risk due to low levels of these compounds in soils.

The list of PAH without SALs in this report includes: benzo(g,h,i)perylene, a noncarcinogenic PAH; phenanthrene, a noncarcinogenic PAHs very similar to pyrene; and 2-methylnaphthalene, a noncarcinogenic PAH very similar to naphthlene. All of the non-carcinogenic PAHs have SALs greater than 1000 mg/kg. The non-carcinogenic PAHs without SALs are likely to have SALs of equivalent magnitude. Because the PAHs without SALs were detected infrequently and at concentrations that are orders of magnitude below SALs for similar compounds; the evaluation of PAHs is considered to be complete after the evaluation of PAHs with SALs available.

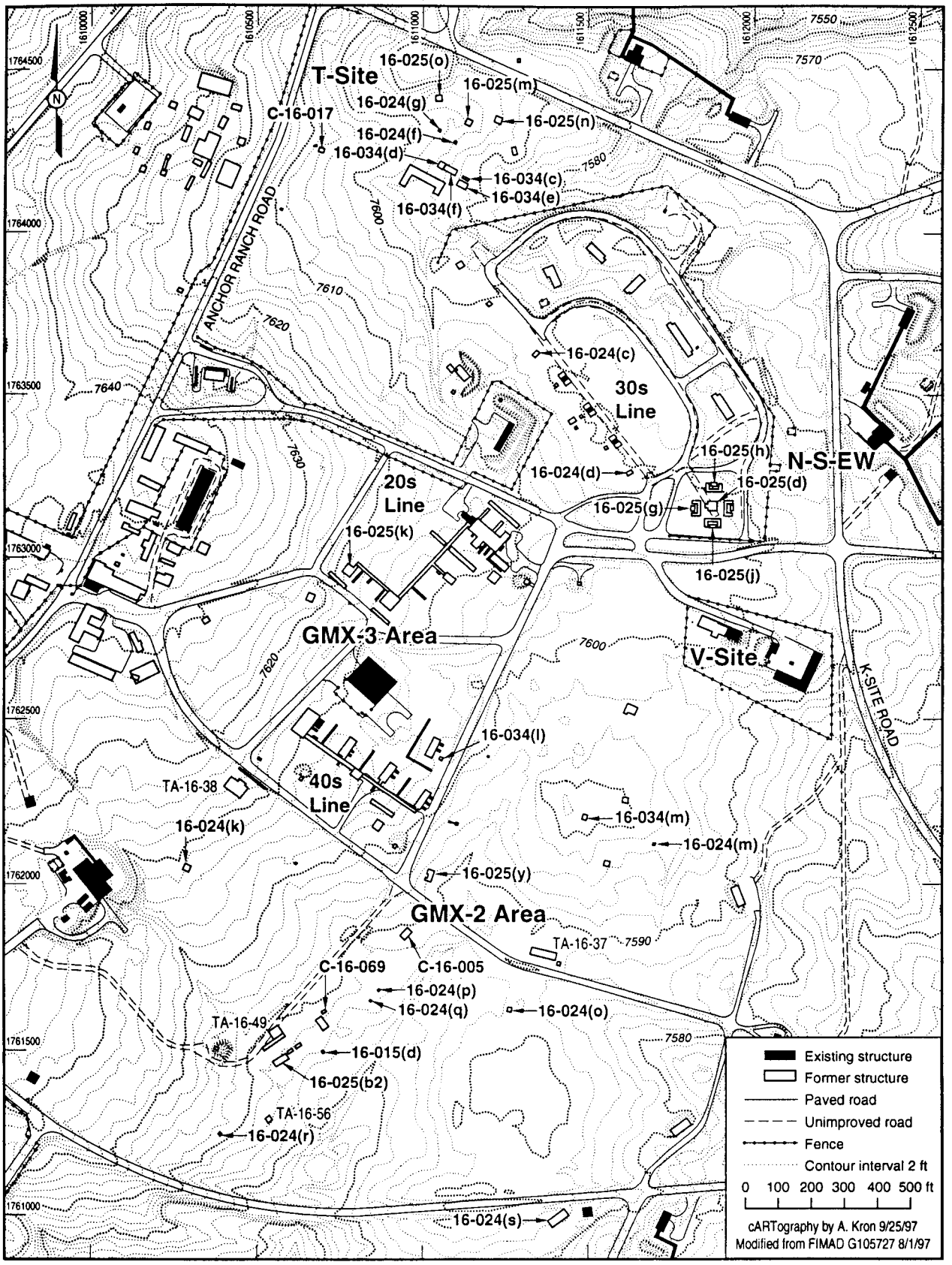

Fig. 5.0-1 Locations of PRSs in this RFI report.

5.1 PRS 16-024(c)

This PRS is the site of former HE magazine TA-16-30, located in the northern portion of World War II TA-16 (GMX-3 area). It is recommended for human-health NFA because contamination is not present at levels that present a potential risk to human health.

5.1.1 History

PRS 16-024(c) is discussed in detail in Subsection 5.19 of the RFI Work Plan for Operable Unit 1082, Addendum 1 (LANL 1994, 1160).

TA-16-30 stored raw HE powder or finished HE product. HE magazines were used to store packaged HE and finished HE products before and after processing. No HE processing was done in such magazines. It stored castings to be machined at TA-16-31, TA-16-32, and TA-16-33. The building contained no sumps or plumbing. The magazine was built in June 1945. It was regarded as HE contaminated when it was surveyed in the 1950's (Engineering Department 1959, 15-16-256), and abandoned in December 1959. It was intentionally burned in 1960 (Wingfield 1960, 15-16-117).

The potential contamination at this PRS was identified as metals, SVOCs, and HE.

5.1.2 Description

The magazine was 12 ft wide x 17.5 ft long x 8 ft high and of wooden-frame construction with a concrete floor. The magazine was bermed on three sides and on top. This magazine was located within the 30s-Line on level terrain.

5.1.3 Previous Investigation(s)

No previous investigations were conducted at this PRS.

5.1.4 Field Investigation

The goal of the Phase I investigation at PRS 16-024(c), as outlined in the approved RFI Work Plan for Operable Unit 1082, Addendum 1 (LANL 1994, 1160), was to determine if contaminants were present in soils at levels of concern. The sampling design is consistent with the current industrial land use scenario of the conceptual model described in Section 4.3 of the RFI work plan. The potential for contamination at this PRS is hypothesized to be via either: (1) leaks and spills from the past operations; or (2) ash, debris, or contamination left behind after the former building was burned and remnants removed. The potential release mechanisms at this PRS are hypothesized

to be via either: (1) infiltration of potential contamination into the near-surface soil; or (2) mechanical movement and mixing of potentially contaminated surface soil during the removal of the former building. There was no historic subsurface construction (or other intrusive activities) at this PRS, and there are no surface water collection points or drainages present that would have spread contamination to the subsurface. Biased sampling was designed to detect residual HE in the surface and near-surface soil at the site of the magazine footprint. The mode of decommissioning of the magazine and the fact that magazines were used for HE storage, but not for HE processing suggest that residual contamination is unlikely at this PRS.

Addendum 1 specified screening soil samples, 0 to 1 ft depth intervals, from four locations and selecting one laboratory sample only if positive field screening results were obtained. The plan called for taking the samples at the four quadrants of the building. The laboratory sample was to be selected from the screening samples using the following prioritized biasing scheme: (1) a sample with positive HE spot test kit results; and (2) a sample with above-two-times background radiation readings. In response to an EPA NOD (EPA 1994, 15-16-644), screening samples were collected from 1 to 2 ft depth intervals (as well as the required 0 to 1 ft intervals) to confirm that the soil beneath this concrete floored building had not been disturbed during decommissioning, and one laboratory sample was collected (based on the above scheme) even if all field screening results were negative.

Two deviations were made from the work plan.

- A fifth screening location was selected at the former location of the door because the door location is a likely place for spills to have occurred or for material to have been swept out of the structures.

- The screening samples were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit. This analysis was performed in addition to the required HE spot test analysis because the D-Tech™ kits can detect specific potential contaminants and provide lower detection limits (1 ppm or less) than the HE spot test. This screening was used to further characterize the samples in the field for biasing purposes.

The building was accurately surveyed using a Trimble™ GPS Total Station. Aerial photographs were used to determine the building position, and the center of the building was surveyed with an estimated accuracy of 2 ft. Screening sample locations were further determined and surveyed relative to the center point and within the known dimensions of the building.

A total of 10 field screening samples were taken from five locations in the building footprint. The samples were collected from 0 to 1 ft and 1 to 2 ft depth intervals. The field screening samples

were taken near the corners of the four quadrants of the building and near the location of the door (Fig. 5.1.4-1). These locations were selected to ensure spatial variability and because the most likely contaminant dispersal mechanism for the operations in this building, which had concrete floors, is hypothesized to be via either: (1) HE spills near door areas; or (2) leakage at the floor/wall joints.

All samples were collected with a manually driven hand auger (LANL-ER-SOP-06.10, Hand Auger and Thin-Wall Tube Sampler). The soil samples were screened in the field for HE and beta/gamma radioactivity using the HE spot test kit with modified Griess™ reagents (LANL-ER-SOP-10.06,R0, High Explosive Spot Test) and an Eberline ESP1™ radiological meter with HP-260™ probe (LANL-ER-SOP-10.07, R0, Field Monitoring for Surface and Volume Radioactivity Levels). The 0 to 1 ft interval samples were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit (EPA SW-846 Methods 4051 and 4050). The 0 to 1 ft intervals were selected for further characterization, rather than the 1 to 2 ft intervals, because the soil beneath the PRS structure is undisturbed, as confirmed by the soil descriptions in the sample collection logs. If contamination is present within the structure footprint, it is most likely present at shallow depths directly beneath the structure. The soil was described and logged on the Sample Collection Log forms (LANL-ER-SOP-01.04, Sample Control and Field Documentation).

All samples screened negative for HE using the HE spot test kit and contained background radioactivity. Two samples screened positive for HE using the D-Tech™ kit (Table 5.1.4-1).

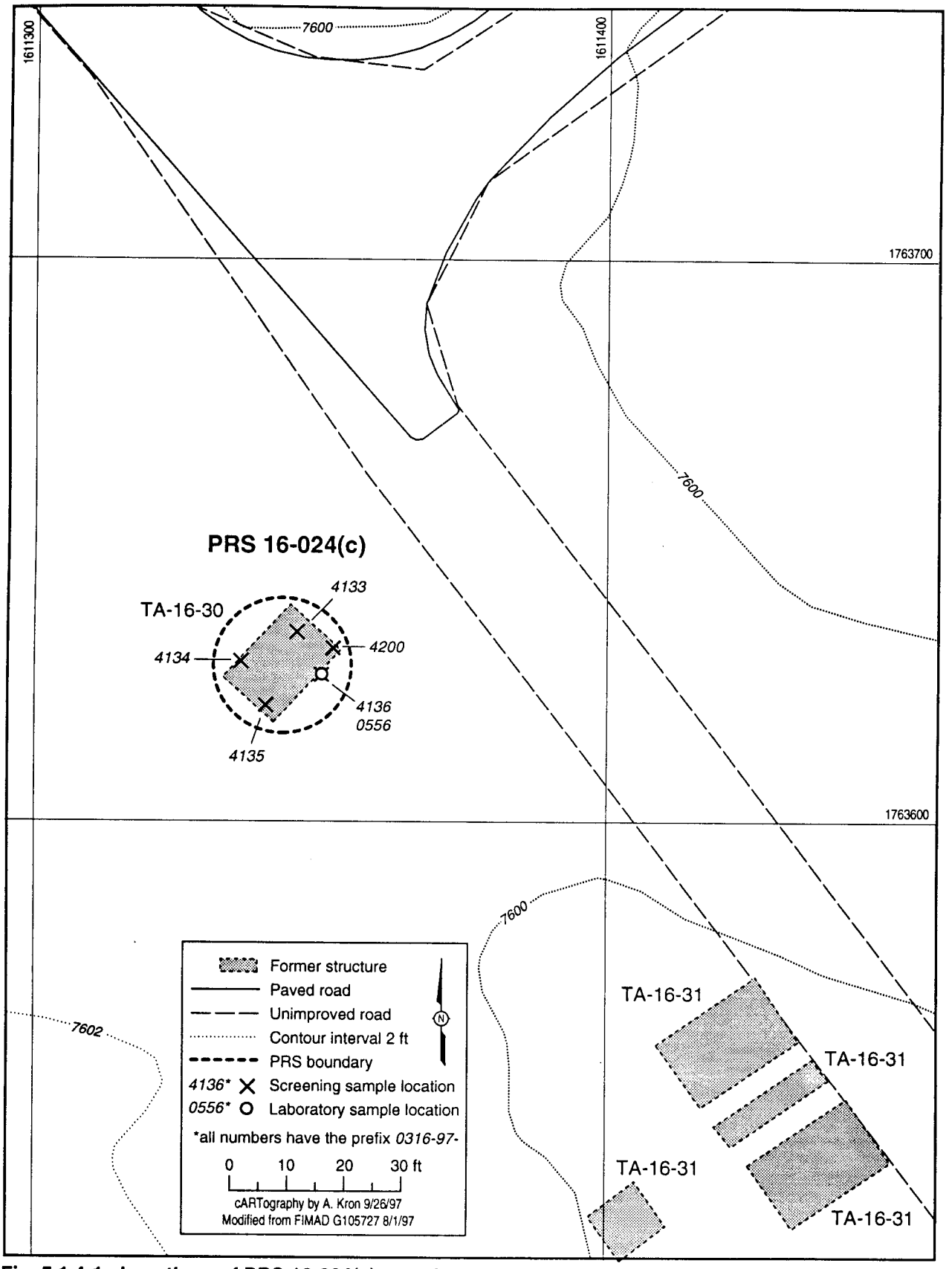

Fig. 5.1.4-1 Locations of PRS 16-024(c) samples.

TABLE 5.1.4-1
SUMMARY OF FIELD SCREENING RESULTS

SCREENING SAMPLE NO.	LOCATION ID	DEPTH (FT)	LAB SAMPLE NO.	HE SPOT TEST	RAD SCREEN	D-TECH RDX (MG/KG)	D-TECH TNT (MG/KG)
0316-97-4133 northeast quadrant	16-4133	0 - 1	NA[a]	negative	background	< 0.5	0.5 - 1.5
0316-97-4134 northwest quadrant	16-4134	0 - 1	NA	negative	background	< 0.5	< 0.5
0316-97-4135 southwest quadrant	16-4135	0 - 1	NA	negative	background	< 0.5	< 0.5
0316-97-4136 southeast quadrant	16-4136	0 - 1	0316-97-0556	negative	background	< 0.5	0.5 - 1.5
0316-97-4200 door	16-4200	0 - 1	NA	negative	background	< 0.5	< 0.5

a. NA = Not analyzed.

Screening sample 0316-97-4136 contained 0.5 to 1.5 mg/kg TNT and was located in the downgradient (southeast) part of the building footprint. This sample was submitted to the laboratory for analysis (Table 5.1.4-1). The sample was analyzed for metals, SVOCs, and HE (Table 5.1.4-2)

TABLE 5.1.4-2
SUMMARY OF REQUEST NUMBERS FOR LABORATORY SAMPLES FOR PRS 16-024(c)

LOCATION ID	SAMPLE ID	DEPTH (FT)	MATRIX	INORGANICS	SVOCS	HE
16-4136	0316-97-0556	0 - 1	soil	3440R	3438R	3439R

5.1.5 Evaluation of Inorganic Chemicals

No inorganic chemicals were present at levels greater than background UTLs at PRS 16-024(c). Baseline validation indicated no problems that affect the use of these inorganic data.

5.1.6 Evaluation of Radionuclides

Radionuclides were not analyzed for at PRS 16-024(c) because historical evidence indicated that radioactive material was not stored or used in this HE magazine. Additionally, field screening did not indicate the presence of radioactive constituents.

5.1.7 Evaluation of Organic Chemicals

No HE was detected in sample 0316-97-0556, despite indications of the presence of TNT in the associated field screening sample. The positive D-Tech™ result, which suggested that low levels of TNT were present, was not confirmed by the fixed laboratory analysis. The D-Tech™ kits have been shown to provide false positives due to interferences with humic materials. See Section 4.3.2 for further details.

No organic chemicals were detected in sample 0316-97-0536. Baseline validation indicated no data quality problems associated with these analyses that affect the use of these organic data.

5.1.8 Risk-Based Screening Assessment

No screening assessment was performed because no chemicals were present at or above UTLs or EQLs at PRS 16-024(c).

5.1.9 Preliminary Human Health Assessment

No human health risk assessment was performed for PRS 16-024(c) because contamination was not detected at or above SALs.

5.1.10 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 PRS will be deferred until the PRS can be assessed as part of the ecological exposure unit methodology currently being developed.

5.1.11 Conclusions and Recommendations

Ten screening samples and one laboratory sample were collected in and adjacent to the footprint of the former HE magazine TA-16-30. The laboratory sample was selected from one of two screening samples that screened positive for HE. It was located in the downgradient (southeast) part of the building footprint. The laboratory sample contained no inorganic or organic contamination above detection limits.

The biased sampling and analysis strategy at this former magazine was designed to ensure that residual contamination would be detected if present within the PRS. Screening locations and depths were selected based on information about the location, orientation, construction, use of the former building, and mode of decommissioning. Because the likelihood of contamination

within the building footprint is judged to be low following the removal of the building, and the likelihood of finding contamination is high based on the biased sampling, a single confirmatory laboratory sample is sufficient to indicate whether or not such contamination is present at levels of concern. The laboratory sample was selected from screening samples based on field screening results, and was analyzed for all potential contaminants based on historical knowledge of operations in TA-16-30.

PRS 16-024(c) is recommended for human-health NFA based on NFA Criterion 5 because contamination is not present at levels that present a potential risk to human health.

5.2 PRS 16-024(d)

This PRS is the site of former HE magazine TA-16-34, located in the northern portion of World War II TA-16 at GMX-3 area (Fig. 5.0-1). It is recommended for human-health NFA because no contaminants were detected above SALs.

5.2.1 History

PRS 16-024(d) is discussed in detail in Subsection 5.19 of the RFI Work Plan for Operable Unit 1082, Addendum 1 (LANL 1994, 1160).

Magazine TA-16-34 stored raw or finished HE product and machined product for physical and x-ray examination. HE magazines were used to store packaged HE and finished HE products before and after processing. No HE processing was done in such magazines. The magazine contained no sump or plumbing. It was built in June 1945. The structure was not burned with the other nearby magazines in 1960, but it had caved in. The structure was demolished at a later, unknown, date.

The potential contamination at this PRS was identified as metals, SVOCs, and HE.

5.2.2 Description

The magazine was 12 ft wide x 17.5 ft long x 8 ft high and of wooden-frame construction with a concrete floor. It was bermed on three sides and on top. The magazine was located within the 30s-Line on level terrain.

5.2.3 Previous Investigation(s)

No previous investigations were conducted at this PRS.

5.2.4 Field Investigation

The goal of the Phase I investigation at PRS 16-024(d), as outlined in the approved RFI Work Plan for Operable Unit 1082, Addendum 1 (LANL 1994, 1160), was to determine if contaminants were present in soils at levels of concern. The sampling design is consistent with the current industrial land use scenario of the conceptual model described in Section 4.3 of the RFI work plan. The potential for contamination at this PRS is hypothesized to be via either: (1) leaks and spills from the past operations; or (2) ash, debris, or contamination left behind after the former building was burned and remnants removed. The potential release mechanisms at this PRS are hypothesized to be via either: (1) infiltration of potential contamination into the near-surface soil; or (2) mechanical movement and mixing of potentially contaminated surface soil during the removal of the former building. There was no historic subsurface construction (or other intrusive activities) at this PRS, and there are no surface water collection points or drainages present that would have spread contamination to the subsurface. Biased sampling was designed to detect residual HE in the surface and near-surface soil at the site of the magazine footprint. The mode of decommissioning of the magazine and the fact that magazines were used for HE storage, but not for HE processing, suggests that residual contamination is unlikely at this PRS.

Addendum 1 specified screening soil samples, 0 to 1 ft depth intervals, from four locations and selecting one laboratory sample only if positive field screening results were obtained. The plan called for taking the samples at the four quadrants of the building. The laboratory sample was to be selected from the screening samples using the following prioritized biasing scheme: (1) a sample with positive HE spot test kit results; and (2) a sample with above-two-times background radiation readings. In response to an EPA NOD (EPA 1994, 15-16-644), screening samples were collected from 1 to 2 ft depth intervals (as well as the required 0 to 1 ft intervals) to confirm that the soil beneath this concrete floored building had not been disturbed during decommissioning, and one laboratory sample was collected (based on the above scheme) even if all field screening results were negative.

Two deviations were made from the work plan.

- A fifth screening location was selected at the former location of the door, because the door location is a likely place for spills to have occurred or for material to have been swept out of the structures.

- The screening samples were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit. This analysis was performed in addition to the required HE spot test analysis because the D-Tech™ kits can detect specific potential contaminants and provide

lower detection limits (1 ppm or less) than the HE spot test. This screening was used to further characterize the samples in the field for biasing purposes.

The building was accurately surveyed using a Trimble™ GPS Total Station. Aerial photographs were used to determine the building position, and the center of the building was surveyed with an estimated accuracy of 2 ft. Screening sample locations were further determined and surveyed relative to the center point and within the known dimensions of the building.

A total of 10 field screening samples were taken from 5 locations in and adjacent to the building footprint. The samples were collected from 0 to 1 ft and 1 to 2 ft depth intervals. The field screening samples were taken near the corners of the four quadrants of the building and adjacent to the location of the door (Fig. 5.2.4-1). These locations were selected to ensure spatial variability and because the most likely contaminant dispersal mechanism for operations in this building, which had concrete floors, is hypothesized to be via either: (1) HE spills near door areas; or (2) leakage at the floor/wall joints.

All samples were collected with a manually driven hand auger (LANL-ER-SOP-06.10, Hand Auger and Thin-Wall Tube Sampler). The soil samples were screened in the field for HE and beta/gamma radioactivity using the HE spot test kit with modified Griess™ reagents (LANL-ER-SOP-10.06,R0, High Explosive Spot Test) and an Eberline ESP1™ radiological meter with HP-260™ probe (LANL-ER-SOP-10.07, R0, Field Monitoring for Surface and Volume Radioactivity Levels).)The 0 to 1 ft interval samples were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit (EPA SW-846 Methods 4051 and 4050). The 0 to 1 ft intervals were selected for further characterization, rather than the 1 to 2 ft intervals, because the soil beneath the PRS structure is undisturbed, as confirmed by the soil descriptions in the sample collection logs. If contamination is present within the structure footprint, it is most likely present at shallow depths directly beneath the structure. The soil was described and logged on the Sample Collection Log forms (LANL-ER-SOP-01.04, Sample Control and Field Documentation).

All samples screened negative for HE using the HE spot test kit and contained background radioactivity. Three samples screened positive for HE using the D-Tech™ kit (Table 5.2.4-1).

TABLE 5.2.4-1
SUMMARY OF FIELD SCREENING RESULTS

SCREENING SAMPLE NO.	LOCATION ID	DEPTH (FT)	LAB SAMPLE NO.	HE SPOT TEST	RAD SCREEN	D-TECH RDX (MG/KG)	D-TECH TNT (MG/KG)
0316-97-4107 northeast quadrant	16-4107	0 - 1	NA[a]	negative	background	< 0.5	0.5 - 1.5
0316-97-4108 northwest quadrant	16-4108	0 - 1	NA	negative	background	< 0.5	< 0.5
0316-97-4109 southwest quadrant	16-4109	0 - 1	NA	negative	background	< 0.5	0.5 - 1.5
0316-97-4110 southeast quadrant	16-4110	0 - 1	0316-97-0549	negative	background	< 0.5	0.5 - 1.5
0316-97-4201 door	16-4201	0 - 1	NA	negative	background	< 0.5	< 0.5

a. NA = Not analyzed

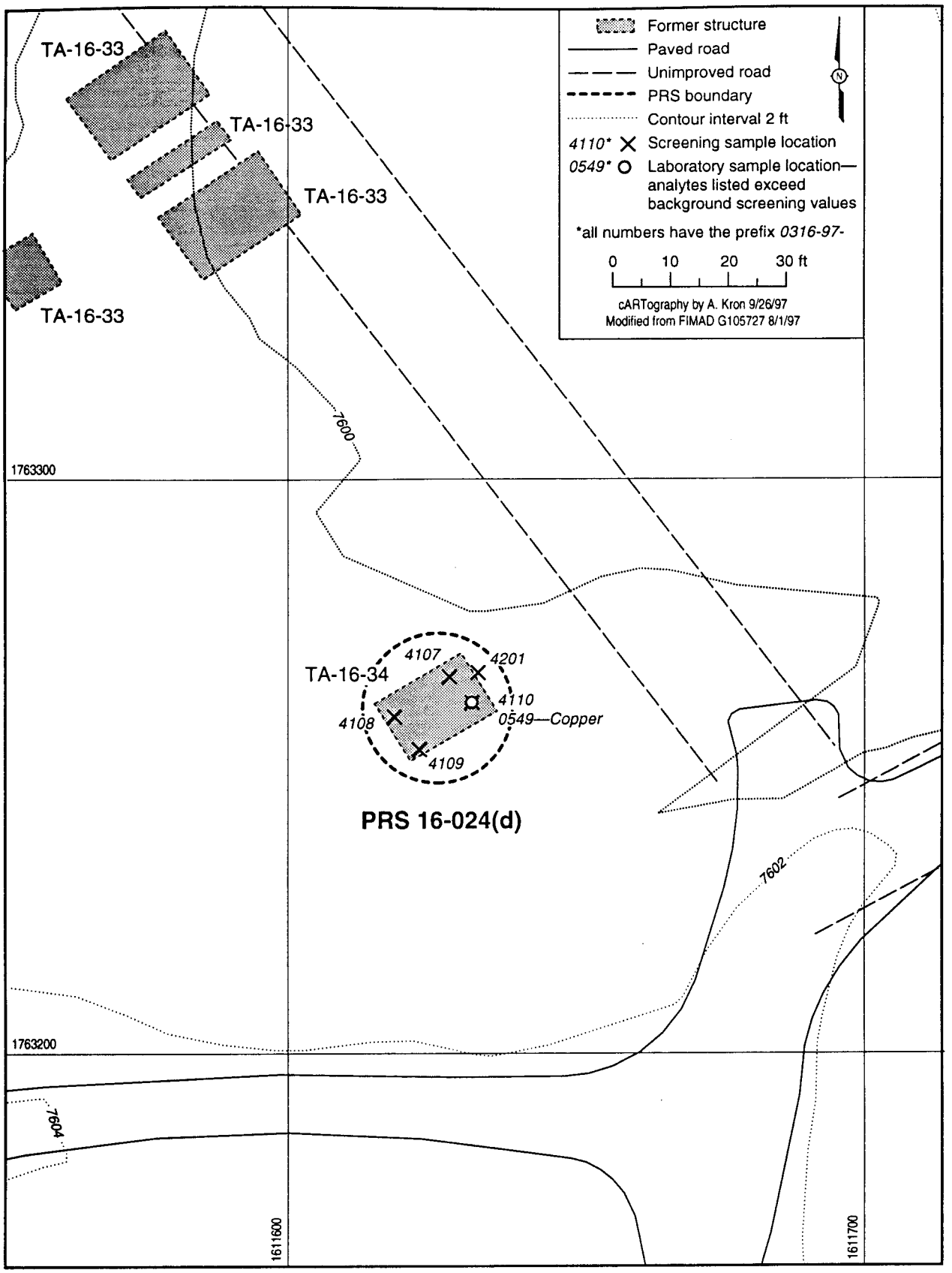

Fig. 5.2.4-1 Locations of PRS 16-024(d) samples.

Screening sample 0316-97-4110 was one of three samples which contained 0.5 to 1.5 mg/kg TNT and it was located in the downgradient (southeast) part of the building footprint. This sample was submitted to the laboratory for analysis (Table 5.2.4-1). The sample was analyzed for metals, SVOCs, and HE (Table 5.2.4-2).

TABLE 5.2.4-2
SUMMARY OF REQUEST NUMBERS FOR LABORATORY SAMPLES FOR PRS 16-024(d)

LOCATION ID	SAMPLE ID	DEPTH (FT)	MATRIX	SVOC	HE	INORGANIC
16-4110	0316-97-0549	0-1	Soil	3441R	3442R	3443R

5.2.5 Evaluation of Inorganic Chemicals

Copper was detected above background UTL (Table 5.2.5-1). The A-qualifier (absent) assigned to this result by baseline validation was removed as described in Section 4.1. Focused validation revealed no problems with the inorganic analyses affecting the use of these inorganic data.

TABLE 5.2.5-1
INORGANIC CHEMICALS WITH CONCENTRATIONS AT OR ABOVE BACKGROUND SCREENING VALUES FOR PRS 16-024(d)

ANALYTE	SAMPLE ID	SAMPLE VALUE (MG/KG)	SAL (MG/KG)	UTL (MG/KG)	MEDIA	DEPTH (FT)
Copper	0316-97-0549	17	2800	15.5	Soil	0-1

5.2.6 Evaluation of Radionuclides

Radionuclides were not analyzed for at PRS 16-024(d) because historical evidence indicated that radioactive material was not stored or used in this HE magazine. Additionally, field screening did not indicate the presence of radioactive constituents.

5.2.7 Evaluation of Organic Chemicals

No HE was detected in sample 0316-97-0549, despite indications of the presence of TNT in the associated field screening sample. The positive D-Tech™ result, which suggested that low levels of TNT were present, was not confirmed by the fixed laboratory analysis. The D-Tech™ kits have been shown to provide false positives due to interferences with humic materials. See Section 4.3.2 for further details.

No semivolatile organic chemicals were detected in sample 0316-97-0549. Baseline validation indicates no data quality problems associated with these analyses that affect these use of the organic data.

5.2.8 Risk-Based Screening Assessment

The only chemical present at PRS 16-024(d) above EQLs and UTLs was copper, at less than 1% of SAL.

5.2.9 Preliminary Human Health Assessment

No human health risk assessment was performed for PRS 16-024(d) because contamination was not detected at or above SALs.

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 PRS will be deferred until the PRS can be assessed as part of the ecological exposure unit methodology currently being developed.

5.2.11 Conclusions and Recommendations

Ten screening samples and one laboratory sample were collected in and adjacent to the footprint of the former HE magazine TA-16-34. The laboratory sample was selected from one of three screening samples that screened positive for HE. It was located in the downgradient (southeast) part of the building footprint. Copper was detected 10% above the background UTL in this sample, but the value was far below the SAL. No HE or organic compounds were detected.

The biased sampling and analysis strategy at this former magazine was designed to ensure that residual contamination would be detected if it were present within the PRS. Screening locations and depths were selected based on the information about the location, orientation, construction, use of the former building, and mode of decommissioning. Because the likelihood of contamination within the building footprint is judged to be low following the removal of the building, and the likelihood of finding contamination is high based on the biased sampling, a single confirmatory laboratory sample is sufficient to indicate whether or not such contamination is present at levels of concern. The laboratory sample was selected from screening samples based on field screening results, and was analyzed for all potential contaminants based on historical knowledge of operations in TA-16-34.

PRS 16-024(d) is recommended for human-health NFA based on NFA Criterion 5 because no hazardous chemicals are present.

5.3 PRS 16-024(f)

This PRS is the site of former HE magazine TA-16-493, located at T-Site (Fig. 5.0-1). It is recommended for human-health NFA because no contaminants were detected above SALs.

5.3.1 History

PRS 16-024(f) is discussed in detail in Subsection 5.24 of the RFI Work Plan for Operable Unit 1082, Addendum 1 (LANL 1994, 1160).

The HE magazine was located northeast of TA-16-490 and constructed in 1945. HE magazines were used to store packaged HE and finished HE products before and after processing. No HE processing was done in such magazines. A former site worker described an incident that occurred in 1950 in which a large chunk of baratol was dropped in the building (Martin and Hickmott 1993, 15-16-500). The magazine had no sumps or plumbing. Before being abandoned in 1959 and burned in 1960, the building was found to be contaminated with HE (Engineering Department 1959, 15-16-256).

The potential contamination at this PRS was identified as metals, SVOCs, and HE.

5.3.2 Description

TA-16-493 was a magazine 6 ft wide x 6 ft long x 7 ft high of wooden-frame construction with a wood floor and with earthen barricades on three sides and the top.

5.3.3 Previous Investigation(s)

No previous field investigations were conducted at this PRS.

5.3.4 Field Investigation

The goal of the Phase I investigation at PRS 16-024(f), as outlined in the approved RFI Work Plan for Operable Unit 1082, Addendum 1 (LANL 1994, 1160), was to determine if contaminants were present in soils at levels of concern. The sampling design is consistent with the current industrial land use scenario of the conceptual model described in Section 4.3 of the RFI work plan. The potential for contamination at this PRS is hypothesized to be via either: (1) leaks and spills from

the past operations; or (2) ash, debris, or contamination left behind after the former building was burned and remnants removed. The potential release mechanisms at this PRS are hypothesized to be via either: (1) infiltration of potential contamination into the near-surface soil; or (2) mechanical movement and mixing of potentially contaminated surface soil during the removal of the former building. There was no historic subsurface construction (or other intrusive activities) at this PRS, and there are no surface water collection points or drainages present that would have spread contamination to the subsurface. Biased sampling was designed to detect residual HE in the surface and near-surface soil at the site of the magazine footprint. The mode of decommissioning of the magazine and the fact that magazines were used for HE storage, but not for HE processing suggest that residual contamination is unlikely at this PRS.

The RFI work plan (LANL 1994, 1160) specified screening soil samples, 0 to 1 ft depth intervals, from five locations and selecting one laboratory sample only if positive field screening results were obtained. The plan called for taking the screening samples at the four quadrants of the building and at the building center. The laboratory sample was to be selected from the screening samples using the following prioritized biasing scheme: (1) a sample with a positive HE spot test kit result; and (2) a sample with above two times background radiation readings. In response to an EPA NOD (EPA 1994, 15-16-644), two laboratory samples were collected (based on the above scheme), even if all field screening results were negative.

Two deviations were made from the work plan.

- A sixth screening location was selected at the former location of the door, because the door location is a likely place for spills to have occurred or for material to have been swept out of the structure.

- The screening samples were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit. This analysis was performed in addition to the required HE spot test analysis because the D-Tech™ kits can detect specific potential contaminants and provide lower detection limits (1 ppm or less) than the HE spot test. This screening was used to further characterize the samples in the field for biasing purposes.

The building was accurately surveyed using a Trimble™ GPS Total Station. Aerial photographs were used to determine the building position, and the center of the building was surveyed with an estimated accuracy of 2 ft. Screening sample locations were further determined and surveyed relative to the center point and within the known dimensions of the building.

A total of six field screening samples were taken from six locations in and adjacent to the building footprint. The samples were collected from the 0 to 1 ft depth interval. The field screening

samples were taken within the four quadrants of the building, the former location of the door, and at the building center (Fig. 5.3.4-1). These locations were selected to ensure spatial variability and because the most likely contaminant dispersal mechanism for operations in this building, which

had wooden floors, is hypothesized to be via either: (1) HE spills near door areas; or (2) leakage from cracks within wooden floors.

All samples were collected with a manually driven hand auger (LANL-ER-SOP-06.10, Hand Auger and Thin-Wall Tube Sampler). The soil samples were screened in the field for HE and beta/gamma radioactivity using the HE spot test kit with modified Griess™ reagents (LANL-ER-SOP-10.06,R0, High Explosive Spot Test) and an Eberline ESP1™ radiological meter with HP-260™ probe (LANL-ER-SOP-10.07, R0, Field Monitoring for Surface and Volume Radioactivity Levels). Samples were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit (EPA SW-846 Methods 4051 and 4050). The soil was described and logged on the Sample Collection Log forms (LANL-ER-SOP-01.04, Sample Control and Field Documentation).

All samples screened negative for HE using the HE spot test kit and contained background radioactivity. Five samples screened positive for HE using the D-Tech™ kit (Table 5.3.4-1).

TABLE 5.3.4-1
SUMMARY OF FIELD SCREENING RESULTS

SCREENING SAMPLE NO.	LOCATION ID	DEPTH (FT)	LAB SAMPLE NO.	HE SPOT TEST	RAD SCREEN	D-TECH RDX (MG/KG)	D-TECH TNT (MG/KG)
0316-97-4162 southwest quadrant	16-4162	0 - 1	0316-97-0564	negative	background	< 0.5	1.5 - 3.0
0316-97-4163 northwest quadrant	16-4163	0 - 1	NA[a]	negative	background	0.5 - 1.5	< 0.5
0316-97-4164 northeast quadrant	16-4164	0 - 1	NA	negative	background	< 0.5	0.5 - 1.5
0316-97-4165 southeast quadrant	16-4165	0 - 1	0316-97-0588	negative	background	< 0.5	0.5 - 1.5
0316-97-4166 center	16-4166	0 - 1	NA	negative	background	< 0.5	< 0.5
0316-97-4197 door	16-4197	0 - 1	NA	negative	background	< 0.5	0.5 - 1.5

a. NA = Not analyzed.

Screening sample 0316-97-4162 contained the highest concentration of HE (1.5 to 3.0 mg/kg TNT). Screening sample 0316-97-4165 was one of four samples with elevated HE (0.5 to 1.5 mg/kg TNT) and was located in the downgradient (southeast) part of the building footprint. These

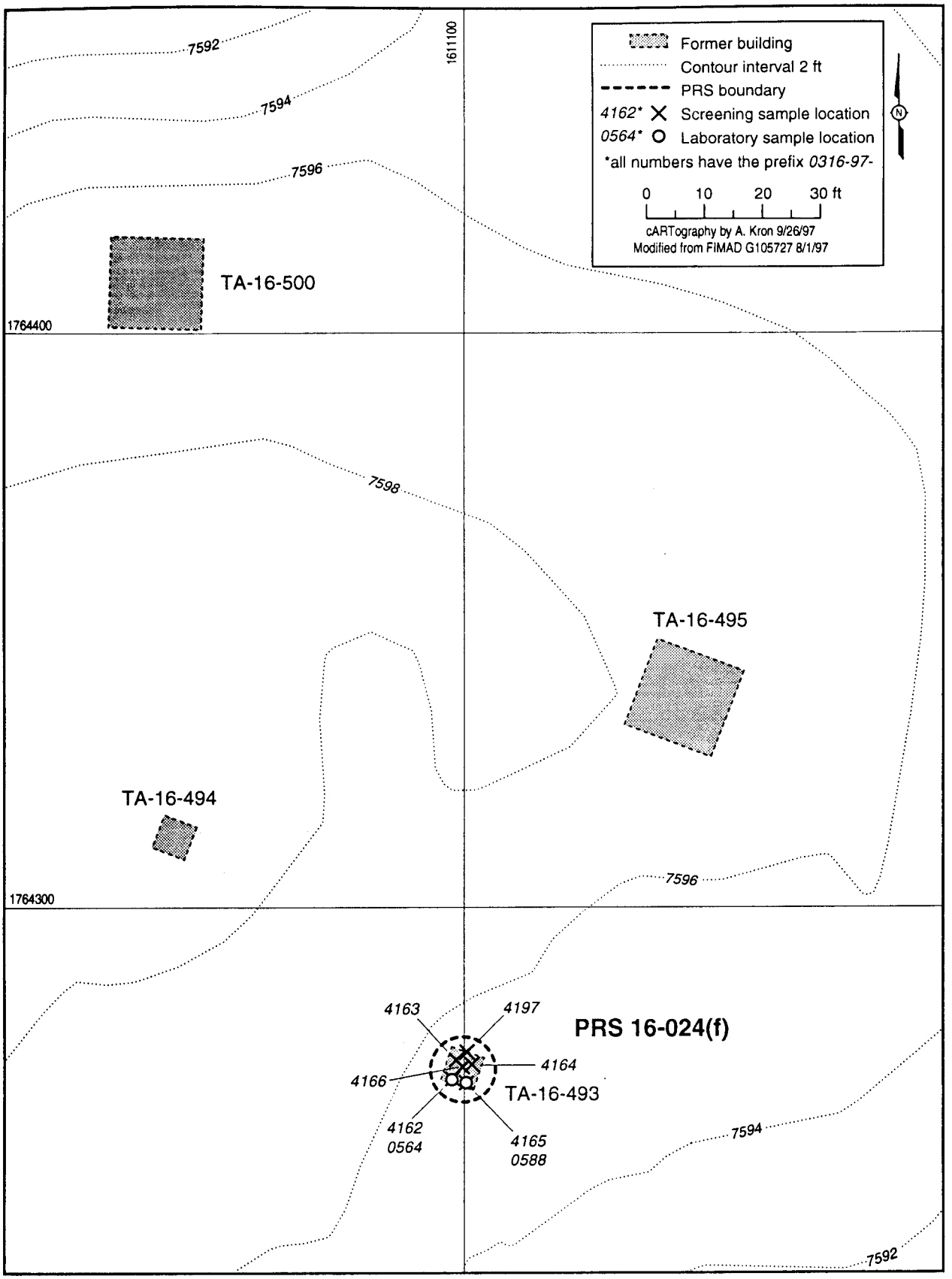

Fig. 5.3.4-1 Locations of PRS 16-024(f) samples.

two samples were submitted to the laboratory for analysis (Table 5.3.4-1). The samples were analyzed for metals, SVOCs, and HE (Table 5.3.4-2).

TABLE 5.3.4-2
SUMMARY OF REQUEST NUMBERS FOR LABORATORY SAMPLES
TAKEN AT PRS 16-024(f)

LOCATION ID	SAMPLE ID	DEPTH (FT)	MATRIX	INORGANICS	SVOCS	HE
16-4162	0316-97-0564	0 - 1	soil	3440R	3438R	3439R
16-4165	0316-97-0588	0 - 1	soil	3440R	3438R	3439R

5.3.5 Evaluation of Inorganic Chemicals

No inorganic chemicals were present at levels greater than background UTLs at PRS 16-024(f). Baseline validation indicated no problems that affect the use of these inorganic data.

5.3.6 Evaluation of Radionuclides

Radionuclides were not analyzed for at PRS 16-024(f) because historical evidence indicated that radioactive material was not stored or used in this HE magazine. Additionally, field screening did not indicate the presence of radioactive constituents.

5.3.7 Evaluation of Organic Chemicals

No HE was detected in sample 0316-97-0564 and 0316-97-0588, despite indications of the presence of TNT in the associated field screening samples. The positive D-Tech™ results, which suggested that low levels of TNT were present, were not confirmed by the fixed laboratory analysis. The D-Tech™ kits have been shown to provide false positives due to interferences with humic materials. See Section 4.3.2 for further details.

No semivolatile organic chemicals were detected in sample 0316-97-0564 and 0316-97-0588. Baseline validation indicates no data quality problems associated with these analyses that affect the use of these organic data.

5.3.8 Risk-Based Screening Assessment

No screening assessment was performed because no chemicals were present at or above UTLs or EQLs at PRS 16-024(f).

5.3.9 Preliminary Human Health Assessment

No human health risk assessment was performed for PRS 16-024(f) because contamination was not detected at or above SALs.

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 PRS will be deferred until the PRS can be assessed as part of the ecological exposure unit methodology currently being developed.

5.3.11 Conclusions and Recommendations

Six screening samples and two laboratory samples were collected in and adjacent to the former HE magazine TA-16-493. The laboratory samples were selected from five screening samples that screened positive for HE, including one reported in the 1.5 to 3 ppm range. No organic or inorganic compounds were detected in the laboratory samples.

The biased sampling and analysis strategy at this former magazine was designed to ensure that residual contamination would be detected if it were present within the PRS. Screening locations and depths were selected based on information about the location, orientation, construction, use of the former building, and mode of decommissioning. Because the likelihood of contamination within the building footprint is judged to be low following the removal of the building, and the likelihood of finding contamination is high based on the biased sampling, two confirmatory laboratory samples are sufficient to indicate whether or not such contamination is present at levels of concern. The laboratory samples were selected from screening samples based on field screening results, and were analyzed for all potential contaminants based on historical knowledge of operations in TA-16-493.

PRS 16-024(f) is recommended for human-health NFA based on NFA Criterion 5 because contamination is not present at this site at levels that present a potential risk to human health.

5.4 PRS 16-024(g)

This PRS is the site of former HE magazine TA-16-494, in the T-Site area (Fig. 5.0-1). It is recommended for human-health NFA because no contaminants were detected above SALs.

5.4.1 History

PRS 16-024(g) is discussed in detail in Subsection 5.24 of the RFI Work Plan for Operable Unit 1082, Addendum 1 (LANL 1994, 1160).

The HE magazine was located northeast of TA-16-490 and constructed in 1945. HE magazines were used to store packaged and finished HE products before and after processing. No HE processing was done in such magazines. The magazine had no sumps or plumbing. Before being abandoned in 1959 and burned in 1960, the building was found to be contaminated with HE (Engineering Department 1959, 15-16-256).

The potential contamination at this PRS was identified as metals, SVOCs, and HE.

5.4.2 Description

TA-16-494 was a magazine 6 ft wide x 6 ft long x 7 ft high of wooden-frame construction with a wooden floor and earthen barricades on three sides and the top.

5.4.3 Previous Investigation(s)

No previous field investigations were conducted at this PRS.

5.4.4 Field Investigation

The goal of the Phase I investigation at PRS 16-024(g), as outlined in the approved RFI Work Plan for Operable Unit 1082, Addendum 1 (LANL 1994, 1160), was to determine if contaminants were present in soils at levels of concern. The sampling design is consistent with the current industrial land use scenario of the conceptual model described in Section 4.3 of the RFI work plan. The potential for contamination at this PRS is hypothesized to be via either: (1) leaks and spills from the past operations; or (2) ash, debris, or contamination left behind after the former building was burned and remnants removed. The potential release mechanisms at this PRS are hypothesized to be via either: (1) infiltration of potential contamination into the near-surface soil; or (2) mechanical movement and mixing of potentially contaminated surface soil during the removal of the former building. There was no historic subsurface construction (or other intrusive activities) at this PRS, and there are no surface water collection points or drainages present that would have spread contamination to the subsurface. Biased sampling was designed to detect residual HE in the surface and near-surface soil at the site of the magazine footprint. The mode of decommissioning of the magazine and the fact that magazines were used for HE storage, but not for HE processing suggest that residual contamination is unlikely at this PRS.

Addendum 1 (LANL 1994, 1160) specified screening soil samples, 0 to 1 ft depth intervals, from five locations and selecting one laboratory sample only if positive field screening results were obtained. The plan called for taking the screening samples at the four quadrants of the building and at the building center. The laboratory sample was to be selected from the screening samples using the following prioritized biasing scheme: (1) a sample with a positive HE spot test kit result; and (2) a sample with above two times background radiation readings. In response to an EPA NOD (EPA 1994, 15-16-644), two laboratory samples were collected (based on the above scheme), even if all field screening results were negative.

Two deviations were made to the approved work plan.

- A sixth screening location was selected at the former location of the door because the door location is a likely place for spills to have occurred or for material to have been swept out of the structures.

- The screening samples were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit. This analysis was performed in addition to the required HE spot test analysis because the D-Tech™ kits can detect specific potential contaminants and provide lower detection limits (1 ppm or less) than the HE spot test. This screening was used to further characterize the samples in the field for biasing purposes.

The building was accurately surveyed using a Trimble™ GPS Total Station. Aerial photographs were used to determine the building position, and the center of the building was surveyed with an estimated accuracy of 2 ft. Screening sample locations were further determined and surveyed relative to the center point and within the known dimensions of the building.

A total of 6 field screening samples were taken from 6 locations in and adjacent to the building footprint. The samples were collected from the 0 to 1 ft depth interval. The field screening samples were taken within the four quadrants of the building, the former location of the door, and at the building center (Fig. 5.4.4-1). These locations were selected to ensure spatial variability and because the most likely contaminant dispersal mechanism for operations in this building, which had wooden floors, is hypothesized to be via either: (1) HE spills near door areas; or (2) leakage from cracks within wooden floors.

All samples were collected with a manually driven hand auger (LANL-ER-SOP-06.10, Hand Auger and Thin-Wall Tube Sampler). The soil samples were screened in the field for HE and beta/gamma radioactivity using the HE spot test kit with modified Griess™ reagents (LANL-ER-SOP-10.06,R0, High Explosive Spot Test) and an Eberline ESP1™ radiological meter with HP-260™ probe

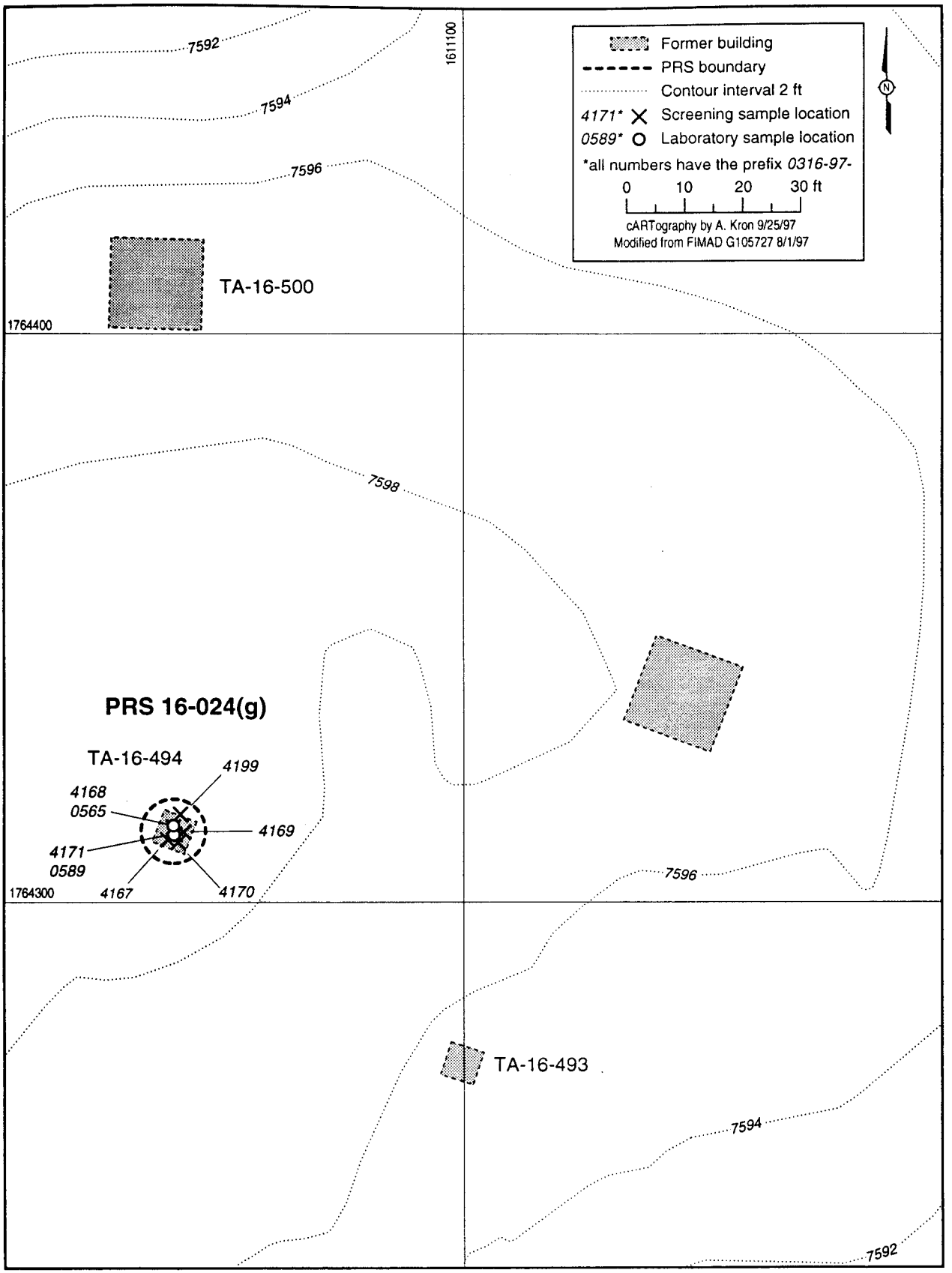

Fig. 5.4.4-1 Locations of PRS 16-024(g) samples.

(LANL-ER-SOP-10.07, R0, Field Monitoring for Surface and Volume Radioactivity Levels). Samples were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit (EPA SW-846 Methods 4051 and 4050). The soil was described and logged on the Sample Collection Log forms (LANL-ER-SOP-01.04, Sample Control and Field Documentation).

All samples screened negative for HE using the HE spot test kit and contained background radioactivity. One sample screened positive for HE using the D-Tech™ kit (Table 5.4.4-1).

TABLE 5.4.4-1
SUMMARY OF FIELD SCREENING RESULTS

SCREENING SAMPLE NO.	LOCATION ID	DEPTH (FT)	LAB SAMPLE NO.	HE SPOT TEST	RAD SCREEN	D-TECH RDX (MG/KG)	D-TECH TNT (MG/KG)
0316-97-4167 southwest quadrant	16-4167	0 - 1	NA[a]	negative	background	< 0.5	< 0.5
0316-97-4168 northwest quadrant	16-4168	0 - 1	0316-97-0565	negative	background	< 0.5	< 0.5
0316-97-4169 northeast quadrant	16-4169	0 - 1	NA	negative	background	< 0.5	< 0.5
0316-97-4170 southeast quadrant	16-4170	0 - 1	NA	negative	background	< 0.5	< 0.5
0316-97-4171 center	16-4171	0 - 1	0316-97-0589	negative	background	0.5 - 1.5	< 0.5
0316-97-4199 door	16-4199	0 - 1	NA	negative	background	< 0.5	< 0.5

a. NA = Not analyzed.

Screening sample 0316-97-4171 contained the highest concentration of HE (0.5 to 1.5 mg/kg RDX) and was the center location. This sample was submitted to the laboratory for analysis. In the absence of other positive screening results, screening sample 0316-97-4168 was selected randomly and submitted to the laboratory for analysis. The random sample was selected by using a random-number generator to select a number one through four. These numbers corresponded with the northeast, northwest, southeast, and southwest quadrants. The northwest quadrant sample was selected (Table 5.4.4-1). The sample was analyzed for metals, SVOCs, and HE (Table 5.4.4-2).

TABLE 5.4.4-2
SUMMARY OF REQUEST NUMBERS FOR LABORATORY SAMPLES TAKEN AT PRS 16-024(g)

LOCATION ID	SAMPLE ID	DEPTH (FT)	MATRIX	INORGANICS	SVOCS	HE
16-4168	0316-97-0565	0 - 1	soil	3440R	3438R	3439R
116-4171	0316-97-0589	0 - 1	soil	3440R	3438R	3439R

5.4.5 Evaluation of Inorganic Chemicals

No inorganic chemicals were present at levels greater than background UTLs at PRS 16-024(g). Baseline validation indicated no problems that affect the use of these inorganic data.

5.4.6 Evaluation of Radionuclides

Radionuclides were not analyzed for at PRS 16-024(g) because historical evidence indicated that radioactive material was not stored or used in this HE magazine. Additionally, field screening did not indicate the presence of radioactive constituents.

5.4.7 Evaluation of Organic Chemicals

No HE was detected in sample 0316-97-0589, despite indications of the presence of RDX in the associated field screening sample. The positive D-Tech™ result, which suggested that low levels of RDX were present, was not confirmed by the fixed laboratory analysis. The D-Tech™ kits have been shown to provide false positives due to interferences with humic materials. See Section 4.3.2 for further details.

No semivolatile organic chemicals were detected in sample 0316-97-0589 or 0316-97-0565. Baseline validation indicates no data quality problems associated with these analyses that affect the use of these organic data.

5.4.8 Risk-Based Screening Assessment

No screening assessment was performed because no chemicals were present at or above UTLs or EQLs at PRS 16-024(g).

5.4.9 Preliminary Human Health Assessment

No human health risk assessment was performed for PRS 16-024(g) because contamination was not detected at or above SALs.

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 PRS will be deferred until the PRS can be assessed as part of the ecological exposure unit methodology currently being developed.

5.4.11 Conclusions and Recommendations

Six screening samples and two laboratory samples were collected in and adjacent to the footprint of the former HE magazine TA-16-494. One laboratory sample was selected from the only screening sample with a positive HE screening result and the other was selected randomly. The samples contained no inorganic or organic contamination above detection limits.

The biased sampling and analysis strategy at this former magazine was designed to ensure that residual contamination would be detected if it were present within the PRS. Screening locations and depths were selected based on information about the location, orientation, construction, use of the former building, and mode of decommissioning. Because the likelihood of contamination within the building footprint is judged to be low following the removal of the building, and the likelihood of finding contamination is high based on the biased sampling, two confirmatory laboratory samples are sufficient to indicate whether or not such contamination is present at levels of concern. The laboratory samples were selected from screening samples based on field screening results, and were analyzed for all potential contaminants based on historical knowledge of operations in TA-16-494.

PRS 16-024(g) is recommended for human-health NFA based on NFA Criterion 5 because contamination is not present at this site at levels that present a potential risk to human health.

5.5 PRS 16-024(k)

This PRS is the site of the former HE magazine TA-16-57, located in the western portion of the GMX-2 area (Fig. 5.0-1). It is recommended for human-health NFA because no contaminants were detected above SALs.

5.5.1 History

PRS 16-024(k) is discussed in detail in Subsection 5.20 of the RFI Work Plan for Operable Unit 1082, Addendum 1 (LANL 1994, 1160).

Little information is known regarding this HE magazine, however, a former site worker suggested that TA-16-57 was not extensively utilized (Martin 1993, 15-16-477). HE magazines were used to store packaged and finished HE products before and after processing. No HE processing was done in such magazines. The magazine had no sumps or plumbing. TA-16-57 was built in May 1946, and was abandoned in 1959. Before being burned in 1960, it was determined that the magazine was contaminated with HE (Engineering Department 1959, 15-16-256).

The potential contamination at this PRS was identified as metals, SVOCs, and HE.

5.5.2 Description

TA-16-57 was a magazine 6 ft long x 6 ft wide x 7 ft high of wooden-frame construction with a wood floor and with earthen barricades on three sides and on top. It was located on flat terrain south of TA-16-38.

5.5.3 Previous Investigation(s)

No previous investigations were conducted at this PRS.

5.5.4 Field Investigation

The goal of the Phase I investigation at PRS 16-024(k), as outlined in the approved RFI Work Plan for Operable Unit 1082, Addendum 1 (LANL 1994, 1160), was to determine if contaminants were present in soils at levels of concern. The sampling design is consistent with the current industrial land use scenario of the conceptual model described in Section 4.3 of the RFI work plan. The potential for contamination at this PRS is hypothesized to be via either: (1) leaks and spills from the past operations; or (2) ash, debris, or contamination left behind after the former building was burned and remnants removed. The potential release mechanisms at this PRS are hypothesized to be via either: (1) infiltration of potential contamination into the near-surface soil; or (2) mechanical movement and mixing of potentially contaminated surface soil during the removal of the former building. There was no historic subsurface construction (or other intrusive activities) at this PRS, and there are no surface water collection points or drainages present that would have spread contamination to the subsurface. Biased sampling was designed to detect residual HE in the surface and near-surface soil at the site of the magazine footprint. The mode of decommissioning of the magazine and the fact that magazines were used for HE storage, but not for HE processing, suggest that residual contamination is unlikely at this PRS.

Addendum 1 (LANL 1994, 1160) specified screening soil samples, 0 to 1 ft depth intervals, from four locations and selecting one laboratory sample only if positive field screening results were obtained. The plan called for taking the screening samples within two of the four quadrants of the building, on the side of the footprint opposite the door, and one foot downgradient from the location of the door. The laboratory sample was to be selected from the screening samples using the following prioritized biasing scheme: (1) a sample with a positive HE spot test kit result; and (2) a sample with above two times background radiation readings. In response to an EPA NOD (EPA 1994, 15-16-644), one laboratory sample was collected(based on the above scheme), even if all field screening results were negative.

One deviation was made to the approved work plan. The screening samples were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit. This analysis was performed in addition to the required HE spot test analysis because the D-Tech™ kits can detect specific potential contaminants and provide lower detection limits (1 ppm or less) than the HE spot test. This screening was used to further characterize the samples in the field for biasing purposes.

The building was accurately surveyed using a Trimble™ GPS Total Station. Aerial photographs were used to determine the building position, and the center of the building was surveyed with an estimated accuracy of 2 ft. Screening sample locations were further determined and surveyed relative to the center point and within the known dimensions of the building.

A total of 4 field screening samples were taken from 4 locations in and adjacent to the building footprint. The samples were collected from the 0 to 1 ft depth interval. The field screening samples were taken within two of the four quadrants of the building, on the side of the footprint opposite the door, and one foot downgradient from the location of the door (Fig. 5.5.4-1). These locations were selected to ensure spatial variability and because the most likely contaminant dispersal mechanism for operations in this building, which had wooden floors, is hypothesized to be via either: (1) HE spills near door areas; or (2) leakage from cracks within wooden floors.

All samples were collected with a manually driven hand auger (LANL-ER-SOP-06.10, Hand Auger and Thin-Wall Tube Sampler). The soil samples were screened in the field for HE and beta/gamma radioactivity using the HE spot test kit with modified Griess™ reagents (LANL-ER-SOP-10.06,R0, High Explosive Spot Test) and an Eberline ESP1™ radiological meter with HP-260™ probe (LANL-ER-SOP-10.07, R0, Field Monitoring for Surface and Volume Radioactivity Levels). Samples were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit (EPA SW-846 Methods 4051 and 4050). The soil was described and logged on the Sample Collection Log forms (LANL-ER-SOP-01.04, Sample Control and Field Documentation).

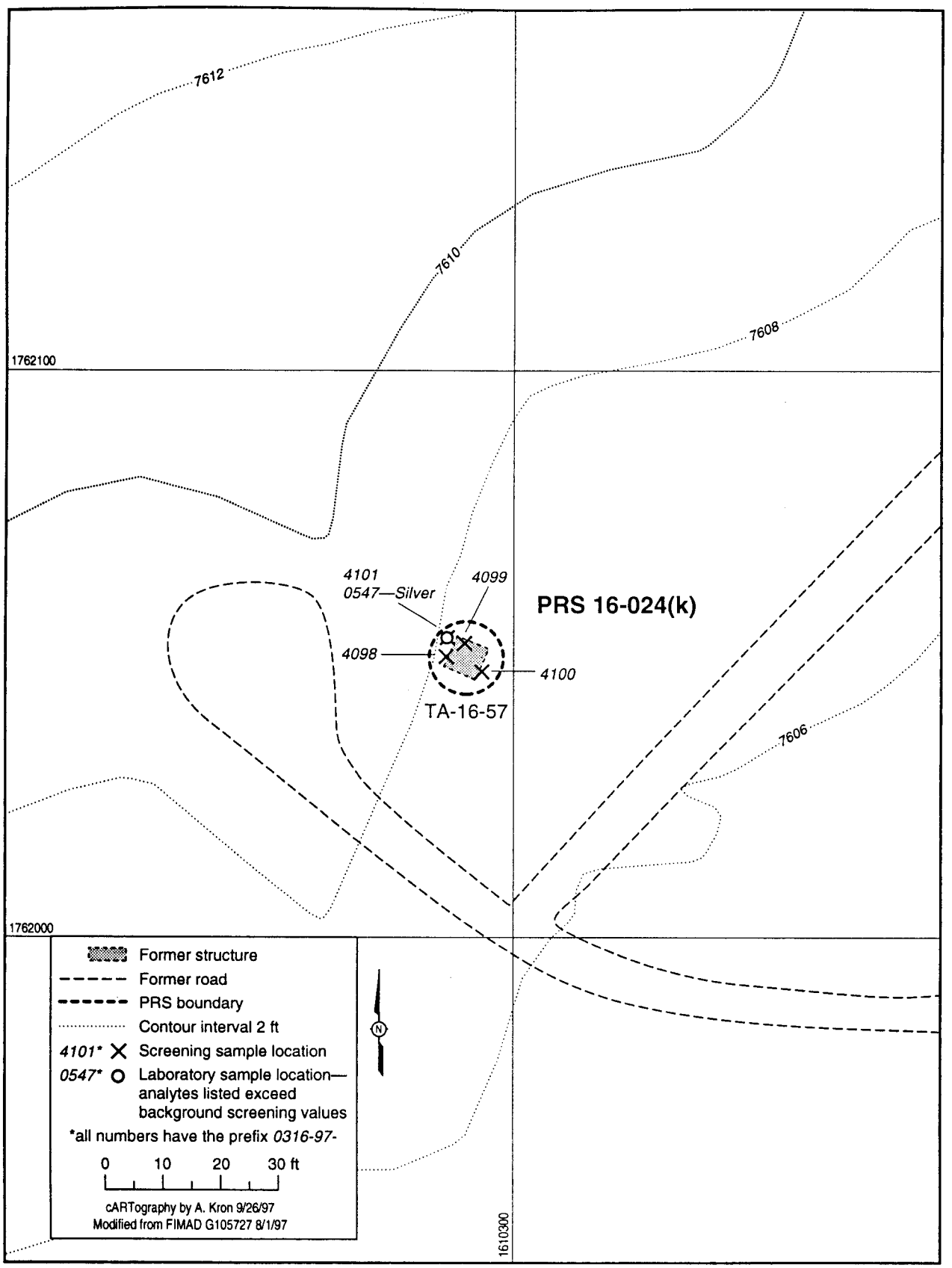

Fig. 5.5.4-1 Locations of PRS 16-024(k) samples.

All samples screened negative for HE using the HE spot test kit and contained background radioactivity. No samples screened positive for HE using the D-Tech™ kit (Table 5.5.4-1).

TABLE 5.5.4-1
SUMMARY OF FIELD SCREENING RESULTS

SCREENING SAMPLE NO.	LOCATION ID	DEPTH (FT)	LAB SAMPLE NO.	HE SPOT TEST	RAD SCREEN	D-TECH RDX (MG/KG)	D-TECH TNT (MG/KG)
0316-97-4098 southwest quadrant	16-4098	0 - 1	NA[a]	negative	background	< 0.5	< 0.5
0316-97-4099 door	16-4099	0 - 1	NA	negative	background	< 0.5	< 0.5
0316-97-4100 southeast quadrant	16-4100	0 - 1	NA	negative	background	< 0.5	< 0.5
0316-97-4101 downgradient door	16-4101	0 - 1	0316-97-0547	negative	background	< 0.5	< 0.5

a. NA = Not analyzed.

All of the samples were non-detects for HE. Screening sample 0316-97-4101 was located one foot downgradient from the door and was submitted to the laboratory for analysis (Table 5.5.4-1). The sample was analyzed for metals, SVOCs, and HE (Table 5.5.4-2).

TABLE 5.5.4-2
SUMMARY OF REQUEST NUMBERS FOR LABORATORY SAMPLES FOR PRS 16-024(k)

LOCATION ID	SAMPLE ID	DEPTH (FT)	MATRIX	INORGANICS	SVOCS	HE
16-4101	0316-97-0547	0 - 1	soil	3419R	3417R	3418R

5.5.5 Evaluation of Inorganic Chemicals

Silver was reported at 0.59 mg/kg (below the EQL for silver). This result was originally reported as P-qualified. After inspection of the data it was qualified as estimated (J) because the duplicate analysis in this run was not within control limits, indicating possibly low precision; see Section 4.2 for discussion. Antimony was reported as estimated undetected (UJ) at 6.7 mg/kg because the spike recovery was low (52%). This result is accepted as undetected as discussed in Section 4.1.

The qualifiers shown in Table 5.5.5-1 have been assigned during baseline and focused data validation. The data are usable for site-specific decisions, as discussed in Section 4.1. Baseline validation revealed no other problems with the analyses that affect the use of these inorganic data.

TABLE 5.5.5-1
INORGANIC CHEMICALS WITH CONCENTRATIONS AT OR ABOVE BACKGROUND SCREENING VALUES FOR PRS 16-024(k)

ANALYTE	SAMPLE ID	SAMPLE VALUE (MG/KG)	SAL (MG/KG)	UTL MG/KG)	MEDIA	DEPTH (FT)
Antimony	0316-97-0547	6.7 (UJ)[b]	31	1	Soil	0-1
Silver	0316-97-0547	0.59(J)[c]	380	NC[a]	Soil	0-1

a. NC = not calculated
b. UJ = Analyte was not detected; the associated value is an estimate of the detection limit or quantitation limit.
c. J = Analyte was positively identified, but the result is estimated to be more uncertain than would normally be expected for that analysis.

5.5.6 Evaluation of Radionuclides

Radionuclides were not analyzed for at PRS 16-024(k) because historical evidence indicated that radioactive material was not stored or used in this HE magazine. Additionally, field screening did not indicate the presence of radioactive constituents.

5.5.7 Evaluation of Organic Chemicals

No organic chemicals were present at levels greater than detection limits in sample 0316-97-0547. Baseline validation indicated no problems that affect the use of these organic data.

5.5.8 Risk-Based Screening Assessment

Silver was reported at less than 0.5% of its SAL. Antimony was reported as undetected and is within the background concentrations for establishing an observed release as discussed in Section 4.1. No other chemicals were detected above EQLs or UTLs.

5.5.9 Preliminary Human Health Assessment

No human health risk assessment was performed for PRS 16-024(k) because inorganic and organic chemicals were below SALs.

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 this PRS will be deferred until the PRS can be assessed as part of the ecological exposure unit methodology currently being developed.

5.5.11 Conclusions and Recommendations

Four screening samples and one laboratory sample were collected in and downgradient from the footprint of former HE magazine TA-16-57. All screening results were negative, so the laboratory sample was selected from the location downgradient from the door of the former bunker. Only silver was reported as estimated in this sample, at less than 1 mg/kg. No other inorganic chemicals were detected. No HE or other organic compounds were detected. The data show that no contaminants are present at this site at levels of concern to human health.

The biased sampling and analysis strategy at this former magazine was designed to ensure that residual contamination would be detected if it were present within the PRS. Screening locations and depths were selected based on information about the location, orientation, construction, use, and mode of decommissioning of the former building. Because the likelihood of contamination within the building footprint is judged to be low following the removal of the building, and the likelihood of finding contamination is high based on the biased sampling, a single confirmatory laboratory sample is sufficient to indicate whether or not such contamination is present at levels of concern. The laboratory sample was selected at the location of the door to the former HE magazine, because this would have been the area of greatest activity. It was analyzed for all potential contaminants based on historical knowledge of operations in TA-16-57.

PRS 16-024(k) is recommended for human-health NFA based on NFA Criterion 5 because contamination is not present at this site at levels that present a potential risk to human health.

5.6 PRS 16-024(m)

This PRS is the site of former HE magazine TA-16-66, located in the northeast portion of the GMX-2 area (Fig. 5.0-1). It is recommended for human-health NFA because no contaminants were detected above SALs.

5.6.1 History

PRS 16-024(m) is discussed in detail in Subsection 5.20 of the RFI Work Plan for Operable Unit 1082, Addendum 1 (LANL 1994, 1160).

TA-16-66 was an HE magazine. HE magazines were used to store packaged HE and finished HE products before and after processing. No HE processing was done in such magazines. Little is known about this specific HE magazine, however, operations in magazines may have resulted in small spills of HE (Martin 1993, 15-16-477). The building had no sumps or plumbing. The

magazine was constructed in the mid 1940's, and abandoned in 1959. Before being burned in 1960, it was determined that the magazine was contaminated with HE (Engineering Department 1959, 15-16-256).

The potential contamination at this PRS was identified as metals, SVOCs, and HE.

5.6.2 Description

TA-16-66 was a 6 ft long x 6 ft wide x 7 ft high wooden-frame building with a wooden floor and with earthen barricades on three sides and on top. It was located on flat terrain northeast of TA-16-37.

5.6.3 Previous Investigation(s)

No previous investigations were conducted at this PRS.

5.6.4 Field Investigation

The goal of the Phase I investigation at PRS 16-024(m), as outlined in the approved RFI Work Plan for Operable Unit 1082, Addendum 1 (LANL 1994, 1160), was to determine if contaminants were present in soils at levels of concern. The sampling design is consistent with the current industrial land use scenario of the conceptual model described in Section 4.3 of the RFI work plan. The potential for contamination at this PRS is hypothesized to be via either: (1) leaks and spills from the past operations; or (2) ash, debris, or contamination left behind after the former building was burned and remnants removed. The potential release mechanisms at this PRS are hypothesized to be via either: (1) infiltration of potential contamination into the near-surface soil; or (2) mechanical movement and mixing of potentially contaminated surface soil during the removal of the former building. There was no historic subsurface construction (or other intrusive activities) at this PRS, and there are no surface water collection points or drainages present that would have spread contamination to the subsurface. Biased sampling was designed to detect residual HE and other constituents in the surface and near-surface soil at the site of the former magazine. The mode of decommissioning of the magazine and the fact that magazines were used for HE storage, but not for HE processing suggest that residual contamination is unlikely at this PRS.

Addendum 1 (LANL 1994, 1160) specified screening soil samples, 0 to 1 ft depth intervals, from four locations and selecting one laboratory sample only if positive field screening results were obtained. The plan called for taking the screening samples within two of the four quadrants of the building, on the side of the footprint opposite the door, and one foot downgradient from the location of the door. The laboratory sample was to be selected from the screening samples using

the following prioritized biasing scheme: (1) a sample with a positive HE spot test kit result; and (2) a sample with above two times background radiation readings. In response to an EPA NOD (EPA 1994, 15-16-644), one laboratory sample was to be collected (based on the above scheme), even if all field screening results were negative.

One deviation was made to the approved work plan. The screening samples were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit. This analysis was performed in addition to the required HE spot test analysis because the D-Tech™ kits can detect specific potential contaminants and provide lower detection limits (1 ppm or less) than the HE spot test. This screening was used to further characterize the samples in the field for biasing purposes.

The location of the former building was accurately surveyed using a Trimble™ GPS Total Station. Aerial photographs were used to determine the building position, and the center of the building was surveyed with an estimated accuracy of 2 ft. Screening sample locations were further determined and surveyed relative to the center point and within the known dimensions of the building.

A total of 4 field screening samples were taken from 4 locations in and adjacent to the building footprint. The samples were collected from the 0 to 1 ft depth interval. The field screening samples were taken within two of the four quadrants of the building, on the side of the footprint opposite the door, and one foot downgradient from the location of the door (Fig. 5.6.4-1). These locations were selected to ensure spatial variability and because the most likely contaminant dispersal mechanism for operations in this building, which had wooden floors, is hypothesized to be via either: (1) HE spills near door areas; or (2) leakage from cracks within wooden floors.

All samples were collected with a manually driven hand auger (LANL-ER-SOP-06.10, Hand Auger and Thin-Wall Tube Sampler). The soil samples were screened in the field for HE and beta/gamma radioactivity using the HE spot test kit with modified Griess™ reagents (LANL-ER-SOP-10.06,R0, High Explosive Spot Test) and an Eberline ESP1™ radiological meter with HP-260™ probe (LANL-ER-SOP-10.07, R0, Field Monitoring for Surface and Volume Radioactivity Levels). The samples were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit (EPA SW-846 Methods 4051 and 4050). The soil was described and logged on the Sample Collection Log forms (LANL-ER-SOP-01.04, Sample Control and Field Documentation).

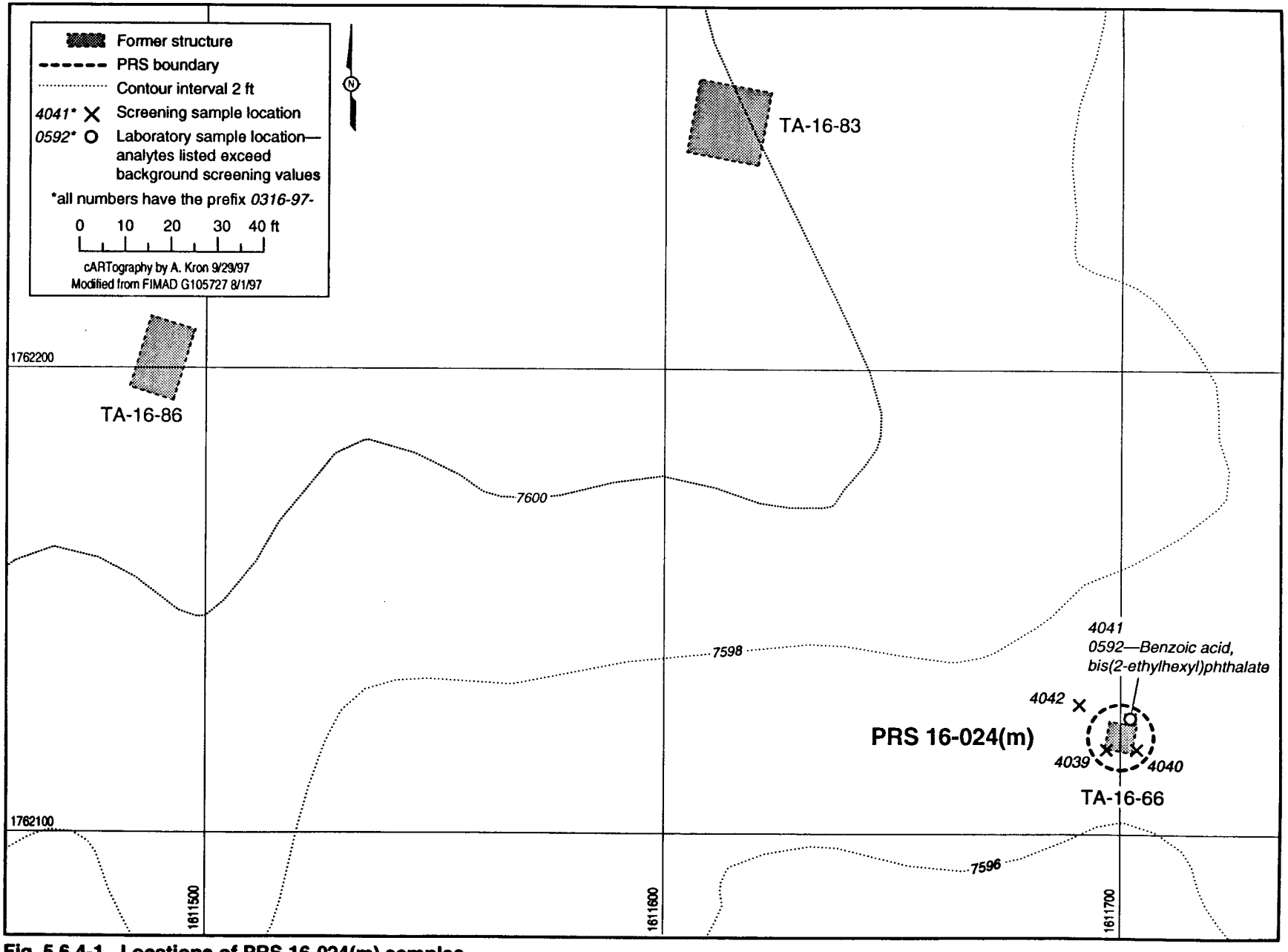

Fig. 5.6.4-1 Locations of PRS 16-024(m) samples.

All samples screened negative for HE using the HE spot test kit and contained background levels of radioactivity. One sample screened positive for HE using the D-Tech™ kit (Table 5.6.4-1).

TABLE 5.6.4-1
SUMMARY OF FIELD SCREENING RESULTS AT 0 TO 1 FT DEPTHS

SCREENING SAMPLE NO.	LOCATION ID	DEPTH (FT)	LAB SAMPLE NO.	HE SPOT TEST	RAD SCREEN	D-TECH RDX (MG/KG)	D-TECH TNT (MG/KG)
0316-97-4039 southwest quadrant	16-4039	0 - 1	NA[a]	negative	background	< 0.5	< 0.5
0316-97-4040 southeast quadrant	16-4040	0 - 1	NA	negative	background	< 0.5	< 0.5
0316-97-4041 door	16-4041	0 - 1	0316-97-0529	negative	background	0.5 - 1.5	< 0.5
0316-97-4042 downgradient door	16-4042	0 - 1	NA	negative	background	< 0.5	< 0.5

a. NA = Not analyzed.

Screening sample 0316-97-4041 contained the highest concentration of HE (0.5 to 1.5 mg/kg RDX). This sample was submitted to the laboratory for analysis (Table 5.6.4-1). The sample was analyzed for inorganic chemicals, SVOCs, and HE (Table 5.6.4-2).

TABLE 5.6.4-2
SUMMARY OF REQUEST NUMBERS FOR LABORATORY SAMPLES TAKEN AT PRS 16-024(m)

LOCATION ID	SAMPLE ID	DEPTH (FT)	MEDIA	INORGANICS	SVOCS	HE
16-4041	0316-97-0529	0 - 1	soil	3352R	3351R	3353R

5.6.5 Evaluation of Inorganic Chemicals

No inorganic constituents were detected above background in sample 0316-97-0529. Baseline validation indicated no problems that affect the use of these inorganic data.

5.6.6 Evaluation of Radionuclides

Radionuclides were not analyzed for at PRS 16-024(m) because historical evidence indicated that radioactive material was not stored or used in this HE magazine. Additionally, field screening did not indicate the presence of radioactive constituents.

5.6.7 Evaluation of Organic Chemicals

No HE was detected in sample 0316-97-0529, despite indications of the presence of RDX in the associated field screening sample. The positive D-Tech™ result, which suggested that low levels of RDX were present, was not confirmed by the fixed laboratory analysis. The D-Tech™ kits have been shown to provide false positives due to interferences with humic materials. See Section 4.3.2 for further details.

Trace amounts of two organic chemicals were present above instrument detection levels but below EQLs. These estimated levels were far below SALs and do not present a hazard at this site (Table 5.6.7-1). The J-qualifiers, assigned by the laboratory and unchanged by baseline data validation, indicate that the reported data are above the instrument detection level but below the EQL. Baseline validation revealed no problems with the organic analyses that affect the use of these organic data.

TABLE 5.6.7-1
DETECTED ORGANIC CHEMICALS FOR PRS 16-024(m)

ANALYTE	SAMPLE ID	SAMPLE VALUE (MG/KG)	SAL (MG/KG)	MEDIA	DEPTH (FT)
Benzoic Acid	0316-97-0529	0.095(J[a])	100000	Soil	0-1
Bis(2-ethylhexyl)phthalate	0316-97-0529	0.038(J)	32	Soil	0-1

a. J = Analyte was positively identified, but the result is estimated to be more uncertain than would normally be expected for that analysis.

5.6.8 Risk-Based Screening Assessment

Bis(2-ethylhexyl)phthalate, a plasticizer commonly found at low levels in environmental samples, was reported at less than 0.5% of its SAL. Benzoic acid was detected at less than one-millionth of its SAL. No other chemicals were detected above EQLs and UTLs.

5.6.9 Preliminary Human Health Assessment

No human health risk assessment was performed for PRS 16-024(m) because contamination was not detected at levels at or above SALs. Visual inspection of the data indicate that an MCE would yield a value far below the target level of 1.

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 PRS will be deferred until the PRS can be assessed as part of the ecological exposure unit methodology currently being developed.

5.6.11 Conclusions and Recommendations

Four screening samples and one laboratory sample were collected in and downgradient from the footprint of former HE magazine TA-16-66. The laboratory sample was selected from a screening sample with a positive HE result. No HE was detected in the laboratory sample. Only benzoic acid and bis(2-ethylhexyl) phthalate were detected in the laboratory sample. These compounds were detected at low levels below EQLs, and SALs. No other organic compounds were reported in this sample. No inorganic compounds were detected in this sample. The data show that no contaminants are present at this site at levels of concern to human health.

The biased sampling and analysis strategy at this former magazine was designed to ensure that residual contamination would be detected if it were present within the PRS. Screening locations and depths were selected based on information about the location, orientation, construction, use of the former building, and mode of decommissioning. Because the likelihood of contamination within the building footprint is judged to be low following the removal of the building, and the likelihood of finding contamination is high based on the biased sampling, a single confirmatory laboratory sample is sufficient to indicate whether or not such contamination is present at levels of concern. The laboratory sample was selected from screening samples based on field screening results, and was analyzed for all potential contaminants based on historical knowledge of operations in TA-16-66.

PRS 16-024(m) is recommended for human-health NFA based on NFA Criterion 5 because contamination is not present at this site at levels that present a potential risk to human health.

5.7 PRS 16-024(o)

This PRS is the site of the former HE magazine TA-16-67, located in the GMX-2 area (Fig. 5.0-1). It is recommended for human-health NFA because no contaminants were detected above SALs.

5.7.1 History

PRS 16-024(o) is discussed in detail in Subsection 5.20 of the RFI Work Plan for Operable Unit 1082, Addendum 1 (LANL 1994, 1160).

TA-16-67 was an HE magazine built in April 1946. Little information is known regarding this HE magazine, however, it was suggested that operations in magazines were likely to have resulted in HE spills (Martin 1993, 15-16-477). HE magazines were used to store packaged HE and finished HE products before and after processing. No HE processing was done in such magazines. The

magazine had no sump or plumbing. Before being abandoned in 1959 and burned in 1960, it was determined that the magazine was contaminated with HE (Engineering Department 1959, 15-16-256).

The potential contamination at this PRS was identified as metals, SVOCs, and HE.

5.7.2 Description

TA-16-67 was a 6 ft long x 6 ft wide x 7 ft high wooden-frame building with a wooden floor and with earthen barricades on three sides and on top. It was located on flat terrain south of TA-16-37.

5.7.3 Previous Investigation(s)

No previous investigations were conducted at this PRS.

5.7.4 Field Investigation

The goal of the Phase I investigation at PRS 16-024(o), as outlined in the approved RFI Work Plan for Operable Unit 1082, Addendum 1 (LANL 1994, 1160), was to determine if contaminants were present in soils at levels of concern. The sampling design is consistent with the current industrial land use scenario of the conceptual model described in Section 4.3 of the RFI work plan. The potential for contamination at this PRS is hypothesized to be via either: (1) leaks and spills from the past operations; or (2) ash, debris, or contamination left behind after the former building was burned and remnants removed. The potential release mechanisms at this PRS are hypothesized to be via either: (1) infiltration of potential contamination into the near-surface soil; or (2) mechanical movement and mixing of potentially contaminated surface soil during the removal of the former building. There was no historic subsurface construction (or other intrusive activities) at this PRS, and there are no surface water collection points or drainages present that would have spread contamination to the subsurface. Biased sampling was designed to detect residual HE in the surface and near-surface soil at the site of the magazine footprint. The mode of decommissioning of the magazine and the fact that magazines were used for HE storage, but not for HE processing suggest that residual contamination is unlikely at this PRS.

Addendum 1 (LANL 1994, 1160) specified screening soil samples, 0 to 1 ft depth intervals, from four locations and selecting one laboratory sample only if positive field screening results were obtained. The plan called for taking the screening samples within two of the four quadrants of the building, on the side of the footprint opposite the door, and one foot downgradient from the location of the door. The laboratory sample was to be selected from the screening samples using the following prioritized biasing scheme: (1) a sample with a positive HE spot test kit result; and (2)

a sample with above two times background radiation readings. In response to an EPA NOD (EPA 1994, 15-16-644), one laboratory sample was collected (based on the above scheme), even if all field screening results were negative.

Two deviations were made to the approved work plan.

- The screening samples were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit. This analysis was performed in addition to the required HE spot test analysis because the D-Tech™ kits can detect specific potential contaminants and provide lower detection limits (1 ppm or less) than the HE spot test. This screening was used to further characterize the samples in the field for biasing purposes.

- The soil samples were collected from 0 - 0.4 ft or 0 - 0.7 ft depths (rather than the required 1 ft depths) because the hand auger met refusal at the soil/tuff interface.

The building was accurately surveyed using a Trimble™ GPS Total Station. Aerial photographs were used to determine the building position, and the center of the building was surveyed with an estimated accuracy of 2 ft. Screening sample locations were further determined and surveyed relative to the center point and within the known dimensions of the building.

A total of 4 field screening samples were taken from 4 locations in and adjacent to the building footprint. The samples were collected from 0 to 0.4 or 0 to 0.7 ft depths. The field screening samples were taken within two of the four quadrants of the building, on the side of the footprint opposite the door, and one foot downgradient from the location of the door (Fig. 5.7.4-1). These locations were selected to ensure spatial variability and because the most likely contaminant dispersal mechanism for operations in this building, which had wooden floors, is hypothesized to be via either: (1) HE spills near door areas; or (2) leakage from cracks within wooden floors.

All samples were collected with a manually driven hand auger (LANL-ER-SOP-06.10, Hand Auger and Thin-Wall Tube Sampler). The soil samples were screened in the field for HE and beta/gamma radioactivity using the HE spot test kit with modified Griess™ reagents (LANL-ER-SOP-10.06,R0, High Explosive Spot Test) and an Eberline ESP1™ radiological meter with HP-260™ probe (LANL-ER-SOP-10.07, R0, Field Monitoring for Surface and Volume Radioactivity Levels). Samples were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit (EPA SW-846 Methods 4051 and 4050). The soil was described and logged on the Sample Collection Log forms (LANL-ER-SOP-01.04, Sample Control and Field Documentation).

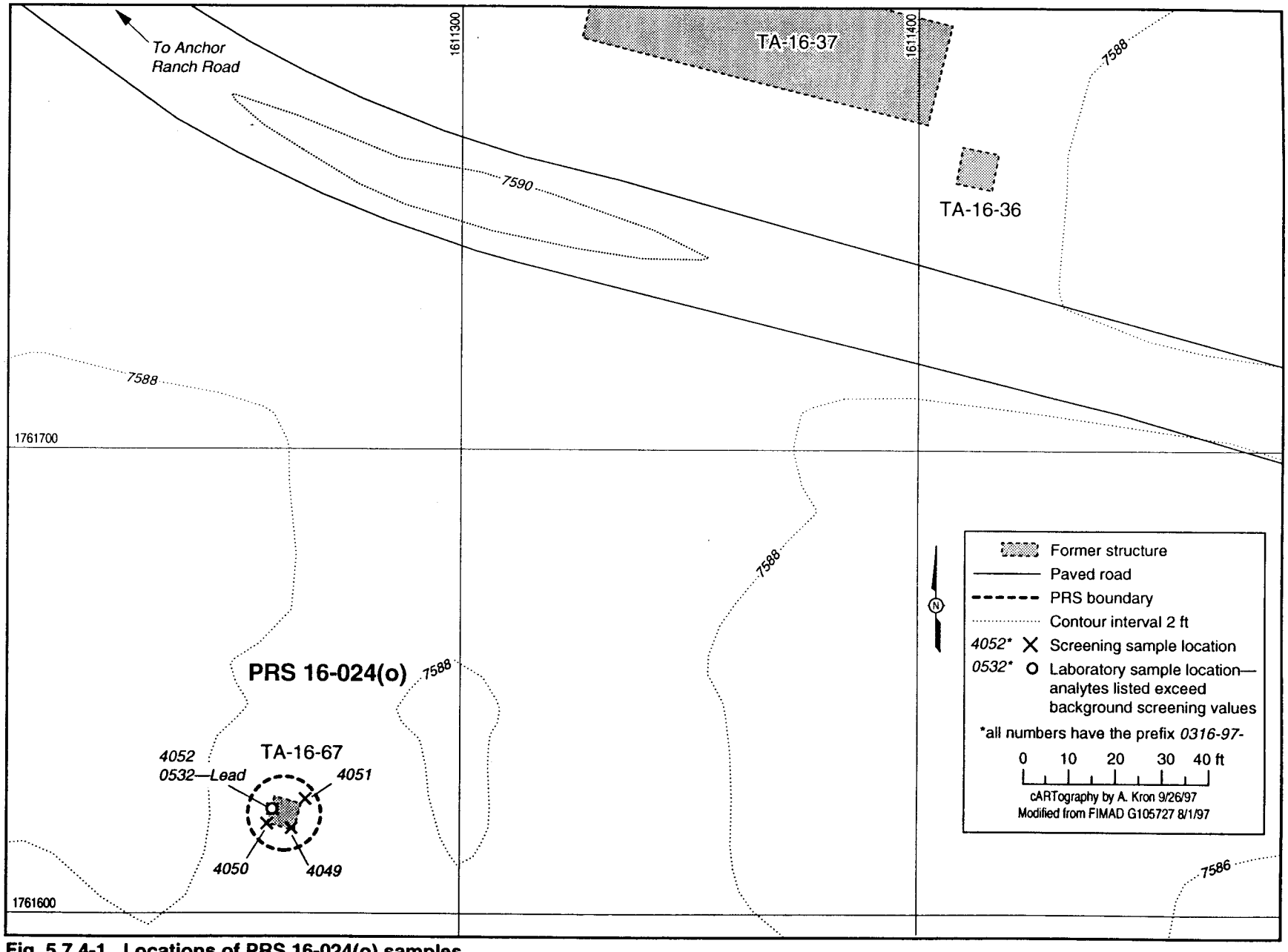

Fig. 5.7.4-1 Locations of PRS 16-024(o) samples.

All samples screened negative for HE using the HE spot test kit and contained background radioactivity. One sample screened positive for HE using the D-Tech™ kit (Table 5.7.4-1).

TABLE 5.7.4-1
SUMMARY OF FIELD SCREENING RESULTS

SCREENING SAMPLE NO.	LOCATION ID	DEPTH (FT)	LAB SAMPLE NO.	HE SPOT TEST	RAD SCREEN	D-TECH RDX (MG/KG)	D-TECH TNT (MG/KG)
0316-97-4049 southeast quadrant	16-4049	0 - 0.7	NA[a]	negative	background	< 0.5	< 0.5
0316-97-4050 door	16-4050	0 - 0.7	NA	negative	background	< 0.5	< 0.5
0316-97-4051 northeast quadrant	16-4051	0 - 0.7	NA	negative	background	< 0.5	< 0.5
0316-97-4052 southwest quadrant	16-4052	0 - 0.4	0316-97-0532	negative	background	< 0.5	0.5 - 1.5

a. NA = Not analyzed.

Screening sample 0316-97-4052 contained the highest concentration of HE (0.5 to 1.5 mg/kg TNT) and was submitted to the laboratory for analysis (Table 5.7.4-1). The sample was analyzed for metals, SVOCs, and HE (Table 5.7.4-2).

TABLE 5.7.4-2
SUMMARY OF REQUEST NUMBERS FOR LABORATORY SAMPLES TAKEN AT PRS 16-024(o)

LOCATION ID	SAMPLE ID	DEPTH (FT)	MATRIX	INORGANICS	SVOCS	HE
16-4052	0316-97-0532	0 - 0.4	soil	3352R	3351R	3353R

5.7.5 Evaluation of Inorganic Chemicals

Lead was detected slightly above the background UTL in sample 0316-97-0532, although the concentration is within the range of the background data (Table 5.7.5-1). Baseline validation indicated no problems that affect the use of these inorganic data.

TABLE 5.7.5-1
INORGANIC CHEMICALS WITH CONCENTRATIONS AT OR ABOVE BACKGROUND SCREENING VALUES FOR PRS 16-024(o)

ANALYTE	SAMPLE ID	SAMPLE VALUE (MG/KG)	SAL (MG/KG)	UTL (MG/KG)	MEDIA	DEPTH (FT)
Lead	0316-97-0532	23.6	400	23.3	Soil	0-.42

5.7.6 Evaluation of Radionuclides

Radionuclides were not analyzed for at PRS 16-024(o) because historical evidence indicated that radioactive material was not stored or used in this HE magazine. Additionally, field screening did not indicate the presence of radioactive constituents.

5.7.7 Evaluation of Organic Chemicals

No HE was detected in sample 0316-97-0532, despite indications of the presence of TNT in the associated field screening sample. The positive D-Tech™ result, which suggested that low levels of TNT was present, was not confirmed by the fixed laboratory analysis. The D-Tech™ kits have been shown to provide false positives due to interferences with humic materials. See Section 4.3.2 for further details.

No other organic chemicals were detected in sample 0316-97-0532. Baseline validation indicates no data quality problems associated with these analyses that affect the use of these organic data.

5.7.8 Risk-Based Screening Assessment

Lead was reported at 1% above the background UTL at 6% of its SAL. No other chemicals were present at or above EQLs or UTLs at PRS 16-024(o).

5.7.9 Preliminary Human Health Assessment

No human health risk assessment was performed for PRS 16-024(o) because contamination was not detected above SALs.

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 PRS will be deferred until the PRS can be assessed as part of the ecological exposure unit methodology currently being developed.

5.7.11 Conclusions and Recommendations

Four screening samples and one laboratory sample were collected in and downgradient from the footprint of the former HE magazine TA-16-67. Selection of the laboratory sample was based on the only positive screening result. No HE or organic compounds were detected. Only lead was reported as detected, at less than 24 mg/kg.

The biased sampling and analysis strategy at this former magazine was designed to ensure that residual contamination would be detected if it were present within the PRS. Screening locations and depths were selected based on information about the location, orientation, construction, use of the former building, and mode of decommissioning. Because the likelihood of contamination within the building footprint is judged to be low following the removal of the building, and the likelihood of finding contamination is high based on the biased sampling, a single confirmatory laboratory sample is sufficient to indicate whether or not such contamination is present at levels of concern. The laboratory sample was selected from screening samples based on field screening results, and was analyzed for all potential contaminants based on historical knowledge of operations in TA-16-67.

PRS 16-024(o) is recommended for human-health NFA based on NFA Criterion 5 because contamination is not present at this site at levels that present a potential risk to human health.

5.8 PRS 16-024(p)

This PRS is the site of former HE magazine TA-16-70, located in the GMX-2 area (Fig. 5.0-1). It is recommended for human-health NFA because no contaminants were detected above SALs.

5.8.1 History

PRS 16-024(p) is discussed in detail in Subsection 5.20 of the RFI Work Plan for Operable Unit 1082, Addendum 1 (LANL 1994, 1160).

TA-16-70 was an HE magazine built in April 1946. Little information is known regarding this HE magazine, however, it was suggested that operations in magazines were likely to have resulted in HE spills (Martin 1993, 15-16-477). HE magazines were used to store packaged HE and finished HE products before and after processing. No HE processing was done in such magazines. Before being abandoned in 1959 and burned in 1960, it was determined that the magazine was contaminated with HE (Engineering Department 1959, 15-16-256).

The potential contamination at this PRS was identified as metals, SVOCs, and HE.

5.8.2 Description

TA-16-70 was a 6 ft long x 6 ft wide x 7 ft high wooden-frame building and wooden floor with earthen barricades on three sides and on top. The magazine had no sumps or plumbing. It was located on flat terrain northeast of TA-16-49.

5.8.3 Previous Investigation(s)

No previous investigations were conducted at this PRS.

5.8.4 Field Investigation

The goal of the Phase I investigation at PRS 16-024(p), as outlined in the approved RFI Work Plan for Operable Unit 1082, Addendum 1 (LANL 1994, 1160), was to determine if contaminants were present in soils at levels of concern. The sampling design is consistent with the current industrial land use scenario of the conceptual model described in Section 4.3 of the RFI work plan. The potential for contamination at this PRS is hypothesized to be via either: (1) leaks and spills from the past operations; or (2) ash, debris, or contamination left behind after the former building was burned and remnants removed. The potential release mechanisms at this PRS are hypothesized to be via either: (1) infiltration of potential contamination into the near-surface soil; or (2) mechanical movement and mixing of potentially contaminated surface soil during the removal of the former building. There was no historic subsurface construction (or other intrusive activities) at this PRS, and there are no surface water collection points or drainages present that would have spread contamination to the subsurface. Biased sampling was designed to detect residual HE in the surface and near-surface soil at the site of the magazine footprint. The mode of decommissioning of the magazine and the fact that magazines were used for HE storage, but not for HE processing suggest that residual contamination is unlikely at this PRS.

Addendum 1 (LANL 1994, 1160) specified screening soil samples, 0 to 1 ft depth intervals, from four locations and selecting one laboratory sample only if positive field screening results were obtained. The plan called for taking the screening samples within two of the four quadrants of the building, on the side of the footprint opposite the door, and one foot downgradient from the location of the door. The laboratory sample was to be selected from the screening samples using the following prioritized biasing scheme: (1) a sample with a positive HE spot test kit result; and (2) a sample with above two times background radiation readings. In response to an EPA NOD (EPA 1994, 15-16-644), one laboratory sample was collected (based on the above scheme), even if all field screening results were negative.

One deviation was made to the approved work plan. The screening samples were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit. This analysis was performed in addition to the required HE spot test analysis because the D-Tech™ kits can detect specific potential contaminants and provide lower detection limits (1 ppm or less) than the HE spot test. This screening was used to further characterize the samples in the field for biasing purposes.

The building was accurately surveyed using a Trimble™ GPS Total Station. Aerial photographs were used to determine the building position, and the center of the building was surveyed with an estimated accuracy of 2 ft. Screening sample locations were further determined and surveyed relative to the center point and within the known dimensions of the building.

A total of four field screening samples were taken from four locations in and adjacent to the building footprint. The samples were collected from the 0 to 1 ft depth interval. The field screening samples were taken within two of the four quadrants of the building, on the side of the footprint opposite the door, and one foot downgradient from the location of the door (Fig. 5.8.4-1). These locations were selected to ensure spatial variability and because the most likely contaminant dispersal mechanism for operations in this building, which had wooden floors, is hypothesized to be via either: (1) HE spills near door areas; or (2) leakage from cracks within wooden floors.

All samples were collected with a manually driven hand auger (LANL-ER-SOP-06.10, Hand Auger and Thin-Wall Tube Sampler). The soil samples were screened in the field for HE and beta/gamma radioactivity using the HE spot test kit with modified Griess™ reagents (LANL-ER-SOP-10.06,R0, High Explosive Spot Test) and an Eberline ESP1™ radiological meter with HP-260™ probe (LANL-ER-SOP-10.07, R0, Field Monitoring for Surface and Volume Radioactivity Levels). Samples were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit (EPA SW-846 Methods 4051 and 4050). The soil was described and logged on the Sample Collection Log forms (LANL-ER-SOP-01.04, Sample Control and Field Documentation).

All samples screened negative for HE using the HE spot test kit and contained background radioactivity. No samples screened positive for HE using the D-Tech™ kit (Table 5.8.4-1).

TABLE 5.8.4-1
SUMMARY OF FIELD SCREENING RESULTS

SCREENING SAMPLE NO.	LOCATION ID	DEPTH (FT)	LAB SAMPLE NO.	HE SPOT TEST	RAD SCREEN	D-TECH RDX (MG/KG)	D-TECH TNT (MG/KG)
0316-97-4059 northwest quadrant	16-4059	0 - 1	NA[a]	negative	background	< 0.5	< 0.5
0316-97-4060 northeast quadrant	16-4060	0 - 1	NA	negative	background	< 0.5	< 0.5
0316-97-4061 downgradient door	16-4061	0 - 1	0316-97-0535	negative	background	< 0.5	< 0.5
0316-97-4062 southeast quadrant	16-4062	0 - 1	NA	negative	background	< 0.5	< 0.5

a. NA = Not analyzed.

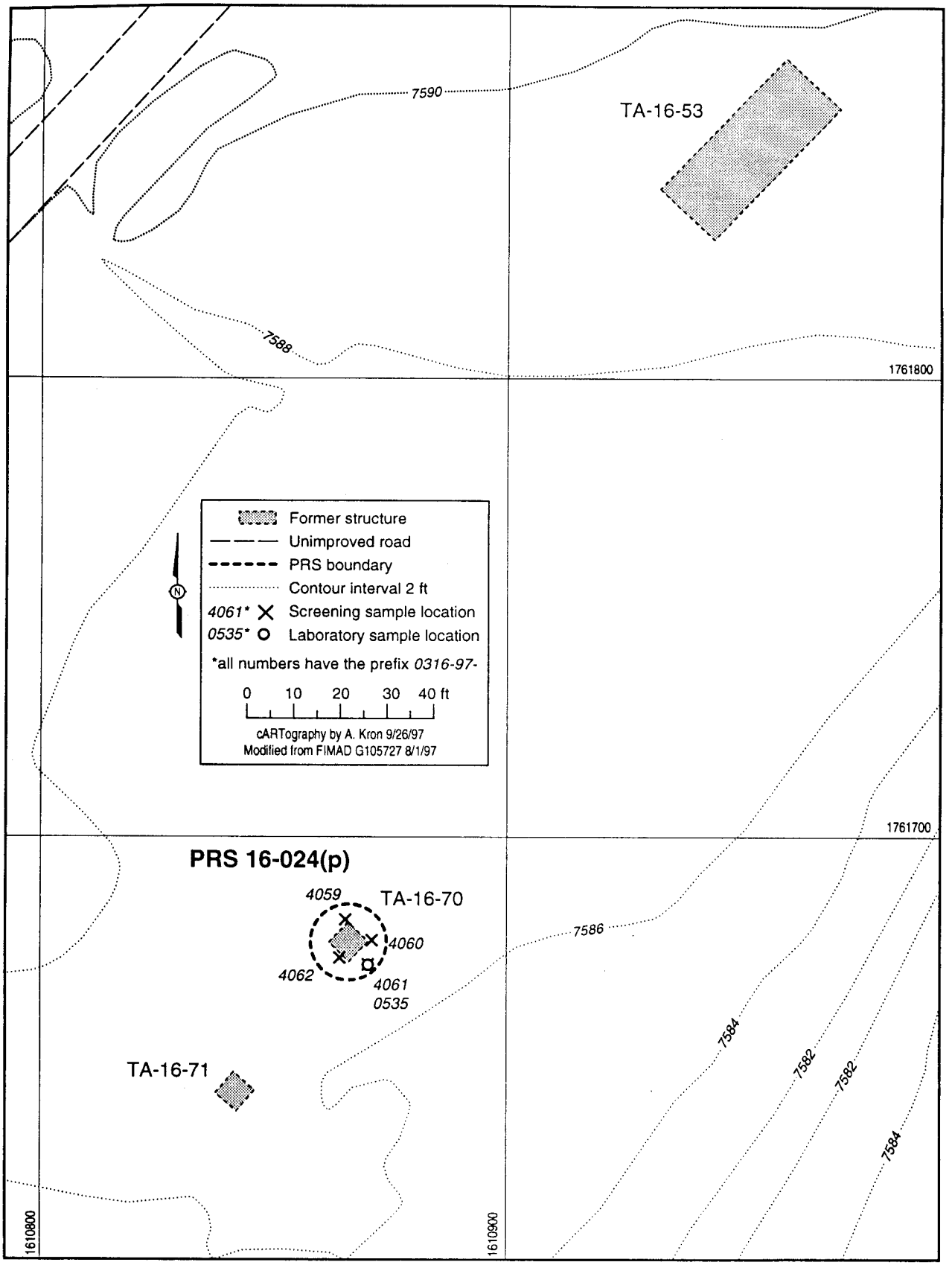

Fig. 5.8.4-1 Locations of PRS 16-024(p) samples.

All of the samples screened below detection for TNT and RDX. Screening sample 0316-97-4061 was located one foot downgradient from the door and was submitted to the laboratory for analysis (Table 5.8.4-1). The sample was analyzed for metals, SVOCs, and HE (Table 5.8.4-2).

TABLE 5.8.4-2
SUMMARY OF REQUEST NUMBERS FOR LABORATORY SAMPLES TAKEN AT PRS 16-024(p)

LOCATION ID	SAMPLE ID	DEPTH (FT)	MATRIX	INORGANICS	SVOCS	HE
16-4061	0316-97-0535	0 - 1	soil	3352R	3351R	3353R

5.8.5 Evaluation of Inorganic Chemicals

No inorganic chemicals were present at levels greater than background UTLs at PRS 16-024(p). Baseline validation indicated no problems that affect the use of these inorganic data.

5.8.6 Evaluation of Radionuclides

Radionuclides were not analyzed for at PRS 16-024(p) because historical evidence indicated that radioactive material was not stored or used in this HE magazine. Additionally, field screening did not indicate the presence of radioactive constituents.

5.8.7 Evaluation of Organic Chemicals

No organic chemicals were detected in sample 0316-97-0535. All semivolatile non-detects were qualified estimated undetected, but as discussed in Section 4.3.1 these were accepted as non detects following focused validation. Baseline validation indicated no problems that affect the use of these data.

5.8.8 Risk-Based Screening Assessment

No screening assessment was performed because chemicals were not present at levels at or above UTLs or EQLs at PRS 16-024(p).

5.8.9 Preliminary Human Health Assessment

No human health risk assessment was performed for PRS 16-024(p) because contamination was not detected at levels at or above SALs.

5.8.10 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 PRS will be deferred until the PRS can be assessed as part of the ecological exposure unit methodology currently being developed.

5.8.11 Conclusions and Recommendations

Four screening samples and one laboratory sample were collected in or adjacent to the footprint of the former HE magazine TA-16-70. In the absence of any positive screening results, the laboratory sample was collected downgradient from the former location of the door. No analytes were detected above background UTLs or EQLs and the data provide no evidence of a release of any contaminant to the environment at this site.

The biased sampling and analysis strategy at this former magazine was designed to ensure that residual contamination would be detected if it were present within the PRS. Screening locations and depths were selected based on information about the location, orientation, construction, use of the former building, and mode of decommissioning. Because the likelihood of contamination within the building footprint is judged to be low following the removal of the building, and the likelihood of finding contamination is high based on the biased sampling, a single confirmatory laboratory sample is sufficient to indicate whether or not such contamination is present at levels of concern. The laboratory sample was selected near the location of the door to the former HE magazine, because this would have been the area of greatest activity. It was analyzed for all potential contaminants based on historical knowledge of operations in TA-16-70.

PRS 16-024(p) is recommended for human-health NFA based on NFA Criterion 5 because contamination is not present at this site at levels that present a potential risk to human health.

5.9 PRS 16-024(q)

This PRS is the site of the former HE magazine TA-16-71 located in the GMX-2 area (Fig. 5.0-1). It is recommended for human-health NFA because no contaminants were detected above SALs.

5.9.1 History

PRS 16-024(q) is discussed in detail in Subsection 5.20 of the RFI Work Plan for Operable Unit 1082, Addendum 1 (LANL 1994, 1160).

TA-16-71 was an HE magazine built in April 1946. Little information is known regarding this HE magazine, however, it was suggested that operations in magazines were likely to have resulted in HE spills (Martin 1993, 15-16-477). HE magazines were used to store packaged and finished HE products before and after processing. No HE processing was done in such magazines. The magazine contained no sumps or plumbing. Before being abandoned in 1959 and burned in 1960, it was determined that the magazine was contaminated with HE (Engineering Department 1959, 15-16-256).

The potential contamination at this PRS was identified as metals, SVOCs, and HE.

5.9.2 Description

TA-16-71 was a magazine 6 ft long x 6 ft wide x 7 ft high of wooden-frame construction with a wooden floor and with earthen barricades on three sides and on top. It was located on flat terrain northeast of TA-16-49.

5.9.3 Previous Investigation(s)

No previous field investigations were conducted at this PRS.

5.9.4 Field Investigation

The goal of the Phase I investigation at PRS 16-024(q), as outline in the approved Work Plan for Operable Unit 1082 (LANL 1994, 1160), was to determine if contaminants were present in soils at levels of concern. The sampling design is consistent with the current industrial land use scenario of the conceptual model described in Section 4.3 of the RFI work plan. The potential for contamination at this PRS is hypothesized to be via either: (1) leaks and spills from the past operations; or (2) ash, debris, or contamination left behind after the former building was burned and remnants removed. The potential release mechanisms at this PRS are hypothesized to be via either: (1) infiltration of potential contamination into the near-surface soil; or (2) mechanical movement and mixing of potentially contaminated surface soil during the removal of the former building. There was no historic subsurface construction (or other intrusive activities) at this PRS, and there are no surface water collection points or drainages present that would have spread contamination to the subsurface. Biased sampling was designed to detect residual HE in the surface and near-surface soil at the site of the magazine footprint. The mode of decommissioning of the magazine and the fact that magazines were used for HE storage, but not for HE processing suggest that residual contamination is unlikely at this PRS.

Addendum 1 (LANL 1994, 1160) specified screening soil samples, 0 to 1 ft depth intervals, from four locations and selecting one laboratory sample only if positive field screening results were obtained. The plan called for taking the screening samples within two of the four quadrants of the building, on the side of the footprint opposite the door, and one foot downgradient from the location of the door. The laboratory sample was to be selected from the screening samples using the following prioritized biasing scheme: (1) a sample with a positive HE spot test kit result; and (2) a sample with above two times background radiation readings. In response to an EPA NOD (EPA 1994, 15-16-644), one laboratory sample was collected (based on the above scheme), even if all field screening results were negative.

One deviation was made to the approved work plan. The screening samples were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit. This analysis was performed in addition to the required HE spot test analysis because the D-Tech™ kits can detect specific potential contaminants and provide lower detection limits (1 ppm or less) than the HE spot test. This screening was used to further characterize the samples in the field for biasing purposes.

The building was accurately surveyed using a Trimble™ GPS Total Station. Aerial photographs were used to determine the building position, and the center of the building was surveyed with an estimated accuracy of 2 ft. Screening sample locations were further determined and surveyed relative to the center point and within the known dimensions of the building.

A total of 4 field screening samples were taken from 4 locations in and adjacent to the building footprint. The samples were collected from the 0 to 1 ft depth interval. The field screening samples were taken within two of the four quadrants of the building, on the side of the footprint opposite the door, and one foot downgradient from the location of the door (Fig. 5.9.4-1). These locations were selected to ensure spatial variability and because the most likely contaminant dispersal mechanism for operations in this building, which had wooden floors, is hypothesized to be via either: (1) HE spills near door areas; or (2) leakage from cracks within wooden floors.

All samples were collected with a manually driven hand auger (LANL-ER-SOP-06.10, Hand Auger and Thin-Wall Tube Sampler). The soil samples were screened in the field for HE and beta/gamma radioactivity using the HE spot test kit with modified Griess™ reagents (LANL-ER-SOP-10.06,R0, High Explosive Spot Test) and an Eberline ESP1™ radiological meter with HP-260™ probe (LANL-ER-SOP-10.07, R0, Field Monitoring for Surface and Volume Radioactivity Levels). Samples were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit (EPA SW-846 Methods 4051 and 4050). The soil was described and logged on the Sample Collection Log forms (LANL-ER-SOP-01.04, Sample Control and Field Documentation).

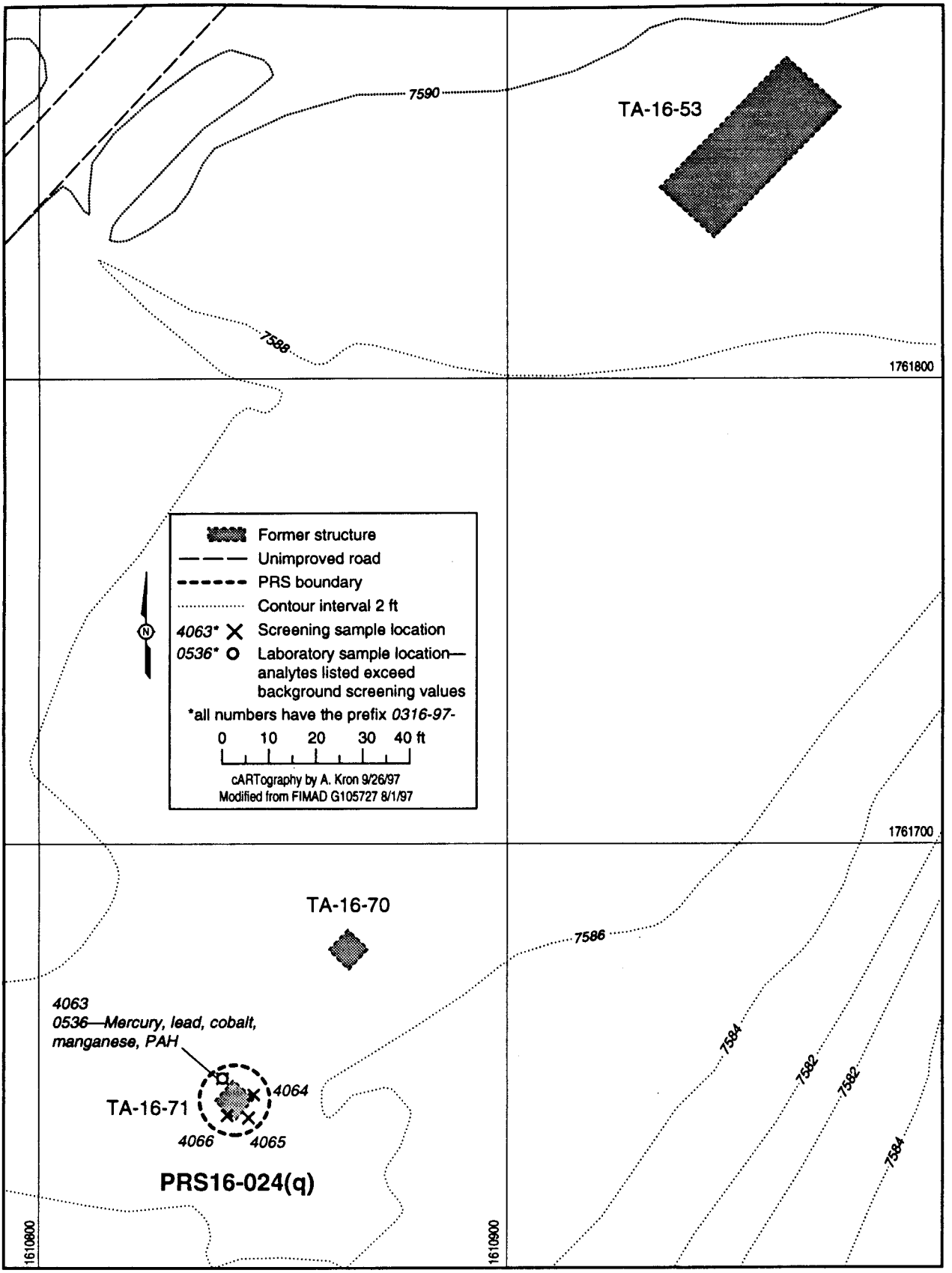

Fig. 5.9.4-1 Locations of PRS 16-024(q) samples.

All samples screened negative for HE using the HE spot test kit and contained background radioactivity. No samples screened positive for HE using the D-Tech™ kit (Table 5.9.4-1).

TABLE 5.9.4-1
SUMMARY OF FIELD SCREENING RESULTS

SCREENING SAMPLE NO.	LOCATION ID	DEPTH (FT)	LAB SAMPLE NO.	HE SPOT TEST	RAD SCREEN	D-TECH RDX (MG/KG)	D-TECH TNT (MG/KG)
0316-97-4063 downgradient door	16-4063	0 - 1	0316-97-0536	negative	background	< 0.5	< 0.5
0316-97-4064 northeast quadrant	16-4064	0 - 1	NA[a]	negative	background	< 0.5	< 0.5
0316-97-4065 opposite door	16-4065	0 - 1	NA	negative	background	< 0.5	< 0.5
0316-97-4066 southeast quadrant	16-4066	0 - 1	NA	negative	background	< 0.5	< 0.5

a. NA = Not analyzed.

All of the samples screened below detection for TNT and RDX. Screening sample 0316-97-4063 was located downgradient from the former location of the door and was submitted to the laboratory for analysis (Table 5.9.4-1). The sample was analyzed for metals, SVOCs, and HE (Table 5.9.4-2).

TABLE 5.9.4-2
SUMMARY OF REQUEST NUMBERS FOR LABORATORY SAMPLES TAKEN AT PRS 16-024(q)

LOCATION ID	SAMPLE ID	DEPTH (FT)	MATRIX	INORGANICS	SVOCS	HE
16-4063	0316-97-0536	0 - 1	soil	3352R	3351R	3353R

5.9.5 Evaluation of Inorganic Chemicals

Lead, cobalt and manganese were detected above background levels in sample 0316-97-0536 (Table 5.9.5-1). Mercury was reported at 0.11 mg/kg as estimated undetected (UJ). No other inorganic chemicals were detected above background UTLs. Baseline validation identified no problems that affect the use of these data.

TABLE 5.9.5-1
INORGANIC CHEMICALS WITH CONCENTRATIONS AT OR ABOVE BACKGROUND SCREENING VALUES FOR PRS 16-024(q)

ANALYTE	SAMPLE ID	SAMPLE VALUE (MG/KG)	SAL (MG/KG)	UTL (MG/KG)	MEDIA	DEPTH (FT)
Cobalt	0316-97-0536	19.5	4600	19.2	Soil	0-1
Lead	0316-97-0536	28.3	400	23.3	Soil	0-1
Manganese	0316-97-0536	1390	3200	714	Soil	0-1
Mercury	0316-97-0536	0.11(UJ[a])	23	0.1	Soil	0-1

a. UJ = Analyte was not detected; the associated value is an estimate of the detection limit or quantitation limit.

5.9.6 Evaluation of Radionuclides

Radionuclides were not analyzed for at PRS 16-024(q) because historical evidence indicated that radioactive material was not stored or used in this HE magazine. Additionally, field screening did not indicate the presence of radioactive constituents.

5.9.7 Evaluation of Organic Chemicals

Pyrene was detected at less than 0.1 mg/kg in sample 0316-97-0536 (Table 5.9.7-1). The sample was originally reported as PM (professional judgment needed) due to poor internal standard response, and it was requalified as estimated (J). No other organic chemicals were detected. Data validation indicated no data quality problems with the laboratory analyses of 0316-97-0536. There is no evidence for the release of organic constituents to the environment at this site.

TABLE 5.9.7-1
DETECTED ORGANIC CHEMICALS FOR PRS 16-024(Q)

ANALYTE	SAMPLE ID	SAMPLE VALUE (MG/KG)	SAL (MG/KG)	MEDIA	DEPTH (FT)
Pyrene	0316-97-0536	0.091(J[a])	1900	Soil	0-1

a. J = Analyte was positively identified, but the result is estimated to be more uncertain than would normally be expected for that analysis.

5.9.8 Risk-Based Screening Assessment

Four inorganic and one semivolatile organic chemical were detected above UTLs and EQLs. Manganese was present at 43% of its SAL and lead was present at 7% of its SAL in sample 0316-97-0536. All of the remaining chemicals were reported at less than 1% of their SALs. There is no risk to human health with a release of these chemicals at these levels. Visual examination of the data suggests an MCE would fall far below the target value of 1.0.

5.9.9 Preliminary Human Health Assessment

No human health risk assessment was performed for PRS 16-024(q) because contamination was not detected at levels at or above SALs.

5.9.10 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 PRS will be deferred until the PRS can be assessed as part of the ecological exposure unit methodology currently being developed.

5.9.11 Conclusions and Recommendations

Four screening samples and one laboratory sample were collected in and downgradient from the footprint of former HE magazine TA-16-71. All screening results were negative, so the laboratory sample was selected from the location downgradient from the former location of the door of the bunker. Mercury, lead, cobalt and manganese were detected but none above SALs. Pyrene was the only organic compound detected at less than 0.1 mg/kg.

The biased sampling and analysis strategy at this former magazine was designed to ensure that residual contamination would be detected if it were present within the PRS. Screening locations and depths were selected based on information about the location, orientation, construction, use of the former building, and mode of decommissioning. Because the likelihood of contamination within the building footprint is judged to be low following the removal of the building, and the likelihood of finding contamination is high based on the biased sampling, a single confirmatory laboratory sample is sufficient to indicate whether or not such contamination is present at levels of concern. The laboratory sample was selected near the location of the door to the former HE magazine, because this would have been the area of greatest activity. It was analyzed for all potential contaminants based on historical knowledge of operations in TA-16-71.

PRS 16-024(q) is recommended for human-health NFA based on NFA Criterion 5 because contamination is not present at this site at levels that present a potential risk to human health.

5.10 PRS 16-024(r)

This PRS is the site of the former HE magazine TA-16-68 located in the southern portion of the GMX-2 area (Fig. 5.0-1). It is recommended for human-health NFA because no contaminants were detected above SALs.

5.10.1 History

PRS 16-024(r) is discussed in detail in Subsection 5.20 of the RFI Work Plan for Operable Unit 1082, Addendum 1 (LANL 1994, 1160).

TA-16-68 was an HE magazine located in GMX-2 area constructed in January 1945. Little information is known regarding this HE magazine, however, it was suggested that operations in magazines were likely to have resulted in HE spills (Martin 1993, 15-16-477). HE magazines were used to store packaged HE and finished HE products before and after processing. No HE processing was done in such magazines. The magazine contained no sumps or plumbing. It was abandoned in late winter 1959. Before being burned in 1960, it was determined that the magazine was contaminated with HE (Engineering Department 1959, 15-16-256).

The potential contamination at this PRS was identified as metals, SVOCs, and HE.

5.10.2 Description

TA-16-68 was 6 ft by 6 ft by 7 ft of wooden-frame construction with a wooden floor and with earthen barricades on three sides and on top. It was located southwest of TA-16-56, on flat terrain, with no nearby well-defined drainage.

5.10.3 Previous Investigation(s)

No previous field investigations were conducted at this PRS.

5.10.4 Field Investigation

The goal of the Phase I investigation at PRS 16-024(r), as outlined in the approved RFI Work Plan for Operable Unit 1082, Addendum 1 (LANL 1994, 1160), was to determine if contaminants were present in soils at levels of concern. The sampling design is consistent with the current industrial land use scenario of the conceptual model described in Section 4.3 of the RFI work plan. The potential for contamination at this PRS is hypothesized to be via either: (1) leaks and spills from the past operations; or (2) ash, debris, or contamination left behind after the former building was burned and remnants removed. The potential release mechanisms at this PRS are hypothesized to be via either: (1) infiltration of potential contamination into the near-surface soil; or (2)

mechanical movement and mixing of potentially contaminated surface soil during the removal of the former building. There was no historic subsurface construction (or other intrusive activities) at this PRS, and there are no surface water collection points or drainages present that would have spread contamination to the subsurface. Biased sampling was designed to detect residual HE in the surface and near-surface soil at the site of the magazine footprint. The mode of decommissioning of the magazine and the fact that magazines were used for HE storage, but not for HE processing suggest that residual contamination is unlikely at this PRS.

Addendum 1 (LANL 1994, 1160) specified screening soil samples, 0 to 1 ft depth intervals, from four locations and selecting one laboratory sample only if positive field screening results were obtained. The plan called for taking the screening samples within two of the four quadrants of the building, on the side of the footprint opposite the door, and 1 foot downgradient from the location of the door. The laboratory sample was to be selected from the screening samples using the following prioritized biasing scheme: (1) a sample with a positive HE spot test kit result; and (2) a sample with above two times background radiation readings. In response to an EPA NOD (EPA 1994, 15-16-644), one laboratory sample was collected (based on the above scheme), even if all field screening results were negative.

One deviation was made to the approved work plan. The screening samples were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit. This analysis was performed in addition to the required HE spot test analysis because the D-Tech™ kits can detect specific potential contaminants and provide lower detection limits (1 ppm or less) than the HE spot test. This screening was used to further characterize the samples in the field for biasing purposes.

The building was accurately surveyed using a Trimble™ GPS Total Station. Aerial photographs were used to determine the building position, and the center of the building was surveyed with an estimated accuracy of 2 ft. Screening sample locations were further determined and surveyed relative to the center point and within the known dimensions of the building.

A total of 4 field screening samples were taken from 4 locations in and adjacent to the building footprint. The samples were collected from the 0 to 1 ft depth interval. The field screening samples were taken within two of the four quadrants of the building, on the side of the footprint opposite the door, and 1 foot downgradient from the location of the door (Fig. 5.10.4-1). These locations were selected to ensure spatial variability and because the most likely contaminant dispersal mechanism for operations in this building, which had wooden floors, is hypothesized to be via either: (1) HE spills near door areas; or (2) leakage from cracks within wooden floors.

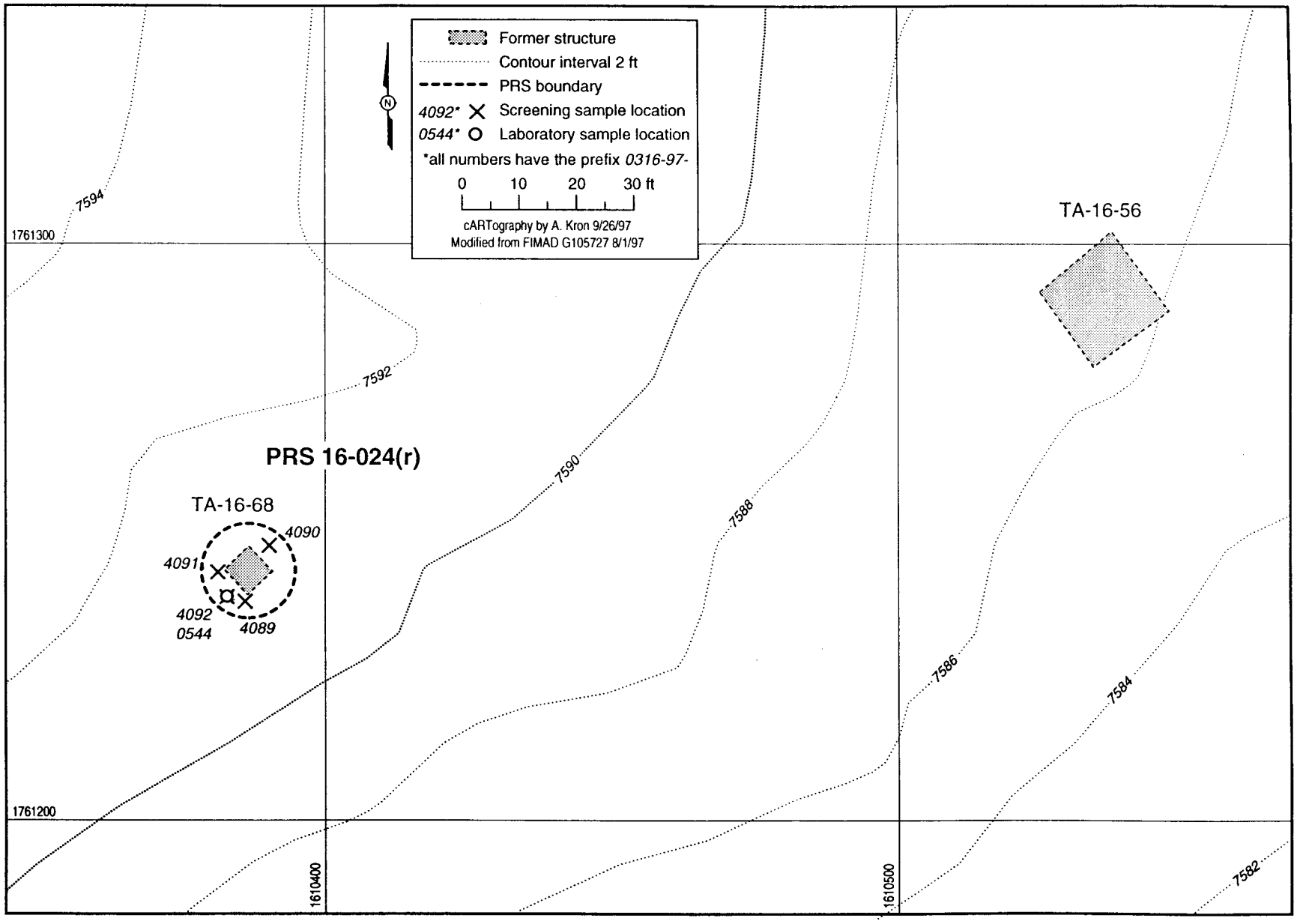

Fig. 5.10.4-1 Locations of PRS 16-024(r) samples.

All samples were collected with a manually driven hand auger (LANL-ER-SOP-06.10, Hand Auger and Thin-Wall Tube Sampler). The soil samples were screened in the field for HE and beta/gamma radioactivity using the HE spot test kit with modified Griess™ reagents (LANL-ER-SOP-10.06,R0, High Explosive Spot Test) and an Eberline ESP1™ radiological meter with HP-260™ probe (LANL-ER-SOP-10.07, R0, Field Monitoring for Surface and Volume Radioactivity Levels). Samples were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit (EPA SW-846 Methods 4051 and 4050). The soil was described and logged on the Sample Collection Log forms (LANL-ER-SOP-01.04, Sample Control and Field Documentation).

All samples screened negative for HE using the HE spot test kit and contained background radioactivity. Three samples screened positive for HE using the D-Tech™ kit (Table 5.10.4-1).

TABLE 5.10.4-1
SUMMARY OF FIELD SCREENING RESULTS

SCREENING SAMPLE NO.	LOCATION ID	DEPTH (FT)	LAB SAMPLE NO.	HE SPOT TEST	RAD SCREEN	D-TECH RDX (MG/KG)	D-TECH TNT (MG/KG)
0316-97-4089 southeast quadrant	16-4089	0 - 1	NA[a]	negative	background	0.5 - 1.5	< 0.5
0316-97-4090 opposite door	16-4090	0 - 1	NA	negative	background	0.5 - 1.5	< 0.5
0316-97-4091 southwest quadrant	16-4091	0 - 1	NA	negative	background	< 0.5	< 0.5
0316-97-4092 downgradient door	16-4092	0 - 1	0316-97-0544	negative	background	< 0.5	0.5 - 1.5

a. NA = Not analyzed.

Screening sample 0316-97-4092 contained an elevated concentration of TNT (0.5 to 1.5 mg/kg) and was downgradient from the former door location. This sample was submitted to the laboratory for analysis (Table 5.10.4-1). The sample was analyzed for metals, SVOCs, and HE (Table 5.10.4-2).

TABLE 5.10.4-2
SUMMARY OF REQUEST NUMBERS FOR LABORATORY SAMPLES TAKEN AT PRS 16-024(r)

LOCATION ID	SAMPLE ID	DEPTH (FT)	MATRIX	INORGANICS	SVOCS	HE
16-4092	0316-97-0544	0 - 1	soil	3440R	3438R	3439R

5.10.5 Evaluation of Inorganic Chemicals

No inorganic chemicals were present at levels greater than UTL or SALs at PRS 16-024(r). Baseline validation indicated no problems that affect the use of these inorganic data.

5.10.6 Evaluation of Radionuclides

Radionuclides were not analyzed for at PRS 16-024(r) because historical evidence indicated that radioactive material was not stored or used in this HE magazine. Additionally, field screening did not indicate the presence of radioactive constituents.

5.10.7 Evaluation of Organic Chemicals

No HE was detected in sample 0316-97-0544, despite indications of the presence of TNT in the associated field screening sample. The positive D-Tech™ result, which suggested that low levels of TNT were present, was not confirmed by the fixed laboratory analysis. The D-Tech™ kits have been shown to provide false positives due to interferences with humic materials. See Section 4.3.2 for further details.

No organic chemicals were detected in sample 0316-97-0544. Baseline validation indicates no data quality problems associated with these analyses that affect the use of these organic data.

5.10.8 Risk-Based Screening Assessment

No screening assessment was performed because chemicals were not present at levels at or above UTLs or EQLs at PRS 16-024(r).

5.10.9 Preliminary Human Health Assessment

No human health risk assessment was performed for PRS 16-024(r) because contamination was not detected at or above SALs.

5.10.10 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 PRS will be deferred until the PRS can be assessed as part of the ecological exposure unit methodology currently being developed.

5.10.11 Conclusions and Recommendations

Four screening samples and one laboratory sample were collected in and adjacent to the footprint of the former HE magazine TA-16-68. One laboratory samples was selected from one of three screening samples that screened positive for HE. It was located downgradient from the door to the magazine. The sample contained no inorganic or organic contamination above detection limits and UTLs.

The biased sampling and analysis strategy at this former magazine was designed to ensure that residual contamination would be detected if it were present within the PRS. Screening locations and depths were selected based on information about the location, orientation, construction, use of the former building, and mode of decommissioning. Because the likelihood of contamination within the building footprint is judged to be low following the removal of the building, and the likelihood of finding contamination is high based on the biased sampling, a single confirmatory laboratory sample is sufficient to indicate whether or not such contamination is present at levels of concern. The laboratory sample was selected from screening samples based on field screening results, and was analyzed for all potential contaminants based on historical knowledge of operations in TA-16-68.

PRS 16-024(r) is recommended for human-health NFA based on NFA Criterion 5 because contamination is not present at this site at levels that present a potential risk to human health.

5.11 PRS 16-024(s)

This PRS is the former site of HE magazine TA-16-60, located at the south periphery of the decommissioned World War II area (Fig. 5.0-1). It is recommended for human-health NFA because no contaminants were detected above SALs.

5.11.1 History

PRS 16-024(s) is discussed in detail in Subsection 5.26 of the RFI Work Plan for Operable Unit 1082, Addendum 2 (LANL 1995, 1342).

TA-16-60 was a receiving magazine built in 1945 that was used for storage of finished HE product and packaged, raw HE. No HE processing was done at the magazine. The magazine had no sumps or plumbing. It was abandoned in 1959 and was removed in late 1950 due to its proximity to the TA-16-435 construction site.

The potential contamination at this PRS was identified as metals, SVOCs, and HE.

5.11.2 Description

TA-16-60 was 20 ft by 60 ft by 8.6 ft and had concrete floors and soil piled up against three sides of the building but not over the top. It was located inside the HE exclusion zone in a grass and tree-covered field that slopes southeast.

5.11.3 Previous Investigation(s)

No previous field investigations were conducted at this PRS.

5.11.4 Field Investigation

The goal of the Phase I investigation at PRS 16-024(s), as outlined in the approved RFI Work Plan for Operable Unit 1082, Addendum 2 (LANL 1995, 1342), was to determine if contaminants were present in soils at levels of concern. The sampling design is consistent with the current industrial land use scenario of the conceptual model described in Section 4.3 of the RFI work plan. The potential for contamination at this PRS is hypothesized to be via either: (1) leaks and spills from the past operations; or (2) ash, debris, or contamination left behind after the former building was burned and remnants removed. The potential release mechanisms at this PRS are hypothesized to be via either: (1) infiltration of potential contamination into the near-surface soil; or (2) mechanical movement and mixing of potentially contaminated surface soil during the removal of the former building. There was no historic subsurface construction (or other intrusive activities) at this PRS, and there are no surface water collection points or drainages present that would have spread contamination to the subsurface. Biased sampling was designed to detect residual HE contamination in heterogeneous surface and near-surface soil at the site of the building footprint. The mode of decommissioning of the magazine and the fact that magazines were used for HE storage, but not for HE processing, suggest that residual contamination is unlikely at this PRS.

Addendum 2 (LANL 1995, 1342) specified screening soil samples, 0 to 1 ft depth intervals, from five locations and selecting one laboratory sample based on field screening results. The plan called for taking the samples at the four quadrants of the building and adjacent to the location of the door. The laboratory sample was to be selected from the screening samples using the following prioritized biasing scheme: (1) a sample with a positive HE spot test kit result; (2) a sample with an above two times background radiation reading; and (3) a sample at the door location.

Two deviations were made from the work plan.

- The screening samples were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit. This analysis was performed in addition to the required HE spot test analysis because the D-Tech™ kits can detect specific potential contaminants and provide lower detection limits (1 ppm or less) than the HE spot test. This screening was used to further characterize the samples in the field for biasing purposes.

- Screening samples were collected from 1 to 2 ft depth intervals (as well as the required 0 to 1 ft intervals) to confirm that the soil beneath this concrete floored building had not been disturbed during decommissioning. One screening sample was collected at 0 - 0.7 ft depth (rather than the required 1 ft depth). And the deeper interval sample (at 2 ft depth) at this same location was not collected because of hand auger refusal. At another location, the 2 ft depth interval sample was not collected because of hand auger refusal.

The building was accurately surveyed using a Trimble™ GPS Total Station. Aerial photographs were used to determine the building position, and the center of the building was surveyed with an estimated accuracy of 2 ft. Screening sample locations were further determined and surveyed relative to the center point and within the known dimensions of the building.

A total of eight field screening samples from five locations were taken in and adjacent to the building footprints. At three locations, samples were taken at 0 to 1 ft and 1 to 2 ft depth intervals. One sample was collected at location 16-4095 (sample 0316-97-4095) from the 0 to 0.7 ft depth interval. One sample was collected at location 16-4096 (sample 0316-97-4096) from the 0 to 1 ft depth interval. (Fig. 5.11.4-1). The two locations were not sampled to the total depth of 2 ft because the hand auger met refusal at solid material. The absence of these samples did not affect the screening decision because the material was undisturbed. According to the conceptual model, potential contaminants should not be present in the undisturbed material. These screening sample locations were selected to ensure spatial variability and because the most likely contaminant dispersal mechanism for operations in this building, which had concrete floors, is hypothesized to be via either: (1) HE spills near door areas; or (2) leakage at the floor/wall joints.

All samples were collected with a manually driven hand auger (LANL-ER-SOP-06.10, Hand Auger and Thin-Wall Tube Sampler). The soil samples were screened in the field for HE and beta/gamma radioactivity using the HE spot test kit with modified Griess™ reagents (LANL-ER-SOP-10.06,R0, High Explosive Spot Test) and an Eberline ESP1™ radiological meter with HP-260™ probe (LANL-ER-SOP-10.07, R0, Field Monitoring for Surface and Volume Radioactivity Levels).

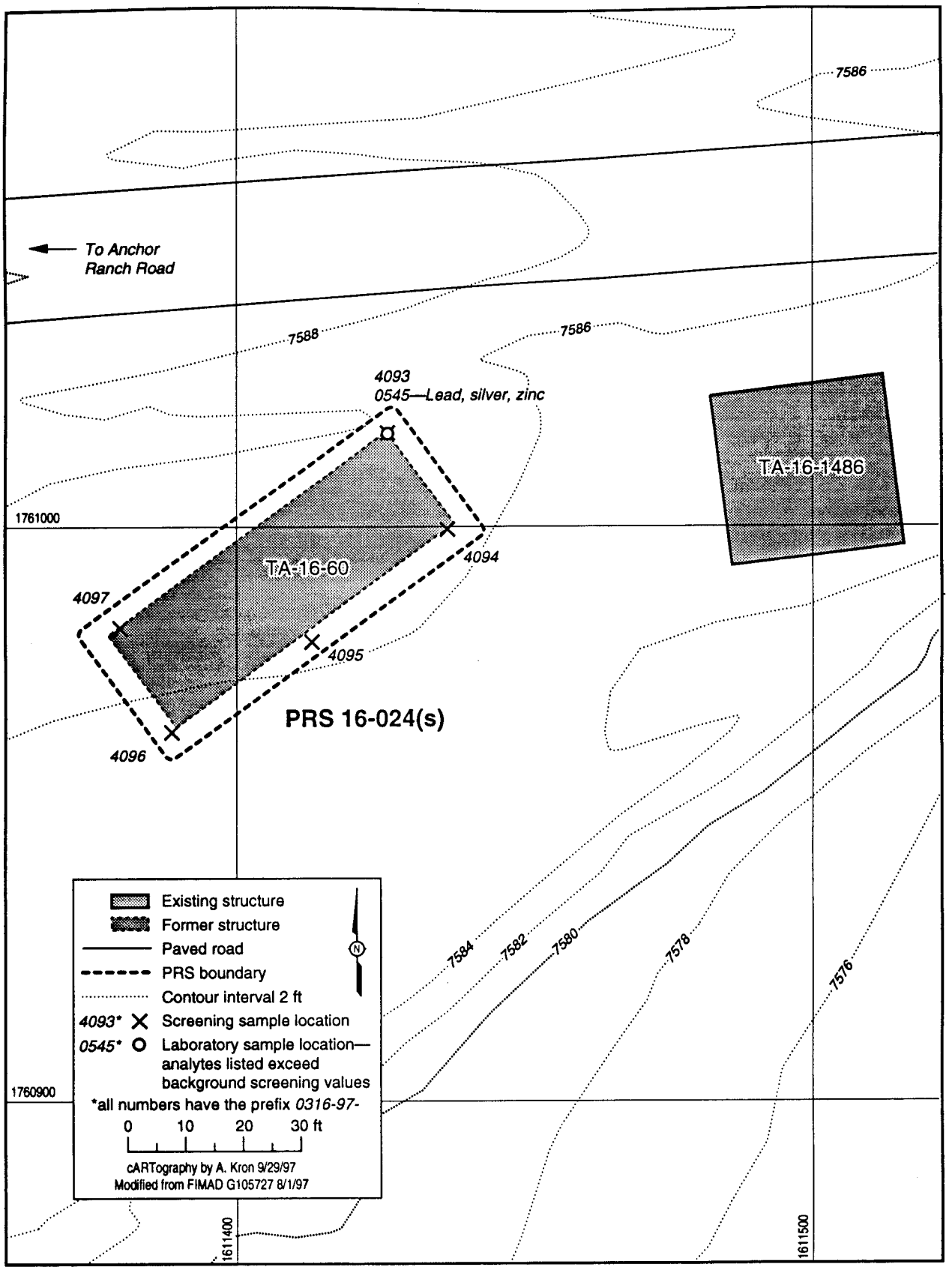

Fig. 5.11.4-1 Locations of PRS 16-024(s) samples.

Samples at 0 to 1 ft depth intervals were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit (EPA SW-846 Methods 4051 and 4050). The 0 to 1 ft intervals were selected for further characterization, rather than the 1 to 2 ft intervals, because the soil beneath the PRS structure is undisturbed, as confirmed by the soil descriptions in the sample collection logs. If contamination is present within the structure footprint, it is most likely present at shallow depths directly beneath the structure. The soil was described and logged on the Sample Collection Log forms (LANL-ER-SOP-01.04, Sample Control and Field Documentation).

All samples screened negative for HE using the HE spot test kit and contained background radioactivity. Two samples screened positive for HE using the D-Tech™ kit (Table 5.11.4-1).

TABLE 5.11.4-1
SUMMARY OF FIELD SCREENING RESULTS

SCREENING SAMPLE NO.	LOCATION ID	DEPTH (FT)	LAB SAMPLE NO.	HE SPOT TEST	RAD SCREEN	D-TECH RDX (MG/KG)	D-TECH TNT (MG/KG)
0316-97-4093 northwest quadrant	16-4093	0 - 1	0316-97-0545	negative	background	4.5 - 6.0	0.5 - 1.5
0316-97-4094 northeast quadrant	16-4094	0 - 1	NA[a]	negative	background	0.5 - 1.5	< 0.5
0316-97-4095 door	16-4095	0 - 0.7	NA	negative	background	< 0.5	< 0.5
0316-97-4096 southeast quadrant	16-4096	0 - 1	NA	negative	background	< 0.5	< 0.5
0316-97-4097 southwest quadrant	16-4097	0 - 1	NA	negative	background	< 0.5	< 0.5

a. NA = Not analyzed.

Screening sample 0316-97-4093 contained the highest concentrations of RDX and TNT (4.5 to 6.0 mg/kg and 0.5 to 1.5 mg/kg). This sample was submitted to the laboratory for analysis (as laboratory sample 0316-97-0545). Additional samples were collected (in duplicate) from this same location at the deeper depth interval (1 to 2 ft) to confirm that HE was not found at depth. These samples were collected as QA/QC samples (0316-97-0598 and 0316-97-0599), and were submitted to the laboratory for analysis (Tables 5.11.4-1 and 5.11.4-2).

TABLE 5.11.4-2
SUMMARY OF FIELD SCREENING RESULTS
FOR QA/QC SAMPLES

LOCATION ID	LAB SAMPLE NO.	HE SPOT TEST	RAD SCREEN	D-TECH RDX (MG/KG)	D-TECH TNT (MG/KG)	QA/QC SAMPLE
16-4093	0316-97-0599	negative	background	< 0.5	< 0.5	0316-97-0598

The laboratory samples were analyzed for metals SVOCs, and HE (Table 5.11.4-3).

TABLE 5.11.4-3
SUMMARY OF REQUEST NUMBERS FOR LABORATORY SAMPLES TAKEN AT PRS 16-024(s)

LOCATION ID	SAMPLE ID	DEPTH (FT)	MEDIA	SVOC	HE	INORGANIC
16-4093	0316-97-0545	0-1	Soil	3417R	3418R	3419R
16-4093	0316-97-0598	1-2	Soil	3526R	3527R	3528R
16-4093	0316-97-0599	1-2	Soil	3526R	3527R	3528R

5.11.5 Evaluation of Inorganic Chemicals

Lead and zinc were reported in sample 0316-97-0545 above background UTLs but below SALs. Silver was reported as estimated (J) at 0.37 mg/kg, because the duplicate analysis in this run was not within control limits, indicating possibly low precision. Antimony was reported as estimated undetected (UJ) at 7.3 mg/kg in sample 0316-97-0545, because the matrix spike recovery was low (52%) (Table 5.11.5-1). This result is accepted as undetected, as discussed in Section 4.1. No inorganic chemicals were detected above UTLs in the field duplicate pair of samples 0316-97-0598 and 0316-97-0599. Baseline validation identified no other problems that affect the use of these data.

TABLE 5.11.5-1
INORGANIC CHEMICALS WITH CONCENTRATIONS AT OR ABOVE BACKGROUND SCREENING VALUES FOR PRS 16-024(s)

ANALYTE	SAMPLE ID	SAMPLE VALUE (MG/KG)	SAL (MG/KG)	UTL (MG/KG)	MEDIA	DEPTH (FT)
Antimony	0316-97-0545	7.3(UJ[b])	31	1	Soil	0-1
Lead	0316-97-0545	35.6	400	23.3	Soil	0-1
Silver	0316-97-0545	0.37(J[c])	380	NC[a]	Soil	0-1
Zinc	0316-97-0545	62.8	23000	50.8	Soil	0-1

a. NC = not calculated
b. UJ = Analyte was not detected; the associated value is an estimate of the detection limit or quantitation limit.
c. J = Analyte was positively identified, but the result is estimated to be more uncertain than would normally be expected for that analysis.

5.11.6 Evaluation of Radionuclides

Radionuclides were not analyzed for at PRS 16-024(s) because historical evidence indicated that radioactive material was not stored or used in this HE magazine. Additionally, field screening did not indicate the presence of radioactive constituents.

5.11.7 Evaluation of Organic Chemicals

No HE was detected in any sample, despite indications of the presence of TNT and RDX in the field screening sample associated with sample 0316-97-0545. The positive D-Tech™ result, which suggested that low levels of TNT and RDX were present, was not confirmed by fixed laboratory analysis. The D-Tech™ kits have been shown to provide false positives due to interferences with humic materials. See Section 4.3.2 for further details. Baseline validation identified no problems with the laboratory analyses.

No SVOCs were detected in any sample. All SVOC non-detects for sample 0316-97-0545 were qualified estimated undetected (UJ), but as discussed in Section 4.3.1, these were accepted as undetected following focused validation. Baseline validation indicated no other problems that affect the use of these data.

5.11.8 Risk-Based Screening Assessment

Lead was detected at less than 10% of its SAL, and zinc and silver at less than 1% of their SALs. Antimony was reported as undetected. A visual inspection of the data suggest an MCE would be far below the target value of 1.0.

5.11.9 Preliminary Human Health Assessment

No human health risk assessment was performed for PRS 16-024(s) because contamination was not detected above SALs

5.11.10 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 PRS will be deferred until the PRS can be assessed as part of the ecological exposure unit methodology currently being developed.

5.11.11 Conclusions and Recommendations

Eight screening samples and three laboratory samples were collected in and downgradient from the footprint of former HE magazine TA-16-60. One laboratory sample was selected from the location with the highest screening results, but these results were not confirmed by laboratory analysis. The other laboratory samples were QA/QC duplicate splits collected at a depth of 1-2 ft at the same location. Lead and zinc were reported in the surface sample slightly above UTLs but well below SALs. No HE or organic compounds were detected. No inorganic or organic contamination was found above SALs and no COPCs were identified.

The biased sampling and analysis strategy at this former magazine was designed to ensure that residual contamination would be detected if it were present within the PRS. Screening locations and depths were selected based on information about the location, orientation, construction, use of the former building, and mode of decommissioning,. Because the likelihood of contamination within the building footprint is judged to be low following the removal of the building, and the likelihood of finding contamination is high based on the biased sampling, sampling at one location was judged sufficient to indicate whether or not such contamination is present at levels of concern. Because of the high initial screening result, three laboratory samples were collected at this location. All samples were analyzed for all potential contaminants based on historical knowledge of operations in TA-16-60.

PRS 16-024(s) is recommended for human-health NFA based on NFA Criterion 5 because contamination is not present at this site at levels that present a potential risk to human health.

5.12 PRS 16-025(b2)

This PRS is the site of former casting building TA-16-52, located in the GMX-2 area (Fig. 5.0-1). It is recommended for human-health NFA because no contaminants were detected above SALs.

5.12.1 History

PRS 16-025(b2) is discussed in detail in Subsection 5.20 of the RFI Work Plan for Operable Unit 1082, Addendum 1 (LANL 1994, 1160).

TA-16-52 was designed in the fall of 1944 as an experimental casting and machining building and served this function throughout its active lifetime (Martin 1993, 15-16-477). The structure had no sump adjacent to the building, only three sumps located approximately 75 ft to the southeast of the building and connected to the building. The locations of these sumps are currently

depressed sinkholes. The drain lines from these tanks exited into the main drainage to the east of the GMX-2 area. The sumps and drain lines are PRS 16-029(e2) and are addressed in the RFI Work Plan for Operable Unit 1082 Addendum 1 (LANL 1994, 1160).The building was abandoned in 1959 and decommissioned by burning in 1960. It was considered to be contaminated with HE before its decommissioning (Engineering Department 1959, 15-16-256).

The potential contamination at this PRS was identified as metals, SVOCs, and HE.

5.12.2 Description

TA-16-52 was located on level ground southeast of TA-16-49 in the southern portion of the GMX-2 area. It consisted of three sections, 15 ft long x 15 ft wide x 9 ft high, 10 ft-8 in. x 15 ft x 9 ft , and 23 ft x 15 ft x 9 ft. It also contained a steel reinforced concrete divider in its southern portion. This portion of the building was separated from the rest of the structure by an earthen barricade. The building was of wooden-frame construction with a concrete floor. The entire structure was surrounded by a large earthen barricade on the west, north, and south sides.

5.12.3 Previous Investigation(s)

No previous field investigations were conducted at this PRS.

5.12.4 Field Investigation

The goal of the Phase I investigation at PRS 16-025(b2), as outlined in the approved RFI Work Plan for Operable Unit 1082, Addendum 1 (LANL 1994, 1160), was to determine if contaminants were present in soils at levels of concern. The sampling design is consistent with the current industrial land use scenario of the conceptual model described in Section 4.3 of the RFI work plan. The potential for contamination at this PRS is hypothesized to be via either: (1) leaks and spills from the past operations; or (2) ash, debris, or contamination left behind after the former building was burned and remnants removed. The potential release mechanisms at this PRS are hypothesized to be via either: (1) infiltration of potential contamination into the near-surface soil; or (2) mechanical movement and mixing of potentially contaminated surface soil during the removal of the former building. There was no historic subsurface construction (or other intrusive activities) at this PRS, and there are no surface water collection points or drainages present that would have spread contamination to the subsurface. Biased sampling was designed to detect HE contamination in heterogeneous surface and subsurface soil at the site of the building footprint. The mode of decommissioning of the building by burning suggests that residual contamination is unlikely at this PRS.

Addendum 1 (LANL 1994, 1160) specified screening soil samples, 0 to 1 ft depth intervals, from six locations and selecting two laboratory samples based on field screening results. The plan called for taking the samples at the four quadrants of the building, at the building center, and adjacent to the location of the door. The laboratory samples were to be selected from the screening samples using the following prioritized biasing scheme: (1) samples with positive HE spot test kit result; (2) samples with above two times background radiation reading; (3) a sample at the door location; and (4) a sample at the building center. In response to an EPA NOD (EPA 1994, 15-16-644), screening samples were collected from 1 to 2 ft depth intervals (as well as the required 0 to 1 ft intervals) to confirm that the soil beneath this concrete floored building had not been disturbed during decommissioning.

One deviation was made to the approved work plan. The screening samples were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit. This analysis was performed in addition to the required HE spot test analysis because the D-Tech™ kits can detect specific potential contaminants and provide lower detection limits (1 ppm or less) than the HE spot test. This screening was used to further characterize the samples in the field for biasing purposes.

The building was accurately surveyed using a Trimble™ GPS Total Station. Aerial photographs were used to determine the building position, and the center of the building was surveyed with an estimated accuracy of 2 ft. Screening sample locations were further determined and surveyed relative to the center point and within the known dimensions of the building.

A total of 12 field screening samples from 6 locations were taken in and adjacent to the building footprints. Two samples were collected from each location, at 0 to 1 ft and 1 to 2 ft depth intervals. The samples were collected near the corners of the four quadrants of the buildings, at the center, and at the door location (Fig. 5.12.4-1). These locations were selected to ensure spatial variability and because the most likely contaminant dispersal mechanism for operations in this building, which had concrete floors, is hypothesized to be via either: (1) HE spills near door areas; or (2) leakage at the floors and floor/wall joints associated with floor washing.

All samples were collected with a manually driven hand auger (LANL-ER-SOP-06.10, Hand Auger and Thin-Wall Tube Sampler). The soil samples were screened in the field for HE and beta/gamma radioactivity using the HE spot test kit with modified Griess™ reagents (LANL-ER-SOP-10.06,R0, High Explosive Spot Test) and an Eberline ESP1™ radiological meter with HP-260™ probe (LANL-ER-SOP-10.07, R0, Field Monitoring for Surface and Volume Radioactivity Levels). Samples at 0 to 1 ft depth intervals were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit (EPA SW-846 Methods 4051 and 4050). The 0 to 1 ft intervals were selected for further characterization, rather

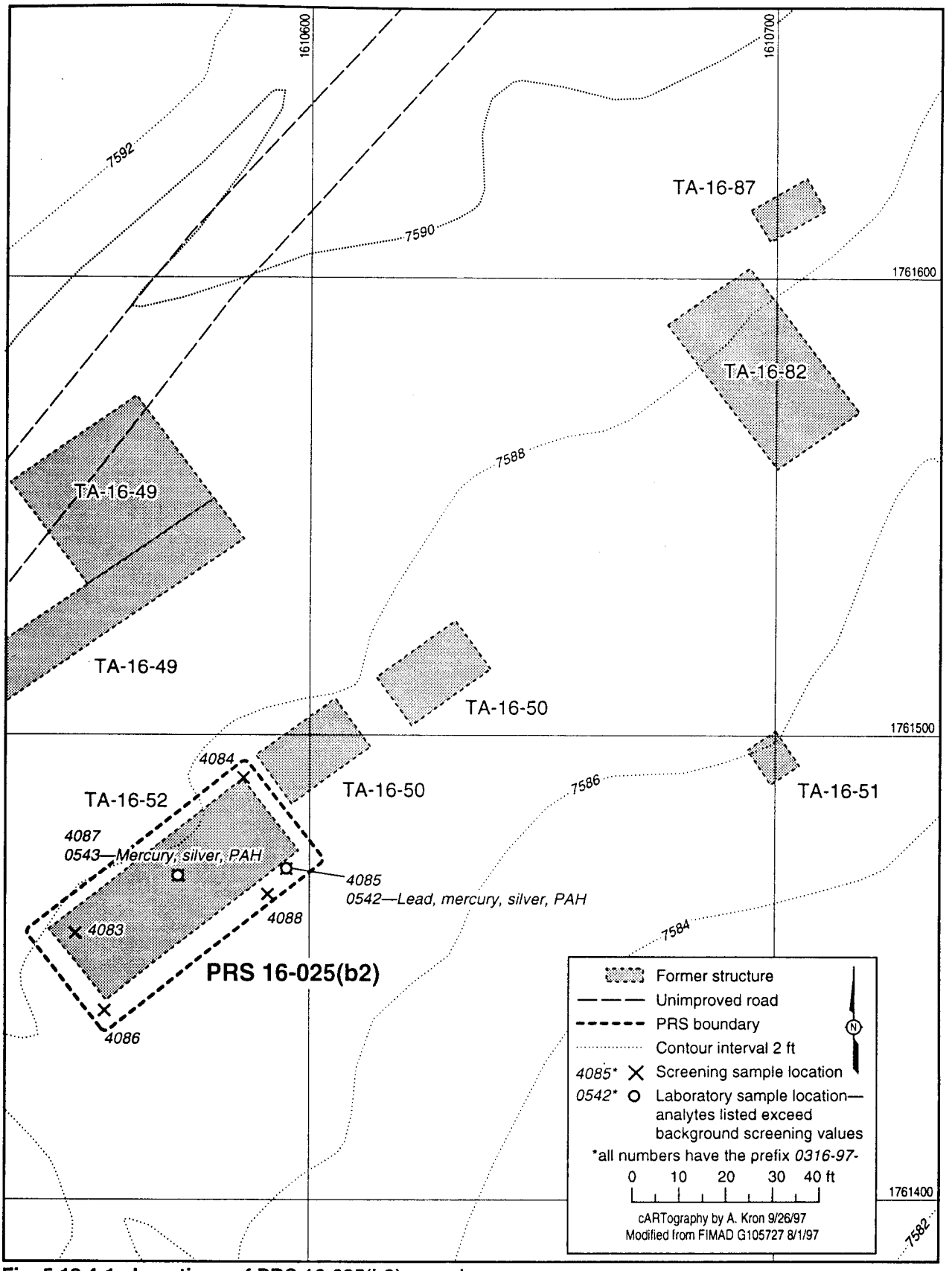

Fig. 5.12.4-1 Locations of PRS 16-025(b2) samples.

than the 1 to 2 ft intervals, because the soil beneath the PRS structure is undisturbed, as confirmed by the soil descriptions in the sample collection logs. If contamination is present within the structure footprint, it is most likely present at shallow depths directly beneath the structure. The soil was described and logged on the Sample Collection Log forms (LANL-ER-SOP-01.04, Sample Control and Field Documentation).

All samples screened negative for HE using the HE spot test kit and contained background radioactivity. Three samples screened positive for HE using the D-Tech™ kit (Table 5.12.4-1).

TABLE 5.12.4-1
SUMMARY OF FIELD SCREENING RESULTS

SCREENING SAMPLE NO.	LOCATION ID	DEPTH (FT)	LAB SAMPLE NO.	HE SPOT TEST	RAD SCREEN	D-TECH RDX (MG/KG)	D-TECH TNT (MG/KG)
0316-97-4083 southwest quadrant	16-4083	0 - 1	NA[a]	negative	background	< 0.5	0.5 - 1.5
0316-97-4084 northwest quadrant	16-4084	0 - 1	NA	negative	background	< 0.5	< 0.5
0316-97-4085 northeast quadrant	16-4085	0 - 1	0316-97-0542	negative	background	0.5 - 1.5	< 0.5
0316-97-4086 southeast quadrant	16-4086	0 - 1	NA	negative	background	< 0.5	< 0.5
0316-97-4087 center	16-4087	0 - 1	0316-97-0543	negative	background	< 0.5	0.5 - 1.5
0316-97-4088 door	16-4088	0 - 1	NA	negative	background	< 0.5	< 0.5

a. NA = Not analyzed.

Screening sample 0316-97-4087 contained an elevated concentration of TNT (0.5 to 1.5 mg/kg) and was the center location. This sample was submitted to the laboratory for analysis. Screening sample 0316-97-4085 was one of the remaining two samples which contained an elevated concentration of HE (0.5 to 1.5 mg/kg RDX) and was selected randomly. The random sample was selected by using a random-number generator to select a number one or two. The two numbers corresponded to the northeast and southwest quadrants (the quadrants containing samples with elevated HE). The northeast quadrant sample was selected. This sample was submitted to the laboratory for analysis (Table 5.12.4-1). The laboratory samples were analyzed for metals, SVOCs, and HE (Table 5.12.4-2).

TABLE 5.12.4-2
SUMMARY OF REQUEST NUMBERS FOR LABORATORY SAMPLES TAKEN AT PRS 16-025(b2)

LOCATION ID	SAMPLE ID	DEPTH (FT)	MATRIX	SVOC	HE	INORGANIC
16-4085	0316-97-0542	0-1	Soil	3457R	3458R	3459R
16-4087	0316-97-0543	0-1	Soil	3457R	3458R	3459R

5.12.5 Evaluation of Inorganic Chemicals

Lead was detected above background UTLs. Antimony was undetected by the laboratory at 6.7 mg/kg and 7.5 mg/kg (Table 5.12.5-1). The data were qualified as estimated undetected (UJ) because the matrix spike recoveries were below the acceptable level (52 %). These results are accepted as non detects, as discussed in Section 4.1. Mercury was detected in both samples above background levels. As discussed in Section 4.1, the data of Ferenbaugh et al (1990, 0099) are being used to make background evaluations for mercury for data reported below the UTL of 0.1 mg/kg.) Silver was detected at 1.5 mg/kg, above the instrument detection limits but below the reporting limits (lab qualifier of B). The data was reevaluated as estimated (J).

Baseline validation revealed no other problems with the inorganic analyses that affect their use in this report.

TABLE 5.12.5-1
INORGANIC CHEMICALS WITH CONCENTRATIONS AT OR ABOVE BACKGROUND SCREENING VALUES FOR PRS 16-025(b2)

ANALYTE	SAMPLE ID	SAMPLE VALUE (MG/KG)	SAL (MG/KG)	SAL UNITS	UTL (MG/KG)	MEDIA	DEPTH (FT)
Antimony	0316-97-0542	6.7(UJ[a])	31	MG/KG	1	Soil	0-1
Antimony	0316-97-0543	7.5(UJ)	31	MG/KG	1	Soil	0-1
Lead	0316-97-0542	27.9	400	MG/KG	23.3	Soil	0-1
Mercury	0316-97-0542	0.17(J[b])	23	MG/KG	NC[c]	Soil	0-1
Mercury	0316-97-0543	0.6(J)	23	MG/KG	NC	Soil	0-1
Silver	0316-97-0542	1.5(J)	380	MG/KG	NC	Soil	0-1
Silver	0316-97-0543	1.5(J)	380	MG/KG	NC	Soil	0-1

a. UJ = Analyte was not detected; the associated value is an estimate of the detection limit or quantitation limit.
b. J = Analyte was positively identified, but the result is estimated to be more uncertain than would normally be expected for that analysis.
c. NC = not calculated

5.12.6 Evaluation of Radionuclides

Radionuclides were not analyzed for at PRS 16-025(b2) because historical evidence indicated that radioactive material was not stored or used in the casting building. Additionally, field screening did not indicate the presence of radioactive constituents.

5.12.7 Evaluation of Organic Chemicals

PAHs were detected in samples 0316-97-0542 and 0316-97-0543 at low concentrations (Table 5.12.7-1). These data were PM-qualified (professional judgment needed) during baseline validation because the samples missed the extraction holding time by two days. Recent EPA findings indicate that minor deviations from the extraction holding times have little effect on sample results for soil samples; see discussion in Section 4.3.1. All data are considered usable; detected results were requalified as estimated (J) and estimated undetected results (UJ).

No HE was detected in sample 0316-97-0542 and 0316-97-0543, despite indications of the presence of TNT and RDX in the associated field screening sample. The positive D-Tech™ result, which suggested that low levels of TNT and RDX were present, was not confirmed by the fixed laboratory analysis. The D-Tech™ kits have been shown to provide false positives due to interferences with humic materials. See Section 4.3.2 for further details.

The qualifiers shown in Table 5.12.7-1 have been assigned during focused data validation.

TABLE 5.12.7-1
DETECTED ORGANIC CHEMICALS FOR PRS 16-025(b2)

ANALYTE	SAMPLE ID	SAMPLE VALUE (MG/KG)	SAL (MG/KG)	MEDIA	DEPTH (FT)
Benzo(a)anthracene	0316-97-0543	0.036(J[a])	0.61	Soil	0-1
Benzo(b)fluoranthene	0316-97-0543	0.05(J)	0.61	Soil	0-1
Benzo(k)fluoranthene	0316-97-0543	0.042(J)	6.1	Soil	0-1
Chrysene	0316-97-0543	0.047(J)	61	Soil	0-1
Fluoranthene	0316-97-0542	0.034(J)	2600	Soil	0-1
Fluoranthene	0316-97-0543	0.054(J)	2600	Soil	0-1
Pyrene	0316-97-0542	0.055(J)	1900	Soil	0-1
Pyrene	0316-97-0543	0.053(J)	1900	Soil	0-1

a. J = Analyte was positively identified, but the result is estimated to be more uncertain than would normally be expected for that analysis.

5.12.8 Risk-Based Screening Assessment

Detected inorganics are present at less than 10% of SALs. Detected organic chemicals are present only at low levels (less than 1 mg/kg).

Four inorganic and five organic chemicals were carried forward from the background comparison and organic constituent evaluation. Analytes are divided into two classes, noncarcinogens and carcinogens, for the screening assessment depending on which toxicological effect forms the basis of their SAL. This separation is required to evaluate possible additive effects within each class of chemical.

An MCE calculation was performed using the sum of the maximum concentrations at this PRS. The MCE calculations are presented in Table 5.12.8-1. The MCE results for noncarcinogens and carcinogens are 0.4 and 0.2, respectively. The MCE value for both classes is less than unity; therefore, a potential human health risk based on additive effects is not identified for this class of chemical.

TABLE 5.12.8-1
MCE CALCULATION FOR PRS 16-025(b2)

	MAXIMUM CONCENTRATION	SAL	
ANALYTE	MG/KG	MG/KG	NORMALIZED VALUE
Noncarcinogenic Effects			
Antimony	8	31	0.25806
Lead	28	400	0.07000
Mercury	0.6	23	0.02609
Silver	2	380	0.00526
Fluoranthene	0.05	2600	0.00002
Pyrene	0.06	1900	0.00003
TOTAL			0.4
Carcinogenic Effects			
Benzo(a)anthracene	0.04	0.61	0.06557
Benzo(b)fluoranthene	0.05	0.61	0.08197
Benzo(k)fluoranthene	0.04	6.1	0.00656
Chrysene	0.05	61	0.00082
TOTAL			0.2

5.12.9 Preliminary Human Health Assessment

No human health risk assessment was performed for PRS 16-025(b2) because contamination was not detected at levels at or above SALs.

5.12.10 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 PRS will be deferred until the PRS can be assessed as part of the ecological exposure unit methodology currently being developed.

5.12.11 Conclusions and Recommendations

Twelve screening samples and two laboratory samples were collected in and adjacent to the footprint of the former casting building TA-16-52. The laboratory samples were selected from screening samples with positive HE screening results. No HE was detected in the laboratory samples. Trace amounts of inorganics and organic compounds were reported above detection but at levels far below SALs. The data show that no contaminants are present at this site at levels of concern to human health.

The biased sampling and analysis strategy at this former casting building was designed to ensure that residual contamination would be detected if it were present within the PRS. Screening locations and depths were selected based on information about the location, orientation, construction, use of the former building, and mode of decommissioning. Because the likelihood of contamination within the building footprint is judged to be low following the removal of the building, and the likelihood of finding contamination is high based on the biased sampling, two confirmatory laboratory samples are sufficient to indicate whether or not such contamination is present at levels of concern. The laboratory samples were based on field screening results, and were analyzed for all potential contaminants based on historical knowledge of operations in TA-16-52.

PRS 16-025(b2) is recommended for human-health NFA because contamination is not present at this site at levels that present a potential risk to human health.

5.13 PRS 16-025(d)

This PRS is the site of former equipment and control building TA-16-94, located in the GMX-3 area (Fig. 5.0-1). It is recommended for human-health NFA because no contaminants were detected above SALs.

5.13.1 History

PRS 16-025(d) is discussed in detail in Subsection 5.19 of the RFI Work Plan for Operable Unit 1082, Addendum 1 (LANL 1994, 1160).

TA-16-94 was an equipment and control building for machining buildings TA-16-95, TA-16-96, TA-16-97, and TA-16-98. It was the center building of the North/South/East/West machining line. It is possible, but unlikely, that some HE was used in the building. The building had no sump or plumbing. TA-16-94 was built in 1948, abandoned in 1959 and destroyed in 1960 by intentional burning. Surveys completed before the destruction of the building suggest it was free of HE contamination (Engineering Department 1956, 15-16-256).

The potential contamination at this PRS was identified as metals, SVOCs, and HE.

5.13.2 Description

TA-16-94 was on relatively level ground with a slight slope to the northeast. The exact dimensions of the building are unknown. Based on photographs, it is estimated to be 30 ft by 30 ft with a 10 ft by 10 ft extension on the west side. The building was of wooden-frame construction on a concrete platform.

5.13.3 Previous Investigation(s)

No previous investigations were conducted at this PRS.

5.13.4 Field Investigation

The goal of the Phase I investigation at PRS 16-025(d), as outlined in the approved RFI Work Plan for Operable Unit 1082, Addendum 1 (LANL 1994, 1160), was to determine if contaminants were present in soils at levels of concern. The sampling design is consistent with the current industrial land use scenario of the conceptual model described in Section 4.3 of the RFI work plan. The potential for contamination at this PRS is hypothesized to be via either: (1) leaks and spills from the past operations; or (2) ash, debris, or contamination left behind after the former building was burned and remnants removed. The potential release mechanisms at this PRS are hypothesized to be via either: (1) infiltration of potential contamination into the near-surface soil; or (2) mechanical movement and mixing of potentially contaminated surface soil during the removal of the former building. There was no historic subsurface construction (or other intrusive activities) at this PRS, and there are no surface water collection points or drainages present that would have spread contamination to the subsurface. Biased sampling was designed to detect residual HE in the surface and near-surface soil at the site of the building footprint. The mode of

decommissioning of the building by burning suggests that residual contamination is unlikely at this PRS.

Addendum 1 (LANL 1994, 1160) specified screening soil samples, 0 to 1 ft depth intervals, from four locations and selecting one laboratory sample if a positive field screening reading is obtained. The plan called for taking the samples at the four quadrants of the building. The laboratory sample was to be selected from the screening samples using the following prioritized biasing scheme: (1) a sample with a positive HE spot test kit result; and (2) a sample with an above two times background radiation reading. In response to an EPA NOD (EPA 1994, 15-16-644), screening samples were collected from 1 to 2 ft depth intervals (as well as the required 0 to 1 ft intervals) to confirm that the soil beneath this concrete floored building had not been disturbed during decommissioning, and one laboratory sample was collected, (based on the above scheme), even if all field screening results were negative.

One deviation was made to the approved work plan. The screening samples were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit. This analysis was performed in addition to the required HE spot test analysis because the D-Tech™ kits can detect specific potential contaminants and provide lower detection limits (1 ppm or less) than the HE spot test. This screening was used to further characterize the samples in the field for biasing purposes.

The building was accurately surveyed using a Trimble™ GPS Total Station. Aerial photographs were used to determine the building position, and the center of the building was surveyed with an estimated accuracy of 2 ft. Screening sample locations were further determined and surveyed relative to the center point and within the known dimensions of the building.

A total of eight field screening samples were taken from four locations in the building footprint. Two samples were collected from each location, at 0 to 1 ft and 1 to 2 ft depth intervals. The samples were collected near the corners of the four quadrants of the building (Fig. 5.13.4-1). These locations were selected to ensure spatial variability and because the most likely contaminant dispersal mechanism for operations in this building, which had concrete floors, is hypothesized to be via leakage at the floor/wall joints.

All samples were collected with a manually driven hand auger (LANL-ER-SOP-06.10, Hand Auger and Thin-Wall Tube Sampler). The soil samples were screened in the field for HE and beta/gamma radioactivity using the HE spot test kit with modified Griess™ reagents (LANL-ER-SOP-10.06,R0, High Explosive Spot Test) and an Eberline ESP1™ radiological meter with HP-260™ probe (LANL-ER-SOP-10.07, R0, Field Monitoring for Surface and Volume Radioactivity Levels).

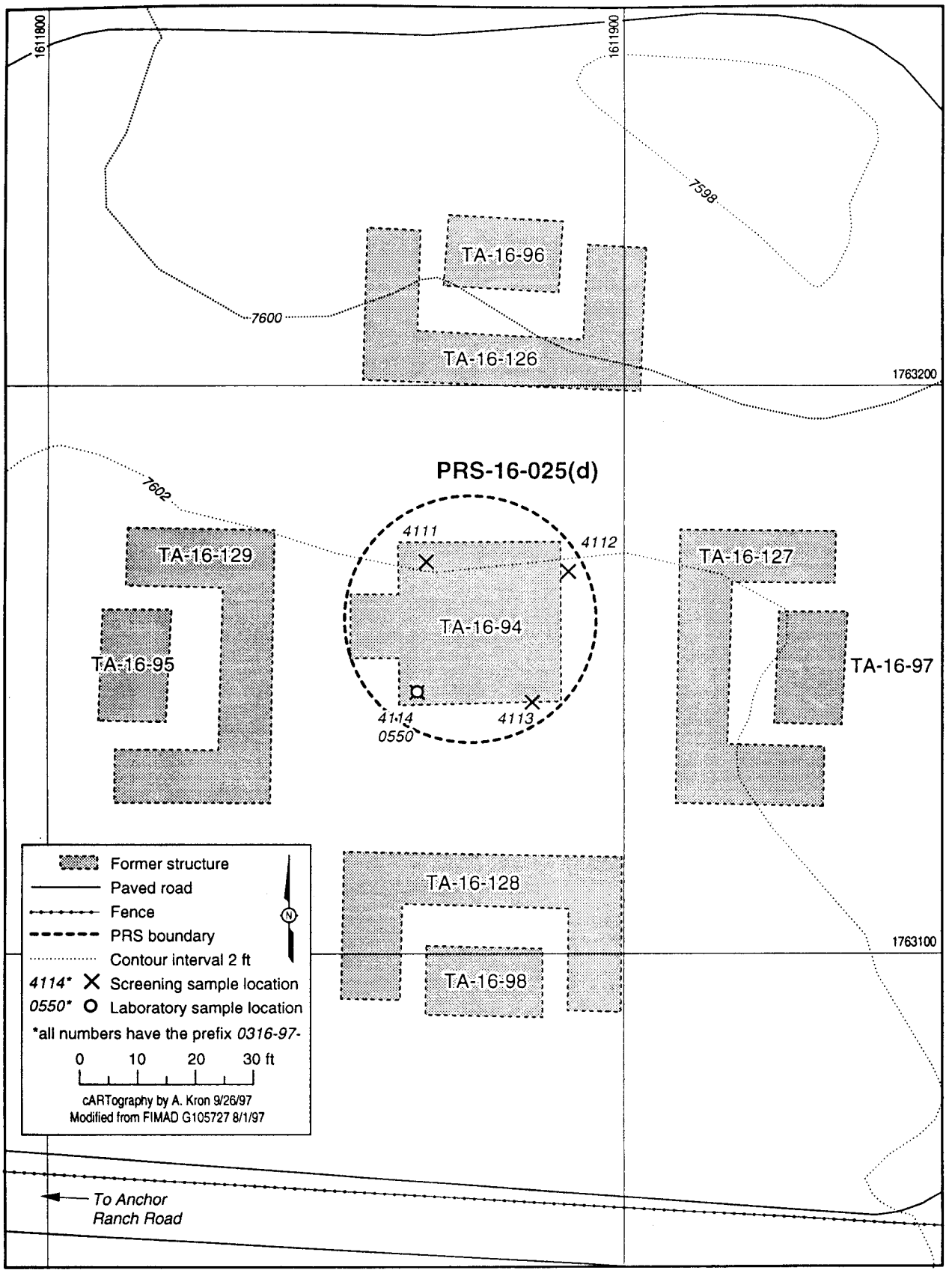

Fig. 5.13.4-1 Locations of PRS 16-025(d) samples.

Samples at 0 to 1 ft depth intervals were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit (EPA SW-846 Methods 4051 and 4050). The 0 to 1 ft intervals were selected for further characterization, rather than the 1 to 2 ft intervals, because the soil beneath the PRS structure is undisturbed, as confirmed by the soil descriptions in the sample collection logs. If contamination is present within the structure footprint, it is most likely present at shallow depths directly beneath the structure. The soil was described and logged on the Sample Collection Log forms (LANL-ER-SOP-01.04, Sample Control and Field Documentation).

All samples screened negative for HE using the HE spot test kit and contained background radioactivity. One sample screened positive for HE using the D-Tech™ kit (Table 5.13.4-1).

TABLE 5.13.4-1
SUMMARY OF FIELD SCREENING RESULTS

SCREENING SAMPLE NO.	LOCATION ID	DEPTH (FT)	LAB SAMPLE NO.	HE SPOT TEST	RAD SCREEN	D-TECH RDX (MG/KG)	D-TECH TNT (MG/KG)
0316-97-4111 northwest quadrant	16-4111	0 - 1	NA[a]	negative	background	< 0.5	< 0.5
0316-97-4112 northeast quadrant	16-4112	0 - 1	NA	negative	background	< 0.5	< 0.5
0316-97-4113 southeast quadrant	16-4113	0 - 1	NA	negative	background	< 0.5	< 0.5
0316-97-4114 southwest quadrant	16-4114	0 - 1	0316-97-0550	negative	background	0.5 - 1.5	< 0.5

a. NA = Not analyzed.

Screening sample 0316-97-4114 contained the highest concentration of HE (0.5 to 1.5 mg/kg RDX) and was submitted to the laboratory for analysis (Table 5.13.4-1). The sample was analyzed for metals, SVOCs, and HE (Table 5.13.4-2).

TABLE 5.13.4-2
SUMMARY OF REQUEST NUMBERS FOR LABORATORY SAMPLES FOR PRS 16-025(d)

LOCATION ID	SAMPLE ID	DEPTH (FT)	MATRIX	INORGANICS	SVOCS	HE
16-4114	0316-97-0550	0 - 1	soil	3443R	3441R	3442R

5.13.5 Evaluation of Inorganic Chemicals

No inorganic chemicals were present at levels greater than UTL in sample 0316-97-0550. Baseline validation indicates no data quality problems associated with the analyses that affect the use of the results.

5.13.6 Evaluation of Radionuclides

Radionuclides were not analyzed for at PRS 16-025(d) because historical evidence indicated that radioactive material was not stored or used in the equipment and control building. Additionally, field screening did not indicate the presence of radioactive constituents.

5.13.7 Evaluation of Organic Chemicals

No organic chemicals were detected in sample 0316-97-0550, despite indications of the presence of RDX in the associated field screening sample. The positive D-Tech™ result, which suggested that low levels of RDX were present, was not confirmed by the fixed laboratory analysis. The D-Tech™ kits have been shown to provide false positives due to interferences with humic materials. See Section 4.3.2 for further details.

Baseline validation indicates no data quality problems associated with these analyses that affect the use of the organic data.

5.13.8 Risk-Based Screening Assessment

No chemicals were present at levels at or above UTLs or EQLs at PRS 16-025(d).

5.13.9 Preliminary Human Health Assessment

No human health risk assessment was performed for PRS 16-025(d) because contamination was not detected at levels at or above SALs.

5.13.10 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 PRS will be deferred until the PRS can be assessed as part of the ecological exposure unit methodology currently being developed.

5.13.11 Conclusions and Recommendations

Eight screening samples and one laboratory sample were collected in and adjacent to the footprint of the former equipment and control building TA-16-94. One laboratory sample was selected from the only sample with a positive HE screening result. The sample contained no inorganic or organic contamination above detection limits and UTLs. The data show that no contaminants are present at this site at levels of concern to human health.

The biased sampling and analysis strategy at this former equipment and control building was designed to ensure that residual contamination would be detected if it were present within the PRS. Screening locations and depths were selected based on information about the location, orientation, construction, use of the former building, and mode of decommissioning. Because the likelihood of contamination within the building footprint is judged to be low following the removal of the building, and the likelihood of finding contamination is high based on the biased sampling, a single confirmatory laboratory sample is sufficient to indicate whether or not such contamination is present at levels of concern. The laboratory sample was selected from screening samples based on field screening results, and was analyzed for all potential contaminants based on historical knowledge of operations in TA-16-94.

PRS 16-025(d) is recommended for human-health NFA because contamination is not present at this site at levels that present a potential risk to human health.

5.14 PRS 16-025(g)

This PRS is the site of former machining building TA-16-95, located in the GMX-3 area (Fig. 5.0-1). It is recommended for human-health NFA because no contaminants were detected above SALs.

5.14.1 History

PRS 16-025(g) is discussed in detail in Subsection 5.18 of the RFI Work Plan for Operable Unit 1082, Addendum 1 (LANL 1994, 1160).

TA-16-95 was an HE machining building which was the western building of the North/South/East/West machining line, built in November 1948. The building had a sump PRS 16-029(m) which is addressed in the RFI Work Plan for Operable Unit 1082 Addendum 1(LANL 1994, 1160). The building was designated as HE contaminated in a 1959 HE survey (Engineering Department 1959, 15-16-256) and was subsequently abandoned. It was destroyed by intentional burning in 1960.

The potential contamination at this PRS was identified as metals, SVOCs, and HE.

5.14.2 Description

The building was located east of the 30s-Line on flat terrain with a slight drop in elevation to the northeast. The building was 20 ft long x 12 ft wide with a 20 ft x 6 ft porch, and was of wooden-frame construction on concrete floors. It had a U-shaped and wooden-walled earthen barricade

separating it from a central utility building, TA-16-94. Some drainage probably flowed into a gully on the east side of the building. The building series was surrounded by access roads that roughly formed a square border.

5.14.3 Previous Investigation(s)

No previous investigations were conducted at this PRS.

5.14.4 Field Investigation

The goal of the Phase I investigation at PRS 16-025(g), as outlined in the approved Addendum 1 (LANL 1994, 1160), was to determine if contaminants were present in soils at levels of concern. The sampling design is consistent with the current industrial land use scenario of the conceptual model described in Section 4.3 of the RFI work plan. The potential for contamination at this PRS is hypothesized to be via either: (1) leaks and spills from the past operations; or (2) ash, debris, or contamination left behind after the former building was burned and remnants removed. The potential release mechanisms at this PRS are hypothesized to be via either: (1) infiltration of potential contamination into the near-surface soil; or (2) mechanical movement and mixing of potentially contaminated surface soil during the removal of the former building. There was no historic subsurface construction (or other intrusive activities) at this PRS, and there are no surface water collection points or drainages present that would have spread contamination to the subsurface. Biased sampling was designed to detect surface and near-surface HE contamination of nonhomogeneous soil at the site of the building footprint. The mode of decommissioning of the building by burning suggests that residual contamination is unlikely at this PRS.

Addendum 1 (LANL 1994, 1160) specified screening soil samples, 0 to 1 ft depth intervals, from six locations and selecting two laboratory samples based on screening results. The plan called for taking the samples at the four quadrants of the building, in the building center, and adjacent to the location of the door. The laboratory samples were to be selected from the screening samples using the following prioritized biasing scheme: (1) samples with positive HE spot test kit results; (2) samples with above two times background radiation reading; (3) a sample at the building door; (4) a sample at building center; and (5) random samples. In response to an EPA NOD (EPA 1994, 15-16-644), screening samples were collected from 1 to 2 ft depth intervals (as well as the required 0 to 1 ft intervals) to confirm that the soil beneath this concrete floored building had not been disturbed during decommissioning, and three laboratory samples were collected (based on the above scheme) rather than two laboratory samples.

One deviation was made to the approved work plan. The samples were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit. This analysis was performed in addition to the required HE spot test analysis because the D-Tech™ kits can detect specific potential contaminants and provide lower detection limits (1 ppm or less) than the HE spot test. This screening was used to further characterize the samples in the field for biasing purposes.

The building was accurately surveyed using a Trimble™ GPS Total Station. Aerial photographs were used to determine the building position, and the center of the building was surveyed with an estimated accuracy of 2 ft. Screening sample locations were further determined and surveyed relative to the center point and within the known dimensions of the building.

A total of 12 field screening samples were taken from 6 locations in and adjacent to the building footprint. Two samples were collected from each location, at 0 to 1 ft and 1 to 2 ft depth intervals. The samples were collected near the corners of the four quadrants of the building, in the building center, and adjacent to the location of the door (Fig. 5.14.4-1). These locations were selected to ensure spatial variability and because the most likely contaminant dispersal mechanism for operations in this building, which had concrete floors, is hypothesized to be via either: (1) HE spills near door areas; or (2) leakage at the floor and floor/wall joints.

All samples were collected with a manually driven hand auger (LANL-ER-SOP-06.10, Hand Auger and Thin-Wall Tube Sampler). The soil samples were screened in the field for HE and beta/gamma radioactivity using the HE spot test kit with modified Griess™ reagents (LANL-ER-SOP-10.06,R0, High Explosive Spot Test) and an Eberline ESP1™ radiological meter with HP-260™ probe (LANL-ER-SOP-10.07, R0, Field Monitoring for Surface and Volume Radioactivity Levels). Samples at 0 to 1 ft depth intervals were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit (EPA SW-846 Methods 4051 and 4050). The 0 to 1 ft intervals were selected for further characterization, rather than the 1 to 2 ft intervals, because the soil beneath the PRS structure is undisturbed, as confirmed by the soil descriptions in the sample collection logs. If contamination is present within the structure footprint, it is most likely present at shallow depths directly beneath the structure. The soil was described and logged on the Sample Collection Log forms (LANL-ER-SOP-01.04, Sample Control and Field Documentation).

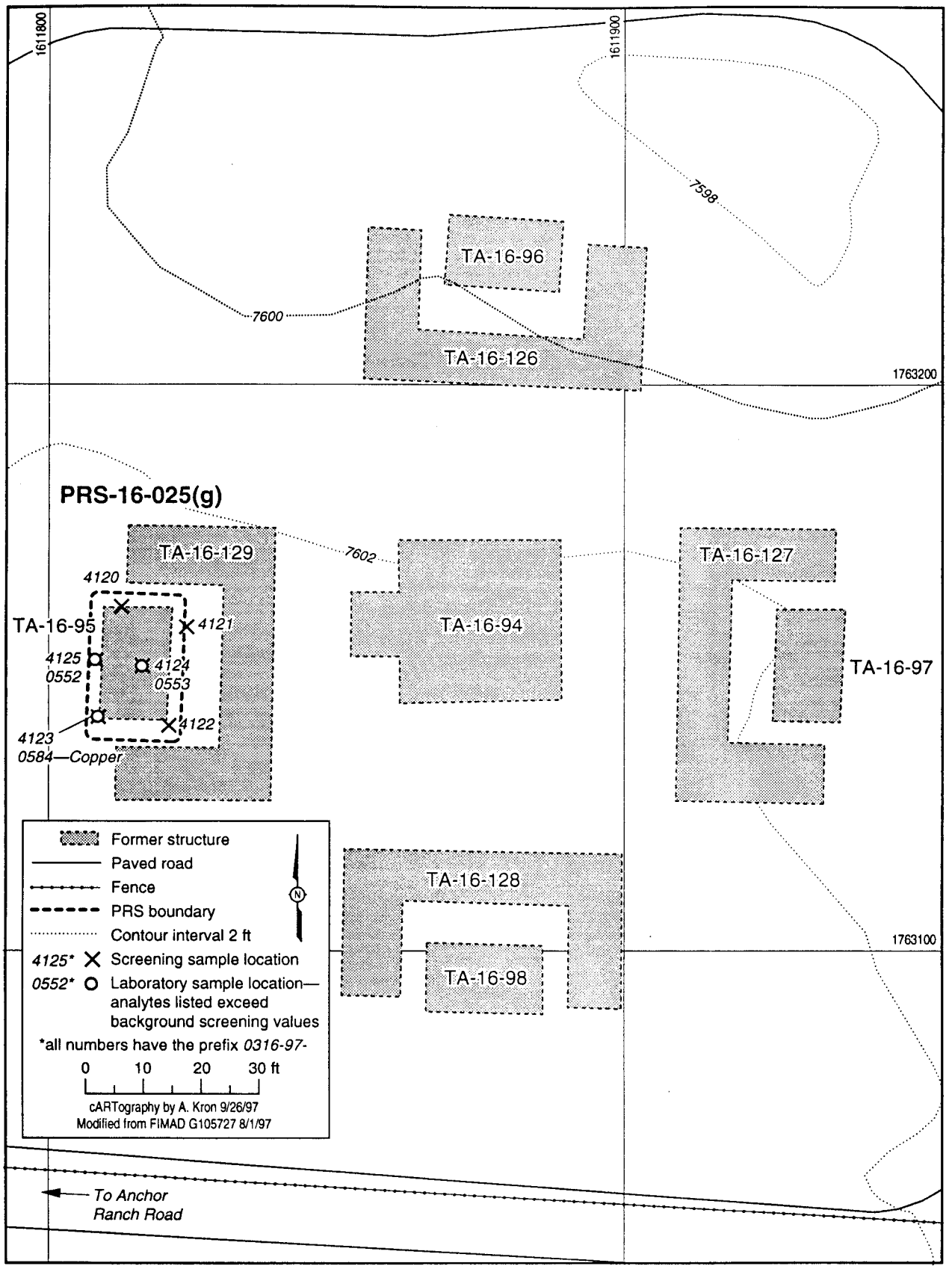

Fig. 5.14.4-1 Locations of PRS 16-025(g) samples.

All samples screened negative for HE using the HE spot test kit and contained background radioactivity. One sample screened positive for HE using the D-Tech™ kit (Table 5.14.4-1).

TABLE 5.14.4-1
SUMMARY OF FIELD SCREENING RESULTS

SCREENING SAMPLE NO.	LOCATION ID	DEPTH (FT)	LAB SAMPLE NO.	HE SPOT TEST	RAD SCREEN	D-TECH RDX (MG/KG)	D-TECH TNT (MG/KG)
0316-97-4120 northwest quadrant	16-4120	0 - 1	NA[a]	negative	background	< 0.5	< 0.5
0316-97-4121 northeast quadrant	16-4121	0 - 1	NA	negative	background	< 0.5	< 0.5
0316-97-4122 southeast quadrant	16-4122	0 - 1	NA	negative	background	< 0.5	< 0.5
0316-97-4123 southwest quadrant	16-4123	0 - 1	0316-97-0584	negative	background	< 0.5	< 0.5
0316-97-4124 center	16-4124	0 - 1	0316-97-0553	negative	background	< 0.5	< 0.5
0316-97-4125 door	16-4125	0 - 1	0316-97-0552	negative	background	< 0.5	0.5 - 1.5

a. NA = Not analyzed.

Screening sample 0316-97-4125 contained the highest concentration of TNT (0.5 to 1.5 mg/kg) and was the door location. This sample was submitted to the laboratory for analysis. The other samples submitted to the laboratory, 0316-97-4124 and 0316-97-4123, were below detection for TNT and RDX and were selected from the center and a random location, respectively. The random sample was selected by using a random-number generator to select a number one through four. These numbers corresponded with the northeast, northwest, southeast, and southwest quadrants. The southwest quadrant sample was selected (Table 5.14.4-1). The samples were analyzed for metals, SVOCs, and HE (Table 5.14.4-2).

TABLE 5.14.4-2
SUMMARY OF REQUEST NUMBERS FOR LABORATORY SAMPLES FOR PRS 16-025(g)

LOCATION ID	SAMPLE ID	DEPTH (FT)	MATRIX	SVOC	HE	INORGANIC
16-4125	0316-97-0552	0-1	Soil	3441R	3442R	3443R
16-4124	0316-97-0553	0-1	Soil	3441R	3442R	3443R
16-4123	0316-97-0584	0-1	Soil	3441R	3442R	3443R

5.14.5 Evaluation of Inorganic Chemicals

Copper was detected slightly above the background UTL but below the SAL. Baseline validation revealed no problems with the inorganic analyses (Table 5.14.5-1).

TABLE 5.14.5-1
INORGANIC CHEMICALS WITH CONCENTRATIONS AT OR ABOVE BACKGROUND SCREENING VALUES FOR PRS 16-025(g)

ANALYTE	SAMPLE ID	SAMPLE VALUE (MG/KG)	SAL (MG/KG)	UTL (MG/KG)	MEDIA	DEPTH (FT)
Copper	0316-97-0584	16.6	2800	15.5	Soil	0-1

5.14.6 Evaluation of Radionuclides

Radionuclides were not analyzed for at PRS 16-025(g) because historical evidence indicated that radioactive material was not stored or used in the machining building. Additionally, field screening did not indicate the presence of radioactive constituents.

5.14.7 Evaluation of Organic Chemicals

No HE was detected in any laboratory sample, despite indications of the presence of TNT in the field screening sample associated with sample 0316-97-0552. The positive D-Tech™ result, which suggested that low levels of TNT were present, was not confirmed by the fixed laboratory analysis. The D-Tech™ kits have been shown to provide false positives due to interferences with humic materials. See Section 4.3.2 for further details.

No organic chemicals were detected in any laboratory sample. Baseline validation indicates no data quality problems associated with these analyses. The data indicate no evidence for a release of organic constituents at the site.

5.14.8 Risk-Based Screening Assessment

Copper was detected slightly above the background UTL, at less than 1% of its SAL. No other chemical was reported above detection limits and UTLs in any laboratory sample.

5.14.9 Preliminary Human Health Assessment

No human health risk assessment was performed for PRS 16-025(g) because contamination was not detected at levels at or above SALs.

5.14.10 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 PRS will be deferred until the PRS can be assessed as part of the ecological exposure unit methodology currently being developed.

5.14.11 Conclusions and Recommendations

Twelve screening samples and three laboratory samples were collected in and adjacent to the footprint of the former machining building TA-16-95. Laboratory samples were selected from the only sample with a positive HE screening result, the center location, and a random location. No inorganic or organic contamination was present in the samples above detection limits. The data show that no contaminants are present at this site at levels of concern to human health.

The biased sampling and analysis strategy at this former machining building was designed to ensure that residual contamination would be detected if it were present within the PRS. Screening locations and depths were selected based on information about the location, orientation, construction, use of the former building, and mode of decommissioning. Because the likelihood of contamination within the building footprint is judged to be low following the removal of the building, and the likelihood of finding contamination is high based on the biased sampling, three confirmatory laboratory samples are sufficient to indicate whether or not such contamination is present at levels of concern. The laboratory samples were selected from screening samples based on the site specific prioritization scheme and were analyzed for all potential contaminants based on historical knowledge of operations in TA-16-95.

PRS 16-025(g) is recommended for human-health NFA based on NFA Criterion 5 because contamination is not present at this site at levels that present a potential risk to human health.

5.15 PRS 16-025(h)

This PRS is the site of former machining building TA-16-96, located in the GMX-3 area (Fig. 5.0-1). It is recommended for human-health because contamination is not present at levels that present a potential risk to human health.

5.15.1 History

PRS 16-025(h) is discussed in detail in Subsection 5.18 of the RFI Work Plan for Operable Unit 1082, Addendum 1 (LANL 1994, 1160).

TA-16-96 was an HE machining building that was the northern building in the North/South/East/West machining line. The building was constructed in 1948 and used for HE machining until the TA-16-260 machining building was completed in the early 1950s. The building had a sump, PRS 16-029(n), that is addressed in the RFI Work Plan for Operable Unit 1082, Addendum 1 (LANL 1994, 1160). The building was designated as HE contaminated in a 1959 HE survey (Engineering Department 1959, 15-16-256) and was subsequently abandoned. It was destroyed by intentional burning in 1960.

The potential contamination at this PRS was identified as metals, SVOCs, and HE.

5.15.2 Description

The building was located east of the 30s-Line on flat terrain with a slight drop in elevation to the northeast. The building was 20 ft long x 12 ft wide with a 20 ft x 6 ft porch, and of wooden-frame construction on a concrete floor. It had a U-shaped and wooden-walled earthen barricade separating it from a central utility building, TA-16-94. Some drainage probably flowed into a culvert under the northern end of the easternmost road into a gully. This building series was surrounded by access roads that roughly formed a square boarder.

5.15.3 Previous Investigation(s)

No previous investigations were conducted at this PRS.

5.15.4 Field Investigation

The goal of the Phase I investigation at PRS 16-025(h), as outlined in the approved Addendum 1 (LANL 1994, 1160), was to determine if contaminants were present in soils at levels of concern. The sampling design is consistent with the current industrial land use scenario of the conceptual model described in Section 4.3 of the RFI work plan. The potential for contamination at this PRS is

hypothesized to be via either: (1) leaks and spills from the past operations; or (2) ash, debris, or contamination left behind after the former building was burned and remnants removed. The potential release mechanisms at this PRS are hypothesized to be via either: (1) infiltration of potential contamination into the near-surface soil; or (2) mechanical movement and mixing of potentially contaminated surface soil during the removal of the former building. There was no historic subsurface construction (or other intrusive activities) at this PRS, and there are no surface water collection points or drainages present that would have spread contamination to the subsurface. Biased sampling was designed to detect surface and near-surface HE contamination of nonhomogeneous soil at the site of the building footprint. The mode of decommissioning of the building by burning suggests that residual contamination is unlikely at this PRS.

Addendum 1 (LANL 1994, 1160) specified screening soil samples, 0 to 1 ft depth interval, from six locations and selecting two laboratory samples based on screening results. The plan called for taking the samples at the four quadrants of the building, in the building center, and adjacent to the location of the door. The laboratory samples were to be selected from the screening samples using the following prioritized biasing scheme: (1) samples with positive HE spot test kit results; (2) samples with above-two-times background radiation readings; (3) a sample at the building door; (4) a sample at the building center; and (5) random sampling. In response to an EPA NOD (EPA 1994, 15-16-644), screening samples were collected from 1 to 2 ft depth intervals (as well as the required 0 to 1 ft intervals) to confirm that the soil beneath this concrete floored building had not been disturbed during decommissioning, and three laboratory samples were collected (based on the above scheme) rather than two laboratory samples.

Two deviations were made from the work plan.

- The screening samples were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit. This analysis was performed in addition to the required HE spot test analysis because the D-Tech™ kits can detect specific potential contaminants and provide lower detection limits (1 ppm or less) than the HE spot test. This screening was used to further characterize the samples in the field for biasing purposes.

- At one location, the soil/tuff/interface was located at 0.5 ft depth, therefore a soil sample was collected to 0.5 ft depth (rather than the required 1 ft depth) and the deeper interval sample (to 2 ft depth) was not collected because the hand auger met refusal. At another location, the deeper screening sample was collected to 1.2 ft (rather than the required 2 ft depths) because the hand auger met refusal at the soil /tuff interface.

The building was accurately surveyed using a Trimble™ GPS Total Station. Aerial photographs were used to determine the building position, and the center of the building was surveyed with an

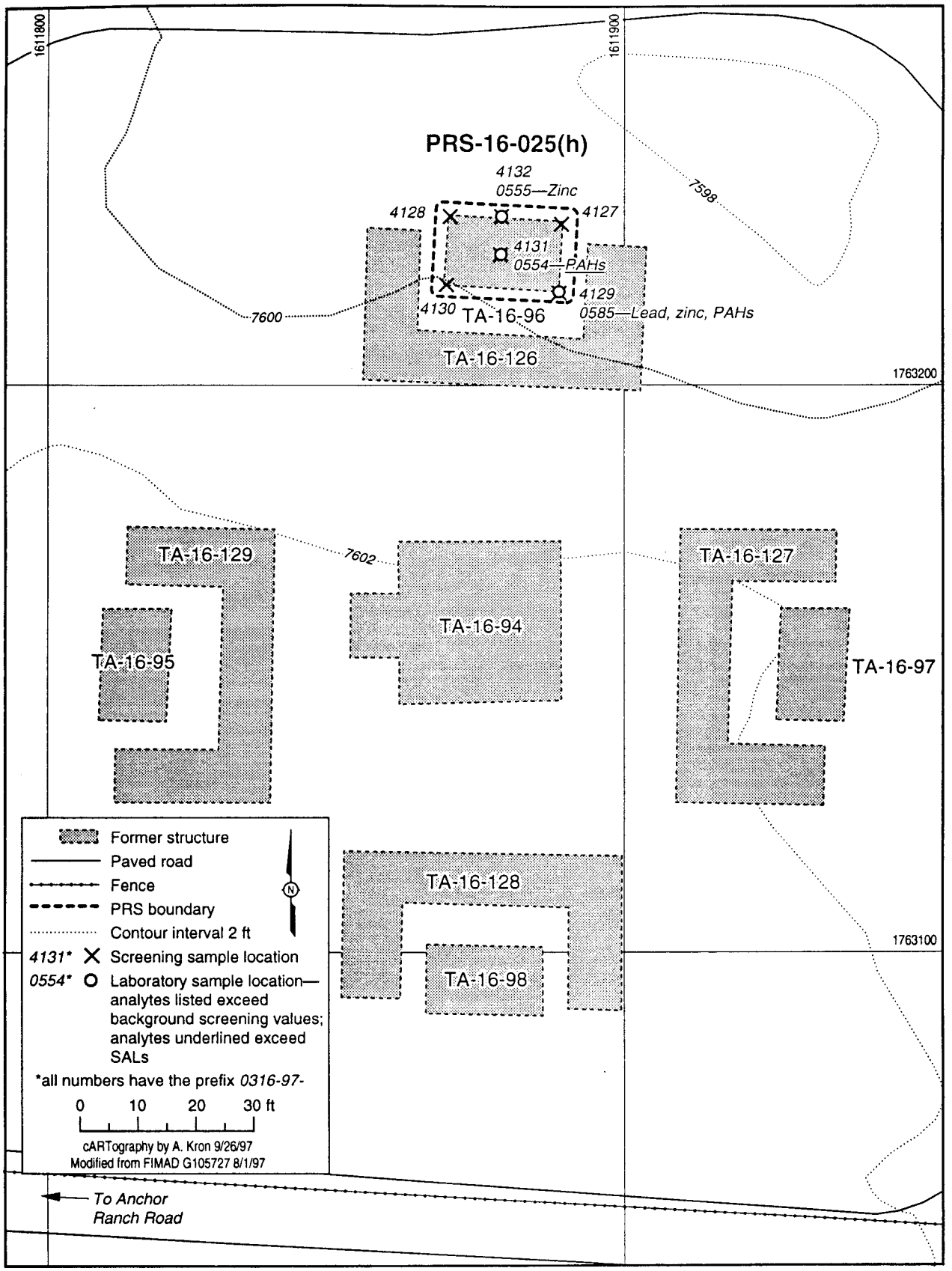

Fig. 5.15.4-1 Locations of PRS 16-025(h) samples.

estimated accuracy of 2 ft. Screening sample locations were further determined and surveyed relative to the center point and within the known dimensions of the building.

A total of 11 field screening samples were taken from 6 locations in and adjacent to the building footprint. Two samples were collected from five locations, at 0 to 1 ft and 1 to 2 ft depth intervals. One sample was collected at one location where soil/tuff interface was encountered. The absence of one screening sample did not affect the screening decision because the material was undisturbed. According to the conceptual model, potential contamination should not be present in the undisturbed material. The field screening samples were taken near the corners of the four quadrants of the building, in the building center, and adjacent to the location of the door (Fig. 5.15.4-1). These locations were selected to ensure spatial variability and because the most likely contaminant dispersal mechanism for operations in this building, which had concrete floors, is hypothesized to be via either: (1) HE spills near door areas; or (2) leakage at the floor/wall joints.

All samples were collected with a manually driven hand auger (LANL-ER-SOP-06.10, Hand Auger and Thin-Wall Tube Sampler). The soil samples were screened in the field for HE and beta/gamma radioactivity using the HE spot test kit with modified Griess™ reagents (LANL-ER-SOP-10.06,R0, High Explosive Spot Test) and an Eberline ESP1™ radiological meter with HP-260™ probe (LANL-ER-SOP-10.07, R0, Field Monitoring for Surface and Volume Radioactivity Levels). Samples at 0 to 1 ft depth intervals were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit (EPA SW-846 Methods 4051 and 4050). The 0 to 1 ft intervals were selected for further characterization, rather than the 1 to 2 ft intervals, because the soil beneath the PRS structure is undisturbed, as confirmed by the soil descriptions in the sample collection logs. If contamination is present within the structure footprint, it is most likely present at shallow depths directly beneath the structure. The soil was described and logged on the Sample Collection Log forms (LANL-ER-SOP-01.04, Sample Control and Field Documentation).

All samples screened negative for HE using the HE spot test kit and contained background radioactivity. One sample screened positive for HE using the D-Tech™ kit (Table 5.15.4-1).

TABLE 5.15.4-1
SUMMARY OF FIELD SCREENING RESULTS

SCREENING SAMPLE NO.	LOCATION ID	DEPTH (FT)	LAB SAMPLE NO.	HE SPOT TEST	RAD SCREEN	D-TECH RDX (MG/KG)	D-TECH TNT (MG/KG)
0316-97-4127 northeast quadrant	16-4127	0 - 1	NA[a]	negative	background	< 0.5	< 0.5
0316-97-4128 northwest quadrant	16-4128	0 - 1	NA	negative	background	< 0.5	< 0.5
0316-97-4129 southeast quadrant	16-4129	0 - 1	0316-97-0585	negative	background	0.5 - 1.5	0.5 - 1.5
0316-97-4130 southwest quadrant	16-4130	0 - 1	NA	negative	background	< 0.5	< 0.5
0316-97-4131 center	16-4131	0 - 1	0316-97-0554	negative	background	< 0.5	< 0.5
0316-97-4132 door	16-4132	0 - 0.5	0316-97-0555	negative	background	< 0.5	< 0.5

a. NA = Not analyzed.

Screening sample 0316-97-4129 contained the highest concentrations of TNT and RDX (0.5 to 1.5 mg/kg for each analyte) and was submitted to the laboratory for analysis. The other two samples which were submitted to the laboratory (0316-97-4131 and 0316-97-4132) were the samples from the door and center locations, respectively (Table 5.15.4-1). Samples were analyzed for metals, SVOCs, and HE (Table 5.15.4-2).

TABLE 5.15.4-2
SUMMARY OF REQUEST NUMBERS FOR LABORATORY SAMPLES TAKEN AT PRS 16-025(h)

LOCATION ID	SAMPLE ID	DEPTH (FT)	MATRIX	INORGANICS	SVOCS	HE
16-4129	0316-97-0585	0 - 1	soil	3403R	3401R	3402R
16-4131	0316-97-0554	0 - 1	soil	3403R	3401R	3402R
16-4132	0316-97-0555	0 - 0.5	soil	3403R	3401R	3402R

5.15.5 Evaluation of Inorganic Chemicals

Lead and zinc were detected at levels slightly above background UTLs (Table 5.15.5-1). The antimony results were rejected as unusable because of calibration problems, as discussed in Section 4.1. Baseline validation indicated no other problems that affect the use of these inorganic data.

TABLE 5.15.5-1
INORGANIC CHEMICALS WITH CONCENTRATIONS AT OR ABOVE BACKGROUND SCREENING VALUES FOR PRS 16-025(h)

ANALYTE	SAMPLE ID	SAMPLE VALUE (MG/KG)	SAL (MG/KG)	UTL (MG/KG)	MEDIA	DEPTH (FT)
Lead	0316-97-0585	38	400	23.3	Soil	0-1
Zinc	0316-97-0555	54	23000	50.8	Soil	0-.5
Zinc	0316-97-0585	78	23000	50.8	Soil	0-1

5.15.6 Evaluation of Radionuclides

Radionuclides were not analyzed for at PRS 16-025(h) because historical evidence indicated that radioactive material was not stored or used the HE machining building. Additionally, field screening did not indicate the presence of radioactive constituents.

5.15.7 Evaluation of Organic Chemicals

No HE was detected in any laboratory sample, despite indications of the presence of TNT and RDX in the field screening sample associated with sample 0316-97-0585. The positive D-Tech™ result, which suggested that low levels of TNT and RDX were present, was not confirmed by the fixed laboratory analysis. The D-Tech™ kits have been shown to provide false positives due to interferences with humic materials. See Section 4.3.2 for further details. Baseline validation identified no problems with the laboratory analyses.

Ten PAH compounds were detected in samples 0316-97-0554 and 0316-97-0585 at or below 0.2 mg/kg including benzo(a)pyrene at a level greater than SAL. The levels reported in Table 5.15.7-1 are reported as estimated (J) by the analytical laboratory because they are below the EQLs for these chemicals. Results from sample 0316-97-0555 were originally reported as JPM (professional judgment required). The detected compounds were requalified as estimated (J).

No other organic chemicals were detected in samples 0316-97-0554, 0316-97-0555, or 0316-97-0585. Baseline validation indicates no data quality problems associated with these analyses.

TABLE 5.15.7-1
DETECTED ORGANIC CHEMICALS FOR PRS 16-025(h)

ANALYTE	SAMPLE ID	SAMPLE VALUE (MG/KG)	SAL (MG/KG)	MEDIA	DEPTH (FT)
Benzo(a)anthracene	0316-97-0554	0.072	0.61	Soil	0-1
Benzo(a)anthracene	0316-97-0585	0.072	0.61	Soil	0-1
Benzo(a)pyrene	0316-97-0554	0.08	0.061	Soil	0-1
Benzo(b)fluoranthene	0316-97-0554	0.2	0.61	Soil	0-1
Benzo(b)fluoranthene	0316-97-0585	0.079	0.61	Soil	0-1
Benzo(g,h,i)perylene	0316-97-0554	0.081	NC[a]	Soil	0-1
Benzo(k)fluoranthene	0316-97-0554	0.064	6.1	Soil	0-1
Chrysene	0316-97-0554	0.12	61	Soil	0-1
Fluoranthene	0316-97-0554	0.16	2600	Soil	0-1
Fluoranthene	0316-97-0585	0.039	2600	Soil	0-1
Indeno(1,2,3-cd)pyrene	0316-97-0554	0.085	0.61	Soil	0-1
Phenanthrene	0316-97-0554	0.098	NC	Soil	0-1
Pyrene	0316-97-0554	0.18	1900	Soil	0-1
Pyrene	0316-97-0585	0.036	1900	Soil	0-1

a. NC = not calculated

5.15.8 Risk-Based Screening Assessment

Lead was reported at less than 10% of its SAL in one sample, and zinc at less than 0.5% of its SAL in two. Antimony results were reported as unusable. No other inorganic chemicals were observed above background UTLs.

These two inorganic chemicals and ten organic PAH chemicals were carried forward from the background comparison and organic constituent evaluation. Analytes are divided into two classes, noncarcinogens and carcinogens, for the screening assessment, depending on which toxicological effect forms the basis of their SAL. This separation is required to evaluate possible additive effects within each class of chemical.

An MCE calculation was performed using the sum of the maximum concentrations of constituents present at levels less than SALs at this PRS (Table 5.15.8-1). The MCE calculations are presented in Table 5.15.8-1. The MCE results for noncarcinogens and carcinogens are 0.1 and 0.7, respectively. The MCE value for both classes are less than unity; therefore, a potential human health risk based on additive effects is not identified for these classes of chemical.

Although benzo(g,h,i)perylene and phenanthrene have no SALs, these PAH compounds are present at low concentrations which are orders of magnitude below SALs for similar compounds.

The evaluation of these PAH compounds is considered to be complete based on the evaluation of PAHs with the available SALs. Refer to Section 5.0.1 for a further discussion of PAH compounds without SALs.

The concentrations of the PAH compounds, including benzo(a)pyrene (which is present slightly above the SAL) are less than the EPA Region 9 PRGs for industrial soils. These concentrations correspond to carcinogenic risk levels below 10^{-6} under an industrial scenario.

TABLE 5.15.8-1
MCE CALCULATION FOR PRS 16-025(h)

	MAXIMUM CONCENTRATION	SAL	
ANALYTE	MG/KG	MG/KG	NORMALIZED VALUE
Noncarcinogenic Effects			
Lead	38	400	0.09500
zinc	78	23000	0.00339
Fluoranthene	0.2	2600	0.00008
Pyrene	0.2	1900	0.00011
TOTAL			0.1
Carcinogenic Effects			
Benzo(a)anthracene	0.1	0.61	0.16393
Indeno(1,2,3-cd)pyrene	0.1	0.61	0.16393
Benzo(b)fluoranthene	0.2	0.61	0.32787
Benzo(k)fluoranthene	0.1	6.1	0.01639
Chrysene	0.1	61	0.00164
TOTAL			0.7

The most likely explanation for the observation of PAHs in these soil samples is that they represent nonspecific contamination associated with general industrial sites. The "Toxicological Profile for Polycyclic Aromatic Hydrocarbons (PAHs)" by the Agency of Toxic Substances and Disease Registry shows that soil concentrations of PAHs in urban/industrial areas commonly range in the tens to hundreds of mg/kg. The source of these constituents includes combustion products from organic materials and fossil fuels and runoff from asphalt and roofing tar.

Process knowledge and history of operations associated with PRS 16-025(h) suggest that PAHs were not used in processes in this area. Asphalt is a common source of PAHs at industrial areas. The site is in close proximity to several former access roads. The sampling locations receive storm-water runoff from these asphalt roads. In addition, buried asphalt was noted in the field at depths of 6 to 9 inches at the locations of sample 0316-97-0554 and 0316-97-0585. Field notes indicate that asphalt may have been present in the samples.

5.15.9 Preliminary Human Health Assessment

No human health risk assessment was performed for PRS 16-025(h) because contamination associated with a release from the PRS was not detected above levels of concern.

5.15.10 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 PRS will be deferred until the PRS can be assessed as part of the ecological exposure unit methodology currently being developed.

5.15.11 Conclusions and Recommendations

Eleven screening samples and three laboratory samples were collected within and near the footprint of former building TA-16-96. One of the laboratory samples was selected based on the only positive screening results obtained. No HE was reported in the laboratory samples. Lead and zinc were detected above background UTL levels but far below levels of concern to human health. The detected organic constituents are low-level PAHs frequently associated with asphalt and industrial operations and field notes indicated that buried asphalt was present at this site and may have been in the collected samples. The samples were collected approximately thirty ft from an old road, and asphalt is visible on the ground surface. Knowledge of operations suggests that PAHs were not used in processes at this site. No other chemicals were present at levels of concern at PRS 16-025(h). The data show that no released contaminants are present at this site at levels of concern to human health.

The biased sampling and analysis strategy at this former machining building was designed to ensure that residual contamination would be detected if it were present within the PRS. Screening locations and depths were selected based on information about the location, orientation, construction, use of the former building, and mode of decommissioning. Because the likelihood of contamination within the building footprint is judged to be low following the removal of the building, and the likelihood of finding contamination is high based on the biased sampling, three laboratory samples are sufficient to indicate whether or not such contamination is present at levels of concern. The laboratory samples were selected from screening samples according to a site specific prioritization scheme and included the only sample with positive HE screening results. All samples were analyzed for all potential contaminants based on historical knowledge of operations in TA-16-96.

PRS 16-025(h) is recommended for human-health NFA based on NFA Criterion 5 because contamination is not present at this site at levels that present a potential risk to human health.

5.16 PRS 16-025(j)

This PRS is the site of former HE machining building TA-16-98, located in the GMX-3 area (Fig. 5.0-1). It is recommended for human-health NFA based on NFA Criterion 5 because no contaminants were detected above SALs.

5.16.1 History

PRS 025(j) is discussed in detail in Subsection 5.18 of the RFI Work Plan for Operable Unit 1082, Addendum 1 (LANL 1994, 1160).

TA-16-98 was an HE machining building that was the south building in the North/South/East/West machining line built in November 1948. The building stored containers for disposal of pieces of HE at the burning ground. It had a sump, PRS 16-029(p), which is addressed in the RFI Work Plan for Operable Unit 1082 Addendum 1 (LANL 1994, 1160). The building was decommissioned as a machining building and converted into a coffee and smoking room. It was abandoned in December 1959, and was destroyed by intentional burning in 1960 (Engineering Department 1959, 15-16-256).

The potential contamination at this PRS was identified as metals, SVOCs, and HE.

5.16.2 Description

This building was 20 ft long x 12 ft wide with a 20 ft x 6 ft porch, and of wooden-frame construction on a concrete floor. The North/South/East/West buildings were surrounded by access roads that roughly formed a square border. The building had a U-shaped wooden-walled earthen barricade. It was located east of the 30s-Line on flat terrain that has a slight drop in elevation to the northeast.

5.16.3 Previous Investigation(s)

No previous investigations were conducted at this PRS.

5.16.4 Field Investigation

The goal of the Phase I investigation at PRS 16-025(j), as outlined in the approved Addendum 1 to the RFI Work Plan (LANL 1994, 1160), was to determine if contaminants were present in soils at levels of concern. The sampling design is consistent with the current industrial land use scenario of the conceptual model described in Section 4.3 of Addendum 1. The potential for contamination at this PRS is hypothesized to be via either: (1) leaks and spills from the past operations, or (2) ash, debris, or contamination left behind after the former building was burned and remnants removed. The potential release mechanisms at this PRS are hypothesized to be via either: (1) infiltration of potential contamination into the near-surface soil, or (2) mechanical movement and mixing of potentially contaminated surface soil during the removal of the former building. There was no historic subsurface construction (or other intrusive activities) at this PRS, and there are no surface water collection points or drainages present that would have spread contamination to the subsurface. Biased sampling was designed to detect surface and near-surface HE contamination of nonhomogeneous soil at the site of the building footprint. The mode of decommissioning of the building by burning suggests that residual contamination is unlikely at this PRS.

Addendum 1 (LANL 1994, 1160) specified screening soil samples, taken at 0 to 1 ft depth intervals, from five locations and selecting one laboratory sample based on screening results. The plan called for taking the samples at the four quadrants of the building and adjacent to the location of the door. The laboratory sample was to be selected from the screening samples using the following prioritized biasing scheme: (1) a sample with positive HE spot test kit result, (2) a sample with a radiation reading two times above background; and (3) a sample at the building door. In response to an Environmental Protection Agency (EPA) notice of deficiency (NOD) (EPA 1994, 15-15-644.), screening samples were collected from 1 to 2 ft depth intervals (as well as the required 0 to 1 ft intervals) to confirm that the soil beneath this concrete floored building had not been disturbed during decommissioning, and three laboratory samples were collected (based on the above scheme) rather than one laboratory sample.

One deviation was made from Addendum 1. The screening samples were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit. This analysis was performed in addition to the required HE spot test analysis because the D-Tech™ kits can detect specific potential contaminants and provide lower detection limits (1 ppm or less) than the HE spot test. This screening was used to further characterize the samples in the field for biasing purposes.

The building was accurately surveyed using a Trimble™ GPS total station. Aerial photographs were used to determine the building position, and the center of the building was surveyed with an

estimated accuracy of 2 ft. Screening sample locations were further determined and surveyed relative to the center point and within the known dimensions of the building.

A total of 10 field screening samples were taken from 5 locations in the building footprint. Two samples were collected from each location, at 0 to 1 ft and 1 to 2 ft depth intervals. The samples were collected near the corners of the four quadrants of the building and adjacent to the location of the door (Fig. 5.16.4-1). These locations were selected to ensure spatial variability and because the most likely contaminant dispersal mechanism for operations in this building, which had concrete floors, is hypothesized to be via either: (1) HE spills near door areas, or (2) leakage at the floor/wall joints.

All samples were collected with a manually driven hand auger (LANL-ER-SOP-06.10, Hand Auger and Thin-Wall Tube Sampler). The soil samples were screened in the field for HE and beta/gamma radioactivity using the HE spot test kit with modified Griess™ reagents (LANL-ER-SOP-10.06,R0, High Explosive Spot Test) and an Eberline ESP1™ radiological meter with HP-260™ probe (LANL-ER-SOP-10.07, R0, Field Monitoring for Surface and Volume Radioactivity Levels). Samples at 0 to 1 ft depth intervals were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit (EPA SW-846 Methods 4051 and 4050). The 0 to 1 ft intervals were selected for further characterization, rather than the 1 to 2 ft intervals, because the soil beneath the PRS structure is undisturbed, as confirmed by the soil descriptions in the sample collection logs. If contamination is present within the structure footprint, it is most likely present at shallow depths directly beneath the structure. The soil was described and logged on the Sample Collection Log forms (LANL-ER-SOP-01.04, Sample Control and Field Documentation).

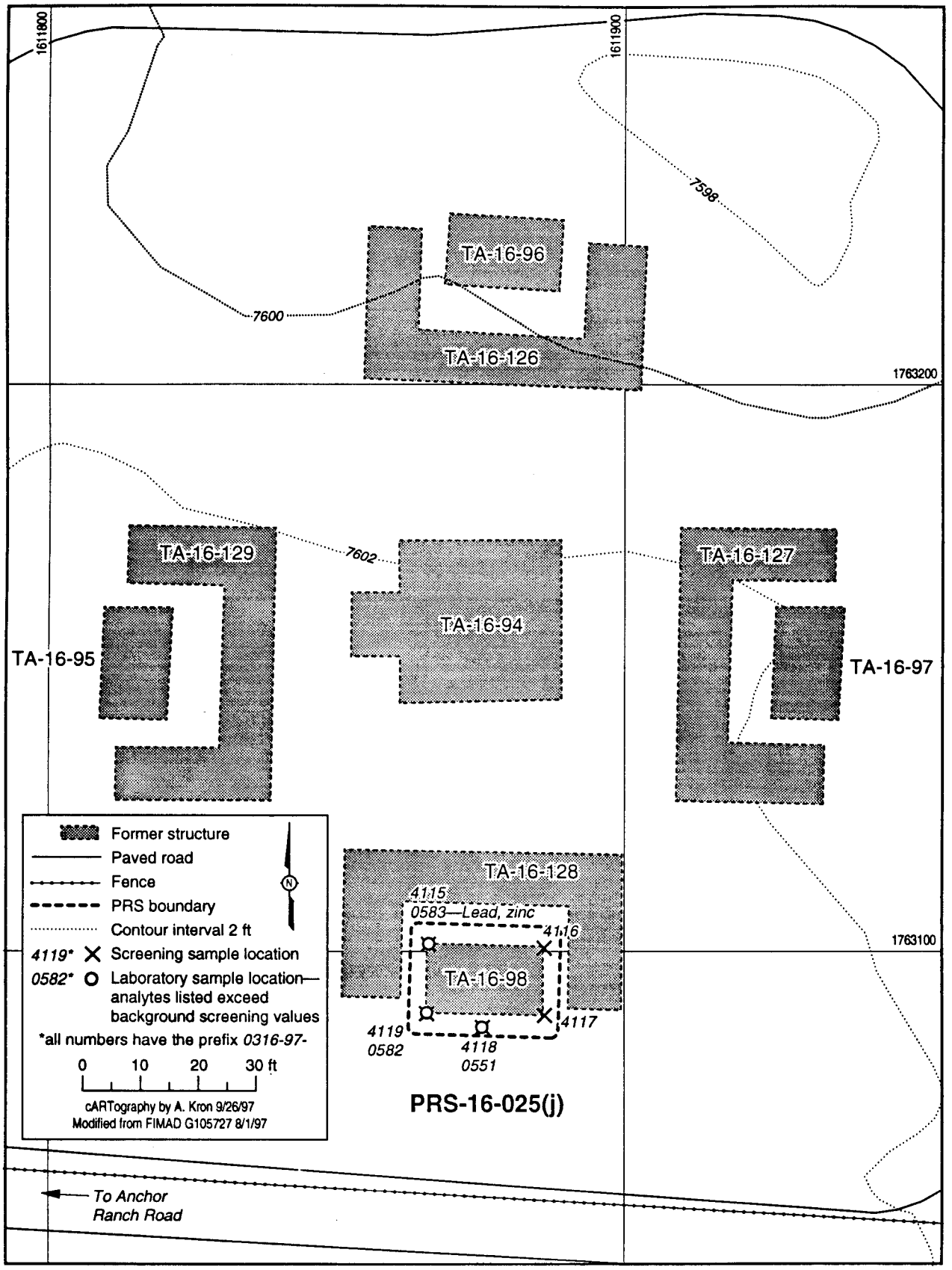

Fig. 5.16.4-1 Locations of PRS 16-025(j) samples.

All samples screened negative for HE using the HE spot test kit and contained background radioactivity. No samples screened positive for HE using the D-Tech™ kit (Table 5.16.4-1).

TABLE 5.16.4-1
SUMMARY OF FIELD SCREENING RESULTS

SCREENING SAMPLE NO.	LOCATION ID	DEPTH (FT)	LAB SAMPLE NO.	HE SPOT TEST	RAD SCREEN	D-TECH RDX (MG/KG)	D-TECH TNT (MG/KG)
0316-97-4115 northwest quadrant	16-4115	0 - 1	0316-97-0583	negative	background	< 0.5	< 0.5
0316-97-4116 northeast quadrant	16-4116	0 - 1	NA[a]	negative	background	< 0.5	< 0.5
0316-97-4117 southeast quadrant	16-4117	0 - 1	NA	negative	background	< 0.5	< 0.5
0316-97-4118 door	16-4118	0 - 1	0316-97-0551	negative	background	< 0.5	< 0.5
0316-97-4119 southwest quadrant	16-4119	0 - 1	0316-97-0582	negative	background	< 0.5	< 0.5

a. NA = Not analyzed.

All of the samples screened below detection for RDX and TNT. Screening sample 0316-97-4118 was located adjacent to the former door and was submitted to the laboratory for analysis. The other two laboratory samples were selected randomly. The random samples were selected by using a random-number generator to select numbers one through four. These numbers corresponded with the northeast, northwest, southeast, and southwest quadrants. The northwest and southwest quadrant samples were selected(Table 5.16.4-1). Samples were analyzed for metals, SVOCs, and HE (Table 5.16.4-2).

TABLE 5.16.4-2
SUMMARY OF REQUEST NUMBERS FOR LABORATORY SAMPLES FOR PRS 16-025(j)

LOCATION ID	SAMPLE ID	DEPTH (FT)	MEDIA	SVOC	HE	INORGANIC
16-4118	0316-97-0551	0-1	Soil	3441R	3442R	3443R
16-4119	0316-97-0582	0-1	Soil	3441R	3442R	3443R
16-4115	0316-97-0583	0-1	Soil	3441R	3442R	3443R

5.16.5 Evaluation of Inorganic Chemicals

Lead and zinc were detected above background UTL (Table 5.16.5-1). Baseline validation revealed no problems with the inorganic analyses that affect the use of the data.

TABLE 5.16.5-1
INORGANIC CHEMICALS WITH CONCENTRATIONS AT OR ABOVE BACKGROUND SCREENING VALUES FOR PRS 16-025(j)

ANALYTE	SAMPLE ID	SAMPLE VALUE (MG/KG)	SAL (MG/KG)	UTL (MG/KG)	MEDIA	DEPTH (FT)
Lead	0316-97-0583	67	400	23.3	Soil	0-1
Zinc	0316-97-0583	260	23000	50.8	Soil	0-1

5.16.6 Evaluation of Radionuclides

Radionuclides were not analyzed for at PRS 16-025(j) because historical evidence indicated that radioactive material was not stored or used in the machining building. Additionally, field screening did not indicate the presence of radioactive constituents.

5.16.7 Evaluation of Organic Chemicals

No organic chemicals were detected above EQLs. Baseline validation indicated no data quality problems associated with these analyses.

5.16.8 Risk-Based Screening Assessment

Lead and zinc were detected in one sample at less than 20% and 2% of their SALs, respectively. No other chemicals were reported above detection limits and UTLs. Visual examination of the data suggests that an MCE would yield a value far below the target value of 1.0.

5.16.9 Preliminary Human Health Assessment

No human health risk assessment was performed for PRS 16-025(j) because contamination was not detected at levels at or above SALs.

5.16.10 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 PRS will be deferred until the PRS can be assessed as part of the ecological exposure unit methodology currently being developed.

5.16.11 Conclusions and Recommendations

Ten screening samples and three laboratory samples were collected in and adjacent to the footprint of the former machining building TA-16-98. In the absence of positive screening results,

laboratory samples were collected from the door location and randomly. No inorganic or organic contamination was detected at levels at or above SALs. The data show that no contaminants are present at this site at levels of concern to human health.

The biased sampling and analysis strategy at this former machining building was designed to ensure that residual contamination would be detected if it were present within the PRS. Screening locations and depths were selected based on information about the location, orientation, construction, use of the former building, and mode of decommissioning. Because the likelihood of contamination within the building footprint is judged to be low following the removal of the building, and the likelihood of finding contamination is high based on the biased sampling, three laboratory samples are sufficient to indicate whether or not such contamination is present at levels of concern. The laboratory samples were selected from the door to the former building, because this would have been the area of greatest activity and randomly (where there were no other biasing criteria). The samples were analyzed for all potential contaminants based on historical knowledge of operations in TA-16-98.

PRS 16-025(j) is recommended for human-health NFA based on NFA Criterion 5 because contamination is not present at this site at levels that present a potential risk to human health.

5.17 PRS 16-025(k)

This PRS is the site of HE inspection building TA-16-25, located in the GMX-3 area (Fig. 5.0-1). It is recommended for human-health NFA because no contaminants were detected above SALs.

5.17.1 History

PRS 16-025(k) is discussed in detail in Subsection 5.18 of RFI Work Plan for Operable Unit 1082, Addendum 1 (LANL 1994, 1160).

The building, TA-16-25, was constructed in February 1944 without a sump as part of the 20s-Line. TA-16-25 initially served as an HE powder inspection room (Ackerman 1945, 15-16-509; Martin 1993, 15-16-477). HE powder was spread on tables for the removal of foreign objects such as nails in preparation for casting (Martin 1993, 15-16-477). An early S-Site drawing suggested that a drain line exited TA-16-25 from its southeast corner and emptied into a pond nearby. The drain line and pond associated with this building is PRS 16-029(r), which is addressed in Addendum 1 to the OU 1082 Work Plan (LANL 1994, 1160). The building was abandoned in 1959 and was shown to be HE contaminated before intentional burning in March 1968.

The potential contamination at this PRS was identified as metals, SVOCs, and HE.

5.17.2 Description

TA-16-25 was a wooden-frame building (20 ft long x 30 ft wide x 15 ft high) with a concrete foundation and floor, plus an addition (6 ft long x 10 ft wide x 15 ft high). This PRS was located on level ground.

5.17.3 Previous Investigation(s)

No previous investigations were conducted at this PRS.

5.17.4 Field Investigation

The goal of the Phase I investigation at PRS 16-025(k), as outline in the approved Addendum 1 (LANL 1994, 1160), was to determine if contaminants were present in soils at levels of concern. The sampling design is consistent with the current industrial land use scenario of the conceptual model described in Section 4.3 of the RFI work plan. The potential for contamination at this PRS is hypothesized to be via either: (1) leaks and spills from the past operations; or (2) ash, debris, or contamination left behind after the former building was burned and remnants removed. The potential release mechanisms at this PRS are hypothesized to be via either: (1) infiltration of potential contamination into the near-surface soil; or (2) mechanical movement and mixing of potentially contaminated surface soil during the removal of the former building. There was no historic subsurface construction (or other intrusive activities) at this PRS, and there are no surface water collection points or drainages present that would have spread contamination to the subsurface. Biased sampling was designed to detect surface and near-surface HE contamination of nonhomogeneous soil at the site of the building footprint. The mode of decommissioning of the building by burning suggests that residual contamination is unlikely at this PRS.

Addendum 1 (LANL 1994, 1160) specified screening soil samples, 0 to 1 ft depth intervals, from five locations and selecting one laboratory sample based on screening results. The plan called for taking the samples at the four quadrants of the building and adjacent to the location of a door. The laboratory sample was to be selected from the screening samples using the following prioritized biasing scheme: (1) a sample with positive HE spot test kit result; (2) a sample with above two times background radiation reading; and (3) a sample at building door. In response to an EPA NOD (EPA 1994, 15-16-644), screening samples were collected from 1 to 2 ft depth intervals (as well as the required 0 to 1 ft intervals) to confirm that the soil beneath this concrete-floored building had not been disturbed during decommissioning, and three laboratory samples were collected (based on the above scheme) rather than one laboratory sample.

Two deviations were made from the work plan.

- A sixth screening location was selected at the second door location, because door locations are likely places for spills to have occurred or for material to have been swept out of the structures.
- The screening samples were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit. This analysis was performed in addition to the required HE spot test analysis because the D-Tech™ kits can detect specific potential contaminants and provide lower detection limits (1 ppm or less) than the HE spot test. This screening was used to further characterize the samples in the field for biasing purposes.

The building was accurately surveyed using a Trimble™ GPS Total Station. Aerial photographs were used to determine the building position, and the center of the building was surveyed with an estimated accuracy of 2 ft. Screening sample locations were further determined and surveyed relative to the center point and within the known dimensions of the building.

A total of 12 field screening samples were taken from 6 locations in the building footprint. Two samples were collected from each location, at 0 to 1 ft and 1 to 2 ft depth intervals. The field screening samples were taken near the corners of the four quadrants of the building and adjacent to the location of two doors (Fig. 5.17.4-1). These locations were selected to ensure spatial variability and because the most likely contaminant dispersal mechanism for operations in this building, which had concrete floors, is hypothesized to be via either: (1) HE spills near door areas; or (2) leakage at the floor/wall joints.

All samples were collected with a manually driven hand auger (LANL-ER-SOP-06.10, Hand Auger and Thin-Wall Tube Sampler). The soil samples were screened in the field for HE and beta/gamma radioactivity using the HE spot test kit with modified Griess™ reagents (LANL-ER-SOP-10.06,R0, High Explosive Spot Test) and an Eberline ESP1™ radiological meter with HP-260™ probe (LANL-ER-SOP-10.07, R0, Field Monitoring for Surface and Volume Radioactivity Levels). Samples at 0 to 1 ft depth intervals were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit (EPA SW-846 Methods 4051 and 4050). The 0 to 1 ft intervals were selected for further characterization, rather than the 1 to 2 ft intervals, because the soil beneath the PRS structure is undisturbed, as confirmed by the soil descriptions in the sample collection logs. If contamination is present within the structure footprint, it is most likely present at shallow depths directly beneath the structure. The soil was described and logged on the Sample Collection Log forms (LANL-ER-SOP-01.04, Sample Control and Field Documentation).

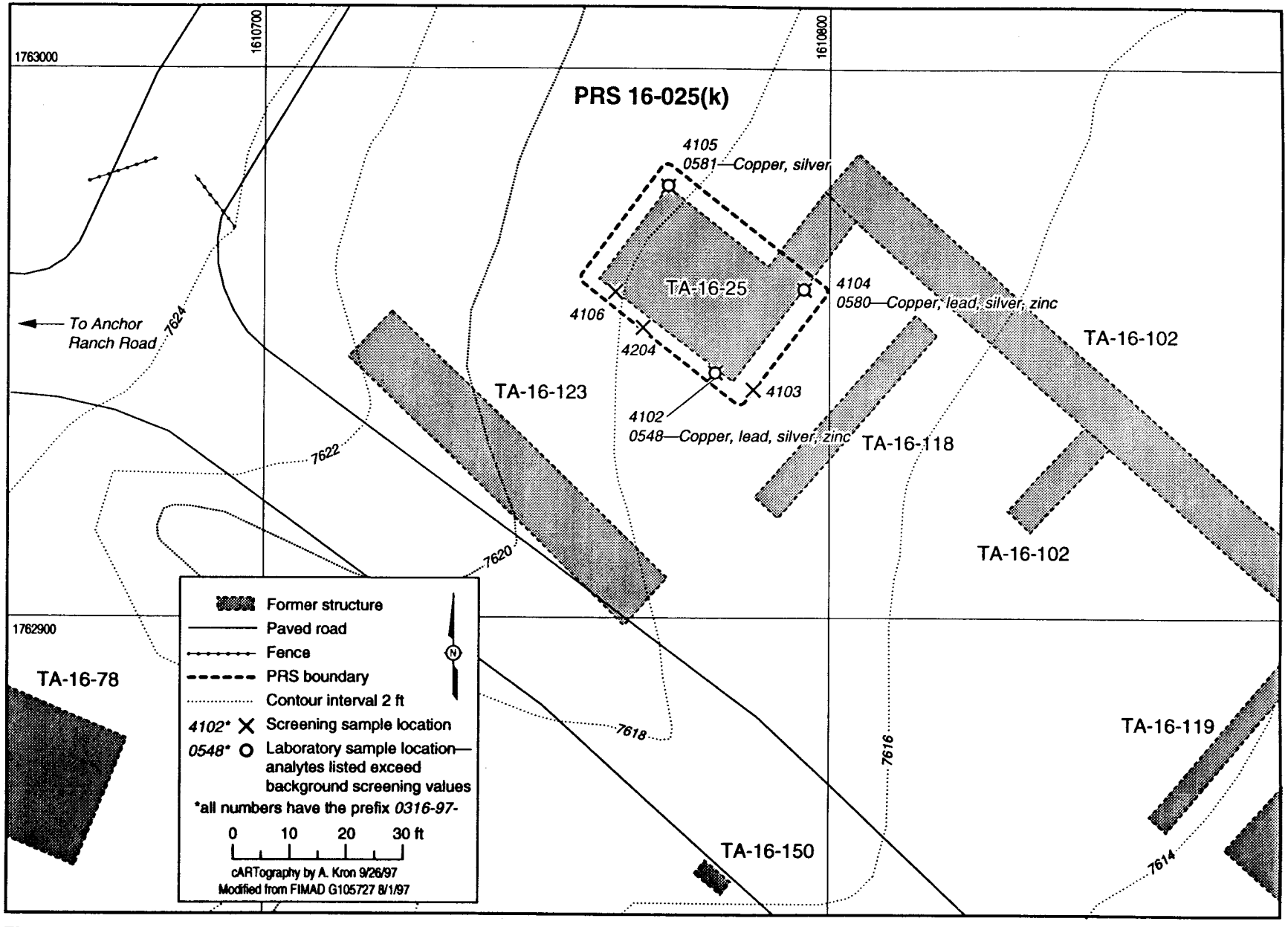

Fig. 5.17.4-1 Locations of PRS 16-025(k) samples.

All samples screened negative for HE using the HE spot test kit and contained background radioactivity. Four samples screened positive for HE using the D-Tech™ kit (Table 5.17.4-1).

TABLE 5.17.4-1
SUMMARY OF FIELD SCREENING RESULTS

SCREENING SAMPLE NO.	LOCATION ID	DEPTH (FT)	LAB SAMPLE NO.	HE SPOT TEST	RAD SCREEN	D-TECH RDX (MG/KG)	D-TECH TNT (MG/KG)
0316-97-4102 door	16-4102	0 - 1	0316-97-0548	negative	background	0.5 - 1.5	0.5 - 1.5
0316-97-4103 southeast quadrant	16-4103	0 - 1	NA[a]	negative	background	< 0.5	< 0.5
0316-97-4104 northeast quadrant	16-4104	0 - 1	0316-97-0580	negative	background	0.5 - 1.5	< 0.5
0316-97-4105 northwest quadrant	16-4105	0 - 1	0316-97-0581	negative	background	0.5 - 1.5	< 0.5
0316-97-4106 southwest quadrant	16-4106	0 - 1	NA	negative	background	< 0.5	0.5 - 1.5
0316-97-4204 door	16-4204	0 - 1	NA	negative	background	< 0.5	< 0.5

a. NA = Not analyzed.

Sample 0316-97-4102 screened positive for RDX and TNT and was the door location. This sample was submitted for laboratory analysis. Samples 0316-97-4104 and 0316-97-4105 screened positive for RDX and were submitted for laboratory analysis (Table 5.17.4-1) Samples were analyzed for metals, SVOCs, and HE (Table 5.17.4-2).

TABLE 5.17.4-2
SUMMARY OF REQUEST NUMBERS FOR LABORATORY SAMPLES FOR PRS 16-025(k)

LOCATION ID	SAMPLE ID	DEPTH (FT)	MEDIA	SVOC	HE	INORGANIC
16-4102	0316-97-0548	0-1	Soil	3457R	3458R	3459R
16-4104	0316-97-0580	0-1	Soil	3457R	3458R	3459R
16-4105	0316-97-0581	0-1	Soil	3457R	3458R	3459R

5.17.5 Evaluation of Inorganic Chemicals

Lead was detected in two samples above the background UTL. Copper and zinc were reported at concentrations above the UTLs (Table 5.17.5-1). These data were originally P-qualified (professional judgment required) because the duplicate recoveries were below the acceptable limits of 20 %. The data was requalified as estimated (J) because they are adequate for comparison to SALs that are much larger than the reported values. Antimony was reported as undetected by the laboratory at 6.7 to 7.3 mg/kg. The data were qualified as estimated undetected (UJ) because the matrix spike recoveries were below the acceptable level (52 %), but are accepted as non detects as discussed in Section 4.1. Silver was detected at 0.87 mg/kg, 0.95 mg/kg, and 1.1 mg/kg, above the instrument detection limits but below the reporting limits (lab qualifier B). The data were reevaluated as estimated (J). Baseline validation revealed no other problems with the inorganic analyses that affect the use of these data.

TABLE 5.17.5-1
INORGANIC CHEMICALS WITH CONCENTRATIONS AT OR ABOVE BACKGROUND SCREENING VALUES FOR PRS 16-025(k)

ANALYTE	SAMPLE ID	SAMPLE VALUE (MG/KG)	SAL (MG/KG)	UTL (MG/KG)	MEDIA	DEPTH (FT)
Antimony	0316-97-0548	7.3(UJ[b])	31	1	Soil	0-1
Antimony	0316-97-0580	7.3(UJ)	31	1	Soil	0-1
Antimony	0316-97-0581	6.7(UJ)	31	1	Soil	0-1
Copper	0316-97-0548	96.8(J[c])	2800	15.5	Soil	0-1
Copper	0316-97-0580	150(J)	2800	15.5	Soil	0-1
Copper	0316-97-0581	18.6(J)	2800	15.5	Soil	0-1
Lead	0316-97-0548	43.1	400	23.3	Soil	0-1
Lead	0316-97-0580	33.1	400	23.3	Soil	0-1
Silver	0316-97-0548	1.1(J)	380	NC[a]	Soil	0-1
Silver	0316-97-0580	0.95(J)	380	NC	Soil	0-1
Silver	0316-97-0581	0.87(J)	380	NC	Soil	0-1
Zinc	0316-97-0548	91.3(J)	23000	50.8	Soil	0-1
Zinc	0316-97-0580	61.4(J)	23000	50.8	Soil	0-1

a. NC = not calculated
b. UJ = Analyte was not detected; the associated value is an estimate of the detection limit or quantitation limit.
c. J = Analyte was positively identified, but the result is estimated to be more uncertain than would normally be expected for that analysis.

5.17.6 Evaluation of Radionuclides

Radionuclides were not analyzed for at PRS 16-025(k) because historical evidence indicated that radioactive material was not stored or used in the HE inspection building. Additionally, field screening did not indicate the presence of radioactive constituents.

5.17.7 Evaluation of Organic Chemicals

No organic compounds were detected in samples 0316-97-0548, 0316-97-0580, and 0316-97-0581. This data was PM-qualified (professional judgment needed) because the samples missed the extraction holding time by one day. Recent EPA findings indicate that minor deviations from the extraction holding times have little effect on sample results for soil samples; see the discussion in Section 4.3.1. All data are considered usable and were reevaluated as estimated undetected (UJ).

No HE was detected in samples 0316-97-0548, 0316-97-0580, and 0316-97-0581, despite indications of the presence of TNT and RDX in the associated field screening samples. The positive D-Tech™ results, which suggested that low levels of TNT and RDX were present, were not confirmed by the fixed laboratory analysis. The D-Tech™ kits have been shown to provide false positives due to interferences with humic materials. See Section 4.3.2 for further details.

Baseline validation revealed no other problems with the organic analyses that affect the use of the data.

5.17.8 Risk-Based Screening Assessment

Lead was reported at 11% of its SAL and copper at 5.4% of its SAL. Other inorganic chemicals present above UTLs were at less than 1% of SALs. No organic chemicals were detected, and no chemicals were present at levels at or above SALs at PRS 16-025(k). Visual examination of the data suggest that an MCE screening evaluation would yield a value far below the target level of 1.0.

5.17.9 Preliminary Human Health Assessment

No human health risk assessment was performed for PRS 16-025(k) because contamination was not detected at levels at or above SALs.

5.17.10 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 PRS will be deferred until the PRS can be assessed as part of the ecological exposure unit methodology currently being developed.

5.17.11 Conclusions and Recommendations

Twelve screening samples and three laboratory samples were collected in and adjacent to the footprint of the former HE inspection building TA-16-25. The laboratory samples were selected from the four screening samples with positive HE results. No HE was detected in the laboratory samples. Inorganic chemicals were found above UTLs, but below SALs. The data show that no contaminants are present at this site at levels of concern to human health.

The biased sampling and analysis strategy at this former HE inspecting building was designed to ensure that residual contamination would be detected if it were present within the PRS. Screening locations and depths were selected based on information about the location, orientation, construction, use of the former building, and mode of decommissioning. Because the likelihood of contamination within the building footprint is judged to be low following the removal of the building, and the likelihood of finding contamination is high based on the biased sampling, three laboratory samples are sufficient to indicate whether or not such contamination is present at levels of concern. The laboratory samples were selected from screening samples based on field screening results, and were analyzed for all potential contaminants based on historical knowledge of operations in TA-16-25.

PRS 16-025(k) is recommended for human-health NFA based on NFA Criterion 5 because contamination is not present at this site at levels that present a potential risk to human health.

5.18 PRS 16-025(m)

This PRS is the site of former radiography source hutment TA-16-495, locate at T-Site (Fig. 5.0-1). It is recommended for human-health NFA because no contaminants were detected above SALs.

5.18.1 History

PRS 16-025(m) is discussed in detail in Subsection 5.24 of the RFI Work Plan for Operable Unit 1082, Addendum 1 (LANL 1994, 1160).

TA-16-495 was constructed in July 1947. The building was used as an x-ray or gamma-ray radiography facility. It was a source building which contained either radium-226 or cobalt-60 gamma sources (Martin and Hickmott 1993, 15-16-500; Martin and Hickmott 1993, 15-16-514). It did not have a pit in the building center like the other source buildings. The building contained no sumps or plumbing. Before being abandoned in 1959 and burned in 1960, the building was found to be contaminated with HE (Engineering Department 1959, 15-16-256) and uranium-238 (Buckland 1957, 15-16-243).

The potential contamination at this PRS was identified as metals, SVOCs, HE, and radionuclides.

5.18.2 Description

TA-16-499 was a 16 ft by 16 ft by 9 ft wooden-frame construction building with a concrete floor. The building was located on level ground.

5.18.3 Previous Investigation(s)

No previous field investigations were conducted at this PRS.

5.18.4 Field Investigation

The goal of the Phase I investigation at PRS 16-025(m), as outlined in the approved Addendum 1 (LANL 1994, 1160), was to determine if contaminants were present in soils at levels of concern. The sampling design is consistent with the current industrial land use scenario of the conceptual model described in Section 4.3 of the RFI work plan. The potential for contamination at this PRS is hypothesized to be via either: (1) leaks and spills from the past operations; or (2) ash, debris, or contamination left behind after the former building was burned and remnants removed. The potential release mechanisms at this PRS are hypothesized to be via either: (1) infiltration of potential contamination into the near-surface soil; or (2) mechanical movement and mixing of

potentially contaminated surface soil during the removal of the former building. There was no historic subsurface construction (or other intrusive activities) at this PRS, and there are no surface water collection points or drainages present that would have spread contamination to the subsurface. Biased sampling was designed to detect residual radionuclides and HE in the surface and near-surface soil at the site of the building footprint. The mode of decommissioning of the building by burning suggests that residual contamination is unlikely at this PRS.

Addendum 1 (LANL 1994, 1160) specified screening soil samples, 0 to 1 ft depth intervals, from five locations and selecting two laboratory samples based on screening results. The plan called for taking the samples at the four quadrants of the building and at the building center. The laboratory samples were to be selected from the screening samples using the following prioritized biasing scheme: (1) samples with positive HE spot test kit result; (2) samples with above two times background radiation reading; (3) a sample from the center of the building; and (4) a sample from a random location. In response to an EPA NOD (EPA 1994, 15-16-644), the screening samples were collected from 1 to 2 ft depth intervals (as well as the required 0 to 1 ft intervals) to confirm that the soil beneath this concrete-floored building had not been disturbed during decommissioning.

Two deviations were made from the work plan:

- The laboratory samples were analyzed for specific radioactive constituents of concern (radium-226, cobalt-60, strontium-90) rather than by beta spectroscopy. This change was made because the analytical laboratories do not have a method for beta spectroscopy. They analyze for the specific radionuclides of concern.

- The screening samples were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit. This analysis was performed in addition to the required HE spot test analysis because the D-Tech™ kits can detect specific potential contaminants and provide lower detection limits (1 ppm or less) than the HE spot test. This screening was used to further characterize the samples in the field for biasing purposes.

The building was accurately surveyed using a Trimble™ GPS Total Station. Aerial photographs were used to determine the building position, and the center of the building was surveyed with an estimated accuracy of 2 ft. Screening sample locations were further determined and surveyed relative to the center point and within the known dimensions of the building.

A total of 10 field screening samples were taken from 5 locations in the building footprint. Two samples were collected from each location, at 0 to 1 ft and 1 to 2 ft depth intervals. The samples were collected near the corners of the four quadrants of the building and the building center (Fig.

5.18.4-1). These locations were selected to ensure spatial variability and because the most likely contaminant dispersal mechanism for operations in this building, which had concrete floors, is hypothesized to be via either: (1) HE or radioactive spills; or (2) leakage at the floor and floor/wall joints.

All samples were collected with a manually driven hand auger (LANL-ER-SOP-06.10, Hand Auger and Thin-Wall Tube Sampler). The soil samples were screened in the field for HE and beta/gamma radioactivity using the HE spot test kit with modified Griess™ reagents (LANL-ER-SOP-10.06,R0, High Explosive Spot Test) and an Eberline ESP1™ radiological meter with HP-260™ probe (LANL-ER-SOP-10.07, R0, Field Monitoring for Surface and Volume Radioactivity Levels). Samples at 0 to 1 ft depth intervals were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit (EPA SW-846 Methods 4051 and 4050). The 0 to 1 ft intervals were selected for further characterization, rather than the 1 to 2 ft intervals, because the soil beneath the PRS structure is undisturbed, as confirmed by the soil descriptions in the sample collection logs. If contamination is present within the structure footprint, it is most likely present at shallow depths directly beneath the structure. The soil was described and logged on the Sample Collection Log forms (LANL-ER-SOP-01.04, Sample Control and Field Documentation).

All samples screened negative for HE using the HE spot test kit and contained background radioactivity. One sample screened positive for HE using the D-Tech™ kit (Table 5.18.4-1).

TABLE 5.18.4-1
SUMMARY OF FIELD SCREENING RESULTS

SCREENING SAMPLE NO.	LOCATION ID	DEPTH (FT)	LAB SAMPLE NO.	HE SPOT TEST	RAD SCREEN	D-TECH RDX (MG/KG)	D-TECH TNT (MG/KG)
0316-97-4177 southwest quadrant	16-4177	0 - 1	NA[a]	negative	background	< 0.5	< 0.5
0316-97-4178 northwest quadrant	16-4178	0 - 1	NA	negative	background	< 0.5	< 0.5
0316-97-4179 northeast quadrant	16-4179	0 - 1	0316-97-0568	negative	background	0.5 - 1.5	< 0.5
0316-97-4180 southeast quadrant	16-4180	0 - 1	NA	negative	background	< 0.5	< 0.5
0316-97-4181 center	16-4181	0 - 1	0316-97-0569	negative	background	< 0.5	< 0.5

a. NA = Not analyzed.

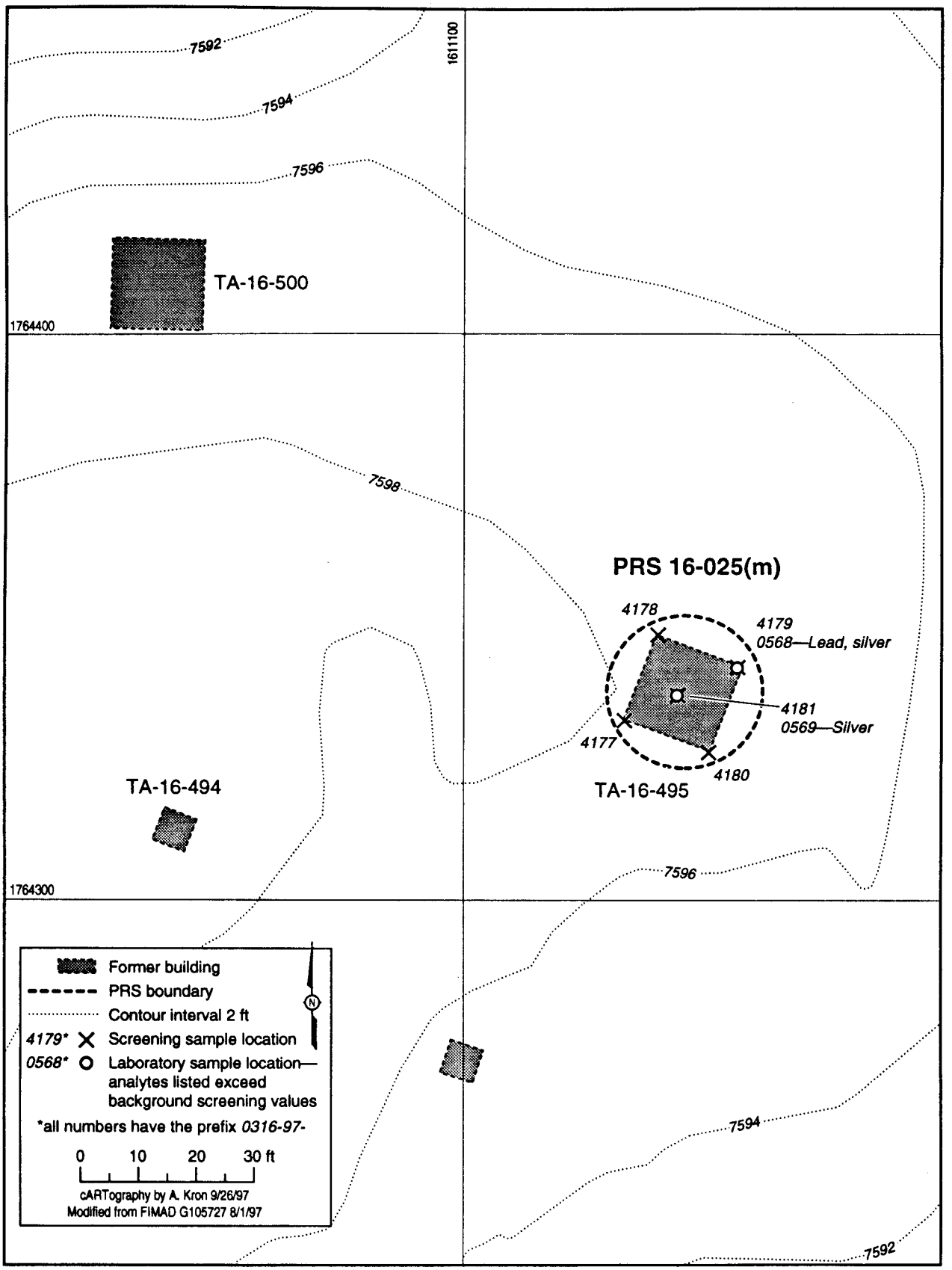

Fig. 5.18.4-1 Locations of PRS 16-025(m) samples.

Screening sample 0316-97-4179 contained the highest concentration of HE (0.5 to 1.5 mg/kg RDX), and screening sample 0316-97-4181 was located at the center of the former structure. These two samples were submitted to the laboratory for analysis (Table 5.18.4-1). The samples were analyzed for metals, SVOCs, HE, isotopic uranium, radium-226, cobalt-60, strontium-90, and gamma spectroscopy (Table 5.18.4-2).

TABLE 5.18.4-2
SUMMARY OF REQUEST NUMBERS FOR LABORATORY SAMPLES TAKEN AT PRS 16-025(m)

LOCATION ID	SAMPLE ID	DEPTH (FT)	MEDIA	SVOC	HE	INORGANIC	RADIONUCLIDES
16-4179	0316-97-0568	0-1	Soil	3417R	3418R	3419R	3420R
16-4181	0316-97-0569	0-1	Soil	3417R	3418R	3419R	3420R

5.18.5 Evaluation of Inorganic Chemicals

Lead was detected above background UTLs. Antimony in the two samples was undetected by the laboratory at 6.8 mg/kg and 9.5 mg/kg. The antimony data were qualified as estimated undetected (UJ) because the matrix spike recoveries were below the acceptable level of 75%, but these results are accepted as non detects as discussed in Section 4.1. Silver is reported by the laboratory at 3.6 mg/kg and 0.8 mg/kg. The data is estimated (J) because the duplicate recoveries were above the acceptable value. Baseline validation revealed no other problems with the inorganic analyses that affect the use of the data

TABLE 5.18.5-1
INORGANIC CHEMICALS WITH CONCENTRATIONS AT OR ABOVE BACKGROUND SCREENING VALUES FOR PRS 16-025(m)

ANALYTE	SAMPLE ID	SAMPLE VALUE (MG/KG)	SAL (MG/KG)	UTL (MG/KG)	MEDIA	DEPTH (FT)
Antimony	0316-97-0568	6.8(UJ[a])	31	1	Soil	0-1
Antimony	0316-97-0569	9.5(UJ)	31	1	Soil	0-1
Lead	0316-97-0568	33.9	400	23.3	Soil	0-1
Silver	0316-97-0568	3.6(J[b])	380	NC[c]	Soil	0-1
Silver	0316-97-0569	0.8(J)	380	NC	Soil	0-1

a. UJ = Analyte was not detected; the associated value is an estimate of the detection limit or quantitation limit.
b. J = Analyte was positively identified, but the result is estimated to be more uncertain than would normally be expected for that analysis.
c. NC = not calculated

5.18.6 Evaluation of Radionuclides

Cesium-137 and lanthanum-140 were detected above the MDAs for sample 0316-97-0568, but at less than two times the associated measurement uncertainty. Thus these observations are statistically indistinguishable from zero, and considered to be non detects. No other radionuclides of interest (see Section 4.2 for a list of these) were detected above MDAs and background levels, and baseline validation indicates no data quality problems associated with these analyses.

5.18.7 Evaluation of Organic Chemicals

No HE was detected in sample 0316-97-0568, despite indications of the presence of TNT in the associated field screening sample. The positive D-Tech™ result, which suggested that low levels of TNT were present, was not confirmed by the fixed laboratory analysis. The D-Tech™ kits have been shown to provide false positives due to interferences with humic materials. See Section 4.3.2 for further details.

No organic chemicals were detected at or above EQLs or SALs. Baseline validation indicates no data quality problems associated with these analyses. The data present no evidence for a release of inorganic constituents at the site.

5.18.8 Risk-Based Screening Assessment

Lead was detected at concentrations above the background UTL at less than 10% the SAL, while silver was estimated at less than 1% of SAL. Antimony was reported as undetected. No chemicals were present at levels at or above SALs at PRS 16-025(m). Visual examination of the data suggests that an MCE evaluation would yield a value far below the target level of 1.0.

5.18.9 Preliminary Human Health Assessment

No human health risk assessment was performed for PRS 16-025(m) because contamination was not detected at levels at or above SALs.

5.18.10 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 PRS will be deferred until the PRS can be assessed as part of the ecological exposure unit methodology currently being developed.

5.18.11 Conclusions and Recommendations

Ten screening samples and two laboratory samples were collected in and adjacent to the footprint of the former radiography building TA-16-495. One laboratory sample was selected from the only screening sample with a positive HE result. The other laboratory sample was selected from the center location. No inorganic or organic contamination was found at levels at or above SALs. The data show that no contaminants are present at this site at levels of concern to human health.

The biased sampling and analysis strategy at this former radiography source hutment was designed to ensure that residual contamination would be detected if it were present within the PRS. Screening locations and depths were selected based on information about the location, orientation, construction, use of the former building, and mode of decommissioning. Because the likelihood of contamination within the building footprint is judged to be low following the removal of the building, and the likelihood of finding contamination is high based on the biased sampling, two laboratory samples are sufficient to indicate whether or not such contamination is present at levels of concern. The laboratory samples were selected from screening samples according to a site specific prioritization scheme, including field screening results, and were analyzed for all potential contaminants based on historical knowledge of operations in TA-16-495.

PRS 16-025(m) is recommended for human-health NFA based on NFA Criterion 5 because contamination is not present at this site at levels that present a potential risk to human health.

5.19 PRS 16-025(n)

This PRS is the site of former source hutment TA-16-499, located at T-Site (Fig. 5.0-1). It is recommended for human-health NFA because no contaminants were detected above SALs.

5.19.1 History

PRS 16-025(n) is discussed in detail in Subsection 5.24 of the RFI Work Plan for Operable Unit 1082, Addendum 1 (LANL 1994, 1160).

TA-16-499 was constructed in March 1945. The source hutment was used for gamma-ray radiography of baratol lenses and other dense weapon parts. It was located along the northern margin of T-Site. The structure was used for radium-226 sources (Martin 1993, 15-16-477) and for cobalt-60 sources (Martin and Hickmott 1993, 15-16-500). The building contained no sumps or plumbing. Before being abandoned in 1959 and burned in 1960, the building was found to be

contaminated with HE. A shelf was contaminated with alpha radiation when it was surveyed before being burned (Engineering Department 1959, 15-16-256).

The potential contamination at this PRS was identified as metals, SVOCs, HE, and radionuclides.

5.19.2 Description

TA-16-500 was a 16 ft by 16 ft by 9 ft wooden-frame construction building with a concrete floor and a pit in the center 2 ft long by 4 ft wide by 2 ft 6 in deep. It was located on level ground.

5.19.3 Previous Investigation(s)

No previous field investigations were conducted at this PRS.

5.19.4 Field Investigation

The goal of the Phase I investigation at PRS 16-025(n), as outlined in the approved Addendum 1 (LANL 1994, 1160), was to determine if contaminants were present in soils at levels of concern. The sampling design is consistent with the current industrial land use scenario of the conceptual model described in Section 4.3 of the RFI work plan. The potential for contamination at this PRS is hypothesized to be via either: (1) leaks and spills from the past operations; or (2) ash, debris, or contamination left behind after the former building was burned and remnants removed. The potential release mechanisms at this PRS are hypothesized to be via either: (1) infiltration of potential contamination into the near-surface soil; or (2) mechanical movement and mixing of potentially contaminated surface soil during the removal of the former building. There was no historic subsurface construction (or other intrusive activities) at this PRS, and there are no surface water collection points or drainages present that would have spread contamination to the subsurface. Biased sampling was designed to detect residual radionuclides and HE in the surface and near-surface soil at the site of the building footprint. The mode of decommissioning of the building by burning suggests that residual contamination is unlikely at this PRS.

Addendum 1 (LANL 1994, 1160) specified screening soil samples, 0 to 1 ft depth intervals, from five locations and selecting two laboratory samples based on screening results. The plan called for taking the samples at the four quadrants of the building and at the building center. The laboratory samples were to be selected from the screening samples using the following prioritized biasing scheme: (1) samples with positive HE spot test kit results; (2) samples with above two times background radiation readings; (3) a sample from the position of the lead-lined pit in the center of the building; and (4) a sample from a random location. In response to an EPA NOD (EPA 1994, 15-16-644), the screening samples were collected from 1 to 2 ft depth intervals (as well as the

required 0 to 1 ft intervals) to confirm that the soil beneath this concrete floored building had not been disturbed during decommissioning.

Two deviations were made from the work plan:

- The laboratory samples were analyzed for specific radioactive constituents of concern (radium-226, cobalt-60, strontium-90) rather than by beta spectroscopy. This change was made because the analytical laboratories do not have a method for beta spectroscopy. They analyze for the specific radionuclides of concern.

- The screening samples were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit. This analysis was performed in addition to the required HE spot test analysis because the D-Tech™ kits can detect specific potential contaminants and provide lower detection limits (1 ppm or less) than the HE spot test. This screening was used to further characterize the samples in the field for biasing purposes.

The building was accurately surveyed using a Trimble™ GPS Total Station. Aerial photographs were used to determine the building position, and the center of the building was surveyed with an estimated accuracy of 2 ft. Screening sample locations were further determined and surveyed relative to the center point and within the known dimensions of the building.

A total of 10 field screening samples were taken from five locations in and adjacent to the building footprint. Two samples were collected from each location, at 0 to 1 ft and 1 to 2 ft depth intervals. The samples were collected near the corners of the four quadrants of the building and the building center (Fig. 5.19.4-1). These locations were selected to ensure spatial variability and because the most likely contaminant dispersal mechanism for operations in this building, which had concrete floors, is hypothesized to be via either: (1) HE or radioactive spills near the center of the building at the source pit; or (2) leakage at the floor/wall joints.

All samples were collected with a manually driven hand auger (LANL-ER-SOP-06.10, Hand Auger and Thin-Wall Tube Sampler). The soil samples were screened in the field for HE and beta/gamma radioactivity using the HE spot test kit with modified Griess™ reagents (LANL-ER-SOP-10.06,R0, High Explosive Spot Test) and an Eberline ESP1™ radiological meter with HP-260™ probe (LANL-ER-SOP-10.07, R0, Field Monitoring for Surface and Volume Radioactivity Levels). Samples at 0 to 1 ft depth intervals were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit (EPA SW-846 Methods 4051 and 4050). The 0 to 1 ft intervals were selected for further characterization, rather than the 1 to 2 ft intervals, because the soil beneath the PRS structure was observed to be undisturbed, as noted in the soil descriptions

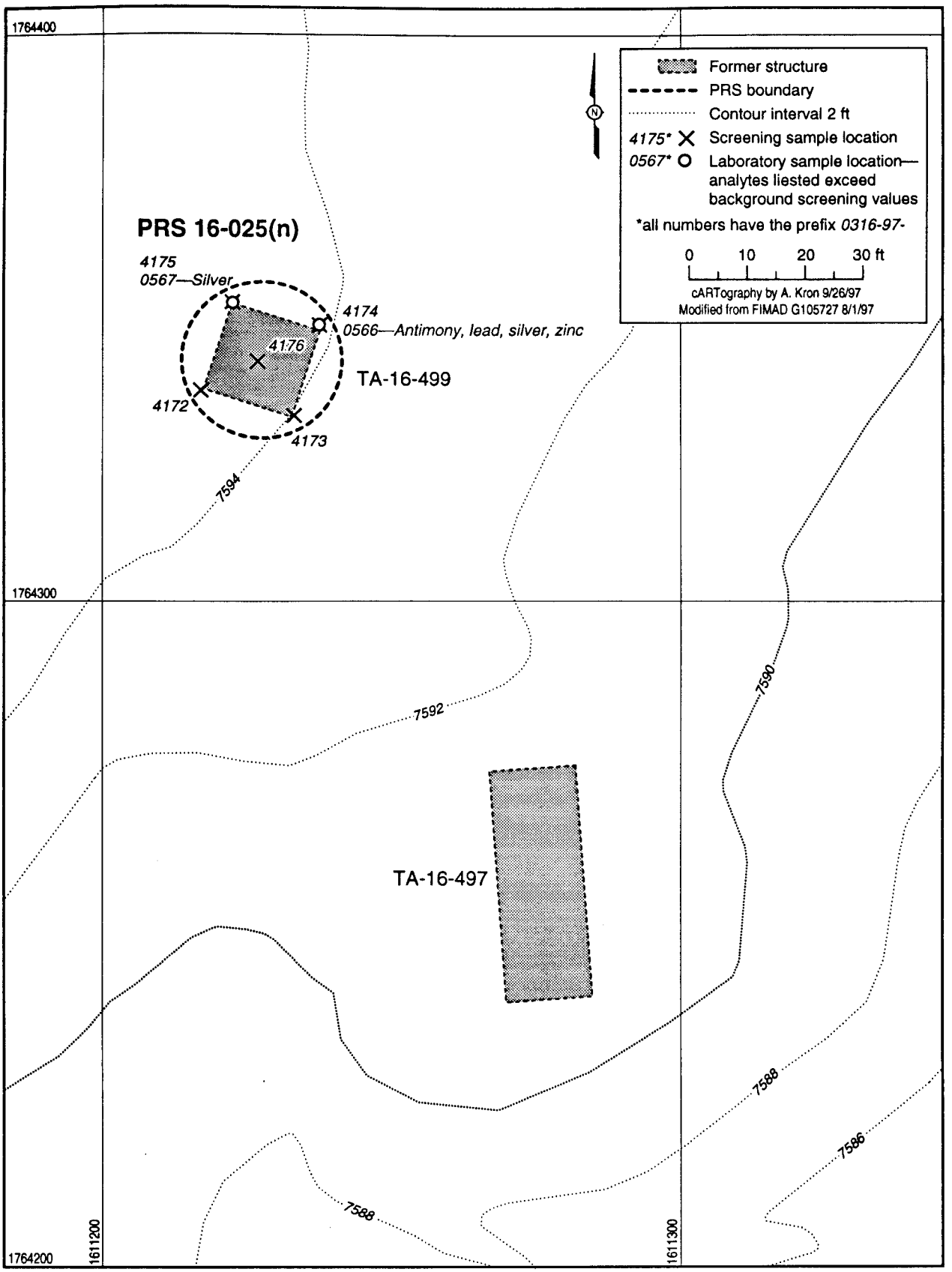

Fig. 5.19.4-1 Locations of PRS 16-025(n) samples.

in the sample collection logs. If contamination is present within the structure footprint, it is most likely present at shallow depths beneath the structure. The soil was described and logged on the Sample Collection Log forms (LANL-ER-SOP-01.04, Sample Control and Field Documentation).

All samples screened negative for HE using the HE spot test kit and contained background radioactivity. Four samples screened positive for HE using the D-Tech™ kit (Table 5.19.4-1).

TABLE 5.19.4-1
SUMMARY OF FIELD SCREENING RESULTS

SCREENING SAMPLE NO.	LOCATION ID	DEPTH (FT)	LAB SAMPLE NO.	HE SPOT TEST	RAD SCREEN	D-TECH RDX (MG/KG)	D-TECH TNT (MG/KG)
0316-97-4172 southwest quadrant	16-4172	0 - 1	NA[a]	negative	background	< 0.5	0.5 - 1.5
0316-97-4173 southeast quadrant	16-4173	0 - 1	NA	negative	background	< 0.5	0.5 - 1.5
0316-97-4174 northeast quadrant	16-4174	0 - 1	0316-97-0566	negative	background	0.5 - 1.5	0.5 - 1.5
0316-97-4175 northwest quadrant	16-4175	0 - 1	0316-97-0567	negative	background	0.5 - 1.5	< 0.5
0316-97-4176 center	16-4176	0 - 1	NA	negative	background	< 0.5	< 0.5

a. NA = Not analyzed.

Screening sample 0316-97-4174 contained elevated concentrations of RDX and TNT (0.5 to 1.5 mg/kg for each analyte). This sample was submitted to the laboratory for analysis. Screening sample 0316-97-4175 was one of three remaining samples which contained an elevated concentration of HE (0.5 to 1.5 mg/kg RDX) and was selected randomly. The random sample was chosen by using a random-number generator to select a number one through three. These numbers corresponded to the northeast, northwest, and southwest quadrants (the quadrant samples containing HE). The northeast quadrant sample was selected. This sample was submitted to the laboratory for analysis (Table 5.19.4-1). The sample was analyzed for metals, SVOCs, HE, isotopic uranium, radium-226, cobalt-60, strontium-90, and gamma spectroscopy (Table 5.19.4-2).

TABLE 5.19.4-2
SUMMARY OF REQUEST NUMBERS FOR LABORATORY SAMPLES
TAKEN AT PRS 16-025(n)

LOCATION ID	SAMPLE ID	DEPTH (FT)	MEDIA	SVOC	HE	INORGANIC	RADIONUCLIDES
16-4174	0316-97-0566	0-1	Soil	3417R	3418R	3419R	3420R
16-4175	0316-97-0567	0-1	Soil	3417R	3418R	3419R	3420R

5.19.5 Evaluation of Inorganic Chemicals

Lead and zinc were detected above background UTLs. Antimony was reported in sample 0316-97-0566 at 14.2 mg/kg. This value is qualified as estimated with a low bias due to poor matrix spike recovery. Antimony was undetected in sample 0316-97-0567 at 5.9 mg/kg (Table 5.19.5-1). The latter result was qualified estimated undetected (UJ) by baseline data validation because the matrix spike recovery was 52.5%. However, this is accepted as a non detect as discussed in Section 4.1. Silver is reported in the two samples at 0.84 mg/kg and 0.88 mg/kg. The data is estimated (J) because the duplicate recoveries were above the acceptable value. Baseline validation revealed no other problems with the inorganic analyses that affect the use of the data.

TABLE 5.19.5-1
INORGANIC CHEMICALS WITH CONCENTRATIONS AT OR ABOVE BACKGROUND SCREENING VALUES FOR PRS 16-025(n)

ANALYTE	SAMPLE ID	SAMPLE VALUE (MG/KG)	SAL (MG/KG)	UTL (MG/KG)	MEDIA	DEPTH (FT)
Antimony	0316-97-0566	14.2(J[b])	31	1	Soil	0-1
Antimony	0316-97-0567	5.9(UJ[c])	31	1	Soil	0-1
Lead	0316-97-0566	64.3	400	23.3	Soil	0-1
Silver	0316-97-0566	0.84(J)	380	NC[a]	Soil	0-1
Silver	0316-97-0567	0.88(J)	380	NC	Soil	0-1
Zinc	0316-97-0566	87.6	23000	50.8	Soil	0-1

a. NC = not calculated
b. J = Analyte was positively identified, but the result is estimated to be more uncertain than would normally be expected for that analysis.
c. UJ = Analyte was not detected; the associated value is an estimate of the detection limit or quantitation limit.

5.19.6 Evaluation of Radionuclides

Cesium-137, lanthanum-140 and neptunium-237 were detected above the MDAs for sample 0316-97-0523, but at less than two times the associated measurement uncertainty. Thus these observations are statistically indistinguishable from zero, and considered to be non detects. No other radionuclides of interest (see Section 4.2 for a list of these) were detected above MDAs and background levels, and baseline validation indicates no data quality problems associated with these analyses.

5.19.7 Evaluation of Organic Chemicals

No organic chemicals were detected in samples 0316-97-0566 and 0316-97-0567, despite indications of the presence of TNT and RDX in the associated field screening samples. The

positive D-Tech™ results, which suggested that low levels of TNT and RDX were present, were not confirmed by the fixed laboratory analysis. The D-Tech™ kits have been shown to provide false positives due to interferences with humic materials. See Section 4.3.2 for further details.

Baseline validation indicates no data quality problems associated with these analyses that affect the use of these data.

5.19.8 Risk-Based Screening Assessment

Antimony was reported at 46% of its SAL in one sample, and this result may have been biased low by as much as a factor of two. Lead was reported at about 16% of SAL in the same sample. Other detected inorganics were present at less than 1% of SAL. No chemicals were present at levels at or above SALs at PRS 16-025(n), and even allowing for the possible negative bias in the antimony result the data indicate that there is little likelihood that contaminants are present at levels that present a potential risk to human health.

Four inorganic chemicals were carried forward from the background comparison evaluation. Analytes are divided into two classes, noncarcinogens and carcinogens, for the screening assessment depending on which toxicological effect forms the basis of their SAL. This separation is required to evaluate possible additive effects within each class of chemical. The MCE evaluation for PRS 16-025(n) was not performed for carcinogenic effects because no chemicals in this class were present above background levels.

An MCE calculation was performed using the sum of the maximum concentrations at this PRS. The MCE calculations are presented in Table 5.19.8-1. The MCE result for noncarcinogens is 0.61.

TABLE 5.19.8-1
MCE CALCULATION FOR PRS 16-025(n)

	MAXIMUM CONCENTRATION	SAL	
ANALYTE	MG/KG	MG/KG	NORMALIZED VALUE
Noncarcinogenic Effects			
Antimony	14	31	0.45161
Lead	64	400	0.16000
Silver	0.9	380	0.00237
Zinc	88	23000	0.00383
TOTAL			0.61

5.19.9 Preliminary Human Health Assessment

No human health risk assessment was performed for PRS 16-025(n) because contamination was not detected at levels at or above SALs.

5.19.10 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 PRS will be deferred until the PRS can be assessed as part of the ecological exposure unit methodology currently being developed.

5.19.11 Conclusions and Recommendations

Ten screening samples and two laboratory samples were collected in and adjacent to the footprint of the former source hutment TA-16-499. The laboratory samples were selected from screening samples with positive HE results. No HE was detected. Antimony, lead, silver, and zinc were detected above background UTLs but below SALs. No inorganic or organic contamination was found at levels at or above SALs. The data show that no contaminants are present at this site at levels of concern to human health.

The biased sampling and analysis strategy at this former source hutment was designed to ensure that residual contamination would be detected if it were present within the PRS. Screening locations and depths were selected based on information about the location, orientation, construction, use of the former building, and mode of decommissioning. Because the likelihood of contamination within the building footprint is judged to be low following the removal of the building, and the likelihood of finding contamination is high based on the biased sampling, two laboratory samples are sufficient to indicate whether or not such contamination is present at levels of concern. The laboratory samples were selected based on field screening results, and were analyzed for all potential contaminants based on historical knowledge of operations in TA-16-499.

PRS 16-025(n) is recommended for human-health NFA based on NFA Criterion 5 because contamination is not present at this site at levels that present a potential risk to human health.

5.20 PRS 16-025(o)

This PRS is the site of former source hutment TA-16-500, located at T-Site (Fig. 5.0-1). It is recommended for human-health NFA because no contaminants were detected above SALs.

5.20.1 History

PRS 16-025(o) is discussed in detail in Subsection 5.24 of the RFI Work Plan for Operable Unit 1082, Addendum 1 (LANL 1994, 1160).

TA-16-500 was built in March 1945. The source hutment was used for gamma-ray radiography of baratol lenses and other dense weapon parts. It was located along the northern margin of T-Site. The structure was used for radium-226 sources (Martin 1993, 15-16-477) and for cobalt-60 sources (Martin and Hickmott 1993, 15-16-500). It is highly likely that a radioactive lanthanum source was used in the building (Buckland 1966, 15-6-136). The building contained no sumps or plumbing. The hutment was abandoned in December 1959. Before being burned in 1960, the building was found to be contaminated with HE (Engineering Department 1959, 15-16-256).

The potential contamination at this PRS was identified as metals, SVOCs, HE, and radionuclides.

5.20.2 Description

TA-16-500 was a 16 ft by 16 ft by 9 ft building of wooden-frame construction with a concrete floor and a pit in the center 2 ft long by 4 ft wide by 2 ft 6 in. deep. It was located on level ground.

5.20.3 Previous Investigation(s)

No previous field investigations were conducted at this PRS.

5.20.4 Field Investigation

The goal of the Phase I investigation at PRS 16-025(o), as outlined in the approved Addendum 1 (LANL 1994, 1160), was to determine if contaminants were present in soils at levels of concern. The sampling design is consistent with the current industrial land use scenario of the conceptual model described in Section 4.3 of the RFI work plan. The potential for contamination at this PRS is hypothesized to be via either: (1) leaks and spills from the past operations; or (2) ash, debris, or contamination left behind after the former building was burned and remnants removed. The potential release mechanisms at this PRS are hypothesized to be via either: (1) infiltration of potential contamination into the near-surface soil; or (2) mechanical movement and mixing of potentially contaminated surface soil during the removal of the former building. There was no

historic subsurface construction (or other intrusive activities) at this PRS, and there are no surface water collection points or drainages present that would have spread contamination to the subsurface. Biased sampling was designed to detect residual radionuclides and HE in the surface and near-surface soil at the site of the building footprint. The mode of decommissioning of the building by burning suggests that residual contamination is unlikely at this PRS.

Addendum 1 (LANL 1994, 1160) specified screening soil samples, 0 to 1 ft depth, from five locations and selecting two laboratory samples based on screening results. The plan called for taking the samples at the four quadrants of the building and at the building center. The laboratory samples were to be selected from the screening samples using the following prioritized biasing scheme: (1) samples with positive HE spot test kit results; (2) samples with above two times background radiation readings; (3) a sample from the position of the lead-lined pit in the center of the building; and (4) a sample from a random location. In response to an EPA NOD (EPA 1994, 15-16-644), the screening samples were collected from 1 to 2 ft depth intervals (as well as the required 0 to 1 ft intervals) to confirm that the soil beneath this concrete floored building had not been disturbed during decommissioning.

Two deviations were made from the work plan:

- The laboratory samples were analyzed for specific radioactive constituents of concern (radium-226, cobalt-60, strontium-90) rather than by beta spectroscopy. This change was made because the analytical laboratories do not have a method for beta spectroscopy. They analyze for the specific radionuclides of concern.

- The screening samples were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit. This analysis was performed in addition to the required HE spot test analysis because the D-Tech™ kits can detect specific potential contaminants and provide lower detection limits (1 ppm or less) than the HE spot test. This screening was used to further characterize the samples in the field for biasing purposes.

The building was accurately surveyed using a Trimble™ GPS Total Station. Aerial photographs were used to determine the building position, and the center of the building was surveyed with an estimated accuracy of 2 ft. Screening sample locations were further determined and surveyed relative to the center point and within the known dimensions of the building.

A total of 10 field screening samples were taken from 5 locations in and adjacent to the building footprint. Two samples were collected from each location, at 0 to 1 ft and 1 to 2 ft depth intervals. The samples were collected near the corners of the four quadrants of the building and the

building center (Fig. 5.20.4-1). These locations were selected to ensure spatial variability and because the most likely contaminant dispersal mechanism for operations in this building, which had concrete floors, is hypothesized to be via either: (1) HE or radioactive spills near the central pit; or (2) leakage at the floor/wall joints.

All samples were collected with a manually driven hand auger (LANL-ER-SOP-06.10, Hand Auger and Thin-Wall Tube Sampler). The soil samples were screened in the field for HE and beta/gamma radioactivity using the HE spot test kit with modified Griess™ reagents (LANL-ER-SOP-10.06,R0, High Explosive Spot Test) and an Eberline ESP1™ radiological meter with HP-260™ probe (LANL-ER-SOP-10.07, R0, Field Monitoring for Surface and Volume Radioactivity Levels). Samples at 0 to 1 ft depth intervals were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit (EPA SW-846 Methods 4051 And 4050). The 0 to 1 ft intervals were selected for further characterization, rather than the 1 to 2 ft intervals, because the soil beneath the PRS structure was found to be undisturbed, as noted in the soil descriptions in the sample collection logs. If contamination is present within the structure footprint, it is most likely present at shallow depths directly beneath the structure. The soil was described and logged on the Sample Collection Log forms (LANL-ER-SOP-01.04, Sample Control and Field Documentation).

All samples screened negative for HE using the HE spot test kit and contained background radioactivity. Three samples screened positive for HE using the D-Tech™ kit (Table 5.20.4-1).

TABLE 5.20.4-1
SUMMARY OF FIELD SCREENING RESULTS

SCREENING SAMPLE NO.	LOCATION ID	DEPTH (FT)	LAB SAMPLE NO.	HE SPOT TEST	RAD SCREEN	D-TECH RDX (MG/KG)	D-TECH TNT (MG/KG)
0316-97-4182 southeast quadrant	16-4182	0 - 1	NA[a]	negative	background	< 0.5	< 0.5
0316-97-4183 northeast quadrant	16-4183	0 - 1	NA	negative	background	< 0.5	< 0.5
0316-97-4184 northwest quadrant	16-4184	0 - 1	0316-97-0570	negative	background	< 0.5	0.5 - 1.5
0316-97-4185 southwest quadrant	16-4185	0 - 1	NA	negative	background	0.5 - 1.5	< 0.5
0316-97-4186 center	16-4186	0 - 1	0316-97-0571	negative	background	< 0.5	0.5 - 1.5

a. NA = Not analyzed.

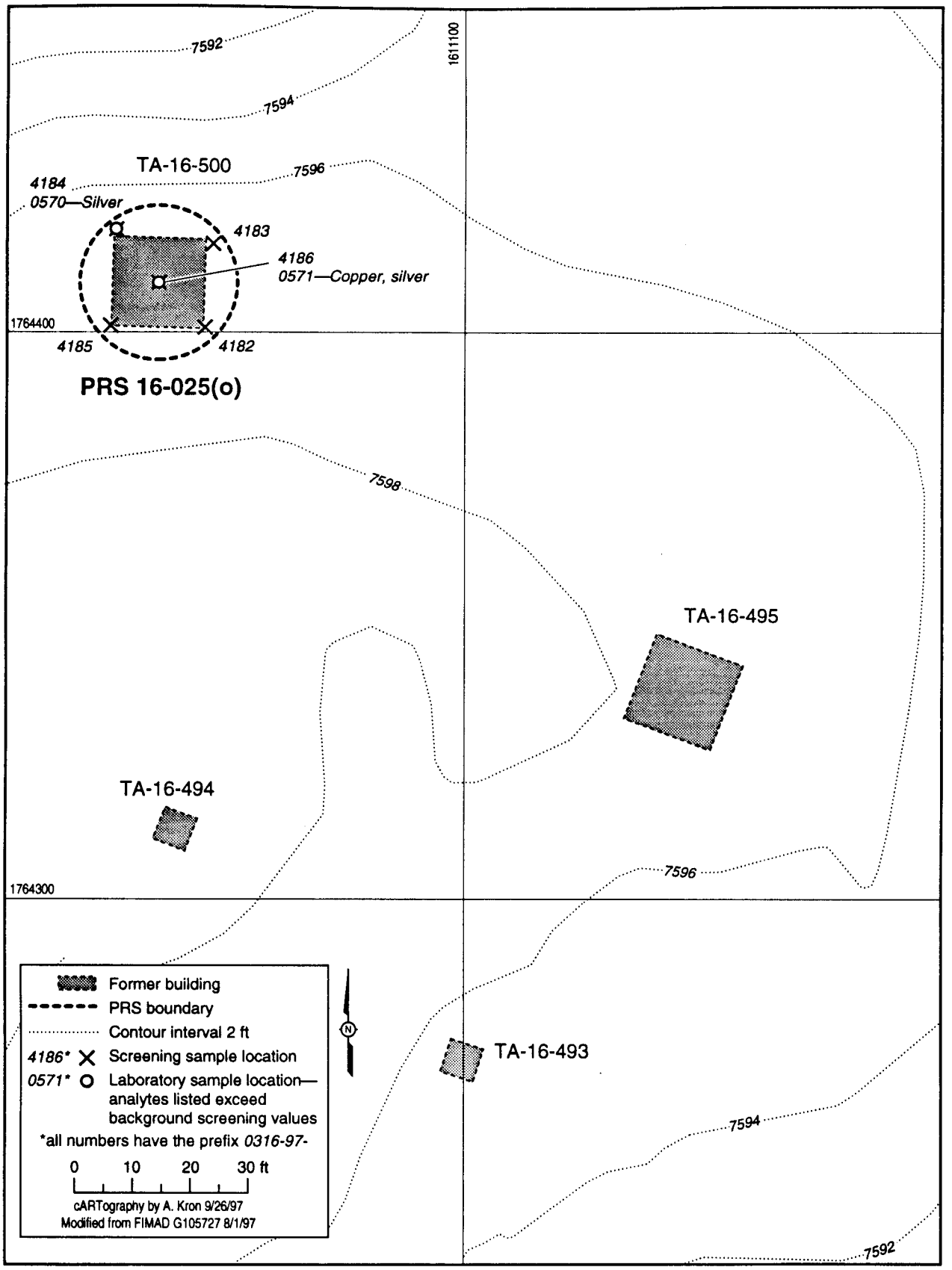

Fig. 5.20.4-1 Locations of PRS 16-025(o) samples.

Screening sample 0316-97-4186 was one of three samples which contained an elevated concentration of HE (0.5 to 1.5 mg/kg TNT) and was located in the center of the former structure. This sample was submitted to the laboratory for analysis. Screening sample 0316-97-4184 was one of two remaining samples which contained an elevated concentration of HE (0.5 to 1.5 mg/kg TNT) and was selected randomly as a laboratory sample (0316-97-0570). The random sample was selected by using a random-number generator to select a number one or two. These numbers corresponded to the northwest and southwest quadrants (the quadrant locations containing HE). The northwest quadrant sample was selected. This sample was submitted to the laboratory for analysis (Table 5.20.4-1). The sample was analyzed for metals, SVOCs, HE, Isotopic uranium, radium-226, cobalt-60, strontium-90, and gamma spectroscopy (Table 5.20.4-2).

TABLE 5.20.4-2
SUMMARY OF REQUEST NUMBERS FOR LABORATORY SAMPLES TAKEN AT PRS 16-025(o)

LOCATION ID	SAMPLE ID	DEPTH (FT)	MEDIA	SVOC	HE	INORGANIC	RADIONUCLIDES
16-4184	0316-97-0570	0-1	Soil	3417R	3418R	3419R	3420R
16-4186	0316-97-0571	0-1	Soil	3417R	3418R	3419R	3420R

5.20.5 Evaluation of Inorganic Chemicals

Copper was detected above background UTLs. Antimony in the two samples was undetected by the laboratory at 5.8 mg/kg and 6.2 mg/kg (Table 5.20.5-1). The data were qualified estimated undetected (UJ) because the matrix spike recoveries were below the acceptable level (52 %). These results are accepted as non-detects, as discussed in Section 4.1. Silver was reported in the two samples at 0.5 mg/kg and 0.75 mg/kg. The data were qualified as estimated (J) because the duplicate recoveries were above the acceptable value.

Baseline validation revealed no other problems with the inorganic analyses that affect the use of the data.

TABLE 5.20.5-1
INORGANIC CHEMICALS WITH CONCENTRATIONS AT OR ABOVE BACKGROUND SCREENING VALUES FOR PRS 16-025(o)

ANALYTE	SAMPLE ID	SAMPLE VALUE (MG/KG)	SAL (MG/KG)	UTL (MG/KG)	MEDIA	DEPTH (FT)
Antimony	0316-97-0570	5.8(UJ)	31	1	Soil	0-1
Antimony	0316-97-0571	6.2(UJ)	31	1	Soil	0-1
Copper	0316-97-0571	21.9	2800	15.5	Soil	0-1
Silver	0316-97-0570	0.5(J)	380	NC[a]	Soil	0-1
Silver	0316-97-0571	0.75(J)	380	NC	Soil	0-1

a. NC = not calculated
b. UJ = Analyte was not detected; the associated value is an estimate of the detection limit or quantitation limit.
c. J = Analyte was positively identified, but the result is estimated to be more uncertain than would normally be expected for that analysis.

5.20.6 Evaluation of Radionuclides

Cesium-137 was reported at 0.48 pCi/g in sample 0316-97-0571. Cesium-137 is a fallout radionuclide (i.e., a moderately long-lived radionuclide produced by atmospheric testing) which continues to be present in surface soils world-wide, including those of the Pajarito Plateau, at levels up to 1 to 1.5 pCi/g. Its presence at less than 0.48 pCi/g in a 0-1 ft soil sample is therefore ascribed to world-wide fallout. No other radionuclides of interest (see Section 4.2 for a list of these) were detected above MDAs and background levels, and baseline validation indicates no data quality problems associated with these analyses.

5.20.7 Evaluation of Organic Chemicals

No organic chemicals were detected in samples 0316-97-0570 and 0316-97-0571, despite indications of the presence of TNT in the associated field screening samples. The positive D-Tech™ results, which suggested that low levels of TNT were present, were not confirmed by the fixed laboratory analysis. The D-Tech™ kits have been shown to provide false positives due to interferences with humic materials. See Section 4.3.2 for further details.

Baseline validation indicates no data quality problems associated with these analyses that affect the use of these data.

5.20.8 Risk-Based Screening Assessment

Copper and silver were reported at less than 0.5% of their SALs. Antimony was reported as undetected. No chemicals were present at levels at or above SALs at PRS 16-025(o). Visual inspection of the data suggest that an MCE calculation would yield a value far below the target level of 1.0.

5.20.9 Preliminary Human Health Assessment

No human health risk assessment was performed for PRS 16-025(o) because contamination was not detected at levels at or above SALs.

5.20.10 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 PRS will be deferred until the PRS can be assessed as part of the ecological exposure unit methodology currently being developed.

5.20.11 Conclusions and Recommendations

Ten screening samples and two laboratory samples were collected in and adjacent to the footprint of the former source hutment TA-16-500. The laboratory samples were selected from screening samples with positive HE results. No inorganic or organic contamination was found at or above SALs. The data show that no contaminants are present at this site at levels of concern to human health.

The biased sampling and analysis strategy at this former source hutment was designed to ensure that residual contamination would be detected if it were present within the PRS. Screening locations and depths were selected based on the information about the location, orientation, construction, use and mode of decommissioning of the former building. Because the likelihood of contamination within the building footprint is judged to be low following the removal of the building, and the likelihood of finding contamination is high based on the biased sampling, two laboratory samples are sufficient to indicate whether or not such contamination is present at levels of concern. The laboratory samples were selected based on field screening results, and were analyzed for all potential contaminants based on historical knowledge of operations in TA-16-500.

PRS 16-025(o) is recommended for human-health NFA based on NFA Criterion 5 because contamination is not present at this site at levels that present a potential risk to human health.

5.21 PRS 16-025(y)

This PRS is the site of the former barium nitrate grinding facility TA-16-55, located in the GMX-2 area (Fig. 5.0-1). It is recommended for human-health NFA because no contaminants were detected above SALs.

5.21.1 History

PRS 16-025(y) is discussed in detail in Subsection 5.20 of the RFI Work Plan for Operable Unit 1082, Addendum 1 (LANL 1994, 1160).

TA-16-55 was the first barium nitrate grinding facility at S-Site, constructed in March 1945. It contained a micropulverizer that was used for grinding barium nitrate. It served this function from March 1945 until TA-16-54 was constructed later in 1945 (Truslow 1973, 15-16-264). A former site worker stated that the building was later used for a number of purposes including lead storage (Martin 1993, 15-16-477). When the building was surveyed in 1959 it was noted as being a storage building containing "blocks of paraffin, jars of toluene, and unlabeled cans" (Schulte 1959, 15-16-263). The sumps were east of the building and exited to a drain line that presumably flowed into the main drainage of World War II era S-site, less than 100 ft from TA-16-55. The sumps, PRS 16-029(a2), are addressed in Addendum 1 (LANL 1994, 1160). This building was abandoned on December 18, 1959. Before burning in February 1960, it was determined that TA-16-55 was contaminated with HE.

The potential contamination at this PRS was identified as metals, SVOCs, and HE.

5.21.2 Description

TA-16-55 was located south of TA-16-45 on a relatively flat site. It consisted of three structures, a large process building (20 ft wide x 40 ft long x 1 ft high) connected to a smaller equipment room (7 ft wide x 11 ft long x 8 ft high) and a small storage room (10 ft wide x 1 ft long x 8 ft high). The structure was of wooden-frame construction with a concrete floor.

5.21.3 Previous Investigation(s)

No previous field investigations were conducted at this PRS.

5.21.4 Field Investigation

The goal of the Phase I investigation at PRS 16-025(y), as outlined in the approved RFI Work Plan for Operable Unit 1082, Addendum 1 (LANL 1994, 1160), was to determine if contaminants were present in soils at levels of concern. The sampling design is consistent with the current industrial

land use scenario of the conceptual model described in Section 4.3 of the RFI work plan. The potential for contamination at this PRS is hypothesized to be via either: (1) leaks and spills from the past operations; or (2) ash, debris, or contamination left behind after the former building was burned and remnants removed. The potential release mechanisms at this PRS are hypothesized to be via either: (1) infiltration of potential contamination into the near-surface soil; or (2) mechanical movement and mixing of potentially contaminated surface soil during the removal of the former building. There was no historic subsurface construction (or other intrusive activities) at this PRS, and there are no surface water collection points or drainages present that would have spread contamination to the subsurface. Biased sampling was designed to detect barium and HE in the surface and near-surface soil at the site of the building footprint. The mode of decommissioning of the building by burning suggests that residual contamination is unlikely at this PRS.

Addendum 1 (LANL 1994, 1160) specified screening soil samples, 0 to 1 ft depth, from five locations and selecting one laboratory sample based on screening results. The plan called for taking the screening samples at the corners of three quadrants of the building (excluding NW), at the building center, and adjacent to the location of the door. The laboratory sample was to be selected from the screening samples using the following prioritized biasing scheme: (1) a sample with elevated barium concentrations; (2) a sample with positive HE spot test kit results; (3) a sample with above two times background radiation readings; (4) a sample adjacent to the location of the door; and (5) a sample at the building center. In response to the EPA NOD (EPA 1994, 15-16-644), screening samples were collected from 1 to 2 ft depth intervals (as well as the required 0 to 1 ft intervals) to confirm that the soil beneath this concrete floored building had not been disturbed during decommissioning, and two laboratory samples were collected (based on the above scheme) rather than one sample.

One deviation was made to work plan. The samples were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit. This analysis was performed in addition to the required HE spot test analysis because the D-Tech™ kits can detect specific potential contaminants and provide lower detection limits (1 ppm or less) than the HE spot test. This screening was used to further characterize the samples in the field for biasing purposes.

The building was accurately surveyed using a Trimble™ GPS Total Station. Aerial photographs were used to determine the building position, and the center of the building was surveyed with an estimated accuracy of 2 ft. Screening sample locations were further determined and surveyed relative to the center point and within the known dimensions of the building.

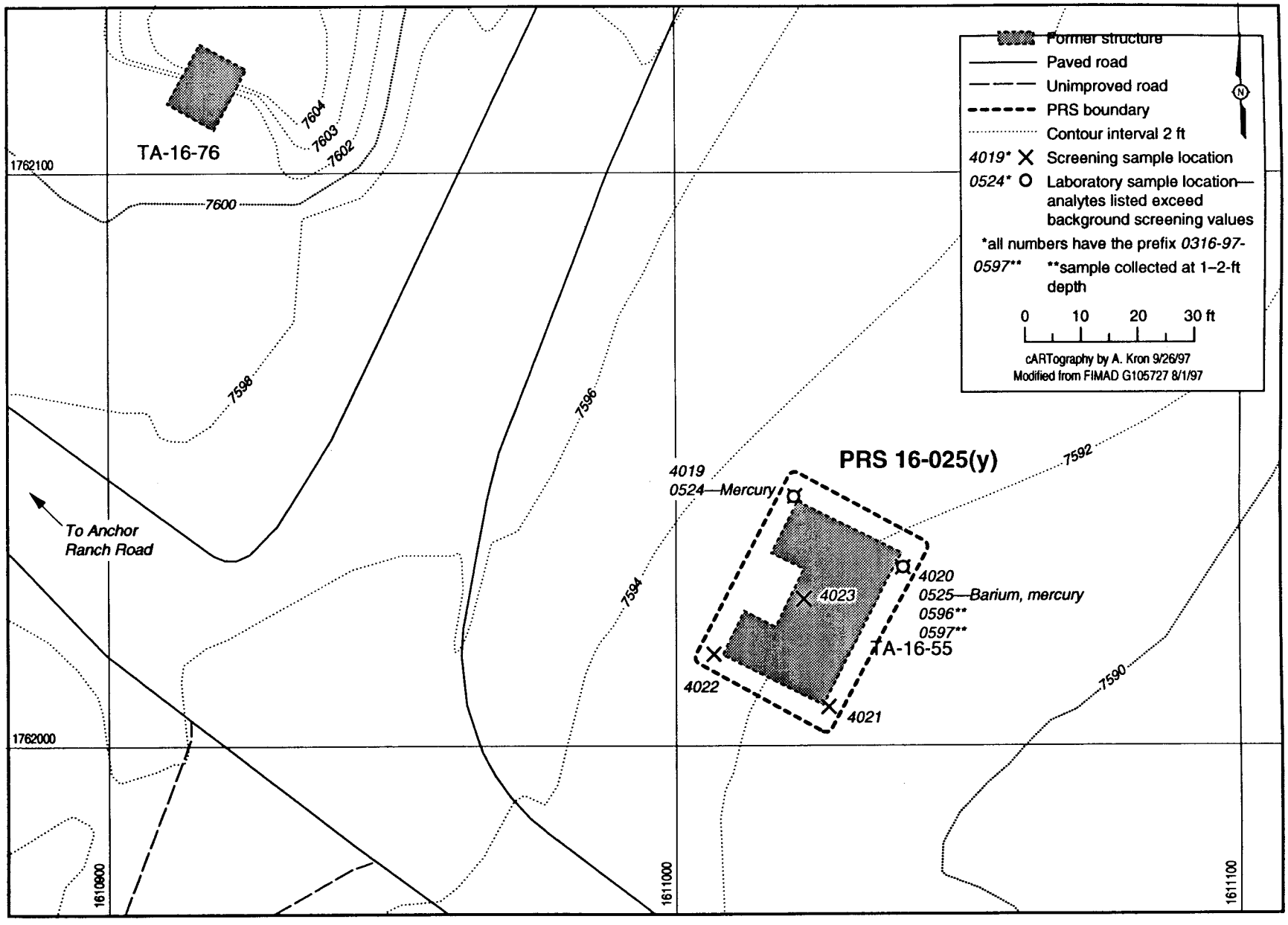

Fig. 5.21.4-1 Locations of PRS 16-025(y) locations.

A total of ten field screening samples were taken from five locations in and adjacent to the building footprint. Two samples were collected from each location, at 0 to 1 ft and 1 to 2 ft depth intervals. The samples were collected near the corners of the three quadrants of the building (excluding NW), at the building center, and adjacent to the location of the door (Fig. 5.21.4-1). These locations were selected to ensure spatial variability and because the most likely contaminant dispersal mechanism for operations in this building, which had concrete floors, is hypothesized to be via either: (1) HE or barium nitrate spills near door areas; or (2) leakage at the floor and floor/wall joints.

All samples were collected with a manually driven hand auger (LANL-ER-SOP-06.10, Hand Auger and Thin-Wall Tube Sampler). The soil samples were screened in the field for HE and beta/gamma radioactivity using the HE spot test kit with modified Griess™ reagents (LANL-ER-SOP-10.06,R0, High Explosive Spot Test) and an Eberline ESP1™ radiological meter with HP-260™ probe (LANL-ER-SOP-10.07, R0, Field Monitoring for Surface and Volume Radioactivity Levels). Samples at 0 to 1 ft depth intervals were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit (EPA SW-846 Methods 4051 and 4050) and metals using the Tracor Northern Spectrace 9000 XRF (LANL-ER-SOP-10.06). The 0 to 1 ft intervals were selected for further characterization, rather than the 1 to 2 ft intervals, because the soil beneath the PRS structure is undisturbed, as confirmed by the soil descriptions in the sample collection logs. If contamination is present within the structure footprint, it is most likely present at shallow depths directly beneath the structure. The soil was described and logged on the Sample Collection Log forms (LANL-ER-SOP-01.04, Sample Control and Field Documentation).

All samples screened negative for HE using the HE spot test kit and contained background radioactivity. All samples screened positive for HE using the D-Tech™ kit and were within two times background for barium using the XRF (Table 5.21.4-1).

TABLE 5.21.4-1
SUMMARY OF FIELD SCREENING RESULTS

SCREENING SAMPLE NO.	LOC. ID	DEPTH (FT)	LAB SAMPLE NO.	HE SPOT TEST	RAD SCREEN	XRF BA (MG/KG)	D-TECH RDX (MG/KG)	D-TECH TNT (MG/KG)
0316-97-4019 door	16-4019	0 - 1	0316-97-0524	negative	bkg.	447 ± 24	0.5 - 1.5	< 0.5
0316-97-4020 northeast quadrant	16-4020	0 - 1	0316-97-0525	negative	bkg.	551 ± 26	4.5 - 6	< 0.5
0316-97-4021 southeast quadrant	16-4021	0 - 1	NA[a]	negative	bkg.	847 ± 36	0.5 - 1.5	< 0.5
0316-97-4022 southwest quadrant	16-4022	0 - 1	NA	negative	bkg.	443 ± 24	0.5 - 1.5	< 0.5
0316-97-4023 center	16-4023	0 - 1	NA	negative	bkg.	822 ± 32	0.5 - 1.5	< 0.5

a. NA = Not analyzed.

All of the samples screened within two times background for barium. The background UTL for barium is 314 mg/kg, however the background for barium using the XRF is approximately 500 mg/kg. (The screening barium values above are reported as concentrations plus or minus two standard deviations). Because barium concentrations did not exceed two times XRF background, they were not used to bias laboratory samples. The laboratory samples were selected from screening locations with HE hits. Screening sample 0316-97-4020 contained the highest concentration of HE (4.5 to 6 mg/kg RDX). Screening sample 0316-97-4019 contained an elevated RDX concentration (0.5 to 1.5 mg/kg) and was located adjacent to the former location of the door. These two samples were submitted to the laboratory for analysis.

Samples 0316-97-0596 and 0316-97-0597 were collected as QA/QC duplicate splits. These samples were taken at 1 to 2 ft depth interval at the same location as sample 0316-97-4020. These samples were collected to confirm that HE was not present at depths. They were submitted to the laboratory for analysis (Table 5.21.4-3).

TABLE 5.21.4-2
SUMMARY OF FIELD SCREENING RESULTS
FOR QA/QC SAMPLES

LOCATION ID	DEPTH (FT)	LAB SAMPLE NO.	HE SPOT TEST	RAD SCREEN	XRF BA (MG/KG)	D-TECH RDX (MG/KG)	D-TECH TNT (MG/KG)	QA/QC SAMPLE
16-4020	1 - 2	0316-97-0596	negative	bkg.	424 ± 24	< 0.5	< 0.5	0316-97-0597

The samples were analyzed for metals, SVOCs, and HE. (Table 5.21.4-3).

TABLE 5.21.4-3
SUMMARY OF REQUEST NUMBERS FOR LABORATORY SAMPLES TAKEN AT PRS 16-025(y)

LOCATION ID	SAMPLE ID	DEPTH (FT)	MATRIX	INORGANICS	SVOCS	HE
16-4019	0316-97-0524	0 - 1	soil	3334R	3333R	3335R
16-4020	0316-97-0525	0 - 1	soil	3334R	3333R	3335R
16-4020	0316-97-0596	1 - 2	soil	3528R	3526R	3527R
16-4020	0316-97-0597	1 - 2	soil	3528R	3526R	3527R

5.21.5 Evaluation of Inorganic Chemicals

Barium was reported above background levels in all screening samples from this site (Table 5.21.5-1). However, the screening method (XRF) detects all barium in the sample material, not only that leachable by the sample digestion method (SW-846 method 3050) used in the preparation of the sample for laboratory analysis by ICPES, so the XRF results are not directly comparable to the data on which the background UTL calculation was based. Barium was detected at 12% above the background UTL but below the associated field screening result in sample 0316-97-0525. In the remaining samples, barium was well within the background range at 180 to 205 mg/kg. Mercury was estimated in both surface samples at 0.03 mg/kg, the upper limit of the results reported by Ferenbaugh et al. (1990, 0099). Baseline and focused validation identified no problems with these inorganic analyses.

TABLE 5.21.5-1
INORGANIC CHEMICALS WITH CONCENTRATIONS AT OR ABOVE BACKGROUND SCREENING VALUES FOR PRS 16-025(y)

ANALYTE	SAMPLE ID	SAMPLE VALUE (MG/KG)	SAL (MG/KG)	UTL (MG/KG)	MEDIA	DEPTH (FT)
Barium	0316-97-0525	353	5600	315	Soil	0-1
Mercury	0316-97-0524	0.03(J[b])	23	NC[a]	Soil	0-1
Mercury	0316-97-0525	0.03(J)	23	NC	Soil	0-1

a. NC = not calculated.
b. J = Analyte was positively identified, but the results are estimated to be more uncertain than would normally be expected for that analysis.

5.21.6 Evaluation of Radionuclides

Radionuclides were not analyzed for at PRS 16-025(y) because historical evidence indicated that radioactive material was not stored or used in the barium nitrate grinding facility. Additionally, field screening did not indicate the presence of radioactive constituents.

5.21.7 Evaluation of Organic Chemicals

No HE was detected in any sample, despite indications of the presence of RDX in the associated field screening samples, including a field screening result of 4.5 to 6 mg/kg for the field screening sample associated with sample 0316-97-0525. The positive D- Tech™ results were not confirmed by the fixed laboratory analyses of three samples from this location. Baseline validation identified no problems with the laboratory analyses.

No semivolatile organic chemicals were detected in any sample. All semivolatile non detects for sample 0316-97-0525 were qualified UJ, but as discussed in Section 4.3.1 these were accepted as non detects following focused validation. Baseline validation indicated no other problems that affect the use of these data.

5.21.8 Risk-Based Screening Assessment

Barium was reported at less than 10% of its SAL in one sample, and mercury was estimated at less than 0.5% of its SAL in two. No chemicals were present at levels above SALs at PRS 16-025(y).

5.21.9 Preliminary Human Health Assessment

No human health risk assessment was performed for PRS 16-025(y) because there were no constituents above SALs or UTLs and MCE screening would yield a value far below the target limit of 1.0.

5.21.10 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 PRS will be deferred until the PRS can be assessed as part of the ecological exposure unit methodology currently being developed.

5.21.11 Conclusions and Recommendations

Ten screening samples and four laboratory samples were collected in and adjacent to the footprint of the former barium nitrate grinding facility 16-025(y). Barium was reported slightly above the background UTL in one of the laboratory samples, and mercury was reported as estimated at the upper limit of background in two. No inorganic or organic contamination was found above SALs and no COPCs were identified.

The biased sampling strategy at this former barium-nitrate grinding building was designed to ensure that residual contamination would be detected if it were present within the PRS. Screening locations and depths were selected based on the information about the location, orientation, construction, use of the former building, and mode of decommissioning. Because the likelihood of contamination within the building footprint is judged to be low following the removal of the building, and the likelihood of finding contamination is high based on the biased sampling, sampling at two locations was judged sufficient to indicate whether or not such contamination is present at levels of concern. Because of the high initial screening result, three laboratory samples were collected at one of these locations. All samples were analyzed for all potential contaminants based on historical knowledge of operations in TA-16-55.

PRS 16-025(y) is recommended for NFA based on NFA Criterion 5 because contamination is not present at this site at levels that present a risk to human health.

5.22 PRS 16-034(c)

This PRS is the site of the former warehouse hut TA-16-491, located at T-Site (Fig. 5.0-1). It is recommended for human-health NFA because no contaminants were detected above SALs.

5.22.1 History

PRS 16-034(c) is discussed in detail in Subsection 5.24 of the RFI Work Plan for Operable Unit 1082, Addendum 1 (LANL 1994, 1160).

The warehouse hut was located northeast of TA-16-490 on ground sloping gently to the east. It was constructed in 1945. During World War II, the building was used to store tools (Martin and Hickmott 1993, 15-16-514), but by 1950 it was used for x-ray exposure experiments on rats and rabbits (Martin and Hickmott 1993, 15-16-500). The building contained no sumps or plumbing. It was abandoned in December 1959. Before destruction by burning in 1960, the building was found to be contaminated with HE (Engineering Department 1959, 15-16-256).

The potential contamination at this PRS was identified as metals, SVOCs, and HE.

5.22.2 Description

TA-16-491 was a 6 ft wide x 24 ft long x 9 ft high wooden-frame construction building with a wooden floor. It was located on fairly level ground.

5.22.3 Previous Investigation(s)

No previous field investigations were conducted at this PRS.

5.22.4 Field Investigation

The goal of the Phase I investigation at PRS 16-034(c), as outlined in the approved RFI Work Plan for Operable Unit 1082, Addendum 1 (LANL 1994, 1160), was to determine if contaminants were present in soils at levels of concern. The sampling design is consistent with the current industrial land use scenario of the conceptual model described in Section 4.3 of the RFI work plan. The potential for contamination at this PRS is hypothesized to be via either: (1) leaks and spills from the past operations; or (2) ash, debris, or contamination left behind after the former building was burned and remnants removed. The potential release mechanisms at this PRS are hypothesized to be via either: (1) infiltration of potential contamination into the near-surface soil; or (2) mechanical movement and mixing of potentially contaminated surface soil during the removal of the former building. There was no historic subsurface construction (or other intrusive activities) at this PRS, and there are no surface water collection points or drainages present that would have spread contamination to the subsurface. Biased sampling was designed to detect residual HE in the surface and near-surface soil at the site of the building footprint. The mode of decommissioning of the building by burning suggests that residual contamination is unlikely at this PRS.

Addendum 1 (LANL 1994, 1160) specified screening soil samples, 0 to 1 ft depth intervals, from five locations and selecting one laboratory sample only if positive field screening results were obtained. The plan called for taking the screening samples at the four quadrants of the building and at the building center. The laboratory sample was to be selected from the screening samples using the following prioritized biasing scheme: (1) a sample with a positive HE spot test kit result; and (2) a sample with above two times background radiation readings. In response to an EPA NOD (EPA 1994, 15-16-644), two laboratory samples were collected (based on the above scheme), even if all field screening results were negative.

One deviation was made from the work plan. The screening samples were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit. This analysis was performed in addition to the required HE spot test analysis because the D-Tech™ kits can detect specific potential contaminants and provide lower detection limits (1 ppm or less) than the HE spot test. This screening was used to further characterize the samples in the field for biasing purposes.

The building was accurately surveyed using a Trimble™ GPS Total Station. Aerial photographs were used to determine the building position, and the center of the building was surveyed with an estimated accuracy of 2 ft. Screening sample locations were further determined and surveyed relative to the center point and within the known dimensions of the building.

A total of five field screening samples were taken from five locations in the building footprint. The samples were collected from the 0 to 1 ft depth interval. The field screening samples were taken within the four quadrants of the building and at the building center (Fig. 5.22.4-1). These locations were selected to ensure spatial variability and because the most likely contaminant dispersal mechanism for operations in this building, which had wooden floors, is hypothesized to be either: (1) HE spills near door areas; or (2) leakage from cracks within wooden floors.

All samples were collected with manually driven hand auger (LANL-ER-SOP-06.10, Hand Auger and Thin-Wall Tube Sampler). The soil samples were screened in the field for HE and beta/gamma radioactivity using the HE spot test kit with modified Griess™ reagents (LANL-ER-SOP-10.06,R0, High Explosive Spot Test) and an Eberline ESP1™ radiological meter with HP-260™ probe (LANL-ER-SOP-10.07, R0, Field Monitoring for Surface and Volume Radioactivity Levels). Samples were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit (EPA SW-846 Methods 4051 and 4050). The soil was described and logged on the Sample Collection Log forms (LANL-ER-SOP-01.04, Sample Control and Field Documentation).

All samples screened negative for HE using the HE spot test kit and contained background radioactivity. Two screening samples screened positive for HE using the D-Tech™ kit (Table 5.22.4-1).

TABLE 5.22.4-1
SUMMARY OF FIELD SCREENING RESULTS

SCREENING SAMPLE NO.	LOCATION ID	DEPTH (FT)	LAB SAMPLE NO.	HE SPOT TEST	RAD SCREEN	D-TECH RDX (MG/KG)	D-TECH TNT (MG/KG)
0316-97-4147 southwest quadrant	16-4147	0 - 1	0316-97-0586	negative	background	< 0.5	0.5 - 1.5
0316-97-4148 northwest quadrant	16-4148	0 - 1	NA[a]	negative	background	< 0.5	< 0.5
0316-97-4149 northeast quadrant	16-4149	0 - 1	NA	negative	background	< 0.5	< 0.5
0316-97-4150 southeast quadrant	16-4150	0 - 1	NA	negative	background	< 0.5	< 0.5
0316-97-4151 center	16-4151	0 - 1	0316-97-0560	negative	background	0.5 - 1.5	< 0.5

a. NA = Not analyzed.

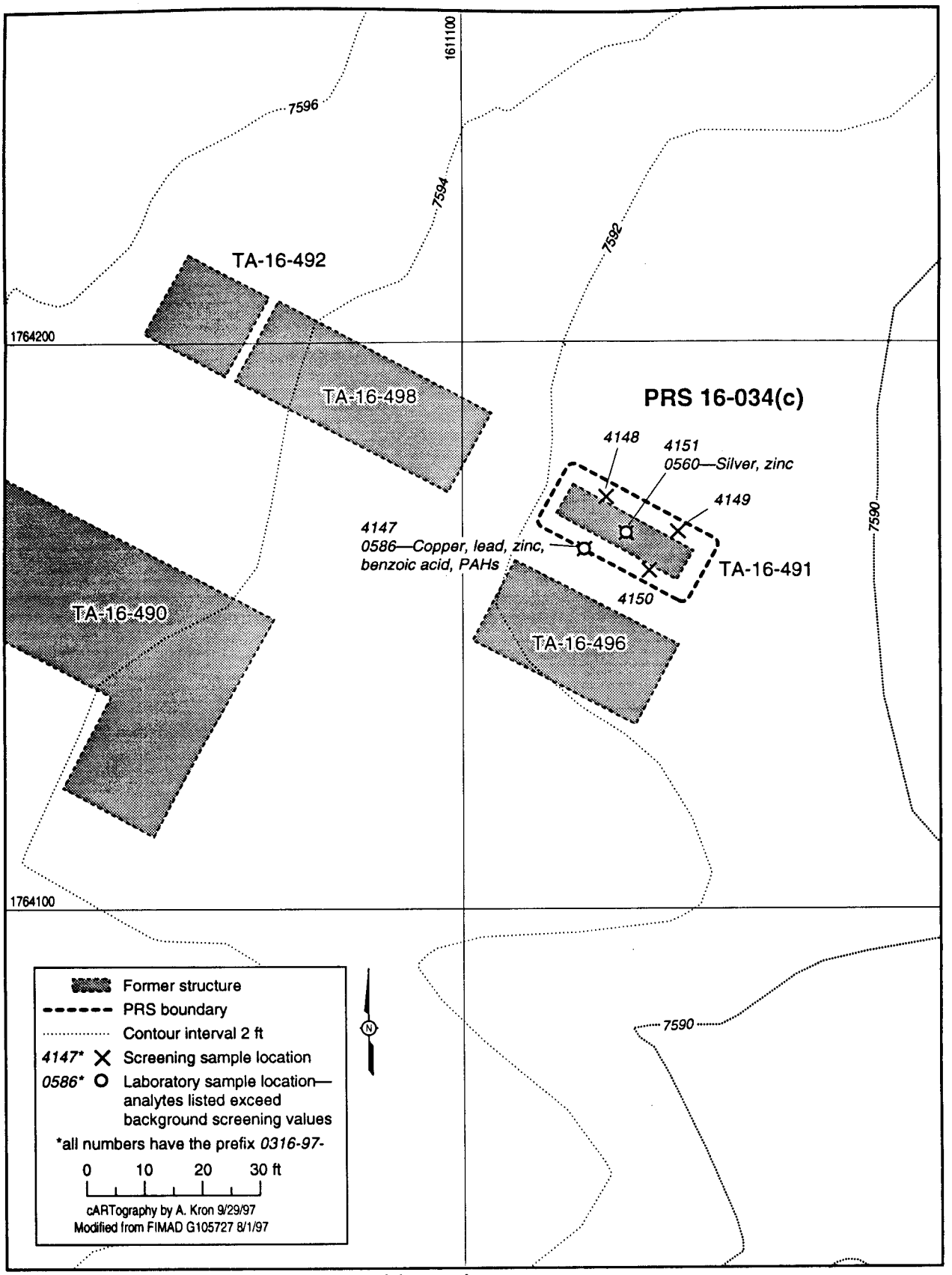

Fig. 5.22.4-1 Locations of PRSs 16-034(c) samples.

Screening sample 0316-97-4147 contained the highest concentration of TNT (0.5 - 1.5 mg/kg) and screening sample 0316-97-4151 contained the highest concentration of RDX (0.5 - 1.5 mg/kg). These samples were submitted to the laboratory for analysis (Table 5.22.4-1). The sample was analyzed for metals, SVOCs, and HE (Table 5.22.4-2).

TABLE 5.22.4-2
SUMMARY OF REQUEST NUMBERS FOR LABORATORY SAMPLES TAKEN AT PRS 16-034(c)

LOCATION ID	SAMPLE ID	DEPTH (FT)	MATRIX	INORGANICS	SVOCS	HE
16-4147	0316-97-0586	0 - 1	soil	3403R	3401R	3402R
16-4151	0316-97-0560	0 - 1	soil	3403R	3401R	3402R

5.22.5 Evaluation of Inorganic Chemicals

Copper, lead, and zinc were detected above background UTLs. Silver was reported by the laboratory at 3.1 mg/kg. The data was qualified as estimated (J) because the duplicate recovery of silver was outside the acceptable limit. No valid antimony results are available for this PRS, as discussed in Section 4.1. Baseline validation indicated no other problems that affect the use of these inorganic data.

TABLE 5.22.5-1
INORGANIC CHEMICALS WITH CONCENTRATIONS AT OR ABOVE BACKGROUND SCREENING VALUES FOR PRS 16-034(c)

ANALYTE	SAMPLE ID	SAMPLE VALUE (MG/KG)	SAL (MG/KG)	UTL (MG/KG)	MEDIA	DEPTH (FT)
Copper	0316-97-0586	30	2800	15.5	Soil	0-1
Lead	0316-97-0586	120	400	23.3	Soil	0-1
Silver	0316-97-0560	3.1(J)[a]	380	NC[b]	Soil	0-1
Zinc	0316-97-0560	91	23000	50.8	Soil	0-1
Zinc	0316-97-0586	480	23000	50.8	Soil	0-1

a. J = Analyte was positively identified, but the result is estimated to be more uncertain than would normally be expected for that analysis.
b. NC = not calculated

5.22.6 Evaluation of Radionuclides

Radionuclides were not analyzed for at PRS 16-034(c) because historical evidence indicated that radioactive material was not stored or used in the warehouse hut. Additionally, field screening did not indicate the presence of radioactive constituents.

5.22.7 Evaluation of Organic Chemicals

The detected SVOCs were reported below the EQLs and above the detection limits (Table 5.22.7-1). No HE was detected in samples 0316-97-0586 and 0316-97-0560, despite indications of the presence of TNT and RDX in the associated field screening samples. The positive D-Tech™ results, which suggested that low levels of TNT and RDX were present, were not confirmed by the fixed laboratory analysis. The D-Tech™ kits have been shown to provide false positives due to interferences with humic materials. See Section 4.3.2 for further details.

No other organic chemicals were detected in the samples. Baseline validation indicates no data quality problems associated with these analyses that would affect the use of these organic data.

TABLE 5.22.7-1
DETECTED ORGANIC CHEMICALS FOR PRS 16-034(c)

ANALYTE	SAMPLE ID	SAMPLE VALUE (MG/KG)	SAL (MG/KG)	MEDIA	DEPTH (FT)
Benzoic Acid	0316-97-0586	0.054	100000	Soil	0-1
Methylnaphthalene[2-]	0316-97-0586	0.046	NC[a]	Soil	0-1
Naphthalene	0316-97-0586	0.039	1000	Soil	0-1

a. NC = not calculated

5.22.8 Risk-Based Screening Assessment

Four inorganic and three semivolatile organic chemicals were detected above UTLs and EQLs. Lead was present at 30% of its SAL in sample 0316-97-0586, but all of the remaining chemicals were reported at less than 2% of their SALs. Although methylnapthalene[2-] has no SAL, this PAH compound is present at a low concentration which is orders of magnitude below SALs for similar compounds. The evaluation of this PAH compound is considered to be complete based on the evaluation of PAHs with the available SALs. Refer to Section 5.0.1 for a further discussion of PAH compounds without SALs.

Four inorganic and two organic chemicals were carried forward from the background comparison and organic constituent evaluation. Analytes are divided into two classes, noncarcinogens and carcinogens, for the screening assessment depending on which toxicological effect forms the basis of their SAL. This separation is required to evaluate possible additive effects within each class of chemical. The MCE evaluation for PRS 16-034(c) was not performed for carcinogenic effects because no chemicals in this class were present above background levels.

An MCE calculation was performed using the sum of the maximum concentrations at this PRS. The MCE calculations are presented in Table 5.22.8-1. The MCE result for noncarcinogens is 0.3.

TABLE 5.22.7-1
MCE CALCULATION FOR PRS 16-034(c)

	MAXIMUM CONCENTRATION	SAL	
ANALYTE	MG/KG	MG/KG	NORMALIZED VALUE
Noncarcinogenic Effects			
Copper	30	2800	0.01071
Lead	120	400	0.30000
Silver	3	380	0.00789
Zinc	480	23000	0.02087
Benzoic acid	0.05	100000	0.00000
Naphthalene	0.04	1000	0.00004
TOTAL			0.33

5.22.9 Preliminary Human Health Assessment

No human health risk assessment was performed for PRS 16-034(c) because contaminants were not detected at levels at or above SALs.

5.22.10 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 PRS will be deferred until the PRS can be assessed as part of the ecological exposure unit methodology currently being developed.

5.22.11 Conclusions and Recommendations

Five screening samples and two laboratory sample were collected within the footprint of the former warehouse hut TA-16-491. The laboratory samples were selected from the two screening samples that screened positive for HE. HE was not reported in either laboratory sample. Inorganic chemicals (copper, lead, silver and zinc) were detected in both samples, above background UTLs but below SALs. There are no valid antimony data, but antimony is not implicated by either historical information or current ER data from TA-16 as a likely contaminant of concern at this site. Three SVOCs were detected in one laboratory sample at low levels and far below the SALs. The data show that no contaminants are present at this site at levels of concern to human health.

The biased sampling and analysis strategy at this former warehouse hut was designed to ensure that residual contamination would be detected if it were present within the PRS. Screening locations and depths were selected based on information about the location, orientation, construction, use of the former building, and mode of decommissioning. Because the likelihood of contamination within the building footprint is judged to be low following the removal of the building, and the likelihood of finding contamination is high based on the biased sampling, two confirmatory laboratory samples are sufficient to indicate whether or not such contamination is present at levels of concern. The laboratory samples were selected based on field screening results, and were analyzed for all potential contaminants based on historical knowledge of operations in TA-16-491.

PRS 16-034(c) is recommended for human-health NFA based on NFA Criterion 5 because contamination is not present at this site at levels that present a potential risk to human health.

5.23 PRS 16-034(d)

This PRS is the site of former non-HE machine shop TA-16-492, located at T-Site (Fig. 5.0-1). It is recommended for human-health NFA because no contaminants were detected above SALs.

5.23.1 History

PRS 16-034(d) is discussed in detail in Subsection 5.24 of the RFI Work Plan for Operable Unit 1082, Addendum 1 (LANL 1994, 1160).

The non-HE machine shop was located north of TA-16-490. It was built in March 1945. Interviews with site workers suggest that its only function was as a staff machine shop. No HE machining was done in the shop (Martin and Hickmott 1993, 15-16-500; Martin and Hickmott 1993, 15-16-514). The building contained no sumps or plumbing. It was abandoned in December 1959. Before being burned in 1960, the building was found to be contaminated with HE (Engineering Department 1959, 15-16-256).

The potential contamination at this PRS was identified as metals, SVOCs, and HE.

5.23.2 Description

TA-16-492 was a 16 ft wide x 16 ft long x 9 ft high wooden-frame construction building with a wooden floor. It was located on fairly level ground.

5.23.3 Previous Investigation(s)

No previous field investigations were conducted at this PRS.

5.23.4 Field Investigation

The goal of the Phase I investigation at PRS 16-034(d), as outlined in the approved RFI Work Plan for Operable Unit 1082, Addendum 1 (LANL 1994, 1160) was to determine if contaminants were present in soils at levels of concern. The sampling design is consistent with the current industrial land use scenario of the conceptual model described in Section 4.3 of the RFI work plan. The potential for contamination at this PRS is hypothesized to be via either: (1) leaks and spills from the past operations; or (2) ash, debris, or contamination left behind after the former building was burned and remnants removed. The potential release mechanisms at this PRS are hypothesized to be via either: (1) infiltration of potential contamination into the near-surface soil; or (2) mechanical movement and mixing of potentially contaminated surface soil during the removal of the former building. There was no historic subsurface construction (or other intrusive activities) at this PRS, and there are no surface water collection points or drainages present that would have spread contamination to the subsurface. Biased sampling was designed to detect residual HE in the surface and near-surface soil at the site of the building footprint. The mode of decommissioning of the building by burning suggests that residual contamination is unlikely at this PRS.

Addendum 1 (LANL 1994, 1160) specified screening soil samples, 0 to 1 ft depth intervals, from five locations and selecting one laboratory sample only if positive field screening results were obtained. The plan called for taking the screening samples at the four quadrants of the building and at the building center. The laboratory sample was to be selected from the screening samples using the following prioritized biasing scheme: (1) a sample with a positive HE spot test kit result; and (2) a sample with above two times background radiation readings. In response to an EPA NOD (EPA 1994, 15-16-644), two laboratory samples were collected (based on the above scheme), even if all field screening results were negative.

One deviation was made to the approved work plan. The samples were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit. This analysis was performed in addition to the required HE spot test analysis because the D-Tech™ kits can detect specific potential contaminants and provide lower detection limits (1 ppm or less) than the HE spot test. This screening was used to further characterize the samples in the field for biasing purposes.

The building was accurately surveyed using a Trimble™ GPS Total Station. Aerial photographs were used to determine the building position, and the center of the building was surveyed with an estimated accuracy of 2 ft. Screening sample locations were further determined and surveyed relative to the center point and within the known dimensions of the building.

A total of five field screening samples were taken from five locations in and adjacent to the building footprint. The samples were collected from the 0 to 1 ft depth interval. The field screening samples were taken within the four quadrants of the building and at the building center (Fig. 5.23.4-1). These locations were selected to ensure spatial variability and because the most likely contaminant dispersal mechanism for operations in this building, which had wooden floors, is hypothesized to be via leakage from cracks within wooden floors.

All samples were collected with a manually driven hand auger (LANL-ER-SOP-06.10, Hand Auger and Thin-Wall Tube Sampler). The soil samples were screened in the field for HE and beta/gamma radioactivity using the HE spot test kit with modified Griess™ reagents (LANL-ER-SOP-10.06,R0, High Explosive Spot Test) and an Eberline ESP1™ radiological meter with HP-260™ probe (LANL-ER-SOP-10.07, R0, Field Monitoring for Surface and Volume Radioactivity Levels). The samples were analyzed for RDX and TNT using the D-Tech™ Immunoassay HE field screening kit (EPA SW-846 Methods 4051 and 4050). The soil was described and logged on the Sample Collection Log forms (LANL-ER-SOP-01.04, Sample Control and Field Documentation).

All samples screened negative for HE using the HE spot test kit and contained background radioactivity. Four samples screened positive for HE using the D-Tech™ kit (Table 5.23.4-1).

TABLE 5.23.4-1
SUMMARY OF FIELD SCREENING RESULTS

SCREENING SAMPLE NO.	LOCATION ID	DEPTH (FT)	LAB SAMPLE NO.	HE SPOT TEST	RAD SCREEN	D-TECH RDX (MG/KG)	D-TECH TNT (MG/KG)
0316-97-4157 southeast quadrant	16-4157	0 - 1	NA[a]	negative	background	< 0.5	< 0.5
0316-97-4158 northeast quadrant	16-4158	0 - 1	0316-97-0587	negative	background	< 0.5	1.5 - 3.0
0316-97-4159 northwest quadrant	16-4159	0 - 1	NA	negative	background	< 0.5	0.5 - 1.5
0316-97-4160 southwest quadrant	16-4160	0 - 1	NA	negative	background	< 0.5	0.5 - 1.5
0316-97-4161 center	16-4161	0 - 1	0316-97-0563	negative	background	< 0.5	0.5 - 1.5

a. NA = Not analyzed.

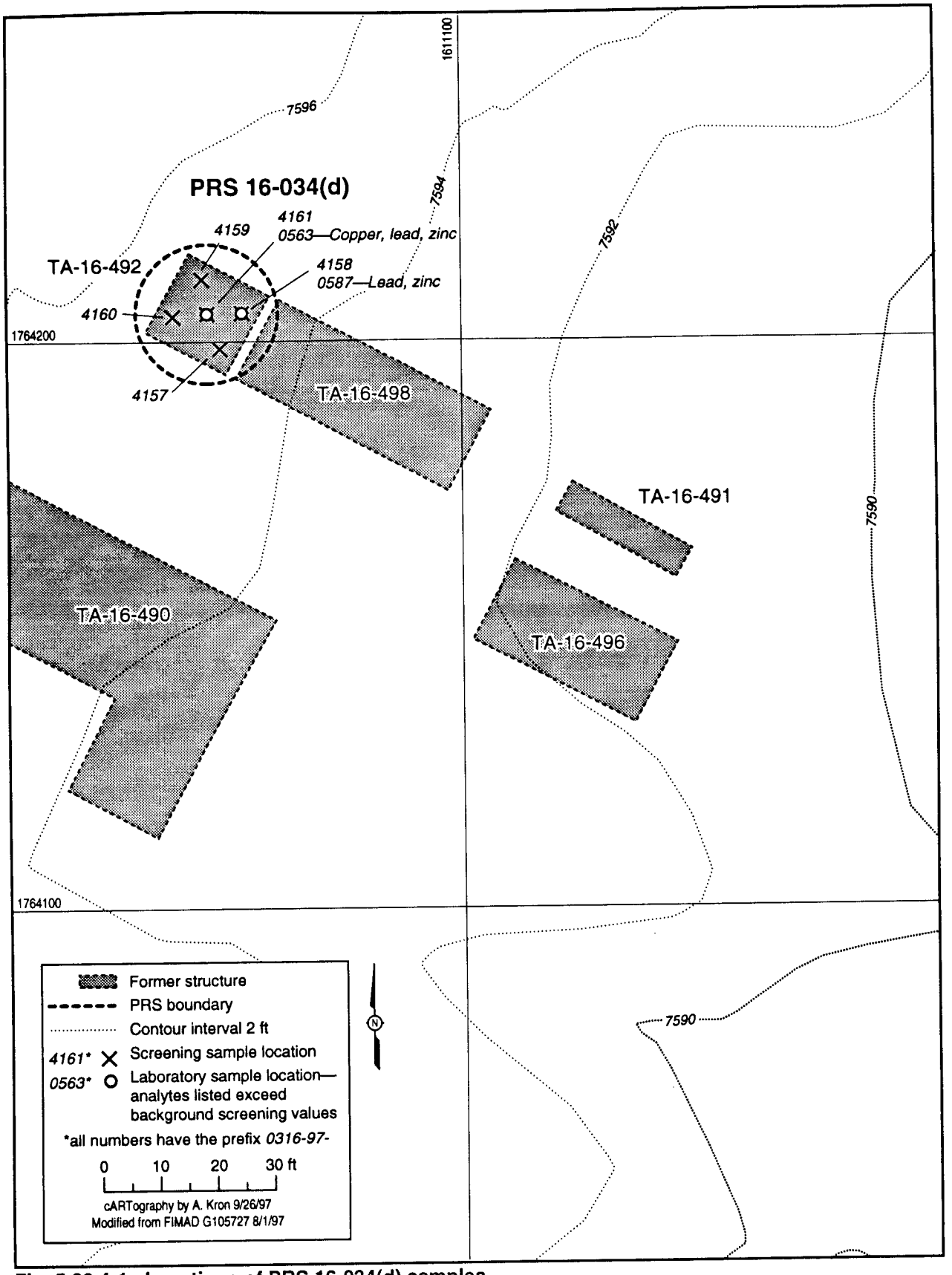

Fig. 5.23.4-1 Locations of PRS 16-034(d) samples.

Screening sample 0316-97-4158 contained the highest concentration of TNT (1.5 - 3.0 mg/kg). Screening sample 0316-97-4161 was one of four locations which contained an elevated concentration of TNT (0.5 - 1.5 mg/kg) and was located at the center of the former structure. These two samples were submitted to the laboratory for analysis (Table 5.23.4-1). The samples were analyzed for inorganic chemicals, SVOCs, and HE (Table 5.23.4-2).

TABLE 5.23.4-2
SUMMARY OF REQUEST NUMBERS FOR LABORATORY SAMPLES TAKEN AT PRS 16-034(d)

LOCATION ID	SAMPLE ID	DEPTH (FT)	MATRIX	INORGANICS	SVOCS	HE
16-4158	0316-97-0587	0 - 1	soil	3403R	3401R	3420R
16-4161	0316-97-0563	0 - 1	soil	3403R	3401R	3420R

5.23.5 Evaluation of Inorganic Chemicals

Copper, lead and zinc were detected above background UTLs (Table 5.23.5-1). No valid antimony results are available for this PRS, as discussed in Section 4.1. Baseline validation indicated no other problems that affect the use of these inorganic data.

TABLE 5.23.5-1
INORGANIC CHEMICALS WITH CONCENTRATIONS AT OR ABOVE BACKGROUND SCREENING VALUES FOR PRS 16-034(d)

ANALYTE	SAMPLE ID	SAMPLE VALUE (MG/KG)	SAL (MG/KG)	UTL (MG/KG)	MEDIA	DEPTH (FT)
Copper	0316-97-0563	18	2800	15.5	Soil	0-1
Lead	0316-97-0563	260	400	23.3	Soil	0-1
Lead	0316-97-0587	200	400	23.3	Soil	0-1
Zinc	0316-97-0563	67	23000	50.8	Soil	0-1
Zinc	0316-97-0587	55	23000	50.8	Soil	0-1

5.23.6 Evaluation of Radionuclides

Radionuclides were not analyzed for at PRS 16-034(d) because historical evidence indicated that radioactive material was not stored or used in the warehouse hut. Additionally, field screening did not indicate the presence of radioactive constituents.

5.23.7 Evaluation of Organic Chemicals

No organic chemicals were detected in samples 0316-97-0587 and 0316-97-0563, despite indications of the presence of TNT in the associated field screening samples. The positive D-

Tech™ result, which suggested that low levels of TNT were present, was not confirmed by the fixed laboratory analysis. The D-Tech™ kits have been shown to provide false positives due to interferences with humic materials. See Section 4.3.2 for further details.

Both samples were reanalyzed for SVOCs because of poor internal standard recovery in the initial analysis. Baseline validation indicated no problems that affect the use of the data from these reanalyses.

5.23.8 Risk-Based Screening Assessment

Lead was present at 50 to 65% of SAL in both laboratory sample. All other chemicals were either undetected or present at less than 1% of SAL. Visual inspection of the data suggests that an MCE calculation would yield a value far below the target level of 1.0.

5.23.9 Preliminary Human Health Assessment

No human health risk assessment was performed for PRS 16-034(d) because contaminants were not detected at levels at or above SALs.

5.23.10 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 PRS will be deferred until the PRS can be assessed as part of the ecological exposure unit methodology currently being developed.

5.23.11 Conclusions and Recommendations

Five field screening samples and two laboratory samples were collected within the footprint of former building TA-16-492. The laboratory samples were selected from the four screening samples with positive screening results. HE and other organics were not detected. Copper, lead and zinc were detected above background UTLs but below SALs. There are no valid antimony data, but antimony is not implicated by either historical information or current ER data from TA-16 as a likely contaminant of concern at this site. The data show that no contaminants are present at this site at levels of concern to human health.

The biased sampling and analysis strategy at this former machine shop was designed to ensure that residual contamination would be detected if it were present within the PRS. Screening locations and depths were selected based on information about the location, orientation, construction, use of the former building, and mode of decommissioning. Because the likelihood

of contamination within the building footprint is judged to be low following the removal of the building, and the likelihood of finding contamination is high based on the biased sampling, two confirmatory laboratory samples are sufficient to indicate whether or not such contamination is present at levels of concern. The laboratory samples were based on field screening results, and were analyzed for all potential contaminants based on historical knowledge of operations in TA-16-492.

PRS 16-034(d) is recommended for human-health NFA based on NFA Criterion 5 because contamination is not present at this site at levels that present a potential risk to human health.

5.24 PRS 16-034(e)

This PRS is the site of former storage building TA-16-496, located at T-Site (Fig. 5.0-1). It is recommended for human-health NFA because no contaminants were detected above SALs.

5.24.1 History

PRS 16-034(e) is discussed in detail in Subsection 5.24 of the RFI Work Plan for Operable Unit 1082, Addendum 1 (LANL 1994, 1160).

TA-16-496 was relocated to the present site on Job Orders No.157102 and 157234 in July 1948. The building was used for storage (Martin and Hickmott 1993, 15-16-514). The building contained no sumps or plumbing. It was shown to be contaminated with HE before being abandoned in 1959 and burned in 1960 (Engineering Department 1959, 15-16-256).

The potential contamination at this PRS was identified as metals, SVOCs, and HE.

5.24.2 Description

The storage building was located east of TA-16-490 on ground sloping slightly to the east. TA-16-496 was a 16 ft by 32 ft by 9 ft building of wooden-frame construction with a wooden floor.

5.24.3 Previous Investigation(s)

No previous field investigations were conducted at this PRS.

5.24.4 Field Investigation

The goal of the Phase I investigation at PRS 16-034(e), as outlined in the approved RFI Work Plan for Operable Unit 1082, Addendum 1 (LANL 1994, 1160), was to determine if contaminants were

present in soils at levels of concern. The sampling design is consistent with the current industrial land use scenario of the conceptual model described in Section 4.3 of the RFI work plan. The potential for contamination at this PRS is hypothesized to be via either: (1) leaks and spills from the past operations; or (2) ash, debris, or contamination left behind after the former building was burned and remnants removed. The potential release mechanisms at this PRS are hypothesized to be via either: (1) infiltration of potential contamination into the near-surface soil; or (2) mechanical movement and mixing of potentially contaminated surface soil during the removal of the former building. There was no historic subsurface construction (or other intrusive activities) at this PRS, and there are no surface water collection points or drainages present that would have spread contamination to the subsurface. Biased sampling was designed to detect residual HE in the surface and near-surface soil at the site of the building footprint. The mode of decommissioning of the building by burning suggests that residual contamination is unlikely at this PRS.

Addendum 1 (LANL 1994, 1160) specified screening soil samples, 0 to 1 ft depth intervals, from five locations and selecting one laboratory sample only if positive field screening results were obtained. The plan called for taking the screening samples at the four quadrants of the building and at the building center. The laboratory sample was to be selected from the screening samples using the following prioritized biasing scheme: (1) a sample with a positive HE spot test kit result; and (2) a sample with above two times background radiation readings. In response to an EPA NOD (EPA 1994, 15-16-644), two laboratory samples were collected (based on the above scheme), even if all field screening results were negative.

One deviation was made from the work plan. The screening samples were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit. This analysis was performed in addition to the required HE spot test analysis because the D-Tech™ kits can detect specific potential contaminants and provide lower detection limits (1 ppm or less) than the HE spot test. This screening was used to further characterize the samples in the field for biasing purposes.

The building was accurately surveyed using a Trimble™ GPS Total Station. Aerial photographs were used to determine the building position, and the center of the building was surveyed with an estimated accuracy of 2 ft. Screening sample locations were further determined and surveyed relative to the center point and within the known dimensions of the building.

A total of five field screening samples were taken from five locations in the building footprint. The samples were collected from the 0 to 1 ft depth interval. The field screening samples were taken within the four quadrants of the building and at the building center (Fig. 5.24.4-1). These locations were selected to ensure spatial variability and because the most likely contaminant

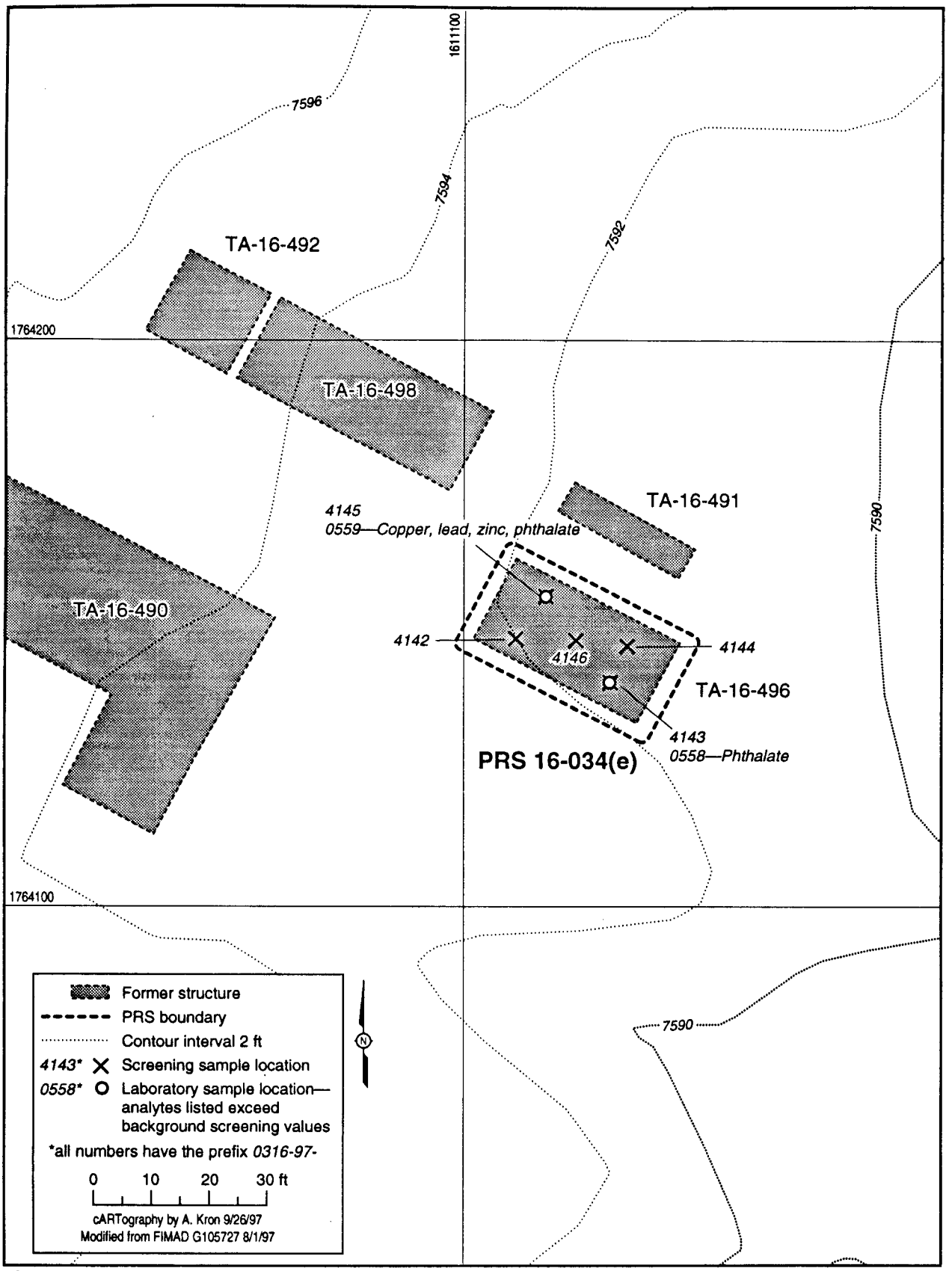

Fig. 5.24.4-1 Locations of PRS 16-034(e) samples.

dispersal mechanism for operations in this building, which had wooden floors, is hypothesized to be via leakage from cracks within wooden floors.

All samples were collected with a manually driven hand auger (LANL-ER-SOP-06.10, Hand Auger and Thin-Wall Tube Sampler). The soil samples were screened in the field for HE and beta/gamma radioactivity using the HE spot test kit with modified Griess™ reagents (LANL-ER-SOP-10.06,R0, High Explosive Spot Test) and an Eberline ESP1™ radiological meter with HP-260™ probe (LANL-ER-SOP-10.07, R0, Field Monitoring for Surface and Volume Radioactivity Levels). Samples were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit (EPA SW-846 Methods 4051 and 4050). The soil was described and logged on the Sample Collection Log forms (LANL-ER-SOP-01.04, Sample Control and Field Documentation).

All samples screened negative for HE using the HE spot test kit and contained background radioactivity. Three samples screened positive for HE using the D-Tech™ kit (Table 5.24.4-1).

TABLE 5.24.4-1
SUMMARY OF FIELD SCREENING RESULTS

SCREENING SAMPLE NO.	LOCATION ID	DEPTH (FT)	LAB SAMPLE NO.	HE SPOT TEST	RAD SCREEN	D-TECH RDX (MG/KG)	D-TECH TNT (MG/KG)
0316-97-4142 southwest quadrant	16-4142	0 - 1	NA[a]	negative	background	0.5 - 1.5	< 0.5
0316-97-4143 southeast quadrant	16-4143	0 - 1	0316-97-0558	negative	background	0.5 - 1.5	0.5 - 1.5
0316-97-4144 northeast quadrant	16-4144	0 - 1	NA	negative	background	< 0.5	< 0.5
0316-97-4145 northwest quadrant	16-4145	0 - 1	0316-97-0559	negative	background	< 0.5	0.5 - 1.5
0316-97-4146 center	16-4146	0 - 1	NA	negative	background	< 0.5	< 0.5

a. NA = Not analyzed.

Screening sample 0316-97-4143 contained elevated concentrations of RDX and TNT (0.5 to 1.5 mg/kg for both analytes). This sample was submitted to the laboratory for analysis. Screening sample 0316-97-4145 was one of two remaining samples which contained an elevated concentration of HE (0.5 to 1.5 mg/kg TNT) and was selected randomly. The random sample was selected by using a random-number generator to select a number one to two. These numbers corresponded to the southeast and northwest quadrants (the quadrant samples containing HE). The northeast quadrant sample was selected. This sample was submitted to the laboratory for

analysis (Table 5.24.4-1). The samples were analyzed for metals, SVOCs, HE, and total uranium (Table 5.24.4-2).

TABLE 5.24.4-2
SUMMARY OF REQUEST NUMBERS FOR LABORATORY SAMPLES TAKEN AT PRS 16-034(e)

LOCATION ID	SAMPLE ID	DEPTH (FT)	MEDIA	SVOC	HE	INORGANIC	RADIONUCLIDES
16-4143	0316-97-0558	0-1	Soil	3401R	3402R	3403R	3404R
16-4145	0316-97-0559	0-1	Soil	3401R	3402R	3403R	3404R

5.24.5 Evaluation of Inorganic Chemicals

Copper, lead and zinc were detected in one of the two laboratory samples above background UTL (Table 5.24.5-1). No valid antimony results are available for this PRS, as discussed in Section 4.1. Baseline validation indicated no other problems that affect the use of these inorganic data.

TABLE 5.24.5-1
INORGANIC CHEMICALS WITH CONCENTRATIONS AT OR ABOVE BACKGROUND SCREENING VALUES FOR PRS 16-034(e)

ANALYTE	SAMPLE ID	SAMPLE VALUE (MG/KG)	SAL (MG/KG)	UTL (MG/KG)	MEDIA	DEPTH (FT)
Copper	0316-97-0559	18	2800	15.5	Soil	0-1
Lead	0316-97-0559	99	400	23.3	Soil	0-1
Zinc	0316-97-0559	60	23000	50.8	Soil	0-1

5.24.6 Evaluation of Radionuclides

Total uranium was detected at 3 mg/kg in both samples. The data were qualified as undetected (U) because this level was less than five times the concentration of uranium in the associated blank, and therefore considered indistinguishable from blank contamination. The technique used for the uranium analysis provides results with a low bias. However, even if low bias is accounted for, uranium is not present at levels near UTLs. Baseline validation indicated no data quality problems associated with these analyses. The data presents no evidence for a release of radioactive constituents at the site.

5.24.7 Evaluation of Organic Chemicals

Bis(2-ethylhexyl)phthalate, a common plasticizer and laboratory contaminant, was present at levels below the EQL in these samples (Table 5.24.7-1). No HE was detected, despite field indications that low levels of HE might be present in the samples selected for laboratory analysis.

The positive D-Tech™ result, which suggested that low levels of TNT were present, was not confirmed by the fixed laboratory analysis. The D-Tech™ kits have been shown to provide false positives due to interferences with humic materials. See Section 4.3.2 for further details.

No other organic chemicals were detected. Baseline validation indicates no data quality problems associated with these analyses that would affect the use of these organic data

TABLE 5.24.7-1
DETECTED ORGANIC CHEMICALS FOR PRS 16-034(e)

ANALYTE	SAMPLE ID	SAMPLE VALUE (MG/KG)	SAL (MG/KG)	MEDIA	DEPTH (FT)
Bis(2-ethylhexyl)phthalate	0316-97-0558	0.063	32	Soil	0-1
Bis(2-ethylhexyl)phthalate	0316-97-0559	0.066	32	Soil	0-1

5.24.8 Risk-Based Screening Assessment

Lead was reported at 25% of SAL in one sample, and copper and zinc were also above UTLs in this sample, but at less than 0.5% of SAL. Antimony data was rejected. Bis(2-ethylhexyl)phthalate was detected below the EQL in both samples, at less than 0.5% of SAL. Chemicals were not present at levels at or above SALs at PRS 16-034(e). Visual examination of the data suggest that an MCE calculation would yield a value far below the target level of 1.0.

5.24.9 Preliminary Human Health Assessment

No human health risk assessment was performed for PRS 16-034(e) because contaminants were not detected at levels at or above SALs.

5.24.10 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 PRS will be deferred until the PRS can be assessed as part of the ecological exposure unit methodology currently being developed.

5.24.11 Conclusions and Recommendations

Five screening samples and two laboratory samples were collected within the footprint of the former storage building TA-16-496. The laboratory samples were selected from three screening samples that screened positive for HE. No HE was detected in the laboratory analyses. Lead, copper and zinc were found above background UTLs in one of the laboratory samples, but well below SALs. There are no valid antimony data, but antimony is not implicated by either historical

information or current ER data from TA-16 as a likely contaminant of concern at this site. Bis(2-ethylhexyl)phthalate was detected below EQLs and well below SALs. No inorganic or organic chemicals were detected at levels at or above SALs. The data show that no contaminants are present at this site at levels of concern to human health.

The biased sampling and analysis strategy at this former storage building was designed to ensure that residual contamination would be detected if it were present within the PRS. Screening locations and depths were selected based on information about the location, orientation, construction, use of the former building, and mode of decommissioning. Because the likelihood of contamination within the building footprint is judged to be low following the removal of the building, and the likelihood of finding contamination is high based on the biased sampling, two confirmatory laboratory samples are sufficient to indicate whether or not such contamination is present at levels of concern. The laboratory samples were based on field screening results, and were analyzed for all potential contaminants based on historical knowledge of operations in TA-16-496.

PRS 16-034(e) is recommended for human-health NFA based on NFA Criterion 5 because contamination is not present at this site at levels that present a potential risk to human health.

5.25 PRS 16-034(f)

This PRS is the site of former laboratory TA-16-498, located at T-Site (Fig. 5.0-1). It is recommended for human-health NFA because no contaminants were detected above SALs.

5.25.1 History

PRS 16-034(f) is discussed in detail in Subsection 5.24 of the RFI Work Plan for Operable Unit 1082, Addendum 1 (LANL 1994, 1160).

The laboratory was initially used for storage and as an eating area (Martin and Hickmott 1993, 15-16-514) , but by 1950, it was used by draftsmen in the western end, by site photographers in its center, and for plutonium autoradiography experiments in its eastern end (Martin and Hickmott 1993, 15-16-500). Small scale photoprocessing was done in this building in support of the plutonium autoradiography experiments. The building contained no sumps. TA-16-498 was constructed in June 1945. The building was abandoned in December 1959. It was found to be contaminated with HE during the survey that preceded demolition by burning in 1960 (Engineering Department 1959, 15-16-256).

The potential contamination at this PRS was identified as metals, SVOCs, HE, and radionuclides.

5.25.2 Description

TA-16-498 was a 16 ft by 42 ft by 9 ft high wooden-frame construction building with wooden floors located northeast of TA-16-490 on fairly level ground.

5.25.3 Previous Investigation(s)

No previous field investigations were conducted at this PRS.

5.25.4 Field Investigation

The goal of the Phase I investigation at PRS 16-034(f), as outlined in the approved RFI Work Plan for Operable Unit 1082, Addendum 1 (LANL 1994, 1160), was to determine if contaminants were present in soils at levels of concern. The sampling design is consistent with the current industrial land use scenario of the conceptual model described in Section 4.3 of the RFI work plan. The potential for contamination at this PRS is hypothesized to be via either: (1) leaks and spills from the past operations; or (2) ash, debris, or contamination left behind after the former building was burned and remnants removed. The potential release mechanisms at this PRS are hypothesized to be via either: (1) infiltration of potential contamination into the near-surface soil; or (2) mechanical movement and mixing of potentially contaminated surface soil during the removal of the former building. There was no historic subsurface construction (or other intrusive activities) at this PRS, and there are no surface water collection points or drainages present that would have spread contamination to the subsurface. Biased sampling was designed to detect residual HE in the surface and near-surface soil at the site of the building footprint. The mode of decommissioning of the building by burning suggests that residual contamination is unlikely at this PRS.

Addendum 1 (LANL 1994, 1160) specified screening soil samples, 0 to 1 ft depth intervals, from five locations and selecting two laboratory samples based on field screening results. The plan called for taking the screening samples at the four quadrants of the building and at the building center. The laboratory samples were to be selected from the screening samples using the following prioritized biasing scheme: (1) samples with a positive HE spot test kit result; (2) samples with above two times background radiation readings; (3) a sample from the building center; and (4) a random sample.

Two deviations were made from the approved work plan.

- The samples were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit. This analysis was performed in addition to the required HE spot test analysis because the D-Tech™ kits can detect specific potential contaminants and provide lower detection limits (1 ppm or less) than the HE spot test. This screening was used to further characterize the samples in the field for biasing purposes.
- Two samples were collected from 0 to 0.83 ft depth intervals (rather than the required 0 to 1 ft interval) because the hand auger met refusal.

The building was accurately surveyed using a Trimble™ GPS Total Station. Aerial photographs were used to determine the building position, and the center of the building was surveyed with an estimated accuracy of 2 ft. Screening sample locations were further determined and surveyed relative to the center point and within the known dimensions of the building.

A total of five field screening samples were taken from five locations in the building footprint. The samples were collected from the 0 to 1 ft depth interval. The field screening samples were taken within the four quadrants of the building and at the building center (Fig. 5.25.4-1). These locations were selected to ensure spatial variability and because the most likely contaminant dispersal mechanism for operations in this building, which had wooden floors, is hypothesized to be via HE or radioactive spills or leakage from cracks within wooden floors.

All samples were collected with a manually driven hand auger (LANL-ER-SOP-06.10, Hand Auger and Thin-Wall Tube Sampler). The soil samples were screened in the field for HE and beta/gamma radioactivity using the HE spot test kit with modified Griess™ reagents (LANL-ER-SOP-10.06,R0, High Explosive Spot Test) and an Eberline ESP1™ radiological meter with HP-260™ probe (LANL-ER-SOP-10.07, R0, Field Monitoring for Surface and Volume Radioactivity Levels). Samples were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit (EPA SW-846 Methods 4051 And 4050). The soil was described and logged on the Sample Collection Log forms (LANL-ER-SOP-01.04, Sample Control and Field Documentation).

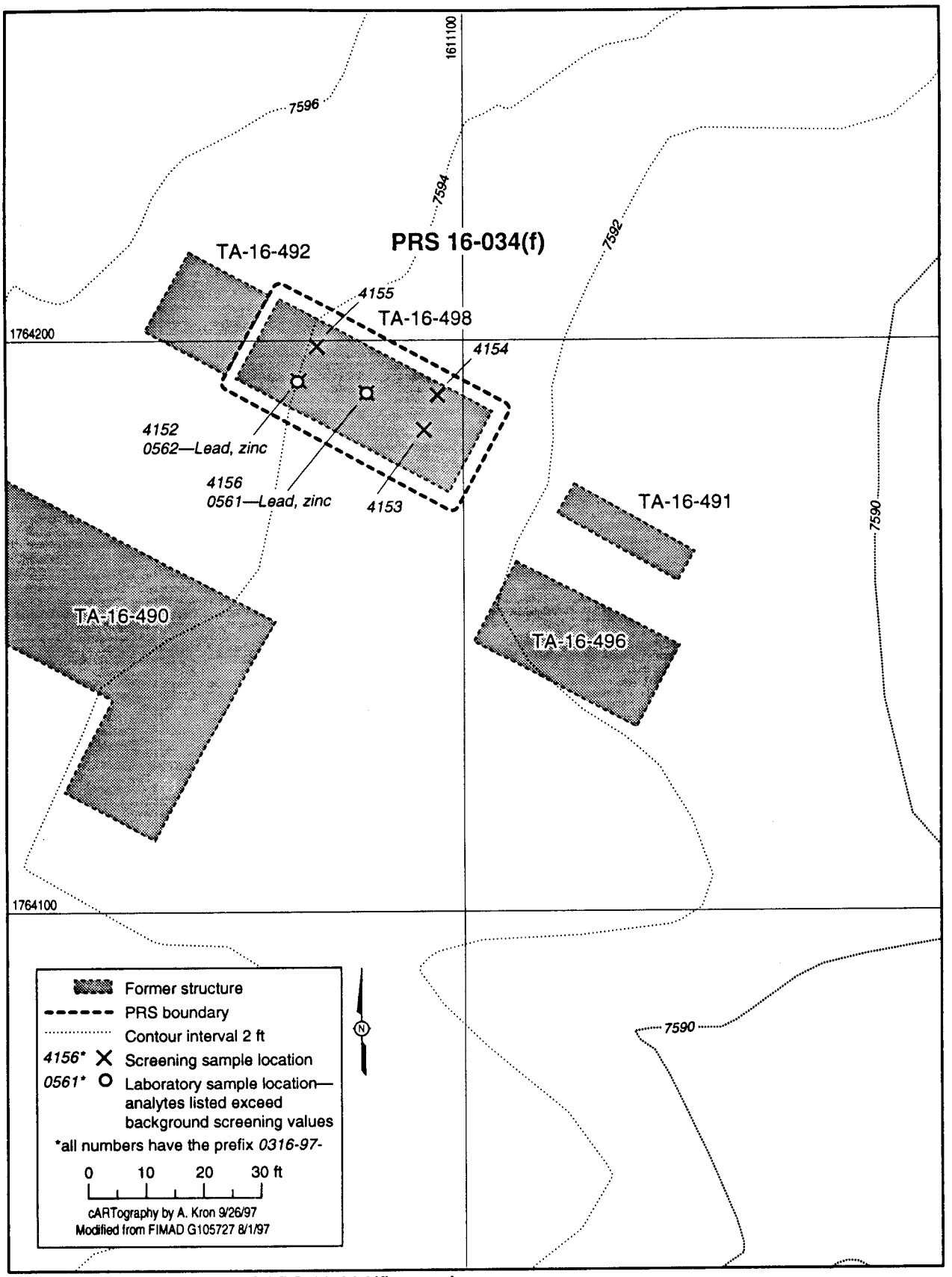

Fig. 5.25.4-1 Locations of PRS 16-034(f) samples.

All samples screened negative for HE using the HE spot test kit and contained background radioactivity. Three samples screened positive for HE using the D-Tech™ kit (Table 5.25.4-1).

TABLE 5.25.4-1
SUMMARY OF FIELD SCREENING RESULTS

SCREENING SAMPLE NO.	LOCATION ID	DEPTH (FT)	LAB SAMPLE NO.	HE SPOT TEST	RAD SCREEN	D-TECH RDX (MG/KG)	D-TECH TNT (MG/KG)
0316-97-4152 southwest quadrant	16-4152	0 - 0.83	0316-97-0562	negative	background	0.5 - 1.5	0.5 - 1.5
0316-97-4153 southeast quadrant	16-4153	0 - 0.83	NA[a]	negative	background	< 0.5	< 0.5
0316-97-4154 northwest quadrant	16-4154	0 - 1	NA	negative	background	< 0.5	< 0.5
0316-97-4155 northeast quadrant	16-4155	0 - 1	NA	negative	background	< 0.5	0.5 - 1.5
0316-97-4156 center	16-4156	0 - 1	0316-97-0561	negative	background	< 0.5	0.5 - 1.5

a. NA = Not analyzed.

Screening sample 0316-97-4152 contained elevated concentrations of RDX and TNT (0.5 to 1.5 mg/kg for both analytes). Screening sample 0316-97-4156 contained an elevated concentration of TNT (0.5 to 1.5 mg/kg) and was located in the center of the former structure. These two samples were submitted to the laboratory for analysis (Table 5.25.4-1). The sample was analyzed for metals, SVOCs, HE, isotopic uranium, isotopic plutonium, and cyanide (Table 5.25.4-2).

TABLE 5.25.4-2
SUMMARY OF REQUEST NUMBERS FOR LABORATORY SAMPLES TAKEN AT PRS 16-034(F)

LOCATION ID	SAMPLE ID	DEPTH (FT)	MATRIX	SVOC	HE	INORGANIC	RADIONUCLIDES
16-4156	0316-97-0561	0-1	Soil	3401R	3402R	3403R	3404R
16-4152	0316-97-0562	0-.83	Soil	3401R	3402R	3403R	3404R

5.25.5 Evaluation of Inorganic Chemicals

Lead and zinc were detected in both samples at concentrations above background UTLs (Table 5.25.5-1). No valid antimony results are available for this PRS, as discussed in Section 4.1. Continuing calibration data was missing for cyanide and this data is qualified as estimated undetected (UJ). Baseline validation revealed no other problems with the inorganic analyses that affect the use of these inorganic data.

TABLE 5.25.5-1
INORGANIC CHEMICALS WITH CONCENTRATIONS AT OR ABOVE BACKGROUND SCREENING VALUES FOR PRS 16-034(F)

ANALYTE	SAMPLE ID	SAMPLE VALUE (MG/KG)	SAL (MG/KG)	UTL (MG/KG)	MEDIA	DEPTH (FT)
Lead	0316-97-0561	39	400	23.3	Soil	0-1
Lead	0316-97-0562	31	400	23.3	Soil	0-.83
Zinc	0316-97-0561	59	23000	50.8	Soil	0-1
Zinc	0316-97-0562	52	23000	50.8	Soil	0-.83

5.25.6 Evaluation of Radionuclides

No radionuclides were detected above MDAs, UTLs, or SALs. Uranium-235 was reported as estimated with high bias (J+) in sample 0316-97-0562. The estimated value 0.19 mg/kg is slightly above the reported uncertainty of 0.1 mg/kg and below the UTL and SAL.

5.25.7 Evaluation of Organic Chemicals

No HE were detected in samples 0316-97-0561 and 0316-97-0562, despite indications of the presence of TNT and RDX in the associated field screening samples. The positive D-Tech™ results, which suggested that low levels of TNT and RDX were present, was not confirmed by the fixed laboratory analysis. The D-Tech™ kits have been shown to provide false positives due to interferences with humic materials. See Section 4.3.2 for further details.

Sample 0316-97-0561 was reanalyzed for SVOCs because of poor internal standard recovery in the initial analysis. Bis(2-ethylhexyl)phthalate was detected between 0.09 and 0.1 mg/kg in both samples (Table 5.25.7-1). Baseline validation indicated no other problems that affect the use of the data from this reanalysis, or from the SVOC analysis of sample 0316-97-0562.

TABLE 5.25.7-1
DETECTED ORGANIC CHEMICALS FOR PRS 16-034(F)

ANALYTE	SAMPLE ID	SAMPLE VALUE (MG/KG)	SAL (MG/KG)	MEDIA	DEPTH (FT)
Bis(2-ethylhexyl)phthalate	0316-97-0561	0.1(J)	32	Soil	0-1

5.25.8 Risk-Based Screening Assessment

Lead and zinc were detected at concentrations above background UTLs but at less than 10% of SALs. Antimony results were rejected as not valid, and cyanide was reported as undetected. The

one organic chemical detected, a common plasticizer, was present at less than 0.5% of its SAL. Uranium-235, even if present at the reported level, is at less than 2% of its SAL. No chemicals were present at levels at or above SALs at PRS 16-034(f). Visual inspection of the data suggests that an MCE calculation would yield a value far below the target level of 1.0.

5.25.9 Preliminary Human Health Assessment

No human health risk assessment was performed for PRS 16-034(f) because no contaminants were detected above SALs.

5.25.10 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 PRS will be deferred until the PRS can be assessed as part of the ecological exposure unit methodology currently being developed.

5.25.11 Conclusions and Recommendations

Five screening samples and two laboratory samples were collected within the footprint of the former storage building TA-16-498. The laboratory samples were selected from the three samples that screened positive for HE. No HE was detected in the laboratory analysis. Lead and zinc were detected above background levels in one of the laboratory samples, but well below SALs. There are no valid antimony data, but antimony is not implicated by either historical information or current ER data from TA-16 as a likely contaminant of concern at this site. No inorganic or organic chemicals were detected at or above SALs. The data show that no contaminants are present at this site at levels of concern to human health.

The biased sampling and analysis strategy at this former laboratory was designed to ensure that residual contamination would be detected if it were present within the PRS. Screening locations and depths were selected based on information about the location, orientation, construction, use of the former building, and mode of decommissioning. Because the likelihood of contamination within the building footprint is judged to be low following the removal of the building, and the likelihood of finding contamination is high based on the biased sampling, two confirmatory laboratory samples are sufficient to indicate whether or not such contamination is present at levels of concern. The laboratory samples were based on field screening results, and were analyzed for all potential contaminants based on historical knowledge of operations in TA-16-498.

PRS 16-034(f) is recommended for human-health NFA based on NFA Criterion 5 because contamination is not present at this site at levels that present a potential risk to human health.

5.26 PRS 16-034(l)

This PRS is the site for the former equipment storage building TA-16-47, located in the GMX-3 area (Fig. 5.0-1). It is recommended for human-health NFA because no contaminants were detected above SALs.

5.26.1 History

PRS 16-034(l) is discussed in detail in Subsection 5.19 of the RFI Work Plan for Operable Unit 1082, Addendum 1 (LANL 1994, 1160).

TA-16-47 was an equipment-storage building completed in 1945. It is unknown what items were stored in this building, but it is possible that HE or HE contaminated materials were included. Surveys completed before combustion suggested that the structure was free of HE contamination (Engineering Department 1956, 15-16-256), however a former site worker (Blackwell 1983, 15-16-076) believed it was contaminated. The building had no sump or plumbing. The building was abandoned and destroyed by intentional burning in 1960.

The potential contamination at this PRS was identified as metals, SVOCs, and HE.

5.26.2 Description

TA-16-47 was of wooden-frame construction (11 ft long x 11 ft wide X 8.5 ft high) with a concrete foundation and floor. It was located roughly 10 ft south of TA-16-46, a rest house. Currently this site is level, with no well-defined drainage.

5.26.3 Previous Investigation(s)

No previous field investigations were conducted at this PRS.

5.26.4 Field Investigation

The goal of the Phase I investigation at PRS 16-034(l), as outlined in the approved RFI Work Plan for Operable Unit 1082, Addendum 1 (LANL 1994, 1160), was to determine if contaminants were present in soils at levels of concern. The sampling design is consistent with the current industrial land use scenario of the conceptual model described in Section 4.3 of the RFI work plan. The

potential for contamination at this PRS is hypothesized to be via either: (1) leaks and spills from the past operations; or (2) ash, debris, or contamination left behind after the former building was burned and remnants removed. The potential release mechanisms at this PRS are hypothesized to be via either: (1) infiltration of potential contamination into the near-surface soil; or (2) mechanical movement and mixing of potentially contaminated surface soil during the removal of the former building. There was no historic subsurface construction (or other intrusive activities) at this PRS, and there are no surface water collection points or drainages present that would have spread contamination to the subsurface. Biased sampling was designed to detect residual HE in the surface and near-surface soil at the site of the building footprint. The mode of decommissioning of the building by burning suggests that residual contamination is unlikely at this PRS.

Addendum 1 (LANL 1994, 1160) specified screening soil samples, 0 to 1 ft depth intervals, from four locations and selecting one laboratory sample if a positive field screening reading is obtained. The plan called for taking the samples at the four quadrants of the building. The laboratory sample was to be selected from the screening samples using the following prioritized biasing scheme: (1) a sample with positive HE spot test kit result; and (2) a sample with above two times background radiation reading. In response to an EPA NOD (EPA 1994, 15-16-644), screening samples were collected from 1 to 2 ft depth intervals (as well as the required 0 to 1 ft intervals) to confirm that the soil beneath this concrete floored building had not been disturbed during decommissioning, and one laboratory sample was collected (based on the above scheme) even if all field screening results were negative.

One deviation was made from the work plan. The screening samples were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit. This analysis was performed in addition to the required HE spot test analysis because the D-Tech™ kits can detect specific potential contaminants and provide lower detection limits (1 ppm or less) than the HE spot test. This screening was used to further characterize the samples in the field for biasing purposes.

The building was accurately surveyed using a Trimble™ GPS Total Station. Aerial photographs were used to determine the building position, and the center of the building was surveyed with an estimated accuracy of 2 ft. Screening sample locations were further determined and surveyed relative to the center point and within the known dimensions of the building.

A total of eight field screening samples were taken from four locations in the building footprint. Two samples were collected from each location, at 0 to 1 ft and 1 to 2 ft depth intervals. The samples were collected near the corners of the four quadrants of the building (Fig. 5.26.4-1). These locations were selected to ensure spatial variability and because the most likely

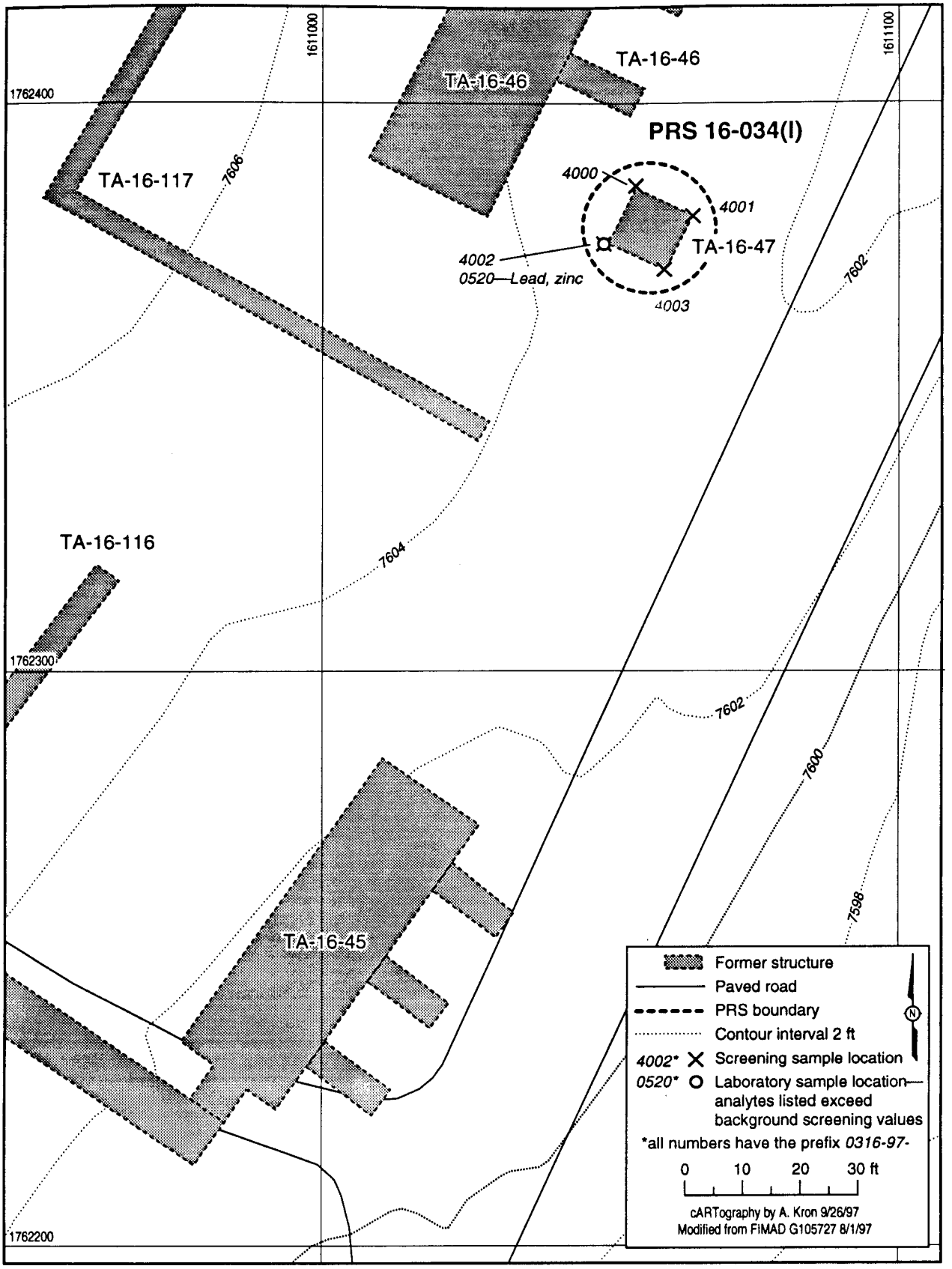

Fig. 5.26.4-1 Locations of PRS 16-034(l) samples.

contaminant dispersal mechanism for operations in this building, which had concrete floors, is hypothesized to be from leakage at the floor/wall joints.

All samples were collected with a manually driven hand auger (LANL-ER-SOP-06.10, Hand Auger and Thin-Wall Tube Sampler). The soil samples were screened in the field for HE and beta/gamma radioactivity using the HE spot test kit with modified Griess™ reagents (LANL-ER-SOP-10.06,R0, High Explosive Spot Test) and an Eberline ESP1™ radiological meter with HP-260™ probe (LANL-ER-SOP-10.07, R0, Field Monitoring for Surface and Volume Radioactivity Levels). Samples at 0 to 1 ft depth intervals were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit (EPA SW-846 Methods 4051 and 4050). The 0 to 1 ft intervals were selected for further characterization, rather than the 1 to 2 ft intervals, because the soil beneath the PRS structure is undisturbed, as confirmed by the soil descriptions in the sample collection logs. If contamination is present within the structure footprint, it is most likely present at shallow depths directly beneath the structure. The soil was described and logged on the Sample Collection Log forms (LANL-ER-SOP-01.04, Sample Control and Field Documentation).

All samples screened negative for HE using the HE spot test kit and contained background radioactivity. Three samples screened positive for HE using the D-Tech™ kit (Table 5.26.4-1).

TABLE 5.26.4-1
SUMMARY OF FIELD SCREENING RESULTS

SCREENING SAMPLE NO.	LOCATION ID	DEPTH (FT)	LAB SAMPLE NO.	HE SPOT TEST	RAD SCREEN	D-TECH RDX (MG/KG)	D-TECH TNT (MG/KG)
0316-97-4000 northwest quadrant	16-4000	0 - 1	NA[a]	negative	background	<0.5	0.5 - 1.5
0316-97-4001 northeast quadrant	16-4001	0 - 1	NA	negative	background	<0.5	<0.5
0316-97-4002 southwest quadrant	16-4002	0 - 1	0316-97-0520	negative	background	0.5 - 1.5	0.5 - 1.5
0316-97-4003 southeast quadrant	16-4003	0 - 1	NA	negative	background	0.5 - 1.5	<0.5

a. NA = Not analyzed.

Screening sample 0316-97-4002 contained the highest concentrations of TNT and RDX (0.5 to 1.5 mg/kg for both analytes) and was submitted to the laboratory for analysis (Table 5.26.4-1). The sample was analyzed for metals, SVOCs, and HE (Table 5.26.4-2).

TABLE 5.26.4-2
SUMMARY OF REQUEST NUMBERS FOR LABORATORY SAMPLES
FOR PRS 16-034(L)

LOCATION ID	SAMPLE ID	DEPTH (FT)	MATRIX	SVOC	HE	INORGANIC
16-4002	0316-97-0520	0-1	Soil	3318R	3319R	3320R

5.26.5 Evaluation of Inorganic Chemicals

Lead and zinc were detected at concentrations above background UTLs (Table 5.26.5-1). The lead value of 60.5 mg/kg is estimated (J) because the duplicate recovery for lead in this sample was outside the acceptable 20% range. The result, although approximate, is usable for comparison both to a UTL at approximately 40% of the reported result and a SAL that is more than six times as large as this result. Baseline validation revealed no other problems with the inorganic analyses.

TABLE 5.26.5-1
INORGANIC CHEMICALS WITH CONCENTRATIONS AT OR ABOVE
BACKGROUND SCREENING VALUES FOR PRS 16-034(L)

ANALYTE	REPORTING UNITS	SAMPLE ID	SAMPLE VALUE (MG/KG)	SAL (MG/KG)	UTL (MG/KG)	MEDIA	DEPTH (FT)
Lead	MG/KG	0316-97-0520	60.5(J[a])	400	23.3	Soil	0-1
Zinc	MG/KG	0316-97-0520	81.7	23000	50.8	Soil	0-1

a. J = Analyte was positively identified, but the result is estimated to be more uncertain than would normally be expected for that analysis.

5.26.6 Evaluation of Radionuclides

Radionuclides were not analyzed for at PRS 16-034(l) because historical evidence indicated that radioactive material was not stored or used in the equipment building. Additionally, field screening did not indicate the presence of radioactive constituents.

5.26.7 Evaluation of Organic Chemicals

No organic chemicals were detected in sample 0316-97-0520, despite indications of the presence of TNT and RDX in the associated field screening sample. The positive D-Tech™ results, which suggested that low levels of TNT and RDX were present, was not confirmed by the fixed laboratory analysis. The D-Tech™ kits have been shown to provide false positives due to interferences with humic materials. See Section 4.3.2 for further details. Baseline validation indicates no data quality problems associated with these analyses that would affect the use of these organic data.

5.26.8 Risk-Based Screening Assessment

Lead was estimated at about 15% of its SAL and zinc was reported at less than 0.5% of SAL. Chemicals were not present at levels at or above SALs at PRS 16-034(l). Visual examination of the data suggests that an MCE calculation would yield a value far below the target level of 1.0.

5.26.9 Preliminary Human Health Assessment

No human health risk assessment was performed for PRS 16-034(l) because contaminants were not detected at levels at or above SALs.

5.26.10 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 PRS will be deferred until the PRS can be assessed as part of the ecological exposure unit methodology currently being developed.

5.26.11 Conclusions and Recommendations

Eight screening samples and one laboratory sample were collected from in and adjacent to the footprint of the former equipment building TA-16-47. The laboratory sample was selected from among the three screening samples with positive HE screening results. Lead and zinc were reported at concentrations above background UTLs but below SALs. No inorganic or organic contamination was found above SALs. The data show that no contaminants are present at this site at levels of concern to human health.

The biased sampling and analysis strategy at this former equipment building was designed to ensure that residual contamination would be detected if it were present within the PRS. Screening locations and depths were selected based on information about the location, orientation, construction, use of the former building, and mode of decommissioning. Because the likelihood of contamination within the building footprint is judged to be low following the removal of the building, and the likelihood of finding contamination is high based on the biased sampling, a single confirmatory laboratory sample is sufficient to indicate whether or not such contamination is present at levels of concern. The laboratory sample was selected from screening samples based on field screening results, and was analyzed for all potential contaminants based on historical knowledge of operations in TA-16-47.

PRS 16-034(l) is recommended for human-health NFA based on NFA Criterion 5 because contamination is not present at this site at levels that present a potential risk to human health.

5.27 PRS 16-034(m)

This PRS is the site of former laboratory building TA-16-86, in the GMX-2 area (Fig. 5.0-1). It is recommended for human-health NFA because no contaminants were detected above SALs.

5.27.1 History

PRS 16-034(m) is discussed in detail in Subsection 5.20 of the RFI Work Plan for Operable Unit 1082, Addendum 1 (LANL 1994, 1160).

TA-16-86 was a small laboratory building with no plumbing fixtures or sumps, constructed in 1945. It contained temperature-controlled curing ovens. One former site worker recalled drying plumbatol (PbO + TNT) charges. In at least one case, such a charge caught on fire (Martin and Hickmott 1993, 15-16-498). In contrast, another site worker recalled that the building was used as a magazine (Martin 1993, 15-16-477). It was abandoned in December 1959. The building was listed as being HE contaminated before its destruction by burning in 1960 (Engineering Department 1959, 15-16-256).

The potential contamination at this PRS was identified as metals, SVOCs, and HE.

5.27.2 Description

TA-16-86 was 10 ft long x 16 ft wide x 10 ft high, of wooden-frame construction with a wooden floor. It was located on level ground.

5.27.3 Previous Investigation(s)

No previous field investigations were conducted at this PRS.

5.27.4 Field Investigation

The goal of the Phase I investigation at PRS 16-034(m), as outlined in the approved RFI Work Plan for Operable Unit 1082, Addendum 1 (LANL 1994, 1160), was to determine if contaminants were present in soils at levels of concern. The sampling design is consistent with the current industrial land use scenario of the conceptual model described in Section 4.3 of the RFI work plan. The potential for contamination at this PRS is hypothesized to be via either: (1) leaks and spills from the past operations; or (2) ash, debris, or contamination left behind after the former building was burned and remnants removed. The potential release mechanisms at this PRS are hypothesized to be via either: (1) infiltration of potential contamination into the near-surface soil; or (2) mechanical movement and mixing of potentially contaminated surface soil during the removal of the former building. There was no historic subsurface construction (or other intrusive

activities) at this PRS, and there are no surface water collection points or drainages present that would have spread contamination to the subsurface. Biased sampling was designed to detect residual HE in the heterogeneous surface and subsurface soil at the site of the building footprint. The mode of decommissioning of the building by burning suggests that residual contamination is unlikely at this PRS.

Addendum 1 (LANL 1994, 1160) specified screening soil samples, 0 to 1 ft depth intervals, from five locations and selecting one laboratory sample based on field screening results. The plan called for taking the screening samples at the four quadrants of the building and at the building center. The laboratory sample was to be selected from the screening samples using the following prioritized biasing scheme: (1) a sample with a positive HE spot test kit result; (2) a sample with above two times background radiation readings; and (3) a sample at the building center. In response to the EPA NOD (EPA 1994, 15-16-644), two laboratory samples were collected (based on the above scheme) rather than one laboratory sample.

One deviation was made from the work plan. The screening samples were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit. This analysis was performed in addition to the required HE spot test analysis because the D-Tech™ kits can detect specific potential contaminants and provide lower detection limits (1 ppm or less) than the HE spot test. This screening was used to further characterize the samples in the field for biasing purposes.

The building was accurately surveyed using a Trimble™ GPS Total Station. Aerial photographs were used to determine the building position, and the center of the building was surveyed with an estimated accuracy of 2 ft. Screening sample locations were further determined and surveyed relative to the center point and within the known dimensions of the building.

A total of five field screening samples were taken from five locations in the building footprint. The samples were collected from the 0 to 1 ft depth interval. The field screening samples were within the four quadrants of the building and at the building center (Fig. 5.27.4-1). These locations were selected to ensure spatial variability and because the most likely contaminant dispersal mechanism for operations in this building, which had wooden floors, is hypothesized to be via leakage from cracks within wooden floors.

All samples were collected with a manually driven hand auger (LANL-ER-SOP-06.10, Hand Auger and Thin-Wall Tube Sampler). The soil samples were screened in the field for HE and beta/gamma radioactivity using the HE spot test kit with modified Griess™ reagents (LANL-ER-SOP-10.06,R0, High Explosive Spot Test) and an Eberline ESP1™ radiological meter with HP-260™ probe

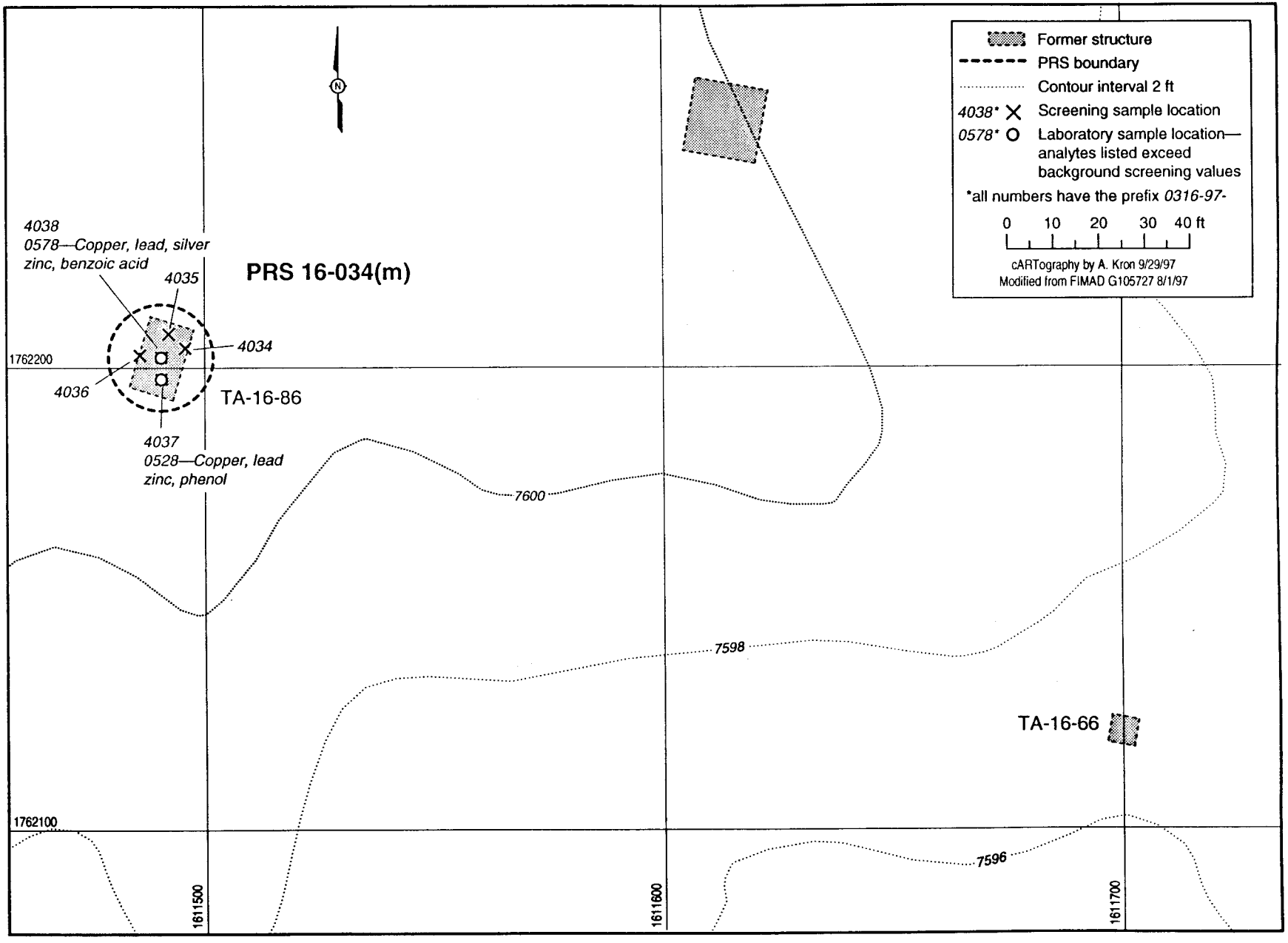

Fig. 5.27.4-1 Locations of PRS 16-034(m) samples.

(LANL-ER-SOP-10.07, R0, Field Monitoring for Surface and Volume Radioactivity Levels). Samples were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit (EPA SW-846 Methods 4051 and 4050). The soil was described and logged on the Sample Collection Log forms (LANL-ER-SOP-01.04, Sample Control and Field Documentation).

All samples screened negative for HE using the HE spot test kit and contained background radioactivity. One sample screened positive for HE using the D-Tech™ kit (Table 5.27.4-1).

TABLE 5.27.4-1
SUMMARY OF FIELD SCREENING RESULTS

SCREENING SAMPLE NO.	LOCATION ID	DEPTH (FT)	LAB SAMPLE NO.	HE SPOT TEST	RAD SCREEN	D-TECH RDX (MG/KG)	D-TECH TNT (MG/KG)
0316-97-4034 northeast quadrant	16-4034	0 - 1	NA[a]	negative	background	< 0.5	< 0.5
0316-97-4035 northwest quadrant	16-4035	0 - 1	NA	negative	background	< 0.5	< 0.5
0316-97-4036 southwest quadrant	16-4036	0 - 1	NA	negative	background	< 0.5	< 0.5
0316-97-4037 southeast quadrant	16-4037	0 - 1	0316-97-0528	negative	background	0.5 - 1.5	< 0.5
0316-97-4038 center	16-4038	0 - 1	0316-97-0578	negative	background	< 0.5	< 0.5

a. NA = Not analyzed.

Screening sample 0316-97-4037 contained the highest concentration of HE (0.5 to 1.5 mg/kg RDX) and sample 0316-97-4038 was the building center location. These two samples were submitted to the laboratory for analysis (Table 5.27.4-1). The samples were analyzed for metals, SVOCs, and HE (Table 5.27.4-2).

TABLE 5.27.4-2
SUMMARY OF REQUEST NUMBERS FOR LABORATORY SAMPLES TAKEN AT PRS 16-034(M)

LOCATION ID	SAMPLE ID	DEPTH (FT)	MATRIX	SVOC	HE	INORGANIC
16-4037	0316-97-0528	0-1	Soil	3457R	3458R	3459R
16-4038	0316-97-0578	0-1	Soil	3457R	3458R	3459R

5.27.5 Evaluation of Inorganic Chemicals

Copper, lead, silver, and zinc were detected at levels above UTLs but below SALs (Table 5.27.5-1). The copper, and zinc data are estimated (J-qualified) because the duplicate recovery was

below the acceptable 20% limit. Sample 0316-97-0528 was used for duplicate analysis in this laboratory batch. Antimony in the two samples was undetected by the laboratory at 6.7 mg/kg and 9.6 mg/kg. The antimony data were estimated undetected (UJ) by the data validator because the matrix spike recoveries were below acceptable levels. This result is accepted as undetected as discussed in Section 4.1. The qualifiers in Table 5.27.5-1 were assigned during baseline and focused data validation. Data validation indicated no other problems with the data that would affect their use.

TABLE 5.27.5-1
INORGANIC CHEMICALS WITH CONCENTRATIONS AT OR ABOVE BACKGROUND SCREENING VALUES FOR PRS 16-034 (M)

ANALYTE	SAMPLE ID	SAMPLE VALUE (MG/KG)	SAL (MG/KG)	UTL (MG/KG)	MEDIA	DEPTH (FT)
Antimony	0316-97-0528	9.6 (UJ)	31	1	Soil	0-1
Antimony	0316-97-0578	6.7 (UJ)	31	1	Soil	0-1
Copper	0316-97-0528	71.5(J[b])	2800	15.5	Soil	0-1
Copper	0316-97-0578	24(J)	2800	15.5	Soil	0-1
Lead	0316-97-0528	64.5	400	23.3	Soil	0-1
Silver	0316-97-0528	2.2	380	NC[a]	Soil	0-1
Silver	0316-97-0578	0.87	380	NC	Soil	0-1
Zinc	0316-97-0528	190(J)	23000	50.8	Soil	0-1
Zinc	0316-97-0578	57.7(J)	23000	50.8	Soil	0-1

a. NC = not calculated
b. J = Analyte was positively identified, but the result is estimated to be more uncertain than would normally be expected for that analysis.

5.27.6 Evaluation of Radionuclides

Radionuclides were not analyzed for at PRS 16-034(m) because historical evidence indicated that radioactive material was not stored or used in the laboratory building. Additionally, field screening did not indicate the presence of radioactive constituents.

5.27.7 Evaluation of Organic Chemicals

Trace amounts of benzoic acid and phenol were present above instrument detection levels but below EQLs (Table 5.27.7-1). Baseline validation revealed no problems with the organic analyses that would affect their use.

No HE was detected in sample 0316-97-0528, despite indications of the presence of RDX in the associated field screening sample. The positive D-Tech™ result, which suggested that low levels of RDX were present, was not confirmed by the fixed laboratory analysis. The D-Tech™ kits have been shown to provide false positives due to interferences with humic materials. See Section

4.3.2 for further details. Baseline validation indicates no data quality problems associated with these analyses.

TABLE 5.27.7-1
DETECTED ORGANIC CHEMICALS FOR PRS 16-034(M)

ANALYTE	SAMPLE ID	SAMPLE VALUE (MG/KG)	SAL (MG/KG)	MEDIA	DEPTH (FT)
Benzoic Acid	0316-97-0578	0.11	100000	Soil	0-1
Phenol	0316-97-0528	0.043	39000	Soil	0-1

5.27.8 Risk-Based Screening Assessment

Lead was reported at 16% of SAL and copper at 2.5% of SAL in one of the two laboratory samples. Other detected inorganic chemicals were reported at less than 1% of SALs. Two organic compounds were detected above instrument detection levels but below EQLs and far below SALs. No chemicals were present at levels at or above SALs at PRS 16-034(m). Visual inspection of the data suggest that an MCE calculation would yield a value far below the target level of 1.0.

5.27.9 Preliminary Human Health Assessment

No human health risk assessment was performed for PRS 16-034(m) because contaminants were not detected at levels at or above SALs.

5.27.10 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 PRS will be deferred until the PRS can be assessed as part of the ecological exposure unit methodology currently being developed.

5.27.11 Conclusions and Recommendations

Five screening samples and two laboratory samples were collected in and adjacent to the footprint of the former laboratory building TA-16-86. One laboratory sample was selected from the only screening sample which screened positive for HE. The other laboratory sample was selected from the center location. No HE was detected in the samples. Copper, lead, silver, and zinc were detected at levels above background UTLs but below SALs. Two organic compounds were detected above instrument detection levels but below EQLs and SALs. No inorganic or organic contamination was detected at levels at or above SALs. The data show that no contaminants are present at this site at levels of concern to human health.

The biased sampling and analysis strategy at this former laboratory building was designed to ensure that residual contamination would be detected if it were present within the PRS. Screening locations and depths were selected based on information about the location, orientation, construction, use and mode of decommissioning of the former building. Because the likelihood of contamination within the building footprint is judged to be low following the removal of the building, and the likelihood of finding contamination is high based on the biased sampling, two confirmatory laboratory samples are sufficient to indicate whether or not such contamination is present at levels of concern. The laboratory samples were based on field screening results, and were analyzed for all potential contaminants based on historical knowledge of operations in TA-16-86.

PRS 16-034(m) is recommended for human-health NFA based on NFA Criterion 5 because contamination is not present at this site at levels that present a potential risk to human health.

5.28 PRS C-16-005

This PRS is the site of former equipment storage and HE machining facility TA-16-53, located in the GMX-2 area (Fig. 5.0-1). It is recommended for human-health NFA because no contaminants were detected above SALs.

5.28.1 History

PRS C-16-005 is discussed in detail in Subsection 5.20 of the RFI Work Plan for Operable Unit 1082, Addendum 1 (LANL 1994, 1160).

TA-16-53 was an optical equipment storage and HE machining facility. The building was constructed in the spring of 1945 and contained a hydraulic press for HE processing. A former site worker claimed to have machined the inner charges for the Trinity device in this building (Martin and Hickmott 1993, 15-16-498). Another worker claimed that both HE machining and casting were done in this building (Martin 1993, 15-16-477). The building had a primary sump on the south side of the southern barricade and a secondary sump 100 ft to the southwest of the building, which had a drain line that exited to the south, eventually flowing into the main drainage ditch for the GMX-2 area. The sumps, PRS 16-029(b2), are addressed in Addendum 1 (LANL 1994, 1160). The building was determined to be contaminated with HE before its demolition by burning in 1960.

The potential contamination at this PRS was identified as metals, SVOCs, and HE.

5.28.2 Description

TA-16-53 was 39 ft long by 16 ft long by 14 ft high with a 6 ft long by 17 ft wide by 8 ft high addition. TA-16-53 was located northeast of TA-16-49. The former location of the building is level, the drainage area slopes slightly to the east. It was wooden-frame construction with a concrete foundation and floor. It was surrounded on three sides with an earthen barricade.

5.28.3 Previous Investigation(s)

No previous field investigations were conducted at this PRS.

5.28.4 Field Investigation

The goal of the Phase I investigation at PRS C-16-005, as outlined in the approved RFI Work Plan for Operable Unit 1082, Addendum 1 (LANL 1994, 1160), was to determine if contaminants were present in soils at levels of concern. The sampling design is consistent with the current industrial land use scenario of the conceptual model described in Section 4.3 of the RFI work plan. The potential for contamination at this PRS is hypothesized to be via either: (1) leaks and spills from the past operations; or (2) ash, debris, or contamination left behind after the former building was burned and remnants removed. The potential release mechanisms at this PRS are hypothesized to be via either: (1) infiltration of potential contamination into the near-surface soil; or (2) mechanical movement and mixing of potentially contaminated surface soil during the removal of the former building. There was no historic subsurface construction (or other intrusive activities) at this PRS, and there are no surface water collection points or drainages present that would have spread contamination to the subsurface. Biased sampling was designed to detect residual HE contamination in heterogeneous surface and near-surface soil at the site of the building footprint. The mode of decommissioning of the building by burning suggests that residual contamination is unlikely at this PRS.

Addendum 1 (LANL 1994, 1160) specified screening soil samples, 0 to 1 ft depth intervals, from six locations and selecting two laboratory samples based on field screening results. The plan called for taking the samples at the four quadrants of the building, at the building center, and adjacent to the location of the door. The laboratory samples were to be selected from the screening samples using the following prioritized biasing scheme: (1) samples with positive HE spot test kit result; (2) samples with above two times background radiation reading; (3) a sample at the door location; and (4) a sample at center location. In response to EPA NOD (EPA 1994, 15-16-644), screening samples were collected from 1 to 2 ft depth intervals (as well as the required 0

to 1 ft intervals) to confirm that the soil beneath this concrete floored building had not been disturbed during decommissioning.

One deviation was made from the work plan. The screening samples were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit. This analysis was performed in addition to the required HE spot test analysis because the D-Tech™ kits can detect specific potential contaminants and provide lower detection limits (1 ppm or less) than the HE spot test. This screening was used to further characterize the samples in the field for biasing purposes.

The building was accurately surveyed using a Trimble™ GPS Total Station. Aerial photographs were used to determine the building position, and the center of the building was surveyed with an estimated accuracy of 2 ft. Screening sample locations were further determined and surveyed relative to the center point and within the known dimensions of the building.

A total of twelve field screening samples from six locations were taken in the building footprints. Two samples were collected from each location, at 0 to 1 ft and 1 to 2 ft depth intervals. The samples were collected near the corners of the four quadrants of the buildings, the building center, and at the door location (Fig. 5.28.4-1). These locations were selected to ensure spatial variability and because the most likely contaminant dispersal mechanism for operations in this building, which had concrete floors, is hypothesized to be via either: (1) HE spills near door areas; or (2) leakage at the floor/wall joints.

All samples were collected with a manually driven hand auger (LANL-ER-SOP-06.10, Hand Auger and Thin-Wall Tube Sampler). The soil samples were screened in the field for HE and beta/gamma radioactivity using the HE spot test kit with modified Griess™ reagents (LANL-ER-SOP-10.06,R0, High Explosive Spot Test) and an Eberline ESP1™ radiological meter with HP-260™ probe (LANL-ER-SOP-10.07, R0, Field Monitoring for Surface and Volume Radioactivity Levels). Samples at 0 to 1 ft depth intervals were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit (EPA SW-846 Methods 4051 and 4050). The 0 to 1 ft intervals were selected for further characterization, rather than the 1 to 2 ft intervals, because the soil beneath the PRS structure is undisturbed, as confirmed by the soil descriptions in the sample collection logs. If contamination is present within the structure footprint, it is most likely present at shallow depths directly beneath the structure. The soil was described and logged on the Sample Collection Log forms (LANL-ER-SOP-01.04, Sample Control and Field Documentation).

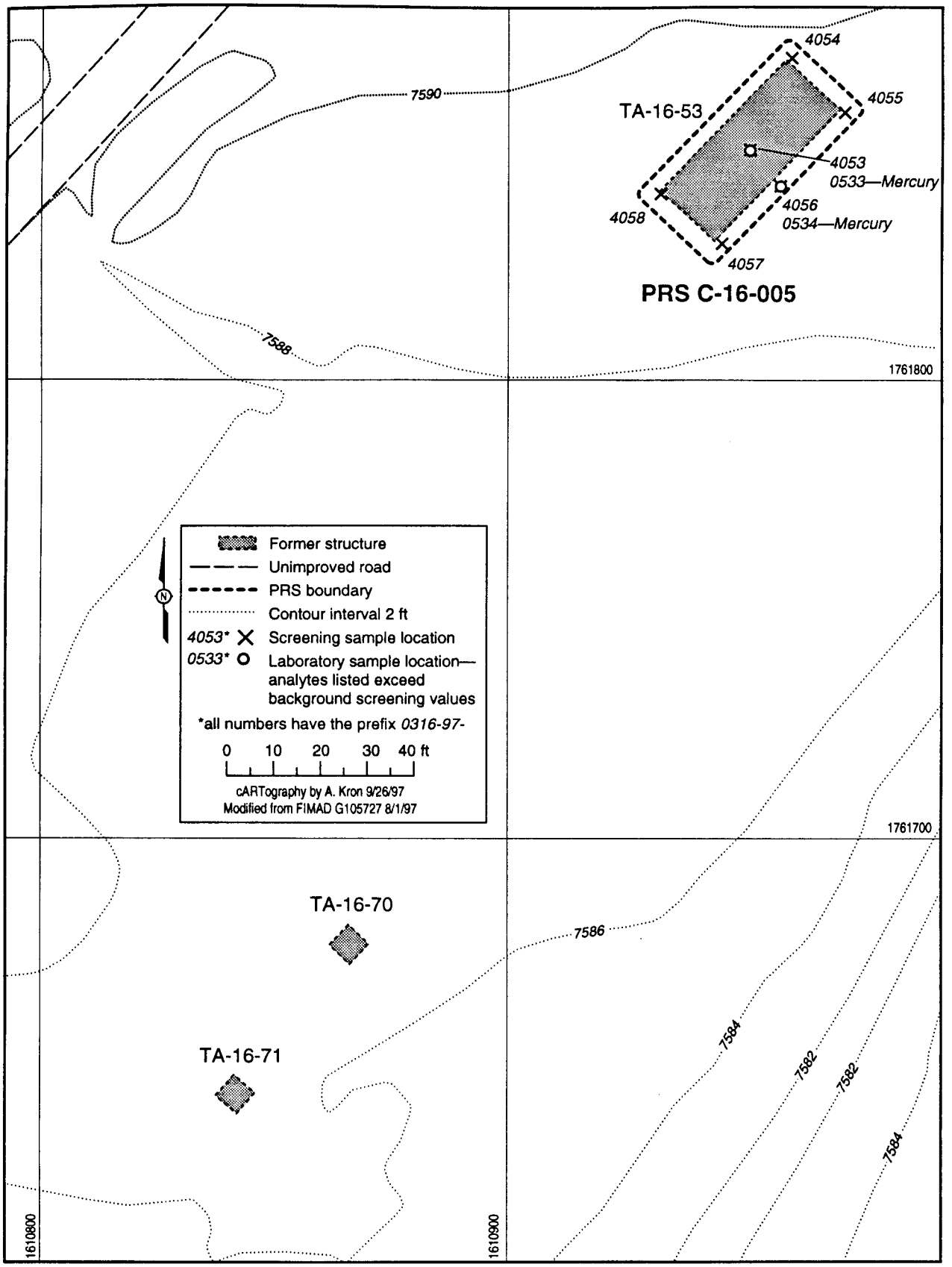

Fig. 5.28.4-1 Locations of PRS C-16-005 samples.

All samples screened negative for HE using the HE spot test kit and contained background radioactivity. Five samples screened positive for HE using the D-Tech™ kit (Table 5.28.4-1).

TABLE 5.28.4-1
SUMMARY OF FIELD SCREENING RESULTS

SCREENING SAMPLE NO.	LOCATION ID	DEPTH (FT)	LAB SAMPLE NO.	HE SPOT TEST	RAD SCREEN	D-TECH RDX (MG/KG)	D-TECH TNT (MG/KG)
0316-97-4053 center	16-4053	0 - 1	0316-97-0533	negative	background	< 0.5	0.5 - 1.5
0316-97-4054 northwest quadrant	16-4054	0 - 1	NA[a]	negative	background	< 0.5	0.5 - 1.5
0316-97-4055 northeast quadrant	16-4055	0 - 1	NA	negative	background	< 0.5	0.5 - 1.5
0316-97-4056 door	16-4056	0 - 1	0316-97-0534	negative	background	< 0.5	0.5 - 1.5
0316-97-4057 southeast quadrant	16-4057	0 - 1	NA	negative	background	0.5 - 1.5	< 0.5
0316-97-4058 southwest quadrant	16-4058	0 - 1	NA	negative	background	< 0.5	< 0.5

a. NA = Not analyzed.

Screening samples 0316-97-4053 and 0316-97-4056 contained elevated concentrations of TNT (0.5 to 1.5 mg/kg). Sample 0316-97-4053 was the center location, and sample 0316-97-4056 was the door location. The two samples were submitted to the laboratory for analysis (Table 5.28.4-1). The laboratory samples were analyzed for metals, SVOCs, and HE (Table 5.28.4-2).

TABLE 5.28.4-2
SUMMARY OF REQUEST NUMBERS FOR LABORATORY SAMPLES TAKEN AT PRS C-16-005

LOCATION ID	SAMPLE ID	DEPTH (FT)	MATRIX	INORGANICS	SVOCS	HE
16-4053	0316-97-0533	0-1	soil	3352R	3351R	3353R
16-4056	0316-97-0534	0-1	soil	3352R	3351R	3353R

5.28.5 Evaluation of Inorganic Chemicals

Mercury was detected in both samples above background levels. Results for sample 0316-97-0534 was reported as estimated (J) (Table 5.28.5-1). As discussed in Section 4.1, the data of Ferenbaugh et al (1990, 46453) are being used to make background evaluations for mercury for data reported below the EQL of 0.1 mg/kg. Baseline validation revealed no other problems with the inorganic analyses that affect the use of these data.

TABLE 5.28.5-1
INORGANIC CHEMICALS WITH CONCENTRATIONS AT OR ABOVE BACKGROUND SCREENING VALUES FOR PRS C-16-005

ANALYTE	SAMPLE ID	SAMPLE VALUE (MG/KG)	SAL (MG/KG)	UTL (MG/KG)	MEDIA	DEPTH (FT)
Mercury	0316-97-0533	0.35	23	0.1	Soil	0-1
Mercury	0316-97-0534	0.05(J[a])	23	0.1	Soil	0-1

a. J = Analyte was positively identified, but the result is estimated to be more uncertain than would normally be expected for that analysis.

5.28.6 Evaluation of Radionuclides

Radionuclides were not analyzed for at PRS C-16-005 because historical evidence indicated that radioactive material was not stored or used in the building. Additionally, field screening did not indicate the presence of radioactive constituents.

5.28.7 Evaluation of Organic Chemicals

No organic chemicals were detected in samples 0317-97-0533 and 0316-97-0534, despite indications of the presence of TNT in the associated field screening samples. The positive D-Tech™ results, which suggested that low levels of TNT were present, was not confirmed by the fixed laboratory analysis. The D-Tech™ kits have been shown to provide false positives due to interferences with humic materials. See Section 4.3.2 for further details. All undetected SVOCs in sample 0316-97-0534 were qualified estimated undetected (UJ), due to problems with an internal standard, but as discussed in Section 4.3.1 these were accepted as undetected following focused validation. Baseline validation indicated no problems that affect the use of these data.

5.28.8 Risk-Based Screening Assessment

Mercury was reported in both samples at less than 2% of the SAL. No chemicals were present at levels at or above SALs at PRS C-16-005.

5.28.9 Preliminary Human Health Assessment

No human health risk assessment was performed for PRS C-16-005 because contamination was not detected at levels at or above SALs.

5.28.10 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 PRS will be deferred until the PRS can be assessed as part of the ecological exposure unit methodology currently being developed.

5.28.11 Conclusions and Recommendations

Twelve screening samples and two laboratory samples were collected in and adjacent to the footprint of the former equipment storage and HE machining facility TA-16-53. Laboratory samples were selected from among the five screening samples that screened positive for HE. No HE was detected in the laboratory samples. Mercury was reported in both samples above background levels but below SAL. No inorganic or organic contamination was found at concentrations above SALs. The data show that no contaminants are present at this site at levels of concern to human health.

The biased sampling and analysis strategy at this former equipment storage building was designed to ensure that residual contamination would be detected if it were present within the PRS. Screening locations and depths were selected based on information about the location, orientation, construction, use of the former building, and mode of decommissioning. Because the likelihood of contamination within the building footprint is judged to be low following the removal of the building, and the likelihood of finding contamination is high based on the biased sampling, two confirmatory laboratory samples are sufficient to indicate whether or not such contamination is present at levels of concern. The laboratory samples were selected based on field screening results, and were analyzed for all potential contaminants based on historical knowledge of operations in TA-16-53.

PRS C-16-005 is recommended for human-health NFA based on NFA Criterion 5 because contamination is not present at this site at levels that present a potential risk to human health.

5.29 PRS C-16-017

This PRS is the site of former steam plant TA-16-502, located at T-Site (Fig. 5.0-1). It is recommended for human-health NFA because no contaminants were detected above SALs.

5.29.1 History

PRS C-16-017 is discussed in detail in Subsection 5.24 of the RFI Work Plan for Operable Unit 1082, Addendum 1 (LANL 1994, 1160).

TA-16-502 was built in September 1945. The steam plant was located at the entrance of T-Site south of the road to the operational area. It is not known what algaecides were used in this facility, but chromates are the most likely additives. The building contained no sumps. It was abandoned in 1959 and destroyed by burning in early 1960.

The potential contamination at this PRS was identified as metals and SVOCs.

5.29.2 Description

TA-16-502 was a 16 ft by 16 ft by 9 ft wooden-frame construction building with a wooden floor. It was located on level ground.

5.29.3 Previous Investigation(s)

No previous field investigations were conducted at this PRS.

5.29.4 Field Investigation

The goal of the Phase I investigation at PRS C-16-017, as outlined in the approved work plan (LANL 1994, 1160), was to determine if contaminants were present in soils at levels of concern. The sampling design is consistent with the current industrial land use scenario of the conceptual model described in Section 4.3 of the RFI work plan. The potential for contamination at this PRS is hypothesized to be via either: (1) leaks and spills from the past operations; or (2) ash, debris, or contamination left behind after the former building was burned and remnants removed. The potential release mechanisms at this PRS are hypothesized to be via either: (1) infiltration of potential contamination into the near-surface soil; or (2) mechanical movement and mixing of potentially contaminated surface soil during the removal of the former building. There was no historic subsurface construction (or other intrusive activities) at this PRS, and there are no surface water collection points or drainages present that would have spread contamination to the subsurface. Biased sampling was designed to detect residual metals associated with algaecides in the surface and near-surface soil at the site of the building footprint. The mode of decommissioning of the building by burning suggests that residual contamination is unlikely at this PRS.

Addendum 1 (LANL 1994, 1160) specified screening soil samples, 0 to 1 ft depth intervals, from five locations and selecting one laboratory sample only if positive field screening results were obtained. The plan called for taking the screening samples at the four quadrants of the building and at the building center. The laboratory sample was to be selected from the screening samples using the following prioritized biasing scheme: (1) a sample with an elevated chromium concentration. In response to an EPA NOD (EPA 1994, 15-16-644), one laboratory sample was collected (based on the above scheme), even if all field screening results were negative.

One deviation was made from the work plan (LANL 1994, 1160). All of the samples were screened for HE using the HE spot test kit and the D-Tech™ immunoassay HE field screening

kits, and one laboratory sample was analyzed for HE. Although HE was not a potential contaminant at this steam plant, HE is a potential contaminant at other sites throughout T-Site. The analyses were performed to confirm that no HE was present at this site.

The building was accurately surveyed using a Trimble™ GPS Total Station. Aerial photographs were used to determine the building position, and the center of the building was surveyed with an estimated accuracy of 2 ft. Screening sample locations were further determined and surveyed relative to the center point and within the known dimensions of the building.

A total of five field screening samples were taken from five locations in the building footprint. The samples were collected from the 0 to 1 ft depth interval. The field screening samples were taken within the four quadrants of the building and at the building center (Fig. 5.29.4-1). These locations were selected to ensure spatial variability and because the most likely contaminant dispersal mechanism for operations in this building, which had wooden floors, is hypothesized to be via spills or leakage from cracks within wooden floors.

All samples were collected with a manually driven hand auger (LANL-ER-SOP-06.10, Hand Auger and Thin-Wall Tube Sampler. The soil samples were screened in the field for HE and beta/gamma radioactivity using the HE spot test kit with modified Griess™ reagents (LANL-ER-SOP-10.06,R0, High Explosive Spot Test) and an Eberline ESP1™ radiological meter with HP-260™ probe (LANL-ER-SOP-10.07, R0, Field Monitoring for Surface and Volume Radioactivity Levels). Samples were analyzed for RDX and TNT using the D-Tech™ immunoassay HE field screening kit (EPA SW-846 Methods 4051 and 4050) and for metals using a Tracor Northern Spectrace 9000 XRF (LANL-ER-SOP-10.08, Operation of the Spectrace 9000 Field-Portable X-Ray Fluorescence Instrument). The soil was described and logged on the Sample Collection Log forms (LANL-ER-SOP-01.04, Sample Control and Field Documentation).

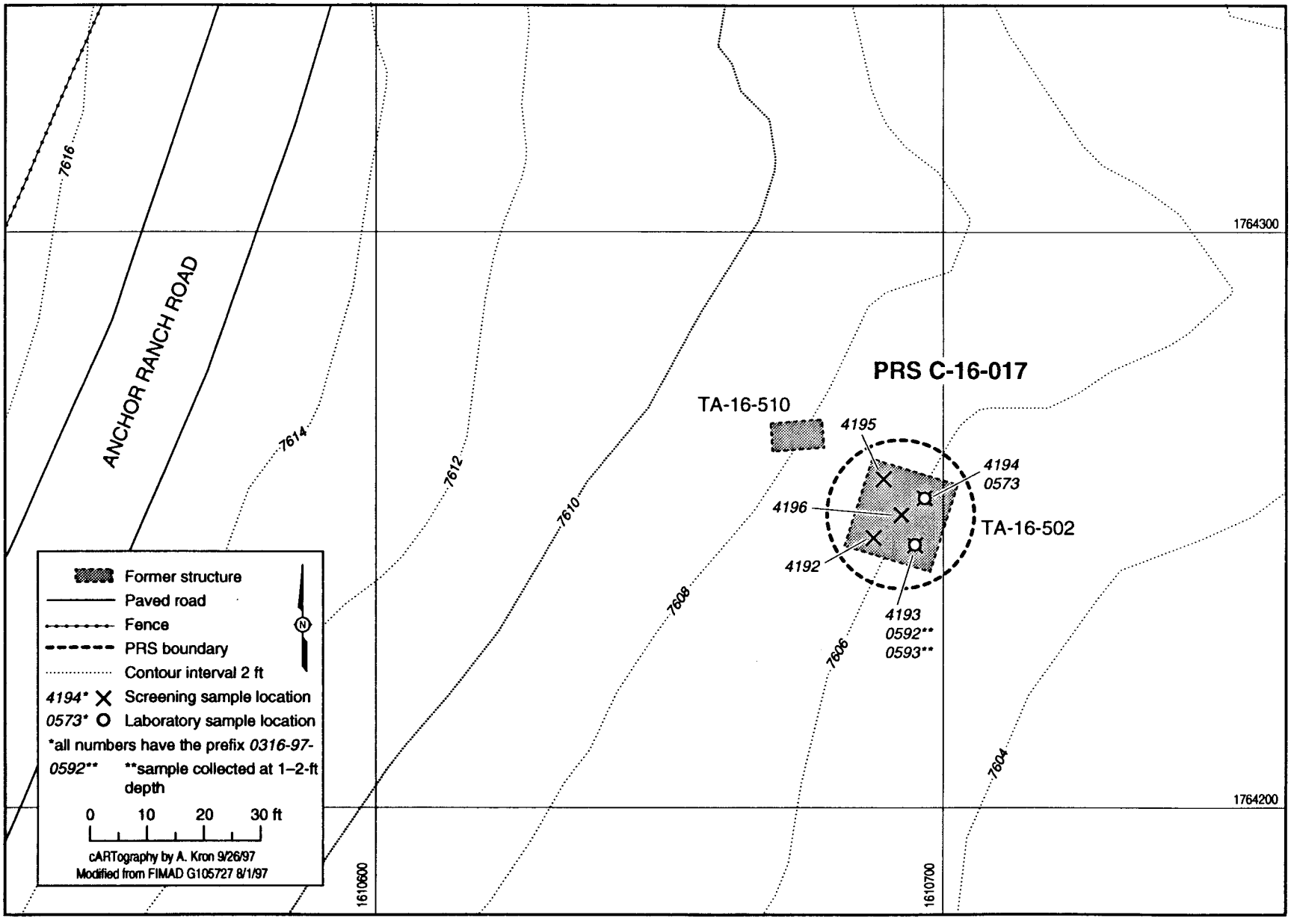

Fig. 5.29.4-1 Locations of PRS C-16-017 samples.

All samples screened negative for HE using the HE spot test kit and contained background radioactivity. Three samples screened positive for HE using the D-Tech™ kit. Samples at one location screened above detect for chromium (Table 5.29.4-1).

TABLE 5.29.4-1
SUMMARY OF FIELD SCREENING RESULTS

SCREENING SAMPLE NO.	LOCATION ID	DEPTH (FT)	LAB SAMPLE NO.	HE SPOT TEST	RAD SCREEN	XRF CR (MG/KG)	D-TECH RDX (MG/K)	D-TECH TNT (MG/KG)
0316-97-4192 southwest quadrant	16-4192	0 - 1	NA[a]	negative	bkg.	ND[b]	< 0.5	0.5 - 1.5
0316-97-4193 southeast quadrant	16-4193	0 - 1	NA	negative	bkg.	530 ± 334	< 0.5	< 0.5
0316-97-4194 northeast quadrant	16-4194	0 - 1	0316-97-0573	negative	bkg.	ND	< 0.5	0.5 - 1.5
0316-97-4195 northwest quadrant	16-4195	0 - 1	NA	negative	bkg.	ND	< 0.5	0.5 - 1.5
0316-97-4196 center	16-4196	0 - 1	NA	negative	bkg.	ND	< 0.5	< 0.5

a. NA = Not analyzed.
b. ND = Not detected.

Three laboratory samples were collected from this PRS. One laboratory sample was selected based on HE screening results. Screening sample 0316-97-4194 was one of three samples which contained an elevated concentration of TNT (0.5 - 1.5 mg/kg) and was selected randomly. The random sample was selected by using a random-number generator to select a number one through three. These numbers corresponded to the northeast, northwest, and southwest quadrants. The northeast quadrant sample was selected. This sample was submitted to the laboratory for analysis (Table 5.29.4-1).

Two laboratory samples were selected based on chromium screening results. The chromium concentrations were not significantly above background, however concentrations were slightly elevated at the southeast quadrant location (16-4193). (The screening chromium values above are reported as concentrations plus or minus two standard deviations). Samples 0316-97-0592 and 0316-97-0593 were collected as QA/QC duplicates from 1 to 2 ft depths and were submitted to the laboratory for analysis (Table 5.29.4-2).

TABLE 5.29.4-2
SUMMARY OF FIELD SCREENING RESULTS
FOR QA/QC SAMPLES

LOCATION ID	DEPTH (FT)	LAB SAMPLE NO.	HE SPOT TEST	RAD SCREEN	XRF CR (MG/KG)	D-TECH RDX (MG/KG)	D-TECH TNT (MG/K)	QA/QC SAMPLE
16-4193 southeast quadrant	1 - 2	0316-97-0592	negative	bkg.	990 ± 746	< 0.5	< 0.5	0316-97-0593

The laboratory samples were analyzed for metals, SVOCs, and HE (Table 5.38.4-3).

TABLE 5.29.4-3
SUMMARY OF REQUEST NUMBERS FOR LABORATORY SAMPLES
TAKEN AT PRS C-16-017

LOCATION ID	SAMPLE ID	DEPTH (FT)	MATRIX	INORGANICS	SVOCS	HE
16-4194	0316-97-0573	0 - 1	soil	3440R	3438R	3440R
16-4193	0316-97-0592	1 - 2	soil	3528R	3526R	NA
16-4193	0316-97-0593	1 - 2	soil	3528R	3526R	NA

5.29.5 Evaluation of Inorganic Chemicals

No inorganic chemicals were present at levels greater than UTL in the laboratory samples from PRS C-16-017. Chromium was reported in the 500-1000 mg/kg range in screening samples from location 16-4193, but with very large measurement errors; the detection limit for chromium using the XRF was about 500 mg/kg. The high field screening result was not confirmed by laboratory analysis; chromium results for the duplicate samples collected from 1 to 2 ft at this location were 8.3 and 8.4 mg/kg, well within the background range for chromium.

5.29.6 Evaluation of Radionuclides

Radionuclides were not analyzed for at PRS C-16-017 because historical evidence indicated that radioactive material was not stored or used in the steam plant. Additionally, field screening did not indicate the presence of radioactive constituents.

5.29.7 Evaluation of Organic Chemicals

No HE was detected in any sample. The positive D- Tech™ result for the screening sample associated with sample 0316-97-0573, which suggested that low levels of TNT were present, was not confirmed by the fixed laboratory analysis. The D-Tech™ kits have been shown to provide

false positives due to interferences with humic materials. See Section 4.3.2 for further details. Baseline validation indicates no data quality problems associated with these analyses.

No other organic chemicals were detected in samples 0316-97-0573, 0316-97-0592 or 0316-97-0593. Baseline validation indicates no data quality problems associated with these analyses.

5.29.8 Risk-Based Screening Assessment

No screening assessment was performed because chemicals were not present at levels or above UTLs, EQLs, or SALs at PRS C-16-017.

5.29.9 Preliminary Human Health Assessment

No human health risk assessment was performed for PRS C-16-017 because contamination was not detected at or above UTLs, EQLs or SALs.

5.29.10 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 PRS will be deferred until the PRS can be assessed as part of the ecological exposure unit methodology currently being developed.

5.29.11 Conclusions and Recommendations

Seven screening samples and three laboratory samples were collected in the footprint of the former steam plant C-16-017. One laboratory sample was selected from the location with the highest HE screening result, but this result was not confirmed by laboratory analysis. The other laboratory samples were QA/QC duplicate splits which were selected from the location with the highest XRF screening result for chromium. No inorganic or organic contamination was found above UTLs, EQLs, or SALs in any of the samples. The data show that no contaminants are present at this site at levels of concern to human health.

The biased sampling strategy at this former steam plant was designed to ensure that residual contamination would be detected if it were present within the PRS. Screening locations and depths were selected based on the information about the location, orientation, construction, use of the former building, and mode of decommissioning. Because the likelihood of contamination within the building footprint is judged to be low following the removal of the building, and the likelihood of finding contamination is high based on the biased sampling, sampling at the two locations with positive field screening results is judged sufficient to indicate whether or not such

contamination is present at levels of concern. The laboratory samples were analyzed for all potential contaminants based on historical knowledge of operations in TA-16-502

PRS C-16-017 is recommended for NFA based on NFA Criterion 5 because contamination is not present at this site at levels that present a risk to human health.

6.0 REFERENCES

Ackerman, Major J. O., June 11, 1945. "Preparedness for Emergency Production at S-Site", Los Alamos Scientific Laboratory Memorandum to G. B. Kistiakowsky (X Division) from J. O. Ackerman (X-3), Los Alamos, New Mexico. **(1945, 15-16-509)**

ATSDR (Agency for Toxic Substances and Disease Registry) August 1995. "Toxicological Profile for Polycyclic Aromatic Hydrocarbons (PAHs) (Update)." ER ID 55663. **(ATSDR 1995, 1408)**

Blackwell, C., D., November 17, 1983. "Structures Removed From TA-16", Los Alamos National Laboratory Memorandum HSE 8-83-794 to A. J. Ahlquist (HSE-8) from C. D. Blackwell (HSE-1), Los Alamos, New Mexico. **(Blackwell 1983, 15-16-076)**

Blake, W. D., F. Goff, A. I. Adams, and D. Counce, May 1995. "Environmental Geochemistry for Surface and Subsurface Waters in the Pajarito Plateau and Outlying Areas, New Mexico," Los Alamos National Laboratory Report LA-12912-MS, UC 903, Los Alamos, New Mexico. **(Blake et al. 1995, 1355)**

Bowen, B. M., May 1990. "Los Alamos Climatology," Los Alamos National Laboratory Report LA-11735-MS, Los Alamos, New Mexico. **(Bowen 1990, 0033)**

Bradley, L. J. N., B. H. Magee, and S. L. Allen, 1994. "Background Levels of Polycyclic Aromatic Hydrocarbons (PAH) and Selected Metals in New England Urban Soils," in *Journal of Soil Contamination*, Vol. 3(4), p. 349. ER ID 46492. **(Bradley et al. 1994, 1144)**

Broxton, D. E., R. T. Ryti, D. Carlson, R. Warren, E, Kluk, and S. Chipera, March 21, 1996. "Natural Background Geochemistry of the Bandelier Tuff at MDA P, Los Alamos National Laboratory," Los Alamos National Laboratory Report LA-UR-96-1151, Los Alamos, New Mexico. **(Broxton et al. 1996, 1305)**

Buckland, C. W., August 15, 1957. "Radiation and Health Clearance at 'S' and 'T' Site Buildings," Los Alamos National Laboratory Memorandum to S. E. Russo (ENG-3) from C. W. Buckland (H-1), Los Alamos, New Mexico. **(Buckland 1957, 15-16-243)**

Buckland, C. W. , July 18, 1966. "Monitoring Results from Survey of Concrete Pads and Debris Following Burning of Superstructures," Los Alamos National Laboratory Memorandum to W. C. Courtwright from C. W. Buckland, Los Alamos, New Mexico. **(Buckland 1966, 15-6-136)**

Crockett, A. B., H. D. Craig, and T. F. Jenkins, May 1997. "On-Site Analytical Methods for Explosives," On-Site Analysis, American Environmental Laboratory, Shelton, Connecticut pp 27-29. **(Crockett et al. 1997, 1411)**

Crockett, A. B., H. D. Craig, T. F. Jenkins, and W. E. Sisk, November 1996. "Field Sampling and Selecting On-Site Analytical Methods for Explosives in Soil," in Federal Facilities Forum Issue, EPA/540/R-97/501, Office of Research and Development and Office of Solid Waste and Emergency Response, US Environmental Protection Agency, Washington, D. C. **(Crockett et al. 1996, 1412)**

Dorries, A. M. (Ed.), 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, 1297)**

Dunham , D., January 1996. " Biological and Floodplain/Wetland Assessment for the Steam Plant Project", Los Alamos National Laboratory Report LA-UR-96-108, Los Alamos, New Mexico. **(Dunham 1996, 1996, 15-16-622)**

Edwards, N.T., 1983. "Polycyclic Aromatic Hydrocarbons (PAHs) in the Terrestrial Environment—A Review." J. Environ. Quality, Vol. 12(4), P. 427-441,. ER ID No.55636. **(Edwards 1983, 1407)**

Engineering Department, October 2, 1959. "Vacated LASL Structures," C. W. Buckland (H-1), Los Alamos National Laboratory Memorandum, Los Alamos, New Mexico. **(Engineering Department 1959, 15-16-256)**

Environmental Protection Group, July 1994. "Environmental Surveillance at Los Alamos during 1992," Los Alamos National Laboratory Report LA-12764-ENV, Los Alamos, New Mexico. **(Environmental Protection Group 1994, 1179)**

EPA (US Environmental Protection Agency), April 10, 1990. Module VIII of RCRA Permit No. NM0890010515, EPA Region VI, issued to Los Alamos National Laboratory, Los Alamos, New Mexico, effective May 23, 1990, EPA Region VI, Hazardous Waste Management Division, Dallas, Texas. **(EPA 1990, 0306)**

EPA (US Environmental Protection Agency), July 1992. "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Third Edition, Final Update 1, Office of Solid Waste and Emergency Response, Washington, DC. **(EPA 1992, 1207)**

EPA (US Environmental Protection Agency), April 1992. "Guidance for Data Usability in Risk Assessment (Part A)," Final, No. 9285.7-09A, Office of Emergency and Remedial Response, Washington, DC. ER ID No. 54947. **(EPA 1992, 1166)**

EPA (US Environmental Protection Agency), October 1994. "Notice of Deficiency, RFI Work Plan Operable Unit 1082 Addendum 1" Letter from William Honker (EPA) to Joseph Vozella (LAAO), EPA Region 6, Hazardous Waste Management Division, Dallas, Texas. **(EPA 1994, 15-16-644)**

EPA (US Environmental Protection Agency), September 1, 1995. "Region IX Preliminary Remediation Goals (PRGs) Second Half 1995," San Francisco, California. **(EPA 1995, 1307)**

Environmental Restoration Decision Support Council and Earth Science Council, June 30, 1997. "Application of LANL Background Data to ER Project Decision-Making, Part II: Radionuclides in Soils, Sediments and Tuff," Los Alamos National Laboratory Report (review draft), ER ID No. 56186, Los Alamos, New Mexico. **(Environmental Restoration Decision Support Council and Earth Science Council 1997, 1414)**

Environmental Restoration Project, September 1996. "RFI Report for Potential Release Sites in TA-16: 16-003(k), 16-021(c), Field Unit 3," Los Alamos National Laboratory Report LA-UR-96-3191, Los Alamos, New Mexico. **(Environmental Restoration Project 1996, 1419)**

Ferenbaugh, R. W., E. S. Gladney, and G. H. Brooks, Jr., October 1990. "Sigma Mesa: Background Elemental Concentrations in Soil and Vegetation, 1979," Los Alamos National Laboratory Report LA-11941-MS, Los Alamos, New Mexico. **(Ferenbaugh et al. 1990, 0099)**

Fresquez, P. R., M. A. Mullen, J. K. Ferenbaugh, and R. A. Perona, April 1996. "Radionuclides and Radioactivity in Soils Within and Around Los Alamos National Laboratory, 1974 through 1994: Concentrations, Trends, and Dose Comparisons," Los Alamos National Laboratory Report LA-13149-MS, Los Alamos, New Mexico **(Fresquez et al. 1996, 1360)**

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, 0848)**

Gautier, M. A., E. S. Gladney, E. A. Jones, N. L. Koski, B. T. O'Malley, G. H. Brooks, and W. D. Moss, December 1992. "Quality Assurance for Environmental Chemistry: 1991," Los Alamos National Laboratory Report LA-12346-MS, Volumes I and II, Los Alamos, New Mexico. **(Gautier et al. 1992, 0947)**

Gautier, M. A. (Ed.). Analytical Chemistry Techniques and Quality Assurance, Los Alamos National Laboratory Report LA-10300-M, Los Alamos, New Mexico. **(Gautier, 1417).**

Knudsen, T.P., P. Black, O. Myers, and B. Vandenplas, April 1996. "Technical Approach to Data Assesment for ER Project Site Characterization Decisions," Los Alamos National Laboratory Report, Los Alamos, New Mexico **(Knudsen et al 1996, 1299).**

Longmire, P. A., D. E. Broxton, and S. L Reneau (Eds.), 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-95-3486, Los Alamos, New Mexico. **(Longmire et al. 1995, 1266)**

LANL (Los Alamos National Laboratory) July 1993, "RFI Work Plan for Operable Unit 1082," Los Alamos National Laboratory LA-UR-93-11196, Los Alamos, New Mexico. **(LANL 1993, 1094)**

LANL (Los Alamos National Laboratory) May 1994, "RFI Work Plan for Operable Unit 1082, Addendum 1" Los Alamos National Laboratory LA-UR-94-1580, Los Alamos, New Mexico. **(LANL 1994, 1160)**

LANL (Los Alamos National Laboratory), February 1995. "Installation Work Plan for Environmental Restoration," Revision 4, Los Alamos National Laboratory Report LA-UR-95-740, ER ID No. 49822, Los Alamos, New Mexico. **(LANL 1995, 1164)**

LANL (Los Alamos National Laboratory), July 1995. "RFI Work Plan for Operable Unit 1082," Addendum II, Los Alamos National Laboratory Report LA-UR-95-1038, Los Alamos, New Mexico. **(LANL 1995, 1342)**

LANL (Los Alamos National Laboratory), July 1995. "Statement of Work–Analytical Support," Revision 2, RFP No. 9-XS1-Q4257, ER ID No. 49738, Los Alamos, New Mexico. **(LANL 1995, 1278)**

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, 1292)**

Martin, B., November 17, 1993. "Early S-Site History: Lee Hilton Interview," Los Alamos National Laboratory Memorandum CST-6-ER/BM-93-060 to File from B. Martin (CST-6), Los Alamos, New Mexico. **(Martin 1993, 15-16-477)**

Martin, B. and D. Hickmott, May 6, 1993. "Early S-Site History: Melvin Brooks Interview," Los Alamos National Laboratory Memorandum CLS-ER/BM-93:022 to File from B. Martin (CLS-DO) and D. Hickmott (EES-1), Los Alamos, New Mexico. **(Martin and Hickmott 1993, 15-16-498)**

Martin, B. and D. Hickmott, June 14, 1993. "Early T-Site History:L. Bailey Interview," Los Alamos National Laboratory Memorandum CLS-ER/BM-93:35 to File from B. Martin (CLS-DO) and D. Hickmott (EES-1), Los Alamos, New Mexico. **(Martin and Hickmott 1993, 15-16-500)**

Martin, B. and D. Hickmott, December 6, 1993. "Early S-Site History: L. Norman Interview," Los Alamos National Laboratory Memorandum CLS-ER/BM-93:061 to File from B. Martin (CLS-DO) and D. Hickmott (EES-1), Los Alamos, New Mexico. **(Martin and Hickmott 1993, 15-16-514)**

McDonald, E.V., R.D. Ryti, P.A. Longmire, and S.L. Reneau, March 1996. "Background Geochemistry of Soils and Colluvium at MDA-P, Los Alamos National Laboratory," Los Alamos National Laboratory Report LA-UR-96-1092, Los Alamos, New Mexico. **(McDonald et al. 1996, 1354)**

National Park Service, September 19, 1983. "Archeology and Historic Preservation; Secretary of the Interior's Standards and Guidelines," Notice, Federal Register, Vol. 48, No. 190, p. 44716. **(National Park Service 1983, 0632)**

Project Consistency Team. "Project Consistency Team (PCT) Policy Memo Notebook," (Controlled), Environmental Restoration Project, Los Alamos National Laboratory, Los Alamos, New Mexico. **(Project Consistency Team, 1210)**

Raymer, D.F., January 1996. "Biological and Floodplain/Wetland Assessment for Environmental Restoration Program, Operable Unit 1082, TAs 11, 13, 16, 24, 37, and 28," Los Alamos National Laboratory Report LA-UR-93-4182, Los Alamos, New Mexico. **(Raymer 1996, 15-16-621)**

Rogers, M.A., 1995. "Insert for Geologic Map of the Los Alamos National Laboratory Reservation," Mara Inc., Los Alamos, New Mexico. **(Rogers 1995, 1353)**

Ryti, R., P. Longmire, and E. McDonald, March 29, 1996. "Application of LANL Background Data to ER Project Decision-Making, Part I: Inorganics," Los Alamos National Laboratory Report LA-UR-96-1534, ER ID No. 54585, Los Alamos, New Mexico. **(Ryti et al. 1996, 1298)**

Schulte, H. F., May 14, 1959. "Contamination Surveys - Abandoned Structures," Los Alamos National Laboratory Memorandum to S. E. Russo (ENG-3) from H. F. Schulte (H-5), Los Alamos, New Mexico. **(Schulte 1959, 15-16-263)**

Taylor, T. J., January 18, 1995. "Approval of the Operable Unit 1082 RFI Workplan," Department of Energy, Los Alamos Area Office Memorandum to H. Jansen (EM/ER) from T. J. Taylor (DOE/LAAO), Los Alamos, New Mexico. **(Taylor 1995, 15-15-645)**

Truslow, E. R., March 1973. "Nonscientific Aspects of Los Alamos Project Y, 1942 through 1946," "Early S-Site Experiences," Appendix by E. Wilder, Jr., AL-5200, Los Alamos, New Mexico. **(Truslow 1973, 15-16-[illegible])**

West, O. R., D. W. Bottrell, C. K. Bayne, R. L. Siegrist, and W. H. Holden, April 1997. "A scientific basis for revising regulatory holding times for VOC water samples," On-Site Analysis, American Environmental Laboratory, Shelton, Connecticut, pp. 15-16. **(West et al. 1997, 1416)**

Wingfield, E. E., May 27, 1960. "Demolition of Buildings by Burning" Atomic Energy Commission Memorandum form E. E. Wingfield (AEC), Los Alamos, New Mexico. **(Wingfield 1960, 15-16-117)**

Wingfield, E. E., January 29, 1960. "Demolition of Building by Fire," Atomic Energy Commission Memorandum from E. E. Wingfield (AEC), Los Alamos, New Mexico. **(Wingfield 1960, 15-16-117)**

THIS PAGE LEFT INTENTIONALLY BLANK

APPENDIX A ANALYTICAL SUITES

Results of analyses can be found in the Facility for information Management and Display (FIMAD). Hard copies of supporting information will be provided upon request.

Chemicals that are reported by analytical laboratories as not detected have not been included in the tables of this RFI report. Nonetheless, undetected analytes are often part of the decision-making process and it is important to note that these chemicals were analyzed for. This appendix lists the target analytes in each analytical suite included in the tables of Section 5.

INORGANIC SUITE

Aluminum	Beryllium	Cobalt	Magnesium	Potassium	Thallium
Antimony	Cadmium	Copper	Manganese	Selenium	Vanadium
Arsenic	Calcium	Iron	Mercury	Silver	Zinc
Barium	Chromium	Lead	Nickel	Sodium	

SEMIVOLATILE ORGANIC COMPOUND (SVOC) SUITE

Acenaphthene	Chrysene	Isophorone
Acenaphthylene	Dibenzo(a,h)anthracene	2-Methylnaphthalene
Aniline	Dibenzofuran	2-Methylphenol
Anthracene	1,2-Dichlorobenzene	4-Methylphenol
Azobenzene	1,3-Dichlorobenzene	Naphthalene
Benzo(a)anthracene	1,4-Dichlorobenzene	2-Nitroaniline
Benzo(b)fluoranthene	3,3'-Dichlorobenzidine	3-Nitroaniline
Benzo(k)fluoranthene	2,4-Dichlorophenol	4-Nitroaniline
Benzo(g,h,i)perylene	Diethylphthalate	Nitrobenzene
Benzo(a)pyrene	Dimethylphthalate	2-Nitrophenol
Benzoic acid	Di-n-butylphthalate	4-Nitrophenol
Benzyl alcohol	Di-n-octylphthalate	N-Nitrosodimethylamine
Bis(2-chloroethoxy)methane	2,4-Dimethylphenol	N-Nitrosodiphenylamine
Bis(2-chloroethyl)ether	2,4-Dinitrophenol	N-Nitroso-di-n-propylamine
Bis(2-chloroisopropyl)ether	4,6-Dinitro-2-methylphenol	Pentachlorophenol
Bis(2-ethylhexyl)phthalate	2,4-Dinitrotoluene	Phenanthrene
4-Bromophenylphenyl ether	2,6-Dinitrotoluene	Phenol
Butylbenzylphthalate	Fluoranthene	Pyrene
Carbazole	Fluorene	Pyridine
4-Chloroaniline	Hexachlorobenzene	1,2,4-Trichlorobenzene
4-Chloro-3-methylphenol	Hexachlorobutadiene	2,4,5-Trichlorophenol
2-Chloronaphthalene	Hexachlorocyclopentadiene	2,4,6-Trichlorophenol
2-Chlorophenol	Hexachloroethane	
4-Chlorophenylphenyl ether	Indeno(1,2,3-cd)pyrene	

INDIVIDUAL RADIONUCLIDES

Strontium-90	Total Uranium	Cobalt-60	Radium-226

RADIONUCLIDE SUITE - GAMMA SPECTROSCOPY

Actinium-228	Americium-241	Annihilation Radiation	Barium-140
Bismuth-211	Bismuth-212	Bismuth-214	Cadmium-109
Cerium-139	Cerium-144	Cesium-134	Cesium-137
Cobalt-57	Cobalt-60	Europium-152	Lanthanum-140
Lead-210	Lead-211	Lead-212	Lead-214
Manganese-54	Mercury-203	Neptunium-237	Potassium-40
Protactinium-231	Protactinium-233	Radium-223	Radium-224
Radium-226	Radon-219	Ruthenium-106	Selenium-75
Sodium-22	Strontium-85	Thallium-208	Thorium-227
Thorium-234	Tin-113	Uranium-235	Yttrium-88
Zinc-65			

HIGH EXPLOSIVES SUITE

2-Amino-4,6-DNT	HMX	RDX
4-Amino-2,6-DNT	Nitrobenzene (NB)	Tetryl
1,3-Dinitrobenzene (1,3-DNB)	o-Nitrotoluene (2-NT)	1,3,5-Trinitrobenzene (1,3,5-TNB)
2,4-Dinitrotoluene (2,4-DNT)	m-Nitrotoluene (3-NT)	2,4,6-Trinitrotoluene (2,4,6-TNT)
2,6-Dinitrotoluene (2,6-DNT)	p-Nitrotoluene (4-NT)	

APPENDIX B DATA VALIDATION

The following tables summarize the results of quality assurance/quality control data validation for all analytical results used to support recommendations in this RFI report. Tables are presented in order of request number for each sample delivery group sent for laboratory analysis. The tables are grouped by analytical suite. Request numbers for each PRS are cited in Section 5.X.4, in Table 5.X.4-1 entitled Summary of Request Numbers for Samples Taken at PRS XX-XXX.

Tables in this appendix cover radiochemical analysis (Table B-1), HE analysis (Table B-2), inorganic analysis (Table B-3), and SVOC analysis (Table B-4).

TABLE B-1
DATA QUALITY EVALUATION FOR RADIOCHEMISTRY ANALYSES AT TA-16

SUITE	REQUEST NUMBER[A]	COMMENTS
Radionuclides	3404R	The laboratory control sample for uranium-235 was above the acceptable limit of 125%. As a result, samples 0316-97-0562 and 0316-97-0572 were qualified as estimated with a high bias (J+[b]). Even if the high bias is taken into consideration, the level of uranium-235 in these samples is not near a decision level. Bismuth-211 values are qualified as estimated (J[c])due to poor duplicate recovery. Bismuth-211 is included in the analysis as a measure of data quality. It is not a COPC at these sites and no decision level exists for bismuth-211. All data are accepted as useable with qualification.
Radionuclides	3420[illegible]	Radium analysis did not have a matrix spike. This did not affect the quality of the data. All data are useable.
Radionuclides	3460R	Duplicate results for lead-212 are not within the acceptable range. All lead-212 values are J-qualified. Lead-212 is included in the analysis as a measure of data quality. It is not a COPC at these sites and no decision level exists for lead-212. Radium analysis did not have a matrix spike. Radium is not a COPC for these sites. This did not affect the quality of the data. All data are accepted as useable.

[a] Environmental Restoration Project analytical request number
[b] J+ = Analyte was positively identified, result is likely biased high.
[c] J = Analyte was positively identified, numerical value is estimated to be more uncertain than would normally be expected for that analysis.

TABLE B-2
DATA QUALITY EVALUATION FOR HIGH EXPLOSIVES ANALYSES AT TA-16

SUITE	REQUEST NUMBER[A]	COMMENTS
HE	3319R	All data are useable without qualification.
HE	3335R	All data are useable without qualification.
HE	3402R	All data are useable without qualification.
HE	3418R	All data are useable without qualification.
HE	3439R	All data are useable without qualification.
HE	3440R	All data are useable without qualification.
HE	3442R	All data are useable without qualification.
HE	3453R	All data are useable without qualification.
HE	3458R	All data are useable without qualification.
HE	3527R	All data are useable without qualification.

[a] Environmental Restoration Project analytical request number

TABLE B-3
DATA QUALITY EVALUATION FOR INORGANIC ANALYSES AT TA-16

SUITE	REQUEST NUMBER[A]	COMMENTS
Inorganics	3320R	Spike recovery of arsenic was above the acceptable 125% limit. Arsenic data were qualified as estimated with a high bias (J+[b]). However, arsenic values are not near a decision level, even when the high bias is taken into consideration. Duplicate recovery for lead was outside the acceptable 20% range and these values were P-qualified[c]. Samples 0316-97-0521 and 0316-97-0576 have levels of lead near a decision level and may be affected by the poor duplicate recovery results. All other samples are not significantly affected by the poor duplicate recovery. All lead data should be qualified as estimated (J[d]). All data are useable with qualification.
Inorganics	3334R	All data except for mercury analysis are A-qualified because a sample not associated with this request number was used as the matrix spike and duplicate sample. The sample used for the matrix spike and duplicate was associated with request number 3440R (see below). This is a reasonable sample to use as matrix spike and duplicate for these samples. All data are accepted as useable without qualification.
Inorganics	3339R	The matrix spike and duplicate sample for the inorganic analysis (excluding cyanide and mercury analysis) were conducted on a sample not associated with the samples in this request. A sample from another request, associated with activities in this field unit and at this site, was used for duplicate and spike samples. As a result, all values (excluding those for mercury and cyanide) were qualified as absent. The matrix spike results and duplicate analysis results were all within the acceptable range. All data are useable with qualification.

Inorganics	3352R	Beryllium was present in the preparation blank. Samples containing less than 5 times the amount of beryllium in the blank were qualified as U[f]. The matrix spike and duplicate sample for the mercury analysis were conducted on a sample not associated with the samples in this request. A sample from another request, associated with activities in this field unit and at this site, was used for duplicate and spike samples. As a result, mercury values were qualified as absent. The matrix spike results and duplicate analysis results were all within the acceptable range. All mercury values are acceptable without qualification. Mercury values B-qualified by the analytical laboratory (indicating that the value reported is between the contract required detection level and the instrument detection level) are qualified as UJ[g] due to the implicit inaccuracies at the low level of detection. The duplicate analysis for antimony was below the acceptable level of 75%. Antimony data was UJ-qualified. All data are useable with qualification.
Inorganics	3403R	Continuing calibration data for cyanide analysis are missing. Cyanide results are qualified as absent (A). Initial calibration data is available and within the acceptable range. Cyanide data should be qualified as UJ, estimated undetected. The duplicate recovery of aluminum and manganese are outside the acceptable 20% limit. These data are P-qualified. The duplicate recovery of silver was also outside the acceptable limit although it was not P-qualified. All three elements should be considered estimated and qualified as J. The matrix spike recovery of manganese was above the acceptable 125% limit and manganese data are qualified as estimated with a high bias (J+). The matrix spike recovery for selenium was below the acceptable 75% limit. All selenium values are UJ-qualified. The matrix spike recovery of antimony was well below the acceptable limit and all antimony data was rejected and qualified as R[h],PM[i]. The duplicate recovery was also well outside the acceptable limit. All antimony data should be rejected and qualified as R. All data are useable with qualification.
Inorganics	3419R	Beryllium and selenium were detected in the preparation blank. All beryllium values were qualified as U. All selenium values containing less than 5 times the value found in the blank were qualified as U. The matrix spike recovery for antimony and selenium were below the acceptable level of 75%. Samples with antimony and selenium at levels greater than the estimated detection limit are qualified as estimated with a low bias (J[j]). All other antimony and selenium values are qualified as UJ. Aluminum, chromium, and iron had duplicate recovery values lower than the acceptable value. Silver had duplicate recovery values higher than the acceptable value. These four elements were P-qualified because of poor duplicate recoveries. They should be considered estimated and qualified with a J. All data are useable with qualification.
Inorganics	3440R	Beryllium and thallium were detected in the preparation blank sample. Analytical samples containing less than 5 times the amount in the blank were qualified as U. No sample contained beryllium or thallium at levels above background levels or near action levels. The matrix spike for antimony was below the acceptable level of 50%. All antimony values are UJ-qualified. All data are considered useable with qualification.
Inorganics	3443R	The spike sample and duplicate sample analyses were conducted on a sample not associated with this request. The sample was a LANL sample from another field unit. All samples were qualified as A. The spike results for manganese were below the acceptable limit of 75%. All manganese samples should be qualified as estimated with a low bias (J-). Duplicate results for arsenic, cobalt, manganese, selenium, vanadium, and thallium were outside the acceptable value of 20%. These compounds should be J-qualified, to indicate that they are estimates. Manganese values should retain the J- qualifier given for poor spike analytical results. All data are useable with qualification.

Inorganics	3459R	Beryllium and selenium were detected in the preparation blank sample. Analytical samples containing less than 5 times the amount in the blank were qualified as U. No sample contained beryllium or selenium at levels above background levels or near action levels. Spike recovery of manganese, antimony, and selenium was below the acceptable limit of 75%. All antimony and selenium data are qualified as UJ. All manganese data are qualified as J-. No manganese values are near background levels or action levels. Duplicate recovery of zinc and copper was below the acceptable 20% limit. Zinc and copper data are P-qualified. Zinc and copper values are not near action levels. Zinc and copper data should be considered estimated and J-qualified. This did not affect the quality of the data for the purposes of this report. All data are considered useable with qualification.
Inorganics	3528R	All data were qualified as absent because the matrix spike and duplicate analysis were conducted on a sample not associated with samples in this request.

[a] Environmental Restoration Project analytical request number

[b] J+ = Analyte was positively identified, result is likely biased high.

[c] P = Professional judgment should be applied before using the data.

[d] J = Analyte was positively identified, numerical value is estimated to be more uncertain than would normally be expected for that analysis.

[e] A = Absent; some portion of the data package is missing.

[f] U = Analyte was not detected.

[g] UJ = Analyte was not detected, numerical value is an estimate of the EQL.

[h] R = Rejected.

[i] PM = Professional judgment should be applied before using the data. Manual review of the raw data is recommended.

[j] J- = Analyte was positively identified, result is likely biased low.

TABLE B-4
DATA QUALITY EVALUATION FOR SEMIVOLATILE ORGANIC COMPOUNDS ANALYSES AT TA-16

SUITE	REQUEST NUMBER[A]	COMMENTS
SVOCs	3318R	The internal standards associated with samples 0316-97-0521, -0022, -0574, -0575, -0576 had area counts outside the acceptable limits. Undetected compounds were qualified as UJ[b]. Detected compounds were qualified as J[c],PM[d]. Inspection of the data indicates that detected compounds should be qualified as estimated (J). All data are useable with qualification.
SVOCs	3333R	One internal standard associated with sample 0316-97-0525 did not meet the acceptable criteria. All analytes in this sample were qualified as UJ. All data are useable with qualification.
SVOCs	3338R	All data are useable.
SVOCs	3351R	Two internal standards were out of control. Perylene was below the acceptable 50% limit for samples 0316-97-0527, -0534, -0535, -0537, and -0577. Chrysene was below the acceptable 50% limit for samples 0316-97-0537 and 0316-97-0577. As a result of this, all undetected compounds in these samples were UJ-qualified. In sample 0316-97-0377, pyrene was detected and was qualified as J,PM. Inspection of the data indicates that this value should be qualified as J. All data are useable with qualification.

SVOCs	3401R	One internal standard associated with samples 0316-97-0587, -0561, and -0563 was below the acceptable level of 50%. All data in these samples were qualified as UJ. All three samples were reanalyzed with better internal standard performance. The reanalyzed results should be used instead of the original sample results. Internal standards associated with samples 0316-97-0560, -0561, -0563, -0555, -0555RE, -0563RE, -0587RE, -0560RE, and -0561RE were above the acceptable 100% limit. Detected compounds in these samples were qualified as J,PM. Inspection of the data indicates that these compounds should be considered estimated and J-qualified. All reanalyzed results should be used instead of the original sample results. All data are useable with qualification.
SVOCs	3417R	The response area for one internal standard was below the acceptable limit of 50% for sample 0316-97-0545. As a result, all the data in this sample were qualified UJ. All data are useable with qualification.
SVOCs	3438R	All data are useable.
SVOCs	3441R	All data are useable.
SVOCs	3457R	Samples 0316-97-0540, -0541, -0548, -0557, -0580, and -0581 missed the extraction holding time by one day. Samples 0316-97-0539, -0542, and -0543 missed the extraction holding time by two days. All data in these samples were PM-qualified. Recent EPA findings indicate that minor deviations from the extraction holding times has little effect on sample results for solid samples. All data are considered usable. The undetected compounds in these samples should be qualified as estimated undetected (UJ) and the detected compounds should be qualified as estimated (J). All data are useable with qualification.
SVOCs	3526R	One internal standard had a recovery of 49%, just below the 50% acceptable limit. Compounds associated with this internal standard were qualified as UJ. All data are acceptable with qualification.

[a] Environmental Restoration Project analytical request number

[a] U = Analyte was not detected.

[b] UJ = Analyte was not detected, numerical value is an estimate of the EQL.

[c] J = Analyte was positively identified, numerical value is estimated to be more uncertain than would normally be expected for that analysis.

[d] PM = Professional judgment should be applied before using the data. Manual review of the raw data is recommended.

TABLE B-5
DATA QUALITY EVALUATION FOR TOTAL URANIUM ANALYSES AT TA-16

SUITE	REQUEST NUMBER[A]	COMMENTS
Uranium	3336R	Analysis consisted of total acid digestion followed by KPA analysis. KPA analysis can cause results to be biased low. However no sample result in this request is near an action level. All data are useable without qualification.
Uranium	3404R	Analysis consisted of total acid digestion followed by KPA analysis. KPA analysis can cause results to be biased low. However no sample result in this request is near an action level. All data are useable without qualification.

[a] Environmental Restoration Project analytical request number