RFI Report for Potential Release Sites in TA-46

46-003(h)	46-004(b)
46-004(g)	46-004(h)
46-004(m)	46-004(q)
46-004(s)	46-004(u)
46-004(v)	46-004(x)
46-004(y)	46-004(z)
46-004(a2)	46-004(b2)
46-004(c2)	46-004(d2)
46-004(e2)	46-004(f2)
46-006(a)	46-006(b)
46-006(c)	46-006(d)
46-006(f)	46-006(g)
46-007	46-008(b)
46-010(d)	C-46-002

C-46-003

Field Unit 3

Environmental Restoration Project

June 1996

A Department of Energy
Environmental Cleanup Program

Los Alamos
NATIONAL LABORATORY

LA-UR-96-1957

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) at Los Alamos National Laboratory (LANL) Technical Area (TA) 46. Since 1954 TA-46 has been the site of diverse experimental programs, including development of nuclear reactors to propel space rockets, uranium isotope separations, cesium-plasma diode experiments, production of nonradioactive isotopes, and research in photochemical, laser, hydrogen fuel cell, passive solar energy, heat pipes, free-electron lasers, accelerator technology, and electronics design.

With approval of the Operable Unit (OU) 1140 RFI work plan, the Environmental Protection Agency (EPA) listed PRSs to be included in the first RFI report for TA-46 (EPA 1994, 11-256). As a result of funding constraints and refocused priorities, sampling was not completed at eight of the specified PRSs. Sampling at these eight sites is scheduled for fiscal year 1997. However, sampling at seven additional PRSs not specified by EPA was completed in 1994 because of similarity of sampling techniques and proximity to the 1994 sampling sites.

Phase I sampling was conducted between August and November 1994. Surface and hand-augered subsurface samples were collected. Analyses were performed for radionuclides, inorganics, volatile and semivolatile organic compounds, pesticides, and polychlorinated biphenyls (PCBs). Because few data were available concerning contamination at these sites, the objective of the Phase I investigation was to determine whether contamination was present.

The PRSs discussed in this RFI report are listed in Table ES-1. The 26 recommendations for no further action (NFA) are based on characterizion of those PRSs under an RFI investigation iindicating that contaminants are not present or are present in concentrations that pose an acceptable risk under projected land use. This RFI report documents studies of all potential contaminants investigated, including non-RCRA constituents such as radionuclides and polychlorinated biphenyls. Contamination originating from continuing sources, such as polycyclic aromatic hydrocarbons, and residuals from pesticides under normal usage are also discussed.

Eight PRSs listed in Table ES-1 were scheduled to be included in this RFI report. Because 1996 sampling was not completed at these PRSs, they will be discussed in a future RFI report, currently scheduled for 1997.

TABLE ES-1

SUMMARY OF PROPOSED ACTIONS

			PROPOSED ACTION		
PRS[a] ID	HSWA[b]	NFA[c] CRITERION	FURTHER ACTION	RATIONALE	SECTION
46-003(h)	X	N/A[d]	VCA[e]	Inorganics above SALs[f]	5.1
46-004(b)	X	5	None	No contaminants above SAL	5.2
46-004(f)	X	TBD[g]	N/A	Awaiting Phase I fieldwork	—
46-004(g)	X	N/A	Phase II	Contamination above SALs	5.3
46-004(h)	X	5	None	No contaminants above SAL	5.4
46-004(m)	X	5	None	No contaminants above SAL	5.5
46-004(q)	X	N/A	Phase II	Contaminants above SALs	5.6
46-004(r)	X	TBD[g]	N/A	Awaiting Phase I fieldwork	—
46-004(s)	X	N/A	Phase I/II	An outfall was not sampled	5.7
46-004(u)	X	5	None	No contaminants above SAL	5.8
46-004(v)	X	5	None	No contaminants above SAL	5.9
46-004(w)	X	TBD	N/A	Awaiting Phase I fieldwork	—
46-004(x)	X	5	None	No contaminants above SAL	5.10
46-004(y)	X	5	None	No contaminants above SAL	5.11
46-004(z)	X	5	None	No contaminants above SAL	5.12
46-004(a2)	X	N/A	Phase II	Inappropriate sampling	5.13
46-004(b2)	X	5	None	No contaminants above SAL	5.14
46-004(c2)	X	5	None	No contaminants above SAL	5.15
46-004(d2)	X	5	None	No contaminants above SAL	5.27
46-004(e2)	No	5	None	No contaminants above SAL	5.16
46-004(f2)	No	5	None	No contaminants above SAL	5.17
46-006(a)	X	5	None	No contaminants above SAL	5.18
46-006(b)	X	5	None	No contaminants above SAL	5.19
46-006(c)	X	5	None	No contaminants above SAL	5.20
46-006(d)	X	N/A	Phase II	Contaminants above SALs	5.21
46-006(f)	X	5	None	No contaminants above SAL	5.22
46-006(g)	X	5	None	No contaminants above SAL	5.23
46-007	X	5	None	No contaminants above SAL	5.24
46-008(a)	X	TBD	N/A	Awaiting Phase I fieldwork	—
46-008(b)	X	5	None	No contaminants above SAL	5.25
46-008(d)	X	TBD	N/A	Awaiting Phase I fieldwork	—
46-008(e)	X	TBD	N/A	Awaiting Phase I fieldwork	—
46-008(f)	X	TBD	N/A	Awaiting Phase I fieldwork	—
46-008(g)	X	TBD	N/A	Awaiting Phase I fieldwork	—
46-010(d)	X	5	None	No contaminants above SAL	5.26
C-46-002	No	5	None	No contaminants above SAL	5.27
C-46-003	No	5	None	No contaminants above SAL	5.27

[a] PRS = Potential release site.
[b] HSWA = Hazardous and Solid Waste Amendments.
[c] NFA = No further action.
[d] N/A = Not applicable.
[e] VCA = Voluntary corrective action.
[f] SAL = Screening action level.
[g] TBD = To be determined.

SUMMARY OF PRSs

PRS 46-003(h) is a small effluent area beneath a sink drainpipe from TA-46-77. The pipe has been plugged. Eight inorganics were detected above LANL background upper tolerance levels (UTLs) in soil under the pipe. Cadmium and lead concentrations were above screening action levels (SALs). The PRS is recommended for voluntary corrective action (VCA).

PRS 46-004(b) was an alkali-metal cleaning tank removed in 1973. No elevated cesium or lithium was detected downhill from former locations of the cleaning tank or in the downstream drainage. The PRS is recommended for NFA.

PRS 46-004(g) is listed as ducts and drains of TA-46-1. Outfall N was the outfall from industrial drains in TA-46-1. In 1994 drains from the building were rerouted to the sanitary sewer line. The outfall is active but now receives only storm water runoff. Inorganics and radionuclides were found above LANL UTLs at the outfall and in its drainage channel. Chromium, copper, lead, mercury, and uranium isotopes were found above SALs in the drainage and in sediments on the canyon bench. In one sample, arsenic was found above the LANL UTL (95%, 0.95) but within the total arsenic background range at LANL and is not considered a contaminant of concern. A Phase II sampling plan is proposed. Duct effluent was included in the stack emissions aggregate (Section 5.27 of this RFI report). No contamination was detected in the widespread sampling effort for that aggregate.

PRS 46-004(h) is listed as ducts and drains of TA-46-16. Outfall A is the active outfall from an industrial drain in TA-46-16. Uranium isotopes, cadmium, copper, lead, mercury, silver, and zinc were found above LANL UTLs. The PRS is recommended for NFA because no contamination was detected above SALs. Multiple chemical evaluation (MCE) screening yields values less than the target limit of 1. Duct effluents were included in the stack emissions aggregate (Section 5.27 of this RFI report). No contamination was detected in the widespread sampling effort for that aggregate.

PRS 46-004(m) is active outfall CC from sinks, floor drains, and a noncontact cooling water system in TA-46-30. Copper, lead, mercury, zinc, and uranium-235 were found above LANL UTLs. The PRS is recommended for NFA because no contamination was detected above SALs. MCE screening yields a value less than the target limit of 1.

PRS 46-004(q) is outfall B that discharges to Cañada del Buey. The source is unknown. Barium, cadmium, copper, lead, mercury, nickel, silver, zinc, and uranium isotopes were found above LANL UTLs. Mercury and isotopes of uranium were found above SALs. The PRS is included in the TA-46 Phase II sampling plan.

PRS 46-004(s) is outfall X and an unnamed outfall from trench drains in TA-46-1. Both outfalls are active. Copper, lead, mercury, nickel, silver, and zinc were found above LANL UTLs at outfall X. No contamination was found above SALs. MCE screening yields a value less than the target limit of 1. The unnamed outfall is scheduled for sampling during the 1996 field campaign.

PRS 46-004(u) is outfall F from a plugged overflow pipe in TA-46-87. Copper, lead, mercury, nickel, silver, zinc, and plutonium isotopes were found above LANL UTLs. MCE screening yields a value less than the target limit of 1. The PRS is recommended for NFA because no contamination associated with LANL activities was found above SALs.

PRS 46-004(v) is active outfall G from a sump in TA-46-87 which collects storm water runoff. Mercury, silver, zinc, and plutonium isotopes were found above LANL UTLs. MCE screening yields a value less than the target limit of 1. The PRS is recommended for NFA because no contamination was detected above SALs.

PRS 46-004(x) is active outfall J from roof drains in TA-46-31. Cadmium, copper, lead, mercury, zinc, uranium, and plutonium isotopes were found above LANL UTLs. MCE screening yields a value less than the target limit of 1. Because no contamination associated with LANL activities was found above SALs, the outfall is recommended for NFA.

PRS 46-004(y) is outfall K from sinks, floor drains, and cooling water blowdown from the cooling tower in TA-46-31. The pipe has been rerouted to the sanitary sewer system and the outfall is inactive. Copper, mercury, silver, zinc, uranium, and plutonium isotopes were found above LANL UTLs. MCE screening yields a value less than the target limit of 1. Because no contamination associated with LANL activities was found above SALs, the outfall is recommended for NFA.

PRS 46-004(z) is outfall L from a floor drain and roof drains in TA-46-31. The floor drain has been rerouted to the sanitary sewer system; only roof drains discharge to the outfall. Mercury, nickel, silver, zinc, uranium and plutonium isotopes were found above LANL UTLs. MCE screening yields a value less than the target limit of 1. Because no contamination was found above SALs, the outfall is recommended for NFA.

PRS 46-004(a2) is outfall MM from sinks and floor drains in TA-46-31, now inactive. Information discovered after sampling was completed indicated that samples may have been collected in inappropriate locations. Because cadmium, chromium, copper, lead, mercury, nickel, silver, zinc, PCBs, and uranium and plutonium isotopes were found above LANL UTLs, further sampling is proposed at this PRS.

PRS 46-004(b2) is outfall U from a utility trench in TA-46-1 and is active. Copper, lead, mercury, zinc, and uranium isotopes were found above LANL UTLs. MCE screening yields a value less than the target limit of 1. Because no contamination associated with LANL activities was found above SALs, the outfall is recommended for NFA.

PRS 46-004(c2) is active outfall S from floor drains and cooling water discharges in TA-46-1. Copper, lead, mercury, silver, zinc, and uranium-235 were found above LANL UTLs. MCE screening yields a value less than the target limit of 1. Because no contamination was found above SALs, the PRS is recommended for NFA.

PRS 46-004(d2) is stack emissions from TA-46-24. Copper, mercury, silver, zinc, and uranium-235 were found above LANL UTLs in widely scattered soil samples. Because no contamination was detected above SALs in samples designated for stack emissions, the PRS is recommended for NFA.

PRS 46-004(e2) is active outfall AP from floor drains in TA-46-42. Chromium, copper, lead, and zinc were found above LANL background UTLs. MCE screening yields a value less than the target limit of 1. Because no contamination was detected above SALs, the PRS is recommended for NFA.

PRS 46-004(f2) is plugged outfall AQ from a floor drain in TA-46-31. Lead, mercury, zinc, uranium and plutonium isotopes were found above LANL background UTLs. MCE screening yields a value less than the target limit of 1. Because no contamination was detected above SALs, this PRS is recommended for NFA.

PRS 46-006(a) is a storage pad and ditch between TA-46-1 and TA-46-42. Copper, lead, mercury, zinc, and PCBs were found above LANL background UTLs. MCE screening yields a value less than the target limit of 1. Because no contamination associated with LANL activities was found above SALs, the PRS is recommended for NFA.

PRS 46-006(b) is the site of a storage shed, now removed, north of TA-46-41. Lead, zinc, and uranium-235 were found above LANL UTLs. MCE screening yields a value less than the target limit of 1. Because no contamination was found above SALs, the PRS is recommended for NFA.

PRS 46-006(c) was a storage area at TA-46-158. Copper, lead, mercury, and zinc were found above LANL UTLs. MCE screening yields a value less than the target limit of 1. Because no contamination was found above SALs, the PRS is recommended for NFA.

PRS 46-006(d) is diverse storage, disposal, and spill areas along the rim of Cañada del Buey. PCBs, inorganics, and radionuclides were found above both UTLs and SALs at diverse points. The PRS is included in Phase II sampling.

PRS 46-006(f) is a storage building located near TA-46-1. Lead, mercury, zinc, and a PCB were found above LANL UTLs. Because no contamination was detected above SALs, the PRS is recommended for NFA.

PRS 46-006(g) is a storage shed attached to TA-46-31. Two organic solvents were found. Because no contamination was detected above SALs, the PRS is recommended for NFA. No action is proposed for low level radioactivity detected in the shed during field screening activities.

PRS 46-007 is a ditch at TA-46-1 once used for disposal. Copper, lead, mercury, nickel, silver, and zinc were found above LANL UTLs. Copper was found above SAL at one point. Samples taken below the point contained levels below SAL, indicating that copper was not migrating at levels of concern. No other contamination was detected above SALs. The PRS is recommended for NFA.

PRS 46-008(b) was storage area near TA-46-1. Copper, mercury, zinc, and PCBs were found above LANL UTLs. MCE screening yields a value less than the target limit of 1. Because no contamination was detected above SALs, the PRS is recommended for NFA.

PRS 46-010(d) is a storage area at TA-46-41. Copper, mercury, and zinc were found above LANL UTLs. MCE screening yields a value less than the target limit of 1. Because no contamination was detected above SALs, the PRS is recommended for NFA.

PRS C-46-002 is stack emissions from TA-46-31. Copper, mercury, silver, zinc, and uranium-235 were found above LANL UTLs in widely scattered samples. Because no contamination was detected above SALs in samples designated solely for stack emissions, the PRS is recommended for NFA.

PRS C-46-003 is stack emissions from TA-46-30. Copper, mercury, silver, zinc, and uranium-235 were found above LANL UTLs in widely scattered samples. Because no contamination was detected above SALs in samples designated solely for stack emissions, the PRS is recommended for NFA.

Contents

LIST OF TABLES

LIST OF FIGURES

1.0 INTRODUCTION

This Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) report evaluates 29 potential release sites (PRSs) at Technical Area (TA) 46 of the Los Alamos National Laboratory (LANL). Investigations were conducted for outfalls, surface releases, storage areas, and stack emissions as specified in the RFI Work Plan for Operable Unit (OU) 1140 (LANL 1993, 1093). Fifteen outfall PRSs and PRS 46-003(h) that drain into Cañada del Buey at the northern perimeter of the site were sampled. Outfalls PRS 46-004(e2) and 46-004(f2), listed in the work plan as unlocated, were found and sampled as prescribed in Appendix G of the work plan. Also addressed in this RFI report are two areas of concern suspected of containing residuals from stack emissions.

With the approval of the RFI work plan for TA-46, the Environmental Protection Agency (EPA) listed 30 PRSs to be included in the first TA-46 RFI report (EPA 1994, 11-256). As a result of funding constraints and refocused priorities, sampling was not completed at eight of the specified PRSs (Table 1.0-1). These PRSs will be sampled in the TA-46 campaign scheduled for August through October 1996. Surface sampling was completed at seven PRSs not specified by EPA because scheduled surface sampling was completed early, the additional seven PRSs were near the 1994 field campaign work sites, and sampling techniques were similar (Table 1.0-1).

TABLE 1.0-1

DEVIATIONS FROM PRSs SPECIFIED BY EPA FOR THIS TA-46 RFI REPORT

EXCLUDED PRSs	INCLUDED PRSs
46-004(f)	46-004(e2)
46-004(r)	46-004(f2)
46-004(w)	46-003(h)
46-008(a)	46-006(c)
46-008(d)	46-010(d)
46-008(e)	C-46-002
46-008(f)	C-46-003
46-008(g)	

1.1 General Site History

The location of TA-46 is shown in Figs. 1.1-1 and 1.1-2. Construction began in 1954 with research for the Rover Program to develop nuclear reactors for space rockets. Subsequent research projects to develop uranium isotope separation techniques and cesium-plasma diodes, photochemical, laser, and hydrogen fuel cell research were performed at TA-46, as well as efforts in passive solar energy, heat pipes, free-electron lasers, accelerator technology, electronics design, and production of nonradioactive isotopes. Production activities never occurred at TA-46.

Diverse research projects are still performed at the site, and many outfalls have been plugged under best management practices. Unpermitted discharges to the environment are prohibited at LANL in accordance with LANL Administrative Requirements Section 9, which specifies practices required for compliance with federal and state pollution control laws and regulations.

1.2 RFI Overview

The RFI Work Plan for OU 1140 of the Environmental Restoration (ER) Project was submitted to EPA Region 6 in August 1993. A notice of deficiency was received July 15, 1994 (EPA 1944, 11-255). LANL's response was submitted to the Los Alamos Area Office of the Department of Energy (DOE) on August 17, 1994 (Environmental Restoration Project 1994, 11-260). EPA's approval of the work plan with modifications was received at LANL October 14, 1994 (EPA 1994, 11-256) with a response to DOE by LANL providing additional requested information dated November 17, 1994 (Environmental Restoration Project, 1994, 11-261).

The technical approach of the plan used phased sampling to locate releases associated with LANL activities. Contaminants detected during Phase I reconnaissance sampling may be subject to further investigation or remediation in compliance with the Hazardous and Solid Waste Amendments (HSWA) Module VIII of the LANL RCRA Facility Permit (EPA 1990, 0306).

Because little was known of contamination levels at TA-46, the objective of most RFI Phase I sampling plans was to ascertain whether contaminants were present at levels of concern. Conceptual exposure models were developed for two different exposure scenarios (site workers and recreational use) as described in Subsection 4.3 of the RFI work plan for OU 1140. Residential use was not considered feasible as a potential land use. Primary release mechanisms at TA-46 include liquid infiltration, organic volatilization, wind entrainment, and soil erosion (LANL 1993, 1093). RFI sampling plans were designed to support preliminary risk assessments should analyses indicate that contamination is present.

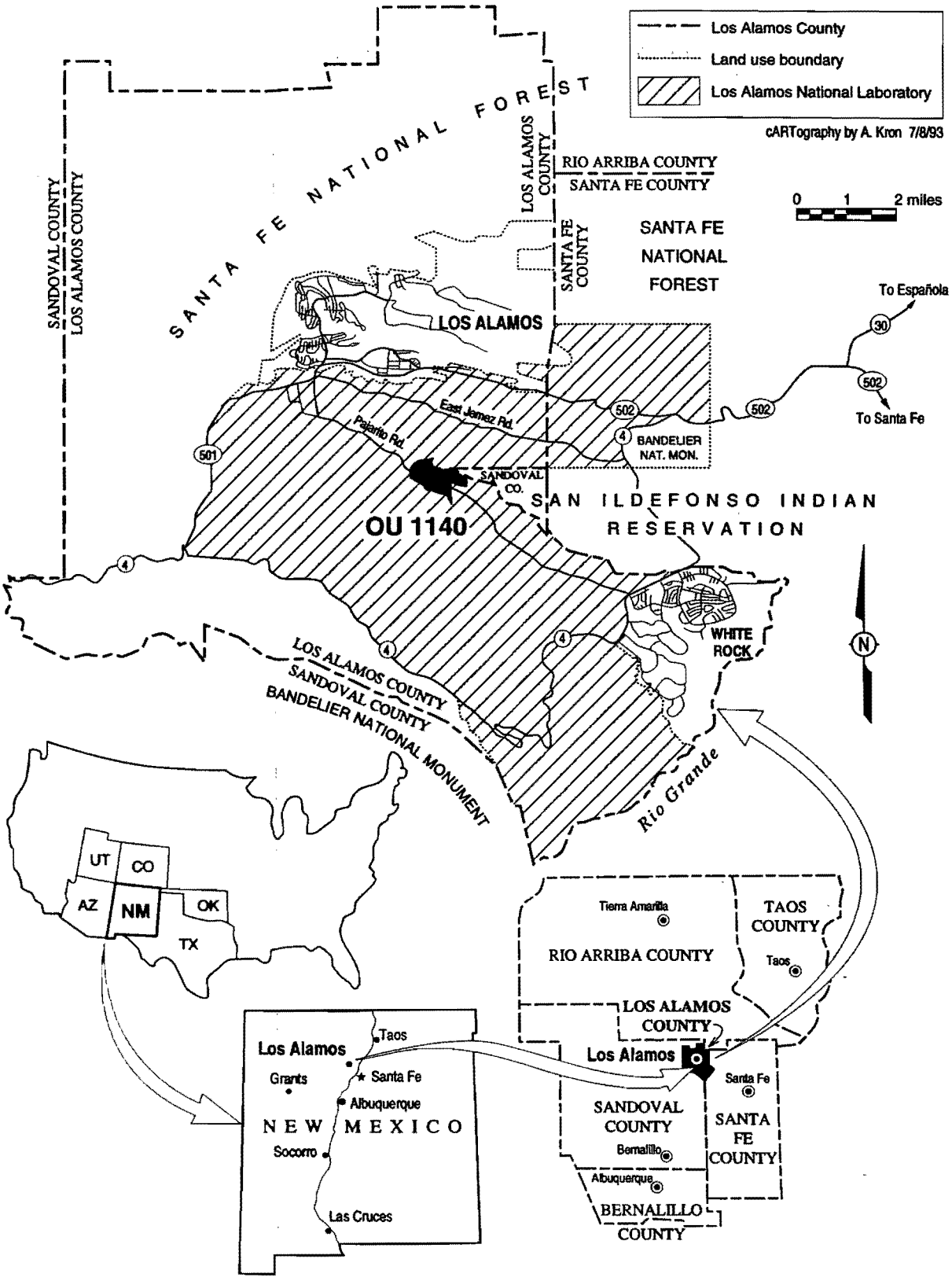


Fig. 1.1-1. Locations of Operable Unit 1140.

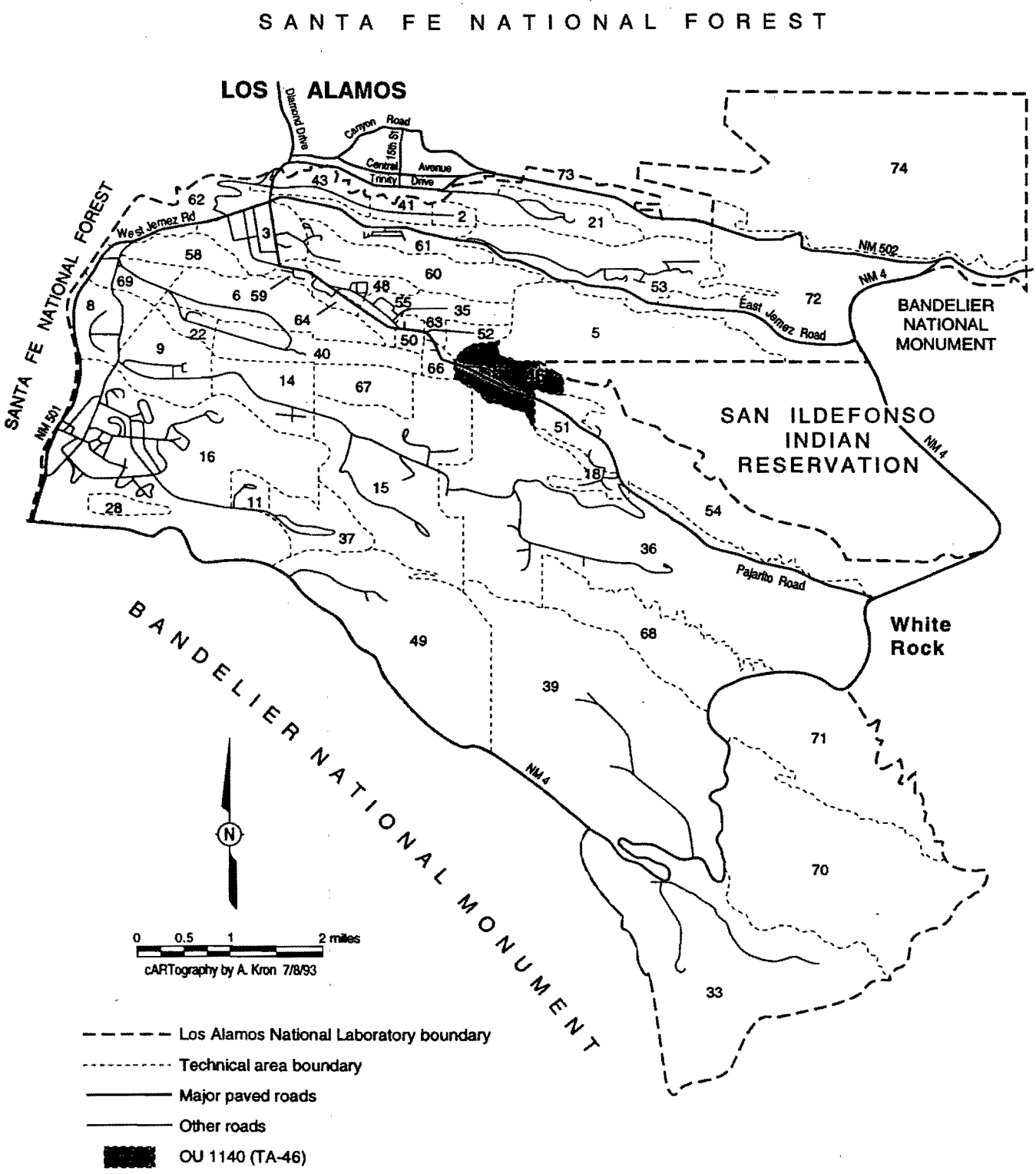


Fig. 1.1-2. Location of Operable Unit 1140 with respect to Laboratory technical areas and surrounding landholdings.

Based on analytical results of sampling activities, options for subsequent actions for each PRS include the following:

- Voluntary corrective action (VCA),
- Expedited cleanup (EC),
- Phase II sampling to provide data for baseline risk assessment and/or define vertical and lateral extent,
- Corrective measures study (CMS), or
- Recommendation of no further action (NFA) and request for removal of the PRS from the LANL HSWA permit.

Of five NFA criteria approved in a document of understanding between DOE and appropriate regulators, criterion 5 is appropriate for all PRSs recommended for NFA in this report : the PRS has been characterized or remediated in accordance with current applicable state or federal regulations, and the available data indicate that contaminants of concern are either not present or are present in concentrations that would pose an acceptable level of risk under the projected future land use (New Mexico Environment Department et al. 1995, 1328).

1.3 Field Activities

For the PRSs in this RFI report, fieldwork was performed from August 18 through October 5, 1994 by ICF-Kaiser Engineers personnel (ICF-Kaiser 1995, 11-257).

1.3.1 Sample Collection Activities

Reconnaissance (biased) sampling was the main sampling strategy for the Phase I campaign. Sample locations were selected where contamination was most likely, as specified in the RFI Work Plan for OU 1140 (LANL 1992, 1093). Prior to sampling, several sample locations were moved and new locations were added based on regulatory guidance or new information. Sampling activities not called for in the RFI work plan were included to provide more information for the following reasons:

- Newly located outfalls,
- Locations requested by New Mexico Environment Department DOE oversight board personnel,
- Locations required by EPA, and
- Expanded boundary of an existing PRS.

Land surveys were conducted in October and November 1993. Radiation surveys were conducted in November 1993 and January 1994, to direct the location of reconnaissance samples. Geophysical surveys used ground penetrating radar to find several drain lines with unlocated outfalls in July 1994. One pipe was found (Section 5.17 of this RFI report). The survey failed to find an alleged pipe north of TA-46-87.

The field sampling campaign at TA-46 was performed from August 18 to October 5, 1994. All surface samples were taken from the surface to a depth of 6 in. within a diameter of approximately 6–8 in. Volatile organic compounds (VOCs) samples were taken from a depth greater than 6 in. but no deeper than 12 in. Soil was collected from each sample location using a dedicated stainless steel spoon and bowl. Shallow hand-auger samples were recovered from depths up to 10 ft using a stainless steel hand-held auger manually driven into the soil. If the soil/tuff interface was encountered, a final sample was taken at the point of encounter. The number of hand-augered samples was limited to the depth of the soil/tuff interface. Hand-augering was attempted at 113 locations but only 24 subsurface samples were collected.

The RFI work plan specified the collection of near-surface soil samples from 0–6 in. beneath asphalt pavements. The asphalt surface was broken up with a jackhammer and cleared away to reveal the subsoil surface. When the sampling was finished, the asphalt was repaired. Five near-surface soil samples were collected.

1.3.2 Quality Assessment Activities

Field quality assessment samples, in the form of rinsate blanks, collocated samples, and performance evaluation (PE) samples, were collected as specified and defined in the site-specific Quality Assurance/Quality Control Plan for TA-46 (ICF-KE 1995, 11-257). Rinsate blank samples were submitted to check for cross-contamination of samples resulting from ineffective decontamination procedures. Collocated samples, designated as field duplicates in the RFI work plan, were established 1 ft north of their respective grid-based sample locations.

The PE samples were collected to check for contamination that may have been introduced from ambient conditions or improper handling procedures and to evaluate matrix effects on analytical laboratory recovery of inorganics and radioactive constituents. Because the majority of the samples collected at TA-46 were soil, the PE blanks were of fine-grained and homogenous soil matrix purchased from off-site sources. Inorganic Ventures, Inc. provided soil spiked with known concentrations of inorganic constituents. Idaho National Engineering Laboratory provided soil spiked with known amounts of radioactive and inorganic constituents. The PE soil was supplied in bulk and placed in sample containers during sampling activities.

1.3.3 Deviations from the RFI Work Plan

Additional samples beyond those specified in the RFI work plan were collected from the following PRSs:

46-003(h)	46-004(e2)	46-004(f2)
46-004 (m)	46-006(b)	46-006(d)
46-007	46-008(a)	46-008(g)

The TA-46 field campaign was completed in October 1994. EPA modifications to the work plan were received in November 1994. Consequently, sampling at 18–24-in. depths, as specified by EPA, was not performed at all outfalls. Additional subsurface samples will be collected during the TA-46 1996 sampling campaign described in Section 5.21.11 of this RFI report.

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 (LANL 1995, 1164). A discussion of the environmental setting of TA-46, including climate, geology, hydrology, and a conceptual hydrogeologic model, is presented in Section 3.0 of the RFI Work Plan for OU 1140 (LANL 1993, 1093).

2.1 Climate

Los Alamos has a semiarid, temperate, mountain climate, with average normal temperatures ranging from 29°F in January to 68°F in July. Mean annual precipitation is 18 in. near TA-46, 40% of which falls in July and August during summer thunderstorms. Most of the rest falls as winter snowfall, which averages 51 in. Surface winds are light, averaging 7 mph, and are strongest from March through June and weakest in December and January (Bowen 1990, 0033). The predominant daytime wind direction is from the south, while southwesterly and westerly winds predominate at night.

2.2 Geology

2.2.1 Geologic Setting

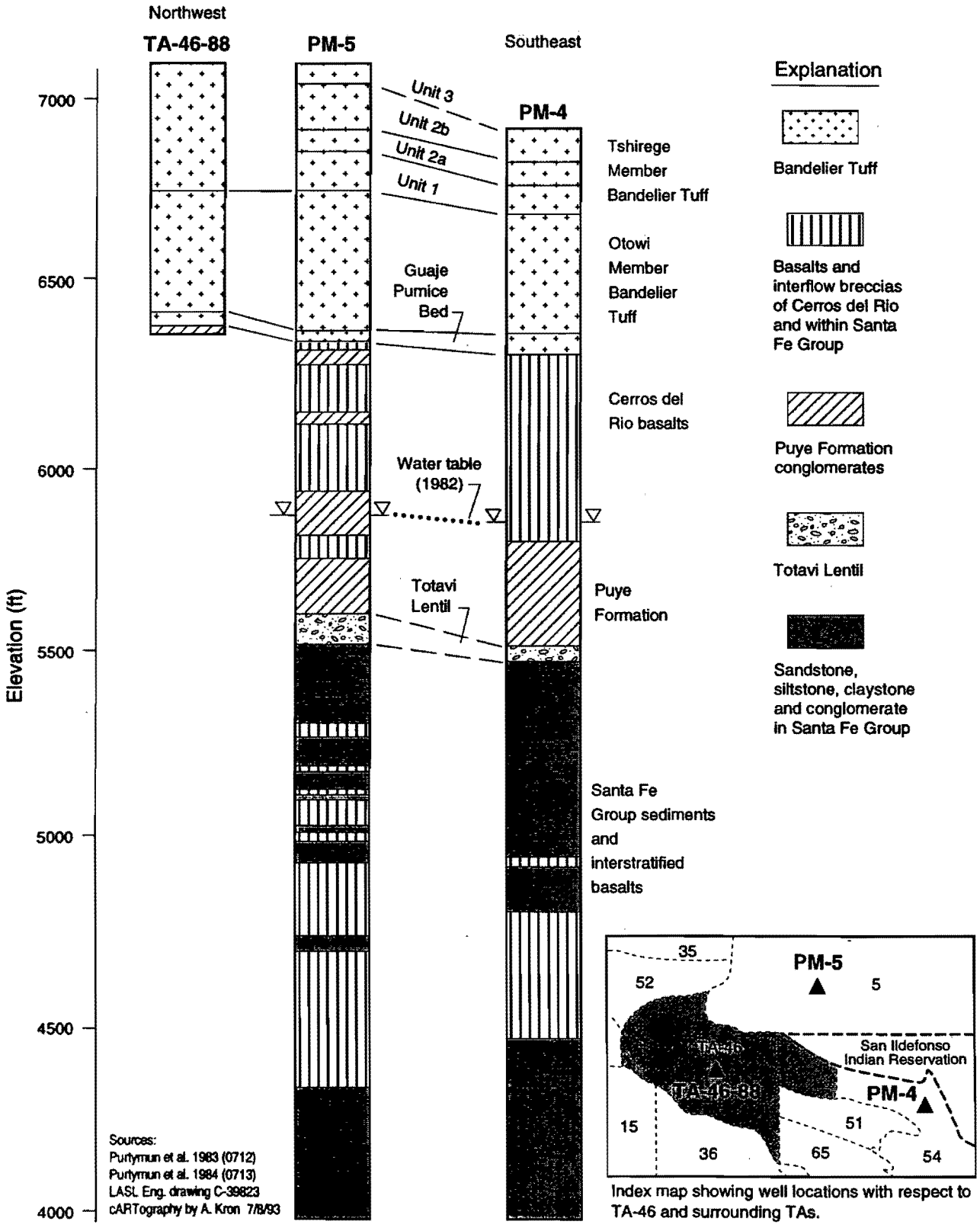
A detailed discussion of the geology of the entire Los Alamos area can be found in Subsection 2.5.1 of the IWP (LANL 1995, 1164). Little site-specific geologic research has been conducted at TA-46. Site-specific information, as available, indicates that surface bedrock throughout the entire vicinity of TA-46 is the Tshirege Member of the Bandelier Tuff. The mesa top at TA-46 lies at an elevation of approximately 7 100 ft and consists of Unit 3, a resistant, brown, poorly welded, cliff-forming tuff (Vaniman and Wohletz 1990, 0541). Two deeper units of Unit 2 of the Tshirege Member crop out in Cañada del Buey north of TA-46.

Subsurface geology in the vicinity of TA-46 derives from lithologic logs for two 3 000-ft-deep water supply wells near TA-46 (PM-4 and PM-5) and a 750-ft-deep test hole drilled beneath TA-46-88 (Fig. 2.2-1). The logs show that the base of the Tshirege Member is at an elevation of between 6 600 and 6 750 ft. The underlying Otowi Member of the Bandelier Tuff is between 320- and 375-ft thick, and the Guaje Pumice Bed is approximately 30 ft thick. The base of the Bandelier Tuff is therefore at an elevation of approximately 6 300 to 6 400 ft, 700 to 800 ft below the mesa top at TA-46, and at least 400 to 500 ft below the adjacent canyon floors.

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). The soil on the mesa at TA-46 is Hackroy sandy loam, a shallow, well-drained soil formed in weathered tuff. This soil is typically approximately 1-ft thick, with a 4-in. brown sandy loam surface layer overlying an 8-in. reddish-brown clay-rich subsoil. Much of the mesa top has been affected by excavation, paving, scraping, building, and filling. The slopes and walls of Cañada de Buey consist of rock outcrops with only sparse and shallow poorly-developed colluvial soils (Nyhan et al. 1978, 0161). Soil development is more widespread on north-facing than on south-facing slopes.

Test holes drilled in Cañada del Buey east of TA-46 revealed alluvial deposits up to 50-ft thick consisting of silt, sand, and gravel (Devaurs and Purtymun 1985, 0049; Gallaher 1993, 11-224), while no alluvium is present immediately north of TA-46.



Index map showing well locations with respect to TA-46 and surrounding TAs.

Fig 2.2-1. Lithologic logs for borings near TA-46.

2.3 Hydrology

The hydrology of the Pajarito Plateau is summarized in Subsection 2.5.2 of the IWP (LANL 1995, 1164). Runoff and infiltration of surface water are significant aspects of surface water hydrology at TA-46.

2.3.1 Surface Water

Surface runoff occurs on the mesa tops and in small drainages off the mesa for brief periods during intense summer thunderstorms and during spring snowmelt periods. Although the long duration of snowmelt runoff results in the movement of significant masses of suspended and bed sediments, the mass transported seems to be less than that carried by summer runoff events (Purtymun et al. 1990, 0215).

Stream flow is intermittent in Cañada del Buey north of TA-46, occurring primarily during snowmelt and the summer thunderstorm season (Purtymun and Kennedy 1971, 0200; Devaurs and Purtymun 1985, 0049). A filtered surface water sample was collected in 1990 from Cañada del Buey north of TA-46 and analyzed for major chemical constituents, trace metals, radionuclides, and a full suite of volatile and semivolatile organic compounds. Analytical results revealed no evidence of contamination from LANL operations (EPG 1992, 0740).

2.3.2 Groundwater

The main aquifer beneath TA-46 is found in conglomerates of the Puye Formation and the Cerros del Rio basalts. The water table elevation beneath TA-46 is approximately 5 900 ft, 1 200 ft below the mesa top (Purtymun and Stoker 1988, 0205). Recent chemical and isotope studies support evidence of recharge areas outside the Valles Caldera (Goff 1991, 11-222; Stephens et al. 1993, 1049). Recharge to the main aquifer from alluvial aquifers in canyons in the vicinity of LANL is a possibility. In contrast, because of the great thickness of unsaturated tuff underlying the mesas, recharge to the main aquifer from infiltration from the mesa tops seems unlikely.

2.4 Biological Surveys

Biological field surveys were conducted at TA-46 for compliance with the Federal Endangered Species Act of 1973; the New Mexico Wildlife Conservation Act; the New Mexico Endangered Species Act; Executive Order 11990, Protection of Wetlands, Executive Order 11988, Floodplain Management; 10 CFR 1022; Department of Energy (DOE) Compliance With Floodplain/ Wetlands Environmental Review Requirements (DOE 1979, 0633) and DOE Order 5400.1,

General Environmental Protection Program (DOE 1988, 0075). The biological summary is included as Appendix B in the RFI Work Plan for OU 1140 (LANL 1993, 1093). Habitat for four threatened or endangered species was identified at TA-46. No on-site surveys were performed but surveys of nearby LANL sites did not indicate the presence of species of concern.

2.5 Cultural Surveys

A cultural resource survey was conducted at TA-46 as required by the National Historic Preservation Act (National Park Service 1983, 0632). Nineteen archaeological sites were identified, of which fourteen are eligible for the National Register of Historic Places. The survey established that none of these sites would be affected by ER sampling activities and a *Determination of No Effect* report was filed with the New Mexico State Historic Preservation officer. The cultural resources summary is included as Appendix A in the RFI Work Plan for OU 1140 (LANL 1993, 1093).

3.0 APPROACH TO DATA ASSESSMENT AND ANALYSIS

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 approaches used in this RFI report included the following:

- sampling and analysis design,
- field investigation and collection of field and quality assurance (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,
- 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 Analysis

Samples were collected in accordance with sample design specified in the RFI Work Plan for OU 1140 (LANL 1993, 1093). All samples requiring chemical and radiological analyses and chain-of-custody documentation were submitted to the sample management office (SMO) for analyses. Analytical suites used for samples at these PRSs include VOCs, semivolatile organic compounds (SVOCs), inorganics, radionuclides, pesticides, and polychlorinated biphenyls (PCBs).

3.1.1 Analytical Methods

All samples were analyzed by contract analytical laboratories using methods specified in ER SMO analytical subcontracts. The allowed methods are EPA SW-846 (EPA 1992, 1207) and contract laboratory program (CLP) methods or equivalent for inorganics including mercury, VOCs, SVOCs, pesticides, and PCBs. The subcontracts specify LANL-approved methods for radiochemical analyses. 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, a lower, contract-required quantitation limit is specified. These values, estimated detection limits for inorganics, and estimated quantitation limits (EQLs) for organics and radionuclides are listed in Appendix III of the ER Project QAPP. Analytes for each suite are listed in Appendix A.

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. For analytical data used for decisions discussed in this RFI report, routine data validation under the ER protocol was performed as described in Technical Approach to the RFI Report (Knudsen et al. 1996, 1299).

PRS-specific quality assurance/quality control details are presented in Chapter 4 of this RFI report. Qualifiers resulting from baseline validation are shown in analytical results tables included in Chapter 5 of this RFI report. Summaries of data quality evaluations for analytical data packages relevant to this RFI report are given in Appendix B.

3.2 Background Comparisons

The purpose of background comparisons is to determine if chemicals that have natural or anthropogenic background distributions should be retained as COPCs or eliminated from further consideration. Background data for decision-making concerning PRSs in this RFI report are from two sources:

- Soil samples collected throughout Los Alamos County for which chemical analyses were performed for certain inorganic (metal) chemicals and naturally occurring radioactive chemicals (Longmire et al. 1995, 1142; 1266).
- Background concentrations of radioactive chemicals associated with global fallout from atmospheric nuclear testing (e.g., plutonium, cesium, strontium, and tritium) reported in LANL Environmental Surveillance reports (Purtymun et al. 1987, 0211; ESG 1988, 0408; ESG 1989, 0308; EPG 1990, 0497; EPG 1992, 0740).

Comparisons between site data and background data are initially performed by comparing each observed concentration datum with an upper tolerance limit (UTL) estimated from background data. Details of statistical methods used to generate UTLs from the background data sets and suggestions for statistical methods for comparing site and background concentration distributions are presented in the guidance document, Application of LANL Background Data to ER Project Decision-Making, Part I: Inorganics (Ryti et al. 1996, 1298). The UTLs used in this report were derived using the upper 95th percentile and 95% upper confidence limit as specified by EPA. Because of the industrial nature of the site, no appropriate soil horizon could be identified. Therefore, the composite UTL data set was used.

3.3 Detected Organic Constituents

Background data are not available for organic chemicals. Organic chemicals reported as detected to the ER facility for information management, analysis, and display (FIMAD) are carried forward to the screening assessment process in this RFI report. Chemicals reported in FIMAD as undetected are removed from further consideration. Organic chemicals derived from permanent sources, such as asphalt paving, roofing tar, etc., are not considered releases from a PRS and are not carried forward in the screening process. No remediation of such chemicals is recommended at TA-46.

3.4 Human Health Assessment

3.4.1 Risk Due to Background

Background risks can result from inorganics that are naturally occurring at 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 3.4.1-1.

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 3.4.1-1

RISK DUE TO BACKGROUND CONCENTRATIONS OF SOIL INORGANICS ASSUMING A RESIDENTIAL SCENARIO[a]

SOIL INORGANIC	SOIL CONCENTRATION (mg/kg)		HAZARD QUOTIENT		LIFETIME CANCER RISK	
	Median	UTL	Median	UTL	Median	UTL
Aluminum	10 000	38 700	0.13	0.5	nc[b]	nc
Antimony	0.6	1.0	0.019	0.032	nc	nc
Arsenic	4.0	7.82	0.18	0.36	1.2E-5	2.4E-5
Barium	130	315	0.025	0.059	nc	nc
Beryllium	0.895	1.95	0.0027	0.0059	6.4E-6	1.4E-5
Cadmium[c]	0.20	2.7	0.0053	0.071	1.4E-10	1.9E-9
Chromium[d]	7.2	16.1	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	12	23.3	0.03	0.058	nc	nc
Manganese	320	714	0.84	1.9	nc	nc
Mercury	0.05	0.1	0.0022	0.0043	nc	nc
Nickel	7.0	15.2	0.0047	0.01	nc	nc
Selenium	0.3	1.7	0.00078	0.0045	nc	nc
Thallium	0.2	1.0	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

[a] Risk estimates are based on reference doses, slope factors, and EPA Region IX default exposure assumptions effective in April 1996.
[b] nc = noncarcinogen.
[c] Cancer risks for cadmium are based solely on inhalation of resuspended dust.
[d] Naturally occurring chromium is assumed to exist in a trivalent state.

3.4.2 Screening Assessment

The purpose of this decision step is to determine if contaminants should be retained as chemicals of potential concern (COPCs) or eliminated from further consideration based on comparisons with screening action levels (SALs). This is the last step in the screening assessment process for human health concerns. If COPCs remain after this step, then further action or a risk assessment may be proposed. If no COPCs remain after this step, then no further action (NFA) may be proposed based on the absence of human health concerns. The screening assessment considered the following questions for the PRSs in this RFI report:

- Are reported concentrations or radiological activities due to analytical laboratory/field bias or contamination?
- Are site data greater than background UTLs and fail an multiple chemical evaluation (MCE)?
- Is the maximum site concentration greater than the SAL?
- If a SAL does not exist for a detected chemical, should that chemical be carried forward as a COPC?

SALs are calculated using chemical-specific toxicity information and conservative, default exposure assumptions. Soil and water media have separate SALs for each contaminant. The decision to identify an contaminant 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. A complete description of the methods used to generate SALs is provided in Screening Assessment Methodology (McCann et al. 1996, 1300).

If more than one chemical or radionuclide was present above UTL at the site, an MCE was performed in which the reported concentration for each chemical was divided by its respective SAL. If the sum of the normalized values was less than one, then the chemicals are removed from further consideration. If the total normalized value is greater than one, then chemicals having an individual normalized value greater than or equal to 0.1 are retained as COPCs pending further evaluation. For further information on the calculation of MCEs see Screening

Assessment Methodology (McCann et al. 1996, 1300). MCEs were performed for 25 PRSs discussed in this RFI report.

3.4.2 Risk Assessment

The human health risk assessments follow the policy document Risk-Based Corrective Action Process (Dorries 1996, 1297). The human health risk assessment process consists of the following four steps:

- identification of COPCs,
- exposure assessment,
- toxicity assessment, and
- risk characterization.

No human health risk assessments were performed for the PRSs in this RFI report.

3.5 Ecological Assessment

The PRSs in this RFI report are evaluated according to the Ecological Risk Assessment Approach for Los Alamos National Laboratory (Ferenbaugh et al. 1996, 1303). Each PRS is first screened for background concentrations and evaluated for presence of suitable habitat, potential for off-site transport of contaminants, and receptor access to the site or to areas impacted by off-site transport. No further action for ecological concern is recommended when background concentrations are not exceeded, suitable habitat does not exist, and/or if there is no receptor access to the site or to areas impacted by off-site transport.

If the preliminary ecological screening for the PRS(s) indicates a potential for ecological concern, the PRS(s) will be evaluated as part of the new Ecological Exposure Unit (Ecozone) approach that is being developed by LANL in conjunction with EPA and the NMED.

4.0 RESULTS OF QUALITY ASSURANCE/QUALITY CONTROL ACTIVITIES

This section reviews the impact on data usability of quality control (QC) results reported in Appendix B of this RFI report, as well as QA results associated with collocated sample pairs, field splits, rinsate samples, and PE samples submitted by the field unit.

4.1 Inorganic Analysis

A total of 183 field samples, plus 7 PE samples (in addition to QC blind samples inserted by the SMO) and 3 equipment rinsate samples, were analyzed for the standard suite of inorganic chemicals, including mercury. The alkali metals cesium and lithium were reported for 35 of the field samples. Qualifications placed on these results by data validation are summarized in Appendix B, Table B-1 of this report.

Data validation indicated that mercury holding times were frequently exceeded and spike recoveries were less than 60% almost one-quarter of the time. Approximately 13% of mercury results were rejected by routine data validation, and more than half were qualified in some way. However, 25 out of 26 mercury blinds were reported under control, and the 26th, associated with request 19507, for which mercury holding times were exceeded and mercury results rejected, was out of control on the high side. Mercury recovery was in control in the PE samples, although mercury holding times were exceeded for three of the seven analytical request packages containing inorganic PE samples. As noted in the validation reports, holding times are only established for water samples. Soil holding times have not been established. Professional judgement is advised in use of data. Consequently, because soil holding times have not been established and mercury results from QA/QC samples provided by the ER project and the OU 1140 field unit were in control, rejected and qualified mercury data are considered representative of mercury concentrations at TA-46. Validation flags are included in tables for the information of the reader.

Mercury is also one of the most problematic inorganic chemicals in field duplicates. The difficulties of measuring mercury in soil samples, documented in Bloom (1992, 0979), are borne out by two field split pairs, samples AAA9139/AAA9440 from PRS 46-004(f2) and AAA9196/AAA9460 from PRS 46-004(c2). In particular, the measured value for sample AAA9139 exceeds that in sample AAA9440 by a factor of more than 10. Differences of up to a factor of 3 were also observed in several collocated pairs of samples.

Problems with lead occurred in field duplicates and laboratory replicates. Lead is reported well above background in samples AAA9323, AAA9478, and AAA9314, but these results are not reproduced by replicate analysis of sample AAA9323, the field split sample AAA9332 of AAA9478, or a collocated sample AAA9317 for AAA9314. The particulate nature of lead contamination in soils has been noted in other reports prepared by this field unit.

Inorganic PE samples accompanied nine requests. Of particular interest are PE sample data in two requests singled out during data validation.

- PE sample AAA9438 was included in request 19448, for which the cadmium results were rejected (R-qualified). Antimony, lead, and mercury results were qualified as estimated rather than quantitated (J-qualified) on the basis of matrix spike results. All of these elements were well within control limits for the PE sample, although antimony was low in both this sample and in the matrix spike. However, copper and zinc were reported a factor of three above the upper control limit for this PE material in this sample.

  This request included samples from the canyon bench below the PRS 46-004(q) and 46-004(a2) outfalls. All copper and zinc concentrations in these field samples are within the background range or only slightly above, suggesting that the problems with the PE sample did not extend to the routine samples.

- PE sample AAA9454 was included in request 20300, for which chromium and nickel results were rejected based on a blind QC. Chromium was low, but within control limits for the PE sample, and nickel was slightly high, but again within control limits.

Overall, PE results were excellent in all seven samples, except for the problems noted above with sample AAA9438 in request 19448.

Lead at 4.7 mg/L was reported in rinsate sample AAA9272 submitted on August 24, 1994. Mercury was observed in two rinsate samples from decontaminated buckets of the hand auger, at concentrations of 0.36 mg/L in sample AAA9272 and 1.5 mg/L in sample AAA9457 submitted on October 5, 1994. Field auger buckets were not used more than once per day, and were decontaminated between uses. The rinsate results suggest that low-level field cross-contamination of hand-auger samples may have occurred. Spoons for collecting surface samples were not reused, so surface samples should not be affected.

In summary, the inorganic field data are judged to be usable for the purposes of this report. Systemic problems with mercury (missed holding times, nonuniform segregation in the pore spaces of porous media like soils and sediments, and possible field cross-contamination) suggest that mercury results may be less reliable than data for other inorganic chemicals. However, there is little doubt that mercury has been released at several TA-46 PRSs, as described in Chapter 5 of this report. Because mercury is one of the primary drivers for proposed Phase II sampling (see Section 5.21.11), future sampling will provide opportunities to confirm Phase I results.

4.2 Organic Analysis

Organic analyses for 1994 TA-46 data are summarized in Table 4.2-1. Qualifications placed on these results are summarized in Appendix B, Tables B-2, B-3, and B-4 of this report.

TABLE 4.2-1

NUMBERS OF SAMPLES SUBMITTED FOR ORGANIC ANALYSIS

ANALYTICAL SUITE	FIELD	RINSATE
Pesticides	123	1
Polychlorinated biphenyls	96	1
Semivolatile organics	168	2
Volatile organics	104	0

Approximately 13% of the organic data were J-qualified or qualified as estimated/undetected (UJ-qualified); less than 1% were rejected by data validation. J-qualification is most commonly due to low recovery of surrogates or of spiked compounds in QC blinds, suggesting that reported results may frequently be biased low.

Several polycyclic aromatic hydrocarbons (PAHs), pesticides, Aroclor 1254™, bis(2-ethylhexyl)phthalate, and methylene chloride were reported above detection level in at least five percent of the samples for which they were measured. J-qualifiers were assigned more frequently to PAHs than to the other analytes mentioned; approximately one-quarter of all data for PAHs were J-qualified. However, very few of the data for these analytes were rejected by data validation.

PAHs and pesticides, some above SALs, in sample AAA9250 from PRS 46-004(c2) were not reproduced in its field split, sample AAA9466. However, the field split pair with highest levels of PAHs, samples AAA9094/AAA9439 from PRS 46-004(x), produced reasonably consistent results. Sample AAA9091, collocated with this pair, showed lower levels, though still well above detection levels. Some very high PAHs in sample AAA9181 were not replicated 1.5 ft

away in sample AAA9184 at the toe of slope in the drainage below PRS 46-004(g). Overall, however, paired samples indicate that organic results are reasonably replicable in field splits and collocated samples.

No organics were detected in the rinsate samples.

In summary, the organic field data are judged to be usable for the purposes of this report.

4.3 Radiochemistry Analysis

Radiochemistry analyses for 1994 TA-46 data are summarized in Table 4.3-1. Qualifications placed on these results are summarized in Appendix B, Table B-5 of this report.

TABLE 4.3-1

NUMBERS OF SAMPLES SUBMITTED FOR RADIOCHEMICAL ANALYSIS

ANALYSIS	FIELD	PE[a]	RINSATE
Americium-241	24	1	1
Cesium-137	167	2	3
Isotopic plutonium	54	0	0
Isotopic thorium	127	2	3
Isotopic uranium	170	2	3

[a] PE = Performance evaluation samples.

Qualifiers are associated with many of the uranium and thorium isotopic data, based on blind QC samples, laboratory control samples, and sometimes on tracer recovery. In general, these QC results indicate a low bias in the associated data. Duplicated analyses and pairs of field samples generally produced comparable results for these isotopes, with relative standard deviations below 40% in most cases. Variability is greater at the lowest levels.

Two PE samples were analyzed for isotopic uranium and thorium. No isotopic thorium reference values were provided with the PE material, while uranium activities are comparable to those found in LANL background samples. All uranium results for sample AAA9450 in request 19997 were within control limits. Uranium-234 and uranium-238 values for sample AAA9436 in request 19598, analyzed in duplicate, were slightly low. Uranium-235 results were high, at 2.5 to 5 times the upper control limit. Several other problems with this request were noted by data validators (see Table B-5 in Appendix B).

Approximately half of the isotopic plutonium results are qualified, again on the basis of blind sample results and occasionally tracer recovery, and more often low than high. Paired results for plutonium isotopes also tend to be more erratic than for the uranium and thorium isotopes, in part because the reported levels are frequently at the low end of what the analytical procedure is capable of detecting. The only plutonium-239 result that was above the regional background maximum, 0.41 pCi/g for sample AAA9336 [PRS 46-004(y)], was not replicated by a duplicate analysis of the same sample; the duplicated result was within the background range at 0.0036 pCi/g. This duplicate result matched the data for collocated sample AAA9339. Based on this information, the singular plutonium-239 observation of 0.41 pCi/g is considered spurious.

Few of the cesium-137 or americium-241 data are qualified. PE sample results for these isotopes are within the control limits.

All three uranium isotopes were reported above 0.1 pCi/L in the rinsate sample AAA9457, which was submitted on October 5, 1994, and which was also contaminated with mercury as discussed in Section 4.1 of this RFI report. Uranium-234 and uranium-235 were also above 0.1 pCi/L in rinsate sample AAA9272, submitted on August 24 and also contaminated with mercury and lead (Section 4.1). Other results were below detection levels for all isotopes.

In summary, radiochemistry data are considered usable for the purposes of this report, with the exception of the anomalous plutonium-239 observation mentioned above. Method detection levels are not used in reporting radiochemistry results, but in practice, low reported levels (below 0.005 or even 0.01 pCi/g) should be considered estimated even if they are not J-qualified. This recommendation is made both because these levels are below the level at which the methods are reliable and because, in the case of uranium, there is a possibility of low-level field cross-contamination suggested by the rinsate results.

5.0 SPECIFIC RESULTS, CONCLUSIONS, AND RECOMMENDATIONS

Of the 29 PRSs discussed in this RFI report, 23 are recommended for NFA. One PRS with limited contamination is recommended for VCA (Table 5.0-1). The remaining PRSs require further sampling. Locations of PRSs are shown in Figs. 5.0-1 and 5.0-2.

TABLE 5.0-1

SUMMARY OF PRSs IN THIS RFI REPORT

SECTION	PRS[a] ID	DESCRIPTION (OUTFALL ID)	COPCs[b]	RECOMMENDATION
5.1	46-003(h)	TA-46-77 drainpipe	Cadmium, lead	VCA[c]
5.2	46-004(b)	Alkali metal cleaning tank	None detected	NFA[d]
5.3	46-004(g)	TA-46-1 industrial drain (N)	Inorganics, uranium	Phase II sampling
5.4	46-004(h)	TA-46-16 industrial drain (A)	None detected	NFA
5.5	46-004(m)	TA-46-30 cooling water (CC)	None detected	NFA
5.6	46-004(q)	Source unknown (B)	Mercury, uranium	Phase II sampling
5.7	46-004(s)	TA-46-1 south high bay (X)	Sampling incomplete	Phase II sampling
5.8	46-004(u)	TA-46-87 overflow drain (F)	None detected	NFA
5.9	46-004(v)	TA-46-87 industrial drain (G)	None detected	NFA
5.10	46-004(x)	TA-46-31 floor and roof drains (J)	None detected	NFA
5.11	46-004(y)	TA-46-31 cooling tower outfall (K)	None detected	NFA
5.12	46-004(z)	TA-46-31 floor drains (L)	None detected	NFA
5.13	46-004(a2)	TA-46-31 industrial drain (MM)	inorganics	Phase II sampling
5.14	46-004(b2)	TA-46-1 north high bay drain (U)	None detected	NFA
5.15	46-004(c2)	TA-46-1 industrial drain (S)	None detected	NFA
5.16	46-004(e2)	TA-46-42 industrial drain (AP)	None detected	NFA
5.17	46-004(f2)	TA-46-31 floor drain (AQ)	None detected	NFA
5.18	46-006(a)	Surface disposal TA-46-1 to 42	None detected	NFA
5.19	46-006(b)	Surface disposal N of TA-46-41	None detected	NFA
5.20	46-006(c)	TA-46-158 drum storage	None detected	NFA
5.21	46-006(d)	TA-46-31 surface disposal	Lead, mercury, PCBs	Phase II sampling
5.22	46-006(f)	TA-46-1 storage shed, east end	None detected	NFA
5.23	46-006(g)	TA-46-31 west storage shed	None detected	NFA
5.24	46-007	TA-46-1 cesium ditch	None detected	NFA
5.25	46-008(b)	Storage shed east of TA-46-1	None detected	NFA
5.26	46-010(d)	TA-46 41 south storage area	None detected	NFA
5.27	Aggregate 1	Stack emissions aggregate	None detected	NFA
		46-004(g), TA-46-1		
		46-004(h), TA-46-16		
		46-004(d2), TA-46-24		
		C-46-002, TA-46-31		
		C-46-003, TA-46-30		

[a] PRS = Potential release site.
[b] COPCs = Chemicals of potential concern.
[c] VCA = Voluntary corrective action.
[d] NFA = No further action.

EPA specified that eight additional PRSs be included in this RFI report for TA-46. Because of reduced funding and refocused priorities in the ER Project, sampling was not completed for these PRSs during the 1994 sampling campaign. Sampling is scheduled for the TA-46 autumn 1996 field campaign. The eight PRSs are listed in Table 5.0-2.

TABLE 5.0-2

TA-46 PRSs SPECIFIED BY EPA, BUT NOT INCLUDED IN THIS RFI REPORT

PRS ID	DESCRIPTION
46-004(f)	Industrial drain from TA-46-24
46-004(r)	Industrial drain from TA-46-24
46-004(w)	Sink drain from TA-46-59
46-008(a)	Drum storage at TA-46-88
46-008(d)	Drum storage at TA-46-24
46-008(e)	Drum storage at TA-46-187
46-008(f)	Drum storage at TA-46-31
46-008(g)	Drum storage at TA-46-76

5.1 PRS 46-003(h)

PRS 46-003(h) is discussed in RFI Work Plan for OU 1140, Subsection 5.3.1.1 (LANL 1993, 1093). The PRS is soil beneath a 1-in.-diameter drainpipe that once protruded approximately 2 ft from the east wall of TA-46-77 (Fig. 5.0-1). The pipe drained a sink in the building. Eight inorganics were detected above LANL UTLs in soil under the pipe. Cadmium and lead concentrations were above SALs.

PRS 46-003(h) is scheduled for a VCA cleanup in fiscal year 1997. A report will be issued prior to September 30, 1997.

5.2 PRS 46-004(b)

PRS 46-004(b) was an alkali-metal cleaning tank, TA-46-81, in use in the late 1950s and early 1960s and destroyed in 1973. No sampling plan for this PRS appears in the TA-46 RFI work plan. The work plan recommendation for NFA was denied in an EPA notice of deficiency (EPA 1994, 11-255). In Phase I sampling, two samples collected below former locations of the cleaning tank were analyzed for cesium and lithium; no elevated concentrations were found. The PRS is recommended for NFA.

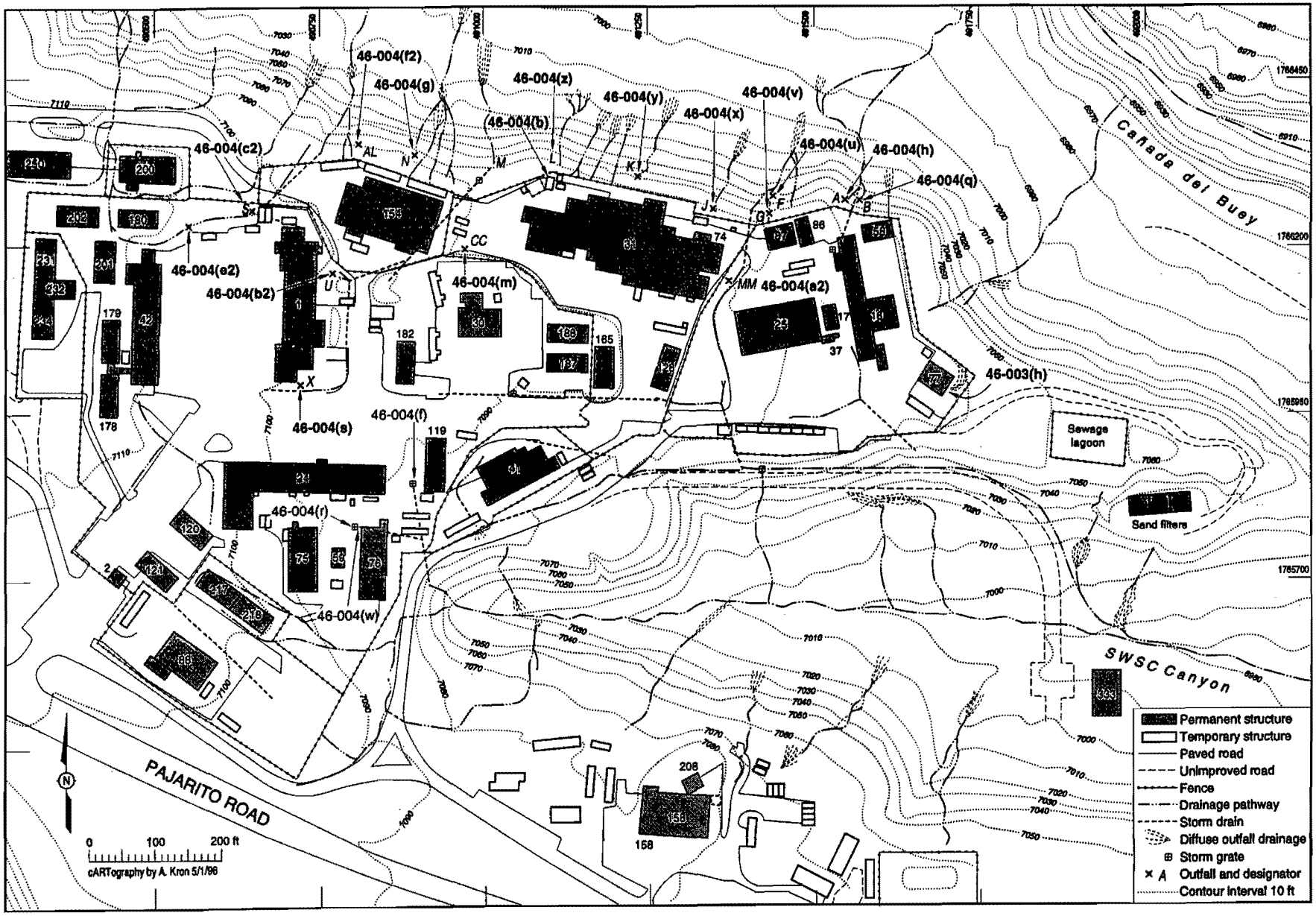


Fig. 5.0-1. Locations of outfall PRSs in this RFI report.

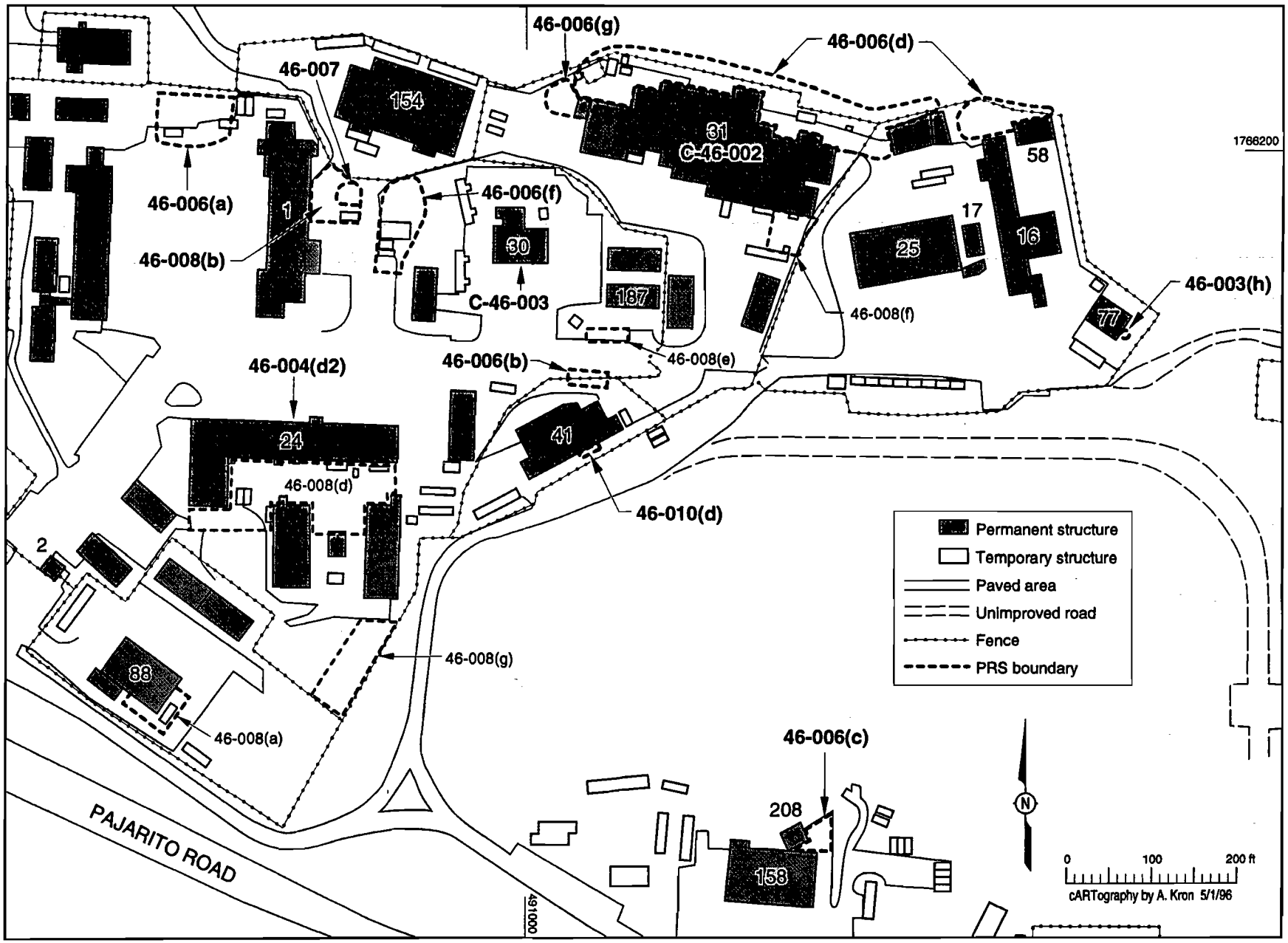


Fig. 5.0-2. Locations of surface release PRSs in this RFI report.

5.2.1 History

PRS 46-004(b) is discussed in the RFI Work Plan for OU 1140, Subsection 6.1.2.2, (LANL 1993, 1093). Naturally occurring cesium and lithium were used in several experiments at TA-46, including cesium plasma diode experiments discussed in Section 5.24 of this RFI report. The metallic form of these elements is corrosive and reactive on contact with water. Hydrogen produced in dissolution may ignite from the heat of reaction. For these reasons, laboratory equipment from the plasma diode experiments was doused with butanol and kerosene to dissolve bits of metal prior to disposal or reuse. Dousing was performed outdoors in the cleaning tank to avoid buildup of explosive hydrogen gas and to keep personnel at a distance from the reaction (Michelotti 1992, 11-177).

5.2.2 Description

The unlined concrete tank occupied two sites. It first sat on asphalt paving within 20 ft of the northwest corner of TA-46-31, then was moved approximately 50 ft north to a 12 x 20 ft concrete pad (Fig. 5.2.2-1). Engineering drawing ENG-C 38763 shows the second location and indicates that the tank was approximately 4 x 8 ft in area; height was not specified. The tank had no outlet. Engineering drawing ENG-R 5124, Rev. 18, indicated that the tank was removed in 1973. The site of this tank is included within the boundaries of PRS 46-006(d). The area around the concrete pad is paved.

5.2.3 Previous Investigations

No previous investigations were conducted at this PRS.

5.2.4 Field Investigation

One soil sample was taken near outfall L below the concrete pad. A second soil sample was taken in the outfall L drainage at the toe of the slope (Fig. 5.2.2-1). Cesium and lithium analyses were performed for PRS 46-004(b) (Table 5.2.4-1). The two locations are included in PRS 46-006(d), discussed in Section 5.21.4 of this RFI report, for which extensive sampling and analyses were performed. Routine inorganic, SVOC, and VOC analytical suites for outfall L, PRS 46-004(z), are discussed in Section 5.12.4 of this RFI report.

TABLE 5.2.4-1

SUMMARY OF SAMPLES TAKEN

SAMPLE ID	LOCATION ID	DEPTH (ft)	MATRIX	CESIUM	LITHIUM
AAA9527	46-1039	0.25	Soil	21843[a]	19507
AAA9465	46-1130	0.5	Soil	21843	19507

[a] ER analytical request number.

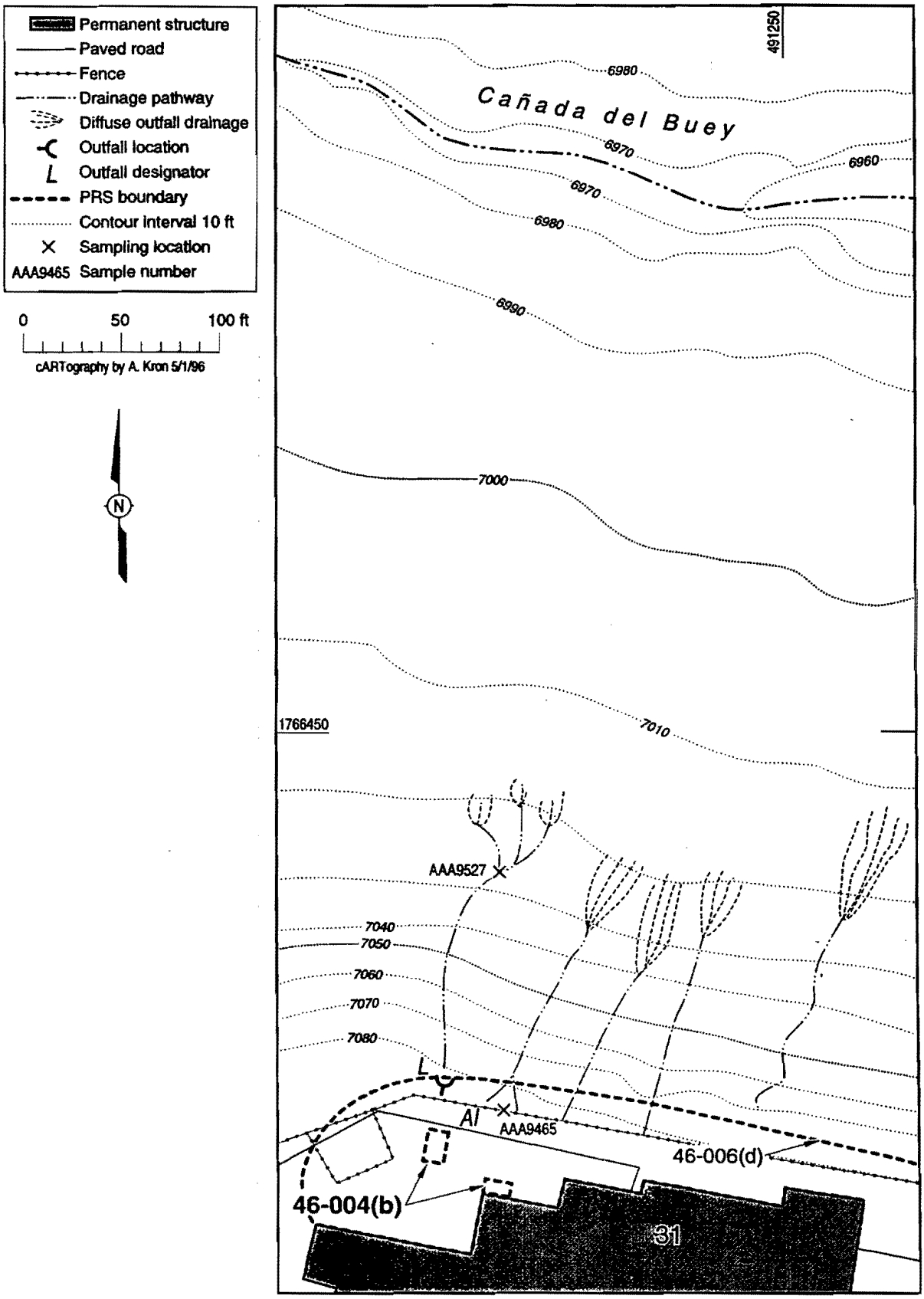


Fig. 5.2.2-1. PRS 46-004(b), cleaning tank.

5.2.5 Background Comparison

Analyses indicate that little cesium or lithium remains at the rim of the canyon or in the first catchment at the bottom of the slope (Table 5.2.5-1). No local data are available for background comparison.

This PRS lies entirely within PRS 46-006(d). Results of analyses for inorganics, radionuclides, and organic compounds for these samples are discussed in Section 5.21 of this RFI report. Lead (409 mg/kg) was found above SAL (400 mg/kg) in sample AAA9465D. Lead is attributed to PRS 46-006(d) activities rather than to the PRS 46-004(b) cleaning tank.

TABLE 5.2.5-1

CESIUM AND LITHIUM AT PRS 46-004(b)

SAMPLE ID	DEPTH (ft)	CESIUM (mg/kg)	LITHIUM (mg/kg)
SAL[a]	N/A[b]	None	None
LANL UTL[c]	N/A	None	None
AAA9527	0.25	<1	<7.9
AAA9465	0.5	3.5	<5.7
AAA9465D[d]	0.5	NA[e]	4.1

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] UTL = Upper tolerance limit.
[d] D = Duplicate.
[e] NA = Not analyzed.

5.2.6 Evaluation of Organics

No organics were detected in any samples for this PRS or for PRS 46-004(z).

5.2.7 Human Health

5.2.7.1 Screening Assessment

Only low levels of cesium and lithium were found at PRS 46-004(b). Detected levels were comparable to cesium (0.3-5.1 mg/kg) and lithium (<5-50 mg/kg) in North American background soils (Pendias 1984, 11-258).

5.2.7.2 Risk Assessment

No risk assessment was performed for this PRS.

5.2.8 Ecological Assessment

PRS 46-004(b) is recommended for NFA because no COPCs were found, thus habitat and/or receptor presence was not of concern. The approach to ecological assessment is discussed in Section 3.5 of this RFI report.

5.2.9 Extent of Contamination

Only low levels of cesium and lithium were detected at sampling points for this PRS.

5.2.10 Conclusions and Recommendations

Two samples and a duplicate were analyzed for cesium and lithium in locations that would have received runoff from the tanks. No elevated concentrations were found. Based on NFA criterion 5, a Class III permit modification is requested to remove this site from the HSWA Module of the Laboratory's RCRA operating permit.

5.3 PRS 46-004(g)

PRS 46-004(g) is ducts and drains from TA-46-1. Floor and roof drains from the central part of the building drained to manhole TA-46-15 and then to daylight at outfall N. Inorganics and radionuclides associated with experimental activities were found in the drainage and in sediments on the canyon bench below TA-46. Phase II sampling is recommended. Ducts of TA-46-1 are addressed in the stack emission aggregate discussed in Section 5.27 of this RFI report. No contamination was detected in samples associated with the stack emissions aggregate.

5.3.1 History

PRS 46-004(g) is discussed in the RFI Work Plan for OU 1140, Subsection 5.4 (LANL 1993, 1093). TA-46-1 housed the Rover Fuel Element Research Program between the late 1950s and the early 1970s. Work involved baking and high-temperature testing of fuel rods. Natural and depleted uranium, as well as uranium-235 were used (Welty 1958, 11-005). In 1965, an approved disposal practice involved the release of radioactive liquid waste containing uranium-235 to a drain in Room 8. In addition, there is a report of work involving thorium (H-Division 1960, 0678). Heat pipe experiments have been conducted at TA-46-1 since the

1960s. It is not known what other activities and processes took place in this building. Suspected contaminants included mercury, other inorganics, VOCs, SVOCs, uranium, and thorium.

Diverse research projects are still performed in the building. Unpermitted discharges to the environment are prohibited at LANL in accordance with LANL Administrative Requirements, Section 9. In 1994, drains from the building were reconfigured in the manhole to discharge to the LANL sanitary waste system. A stormwater grate line still discharges into the manhole and thus to outfall N.

5.3.2 Description

The drain is a 12-in.-diameter vitrified clay pipe that intersects manhole TA-46-15 and daylights at Cañada del Buey northeast of the building (Fig. 5.3.2-1). Engineering drawing ENG-C 18111 indicates that all roof and floor drains within the central portion of the building are plumbed into the industrial drain. Laboratory sinks also tie into this drain system (McCulla 1992, 11-203).

5.3.3 Previous Investigation(s)

No previous investigations were conducted at this PRS.

5.3.4 Field Investigation

Twelve samples at 10 locations were collected for this PRS (Table 5.3.4-1). Three samples (AAA9187, AAA9190, AAA9193) were collected at outfall N, four at the toe of the steep slope, two samples in the drainage sediments on the bench, and one sample in the sediment bed outside of any presently established drainage (Fig. 5.3.2-1).

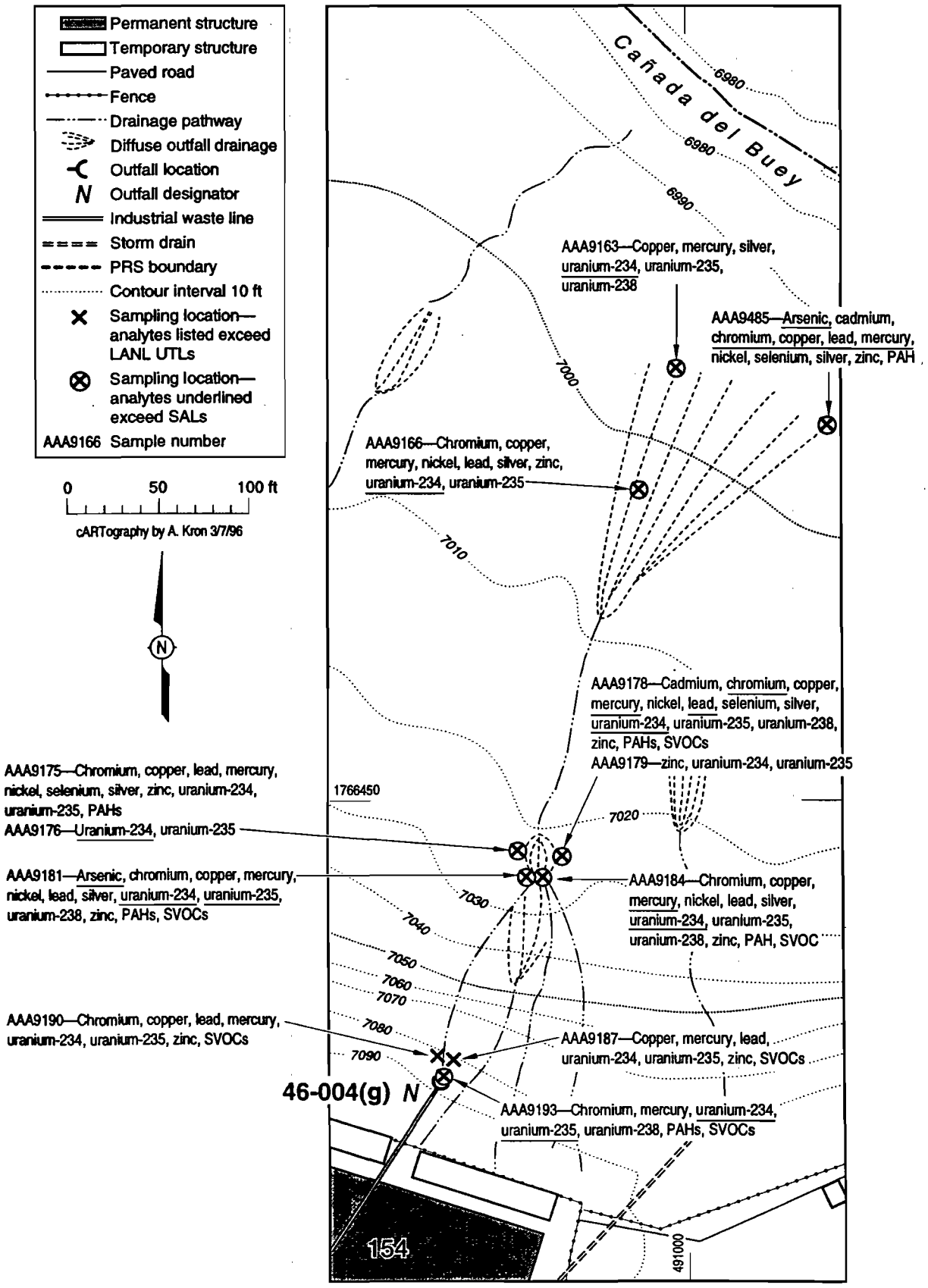


Fig. 5.3.2-1. PRS 46-004g, industrial drain from TA-46-1 (outfall N).

TABLE 5.3.4-1

SUMMARY OF SAMPLES TAKEN

SAMPLE ID	LOCATION ID	DEPTH (ft)	MATRIX	INOR-GANICS	RADIO-NUCLIDES	VOCs[a]	SVOCs[b]	PCBs[c]
AAA9163	46-1044	0.25	Soil	19539[d]	19996	NA[e]	18999	NA
AAA9166	46-1045	0.5	Soil	19539	19996	NA	18999	NA
AAA9175	46-1048	0.5	Soil	19539	19996	18999	18999	NA
AAA9176	46-1048	4.5	Soil	19539	19996	18999	18999	NA
AAA9178	46-1049	0.5	Soil	19451	19839	19001	19001	NA
AAA9179	46-1049	4	Soil	19451	19839	19001	19001	NA
AAA9181	46-1050	0.5	Soil	19539	19996	18999	18999	NA
AAA9184	46-1051	0.5	Soil	19539	19996	18999	18999	NA
AAA9187	46-1052	0.5	Soil	19451	19839	NA	19001	NA
AAA9190	46-1053	0.5	Soil	19451	19839	NA	19001	NA
AAA9193	46-1054	0.5	Soil	19451	19839	19001	19001	NA
AAA9485	46-1124	0.5	Soil	19451	19839	19001	19001	19001

[a] VOCs = Volatile organic compounds.
[b] SVOCs = Semivolatile organic compounds.
[c] PCBs = Polychlorinated biphenyls.
[d] ER analytical request number.
[e] NA = Not analyzed.

5.3.5 Background Comparison

Ten inorganics were detected above LANL background UTLs. Five contaminants had concentrations above SALs (Table 5.3.5-1). Five chromium analyses were qualified as estimates because of low recovery of the blind QA. Mercury results were qualified because holding times were missed and blind recovery was poor. Selenium results were rejected because of excessively high blind recovery. Selenium is not considered a COPC because it is not elevated in non-qualified samples. These qualifiers do not affect the conclusion that mercury is present above SAL; chromium is elevated at this PRS.

Because work in TA-46-1 involved large quantities of cesium and lithium, several samples were analyzed for these alkali metals (Table 5.3.5-2). No local background UTLs exist for these contaminants; however, results indicate that these elements are not present at elevated concentrations.

Uranium-235 was detected above LANL background UTL. Eight samples had activities above SAL for uranium-234; uranium-235 activity was above SAL in two samples (Table 5.3.5-3). Uranium results are qualified because of anomalous analyte recoveries from control samples. These qualifiers do not affect the conclusion that uranium is a COPC.

TABLE 5.3.5-1

INORGANIC ANALYTES WITH CONCENTRATIONS GREATER THAN BACKGROUND UTLs FOR PRS 46-004(g)

SAMPLE ID	DEPTH (ft)	ARSENIC (mg/kg)	CADMIUM (mg/kg)	CHROMIUM (mg/kg)	COPPER (mg/kg)	LEAD (mg/kg)	MERCURY (mg/kg)	NICKEL (mg/kg)	SELENIUM (mg/kg)	SILVER (mg/kg)	ZINC (mg/kg)
SAL[a]	N/A[b]	background	38	210	2 800	400	23	1 500	380	380	23 000
LANL UTL[c]	N/A	7.82	2.7	19.3	15.5	23.3	0.1	15.2	1.7	ND[d]	50.8
AAA9163	0.25	2.9	0.77	5.6 (J)[e]	**56.1**	15.3	**0.38 (J)**	10	<0.31	**2.9**	44.7
AAA9166	0.5	4.8	1.5	**19.7 (J)**	**218**	**50.6**	**2 (J)**	**16**	<0.3	**15.6**	**62.2**
AAA9175	0.5	<0.97	2	**63.3 (J)**	**681**	**96.8**	**7.7 (J)**	**23.2**	**4.5**	**23.8**	**162**
AAA9178	0.5	4.8	**4.6**	**281**	**1 690**	**474**	**26.6 (J)**	**41.3**	**3.7**	**141**	**261**
AAA9178D[f]	0.5	4.9	**5.3**	**198**	**1 675**	**627**	**42.1 (J)**	**53.2**	**4.5 (R)[g]**	<147	**239**
AAA9179	4	5.1	<0.09	3	<6.4	9.1	<0.15(UJ)	<10.3	<0.74 (R)	<1.1	**59.2**
AAA9181	0.5	**9**	1.8	**110 (J)**	**831**	**328**	**20.9 (J)**	**21.3**	1.1	**97.1**	**98.4**
AAA9184	0.5	5.9	1.6	**171 (J)**	**787**	**159**	**27.9 (J)**	**23.7**	1.7	**155**	**110**
AAA9187	0.5	<1.7	<0.39	16	**86.3**	**96.3**	**4.1 (J)**	<6.9	<0.58 (R)	<0.27	**133**
AAA9190	0.5	<1.7	<0.53	**24.3**	**134**	**104**	**1.2 (J)**	<5.7	<0.68 (R)	<1.9	**157**
AAA9193	0.5	7.6	<0.08	**19.5**	<5.9	12.9	**0.39 (J)**	<5.6	<0.69 (R)	<0.42 (R)	38.1
AAA9485	0.5	**8.2**	**12.7**	**807**	**8 060**	**705**	**123 (J)**	**217**	**23 (R)**	**178**	**1 830**

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] UTL = Upper tolerance limit.
[d] ND = Not determined.
[e] J = Estimated result.
[f] D = Duplicate analysis.
[g] R = Rejected result.

TABLE 5.3.5-2

CESIUM AND LITHIUM AT PRS 46-004(g)

SAMPLE ID	DEPTH (ft)	CESIUM (mg/kg)	LITHIUM (mg/kg)
SAL[a]	N/A[b]	none	none
LANL UTL[c]	N/A	ND[d]	ND
AAA9163	0.25	7.2	6.18
AAA9166	0.5	8.59	6.84
AAA9175	0.5	0.337	2.44
AAA9176	4.5	1.48	9.13
AAA9178	0.5	8.1	<9.6
AAA9179	4	<1.4	<7.4
AAA9181	0.5	5.81	3.86
AAA9184	0.5	3.91	5.21
AAA9485	0.5	1.3	22.4

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] UTL = Upper tolerance limit.
[d] ND = Not determined.

TABLE 5.3.5-3

RADIONUCLIDES WITH ACTIVITIES GREATER THAN BACKGROUND UTLs FOR PRS 46-004(g)

SAMPLE ID	DEPTH (ft)	URANIUM-234 (pCi/g)	URANIUM-235 (pCi/g)	URANIUM-238 (pCi/g)
SAL[a]	N/A[b]	13	10	67
LANL UTL[c]	N/A	1.94	0.084	1.82
AAA9163	0.25	20.1	0.876	1.93
AAA9166	0.5	36.5	1.26	1.67
AAA9175	0.5	71.6	2.54	1.24
AAA9176	4.5	2.16	0.095	1.14
AAA9178	0.5	161.9 (J)[d]	7.436	2.98 (J)
AAA9178D[e]	0.5	180.5 (J)	7.836	3.358 (J)
AAA9179	4	2.58 (J)	0.1476	0.5279 (J)
AAA9181	0.5	471	14.1	8.62
AAA9184	0.5	276	8.81	3.31
AAA9187	0.5	2.438 (J)	0.1344	0.4749 (J)
AAA9190	0.5	4.971 (J)	0.1985	0.3722 (J)
AAA9193	0.5	603.3 (J)	31.8	13.7 (J)

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] UTL = Upper tolerance limit.
[d] J = Estimated result.
[e] D = Duplicate analysis.

5.3.6 Evaluation of Organics

Polycyclic aromatic hydrocarbons (PAHs), several above SALs, and plasticizers were reported for this PRS (Table 5.3.6-1). These contaminants are derived from continuing sources (asphalt paving and roofing tar).

TABLE 5.3.6-1

PRS 46-004(g) SOIL CONCENTRATIONS FOR ORGANIC ANALYTES WITH VALUES GREATER THAN THE REPORTING LIMIT

SAMPLE ID	DEPTH (ft)	SVOC[a] or VOC[b]	RESULT (mg/kg)	SAL[c] (mg/kg)	EQL[d] (mg/kg)
AAA9181	0.5	Acenaphthene	7.4	360	0.33
AAA9181	0.5	Acenaphthylene	0.63	NC[e]	0.33
AAA9181	0.5	Anthracene	13 (J)[f]	19	0.33
AAA9184	0.5	Anthracene	0.73 (J)	19	0.33
AAA9175	0.5	Benzo[a]anthracene	0.53	0.61	0.33
AAA9178	0.5	Benzo[a]anthracene	0.92	0.61	0.33
AAA9181	0.5	Benzo[a]anthracene	14	0.61	0.33
AAA9184	0.5	Benzo[a]anthracene	0.99	0.61	0.33
AAA9175	0.5	Benzo[a]pyrene	0.98 (J)	0.061	0.33
AAA9178	0.5	Benzo[a]pyrene	1.6	0.061	0.33
AAA9181	0.5	Benzo[a]pyrene	7.2 (J)	0.061	0.33
AAA9184	0.5	Benzo[a]pyrene	1.2 (J)	0.061	0.33
AAA9175	0.5	Benzo[b]fluoranthene	1.3	0.61	0.33
AAA9178	0.5	Benzo[b]fluoranthene	1.8	0.61	0.33
AAA9181	0.5	Benzo[b]fluoranthene	12	0.61	0.33
AAA9184	0.5	Benzo[b]fluoranthene	3.2	0.61	0.33
AAA9193	0.5	Benzo[b]fluoranthene	1.2	0.61	0.33
AAA9175	0.5	Benzo[g,h,i]perylene	0.52	NC	0.33
AAA9178	0.5	Benzo[g,h,i]perylene	1.4	NC	0.33
AAA9181	0.5	Benzo[g,h,i]perylene	11	NC	0.33
AAA9184	0.5	Benzo[g,h,i]perylene	1.4	NC	0.33
AAA9175	0.5	Benzo[k]fluoranthene	0.93	6.1	0.33
AAA9178	0.5	Benzo[k]fluoranthene	1.9	6.1	0.33
AAA9181	0.5	Benzo[k]fluoranthene	28	6.1	0.33
AAA9184	0.5	Benzo[k]fluoranthene	0.78	6.1	0.33
AAA9178	0.5	Bis(2-ethylhexyl)phthalate	0.69	32	0.33
AAA9181	0.5	Bis(2-ethylhexyl)phthalate	1.9	32	0.33
AAA9187	0.5	Bis(2-ethylhexyl)phthalate	1.3	32	0.33
AAA9190	0.5	Bis(2-ethylhexyl)phthalate	0.98	32	0.33
AAA9193	0.5	Bis(2-ethylhexyl)phthalate	3	32	0.33
AAA9187	0.5	Butyl benzyl phthalate	0.68	13 000	0.33
AAA9190	0.5	Butyl benzyl phthalate	0.43	13 000	0.33
AAA9193	0.5	Butyl benzyl phthalate	2.9	13 000	0.33

TABLE 5.3.6-1

PRS 46-004(g) SOIL CONCENTRATIONS FOR ORGANIC ANALYTES WITH VALUES GREATER THAN THE REPORTING LIMIT

SAMPLE ID	DEPTH (ft)	SVOC [a] or VOC [b]	RESULT (mg/kg)	SAL [c] (mg/kg)	EQL [d] (mg/kg)
AAA9175	0.5	Chrysene	0.84	24	0.33
AAA9178	0.5	Chrysene	1.3	24	0.33
AAA9181	0.5	Chrysene	4.8	24	0.33
AAA9184	0.5	Chrysene	1.9	24	0.33
AAA9184	0.5	Di-n-butyl phthalate	0.55	6 500	0.33
AAA9181	0.5	Dibenzofuran	4.5	260	0.33
AAA9178	0.5	Dibenzo[a,h]anthracene	0.57	0.061	0.33
AAA9181	0.5	Dibenzo[a,h]anthracene	4.8	0.061	0.33
AAA9175	0.5	Fluoranthene	1.7	2 600	0.33
AAA9178	0.5	Fluoranthene	3.6	2 600	0.33
AAA9181	0.5	Fluoranthene	49	2 600	0.33
AAA9184	0.5	Fluoranthene	4.9	2 600	0.33
AAA9193	0.5	Fluoranthene	0.92	2 600	0.33
AAA9181	0.5	Fluorene	8	300	0.33
AAA9175	0.5	Indeno[1,2,3-cd]pyrene	0.56	0.61	0.33
AAA9178	0.5	Indeno[1,2,3-cd]pyrene	1.3	0.61	0.33
AAA9181	0.5	Indeno[1,2,3-cd]pyrene	11	0.61	0.33
AAA9184	0.5	Indeno[1,2,3-cd]pyrene	1.4	0.61	0.33
AAA9178	0.5	Isopropyltoluene [4-]	0.035 (J)	NC	0.005
AAA9181	0.5	Methylnaphthalene [2-]	2.5	NC	0.33
AAA9181	0.5	Naphthalene	9.4 (J)	800	0.33
AAA9175	0.5	Phenanthrene	0.77	NC	0.33
AAA9178	0.5	Phenanthrene	2	NC	0.33
AAA9181	0.5	Phenanthrene	52	NC	0.33
AAA9184	0.5	Phenanthrene	3	NC	0.33
AAA9175	0.5	Pyrene	0.99 (J)	2 000	0.33
AAA9178	0.5	Pyrene	2	2 000	0.33
AAA9181	0.5	Pyrene	31 (J)	2 000	0.33
AAA9184	0.5	Pyrene	3 (J)	2 000	0.33

[a] SVOC = Semivolatile organic compound.
[b] VOC = Volatile organic compound.
[c] SAL = Screening action level.
[d] EQL = Estimated quantitation level.
[e] J = Estimated result.
[f] NC = Not calculated.

5.3.7 Human Health

5.3.7.1 Screening Assessment

Inorganic constituents detected above SALs at this PRS include arsenic, chromium, copper, lead, and mercury (Table 5.3.7-1). Uranium was also detected above SAL (Table 5.3.7-2). These constituents will be carried forward through the screening assessment and addressed in the further assessment planned for this PRS (Section 5.21.11 of this RFI report).

TABLE 5.3.7-1

PRS 46-004(g) INORGANICS WITH CONCENTRATIONS IN SOIL THAT EXCEED SALs

SAMPLE ID	DEPTH (ft)	ARSENIC (mg/kg)	CHROMIUM (mg/kg)	COPPER (mg/kg)	LEAD (mg/kg)	MERCURY (mg/kg)
SAL[a]	N/A[b]	7.82	210	2 800	400	23
AAA9178	0.5	4.8	198	1 675	**474**	**26.6 (J)** [c]
AAA9178D[d]	0.5	4.9	**281**	1 690	**627**	**42.1 (J)**
AAA9184	0.5	5.9	171 (J)	787	159	**27.9 (J)**
AAA9485	0.5	**8.2**	**807**	**8 060**	**705**	**123 (J)**
AAA9181	0.5	**9**	110	831	328	20.9

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] J = Estimated result.
[d] D = Duplicate analysis.

TABLE 5.3.7-2

PRS 46-004(g) RADIONUCLIDES WITH ACTIVITIES IN SOIL THAT EXCEED SALs

SAMPLE ID	DEPTH (ft)	URANIUM-234 (pCi/g)	URANIUM-235 (pCi/g)
SAL[a]	N/A[b]	13	10
AAA9163	0.25	**20.1**	0.876
AAA9166	0.5	**36.5**	1.26
AAA9175	0.5	**71.6**	2.54
AAA9178	0.5	**180.5 (J)**[c]	7.836
AAA9178D[d]	0.5	**161.9 (J)**	7.436
AAA9181	0.5	**471**	**14.1**
AAA9184	0.5	**276**	8.81
AAA9193	0.5	**603.3 (J)**	**31.8**

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] J = Estimated result.
[d] D = Duplicate analysis.

An MCE screening was performed for the remaining noncarcinogenic inorganics detected at PRS 46-004(g) (Table 5.3.7-3). Because the result is greater than the action level of 1, inorganics will be carried forward through the screening assessment and addressed in further assessments planned for this PRS.

TABLE 5.3.7-3

MCE FOR NONCARCINOGENIC EFFECTS AT PRS 46-004(g)

CONTAMINANT	MAXIMUM SOIL CONCENTRATION (mg/kg)	SOIL SAL[a] (mg/kg)	CONCENTRATION NORMALIZED TO SAL
Cadmium	12.7	38	0.3
Nickel	217	1 500	0.1
Selenium	23	380	0.06
Silver	178	380	0.5
Zinc	1 830	23 000	0.08
Total			**1**

[a] SAL - Screening action level.

5.3.7.2 Risk Assessment

No risk assessment was performed for this PRS.

5.3.8 Ecological Assessment

The approach to ecological assessment is discussed in Section 3.5. This PRS was retained for further ecological analysis because COPCs were present, appropriate habitat was present, and there were potentially several receptors that use the area.

5.3.9 Extent of Contamination

Uranium and inorganics, principally mercury, have accumulated at levels of concern in the sediment accumulation areas on the canyon bench. Although several PRSs contributed effluent to this drainage, archival evidence indicates that TA-46-1 is the likely source of these contaminants.

5.3.10 Conclusions and Recommendations

Because contamination was found at levels above SALs at PRS 46-004(g), Phase II sampling is proposed to determine the extent and concentrations of inorganics and radionuclides. Phase I sampling indicates that contamination from LANL activities appears to be minimal on the mesa top at TA-46, but years of runoff may have concentrated contaminants in the Cañada del Buey sediment accumulation areas below the site. Therefore, Phase II sampling is proposed on the canyon bench. The sampling and analysis plan for this PRS is presented in Section 5.21.11 of this RFI report. Because the sediment accumulation areas received effluent from multiple PRSs, the plan also includes sampling points intended to address Phase II sampling for PRSs 46-004(q) and 46-006(d) (Sections 5.6 and 5.21 of this RFI report, respectively).

5.4 PRS 46-004(h)

PRS 46-004(h) is ducts and drains from TA-46-16. The industrial drain from sinks, floor drains and noncontact cooling water daylighted at outfall A. The PRS is recommended for NFA because no contaminants were detected above SALs. Ducts of TA-46-16 are further discussed in stack emissions aggregate (Section 5.27 of this RFI report). No contamination was detected in samples associated with the stack emissions aggregate.

5.4.1 History

PRS 46-004(h) is discussed in the RFI Work Plan for OU 1140, Subsection 5.4 (LANL 1993, 1093). Experiments with uranium-loaded graphite were conducted in test cells in TA-46-16 during the Rover Program. Based on historical information, depleted uranium was used and there were plans to use enriched uranium (Welty 1958, 11-007). Suspected contaminants included inorganics, VOCs, SVOCs, and uranium isotopes.

The drains from TA-46-16 are plugged (LANL 1993, 11-262).

5.4.2 Description

The outfall is a 6-in.-diameter cast iron pipe located north of TA-46-16 (Fig. 5.4.2-1). Engineering drawing ENG-C 14983 indicates that floor drains and possibly roof drains are plumbed to this drain. Floor drain connections to this outfall were verified in the field (McCulla 1992, 11-203).

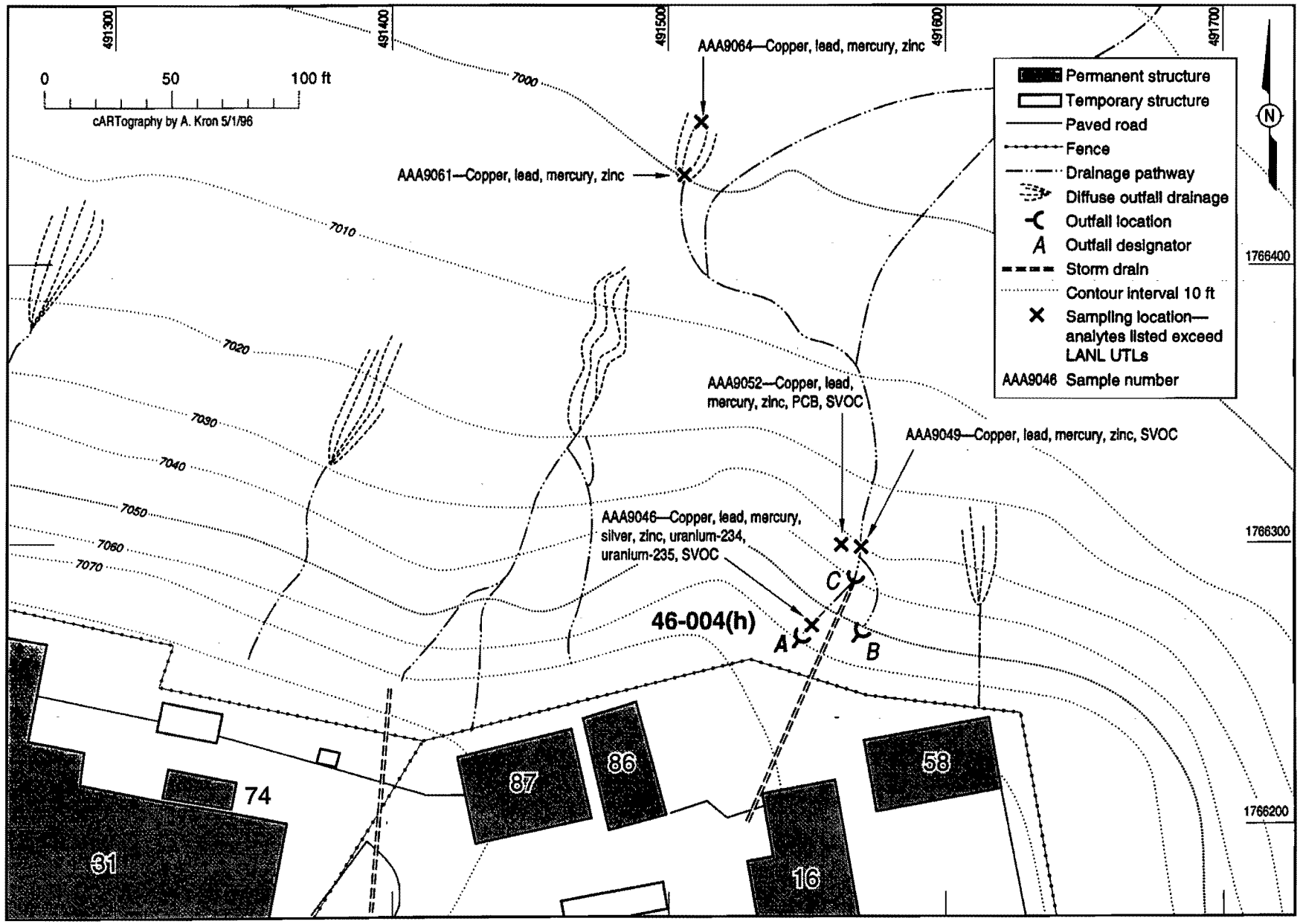


Fig. 5.4.2-1. PRS 46-004h, industrial drain from TA-46-16 (outfall A).

5.4.3 Previous Investigations

No previous investigations were conducted at this PRS.

5.4.4 Field Investigation

Five samples were collected for this PRS (Table 5.4.4-1). Sample AAA9046 was taken at the outfall. Two samples were taken at the toe of the steep slope and two in the drainage channel on the bench of Cañada del Buey (Fig. 5.4.2-1). Effluent from outfalls B and C also contribute to the lower samples.

TABLE 5.4.4-1

SUMMARY OF SAMPLES TAKEN

SAMPLE ID	SITE ID	DEPTH (ft)	MATRIX	INOR-GANICS	RADIO-NUCLIDES	VOCs[a]	SVOCs[b]
AAA9046	46-1003	1	Soil	19323[c]	19840	18662	18662
AAA9049	46-1004	1	Soil	19323	19840	18662	18662
AAA9052	46-1005	1	Soil	19323	19840	18662	18662
AAA9061	46-1008	1	Soil	19448	19843	19039	19039
AAA9064	46-1009	1	Soil	19448	19843	19039	19039

[a] VOCs = Volatile organic compounds.
[b] SVOCs = Semivolatile organic compounds.
[c] ER analytical request number.

5.4.5 Background Comparison

Six inorganics were detected above LANL background UTLs but below SALs (Table 5.4.5-1). Two lead and mercury results were qualified as estimated (J) based on high recoveries from QC samples; results are considered possibly elevated. Uranium-234 and uranium-235 were detected above LANL background UTL in one sample (Table 5.4.5-2).

TABLE 5.4.5-1

INORGANIC ANALYTES WITH CONCENTRATIONS GREATER THAN BACKGROUND UTLs FOR PRS 46-004(h)

SAMPLE ID	DEPTH (ft)	COPPER (mg/kg)	LEAD (mg/kg)	MERCURY (mg/kg)	SILVER (mg/kg)	ZINC (mg/kg)
SAL[a]	N/A[b]	2 800	400	23	380	23 000
LANL UTL[c]	N/A	15.5	23.3	0.1	ND[d]	50.8
AAA9046	1	**237**	**46.9**	**2.4**	**5.7**	**262**
AAA9046D[e]	1	**130**	**44**	**2**	**4.2**	**253**
AAA9049	1	**1 420**	**112**	**1**	<0.11	**175**
AAA9052	1	**51.7**	**37.4**	**3.2**	<0.11	**3 350**
AAA9061	1	**16.6**	**51.5 (J)[f]**	**0.9 (J)**	<0.79	**61.8**
AAA9064	1	**17.1**	**104 (J)**	**0.38 (J)**	<0.94	**59.7**

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] UTL = Upper tolerance limit.
[d] ND = Not determined.
[e] D = Duplicate analysis.
[f] J = Estimated result.

TABLE 5.4.5-2

RADIONUCLIDES WITH ACTIVITIES GREATER THAN BACKGROUND UTLs FOR PRS 46-004(h)

SAMPLE ID	DEPTH (ft)	URANIUM-234 (pCi/g)	URANIUM-235 (pCi/g)
SAL[a]	N/A[b]	13	10
LANL UTL[c]	N/A	1.94	0.084
AAA9046	1	9.443 (J)[d]	0.4839

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] UTL = Upper tolerance limit.
[d] J = Estimated result.

5.4.6 Evaluation of Organics

Trace levels of a PCB were found in sample AAA9052 (Table 5.4.6-1).

TABLE 5.4.6-1

PRS 46-006(a) SOIL CONCENTRATIONS FOR PCBs

SAMPLE ID	DEPTH (ft)	PCBs[a] (mg/kg)
SAL[b]	N/A[c]	1
EQL[d]	N/A	0.021
AAA9052	1	0.043

[a] PCBs = Polychlorinated biphenyls.
[b] SAL = Screening action level.
[c] N/A = Not applicable.
[d] EQL = Estimated quantitation limit.

Low levels of a plasticizer were reported for this PRS (Table 5.4.6-2). This analyte is a common field or laboratory contaminant and was never identified with LANL activities at this PRS.

TABLE 5.4.6-2

PRS 46-004(h) SOIL CONCENTRATIONS FOR ORGANIC ANALYTES WITH VALUES GREATER THAN THE REPORTING LIMIT

SAMPLE ID	SVOC[a]	RESULT	SAL[b] (mg/kg)	EQL[c] (mg/kg)
AAA9046	Bis(2-ethylhexyl)phthalate	4.4	50	0.33
AAA9049	Bis(2-ethylhexyl)phthalate	0.39	50	0.33
AAA9052	Bis(2-ethylhexyl)phthalate	0.37	50	0.33

[a] SVOCs = Semivolatile organic compounds.
[b] SAL = Screening action level.
[c] EQL = Estimated quantitation level

5.4.7 Human Health

5.4.7.1 Screening Assessment

Inorganic contaminants identified to be greater than LANL background UTLs were submitted for an MCE for noncarcinogenic effects. Lead is excluded from this grouping because its toxicity is based on the uptake of lead in children as modeled by EPA's IUBEK Model (EPA 1994, 1178). The maximum lead concentration detected at this PRS (104 mg/kg) is below the SAL for lead. The sum of the maxima for the noncarcinogenic group is 0.8 (Table 5.4.7-1). This result is below the target value of 1, which indicates a low potential for adverse effects due to exposure to this grouping. Therefore, these contaminants are not identified as potentially hazardous. No carcinogens were detected above UTL; therefore, no MCE was performed for this grouping. Uuranium isotopes were detected above UTL, but below SAL Inspection of the data indicate that an MCE result is below the target value of 1.

TABLE 5.4.7-1

MCE FOR NONCARCINOGENIC EFFECTS AT PRS 46-004(h)

CONTAMINANT	MAXIMUM SOIL CONCENTRATION (mg/kg)	SOIL SAL[a] (mg/kg)	CONCENTRATION NORMALIZED TO SAL
Copper	1 420	2 800	0.5
Mercury	3.2	23	0.1
Silver	5.7	380	0.01
Zinc	3 350	23 000	0.1
Total			**0.8**

[a] SAL = Screening action level.

5.4.7.2 Risk Assessment

No risk assessment was performed for this PRS.

5.4.8 Ecological Assessment

This PRS is recommended for NFA because no COPCs were detected. The approach to ecological assessment is discussed in Section 3.5 of this RFI report.

5.4.9 Extent of Contamination

No contaminants at concentrations of concern were detected at sampling points for this PRS.

5.4.10 Conclusions and Recommendations

Copper, lead, mercury, silver, zinc, uranium isotopes, and PCBs were found at PRS 46-004(h) above background UTLs, but below SALs. MCEs performed for noncarcinogenic and uranium effects indicate results below the target value of 1. No MCE was performed for lead or carcinogenic effects because multiple constituents for these groupings were not found above LANL UTLs. Based on NFA criterion 5, a Class III permit modification is requested to remove this site from the HSWA Module of the Laboratory's RCRA operating permit.

5.5 PRS 46-004(m)

PRS 46-004(m) (outfall CC) is the outfall from floor drains, a sink, and a noncontact cooling water system in TA-46-30. The PRS is recommended for NFA because no analytes were detected above SALs.

5.5.1 History

PRS 46-004(m) is discussed in RFI Work Plan for OU 1140, Subsection 5.4 (LANL 1993, 1093). TA-46-30 was built in 1967 as a hydraulics laboratory. Suspected contaminants include mercury, other inorganics, SVOCs, and uranium from laboratory processes. Except for the cooling water line from an air compressor, sinks and floor drains in TA-46-30 are clogged with debris and are unusable, but are not permanently plugged (LANL 1993, 11-259). Unpermitted effluent discharge to the environment is currently prohibited at LANL in accordance with LANL Administrative Requirement, Section 9.

5.5.2 Description

The outfall, national pollution discharge elimination system (NPDES) 04A013 located north of the building, protrudes from a 10 ft-high bank cut (Fig. 5.5.2-1). Effluent flows through a ditch at the foot of the bank into a storm drain located east of TA-46-154. This storm drain is part of a network that discharges to Cañada del Buey. Figure 5.5.2-1 shows this storm drain network and its discharge point at outfall M. A noncontact cooling-water system is one of several

sources for this outfall. The 1990 NPDES permit application indicates that the noncontact cooling-water system serves a compressor. Engineering drawing ENG-C 22732 indicates that the compressor room floor drains are plumbed to this drain. In addition, roof drains and laboratory sinks, with the exception of the north wall sink, are also plumbed to the drain (ICF Kaiser Engineers 1992, 11-214).

5.5.3 Previous Investigation(s)

No previous investigations were conducted at this PRS.

5.5.4 Field Investigation

Five samples were collected for this PRS (Table 5.5.4-1). Three samples (AAA9314, AAA9317, AAA9320) were taken at outfall CC and two in the sediment channel on the bench of the canyon. The lower samples also receive effluent from PRSs on the east side of TA-46-1. No sample was taken at outfall M because it is barren tuff on the steep terrain. Sample locations are shown in Fig. 5.5.2-1.

TABLE 5.5.4-1

SUMMARY OF SAMPLES TAKEN

SAMPLE ID	LOCATION ID	DEPTH (ft)	MATRIX	INOR-GANICS	RADIO-NUCLIDES	VOCs[a]	SVOCs[b]	PCBs[c]	PESTI-CIDES	ASBES-TOS
AAA9169	46-1046	1	Soil	19539	19996	18999	18999	18999	18999	20256
AAA9172	46-1047	1	Soil	19539	19996	18999	18999	NA[d]	NA	20256
AAA9314	46-1111	0.5	Soil	19674	20005	NA	19266	NA	NA	NA
AAA9317	46-1112	0.5	Soil	19674	20005	NA	19266	NA	NA	NA
AAA9320	46-1113	0.5	Soil	19674	20005	NA	19266	NA	NA	NA

[a] VOCs = Volatile organic compounds.
[b] SVOCs = Semivolatile organic compounds.
[c] PCBs = Polychlorinated biphenyls.
[d] NA = Not analyzed.

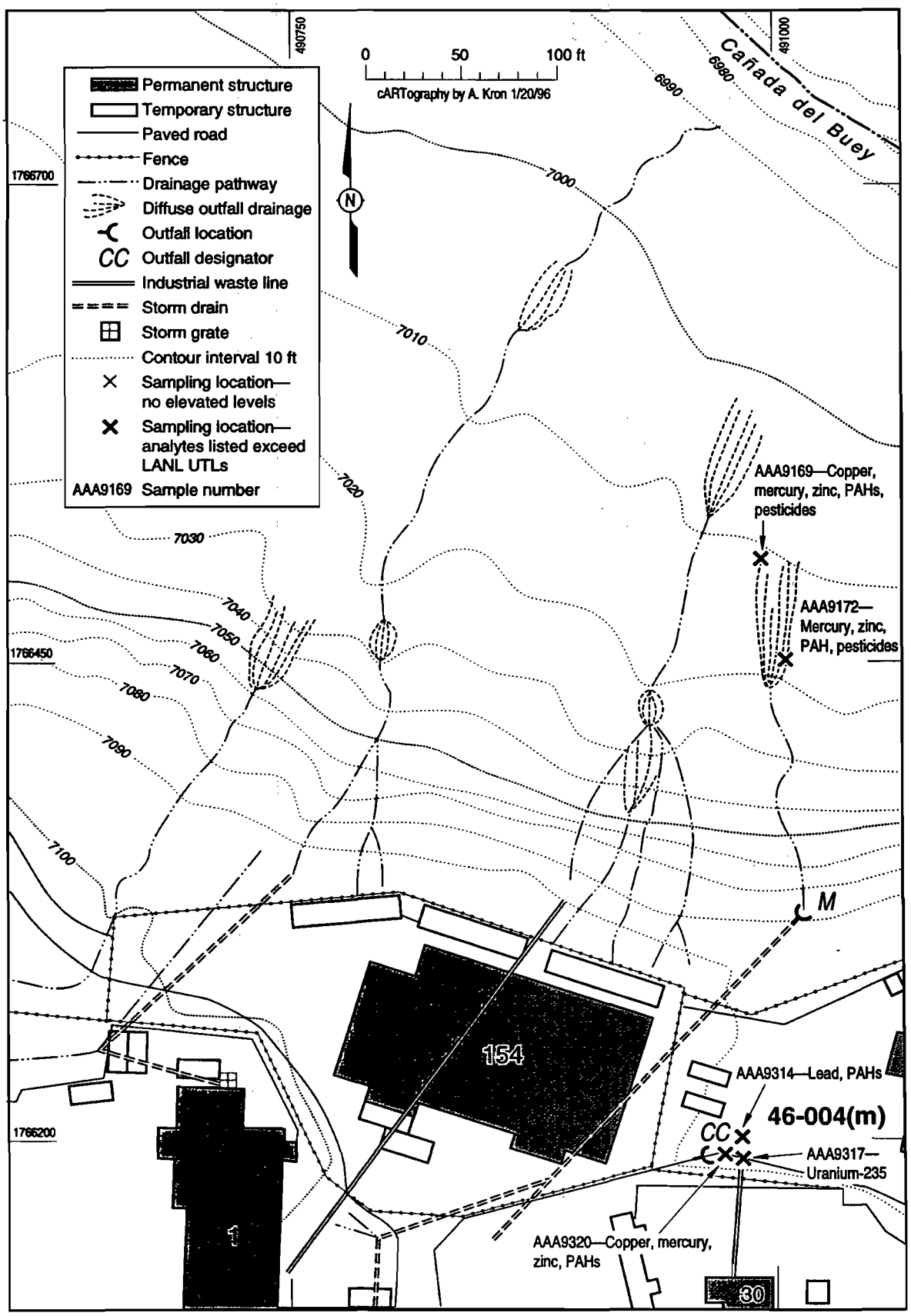


Fig. 5.5.2-1. PRS 46-004(m), industrial drain from TA-46-30 (oufalls CC and M).

5.5.5 Background Comparison

Copper, lead, mercury, and zinc were detected above LANL background UTLs but below SALs (Table 5.5.5-1). Uranium-235 was detected above LANL background UTL but below SAL in one sample (Table 5.5.5-2). Although mercury results were qualified as estimated (J) based on missed holding time, values are consistent with nonqualified results and are accepted as reasonable estimates.

TABLE 5.5.5-1

INORGANIC ANALYTES WITH CONCENTRATIONS GREATER THAN BACKGROUND UTLs FOR PRS 46-004(m)

SAMPLE ID	DEPTH (ft)	COPPER (mg/kg)	LEAD (mg/kg)	MERCURY (mg/kg)	ZINC (mg/kg)
SAL[a]	N/A[b]	2 800	400	23	23 000
LANL UTL[c]	N/A	15.5	23.3	0.1	50.8
AAA9169	1	**17.3**	10.1	**0.2 (J)** [d]	**69.4**
AAA9172	1	14.4	10.7	**0.13 (J)**	**142**
AAA9314	0.5	12.6	**44.4**	<0.02	43.9
AAA9320	0.5	**63.7**	21.7	**0.48**	**401**

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] UTL = Upper tolerance limit.
[d] J = Estimated result.

TABLE 5.5.5-2

RADIONUCLIDES WITH ACTIVITIES GREATER THAN BACKGROUND UTLs FOR PRS 46-004(m)

SAMPLE ID	DEPTH (ft)	URANIUM-235 (pCi/g)
SAL[a]	N/A[b]	10
LANL UTL[c]	N/A	0.084
AAA9317	0.5	0.0953

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] UTL = Upper tolerance limit.

5.5.6 Evaluation of Organics

Pesticides and low levels of PAHs, several above SAL, were reported for this PRS (Table 5.5.6-1). At TA-46, with large paved parking areas and many flat roofs, these contaminants are derived from continuing sources (asphalt paving, roofing tar) and routine spraying.

TABLE 5.5.6-1

PRS 46-004(m) SOIL CONCENTRATIONS FOR ORGANIC ANALYTES WITH VALUES GREATER THAN THE REPORTING LIMIT

SAMPLE ID	DEPTH (ft)	SVOC [a]	RESULT (mg/kg)	SAL [b] (mg/kg)	EQL [c] (mg/kg)
AAA9320	0.5	Benzo[a]anthracene	0.64	0.61	0.33
AAA9169	1	Benzo[a]pyrene	0.5 (J) [d]	0.061	0.33
AAA9320	0.5	Benzo[a]pyrene	0.56	0.061	0.33
AAA9169	1	Benzo[b]fluoranthene	0.53	0.6	0.33
AAA9320	0.5	Benzo[b]fluoranthene	0.75	0.6	0.33
AAA9169	1	Chrysene	0.49	24	0.33
AAA9320	0.5	Chrysene	0.67	24	0.33
AAA9169	1	Fluoranthene	1.3	2 600	0.33
AAA9172	1	Fluoranthene	0.47	2 600	0.33
AAA9314	0.5	Fluoranthene	0.53	2 600	0.33
AAA9320	0.5	Fluoranthene	1.3	2 600	0.33
AAA9169	1	Phenanthrene	0.9	NC [e]	0.33
AAA9314	0.5	Phenanthrene	0.47	NC	0.33
AAA9320	0.5	Phenanthrene	1.2	NC	0.33
AAA9169	1	Pyrene	0.78 (J)	2 000	0.33
AAA9314	0.5	Pyrene	0.48 (J)	2 000	0.33
AAA9320	0.5	Pyrene	1.4 (J)	2 000	0.33
SAMPLE ID	**DEPTH (ft)**	**PESTICIDES**	**RESULT (mg/kg)**	**SAL (mg/kg)**	**EQL (mg/kg)**
AAA9172	1	Dieldrin	0.00268 (J)	0.28	0.0033
AAA9169	1	Endosulfan II	0.00249 (J)	3.3	0.0033
AAA9172	1	Endosulfan II	0.00362 (J)	3.3	0.0033

[a] SVOC = Semivolatile organic compound.
[b] SAL = Screening action level.
[c] EQL = Estimated quantitation level.
[d] J = Estimated result.
[e] NC = Not calculated.

5.5.7 Human Health

5.5.7.1 Screening Assessment

Inorganic contaminants identified to be greater than LANL background UTLs were submitted for an MCE for noncarcinogenic effects. Lead is excluded from this grouping because its toxicity is based on the uptake of lead in children as modeled by EPA's IUBEK Model (EPA 1994, 1178). The maximum lead concentration detected at this PRS (44 mg/kg) is below the SAL (400 mg/kg) for lead. The sum of the maxima for the noncarcinogenic group is less than 0.1, below the target value of 1 (Table 5.5.7-1), indicating a low potential for adverse effects due to exposure to this grouping. Therefore, these contaminants are not identified as potentially hazardous. Only one radionuclide (uranium-235) was detected above UTL, but below SAL; therefore; no MCE was performed for this grouping. Because PAHs are derived from continuing sources, they will not be carried forward in the screening process.

TABLE 5.5.7-1

MCE FOR NONCARCINOGENIC EFFECTS AT PRS 46-004(m)

CONTAMINANT	MAXIMUM SOIL CONCENTRATION (mg/kg)	SOIL SAL[a] (mg/kg)	CONCENTRATION NORMALIZED TO SAL
Copper	63.7	2 800	0.023
Mercury	0.48	23	0.021
Zinc	401	23 000	0.017
Total			**0.061**

[a] SAL = Screening action level.

5.5.7.2 Risk Assessment

No risk assessment was performed for this PRS.

5.5.8 Ecological Assessment

This PRS is recommended for NFA because no COPCs were detected. The approach to ecological assessment is discussed in Section 3.5 of this RFI report.

5.5.9 Extent of Contamination

No contaminants at concentrations of concern were detected at sampling points for this PRS.

5.5.10 Conclusions and Recommendations

Copper, lead, mercury, zinc, and uranium-235 were found at PRS 46-004(m) above background UTLs, but below SALs. An MCE was performed for noncarcinogenic effects with a result (0.06) far below the target value of 1. No MCE was performed for lead, carcinogenic, or radionuclide effects because multiple constituents for these groupings were not found above LANL UTLs. Based on NFA criterion 5, a Class III permit modification is requested to remove this site from the HSWA Module of the Laboratory's RCRA operating permit.

5.6 PRS 46-004(q)

PRS 46-004(q) (outfall B) discharges to Cañada del Buey. The source is unknown. Mercury and isotopes of uranium were found above SALs. The PRS is recommended for Phase II sampling.

5.6.1 History

PRS 46-004(q) is discussed in RFI Work Plan for OU 1140, Subsection 5.4 (LANL 1993, 1093). The PRS is located north of TA-46-58 (Fig. 5.6.2-1). Because the source is unknown, the outfall was treated as an industrial drain. Potential contaminants were listed as uranium, SVOCs, VOCs, and inorganics.

5.6.2 Description

Outfall B is a 6-in.-diameter cast iron pipe that discharges to Cañada del Buey north of TA-46-58 (Fig. 5.6.2-1). The outfall protrudes from a steep slope of loose fill; the end of the pipe is supported by a pile of rocks. A drainage ditch has formed below the outfall, leading approximately 15 ft to a large ditch scoured by runoff from outfall C, a 2 ft-diameter culvert that receives parking lot runoff from the northeast quadrant of TA-46.

5.6.3 Previous Investigations

No previous investigations were conducted at this PRS.

5.6.4 Field Investigation

Five samples were collected for this PRS (Table 5.6.4-1). One sample (AAA9043) was collected at outfall B, two samples in the nearest downstream sediment trap and two samples in the drainage channel on the level bench. The lower samples also received effluent from outfalls A and C (Fig. 5.6.2-1).

TABLE 5.6.4-1

SUMMARY OF SAMPLES TAKEN

SAMPLE ID	LOCATION ID	DEPTH (ft)	MATRIX	INOR-GANICS	RADIO-NUCLIDES	VOCs[a]	SVOCs[b]
AAA9043	46-1002	0.5	Soil	19160	19598	18592	18592
AAA9049	46-1004	1	Soil	19323	19840	18662	18662
AAA9052	46-1005	0.5	Soil	19323	19840	18662	18662
AAA9061	46-1008	1	Soil	19448	19843	19039	19039
AAA9064	46-1009	1	Soil	19448	19843	19039	19039

[a] VOCs = Volatile organic compounds.
[b] SVOCs = Semivolatile organic compounds.

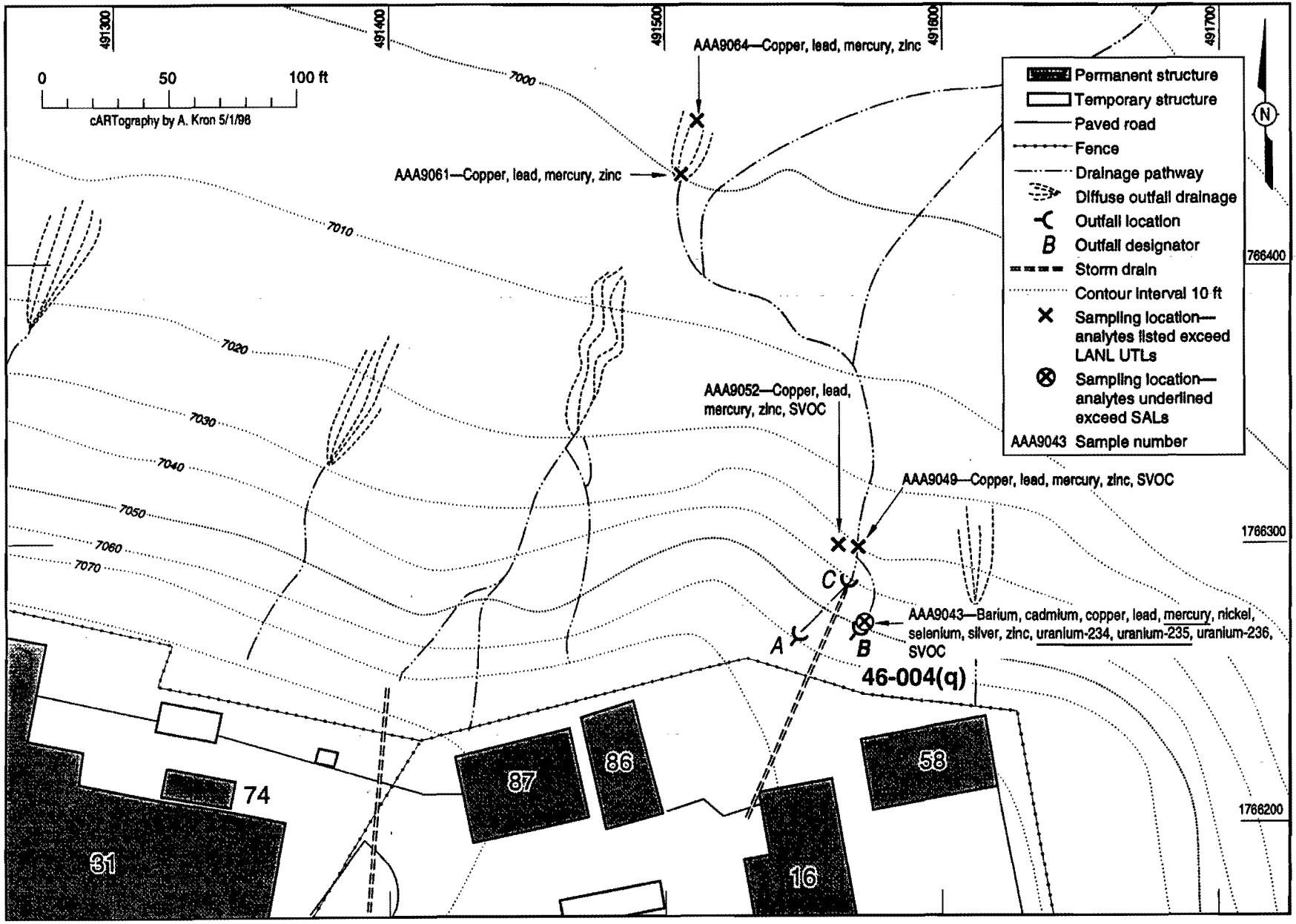


Fig. 5.6.2-1. PRS 46-004(q), outfall B (source unknown).

5.6.5 Background Comparison

Eight inorganic contaminants were detected above LANL background UTLs but below SALs. Mercury was detected above SAL (Table 5.6.5-1) and three uranium isotopes were detected above SAL in sample AAA 9043 (Table 5.6.5-2). Although results were qualified due to anomalous QC recoveries, these contaminants are considered present at levels of concern.

TABLE 5.6.5-1

INORGANIC ANALYTES WITH CONCENTRATIONS GREATER THAN BACKGROUND UTLs FOR PRS 46-004(q)

SAMPLE ID	DEPTH (ft)	BARIUM (mg/kg)	CADMIUM (mg/kg)	COPPER (mg/kg)	LEAD (mg/kg)	MERCURY (mg/kg)	NICKEL (mg/kg)	SILVER (mg/kg)	ZINC (mg/kg)
SAL[a]	N/A[b]	5 340	38	2 800	400	23	1 500	380	23 000
LANL UTL[c]	N/A	315	2.7	15.5	23.3	0.1	15.2	ND[d]	50.8
AAA9043	0.5	**409**	**5.1**	**208**	**76**	**156**	**292**	**7**	**272**
AAA9049	1	<17	<0.26	**1 420**	**112**	**1**	11.8	<0.11	**175**
AAA9052	0.5	91.6	2	**51.7**	**37.4**	**3.2**	<4.2	<0.11	**3 350**
AAA9061	1	<29.2	<0.09	**16.6**	**51.5**	**0.9**	<2.8	<0.79	**61.8**
AAA9064	1	<31.3	<0.08	**17.1**	**104**	**0.38**	<3.2	<0.94	**59.7**

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] UTL = Upper tolerance limit.
[d] ND = Not determined.

TABLE 5.6.5-2

RADIONUCLIDES WITH ACTIVITIES GREATER THAN BACKGROUND UTLs FOR PRS 46-004(q)

SAMPLE ID	DEPTH (ft)	URANIUM-234 (pCi/g)	URANIUM-235 (pCi/g)	URANIUM-238 (pCi/g)
SAL[a]	N/A[b]	13	10	67
LANL UTL[c]	N/A	1.94	0.084	1.7
AAA9043	0.5	228.3 (J)[d]	42.03 (J)	16.66 (J)

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] UTL = Upper tolerance limit.
[d] J = Estimated result.

5.6.6 Evaluation of Organics

Low levels of a plasticizer were reported for this PRS (Table 5.6.6-1). Phthalates are common field and/or laboratory contaminants and were never identified with LANL activities at this PRS.

TABLE 5.6.6-1

PRS 46-004(q) SOIL CONCENTRATIONS FOR ORGANIC ANALYTES WITH VALUES GREATER THAN THE REPORTING LIMIT

SAMPLE ID	SVOC[a]	RESULT	SAL[b] (mg/kg)	EQL[c] (mg/kg)
AAA9043	Bis(2-ethylhexyl)phthalate	1.3	50	0.33
AAA9049	Bis(2-ethylhexyl)phthalate	0.39	50	0.33
AAA9052	Bis(2-ethylhexyl)phthalate	0.37	50	0.33

[a] SVOC = Semivolatile organic compound.
[b] SAL = Screening action level.
[c] EQL = Estimated quantitation level.

5.6.7 Human Health

5.6.7.1 Screening Assessment

Because mercury and enriched uranium were detected above SALs, these constituents will be carried forward through the screening assessment and addressed in the further assessment planned for this PRS (Tables 5.6.7-1 and 5.6.7-2).

TABLE 5.6.7-1

INORGANIC ANALYTES WITH CONCENTRATIONS GREATER THAN SALs FOR PRS 46-004(q)

SAMPLE ID	DEPTH (ft)	MERCURY (mg/kg)
SAL[a]	N/A[b]	23
AAA9043	0.5	156

[a] SAL = Screening action level.
[b] N/A = Not applicable.

TABLE 5.6.7-2

RADIONUCLIDES WITH ACTIVITIES GREATER THAN SALs FOR PRS 46-004(q)

SAMPLE ID	DEPTH (ft)	URANIUM-234 (pCi/g)	URANIUM-235 (pCi/g)
SAL[a]	N/A [b]	13	10
AAA9043	0.5	228.3 (J) [c]	42.03 (J)

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] J = Estimated result.

The remaining inorganic contaminants identified to be greater than LANL background UTLs were submitted for an MCE for noncarcinogenic effects. Lead is excluded from this grouping because its toxicity is based on the uptake of lead in children as modeled by EPA's IUBEK Model (EPA 1994, 1178). The maximum lead concentration detected at this PRS (112 mg/kg) is below the SAL for lead (400 mg/kg). The sum of the maxima for the noncarcinogenic group is greater than 1 (Table 5.6.7-3). Therefore, these contaminants will be carried forward through the screening process.

TABLE 5.6.7-3

MCE FOR NONCARCINOGENIC EFFECTS AT PRS 46-004(q)

CONTAMINANT	MAXIMUM SOIL CONCENTRATION (mg/kg)	SOIL SAL[a] (mg/kg)	CONCENTRATION NORMALIZED TO SAL
Barium	409	5 340	0.08
Cadmium	5.1	38	0.18
Copper	1 420	2 800	0.58
Nickel	292	1 500	0.2
Silver	7	380	0.02
Zinc	3 350	23 000	0.1
Total			**1**

[a] SAL = Screening action level.

5.6.7.2 Risk Assessment

No risk assessment was performed for this PRS.

5.6.8 Ecological Assessment

The presence of COPCs, appropriate habitat, and the potential use of the area by ecological receptors indicates that this PRS be retained for further ecological analysis. The approach to ecological assessment is discussed in Section 3.5.

5.6.9 Extent of Contamination

Mercury and uranium isotopes were detected above SALs. Contamination at levels of concern appear to be concentrated at the outfall. Vertical extent is unknown. Downstream sampling points show low levels characteristic of concentrations found in most samples at TA-46.

5.6.10 Conclusions and Recommendations

PRS 46-004(q) is recommended for Phase II sampling. The outfall is included in the sampling plan presented in Section 5.21.11 for the Cañada del Buey sediment accumulation areas.

5.7 PRS 46-004(s)

PRS 46-004(s) (outfall X and an unnamed outfall) is outfalls from floor drains in TA-46-1. No contaminants were found above SALs at outfall X. The unnamed outfall was not sampled during the 1994 campaign; it is included in Phase II sampling in Section 5.13.11 of this RFI report.

5.7.1 History

PRS 46-004(s) is discussed in RFI Work Plan for OU 1140, Subsection 5.4 (LANL 1993, 1093). Outfall X serves a trench and floor drain in room 133 of the south high bay of TA-46-1. The unnamed outfall serves the utility trench in room 131. All activities and processes that were conducted in the south high bay of TA-46-1 are not known; however, based on general process knowledge of TA-46-1, suspected contaminants include mercury, other inorganics, VOCs, SVOCs, and uranium. Both drains are plugged. (LANL 1993, 11-262).

5.7.2 Description

The outfalls are 4-in.-diameter cast iron pipes that discharged at the south side of TA-46-1 (Fig. 5.7.2-1). Engineering drawing ENG-C 3369 indicates that the floor and roof drains in the south high bay discharged to outfall X, an area scraped to near-bedrock. Effluent flowed a few feet to a ditch, PRS 46-007, that is part of a storm drain network discharging to Cañada del Buey. The outfall for this storm drain network is designated outfall M. The unnamed outfall is buried.

5.7.3 Previous Investigations

No previous investigations were conducted at this PRS.

5.7.4 Field Investigation

Two samples were collected for this PRS (Table 5.7.4-1). One sample was taken at outfall X, one sample in the channel below the outfall. Three additional samples were collected in the ditch below outfall X (Fig. 5.7.2-1).

TABLE 5.7.4-1

SUMMARY OF SAMPLES TAKEN

SAMPLE ID	LOCATION ID	DEPTH (ft)	MATRIX	INOR-GANICS	RADIO-NUCLIDES	VOCs[a]	SVOCs[b]	PCBs[c]	PESTI-CIDES
AAA9273	46-1086	0.5	Soil	20300	20006	19281	19281	19281	19281
AAA9274	46-1087	0.5	Soil	20300	20006	19281	19281	19281	19281
AAA9275	46-1088	1	Soil	20300	20006	19281	19281	19281	19281
AAA9278	46-1089	0.5	Soil	20300	20006	19281	19281	19281	19281
AAA9281	46-1090	0.5	Soil	20300	NA[d]	NA	19281	19281	19281

[a] VOCs = Volatile organic compounds.
[b] SVOCs = Semivolatile organic compounds.
[c] PCBs = Polychlorinated biphenyls.
[d] NA = Not analyzed.

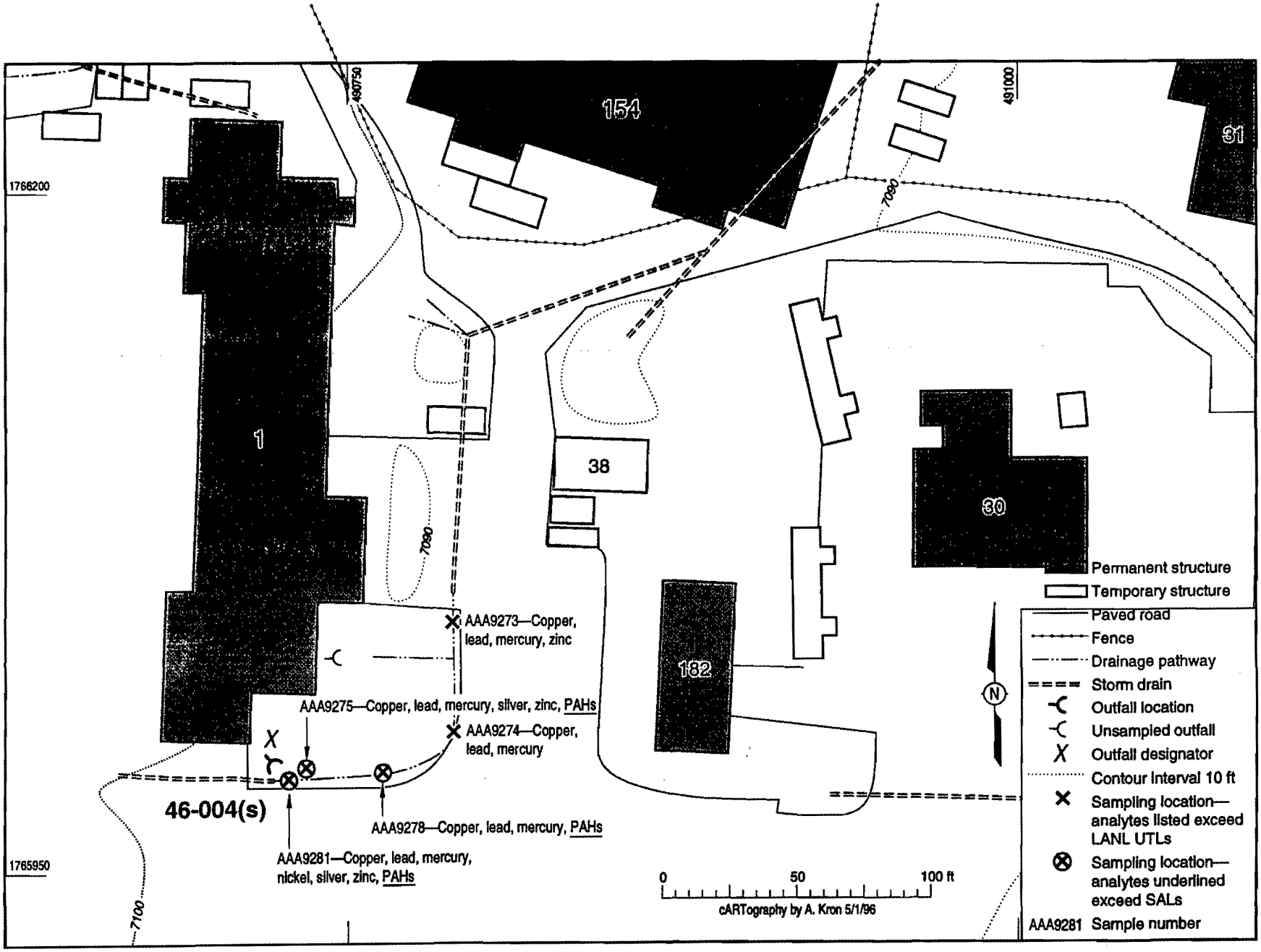


Fig. 5.7.2-1. PRS 46-004(s), floor and roof drains from TA-46-1, south high bay (outfall X).

5.7.5 Background Comparison

Seven inorganic contaminants were detected above LANL background UTLs but below SALs (Table 5.7.5-1). Although mercury results were qualified as estimated (J) based on missed holding time, values are accepted as reasonable estimates (Section 4.1 of this RFI report).

No radionuclides were detected above LANL UTLs.

TABLE 5.7.5-1

INORGANIC ANALYTES WITH CONCENTRATIONS GREATER THAN BACKGROUND UTLs AT PRS 46-004(s)

SAMPLE ID	DEPTH (ft)	COPPER (mg/kg)	LEAD (mg/kg)	MERCURY (mg/kg)	NICKEL (mg/kg)	SILVER (mg/kg)	ZINC (mg/kg)
SAL[a]	N/A[b]	2 800	400	23	1 500	380	23 000
LANL UTL[c]	N/A	15.5	23.3	0.1	15.2	ND[d]	50.8
AAA9273	0.5	**44.6**	**67.5**	0.29 (J)[e]	<4.5	<0.5	**84.5**
AAA9274	0.5	**16.6**	**23.8**	**0.21 (J)**	<3.9 (R)[f]	<2.4	34.6
AAA9275	1	**22.3**	**61.8**	**0.66**	<4.5	<3.2	42.2
AAA9275D[g]	1	**19.7**	**48.7**	**0.64**	4.5	**0.58**	39.1
AAA9278	0.5	**30.2**	**40.9**	**1.1 (J)**	<5.2 (R)	<0.48	49.5
AAA9281	0.5	**291**	**46.9**	**11.5 (J)**	**25.9 (J)**	**9.1**	**470**

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] UTL = Upper tolerance limit.
[d] ND = Not determined.
[e] J = Estimated result.
[f] R = Rejected result.
[g] D = duplicate sample.

5.7.6 Evaluation of Organics

Low levels of PAHs, several above SALs, were reported for this PRS (Table 5.7.6-1). These contaminants are attributed to continuing sources, asphalt paving and roofing tar from the large exposure areas at TA-46.

TABLE 5.7.6-1

PRS 46-004(s) SOIL CONCENTRATIONS FOR ORGANIC ANALYTES WITH VALUES GREATER THAN THE REPORTING LIMIT

SAMPLE ID	DEPTH (ft)	SVOC [a]	RESULT (mg/kg)	SAL [b] (mg/kg)	EQL [c] (mg/kg)
AAA9275	1	Acenaphthene	0.35	360	0.33
AAA9275	1	Anthracene	0.73 (J) [d]	19	0.33
AAA9281	0.5	Anthracene	0.43 (J)	19	0.33
AAA9275	1	Benzo[a]anthracene	1.4	0.61	0.33
AAA9278	0.5	Benzo[a]anthracene	0.55	0.61	0.33
AAA9281	0.5	Benzo[a]anthracene	0.9	0.61	0.33
AAA9275	1	Benzo[a]pyrene	1.9	0.061	0.33
AAA9278	0.5	Benzo[a]pyrene	0.83	0.061	0.33
AAA9281	0.5	Benzo[a]pyrene	1.3	0.061	0.33
AAA9275	1	Benzo[b]fluoranthene	1.9	0.61	0.33
AAA9278	0.5	Benzo[b]fluoranthene	0.85	0.61	0.33
AAA9281	0.5	Benzo[b]fluoranthene	1.3	0.61	0.33
AAA9275	1	Benzo[g,h,i]perylene	0.91	NC [e]	0.33
AAA9281	0.5	Benzo[g,h,i]perylene	0.43	NC	0.33
AAA9275	1	Benzo[k]fluoranthene	1.8	6.1	0.33
AAA9278	0.5	Benzo[k]fluoranthene	0.86	6.1	0.33
AAA9281	0.5	Benzo[k]fluoranthene	1.1	6.1	0.33
AAA9275	1	Chrysene	1.5	24	0.33
AAA9278	0.5	Chrysene	0.66	24	0.33
AAA9281	0.5	Chrysene	0.97	24	0.33
AAA9275	1	Dibenzo[a,h]anthracene	0.42	0.061	0.33
AAA9275	1	Fluoranthene	5.5	2 600	0.33
AAA9278	0.5	Fluoranthene	2.4	2 600	0.33
AAA9281	0.5	Fluoranthene	3.4	2 600	0.33
AAA9275	1	Indeno[1,2,3-cd]pyrene	0.94	0.61	0.33
AAA9278	0.5	Indeno[1,2,3-cd]pyrene	0.38	0.61	0.33
AAA9281	0.5	Indeno[1,2,3-cd]pyrene	0.49	0.61	0.33
AAA9275	1	Phenanthrene	3.4	NC	0.33
AAA9278	0.5	Phenanthrene	1.3	NC	0.33
AAA9281	0.5	Phenanthrene	2.1	NC	0.33
AAA9275	1	Pyrene	3.1 (J)	2 000	0.33
AAA9278	0.5	Pyrene	1.4 (J)	2 000	0.33
AAA9281	0.5	Pyrene	2.2 (J)	2 000	0.33

[a] SVOC = Semivolatile organic compound.
[b] SAL = Screening action level.
[c] EQL = Estimated quantitation level.
[d] J = Estimated result.
[e] NC = Not calculated.

5.7.7 Human Health

5.7.7.1 Screening Assessment

Inorganic constituents identified to be greater than LANL background UTLs were submitted for MCE screening for noncarcinogenic effects. Lead is excluded from this grouping because its toxicity is based on the uptake of lead in children as modeled by EPA's IUBEK Model (EPA 1994, 1178). The maximum lead concentration detected at this PRS (62 mg/kg) is below the SAL for lead (400 mg/kg). The sum of the maxima for the noncarcinogenic group is 0.7 (Table 5.7.7-1). This result is below the target value of 1, which indicates a low potential for adverse effects due to exposure to this grouping. Therefore, these constituents are not identified as potentially hazardous. No carcinogens resulting from LANL activities were detected above UTL; therefore, no MCE was performed for this grouping. No radionuclides were detected above UTL at this PRS; therefore, no MCE was performed for this grouping. Because PAHs are derived from continuing sources, they will not be carried forward in the screening process.

TABLE 5.7.7-1

MCE FOR NONCARCINOGENIC EFFECTS AT PRS 46-004(s)

CONTAMINANT	MAXIMUM SOIL CONCENTRATION (mg/kg)	SOIL SAL[a] (mg/kg)	CONCENTRATION NORMALIZED TO SAL
Copper	291	2 800	0.1
Mercury	12	23	0.5
Nickel	26	1 500	0.02
Silver	9	380	0.02
Zinc	470	23 000	0.02
Total			**0.7**

[a] SAL = Screening action level.

5.7.7.2 Risk Assessment

No risk assessment was performed for this PRS.

5.7.8 Ecological Assessment

This PRS may be recommended for NFA pending sampling at the unnamed outfall. The approach to ecological assessment is discussed in Section 3.5 of this RFI report.

5.7.9 Extent of Contamination

No contaminants at concentrations of concern were detected at sampling points for this PRS.

5.7.10 Conclusions and Recommendations

Copper, lead, mercury, nickel, silver, and zinc were found at PRS 46-004(s) above background UTLs, but below SALs. An MCE was performed for noncarcinogenic effects with a result (0.74) below the target value of 1. No MCE was performed for lead, carcinogenic, or radionuclide effects because multiple constituents for these groupings were not found above LANL UTLs. Although outfall X is eligible for NFA, the PRS is retained pending sampling at the unnamed outfall. The sampling and analysis plan is presented in Section 5.13.11 of this RFI report.

5.8 PRS 46-004(u)

PRS 46-004(u) (outfall F) was an outfall from an overflow pipe for the west concrete sump in TA-46-87. The pipe is now plugged. The PRS is recommended for NFA because no contamination associated with LANL activities was found above SALs.

5.8.1 History

PRS 46-004(u) is discussed in RFI Work Plan for OU 1140, Subsection 5.4 (LANL 1993, 1093). The sump in TA-46-87 receives effluent from two sinks in TA-46-25, a battery storage building that contained selective small-scale painting activities during the Rover Program (ICF Kaiser Engineers 1992, 11-214). The drain has been plugged inside TA-46-87 and is no longer used (LANL, 1993, 11-259). Suspected contaminants included VOCs, SVOCs, and inorganics.

5.8.2 Description

The outfall, located on the steep slope north of TA-46-87, is an 8-in.-diameter cast iron pipe that discharges to Cañada del Buey (Fig. 5.8.2-1). A steep runoff drainage channel from the mesa top has formed near the outfall. Effluent from the outfall quickly merges with the runoff channel. No channel has formed between the outfall and the runoff drainage.

5.8.3 Previous Investigations

No previous investigations were conducted at this PRS.

5.8.4 Field Investigation

Ten samples were collected for this PRS (Table 5.8.4-1). One sample (AAA9106) was taken at outfall F. Two samples were taken just below outfall F, two hand-augered samples (two samples each) and one surface sample at the toe of the steep slope, and one hand-augered sample (two samples) in the drainage channel on the level bench (Fig. 5.8.2-1). The lower samples also received effluent from outfalls G and I. Data from outfall MM, PRSs 46-004(a2), discussed in Section 5.13 of this RFI report, were also used in the decision process for this PRS.

TABLE 5.8.4-1

SUMMARY OF SAMPLES TAKEN

SAMPLE ID	LOCATION ID	DEPTH (ft)	INOR-GANICS	RADIO-NUCLIDES	VOCs[a]	SVOCs[b]	PCBs[c]	PESTI-CIDES
AAA9067	46-1010	0.5	19448	19843	19039	19039	19039	NA[d]
AAA9068	46-1010	1.5	19448	19843	19039	19039	19039	NA
AAA9070	46-1011	1	19448	19843	19039	19039	19039	NA
AAA9071	46-1011	2	19448	19843	19039	19039	19039	NA
AAA9073	46-1012	1	19448	19843	19039	19039	19039	NA
AAA9076	46-1013	0.5	19325	19848	NA	18707	18707	18707
AAA9077	46-1013	1.5	19325	19848	NA	18707	18707	18707
AAA9100	46-1021	0.3	19328	19846	NA	18708	18708	18708
AAA9103	46-1022	0.5	19328	19846	18708	18708	18708	18708
AAA9106	46-1023	0.25	19328	19846	NA	18708	NA	NA

[a] VOCs = Volatile organic compounds.
[b] SVOCs = Semivolatile organic compounds.
[c] PCBs = Polychlorinated biphenyls.
[d] NA = Not analyzed.

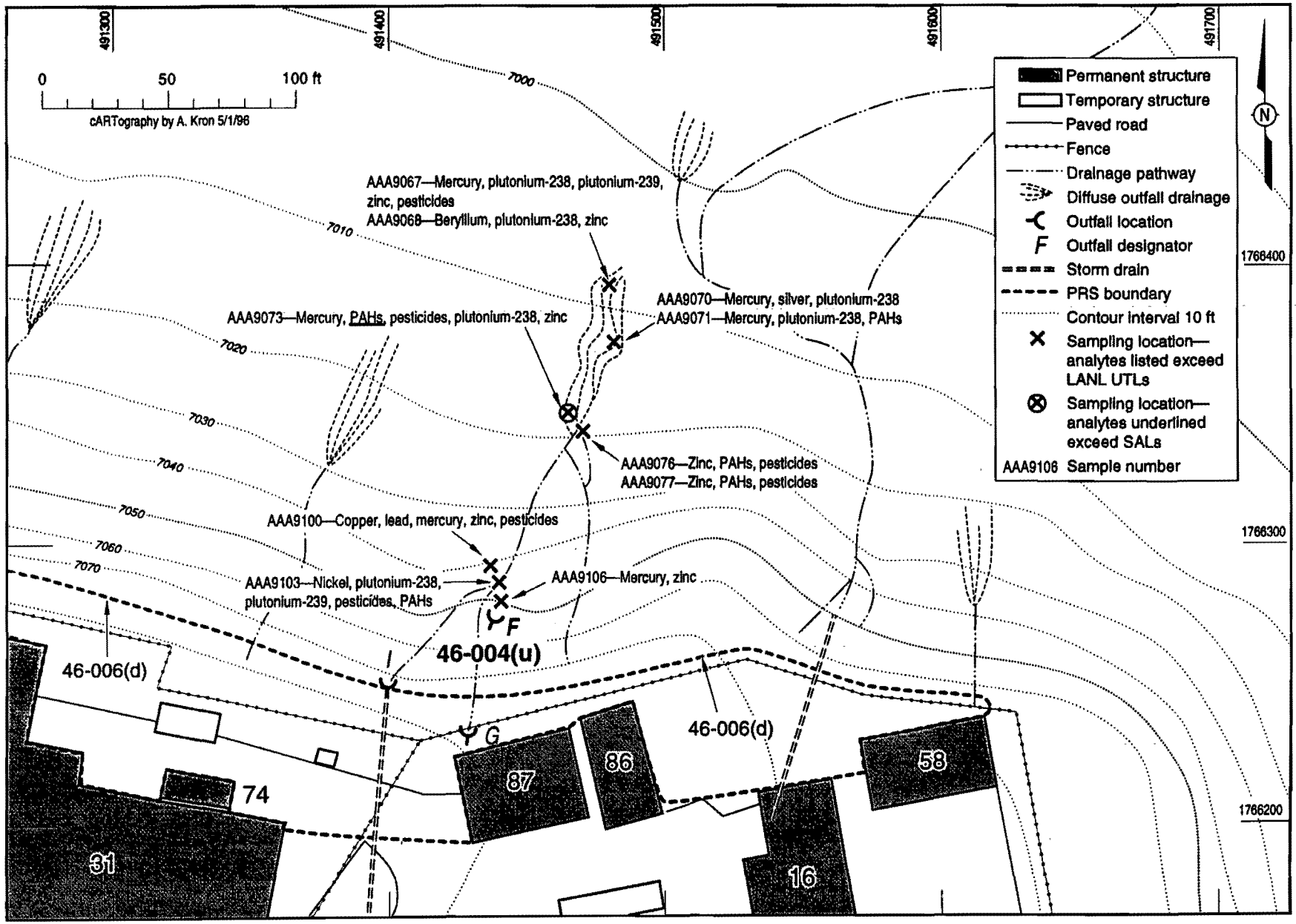


Fig. 5.8.2-1. PRS 46-004(u), west wet well from TA-46-87 (outfall F).

5.8.5 Background Comparison

Mercury, nickel, silver, and zinc were detected above LANL background UTLs but below SALs in all samples (Table 5.8.5-1). Although several mercury results were qualified as estimated (J) based on high spike recoveries, values are consistent with nonqualified results and are accepted as upper limits. Trace levels of plutonium isotopes were detected above LANL background UTL in all samples (Table 5.8.5-2).

TABLE 5.8.5-1

INORGANIC ANALYTES WITH CONCENTRATIONS GREATER THAN BACKGROUND UTLs FOR PRS 46-004(u)

SAMPLE ID	DEPTH (ft)	COPPER (mg/kg)	LEAD (mg/kg)	MERCURY (mg/kg)	NICKEL (mg/kg)	SILVER (mg/kg)	ZINC (mg/kg)
SAL[a]	N/A[b]	2 800	400	23	1 500	380	23 000
LANL UTL[c]	N/A	15.5	23.3	0.1	15.2	ND[d]	50.8
AAA9067	0.5	14.6	17	**0.42 (J)[e]**	<4.9	<1.2	**91.5**
AAA9068	1.5	7.8	8.7	<0.12	<8.5	<1.3	**59.2**
AAA9070	1	<2.9	8.2	**0.51J)**	<5.1	<1.1	31.4
AAA9070D[f]	1	4.1	9.5	**0.36 (J)**	5.2	**1.2**	35.4
AAA9071	2	<0.15	4.3	**0.51 (J)**	<3.8	<0.78	43.5
AAA9073	1	14.9	16.1	**1.2 (J)**	<3.3	<0.67	**100**
AAA9076	0.5	13.4	14.5	<0.1	2.5	<0.67	**98.9**
AAA9076D	0.5	13.7	16.3	<0.11	<2.1	<0.11	**102.7**
AAA9077	1.5	11	10.3	<0.11	<3.2	<0.12	**69.1**
AAA9100	0.3	**21.4**	**23.9**	**0.44**	<4.3	<0.13	**183**
AAA9100D	0.3	**20.3**	19.8	**0.32**	12.5	<0.13	**144**
AAA9103	0.7	<2.8	14.8	<0.12	**23.7**	<0.12	31.1
AAA9106	0.25	15.3	8.7	**0.21**	<4.1	<0.13	**415**

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] UTL = Upper tolerance limit.
[d] ND = Not determined.
[e] J = Estimated result.
[f] D = Duplicate analysis.

TABLE 5.8.5-2

RADIONUCLIDES WITH ACTIVITIES GREATER THAN BACKGROUND UTLs FOR PRS 46-004(u)

SAMPLE ID	DEPTH (ft)	PLUTONIUM-238 (pCi/g)	PLUTONIUM-239 (pCi/g)
SAL[a]	N/A[b]	27	24
LANL UTL[c]	N/A	0.014	0.0195
AAA9067	1	**0.0352 (J)[d]**	**0.0305 (J)**
AAA9068	1.5	**0.0232 (J)**	0.0056 (J)
AAA9070	1	**0.0479 (J)**	0.0096 (J)
AAA9071	2	**0.0297 (J)**	0.0035 (J)
AAA9073	1	**0.0313 (J)**	0.0039 (J)
AAA9103	0.7	**0.0251**	**0.0252**

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] UTL = Upper tolerance limit.
[d] J = Estimated result.

5.8.6 Evaluation of Organics

PCBs detected above SAL in one sample (AAA9073) are ascribed to PRS 46-006(d) in Section 5.21 of this RFI report. Low levels of PAHs and pesticides were reported for this PRS (Table 5.8.6-1). These contaminants are derived from continuing sources: asphalt paving and roofing tar.

TABLE 5.8.6-1

PRS 46-004(u) SOIL CONCENTRATIONS FOR ORGANIC ANALYTES WITH VALUES GREATER THAN THE REPORTING LIMIT

SAMPLE ID	DEPTH (ft)	SVOC [a] or VOC [b]	RESULT (mg/kg)	SAL [c] (mg/kg)	EQL [d] (mg/kg)
AAA9073	1	Benzo[a]pyrene	0.43	0.061	0.33
AAA9073	1	Benzo[k]fluoranthene	0.61	6.1	0.33
AAA9076	0.5	Benzo[k]fluoranthene	0.55	6.1	0.33
AAA9073	1	Chrysene	0.38	24	0.33
AAA9076	0.5	Chrysene	0.47	24	0.33
AAA9073	1	Fluoranthene	1.1	2 600	0.33
AAA9103	0.5	Methylene chloride	0.051	11	0.005
AAA9073	1	Phenanthrene	0.85	NC [e]	0.33
AAA9076	0.5	Phenanthrene	0.63	NC	0.33
AAA9073	1	Pyrene	0.68	2 000	0.33
AAA9077	1.5	Pyrene	0.4	2 000	0.33
SAMPLE ID	**DEPTH (ft)**	**PESTICIDES**	**RESULT (mg/kg)**	**SAL (mg/kg)**	**EQL (mg/kg)**
AAA9067	0.5	BHC [alpha-]	0.00395	NC	0.0017
AAA9067	0.5	Dieldrin	0.00079	0.028	0.0033
AAA9073	1	BHC [alpha-]	0.0176	NC	0.0017
AAA9073	1	DDD [p,p'-]	0.0199	1.9	0.0033
AAA9073	1	Endrin aldehyde	0.0607	NC	0.0033
AAA9076	0.5	BHC [delta-]	0.16 (J) [f]	NC	0.0017
AAA9076	0.5	DDD [p,p'-]	0.021	1.9	0.0033
AAA9076	0.5	DDE [p,p'-]	0.0835 (J)	1.3	0.0033
AAA9076	0.5	Endrin aldehyde	0.18 (J)	NC	0.0033
AAA9076	0.5	Heptachlor epoxide	0.0048 (J)	0.049	0.0017
AAA9076	0.5	Lindane	0.082 (J)	NC	0.0017
AAA9076	0.5	Methoxychlor	0.24	330	0.0165
AAA9077	1.5	Heptachlor epoxide	0.0029 (J)	0.049	0.0017
AAA9077	1.5	Lindane	0.0124 (J)	NC	0.0017
AAA9100	0.3	Heptachlor epoxide	0.0046	0.049	0.0017
AAA9100	0.3	Lindane	0.0077	NC	0.0017
AAA9103	0.25	Lindane	0.0028 (J)	NC	0.0017

[a] SVOC = Semivolatile organic compound.
[b] VOC = Volatile organic compound.
[c] SAL = Screening action level.
[d] EQL = Estimated quantitation level.
[e] NC = Not calculated.
[f] J = Estimated result.

5.8.7 Human Health

5.8.7.1 Screening Assessment

Inorganic contaminants identified to be greater than LANL background UTLs were submitted for an MCE for noncarcinogenic effects. The sum of the maxima for the noncarcinogenic group is less than 0.1 (Table 5.8.7-1). This result is below the target value of 1, which indicates a low potential for adverse effects due to exposure to this grouping. Therefore, these contaminants are not identified as potentially hazardous.

PCBs were detected in only one sample and at a concentration above the SAL. PCBs are assigned to PRS 46-006(d) and discussed in Section 5.21.6 of this RFI report. Low levels of PAHs were reported above SALs. PAHs at TA-46 are attributed to parking lot runoff, an ongoing source, and will not be carried forward in the screening process. Low levels of pesticides were detected. Because their use at TA-46 was in accordance with established practice, pesticides will not be carried forward in the screening process.

Plutonium isotopes were detected above UTL. An MCE was not performed because inspection of the data indicates that the result will be far below 1.

TABLE 5.8.7-1

MCE FOR NONCARCINOGENIC EFFECTS AT PRS 46-004(u)

CONTAMINANT	MAXIMUM SOIL CONCENTRATION (mg/kg)	SOIL SAL[a] (mg/kg)	CONCENTRATION NORMALIZED TO SAL
Mercury	0.51	23	0.02
Nickel	24	1 500	0.02
Silver	1.2	380	0.003
Zinc	415	23 000	0.02
Total			**0.06**

[a] SAL = Screening action level.

5.8.7.2 Risk Assessment

No risk assessment was performed for this PRS.

5.8.8 Ecological Assessment

This PRS is recommended for NFA because no COPCs were detected. The approach to ecological assessment is discussed in Section 3.5 of this RFI report.

5.8.9 Extent of Contamination

No contaminants at concentrations of concern were detected at sampling points for this PRS.

5.8.10 Conclusions and Recommendations

Copper, lead, mercury, nickel, silver, zinc, and plutonium isotopes were found at PRS 46-004(u) above background UTLs, but below SALs. An MCE was performed for noncarcinogenic effects with a result (0.06) far below the target value of 1. No MCE was performed for lead or carcinogenic effects because multiple constituents for these groupings were not found above LANL UTLs. Based on NFA criterion 5, a Class III permit modification is requested to remove this site from the HSWA Module of the Laboratory's RCRA operating permit.

5.9 PRS 46-004(v)

PRS 46-004(v) (outfall G) is the outfall for roof drains and an unused sump from TA-46-87. The PRS is recommended for NFA because no contaminants were detected above SALs.

5.9.1 History

PRS 46-004(v) is discussed in the RFI Work Plan for OU 1140, Subsection 5.4 (LANL 1993, 1093). TA-46-87 is the pump house for the associated inactive cooling tower, TA-46-86. TA-46-87 houses two sumps and mechanical equipment associated with the cooling tower. One sump is not in use. The east sump draining to outfall G was a cooling water reservoir for the tower and is not plugged (LANL 1993, 11-259). It now collects storm water runoff from roof drains. Suspected contaminants included SVOCs. Unpermitted discharges to the environment are prohibited at LANL in accordance with LANL Administrative Requirement, Section 9.

5.9.2 Description

OutfallG is a 6-in.-diameter cast iron pipe located northwest of TA-46-87. The outfall discharges to Cañada del Buey (Fig. 5.9.2-1). The drainage channel from the outfall merges with channels from outfalls I and F.

5.9.3 Previous Investigation(s)

No previous investigations were conducted at this PRS.

5.9.4 Field Investigation

Ten samples were collected for this PRS (Table 5.9.4-1). One sample (AAA9109) was taken at outfall G. Remaining samples were taken from the drainage below the outfall that also received runoff from outfall I and effluent from outfall F [PRS 46-004(u) described in Section 5.8 of this RFI report]. Sample locations are shown in Fig. 5.9.2-1. Data from outfall MM, PRS 46-004(a2), discussed in Section 5.13 of this RFI report, were also considered in the decision process for this PRS. Data from this PRS were also considered for the decision for PRS 46-006(d), discussed in Section 5.21 of this RFI report.

TABLE 5.9.4-1

SUMMARY OF SAMPLES TAKEN

SAMPLE ID	LOCATION ID	DEPTH (ft)	MATRIX	INORGANICS	RADIONUCLIDES	VOCs[a]	SVOCs[b]	PCBs[c]	PESTICIDES
AAA9067	46-1010	1	Soil	19448	19843	19039	19039	19039	NA[d]
AAA9068	46-1010	1.5	Soil	19448	19843	19039	19039	19039	NA
AAA9070	46-1011	1	Soil	19448	19843	19039	19039	19039	NA
AAA9071	46-1011	2	Soil	19448	19843	19039	19039	19039	NA
AAA9073	46-1012	1	Soil	19448	19843	19039	19039	19039	NA
AAA9076	46-1013	0.5	Soil	19325	19848	NA	18707	18707	18707
AAA9077	46-1013	1.5	Soil	19325	19848	NA	18707	18707	18707
AAA9100	46-1021	0.3	Soil	19328	19846	NA	18708	18708	18708
AAA9103	46-1022	0.5	Soil	19328	19846	18708	18708	18708	18708
AAA9109	46-1024	0.3	Soil	19328	19846	NA	18708	NA	NA

[a] VOCs = Volatile organic compounds.
[b] SVOCs = Semivolatile organic compounds.
[c] PCBs = Polychlorinated biphenyls.
[d] NA = Not analyzed.

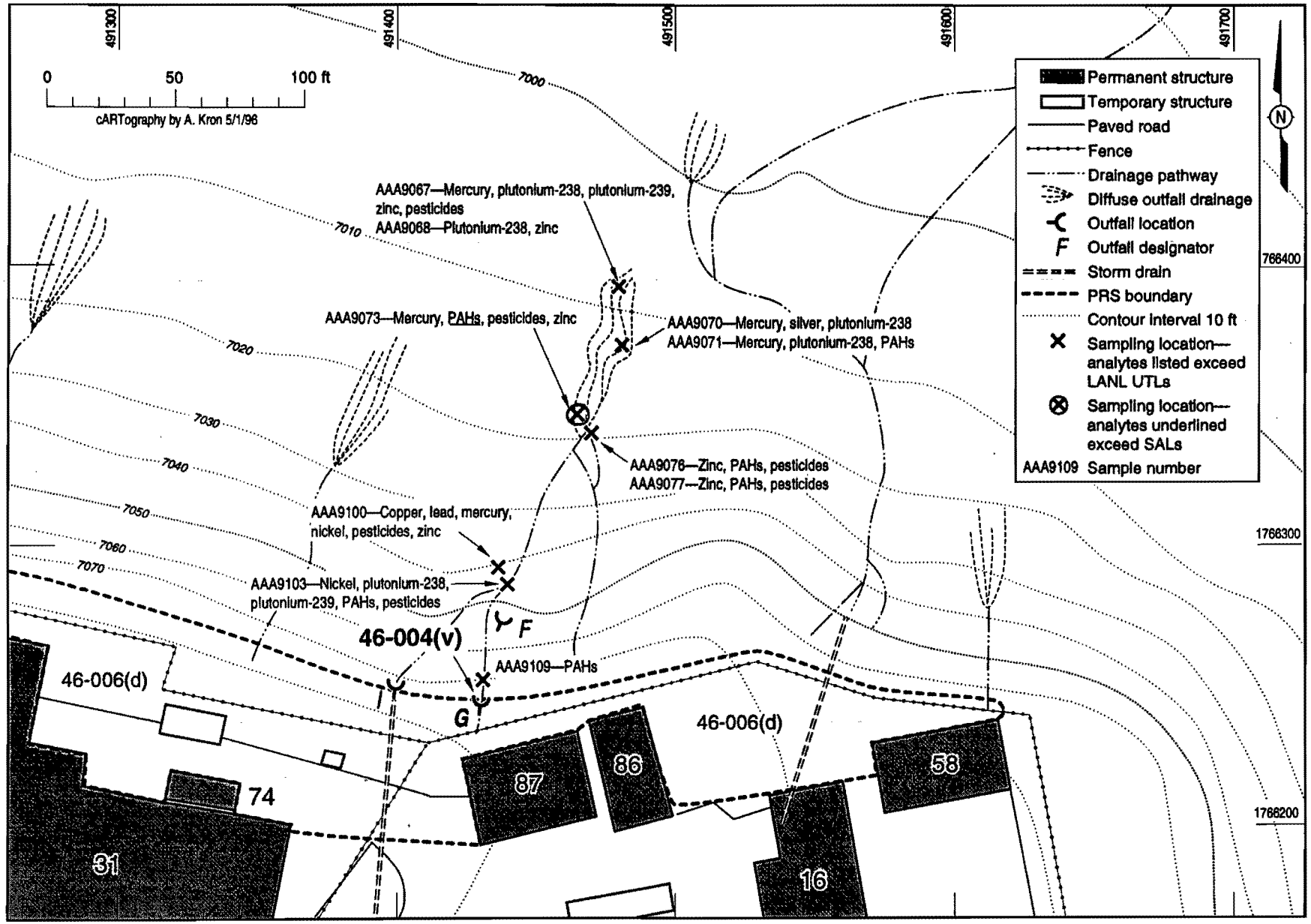


Fig. 5.9.2-1. PRS-004(v), industrial drain from TA-46-87 (outfall G).

5.9.5 Background Comparison

Beryllium was detected slightly above the LANL (0.95, 0.95) UTL. Mercury, nickel, silver, and zinc were detected above LANL background UTLs but below SALs (Table 5.9.5-1). Mercury results were qualified because of high matrix spike recovery, but are considered valid for decision purposes at this PRS.

Trace levels of plutonium isotopes were detected above LANL background UTL in six samples (Table 5.9.5-2).

TABLE 5.9.5-1

INORGANIC ANALYTES WITH CONCENTRATIONS GREATER THAN BACKGROUND UTLs FOR PRS 46-004(v)

SAMPLE ID	DEPTH (ft)	COPPER (mg/kg)	LEAD (mg/kg)	MERCURY (mg/kg)	NICKEL (mg/kg)	SILVER (mg/kg)	ZINC (mg/kg)
SAL[a]	N/A[b]	2 800	400	23	1 500	380	23 000
LANL UTL[c]	N/A	15.5	23.3	0.1	15.2	ND[d]	50.8
AAA9067	0.5	14.6	17	**0.42 (J)[e]**	<4.9	<1.2	**91.5**
AAA9068	1.5	7.8	8.7	<0.12	<8.5	<1.3	**59.2**
AAA9070	1	<2.9	8.2	**0.51J)**	<5.1	<1.1	31.4
AAA9070D[f]	1	4.1	9.5	**0.36 (J)**	5.2	**1.2**	35.4
AAA9071	2	<0.15	4.3	**0.51 (J)**	<3.8	<0.78	43.5
AAA9073	1	14.9	16.1	**1.2 (J)**	<3.3	<0.67	**100**
AAA9076	0.5	13.4	14.5	<0.1	2.5	<0.67	**98.9**
AAA9076D	0.5	13.7	16.3	<0.11	<2.1	<0.11	**102.7**
AAA9077	1.5	11	10.3	<0.11	<3.2	<0.12	**69.1**
AAA9100	0.3	**21.4**	**23.9**	**0.44**	<4.3	<0.13	**183**
AAA9100D	0.3	**20.3**	19.8	**0.32**	12.5	<0.13	**144**
AAA9103	0.7	<2.8	14.8	<0.12	**23.7**	<0.12	31.1

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] UTL = Upper tolerance limit.
[d] ND = Not determined.
[e] J = Estimated result.
[f] D = Duplicate analysis.

TABLE 5.9.5-2

RADIONUCLIDES WITH ACTIVITIES GREATER THAN BACKGROUND UTLs FOR PRS 46-004(v)

SAMPLE ID	DEPTH (ft)	PLUTONIUM-238 (pCi/g)	PLUTONIUM-239 (pCi/g)
SAL[a]	N/A[b]	27	24
LANL UTL[c]	N/A	0.014	0.0195
AAA9067	1	**0.0352 (J)[d]**	**0.0305 (J)**
AAA9068	1.5	**0.0232 (J)**	0.0056 (J)
AAA9070	1	**0.0479 (J)**	0.0096 (J)
AAA9071	2	**0.0297 (J)**	0.0035 (J)
AAA9073	1	**0.0313 (J)**	0.0039 (J)
AAA9103	0.7	**0.0251**	**0.0252**

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] UTL = Upper tolerance limit.
[d] J = Estimated result.

5.9.6 Evaluation of Organics

Because PCBs detected in these samples originated from activities in TA-46-31, PCBs are assigned to PRS 46-006(d) as discussed in Section 5.21.6 of this RFI report. Low levels of PAHs and pesticides were reported for this PRS (Table 5.9.6-1). These contaminants are derived from continuing sources, asphalt paving and roofing tar.

TABLE 5.9.6-1

PRS 46-004(v) SOIL CONCENTRATIONS FOR ORGANIC ANALYTES WITH VALUES GREATER THAN THE REPORTING LIMIT

SAMPLE ID	DEPTH (ft)	SVOC [a] or VOC [b]	RESULT (mg/kg)	SAL [c] (mg/kg)	EQL [d] (mg/kg)
AAA9109	0.3	Benzo[a]anthracene	0.45	0.61	0.33
AAA9073	1	Benzo[a]pyrene	0.43	0.061	0.33
AAA9073	1	Benzo[k]fluoranthene	0.61	6.1	0.33
AAA9076	0.5	Benzo[k]fluoranthene	0.55	6.1	0.33
AAA9073	1	Chrysene	0.38	24	0.33
AAA9076	0.5	Chrysene	0.47	24	0.33
AAA9109	0.3	Chrysene	0.48	24	0.33
AAA9073	1	Fluoranthene	1.1	2 600	0.33
AAA9109	0.3	Fluoranthene	1.1	3 600	0.33
AAA9103	0.5	Methylene chloride	0.051	11	0.005
AAA9073	1	Phenanthrene	0.85	NC [e]	0.33
AAA9076	0.5	Phenanthrene	0.63	NC	0.33
AAA9109	0.3	Phenanthrene	0.74	NC	0.33
AAA9073	1	Pyrene	0.68	2 000	0.33
AAA9077	1.5	Pyrene	0.4	2 000	0.33
AAA9109	0.3	Pyrene	0.92	2 000	0.33
SAMPLE ID	**DEPTH (ft)**	**PESTICIDES**	**RESULT (mg/kg)**	**SAL (mg/kg)**	**EQL (mg/kg)**
AAA9067	1	BHC [alpha-]	0.00395	NC	0.0017
AAA9073	1	BHC [alpha-]	0.0176	NC	0.0017
AAA9076	0.5	BHC [delta-]	0.16 (J) [f]	NC	0.0017
AAA9073	1	DDD [p,p'-]	0.0199	1.9	0.0033
AAA9076	0.5	DDD [p,p'-]	0.021	1.9	0.0033
AAA9076	0.5	DDE [p,p'-]	0.0835 (J)	1.3	0.0033
AAA9067	1	Dieldrin	0.00079	0.28	0.0033
AAA9073	1	Endrin aldehyde	0.0607	NC	0.0033
AAA9076	0.5	Endrin aldehyde	0.18 (J)	NC	0.0033
AAA9076	0.5	Heptachlor epoxide	0.0048 (J)	0.049	0.0017
AAA9077	1.5	Heptachlor epoxide	0.0029 (J)	0.049	0.0017
AAA9100	0.3	Heptachlor epoxide	0.0046 (J)	0.049	0.0017
AAA9076	0.5	Lindane	0.082 (J)	NC	0.0017
AAA9077	1.5	Lindane	0.0124 (J)	NC	0.0017
AAA9100	0.3	Lindane	0.0077 (J)	NC	0.0017
AAA9103	0.5	Lindane	0.0028 (J)	NC	0.0017
AAA9076	0.5	Methoxychlor	0.24	330	0.0165

[a] SVOC = Semivolatile organic compound.
[b] VOC = Volatile organic compound.
[c] SAL = Screening action level.
[d] EQL = Estimated quantitation level.
[e] NC = Not calculated.
[f] J = Estimated result.

5.9.7 Human Health

5.9.7.1 Screening Assessment

Several constituents were detected above background UTLs but below SALs. Inspection of the data indicates MCE screening would yield a value less than 1. Because PAHs are derived from continuing sources and pesticides were used in customary practice, they will not be carried forward in the screening process.

5.9.7.2 Risk Assessment

No risk assessment was performed for this PRS.

5.9.8 Ecological Assessment

This PRS is recommended for NFA because no COPCs were detected. The approach to ecological assessment is discussed in Section 3.5 of this RFI report.

5.9.9 Extent of Contamination

No contaminants at concentrations of concern were detected at sampling points for this PRS.

5.9.10 Conclusions and Recommendations

Copper, lead, mercury, nickel, silver, and zinc were found at PRS 46-004(v) above background UTLs, but below SALs. Inspection of inorganic and plutonium isotipic data indicates that MCE screening results in a value far below 1. No MCE was performed for lead or carcinogenic effects because multiple constituents for these groupings were not found above LANL UTLs. Based on NFA criterion 5, a Class III permit modification is requested to remove this site from the HSWA Module of the Laboratory's RCRA operating permit.

5.10 PRS 46-004(x)

PRS 46-004(x) (outfall J) is an outfall from TA-46-31. Because no contaminants associated with LANL activities were found above SALs, the outfall is recommended for NFA.

5.10.1 History

PRS 46-004(x) is discussed in RFI Work Plan for OU 1140, Subsection 5.4 (LANL 1993, 1093). It serves roof drains and possibly a potable water drain from TA-46-31 (LANL 1993, 11-259). TA-46-31 has been the site of many experimental programs over the years. It is now primarily a laser laboratory with offices and shops. Based on general activity and process information

about the building, possible contaminants were listed in the TA-46 work plan as mercury, other inorganics, VOCs, SVOCs, uranium, and thorium. Further studies of the source drains after the work plan was written indicate that these contaminants are unlikely at outfall J.

Because the drain from TA-46-31 is not plugged (LANL 1993, 11-259), outfall J is considered active. Although diverse research projects are still performed in the building, unpermitted discharges to the environment are currently prohibited at LANL.

5.10.2 Description

The outfall is a 6-in.-diameter cast iron pipe, located northeast of TA-46-31, that discharges to Cañada del Buey (Fig. 5.10.2-1). The pipe projects approximately 1 ft beyond the steep canyon slope. A drainage channel 1–2 ft wide has formed beneath the pipe and extends to the toe of the slope.

5.10.3 Previous Investigation(s)

No previous investigations were conducted at this PRS.

5.10.4 Field Investigation

Eight samples were collected for this PRS (Table 5.10.4-1). Sample AAA9097 was taken at outfall J. Data from this PRS were also used for the decision for PRS 46-006(d) discussed in Section 5.21 of this RFI report.

TABLE 5.10.4-1

SUMMARY OF SAMPLES TAKEN

SAMPLE ID	LOCATION ID	DEPTH (ft)	MATRIX	INOR-GANICS	RADIO-NUCLIDES	VOCs[a]	SVOCs[b]	PCBs[c]	PESTI-CIDES
AAA9079	46-1014	1	Soil	19325	19848	NA [d]	18707	18707	18707
AAA9082	46-1015	0.5	Soil	19325	19848	18707	18707	18707	18707
AAA9085	46-1016	0.5	Soil	19325	19848	18707	18707	18707	18707
AAA9088	46-1017	0.5	Soil	19325	19848	18707	18707	18707	18707
AAA9091	46-1018	0.5	Soil	19328	19846	18708	18708	18708	18708
AAA9094	46-1019	0.5	Soil	19328	19846	18708	18708	18708	18708
AAA9439	46-1143	0.5	Soil	19328	19846	18708	18708	18708	18708
AAA9097	46-1020	0.5	Soil	19328	19846	18708	18708	18708	18708

[a] VOCs = Volatile organic compounds.
[b] SVOCs = Semivolatile organic compounds.
[c] PCBs = Polychlorinated biphenyls.
[d] NA = Not analyzed.

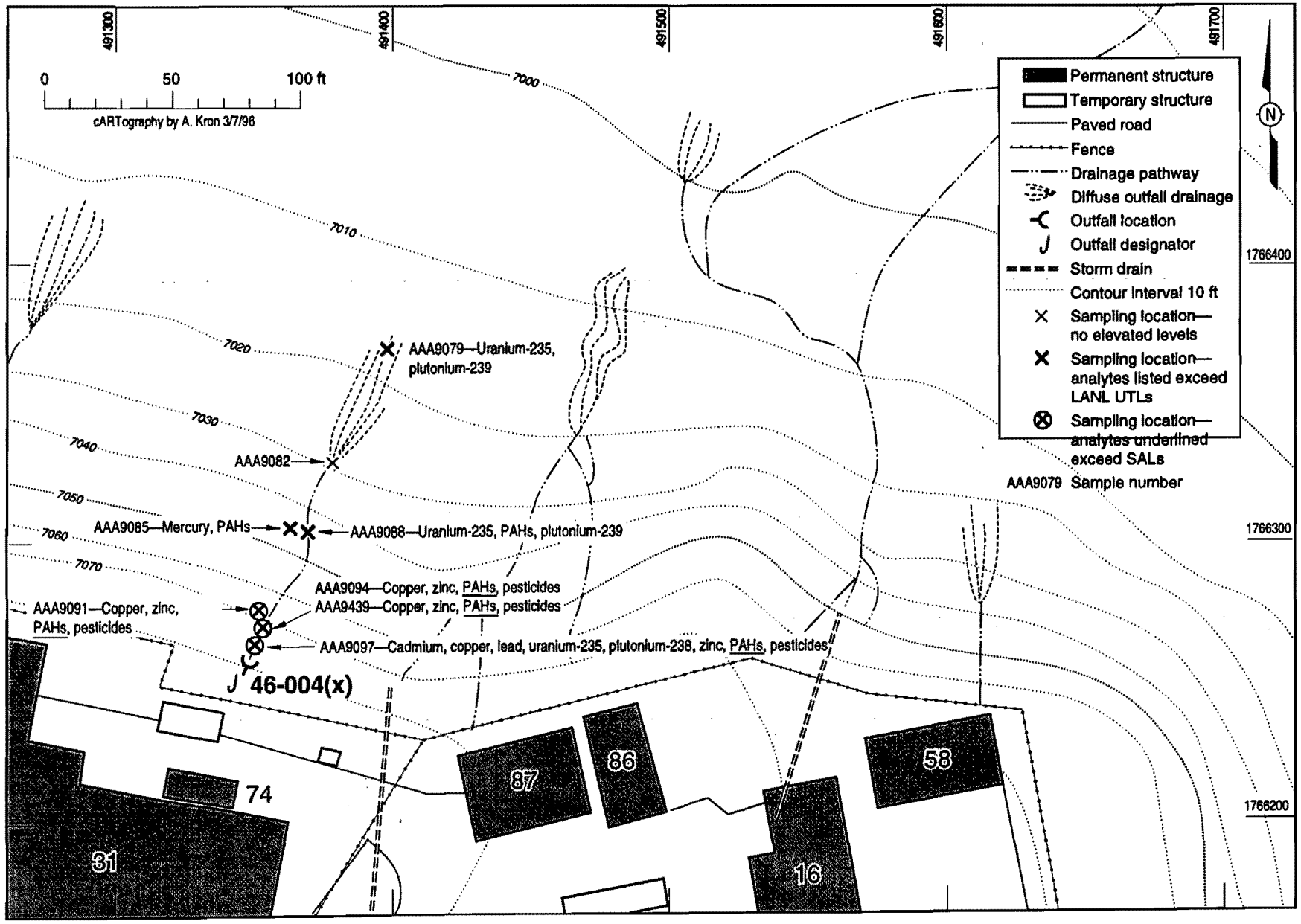


Fig. 5.10.2-1. PRS 46-004(x), industrial drain from TA-46-31 (outfall J).

5.10.5 Background Comparison

Five inorganic contaminants were detected above LANL background UTLs but below SALs (Table 5.10.5-1). Trace levels of uranium-235 were detected above UTL in three samples (Table 5.10.5-2). Two results are qualified as estimates because of high recovery of the laboratory control sample. Uranium-235 results for sample AAA9097 were rejected because of 4.2% tracer recovery; results are accepted as representative because normalization of the result (6.3 mg/kg) would not exceed the SAL of 10 pCi/g.

TABLE 5.10.5-1

INORGANIC ANALYTES WITH CONCENTRATIONS GREATER THAN BACKGROUND UTLs FOR PRS 46-004(x)

SAMPLE ID	DEPTH (ft)	CADMIUM (mg/kg)	COPPER (mg/kg)	LEAD (mg/kg)	MERCURY (mg/kg)	ZINC (mg/kg)
SAL[a]	N/A[b]	38	2 800	400	23	23 000
LANL UTL[c]	N/A	2.7	15.5	23.3	0.1	50.8
AAA9085	0.5	<0.07	<4.8	8	**0.34**	28.5
AAA9091	0.5	<0.91	**21.9**	7.8	<0.12	**124**
AAA9094	0.5	1.5	**35.8**	8.3	<0.13	**161**
AAA9439	0.5	<1.2	**35.3**	10.1	<0.13	**168**
AAA9097	0.5	**5.1**	**274**	**30.4**	<0.19	**886**

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] UTL = Upper tolerance limit.

TABLE 5.10.5-2

RADIONUCLIDES WITH ACTIVITIES GREATER THAN BACKGROUND UTLs FOR PRS 46-004(x)

SAMPLE ID	DEPTH (ft)	URANIUM-235 (pCi/g)	PLUTONIUM-238 (pCi/g)	PLUTONIUM-239 (pCi/g)
SAL[a]	N/A[b]	10	27	24
LANL UTL[c]	N/A	0.084	0.014	0.0195
AAA9079	1	**0.0853 (J)[d]**	not detected	**0.0853 (J)**
AAA9088	0.5	**0.0949 (J)**	0.0007	**0.0949 (J)**
AAA9097	0.5	**0.2641 (R)[e]**	**0.0316**	0.0150

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] UTL = Upper tolerance limit.
[d] J = Estimated result.
[e] R = Rejected.

5.10.6 Evaluation of Organics

Pesticides and low levels of PAHs, several above SALs, were reported for this PRS (Table 5.10.6-1). PAHs are derived from continuing sources: asphalt paving and roofing tar. Pesticide residues are due to routine sitewide use.

TABLE 5.10.6-1

PRS 46-004(x) SOIL CONCENTRATIONS FOR ORGANIC ANALYTES WITH VALUES GREATER THAN THE REPORTING LIMIT

SAMPLE ID	DEPTH (ft)	SVOC [a] or VOC [b]	RESULT (mg/kg)	SAL [c] (mg/kg)	EQL [d] (mg/kg)
AAA9094	0.5	Acenaphthene	4.1	360	0.33
AAA9097	0.5	Acenaphthene	0.49	360	0.33
AAA9439	0.5	Acenaphthene	7.8	360	0.33
AAA9094	0.5	Acenaphthylene	2.3	NC [e]	0.33
AAA9439	0.5	Acenaphthylene	2.8	NC	0.33
AAA9097	0.5	Acetone	0.42 (J) [f]	2 000	0.33
AAA9091	0.5	Anthracene	0.55	19	0.02
AAA9094	0.5	Anthracene	2.9	19	0.33
AAA9097	0.5	Anthracene	0.64	19	0.33
AAA9439	0.5	Anthracene	5.5	19	0.33
AAA9091	0.5	Benzo[a]anthracene	1.9	0.61	0.33
AAA9094	0.5	Benzo[a]anthracene	5.7	0.61	0.33
AAA9097	0.5	Benzo[a]anthracene	2.9	0.61	0.33
AAA9439	0.5	Benzo[a]anthracene	9.4	0.61	0.33
AAA9091	0.5	Benzo[a]pyrene	2	0.061	0.33
AAA9094	0.5	Benzo[a]pyrene	5.2	0.061	0.33
AAA9097	0.5	Benzo[a]pyrene	2.8	0.061	0.33
AAA9439	0.5	Benzo[a]pyrene	7.8	0.061	0.33
AAA9091	0.5	Benzo[b]fluoranthene	4.9	0.61	0.33
AAA9094	0.5	Benzo[b]fluoranthene	11	0.61	0.33
AAA9097	0.5	Benzo[b]fluoranthene	8.5	0.61	0.33
AAA9439	0.5	Benzo[b]fluoranthene	17	0.61	0.33
AAA9091	0.5	Benzo[g,h,i]perylene	0.89	NC	0.33
AAA9094	0.5	Benzo[g,h,i]perylene	1.7	NC	0.33
AAA9097	0.5	Benzo[g,h,i]perylene	1.2	NC	0.33
AAA9439	0.5	Benzo[g,h,i]perylene	3.2 (J)	NC	0.33
AAA9094	0.5	Benzo[k]fluoranthene	3.1	6.1	0.33
AAA9439	0.5	Benzo[k]fluoranthene	5.6	6.1	0.33
AAA9091	0.5	Bis(2-ethylhexyl)phthalate	0.88	32	0.33

TABLE 5.10.6-1 (CONTINUED)

PRS 46-004(x) SOIL CONCENTRATIONS FOR ORGANIC ANALYTES WITH VALUES GREATER THAN THE REPORTING LIMIT

SAMPLE ID	DEPTH (ft)	SVOC[a] or VOC[b]	RESULT (mg/kg)	SAL[c] (mg/kg)	EQL[d] (mg/kg)
AAA9085	0.5	Chrysene	0.47	24	0.33
AAA9091	0.5	Chrysene	3.8	24	0.33
AAA9094	0.5	Chrysene	15	24	0.33
AAA9097	0.5	Chrysene	6.2	24	0.33
AAA9439	0.5	Chrysene	26	24	0.33
AAA9094	0.5	Dibenzofuran	3.7	260	0.33
AAA9097	0.5	Dibenzofuran	0.57	260	0.33
AAA9439	0.5	Dibenzofuran	12	260	0.33
AAA9439	0.5	Dibenzo[a,h]anthracene	0.91 (J)	0.061	0.33
AAA9085	0.5	Fluoranthene	0.76	2 600	0.33
AAA9088	0.5	Fluoranthene	0.41	2 600	0.33
AAA9091	0.5	Fluoranthene	8.8	2 600	0.33
AAA9094	0.5	Fluoranthene	40	2 600	0.33
AAA9097	0.5	Fluoranthene	14	2 600	0.33
AAA9439	0.5	Fluoranthene	74	2 600	0.33
AAA9094	0.5	Fluorene	4.7	2 600	0.33
AAA9097	0.5	Fluorene	0.5	2 600	0.33
AAA9439	0.5	Fluorene	11	2 600	0.33
AAA9091	0.5	Indeno[1,2,3-cd]pyrene	1	0.61	0.33
AAA9094	0.5	Indeno[1,2,3-cd]pyrene	2.1	0.61	0.33
AAA9097	0.5	Indeno[1,2,3-cd]pyrene	1.4	0.61	0.33
AAA9439	0.5	Indeno[1,2,3-cd]pyrene	5.1	0.61	0.33
AAA9094	0.5	Methylnaphthalene [2-]	2.5	NC	0.33
AAA9439	0.5	Methylnaphthalene [2-]	9.8	NC	0.33
AAA9094	0.5	Methylphenol [4-]	0.54	NC	0.33
AAA9439	0.5	Methylphenol [4-]	1.2	NC	0.33
AAA9094	0.5	Naphthalene	9.4	800	0.33
AAA9097	0.5	Naphthalene	2.6	800	0.33
AAA9439	0.5	Naphthalene	39	800	0.33
AAA9091	0.5	Phenanthrene	4.4	NC	0.33
AAA9094	0.5	Phenanthrene	38	NC	0.33
AAA9097	0.5	Phenanthrene	10	NC	0.33
AAA9439	0.5	Phenanthrene	83	NC	0.33
AAA9439	0.5	Phenol	0.56	39 000	0.33

TABLE 5.10.6-1 (CONTINUED)

PRS 46-004(x) SOIL CONCENTRATIONS FOR ORGANIC ANALYTES WITH VALUES GREATER THAN THE REPORTING LIMIT

SAMPLE ID	DEPTH (ft)	SVOC [a] or VOC [b]	RESULT (mg/kg)	SAL [c] (mg/kg)	EQL [d] (mg/kg)
AAA9085	0.5	Pyrene	0.87	2 000	0.33
AAA9088	0.5	Pyrene	0.45	2 000	0.33
AAA9091	0.5	Pyrene	8.6	2 000	0.33
AAA9094	0.5	Pyrene	32	2 000	0.33
AAA9097	0.5	Pyrene	14	2 000	0.33
AAA9439	0.5	Pyrene	62	2 000	0.33
SAMPLE ID	**DEPTH (ft)**	**PESTICIDES**	**RESULT (mg/kg)**	**SAL (mg/kg)**	**EQL (mg/kg)**
AAA9439	0.5	DDD [p,p'-]	0.0045 (J)	1.9	0.0033
AAA9091	0.5	DDE [p,p'-]	0.0063 (J)	1.3	0.0033
AAA9094	0.5	DDE [p,p'-]	0.023 (J)	1.3	0.0033
AAA9439	0.5	DDE [p,p'-]	0.011 (J)	1.3	0.0033
AAA9439	0.5	DDT [p,p'-]	0.012 (J)	1.3	0.0033
AAA9091	0.5	Endrin aldehyde	0.0075 (J)	NC	0.0033
AAA9094	0.5	Endrin aldehyde	0.017 (J)	NC	0.0033
AAA9097	0.5	Endrin aldehyde	0.0099 (J)	NC	0.0033
AAA9439	0.5	Endrin aldehyde	0.014 (J)	NC	0.0033
AAA9094	0.5	Heptachlor epoxide	0.007 (J)	0.049	0.0017
AAA9097	0.5	Heptachlor epoxide	0.003	0.049	0.0017

[a] SVOC = Semivolatile organic compound.
[b] VOC = Volatile organic compound.
[c] SAL = Screening action level.
[d] EQL = Estimated quantitation level.
[e] NC = Not calculated.
[f] J = Estimated result.

5.10.7 Human Health

5.10.7.1 Screening Assessment

As was evident in the discussion of the PRS in Section 5.10.5 of this RFI report, several constituents were detected above background UTLs but below SALs. Inspection of the data indicates that MCE screening would yield a value less than the target limit of 1. Because PAHs are derived from continuing sources, they will not be carried forward in the screening process.

5.10.7.2 Risk Assessment

No risk assessment was performed for this PRS.

5.10.8 Ecological Assessment

This PRS is recommended for NFA because no COPCs were detected. The approach to ecological assessment is discussed in Section 3.5 of this RFI report.

5.10.9 Extent of Contamination

No contaminants at concentrations of concern were detected at sampling points for this PRS.

5.10.10 Conclusions and Recommendations

Cadmium, copper, lead, mercury, and zinc were found at PRS 46-004(x) above background UTLs, but below SALs. Inspection of the data indicates that an MCE for noncarcinogenic effects would yield a result far below the target value of 1. No MCEs were performed for lead, carcinogenic, or radionuclide effects because multiple constituents due to operational releases for these groupings were not found above LANL UTLs. PAHs and pesticides are not due to operational releases. Based on NFA criterion 5, a Class III permit modification is requested to remove this site from the HSWA Module of the Laboratory's RCRA operating permit.

5.11 PRS 46-004(y)

PRS 46-004(y) (outfall K) was an outfall for sinks, drains, and cooling water blowdown from the central portion of TA-46-31. Because no contaminants associated with laboratory activities were found above SALs, the outfall is recommended for NFA.

5.11.1 History

PRS 46-004(y) is discussed in RFI Work Plan for OU 1140, Subsection 5.4 (LANL 1993, 1093). Outfall K was an outfall from sinks, drains, and cooling water blowdown from the central portion of TA-46-31. Historical information indicates that uranium and possibly thorium were used in several rooms in TA-46-31 (Ehrenkranz 1964, 11-043). Based on general activity and process information, suspected contaminants included mercury, other inorganics, VOCs, SVOCs, uranium, and thorium.

The drainpipe leading to outfall K was rerouted and connected the LANL sanitary sewer system prior to 1993. The outfall is now inactive (LANL 1993, 11-259).

5.11.2 Description

The outfall is a 6-in.-diameter cast iron pipe labeled NPDES 03A043 and located north of TA-46-31 (Fig. 5.11.2-1). It discharges to Cañada del Buey. Engineering drawing ENG-C 22752 indicates that floor and roof drains, laboratory sinks, and fume hoods in TA-46-31 were plumbed to this outfall (McCulla 1992, 11-203).

5.11.3 Previous Investigations

No previous investigations were conducted at this PRS.

5.11.4 Field Investigation

Six samples were collected for this PRS (Table 5.11.4-1). One sample (AAA9342) was taken at outfall K. Two samples were taken just below outfall K, one hand auger location (two samples) at the toe of the slope, and one sample in the drainage on the level bench (Fig. 5.11.2-1). Data from this PRS were also used for the decision for PRS 46-006(d) discussed in Section 5.21 of this RFI report.

TABLE 5.11.4-1

SUMMARY OF SAMPLES TAKEN

SAMPLE ID	LOCATION ID	DEPTH (ft)	MATRIX	INOR-GANICS	RADIO-NUCLIDES	VOCs[a]	SVOCs[b]	PCBs[c]
AAA9112	46-1025	0.5	Soil	19326	19845	18762	18762	18762
AAA9115	46-1026	0.5	Soil	19326	19845	18762	18762	18762
AAA9116	46-1026	3	Soil	19326	19845	18762	18762	18762
AAA9336	46-1121	0.5	Soil	19326	19845	18762	18762	18762
AAA9339	46-1122	0.5	Soil	19326	19845	NA[d]	18762	18762
AAA9342	46-1123	0.5	Soil	19326	19845	18762	18762	18762

[a] VOCs = Volatile organic compounds.
[b] SVOCs = Semivolatile organic compounds.
[c] PCBs = Polychlorinated biphenyls.
[d] NA = Not analyzed.

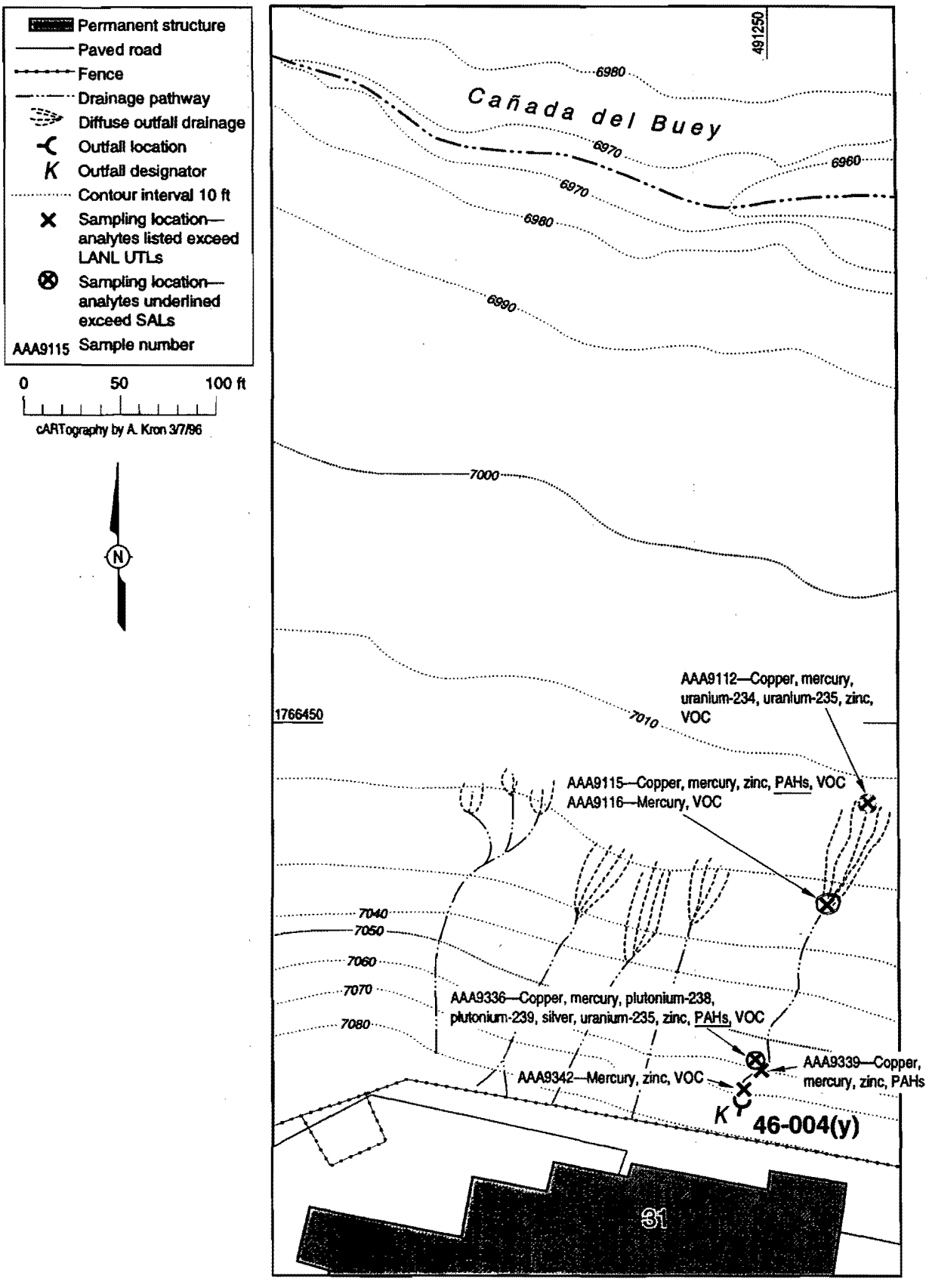


Fig. 5.11.2-1. PRS 46-004(y), cooling tower outfall from TA-46-31 (oufall K).

5.11.5 Background Comparison

Copper, mercury, nickel, and zinc were detected above LANL background UTLs but below SALs (Table 5.11.5-1). Scattered samples contained low and trace levels of radionuclides (Table 5.11.5-2).

TABLE 5.11.5-1

INORGANIC ANALYTES WITH CONCENTRATIONS GREATER THAN BACKGROUND UTLs FOR PRS 46-004(y)

SAMPLE ID	DEPTH (ft)	COPPER (mg/kg)	MERCURY (mg/kg)	NICKEL (mg/kg)	SILVER (mg/kg)	ZINC (mg/kg)
SAL[a]	N/A[b]	2 800	23	1 500	380	23 000
LANL UTL[c]	N/A	15.5	0.1	15.2	ND[d]	50.8
AAA9112	0.5	**21.2**	**2.4**	<6	<0.45	**148**
AAA9115	0.5	**34.8**	**1.7**	<3.9	<0.44	**328**
AAA9116	3	6	**0.28**	<4.2	<0.24	**73.8**
AAA9336	0.5	**26.2**	**8.4**	13.9	<0.58	**152**
AAA9336D[e]	0.5	**45.9**	**9.7**	**15.7**	**0.50**	**167**
AAA9339	0.5	**42.7**	**2.4**	<4.4	<1.2	**217**
AAA9342	0.5	8.4	**0.83**	<6.3	<0.37	**70.3**

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] UTL = Upper tolerance limit.
[d] D = Duplicate analysis.

TABLE 5.11.5-2

RADIONUCLIDES WITH ACTIVITIES GREATER THAN BACKGROUND UTLs FOR PRS 46-004(y)

SAMPLE ID	DEPTH (ft)	URANIUM-234 (pCi/g)	URANIUM-235 (pCi/g)	PLUTONIUM-238 (pCi/g)	PLUTONIUM-239 (pCi/g)
SAL[a]	N/A[b]	13	10	27	24
LANL UTL[c]	N/A	1.94	0.084	0.014	0.052
AAA9112	0.5	**2.724 (J)[d]**	**0.1721 (J)**	0.0083 (J)	0.0166 (J)
AAA9336	0.5	1.229(J)	**0.1042(J)**	**0.0261(J)**	**0.4105(J)**

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] UTL = Upper tolerance limit.
[d] J = Estimated result.

5.11.6 Evaluation of Organics

Low levels of VOCs and PAHs were reported for this PRS with three PAHs above SAL (Table 5.11.6-1). The PAHs are derived from continuing sources: asphalt paving and roofing tar.

TABLE 5.11.6-1

PRS 46-004(y) SOIL CONCENTRATIONS FOR ORGANIC ANALYTES WITH VALUES GREATER THAN THE REPORTING LIMIT

SAMPLE ID	DEPTH (ft)	SVOC [a] or VOC [b]	RESULT (mg/kg)	SAL [c] (mg/kg)	EQL [d] (mg/kg)
AAA9115	0.5	Anthracene	0.41	19	0.33
AAA9115	0.5	Benzo[a]anthracene	1.1	0.61	0.33
AAA9336	0.5	Benzo[a]anthracene	3.7	0.61	0.33
AAA9115	0.5	Benzo[a]pyrene	0.78	0.061	0.33
AAA9115	0.5	Benzo[b]fluoranthene	1.2	0.61	0.33
AAA9115	0.5	Chrysene	0.93	24	0.33
AAA9115	0.5	Fluoranthene	2.4	2 600	0.33
AAA9336	0.5	Fluoranthene	7.3	2 600	0.33
AAA9339	0.5	Fluoranthene	8.3	2 600	0.33
AAA9115	0.5	Indeno[1,2,3-cd]pyrene	0.44	0.61	0.33
AAA9112	0.5	Methylene chloride	0.008	11	0.005
AAA9115	0.5	Methylene chloride	0.009	11	0.005
AAA9116	3	Methylene chloride	0.009	11	0.005
AAA9336	0.5	Methylene chloride	0.008	11	0.005
AAA9342	0.5	Methylene chloride	0.009	11	0.005
AAA9115	0.5	Phenanthrene	1.6	NC [e]	0.33
AAA9336	0.5	Phenanthrene	6.4	NC	0.33
AAA9339	0.5	Phenanthrene	6.2	NC	0.33
AAA9115	0.5	Pyrene	1.9	2 000	0.33
AAA9336	0.5	Pyrene	6.5	2 000	0.33
AAA9339	0.5	Pyrene	7.3	2 000	0.33
AAA9336	0.5	Trichlorofluoromethane	0.006	710	0.005

[a] SVOC = Semivolatile organic compound.
[b] VOC = Volatile organic compound.
[c] SAL = Screening action level.
[d] EQL = Estimated quantitation level.
[e] NC = Not calculated.

5.11.7 Human Health

5.11.8.1 Screening Assessment

Several constituents were detected above background UTLs but below SALs. Inspection of the data indicates that MCE screening would yield a value less than the target limit of 1. PAHs above SALs are due to continuing sources, such as asphalt paving and roofing tar, and will not be carried forward in the screening process.

5.11.8.2 Risk Assessment

No risk assessment was performed for this PRS.

5.11.8.3 Ecological Assessment

This PRS is recommended for NFA because no COPCs were detected. The approach to ecological assessment is discussed in Section 3.5 of this RFI report.

5.11.9 Extent of Contamination

No contaminants at concentrations of concern were detected at sampling points for this PRS.

5.11.10 Conclusions and Recommendations

Copper, mercury, silver, and zinc were found at PRS 46-004(y) above background UTLs, but below SALs. Inspection of the data indicates that results of an MCE for noncarcinogenic and radionuclide effects are far below the target value of 1. No MCE was performed for lead or carcinogenic effects because multiple constituents for these groupings were not found above LANL UTLs. Based on NFA criterion 5, a Class III permit modification is requested to remove this site from the HSWA Module of the Laboratory's RCRA operating permit.

5.12 PRS 46-004(z)

PRS 46-004(z) (outfall L) is the outfall from roof and floor drains in TA-46-31. Because no contaminants were found above SALs, the outfall is recommended for NFA.

5.12.1 History

PRS 46-004(z) is discussed in RFI Work Plan for OU 1140, Subsection 5.4 (LANL 1993, 1093). Outfall L served roof drains and two floor drains in rooms 160 through 172 of TA-46-31, called the west high bay. Based on general activity and process information, suspected contaminants included mercury, other inorganics, SVOCs, VOCs, uranium, and thorium.

As a best management practice, the two floor drains leading to outfall K were rerouted to the LANL sanitary sewer system prior to 1993. Only two roof drains now discharge to outfall L (LANL 1993, 11-259).

5.12.2 Description

The outfall is a 6-in.-diameter cast iron pipe, located northwest of building TA-46-31, that discharges to Cañada del Buey (Fig. 5.12.2-1).

5.12.3 Previous Investigation(s)

No previous investigations were conducted at this PRS.

5.12.4 Field Investigation

Ten samples were collected for this PRS (Table 5.12.4-1). No samples were taken at outfall L. Because a concrete pad lies beneath the pipe, no sample was collected there. Two samples were taken at the toe of the slope. The remaining were taken in three drainage channels diverging onto the level bench. (Fig. 5.12.2-1).

TABLE 5.12.4-1

SUMMARY OF SAMPLES TAKEN

SAMPLE ID	LOCATION ID	DEPTH (ft)	MATRIX	INOR-GANICS	RADIO-NUCLIDES	VOCs[a]	SVOCs[b]	PCBs[c]	PESTI-CIDES
AAA9133	46-1034	0.5	Soil	19322	19844	18828	18828	18828	18828
AAA9136	46-1035	0.5	Soil	19447	19842	NA [d]	18927	18927	18927
AAA9145	46-1038	0.3	Soil	19447	19842	NA	18927	18927	18927
AAA9148	46-1039	0.3	Soil	19447	19842	NA	18927	18927	18927
AAA9151	46-1040	0.5	Soil	19447	19842	NA	18927	18927	18927
AAA9154	46-1041	1	Soil	19447	19842	18927	18927	18927	18927
AAA9157	46-1042	1	Soil	19447	19842	18927	18927	18927	18927
AAA9158	46-1042	4	Soil	19447	19842	18927	18927	18927	18927
AAA9160	46-1043	1	Soil	19447	19842	18927	18927	18927	18927
AAA9161	46-1043	3	Soil	19447	19842	18927	18927	18927	18927

[a] VOCs = Volatile organic compounds.
[b] SVOCs = Semivolatile organic compounds.
[c] PCBs = Polychlorinated biphenyls.
[d] NA = Not analyzed.

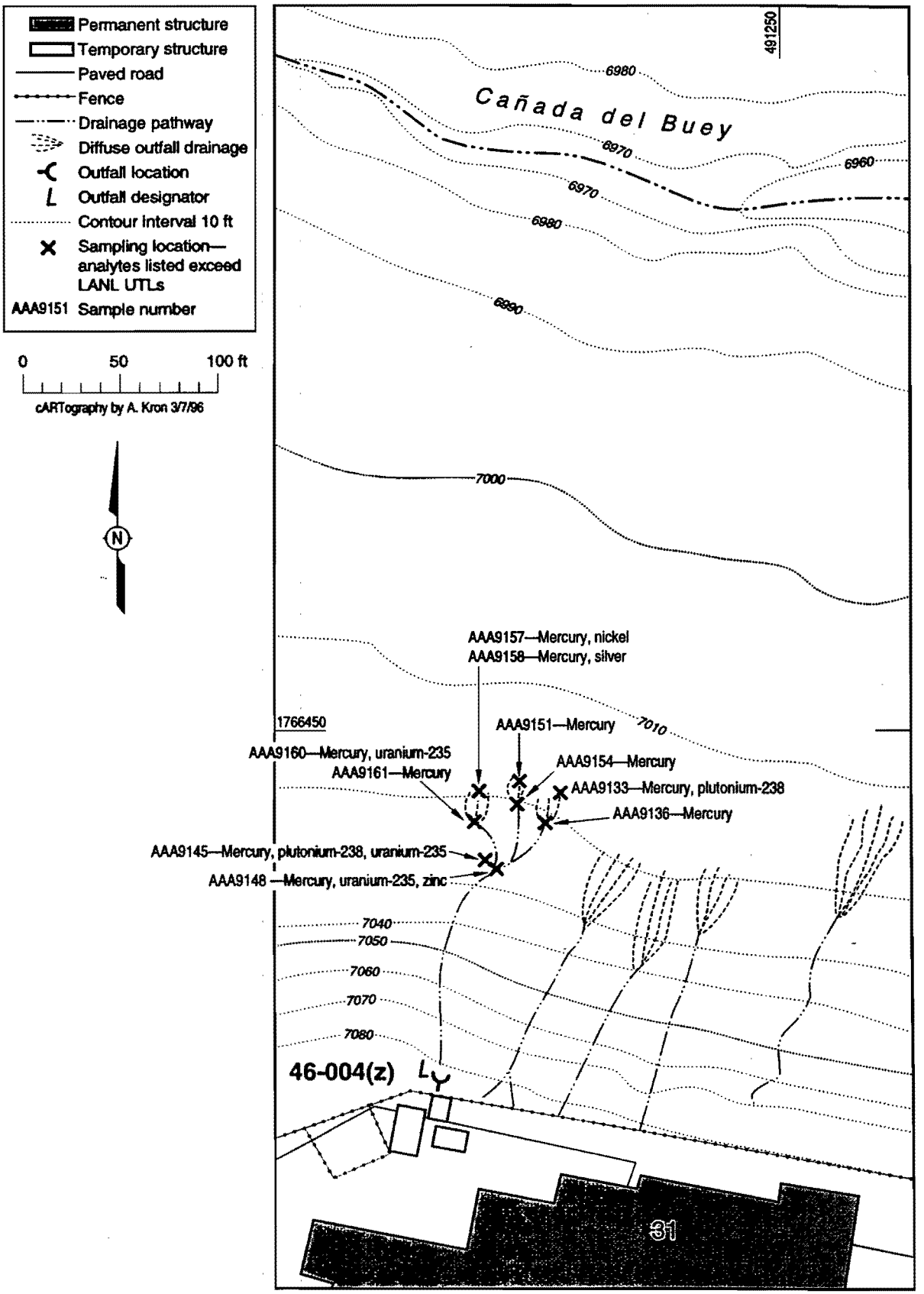


Fig. 5.12.2-1. PRS 46-004(z), industrial drain from TA-46-31 (outfall L).

5.12.5 Background Comparison

Mercury was detected above LANL background UTL in all samples. Nickel and zinc were detected above LANL UTLs, but below SALs, in isolated samples. Silver was found in one subsurface sample but not in the duplicate analysis (Table 5.12.5-1). Trace levels of uranium and plutonium isotopes were detected above UTLs (Table 5.12.5-2).

TABLE 5.12.5-1

INORGANIC ANALYTES WITH CONCENTRATIONS GREATER THAN BACKGROUND UTLs FOR PRS 46-004(z)

SAMPLE ID	DEPTH (ft)	MERCURY (mg/kg)	NICKEL (mg/kg)	SILVER (mg/kg)	ZINC (mg/kg)
SAL[a]	N/A[b]	23	1 500	380	23 000
LANL UTL[c]	N/A	0.1	15.2	ND[d]	50.8
AAA9133	0.5	**0.41**	<3.4	<0.1	20.1
AAA9136	0.5	**0.5**	<3.5	<0.11	32.5
AAA9145	0.3	**1.3**	<4	<0.11	37.1
AAA9148	0.3	**0.49**	<5.3	<0.12	**72.7**
AAA9151	0.5	**0.21**	<7.4	<0.1	21
AAA9154	1	**1.1**	<2.6	<0.11	24.3
AAA9157	1	**0.59**	**261**	<0.17	21.9
AAA9158	4	**0.52**	<8.5	<0.43	35.7
AAA9158D[e]	4	**0.45**	<8.5	**0.38**	31
AAA9160	1	**0.69**	<3.7	<0.12	28.9
AAA9161	3	**0.28**	<6.4	<0.11	34

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] UTL = Upper tolerance limit.
[d] ND = Not determined.
[e] D = Duplicate analysis.

TABLE 5.12.5-2

RADIONUCLIDES WITH ACTIVITIES GREATER THAN BACKGROUND UTLs FOR PRS 46-004(z)

SAMPLE ID	DEPTH (ft)	URANIUM-235 (pCi/g)	PLUTONIUM-238 (pCi/g)
SAL[a]	N/A[b]	10	27
LANL UTL[c]	N/A	0.084	0.014
AAA9133	0.5	0.0189 (J)[d]	**0.0174 (J)**
AAA9145	0.33	**0.147 (J)**	0.0011 (J)
AAA9145D[e]	0.33	0.0618	**0.0268**
AAA9148	0.33	**0.1976 (J)**	0.0026 (J)
AAA9160	0.5	**0.1221 (J)**	0.004 (J)

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] UTL = Upper tolerance limit.
[d] J = Estimated result.
[e] D = Duplicate sample.

5.12.6 Evaluation of Organics

No organics were detected at this PRS.

5.12.7 Human Health

5.12.7.1 Screening Assessment

Inorganic contaminants identified to be greater than LANL background UTLs were submitted for MCE for noncarcinogenic effects. The sum of the maxima for the noncarcinogenic group is less than 0.1, below the target value of 1, indicating a low potential for adverse effects due to exposure to this grouping (Table 5.12.7-1). Therefore, these contaminants are not identified as potentially hazardous. Only trace levels of radionuclides were detected above UTL at this PRS; therefore, no MCE was performed for this grouping.

TABLE 5.12.7-1

MCE FOR NONCARCINOGENIC EFFECTS AT PRS 46-004(z)

CONTAMINANT	MAXIMUM SOIL CONCENTRATION (mg/kg)	SOIL SAL[a] (mg/kg)	CONCENTRATION NORMALIZED TO SAL
Mercury	1.3	23	0.057
Silver	0.38	380	0.001
Zinc	73	23 000	0.003
Total			**0.061**

[a] SAL = Screening action level.

5.12.7.2 Risk Assessment

No risk assessment was performed for this PRS.

5.12.8 Ecological Assessment

This PRS is recommended for NFA because no COPCs were detected. The approach to ecological assessment is discussed in Section 3.5 of this RFI report.

5.12.9 Extent of Contamination

No contaminants at concentrations of concern were detected at sampling points for this PRS.

5.12.10 Conclusions and Recommendations

Mercury, silver, and zinc were found at PRS 46-004(z) above background UTLs, but below SALs. An MCE was performed for noncarcinogenic effects with a result (0.061) far below the target value of 1. Concentrations for uranium and plutonium are low enough to indicate that an MCE would yield a result far below the target value of 1 for radionuclide effects. No MCE was performed for lead or carcinogenic effects because multiple constituents for these groupings were not found above LANL UTLs. Based on NFA criterion 5, a Class III permit modification is requested to remove this site from the HSWA Module of the Laboratory's RCRA operating permit.

5.13 PRS 46-004(a2)

PRS 46-004(a2) (outfall MM) was the outfall from sink and floor drains in TA-46-31. Although no contaminants associated with LANL activities were found above SALs, information discovered subsequent to implementing field work indicates that material most likely to be contaminated was not sampled. A Phase II sampling plan is proposed.

5.13.1 History

PRS 46-004(a2) is discussed in RFI Work Plan for OU 1140, Subsection 5.4 (LANL 1993, 1093). Outfall MM served the southeast quadrant of TA-46-31. Engineering drawing ENG-C 25879 indicates that sinks and drains from rooms 101, 103, and 105, were plumbed to this industrial drain. Historical information indicates that fissionable materials were used in several rooms in TA-46-31 (Ehrenkranz 1964, 11-043). Based on general activity and process information, suspected contaminants included mercury, other inorganics, VOCs, SVOCs, uranium, thorium, and PCBs.

All lines leading to this outfall have been rerouted to the LANL sanitary sewage system. Outfall MM is plugged and inactive (LANL 1993, 11-259)

5.13.2 Description

Outfall MM was a 6-in.-diameter cast iron pipe located midway up a steep, 20 ft-high slope The pipe discharged to a shallow ditch located between the slope and the asphalt paving west of TA-46-25 (Fig. 5.13.2-1). The ditch is part of a storm drain network serving the northeastern quadrant of TA-46. From the outfall, the ditch leads approximately 50 ft to a culvert that discharges to the steep slope of Cañada del Buey at outfall I (ICF Kaiser Engineers 1992, 11-214). Construction work at outfall MM prior to ER sampling resulted in some original soil being moved from the ditch to the adjacent bank.

5.13.3 Previous Investigation(s)

No previous investigations were conducted at this PRS.

5.13.4 Field Investigation

Twelve samples were collected for this PRS (Table 5.13.4-1). One sample (AAA9329) was taken at outfall MM and two in the shallow drainage on the mesa top below it. Two samples were taken from a sediment trap approximately 100 ft below outfall I. The remaining samples were from drainage locations at the toe of the slope and on the bench below outfall I (Fig. 5.13.2-1). Outfalls F [PRS 46-004(u)] and G [PRS 46-004(v)] also contribute to this drainage.

TABLE 5.13.4-1

SUMMARY OF SAMPLES TAKEN

SAMPLE ID	LOCATION ID	DEPTH (ft)	MATRIX	INOR-GANICS	RADIO-NUCLIDES	VOCs[a]	SVOCs[b]	PCBs[c]	PESTI-CIDES
AAA9067	46-1010	1	soil	19448	19843	19039	19039	19039	19039
AAA9068	46-1010	1.5	soil	19448	19843	19039	19039	19039	19039
AAA9070	46-1011	1	soil	19448	19843	19039	19039	19039	19039
AAA9071	46-1011	2	soil	19448	19843	19039	19039	19039	19039
AAA9073	46-1012	1	soil	19448	19843	19039	19039	19039	19039
AAA9076	46-1013	1	soil	19325	19848	NA[d]	18707	18707	18707
AAA9077	46-1013	1.5	soil	19325	19848	NA	18707	18707	18707
AAA9100	46-1021	0.3	soil	19328	19846	NA	18708	18708	18708
AAA9103	46-1022	0.7	soil	19328	19846	18708	18708	18708	18708
AAA9323	46-1114	0.5	soil	19674	20005	NA	19266	19266	19266
AAA9326	46-1116	0.3	soil	19674	20005	NA	19266	19266	19266
AAA9329	46-1115	0.5	soil	19674	20005	NA	19266	19266	19266

[a] VOCs = Volatile organic compounds.
[b] SVOCs = Semivolatile organic compounds.
[c] PCBs = Polychlorinated biphenyls.
[d] NA = Not analyzed.

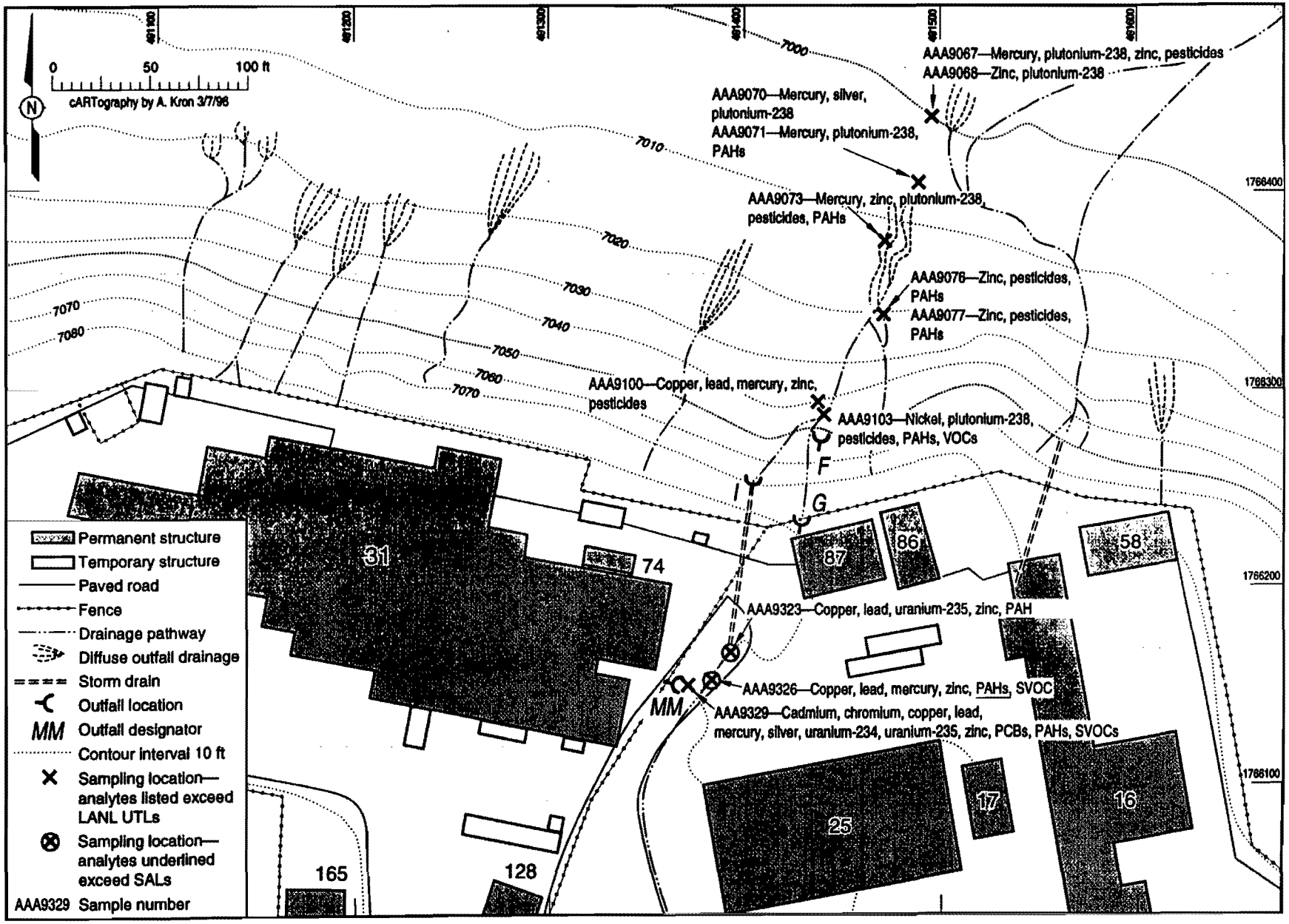


Fig. 5.13.2-1. PRS 46-004(a2), industrial drain from TA-46-31.

5.13.5 Background Comparison

Eight inorganic contaminants were detected above LANL background UTL but below SALs (Table 5.13.5-1). Trace levels of uranium and plutonium isotopes were detected above UTL (Table 5.13.5-2).

TABLE 5.13.5-1

INORGANIC ANALYTES WITH CONCENTRATIONS GREATER THAN BACKGROUND UTLs FOR PRS 46-004(a2)

SAMPLE ID	DEPTH (ft)	CADMIUM (mg/kg)	CHROMIUM (mg/kg)	COPPER (mg/kg)	LEAD (mg/kg)	MERCURY (mg/kg)	NICKEL (mg/kg)	SILVER (mg/kg)	ZINC (mg/kg)
SAL[a]	N/A[b]	38	210	2 800	400	23	1 500	380	23 000
LANL UTL[c]	N/A	2.7	19.3	15.5	23.3	0.1	15.2	ND[d]	50.8
AAA9067	1	<0.1 (R)[e]	6.6	14.6	17 (J)[f]	0.42 (J)	<4.9	<1.2	91.5
AAA9068	1.5	<0.07 (R)	13	7.8	8.7 (J)	<0.12	<8.5	<1.3	59.2
AAA9070	1	<0.07 (R)	5.5	<2.9	8.2 (J)	0.51 (J)	<5.1	<1.1	31.4
AAA9070D[g]	1	<0.07 (R)	5.4	4.1	9.5 (J)	0.36 (J)	5.2	1.2	35.4
AAA9071	2	<0.07 (R)	3	<1.5	4.3 (J)	0.51 (J)	<3.8	<0.78	43.5
AAA9073	1	<0.15	4.4	14.9	16.1	1.2	<3.3	<0.67	100
AAA9076	1	<0.44	2.6	13.4	16.3	<0.1	2.5	<0.67	98.9
AAA9076D	1	<0.12	3	13.7	14.5	<0.11	<2.1	<0.11	102.7
AAA9077	1.5	<0.07	4.9	11	10.3	<0.11	<3.2	<0.12	69.1
AAA9100	0.3	<0.36	5.6	21.4	23.9	0.44	<4.3	<0.13	183
AAA9100D	0.3	0.23	12.7	20.3	19.8	0.32	12.5	<0.13	144
AAA9103	0.7	<0.07	<1.9	<2.8	14.8	<0.12	23.7	<0.12	31.1
AAA9323	0.5	<0.51	4.5	36	23.2	0.07	3.5	<2.2	164
AAA9323D	0.5	0.46	3.4	32.7	67.6	<0.04	<3.5	<2.2	122
AAA9326	0.3	2	8.9	174	28.8	0.19	<5.5	<2.3	328
AAA9329	0.5	6	41	1 610	157	0.4	13	3.3	2 620

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] UTL = Upper tolerance limit.
[d] ND = Not determined.
[e] R = Rejected result.
[f] J = Estimated result.
[g] D = Duplicate analysis.

TABLE 5.13.5-2

RADIONUCLIDES WITH ACTIVITIES GREATER THAN BACKGROUND UTLs FOR PRS 46-004(a2)

SAMPLE ID	DEPTH (ft)	URANIUM-234 (pCi/g)	URANIUM-235 (pCi/g)	PLUTONIUM-238 (pCi/g)
SAL[a]	N/A[b]	13	10	27
LANL UTL[c]	N/A	1.94	0.084	0.014
AAA9067	1	0.4875(J)[d]	0.0293 (J)	**0.0352 (J)**
AAA9068	1.5	0.3561(J)	0.0154 (J)	**0.0232 (J)**
AAA9070	1	0.1604 (J)	0.0085 (J)	**0.0479 (J)**
AAA9071	2	0.1409 (J)	0.0104 (J)	**0.0297 (J)**
AAA9073	1	0.1254	0.0089	**0.0313**
AAA9103	0.7	0.6549 (J)	0.0489 (J)	**0.0251**
AAA9323	0.5	**1.4**	**0.1313**	NA[e]
AAA9329	0.5	**1.98**	**0.0914**	NA

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] UTL = Upper tolerance limit.
[d] J = Estimated result.
[e] NA = Not analyzed.

5.13.6 Evaluation of Organics

PCBs were detected at several sampling points receiving runoff from this PRS. PCBs were also detected at elevated levels in samples collected for PRS 46-006(d). Because PRS 46-006(d) received contaminants from many areas of TA-46-31, it is appropriate to assigned all PCBs to PRS 46-006(d) as discussed in Section 5.21.7.1 of this RFI report.

Low levels of PAHs (including a few levels above SAL), pesticides, and a common laboratory contaminant were reported for this PRS (Table 5.13.6-1). PAHs and pesticides contaminants are derived from asphalt paving, roofing tar, and routine pesticide spraying.

TABLE 5.13.6-1

PRS 46-004(a2) SOIL CONCENTRATIONS FOR ORGANIC ANALYTES WITH VALUES GREATER THAN THE REPORTING LIMIT

SAMPLE ID	DEPTH (ft)	SVOC[a] or VOC[b]	RESULT (mg/kg)	SAL[c] (mg/kg)	EQL[d] (mg/kg)
AAA9323	0.5	Anthracene	0.48 (J)[e]	19	0.33
AAA9323	0.5	Benzo[a]anthracene	1.1 (J)	0.61	0.33
AAA9326	0.3	Benzo[a]anthracene	0.54 (J)	0.61	0.33
AAA9073	1	Benzo[a]pyrene	0.43	0.061	0.33
AAA9323	0.5	Benzo[a]pyrene	0.9 (J)	0.061	0.33
AAA9326	0.3	Benzo[a]pyrene	0.55 (J)	0.061	0.33
AAA9323	0.5	Benzo[b]fluoranthene	1.4 (J)	0.61	0.33
AAA9326	0.3	Benzo[b]fluoranthene	0.99 (J)	0.61	0.33
AAA9329	0.5	Benzo[b]fluoranthene	0.86 (J)	0.61	0.33
AAA9073	1	Benzo[k]fluoranthene	0.61	0.61	0.33
AAA9076	1	Benzo[k]fluoranthene	0.55	0.61	0.33
AAA9323	0.5	Benzo[k]fluoranthene	0.56 (J)	0.61	0.33
AAA9326	0.3	Bis(2-ethylhexyl)phthalate	0.65 (J)	32	0.33
AAA9329	0.5	Bis(2-ethylhexyl)phthalate	1 (J)	32	0.33
AAA9073	1	Chrysene	0.38	24	0.33
AAA9076	1	Chrysene	0.47	24	0.33
AAA9323	0.5	Chrysene	1 (J)	24	0.33
AAA9326	0.3	Chrysene	0.65 (J)	24	0.33
AAA9329	0.5	Chrysene	0.43 (J)	24	0.33
AAA9329	0.5	Chrysene	0.43	24	0.33
AAA9329	0.5	Di-n-octyl phthalate	0.74 (J)	1 300	0.33
AAA9073	1	Fluoranthene	1.1	2 600	0.33
AAA9323	0.5	Fluoranthene	1.6 (J)	2 600	0.33
AAA9326	0.3	Fluoranthene	1.2 (J)	2 600	0.33
AAA9329	0.5	Fluoranthene	0.72 (J)	2 600	0.33
AAA9329	0.5	Fluoranthene	0.72	2 600	0.33
AAA9103	0.7	Methylene chloride	0.051	11	0.33
AAA9073	1	Phenanthrene	0.85	NC[f]	0.33
AAA9076	1	Phenanthrene	0.63	NC	0.33
AAA9323	0.5	Phenanthrene	1.5 (J)	NC	0.33
AAA9326	0.3	Phenanthrene	0.78 (J)	NC	0.33
AAA9329	0.5	Phenanthrene	0.43 (J)	NC	0.33
AAA9329	0.5	Phenanthrene	0.43	NC	0.33
AAA9073	1	Pyrene	0.68	2 000	0.33
AAA9077	1.5	Pyrene	0.4	2 000	0.33
AAA9323	0.5	Pyrene	2.8 (J)	2 000	0.33
AAA9326	0.3	Pyrene	1.7 (J)	2 000	0.33
AAA9329	0.5	Pyrene	1.5 (J)	2 000	0.33

TABLE 5.13.6-1 (CONTINUED)

PRS 46-004(a2) SOIL CONCENTRATIONS FOR ORGANIC ANALYTES WITH VALUES GREATER THAN THE REPORTING LIMIT

SAMPLE ID	DEPTH (ft)	PESTICIDES	RESULT (mg/kg)	SAL (mg/kg)	EQL (mg/kg)
AAA9067	1	BHC [alpha-]	0.00395 (J)	NC	0.0017
AAA9073	1	BHC [alpha-]	0.018	NC	0.0017
AAA9076	1	BHC [delta-]	0.16 (J)	NC	0.0017
AAA9073	1	DDD [p,p'-]	0.020	1.9	0.0033
AAA9076	1	DDD [p,p'-]	0.021	1.9	0.0033
AAA9076	1	DDE [p,p'-]	0.0835 (J)	1.3	0.0033
AAA9067	1	Dieldrin	0.000785 (J)	0.28	0.0033
AAA9073	1	Endrin aldehyde	0.061	NC	0.0033
AAA9076	1	Endrin aldehyde	0.18 (J)	NC	0.0033
AAA9076	1	Heptachlor epoxide	0.0048 (J)	0.049	0.0017
AAA9077	1.5	Heptachlor epoxide	0.0029 (J)	0.049	0.0017
AAA9100	0.3	Heptachlor epoxide	0.0046 (J)	0.049	0.0017
AAA9076	1	Lindane	0.082 (J)	NC	0.0017
AAA9077	1.5	Lindane	0.0124 (J)	NC	0.0017
AAA9100	0.3	Lindane	0.0077 (J)	NC	0.0017
AAA9103	0.7	Lindane	0.0028 (J)	NC	0.0017
AAA9076	1	Methoxychlor	0.240	330	0.0165

[a] SVOC = Semivolatile organic compound.
[b] VOC = Volatile organic compound.
[c] SAL = Screening action level.
[d] EQL = Estimated quantitation level.
[e] J = Estimated result.
[f] NC = Not calculated.

5.13.7 Human Health

5.13.7.1 Screening Assessment

Inorganic contaminants identified to be greater than LANL background UTLs were submitted for an MCE for noncarcinogenic effects. The sum of the maxima for the noncarcinogenic group is 0.9 (Table 5.13.7-1). This result is below the target value of 1, which indicates a low potential for adverse effects due to exposure to this grouping. Therefore, these contaminants are not identified as potentially hazardous. Only one inorganic carcinogen, chromium, was detected above UTL, but below SAL; therefore, no MCE was performed for this grouping. Only trace levels of radionuclides were detected above UTLs at this PRS; therefore, no MCE was performed for this grouping.

PCBs were detected on the bench in sample AAA9073 at a concentration above the SAL and are included in the list of analytes for the sampling plan discussed in Section 5.21.11 of this RFI report. Although PCBs were detected in samples from both PRS 46-004(a2) and PRS 46-006(d), all PCBs are assigned to PRS 46-006(d) for further investigation.

Low levels of PAHs were reported above SALs. PAHs at TA-46 are attributed to ongoing sources, parking lot and roofing tar runoff. Pesticides were detected, but not above SAL, and their use at TA-46 was in accordance with established practice. Therefore, these contaminants will not be carried forward in the screening process. No other contaminants were found above SALs.

TABLE 5.13.7-1

MCE FOR NONCARCINOGENIC EFFECTS AT PRS 46-004(a2)

CONTAMINANT	MAXIMUM SOIL CONCENTRATION (mg/kg)	SOIL SAL[a] (mg/kg)	CONCENTRATION NORMALIZED TO SAL
Cadmium	6	38	0.158
Copper	1 610	2 800	0.575
Mercury	1.2	23	0.052
Nickel	24	1 500	0.016
Silver	3.3	380	0.009
Zinc	2 620	23 000	0.114
Total			**0.924**

[a] SAL - Screening action level.

5.13.7.2 Risk Assessment

No risk assessment was performed for this PRS.

5.13.8 Ecological Assessment

Because the absence of COPCs has not been confirmed for PRS 46-004(a2), this PRS will be retained for further ecological analysis. The approach to ecological assessment is discussed in Section 3.5.

5.13.9 Extent of Contamination

PCBs were detected at sampling points for this PRS. The highest concentration is in the sediment accumulation areas in Cañada del Buey below TA-46. Samples from Phase II sampling will be analyzed for PCBs to determine extent and will be assigned to PRS 46-006(d). Data from this PRS were also used for the decision for PRS 46-006(d) discussed in Section 5.21 of this RFI report.

5.13.10 Conclusions and Recommendations

Construction work at outfall MM prior to sampling resulted in some original soil being removed from the ditch and stored on the bank. Because concentrations of several contaminants were found in samples taken for outfall MM in samples that may not be representative of the the highest contamination inthe original soil, PRS 46-004(a2) is recommended for resampling as described in Section 5.13.11.

5.13.11 Sampling and Analysis Plan for Mesa-Top PRSs 46-004(s) and 46-004(a2)

5.13.11.1 Problem Definition

Two mesa-top PRSs, 46-004(s) (Section 5.7 of this RFI report) and 46-004(a2), need minor additional sampling to determine if contamination is present at levels of concern. These will be address during Phase II sampling at TA-46.

PRS 46-004(s): The outfall from the utility trench in the south high bay of TA-46-1 was buried at some unknown time. During the 1994 sampling campaign, the outfall was not located precisely enough to be sampled. Mercury spills have been reported at the south high bay and mercury may remain in soils at the buried outfall. As part of the mesa-top 1996 campaign, the outfall discharge point will be located and sampled.

In addition to mercury, other inorganics, SVOCs, VOCs, and uranium may have been released at this site.

PRS 46-004(a2): Between the time that the RFI Work Plan for OU 1140 was completed and Phase I sampling was performed, the ditch carrying runoff from the outfall to the culvert leading to outfall MM was cleaned. Some sedimentary material was excavated and deposited on the slope west of the ditch. The outfall itself, previously buried, was exposed.

As a result, the Phase I samples that were taken on the slope below the outfall and in the ditch may not have been biased towards the material with the highest level of contamination, as intended by the RFI work plan. Material on the slope west of the ditch will be sampled to determine if it contains contamination at levels that could present a risk to human health or the environment.

Based on results from Phase I sampling, PCBs, inorganic chemicals, and possibly uranium may have been released at this site.

The regulatory driver for this sampling is Module VIII of LANL's RCRA operating permit. Should levels of contamination above SALs be identified, a risk assessment will be performed or corrective action will be proposed. If no SALs are exceeded, then the PRS will be recommended for NFA.

5.13.11.2. Sampling and Analysis Design

At PRS 46-004(s), the outfall point (the terminus of the drainpipe from the utility trench) will be located. A sampling point will be identified that is below the original opening, now buried or destroyed, and in a direct path to have received runoff from the drain (Fig. 5.13.11-1).

Two samples will be taken at the sampling point, one at 0–6 in. and one at the soil/tuff interface. They will be submitted for VOC, SVOC, inorganic, and isotopic uranium analyses.

At PRS 46-004(a2), a preliminary survey will attempt to identify material that was excavated from the ditch and placed on the slope to the west. If this material can be identified, the samples will be collected from it. Otherwise, sampling locations will be selected at random on this slope, as illustrated schematically in Fig. 5.13-11-2.

Three 0–6 in. samples will be collected. They will be submitted for SVOC, PCB, inorganic and isotopic uranium analyses.

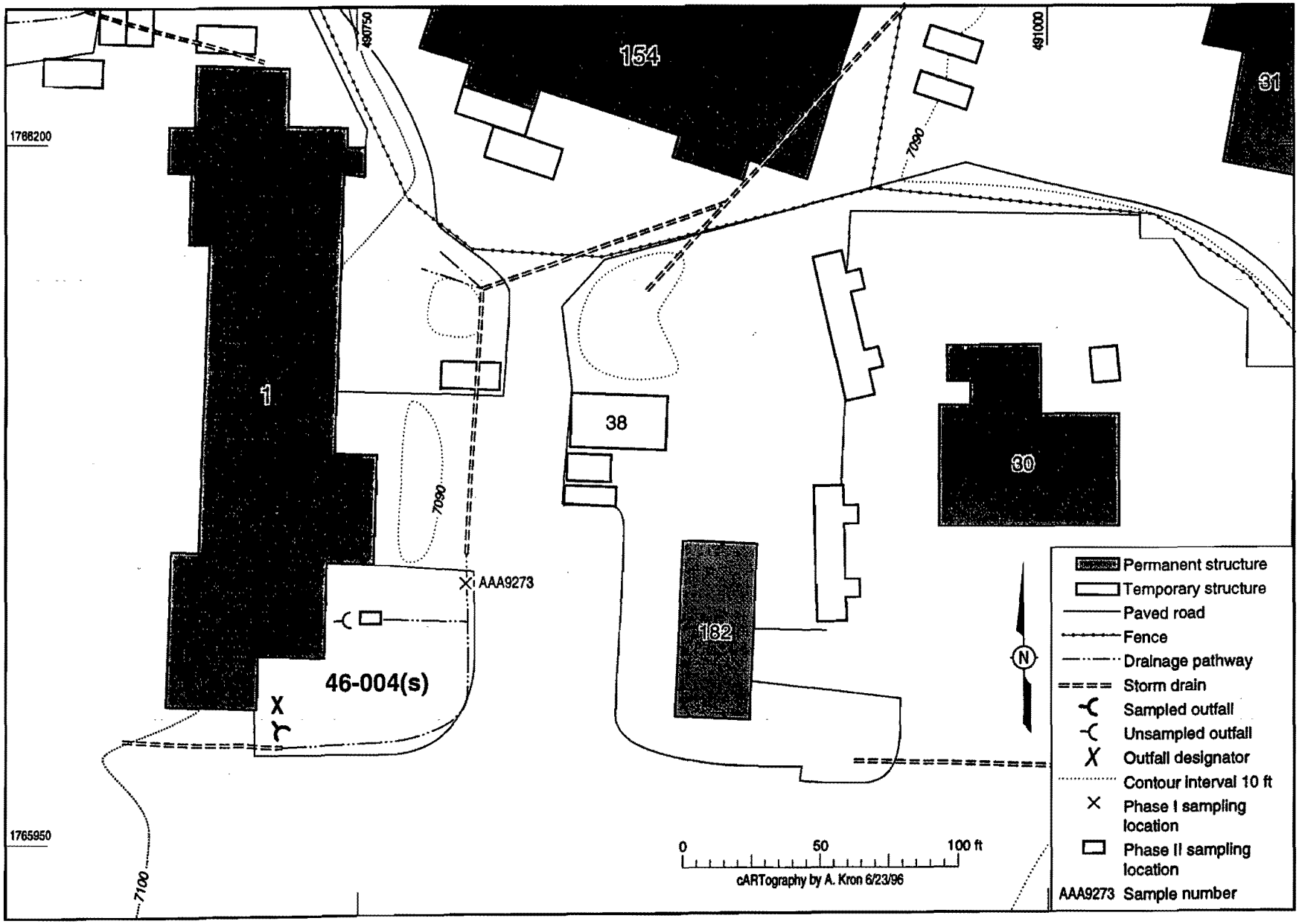


Fig. 5.13.11-1. PRS 46-004(s), sampling plan for drain from TA-46-1 south high bay utility trench.

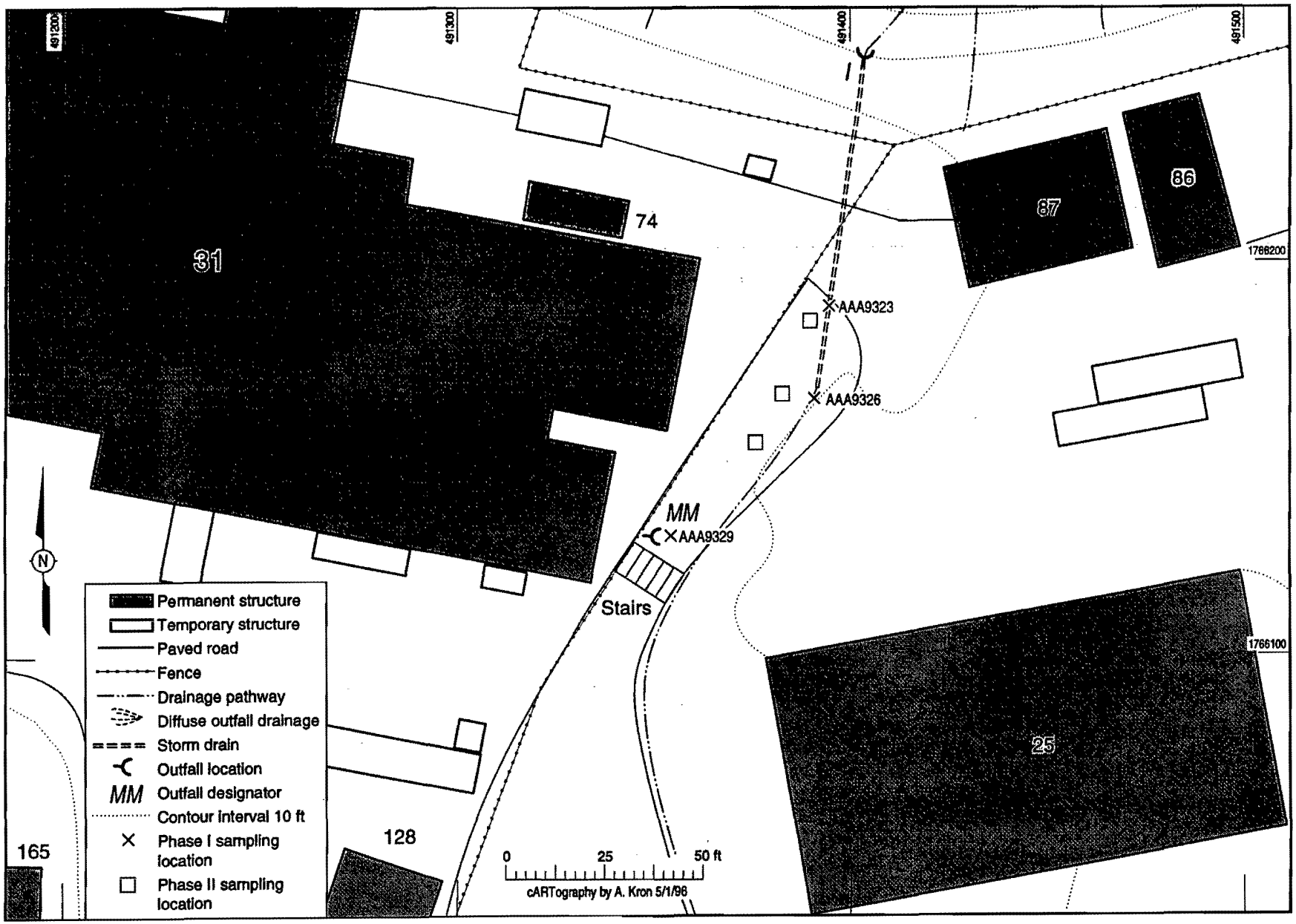


Fig. 5.13.11-2. Sampling for PRS 46-004(a2).

The contract laboratories will provide standard QC measurements (surrogates, blanks, check standards, matrix spikes, etc., as specified by the analytical procedures requested) and will supply complete analytical data packages supporting the reported results. No special handling beyond good laboratory practices and standard field procedures is required.

5.13.11.3 Sampling Plan Implementation

5.13.11.3.1 Field Methods

Land surveys In the field the engineering survey will locate, stake, and document the locations of sample points. These data will be recorded on the base map. If repositioning a sample location becomes necessary during sample collection, this new position will be resurveyed and the revised location will be indicated on the base map. The engineering will be performed by licensed professionals working to minimum standards for land surveying in New Mexico with oversight by the field team leader.

Sample collection Prior to sampling, all sample locations will be field screened for radioactivity and VOCs to identify gross concentrations of contaminants. Appropriate health and safety precautions will be undertaken under the site-specific health and safety plan for TA-46 in accordance with 29 CFR 1910.120, the LANL radiological control manual, and the LANL generic health and safety plan.

Sampling techniques Surface soil samples will be collected using the most current versions of LANL-ER-SOP-06.09, Spade and Scoop Method for Collection of Soil Samples. Hand augered samples will be collected using LANL-ER-SOP-6.10, R0, Hand Auger and Thin-wall Tube Sampler.

5.13.11.3.2 Sample Handling, Packaging and Shipping

Samples will be handled, packaged, and shipped in accordance with the latest revisions of the applicable ER Project SOPs: LANL-ER-SOP-01.01, General Instructions for Field Investigations; LANL-ER-SOP-01.02, Sample Containers and Preservation; LANL-ER-SOP-01.03, Handling, Packaging, and Shipping of Samples; LANL-ER-SOP-01.04, Sample Control and Field Documentation; LANL-ER-SOP-01.05, Field Quality Control Samples. Samples will be submitted to off-site contract analytical laboratories through the ER SMO under the current statement of work.

5.13.11.3.3 Laboratory Analyses

All samples submitted for laboratory analyses will be analyzed using routine laboratory contract methods under the current statement of work (LANL 1995, 1278). Inorganic analyses will be performed by EPA SW-846 Method 6010 or equivalent. Analytical samples will be analyzed for PCBs by EPA Method 8080A (EPA 1990, 11-240). Uranium isotopes will be analyzed by alpha spectroscopy as specified in the LANL ER QAPP (Environmental Restoration Project 1996, 1292).

5.13.11.3.4 Transmittal of Results

Field Data Field data will be collected and documented in field notebooks and field sample collection logs. Additionally, required field data will be entered in the ER 4-D™ electronic field database. This electronic record will be uploaded to FIMAD at the conclusion of the sampling season.

Laboratory Data Analytical results will be returned to the SMO from off-site contract analytical laboratories. Complete data packets, adequate to support focused validation if necessary, will be provided. Data will be uploaded into the FIMAD database by the SMO.

5.13.11.3.5 Schedule Constraints

Proposed sampling locations must be reviewed before surveying is completed and before any samples are collected.

5.13.11.4 Data Assessment

Data packages will be checked for completeness (Environmental Restoration Project 1996, 1292). Focused validation will be performed only if verification or subsequent data assessment indicates possible problems with analytes of concern.

5.13.11.5 Administration

A field summary report prepared following the field activities will be submitted to the ER records processing facility. Field data will be preserved in a 4-D™ database and provided to FIMAD. The analytical laboratories will prepare electronic deliverables, as well as hard copy reports of the results. Data package reports are retained under chain-of-custody by the SMO.

5.14 PRS 46-004(b2)

PRS 46-004(b2) (outfall U) is the outfall from a utility trench drain in the north high bay in TA-46-1. Because no contaminants associated with laboratory activities were found above SALs, the outfall is recommended for NFA.

5.14.1 History

PRS 46-004(b2) is discussed in RFI Work Plan for OU 1140, Subsection 5.4 (LANL 1993, 1093). Outfall U serves the drain of a utility trench in the floor of the north high bay of TA-46-1. The utility trench runs the extent of the north and east wall of the bay and receives infrequent flow from floor washings (LANL 1993, 11-259). Activities and processes that were conducted in the north high bay are not known; however, based on overall process knowledge of TA-46-1, suspected contaminants included mercury, other inorganics, VOCs, SVOCs, uranium, and thorium. The drain is plugged (LANL 1993, 11-262).

5.14.2 Description

The outfall is a 4-in.-diameter vitrified-clay pipe located at the northeast corner of TA-46-1. Engineering drawing ENG-C 18111 indicates that the floor drains along the east wall of the north high bay are plumbed to this drain. The effluent from this outfall discharged to a ditch, PRS 46-007, that is part of a storm drain network discharging to Cañada del Buey (ICF Kaiser Engineers 1992, 11-214). Figure 5.14.2-1 shows both outfall U and the storm drain network with its outfall designated M.

5.14.3 Previous Investigation(s)

No previous investigations were conducted at this PRS.

5.14.4 Field Investigation

Four samples were collected for this PRS (Table 5.14.4-1). Three samples were taken at the outfall and one sample (AAA9256) at the mouth of the culvert leading to outfall M (Fig. 5.14.2-1).

TABLE 5.14.4-1

SUMMARY OF SAMPLES TAKEN

SAMPLE ID	LOCATION ID	DEPTH (ft)	MATRIX	INOR-GANICS	RADIO-NUCLIDES	VOCs[a]	SVOCs[b]	PCBs[c]	PESTI-CIDES
AAA9256	46-1077	1	Soil	19879	20008	19367	19367	19367	19367
AAA9259	46-1078	0.4	Soil	19879	20008	NA[d]	19367	NA	NA
AAA9262	46-1079	1	Soil	19879	20008	19367	19367	NA	NA
AAA9265	46-1080	1	Soil	19879	20008	19367	19367	NA	NA

[a] VOCs = Volatile organic compounds.
[b] SVOCs = Semivolatile organic compounds.
[c] PCBs = Polychlorinated biphenyls.
[d] NA = Not analyzed.

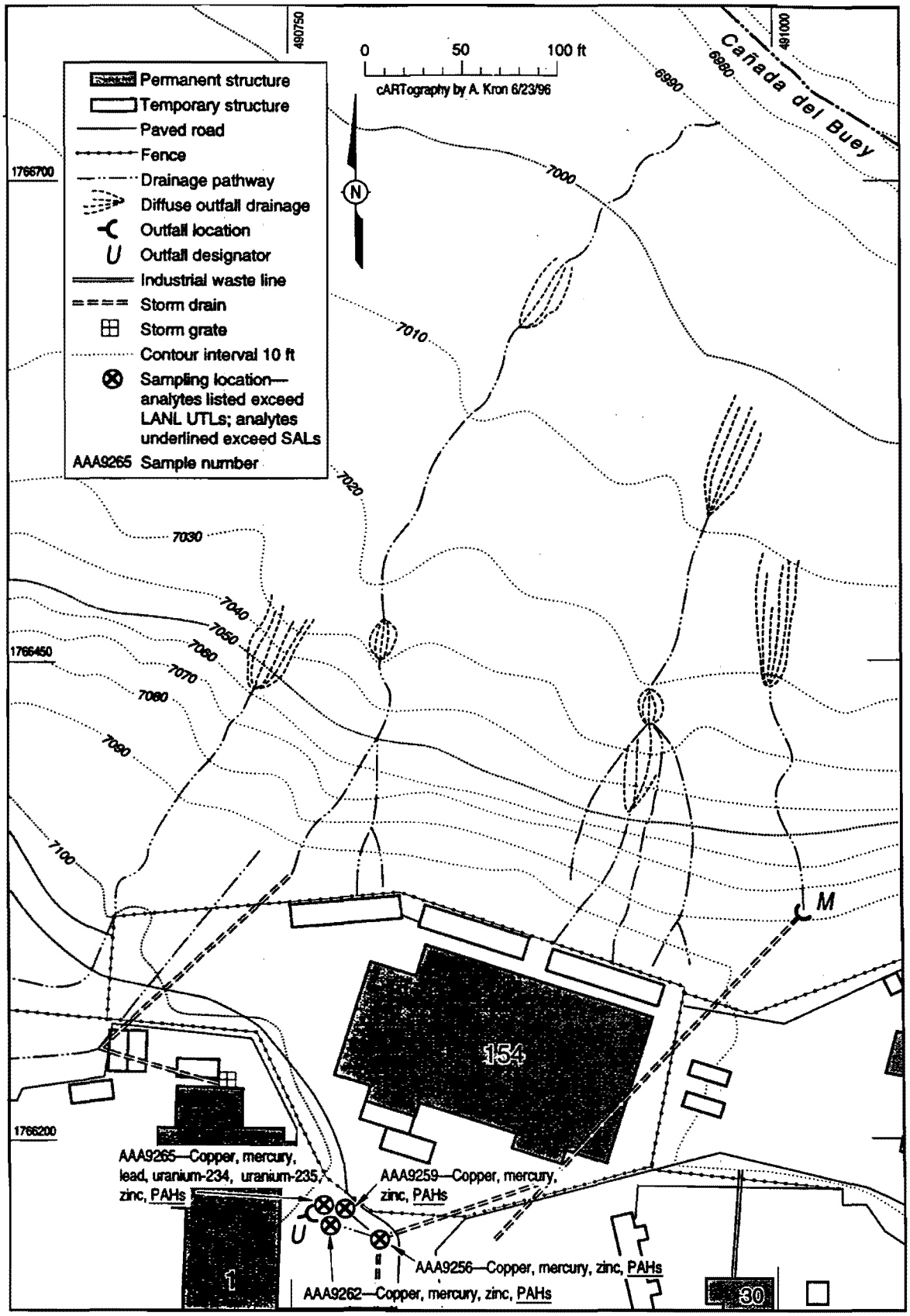


Fig. 5.14.2-1. PRS 46-004(b2), industrial drain from TA-46-1 (oufall U).

5.14.5 Background Comparison

Mercury was detected above LANL background UTL in all samples. Results are qualified as estimates because holding time was exceeded, but are considered reasonable estimates because recovery from QA samples was acceptable (see Section 4.1 of this RFI report). Copper, lead, and zinc were detected above LANL UTLs but below SALs (Table 5.14.5-1). Traces of two uranium isotopes were detected above UTL in one sample (Table 5.14.5-2).

TABLE 5.14.5-1

INORGANIC ANALYTES WITH CONCENTRATIONS GREATER THAN BACKGROUND UTLs FOR PRS 46-004(b2)

SAMPLE ID	DEPTH (ft)	COPPER (mg/kg)	LEAD (mg/kg)	MERCURY (mg/kg)	ZINC (mg/kg)
SAL[a]	N/A[b]	2 800	400	23	23 000
LANL UTL[c]	N/A	15.5	23.3	0.1	50.8
AAA9256	1	167	18.6	0.54 (J)[d]	123
AAA9256D[e]	1	54.5	21.1	NA[f]	79.7
AAA9259	0.4	16.7	21.7	0.34 (J)	85.4
AAA9262	1	18.6	22.2	0.24 (J)	69.9
AAA9265	1	37.1	26.5	0.75 (J)	168

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] UTL = Upper tolerance limit.
[d] J = Estimated result.
[e] D = Duplicate analysis.
[f] NA = Not analyzed.

TABLE 5.14.5-2

RADIONUCLIDES WITH ACTIVITIES GREATER THAN BACKGROUND UTLs FOR PRS 46-004(b2)

SAMPLE ID	DEPTH ft)	URANIUM-234 (pCi/g)	URANIUM-235 (pCi/g)
SAL[a]	N/A[b]	13	10
LANL UTL[c]	N/A	1.94	0.084
AAA9265	1	3.83	0.136

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] UTL = Upper tolerance limit.

5.14.6 Evaluation of Organics

Low levels of PAHs, some above SAL, were reported for this PRS (Table 5.14.6-1). These contaminants are derived from two continuing sources, asphalt paving and roofing tar.

TABLE 5.14.6-1

PRS 46-004(b2) SOIL CONCENTRATIONS FOR ORGANIC ANALYTES WITH VALUES GREATER THAN THE REPORTING LIMIT

SAMPLE ID	DEPTH (ft)	SVOC [a]	RESULT (mg/kg)	SAL [b] (mg/kg)	EQL [c] (mg/kg)
AAA9256	1	Acenaphthene	0.58	360	0.33
AAA9265	1	Acenaphthene	0.48	360	0.33
AAA9256	1	Anthracene	0.77 (J) [d]	19	0.33
AAA9265	1	Anthracene	0.7 (J)	19	0.33
AAA9256	1	Benzo[a]anthracene	1.4	0.61	0.33
AAA9259	0.4	Benzo[a]anthracene	0.79	0.61	0.33
AAA9262	1	Benzo[a]anthracene	0.46	0.61	0.33
AAA9265	1	Benzo[a]anthracene	1.8	0.61	0.33
AAA9256	1	Benzo[a]pyrene	1.8	0.061	0.33
AAA9259	0.4	Benzo[a]pyrene	1.2	0.061	0.33
AAA9262	1	Benzo[a]pyrene	0.72	0.061	0.33
AAA9265	1	Benzo[a]pyrene	1.9	0.061	0.33
AAA9256	1	Benzo[b]fluoranthene	1.7	0.61	0.33
AAA9259	0.4	Benzo[b]fluoranthene	1	0.61	0.33
AAA9262	1	Benzo[b]fluoranthene	0.6	0.61	0.33
AAA9265	1	Benzo[b]fluoranthene	1.9	0.61	0.33
AAA9256	1	Benzo[g,h,i]perylene	0.96	NC [e]	0.33
AAA9259	0.4	Benzo[g,h,i]perylene	0.77	NC	0.33
AAA9262	1	Benzo[g,h,i]perylene	0.47	NC	0.33
AAA9265	1	Benzo[g,h,i]perylene	1.3	NC	0.33
AAA9256	1	Benzo[k]fluoranthene	2	6.1	0.33
AAA9259	0.4	Benzo[k]fluoranthene	1.2	6.1	0.33
AAA9262	1	Benzo[k]fluoranthene	1.1	6.1	0.33
AAA9265	1	Benzo[k]fluoranthene	2.2	6.1	0.33
AAA9256	1	Chrysene	1.8	24	0.33
AAA9259	0.4	Chrysene	1	24	0.33
AAA9262	1	Chrysene	0.65	24	0.33
AAA9265	1	Chrysene	1.9	24	0.33
AAA9256	1	Dibenzo[a,h]anthracene	0.45	0.061	0.33
AAA9265	1	Dibenzo[a,h]anthracene	0.48	0.061	0.33

TABLE 5.14.6-1 (CONTINUED)

PRS 46-004(b2) SOIL CONCENTRATIONS FOR ORGANIC ANALYTES WITH VALUES GREATER THAN THE REPORTING LIMIT

SAMPLE ID	DEPTH (ft)	SVOC [a]	RESULT (mg/kg)	SAL [b] (mg/kg)	EQL [c] (mg/kg)
AAA9256	1	Fluoranthene	4.3	2 600	0.33
AAA9259	0.4	Fluoranthene	2.2	2 600	0.33
AAA9262	1	Fluoranthene	1.2	2 600	0.33
AAA9265	1	Fluoranthene	4.1	2 600	0.33
AAA9256	1	Fluorene	0.47 (J)	300	0.33
AAA9265	1	Fluorene	0.42 (J)	300	0.33
AAA9256	1	Indeno[1,2,3-cd]pyrene	1.2	0.61	0.33
AAA9259	0.4	Indeno[1,2,3-cd]pyrene	0.86	0.61	0.33
AAA9262	1	Indeno[1,2,3-cd]pyrene	0.53	0.61	0.33
AAA9265	1	Indeno[1,2,3-cd]pyrene	1.3	0.61	0.33
AAA9256	1	Naphthalene	0.47 (J)	800	0.33
AAA9265	1	Naphthalene	0.43 (J)	800	0.33
AAA9256	1	Phenanthrene	3.8	NC	0.33
AAA9259	0.4	Phenanthrene	1.4	NC	0.33
AAA9262	1	Phenanthrene	0.68	NC	0.33
AAA9265	1	Phenanthrene	3.2	NC	0.33
AAA9256	1	Pyrene	3.5 (J)	2 000	0.33
AAA9259	0.4	Pyrene	1.7 (J)	2 000	0.33
AAA9262	1	Pyrene	0.97 (J)	2 000	0.33
AAA9265	1	Pyrene	3.7 (J)	2 000	0.33

[a] SVOC = Semivolatile organic compound.
[b] SAL = Screening action level.
[c] EQL = Estimated quantitation level.
[d] J = Estimated result.
[e] NC = Not calculated.

5.14.7 Human Health

5.14.7.1 Screening Assessment

Several inorganic constituents and two radionuclides were detected above background UTLs but below SALs. Inspection of both data sets indicates that MCE screening would yield a value less than the target limit of 1.

Low levels of PAHs were reported above SALs. Because PAHs are derived from continuing sources, they will not be carried forward in the screening process. No other contaminants were found above SALs.

5.14.7.2 Risk Assessment

No risk assessment was performed for this PRS.

5.14.8 Ecological Assessment

This PRS is recommended for NFA because no COPCs were detected. The approach to ecological assessment is discussed in Section 3.5 of this RFI report.

5.14.9 Extent of Contamination

No contaminants at concentrations of concern were detected at sampling points for this PRS.

5.14.10 Conclusions and Recommendations

Copper, lead, mercury, and zinc were found at PRS 46-004(b2) above background UTLs, but below SALs. Inspection of the data indicates that an MCE for noncarcinogenic or radionuclide effects will yield a result far below the target value of 1. No MCE was performed for lead or carcinogenic effects because multiple constituents for these groupings were not found above LANL UTLs. Based on NFA criterion 5, a Class III permit modification is requested to remove this site from the HSWA Module of the Laboratory's RCRA operating permit.

5.15 PRS 46-004(c2)

PRS 46-004(c2) (outfall S) is the outfall from cooling water blowdown, floor drains, and trench drains from the north equipment room of TA-46-1. Because no contaminants were found above SALs, the PRS is recommended for NFA.

5.15.1 History

PRS 46-004(c2) is discussed in RFI Work Plan for OU 1140, Subsection 5.4 (LANL 1993, 1093). Outfall S receives treated discharges from a cooling tower located on the roof. It also receives effluent from floor drains in rooms 103 and 105 and from the drain of a utility trench in the floor of the north high bay of TA-46-1. The utility trench runs the extent of the north and east wall of the bay and received infrequent flow from floor washings (LANL 1993, 11-259). TA-46-1 was used for Rover experiments. It is not known what activities and processes took place in the north high bay. Suspected contaminants include mercury, other inorganics, VOCs, SVOCs, uranium, and thorium.

Effluent from outfall S flows to NPDES-permitted outfall 03AS042 (LANL 1993, 11-259).

5.15.2 Description

The outfall is a 4-in.-diameter cast iron pipe, located northwest of the building, that drains into a ditch. Engineering drawing ENG-C 18111 indicates that the floor drains in the north equipment room are plumbed to this drain. Effluent from outfall S, several other outfalls, and runoff from the surrounding area flow into a culvert that daylights at outfall P on the steep slope of Cañada del Buey (Fig. 5.15.2-1).

5.15.3 Previous Investigations

No previous investigations were conducted at this PRS.

5.15.4 Field Investigation

Eighteen samples were collected in this drainage (Table 5.15.4-1). One sample (AAA9253) was collected directly below outfall S (Fig. 5.15.2-1). The remaining samples were collected from the drainage below outfall P and on the bench in the canyon below TA-46.

TABLE 5.15.4-1

SUMMARY OF SAMPLES TAKEN

SAMPLE ID	LOCATION ID	DEPTH (ft)	MATRIX	INOR-GANICS	RADIO-NUCLIDES	VOCs[a]	SVOCs[b]	PCBs[c]	PESTI-CIDES
AAA9196	46-1055	1	Soil	19450	19849	19003	19003	19003	19003
AAA9199	46-1056	1	Soil	19450	19849	19003	19003	19003	19003
AAA9202	46-1057	0.5	Soil	19450	19849	19003	19003	19003	19003
AAA9205	46-1058	0.5	Soil	19450	19849	NA[d]	19003	19003	19003
AAA9208	46-1059	1	Soil	19450	19849	NA	19003	19003	19003
AAA9211	46-1060	3	Soil	19545	19998	19092	19092	19092	19092
AAA9212	46-1060	0.5	Soil	19545	19998	19092	19092	19092	19092
AAA9214	46-1061	1	Soil	19545	19998	19092	19092	19092	19092
AAA9215	46-1061	3.5	Soil	19545	19998	19092	19092	19092	19092
AAA9217	46-1062	1	Soil	19545	19998	19092	19092	19092	19092
AAA9218	46-1062	3.5	Soil	19545	19998	19092	19092	19092	19092
AAA9220	46-1063	0.5	Soil	19545	19998	NA	19092	19092	19092
AAA9223	46-1064	0.5	Soil	19545	19998	NA	19092	19092	19092
AAA9241	46-1072	0.5	Soil	19675	20007	NA	19438	19438	19438
AAA9250	46-1075	0.5	Soil	19675	20007	NA	19438	19438	19438
AAA9253	46-1076	0.5	Soil	19675	20007	NA	19438	19438	19438
AAA9460	46-1055	0.5	Soil	19450	19849	19003	19003	19003	19003
AAA9466	46-1075	0.5	Soil	19675	20007	NA	19438	19438	19438

[a] VOCs = Volatile organic compounds.
[b] SVOCs = Semivolatile organic compounds.
[c] PCBs = Polychlorinated biphenyls.
[d] NA = Not analyzed.

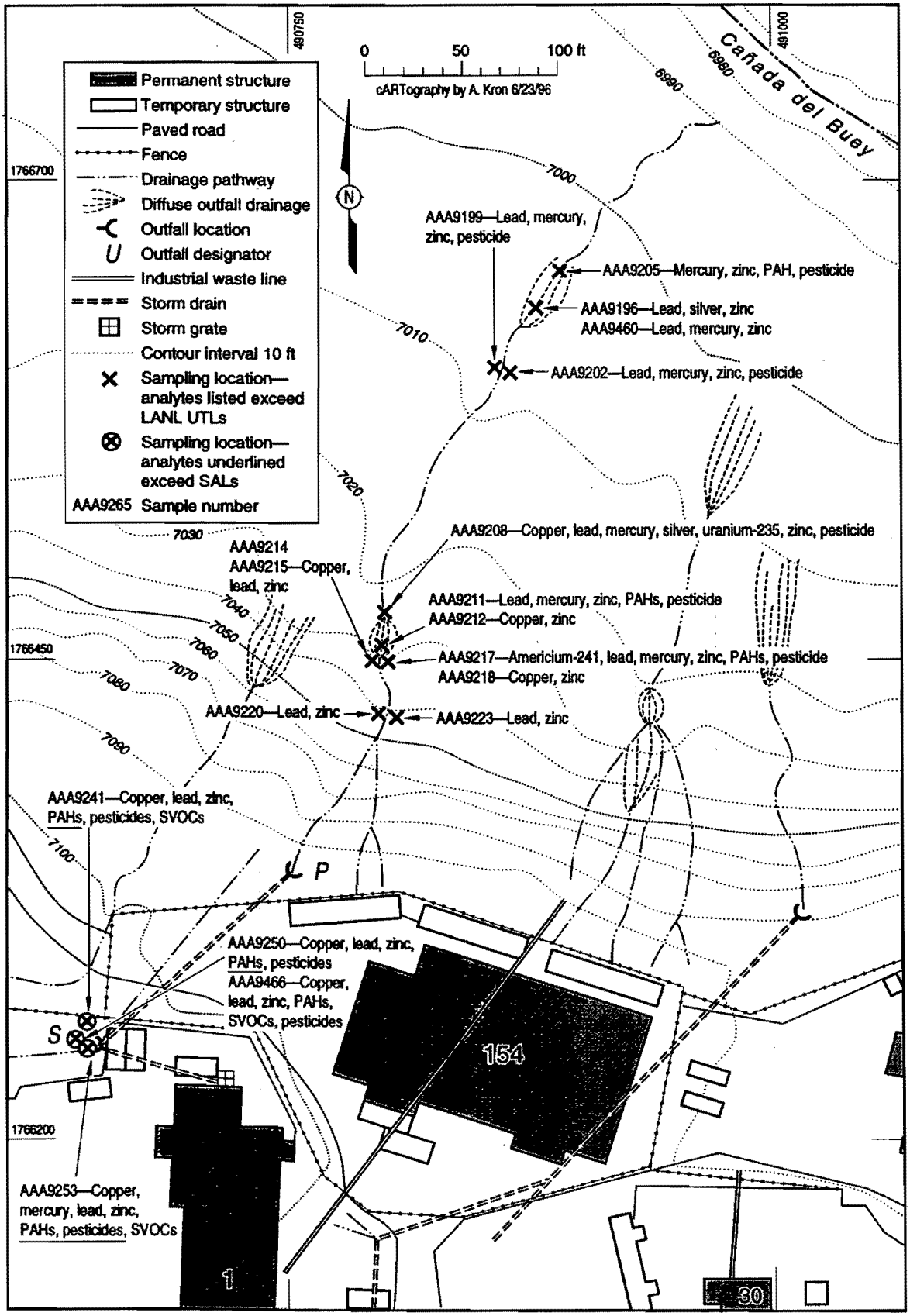


Fig. 5.15.2-1. PRS 46-004(c2), industrial drain from TA-46-1 (outfall S).

5.15.5 Background Comparison

Five inorganic contaminants were detected above LANL UTLs but below SALs (Table 5.15.5-1). Trace levels of uranium-235 were detected above UTL in one sample (Table 5.15.5-2). Although mercury results were qualified as estimated (J) based on high recoveries from the blind or rejected (R) based on missed holding time, values are consistent with nonqualified results and are accepted as reasonable estimates (see Section 4.1 of this RFI report).

TABLE 5.15.5-1

INORGANIC ANALYTES WITH CONCENTRATIONS GREATER THAN BACKGROUND UTLs FOR PRS 46-004(c2)

SAMPLE ID	DEPTH (ft)	COPPER (mg/kg)	LEAD (mg/kg)	MERCURY (mg/kg)	SILVER (mg/kg)	ZINC (mg/kg)
SAL[a]	N/A[b]	2 800	400	23	380	23 000
LANL UTL[c]	N/A	15.5	23.3	0.1	ND[d]	50.8
AAA9196	1	2.4	**24.4**	<0.1	<0.6	**53**
AAA9196D[e]	1	<2.6	**53.8**	<0.11	**0.49**	**50.9**
AAA9199	1	11.2	**50.2**	**0.34 (J)[f]**	<0.52	**99**
AAA9202	0.5	12.3	**40.4**	**0.4**	<0.45	**98.5**
AAA9205	0.5	5.9	12.1	**0.61**	<0.14	**102**
AAA9208	1	**149**	**46.4**	**0.12 (J)**	**0.57**	**87.3**
AAA9211	3	14.2	**52.1**	**0.16 (J)**	<0.58	**85.9**
AAA9212	0.5	10	9.2	<0.1(J)	<0.59	**108**
AAA9215	3.5	**18.4**	**23.8**	0.1 (J)	<0.68	**83**
AAA9215D	3.5	15.1	26	<0.11 (J)	<0.66	**58.3**
AAA9217	1	8.4	**50.4**	**0.12 (J)**	<0.56	**69.1**
AAA9218	3.5	**17.8**	17.5	<0.09 (J)	<0.64	**90**
AAA9220	0.5	8	**52.4**	<0.1 (J)	<0.58	**77.9**
AAA9223	0.5	0.618	**77.4**	<0.12	<0.71	**61.7**
AAA9241	0.5	**37.3**	**44.7**	0.06 (R)[g]	<2.7	**99.5**
AAA9250	0.5	**44.4**	**45.7**	0.1 (R)	<2.3	**111**
AAA9253	0.5	**50.1**	**92.7**	**0.19 (R)**	<2.6	**241**
AAA9460	0.5	15	**34.4**	**0.36 (J)**	<0.21	**96.6**
AAA9466	0.5	**50.5**	**40.4**	0.1 (R)	<2.6	**90.5**

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] UTL = Upper tolerance limit.
[d] ND = Not determined.
[e] D = Duplicate analysis.
[f] J = Estimated result.
[g] R = Rejected result.

TABLE 5.15.5-2

RADIONUCLIDES WITH ACTIVITIES GREATER THAN BACKGROUND UTLs FOR PRS 46-004(c2)

SAMPLE ID	DEPTH (ft)	URANIUM-235 (pCi/g)
SAL[a]	N/A[b]	10
LANL UTL[c]	N/A	0.084
AAA9208	1	0.0864

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] UTL = Upper tolerance limit.

5.15.6 Evaluation of Organics

The pesticide methoxychlor was reported above SAL (28.3 mg/kg) in one sample. No evidence indicates widespread contamination. Trace levels of other pesticides and low levels of PAHs were reported for this PRS (Table 5.15.6-1). These contaminants are derived from asphalt paving, roofing tar, and routine spraying. Low levels of bis(2-ethylkhexyl)phthalate, a common plasticizer, were also found.

TABLE 5.15.6-1

PRS 46-004(c2) SOIL CONCENTRATIONS FOR ORGANIC ANALYTES WITH VALUES GREATER THAN THE REPORTING LIMIT

SAMPLE ID	DEPTH (ft)	SVOC [a]	RESULT (mg/kg)	SAL [b] (mg/kg)	EQL [c] (mg/kg)
AAA9241	0.5	Acenaphthene	1.5	360	0.33
AAA9241	0.5	Anthracene	6.2	19	0.33
AAA9241	0.5	Benzo[a]anthracene	2.6 (J) [d]	0.61	0.33
AAA9250	0.5	Benzo[a]anthracene	2	0.61	0.33
AAA9253	0.5	Benzo[a]anthracene	1.2 (J)	0.61	0.33
AAA9466	0.5	Benzo[a]anthracene	0.47 (J)	0.61	0.33
AAA9241	0.5	Benzo[a]pyrene	2.1 (J)	0.061	0.33
AAA9250	0.5	Benzo[a]pyrene	1.7 (J)	0.061	0.33
AAA9241	0.5	Benzo[b]fluoranthene	3.3 (J)	0.61	0.33
AAA9250	0.5	Benzo[b]fluoranthene	2.9 (J)	0.61	0.33
AAA9253	0.5	Benzo[b]fluoranthene	2.1 (J)	0.61	0.33
AAA9241	0.5	Bis(2-ethylhexyl)phthalate	1.5 (J)	32	0.33
AAA9253	0.5	Bis(2-ethylhexyl)phthalate	0.91 (J)	32	0.33
AAA9466	0.5	Bis(2-ethylhexyl)phthalate	1.1 (J)	32	0.33
AAA9241	0.5	Chrysene	2.6 (J)	24	0.33
AAA9250	0.5	Chrysene	1.8	24	0.33
AAA9253	0.5	Chrysene	1.2 (J)	24	0.33
AAA9466	0.5	Chrysene	0.52 (J)	24	0.33
AAA9241	0.5	Dibenzofuran	0.57	260	0.33
AAA9205	0.5	Fluoranthene	0.48	2 600	0.33
AAA9211	3	Fluoranthene	0.85	2 600	0.33
AAA9217	1	Fluoranthene	0.41	2 600	0.33
AAA9241	0.5	Fluoranthene	5.2	2 600	0.33
AAA9250	0.5	Fluoranthene	3.4	2 600	0.33
AAA9253	0.5	Fluoranthene	1.9	2 600	0.33
AAA9466	0.5	Fluoranthene	0.63	2 600	0.33
AAA9241	0.5	Fluorene	1.1	300	0.33
AAA9241	0.5	Methylnaphthalene [2-]	0.43	NC [e]	0.33
AAA9241	0.5	Naphthalene	1.8 (J)	800	0.33
AAA9211	3	Phenanthrene	0.68	NC	0.33
AAA9241	0.5	Phenanthrene	6.2	NC	0.33
AAA9250	0.5	Phenanthrene	2.5	NC	0.33
AAA9253	0.5	Phenanthrene	1.8	NC	0.33
AAA9466	0.5	Phenanthrene	0.7	NC	0.33

TABLE 5.15.6-1 (CONTINUED)

PRS 46-004(c2) SOIL CONCENTRATIONS FOR ORGANIC ANALYTES WITH VALUES GREATER THAN THE REPORTING LIMIT

SAMPLE ID	DEPTH (ft)	SVOC [a]	RESULT (mg/kg)	SAL [b] (mg/kg)	EQL [c] (mg/kg)
AAA9211	3	Pyrene	0.63	2 000	0.33
AAA9241	0.5	Pyrene	6.3 (J)	2 000	0.33
AAA9250	0.5	Pyrene	5.2	2 000	0.33
AAA9253	0.5	Pyrene	5.8 (J)	2 000	0.33
AAA9466	0.5	Pyrene	1.7 (J)	2 000	0.33
SAMPLE ID	**DEPTH (ft)**	**PESTICIDES**	**RESULT (mg/kg)**	**SAL (mg/kg)**	**EQL (mg/kg)**
AAA9253	0.5	Aldrin	0.0489 (J)	0.026	0.0017
AAA9241	0.5	DDT [p,p'-]	0.00714	1.3	0.0033
AAA9250	0.5	DDT [p,p'-]	0.0486 (J)	1.3	0.0033
AAA9253	0.5	DDT [p,p'-]	0.00828 (J)	1.3	0.0033
AAA9466	0.5	DDT [p,p'-]	0.00614 (J)	1.3	0.0033
AAA9199	1	Dieldrin	0.00119 (J)	0.028	0.0033
AAA9202	0.5	Dieldrin	0.002	0.028	0.0033
AAA9205	0.5	Dieldrin	0.00084 (J)	0.028	0.0033
AAA9208	1	Dieldrin	0.00115 (J)	0.028	0.0033
AAA9211	3	Dieldrin	0.00173 (J)	0.028	0.0033
AAA9217	1	Dieldrin	0.00177	0.028	0.0033
AAA9466	0.5	Dieldrin	0.00408 (J)	0.028	0.0033
AAA9241	0.5	Endosulfan II	0.00467 (J)	3.3	0.0033
AAA9250	0.5	Endosulfan II	0.0184	3.3	0.0033
AAA9466	0.5	Endosulfan II	0.00378 (J)	3.3	0.0033
AAA9466	0.5	Endosulfan sulfate	0.00175 (J)	NC	0.0033
AAA9241	0.5	Endrin	0.00352	20	0.0033
AAA9250	0.5	Endrin	0.0267 (J)	20	0.0033
AAA9466	0.5	Endrin	0.00228 (J)	20	0.0033
AAA9250	0.5	Heptachlor epoxide	0.0149 (J)	0.049	0.0017
AAA9250	0.5	Methoxychlor	28.2 (J)	0.24	0.0165
AAA9466	0.5	Methoxychlor	0.0264 (J)	0.24	0.0165

[a] SVOC = Semivolatile organic compound.
[b] SAL = Screening action level.
[c] EQL = Estimated quantitation level.
[d] J = Estimated result.
[e] NC = Not calculated.

5.15.7 Human Health

5.15.7.1 Screening Assessment

Inorganic contaminants identified to be greater than LANL background UTLs were submitted for MCE for noncarcinogenic effects. Lead is excluded from this grouping because its toxicity is based on the uptake of lead in children as modeled by EPA's IUBEK Model (EPA 1994, 1178). The maximum lead concentration detected at this PRS (93 mg/kg) is below the SAL for lead (400 mg/kg). The sum of the maxima for the noncarcinogenic group is less than 0.1 (Table 5.15.7-1), below the target value of 1, indicating a low potential for adverse effects due to exposure to this grouping. Therefore, these contaminants are not identified as potentially hazardous. No carcinogens due to LANL operations were detected above UTL at this PRS; therefore, no MCE was performed for this grouping. Only one radionuclide (uranium) was detected at this PRS (below SAL); therefore, no MCE was performed for this grouping.

Low levels of PAHs were reported above SALs. Because PAHs are derived from continuing sources, they will not be carried forward in the screening process. Pesticides were detected slightly above SAL and their use at TA-46 was in accordance with established practice. No other contaminants were found above SALs.

TABLE 5.15.7-1

MCE FOR NONCARCINOGENIC EFFECTS AT PRS 46-004(c2)

CONTAMINANT	MAXIMUM SOIL CONCENTRATION (mg/kg)	SOIL SAL[a] (mg/kg)	CONCENTRATION NORMALIZED TO SAL
Copper	149	2 800	0.053
Mercury	0.61	23	0.027
Silver	0.49	380	0.001
Zinc	241	23 000	0.010
Total			0.091

[a] SAL - Screening action level.

5.15.7.2 Risk Assessment

No risk assessment was performed for this PRS.

5.15.8 Ecological Assessment

No ecological assessment was performed for this PRS, which is recommended for NFA because no COPCs were identified. The approach to ecological assessment is discussed in Section 3.5 of this RFI report.

5.15.9 Extent of Contamination

No contaminants at concentrations of concern were detected at sampling points for this PRS.

5.15.10 Conclusions and Recommendations

Copper, lead, mercury, silver, and zinc were found at PRS 46-004(c2) above background UTLs, but below SALs. An MCE was performed for noncarcinogenic effects with a result (0.09) below the target value of 1. No MCE was performed for lead, carcinogenic, or radionuclide effects because multiple constituents for these groupings were not found above LANL UTLs. Based on NFA criterion 5, a Class III permit modification is requested to remove this site from the HSWA Module of the Laboratory's RCRA operating permit.

5.16 PRS 46-004(e2)

PRS 46-004(e2) (outfall AP), served drains from TA-46-42. Because no contaminants were detected above SALs, the PRS is recommended for NFA.

5.16.1 History

PRS 46-004(e2) is discussed in RFI Work Plan for OU 1140, Appendix G, as an unlocated outfall (LANL 1993, 1093). The outfall was found prior to the 1994 field campaign. Outfall AP serves roof, floor, and sink drains from TA-46-42. Much of the routine effluent is from blowdown and condensate (LANL 1993, 11-259). TA-46-42 was constructed in 1960 as an equipment check-out facility. It now contains electronic and robotics laboratories. Hazardous materials may have been handled in machining operations. Solvents may have been used in conjunction with the laboratory. COPCs included inorganics, SVOCs, VOCs, and radionuclides.

The drains from TA-46-42 are plugged (LANL 1993, 11-259).

5.16.2 Description

The 4-in. outfall is located at the head of the ditch that comprises PRS 46-006(a) (Fig. 5.16.2-1). The area south of the ditch is paved between TA-46-42 and TA-46-1, and the ditch serves as a runoff area from the pavement. The outfall is approximately 3 ft below the level of the asphalt and is covered by silt and sediment deposited during runoff events. The outfall was excavated for sampling; within months it was silted over.

5.16.3 Previous Investigations

No previous investigations were conducted at this PRS.

5.16.4 Field Investigation

Three samples were collected for this PRS (Table 5.16.4-1). Sample AAA9458 was taken at the outfall and two samples were collected from the ditch below the outfall (Fig. 5.16.2-1). This ditch is also discussed in Section 5.15 [PRS 46-004(c2)] and Section 5.18 [PRS 46-006(a)].

TABLE 5.16.4-1

SUMMARY OF SAMPLES TAKEN

SAMPLE ID	LOCATION ID	DEPTH (ft)	MATRIX	INOR-GANICS	RADIO-NUCLIDES	VOCs[a]	SVOCs[b]	PESTI-CIDES
AAA9244	461073	0.5	Soil	19675	20007	19438	19438	19438
AAA9247	461074	0.5	Soil	19675	20007	NA[c]	19438	19438
AAA9458	461125	0.25	Soil	19675	20007	NA	19438	19438

[a] VOCs = Volatile organic compounds.
[b] SVOCs = Semivolatile organic compounds.
[c] NA = Not analyzed.

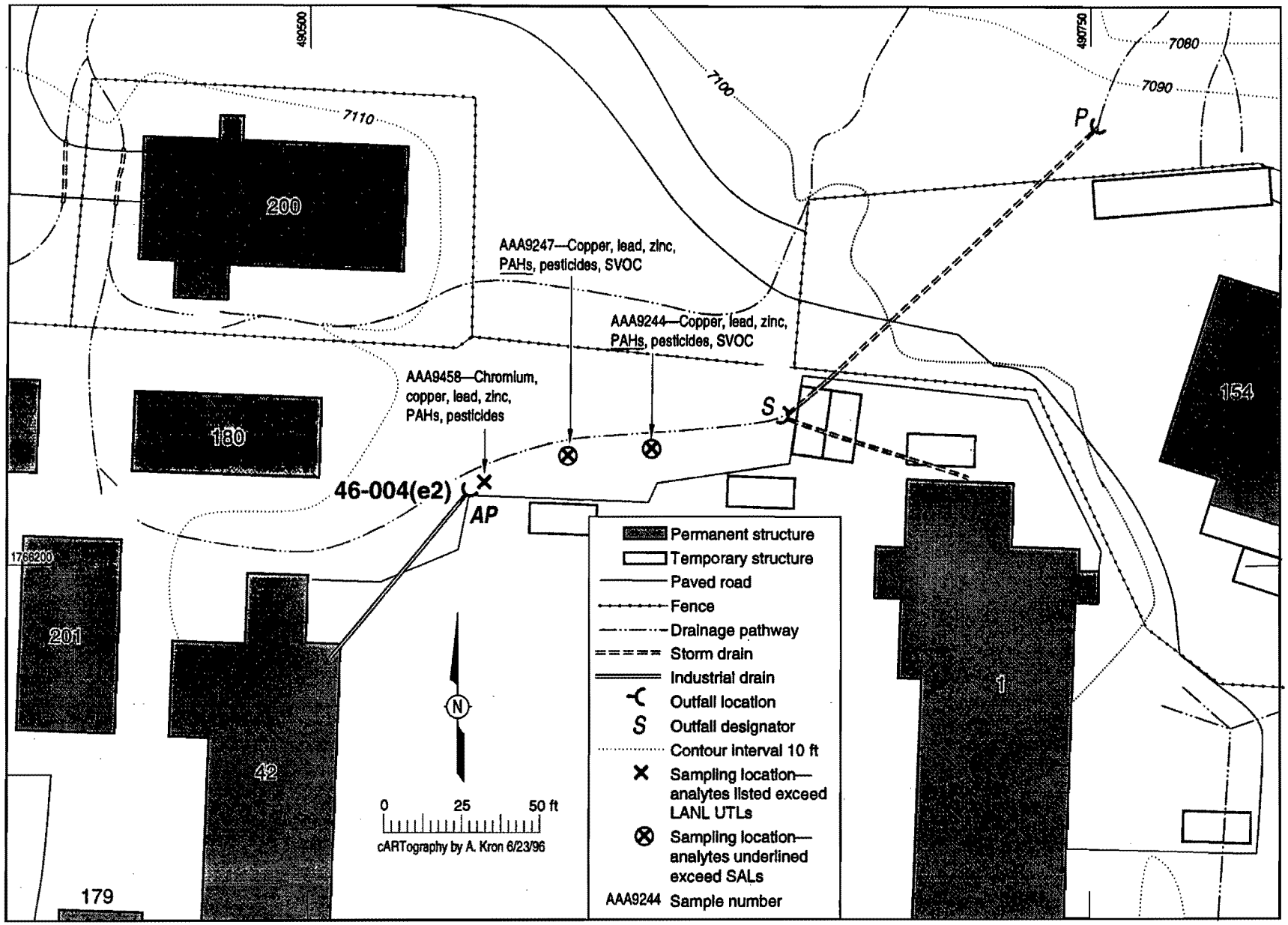


Fig. 5.16.2-1. PRS 46-004(e2), industrial drain from TA-46-42 (outfall AP).

5.16.5 Background Comparison

Five inorganics were found somewhat above LANL background UTLs (Table 5.16.5-1). Although chromium results were qualified as estimated (J) based on 75% recoveries from the blind sample, values are accepted as reasonable estimates. No radionuclides were found above LANL UTLs.

TABLE 5.16.5-1

INORGANIC ANALYTES WITH CONCENTRATIONS GREATER THAN BACKGROUND UTLs FOR PRS 46-004(e2)

SAMPLE ID	DEPTH (ft)	CHROMIUM (mg/kg)	COPPER (mg/kg)	LEAD (mg/kg)	ZINC (mg/kg)
SAL[a]	N/A[b]	210	2 800	400	23 000
LANL UTL[c]	N/A	19.3	15.5	23.3	50.8
AAA9244	0.5	6.9 (J)[d]	26.6	31.7	52
AAA9247	0.5	18.8 (J)	27.9	73.5	98.9
AAA9247D[e]	0.5	17 (J)	18.4	62.8	102
AAA9458	0.25	19.4 (J)	61.5	26.5	97.7

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] UTL = Upper tolerance limit.
[d] J = Estimated result.
[e] D = Duplicate analysis.

5.16.6 Evaluation of Organics

Low levels of PAHs and pesticides were reported for this PRS (Table 5.16.6-1). These contaminants are derived from continuing sources: asphalt paving, roofing tar, and routine pesticide spraying.

TABLE 5.16.6-1

PRS 46-004(e2) SOIL CONCENTRATIONS FOR ORGANIC ANALYTES WITH VALUES GREATER THAN THE REPORTING LIMIT

SAMPLE ID	DEPTH (ft)	SVOC [a]	RESULT (mg/kg)	SAL [b] (mg/kg)	EQL [c] (mg/kg)
AAA9244	0.5	Anthracene	0.45 (J) [d]	19	0.33
AAA9247	0.5	Anthracene	2.4 (J)	19	0.33
AAA9458	0.25	Anthracene	0.87 (J)	19	0.33
AAA9244	0.5	Benzo[a]anthracene	1 (J)	0.61	0.33
AAA9247	0.5	Benzo[a]anthracene	3.7 (J)	0.61	0.33
AAA9458	0.25	Benzo[a]anthracene	1.8 (J)	0.61	0.33
AAA9244	0.5	Benzo[a]pyrene	1.9 (J)	0.061	0.33
AAA9247	0.5	Benzo[a]pyrene	4.2 (J)	0.061	0.33
AAA9458	0.25	Benzo[a]pyrene	2.2 (J)	0.061	0.33
AAA9244	0.5	Benzo[b]fluoranthene	3.2 (J)	0.61	0.33
AAA9247	0.5	Benzo[b]fluoranthene	5.8 (J)	0.61	0.33
AAA9247	0.5	Benzo[b]fluoranthene	5.8	0.61	0.33
AAA9458	0.25	Benzo[b]fluoranthene	3 (J)	0.61	0.33
AAA9458	0.25	Bis(2-ethylhexyl)phthalate	1 (J)	32	0.33
AAA9244	0.5	Chrysene	1 (J)	24	0.33
AAA9247	0.5	Chrysene	4 (J)	24	0.33
AAA9458	0.25	Chrysene	2 (J)	24	0.33
AAA9244	0.5	Fluoranthene	1.7	2 600	0.33
AAA9247	0.5	Fluoranthene	5.9	2 600	0.33
AAA9458	0.25	Fluoranthene	2.7	2 600	0.33
AAA9244	0.5	Phenanthrene	2.3	NC [e]	0.33
AAA9247	0.5	Phenanthrene	8.8	NC	0.33
AAA9458	0.25	Phenanthrene	3.9	NC	0.33
AAA9244	0.5	Pyrene	4.1 (J)	2 000	0.33
AAA9247	0.5	Pyrene	15 (J)	2 000	0.33
AAA9458	0.25	Pyrene	7.7 (J)	2 000	0.33

TABLE 5.16.6-1 (CONTINUED)

PRS 46-004(e2) SOIL CONCENTRATIONS FOR ORGANIC ANALYTES WITH VALUES GREATER THAN THE REPORTING LIMIT

SAMPLE ID	DEPTH (ft)	PESTICIDES	RESULT (mg/kg)	SAL (mg/kg)	EQL (mg/kg)
AAA9244	0.5	DDE [p,p'-]	0.0155 (J)	1.3	0.0033
AAA9458	0.25	DDE [p,p'-]	0.00616 (J)	1.3	0.0033
AAA9244	0.5	DDT [p,p'-]	0.0129 (J)	1.3	0.0033
AAA9247	0.5	DDT [p,p'-]	0.01	1.3	0.0033
AAA9458	0.25	DDT [p,p'-]	0.0173	1.3	0.0033
AAA9244	0.5	Dieldrin	0.00788 (J)	0.028	0.0033
AAA9244	0.5	Endosulfan II	0.0209 (J)	NC	0.0033
AAA9247	0.5	Endosulfan II	0.00431 (J)	NC	0.0033
AAA9458	0.25	Endosulfan II	0.0108 (J)	NC	0.0033
AAA9244	0.5	Endrin	0.0122 (J)	20	0.0033
AAA9247	0.5	Endrin	0.00918	20	0.0033
AAA9458	0.25	Endrin	0.0116 (J)	20	0.0033
AAA9244	0.5	Endrin aldehyde	0.00314 (J)	NC	0.0033
AAA9458	0.25	Heptachlor epoxide	0.00632 (J)	0.049	0.0017
AAA9244	0.5	Methoxychlor	0.0277 (J)	330	0.0165
AAA9247	0.5	Methoxychlor	0.0325 (J)	330	0.0165
AAA9458	0.25	Methoxychlor	0.0483 (J)	330	0.0165

[a] SVOC = Semivolatile organic compound.
[b] SAL = Screening action level.
[c] EQL = Estimated quantitation level.
[d] J = Estimated result.
[e] NC = Not calculated.

5.16.7 Human Health

5.16.7.1 Screening Assessment

Several constituents were detected above background UTLs but well below SALs. Inspection of the data indicates that MCE screening would yield a value less than the target limit of 1. Low levels of PAHs were reported above SALs. PAHs at TA-46 are attributed to ongoing sources, e.g., parking lot runoff and roofing tar. Therefore, these contaminants are not carried forward in the screening process. No other contaminants were found above SALs.

5.16.7.2 Risk Assessment

No risk assessment was performed for this PRS.

5.16.8 Ecological Assessment

This PRS is recommended for NFA because no COPCs were detected. The approach to ecological assessment is discussed in Section 3.5 of this RFI report.

5.16.9 Extent of Contamination

No contaminants at concentrations of concern were detected at sampling points for this PRS.

5.16.10 Conclusions and Recommendations

Chromium, copper, lead, and zinc were found at PRS 46-004(e2) above background UTLs, but below SALs. Inspection of the data indicates that an MCE for noncarcinogenic effects would yield a result far below the target value of 1. No MCE was performed for lead, carcinogenic, or radionuclide effects because multiple constituents for these groupings were not found above LANL UTLs. Based on NFA criterion 5, this site will not be added to the HSWA Module of the Laboratory's RCRA operating permit and is proposed for removal from the ER Project list of PRSs proposed for further action.

5.17 PRS 46-004(f2)

PRS 46-004(f2) (outfall AQ) was from a floor drain in TA-46-31, now plugged. Because no contaminants were detected above SALs, this PRS is recommended for NFA.

5.17.1 History

PRS 46-004(f2) is discussed in RFI Work Plan for OU 1140, Appendix G as an unlocated outfall from floor drains in TA-46-31 (LANL 1993, 1093). The outfall was located prior to the 1994 sampling campaign. The outfall served a single floor drain, now plugged, in room 151B of TA-46-31 (LANL 1993, 11-259). Historical information indicates that fissionable materials were used in several rooms in TA-46-31 (Ehrenkranz 1964, 11-043). Based on general activity and process information, suspected contaminants included mercury, other inorganics, VOCs, SVOCs, uranium, and thorium.

5.17.2 Description

The outfall is from a 4-in. diameter cast iron pipe located on the steep slope north of TA-46-31 (Fig. 5.17.2-1). The pipe lies approximately 10 ft below the TA-46 perimeter fence near the northwest corner of the building. Effluent from the pipe has not formed a ditch. A large runoff channel lies a few feet west of the pipe.

5.17.3 Previous Investigations

No previous investigations were conducted at this PRS.

5.17.4 Field Investigation

Six samples were collected for this PRS (Table 5.17.4-1). One sample (AAA9499) was taken at the outfall, two samples from a sediment channel on the steep slope, one sample at the toe of the slope, and a field duplicate (two samples) in the drainage on the level bench (Fig. 5.17.2-1).

TABLE 5.17.4-1

SUMMARY OF SAMPLES TAKEN

SAMPLE ID	LOCATION ID	DEPTH (ft)	MATRIX	INOR-GANICS	RADIO-NUCLIDES	VOCs[a]	SVOCs[b]	PCBs[c]	PESTI-CIDES
AAA9130	46-1033	0.5	Soil	19322	19844	18828	18828	18828	18828
AAA9139	46-1036	0.5	Soil	19322	19844	NA[d]	18828	18828	18828
AAA9440	46-0136	0.5	Soil	19322	19844	NA	18828	18828	18828
AAA9499	46-1140	0.5	Soil	19450	19849	NA	19003	19003	19003
AAA9502	46-1141	0.5	Soil	19450	19849	NA	19003	19003	19003
AAA9505	46-1142	0.5	Soil	19450	19849	NA	19003	19003	19003

[a] VOCs = Volatile organic compounds.
[b] SVOCs = Semivolatile organic compounds.
[c] PCBs = Polychlorinated biphenyls.
[d] NA = Not analyzed.

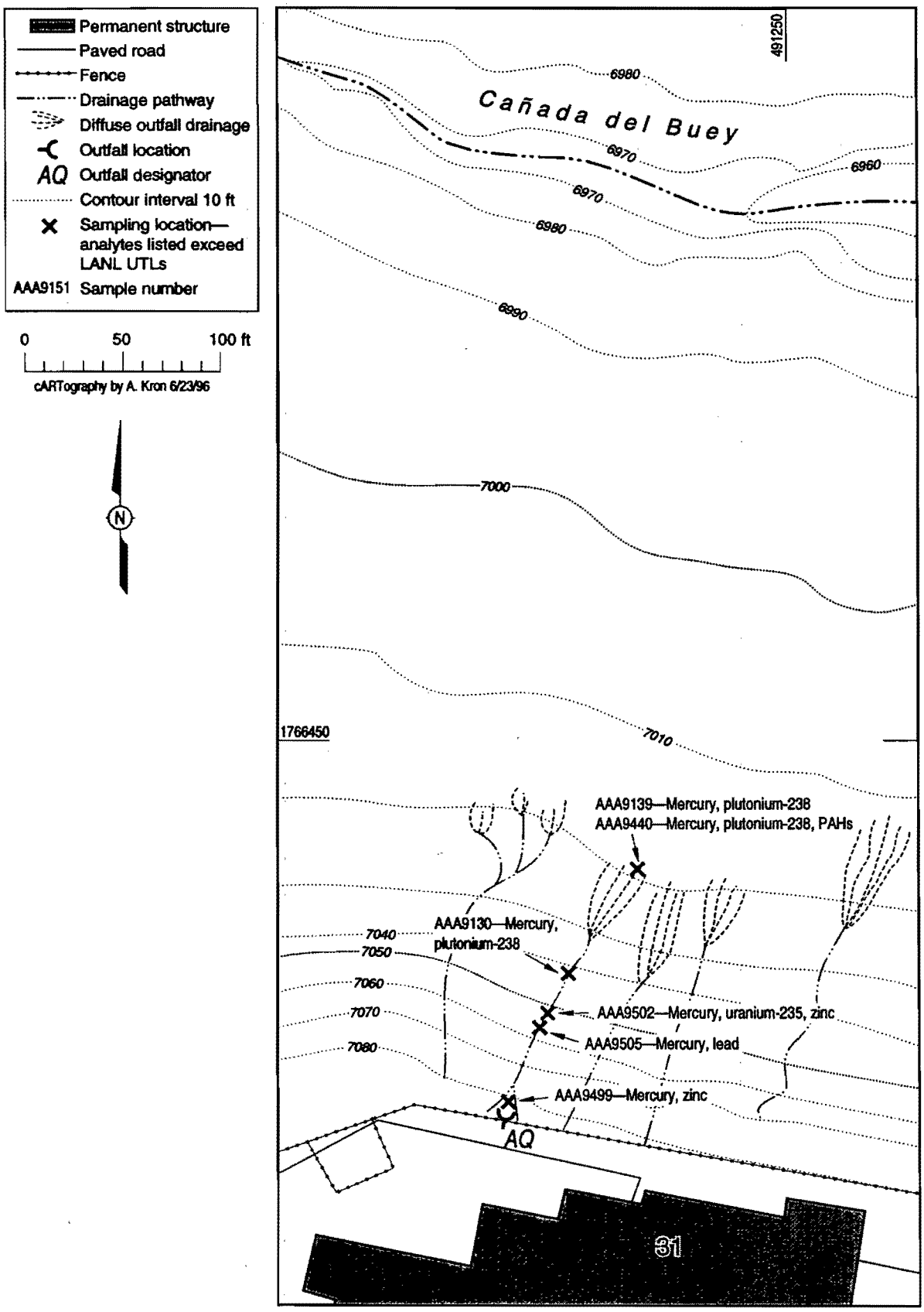


Fig. 5.17.2-1. PRS 46-004(f2), industrial drain from TA-46-31.

5.17.5 Background Comparison

Three contaminants were detected above LANL background UTLs but well below SALs (Table 5.17.5-1). Although mercury results were qualified as estimated (J) based on high recoveries from the blind QC sample, values are consistent with nonqualified results and are accepted as reasonable estimates well below SAL. Trace levels of uranium-235 and plutonium-238 were found somewhat above background UTLs, but far below SALs (Table 5.17.5-2). Results are qualified as estimated (J) because of anomalous recoveries from blind QC samples, but are considered adequate for screening purposes.

TABLE 5.17.5-1

INORGANIC ANALYTES WITH CONCENTRATIONS GREATER THAN BACKGROUND UTLs FOR PRS 46-004(f2)

SAMPLE ID	DEPTH (ft)	LEAD (mg/kg)	MERCURY (mg/kg)	ZINC (mg/kg)
SAL[a]	N/A[b]	400	23	23 000
LANL UTL[c]	N/A	23.3	0.1	50.8
AAA9130	0.5	5.6	**0.34**	27.2
AAA9139	0.5	3.9	**3.3**	24.5
AAA9139D[d]	0.5	4.6	**1.6**	23.7
AAA9440	0.5	7.8	**0.28**	31.2
AAA9499	0.5	22.4	**0.71 (J)[e]**	**86.1**
AAA9502	0.5	18.8	**0.36 (J)**	**74.5**
AAA9505	0.5	**76.2**	**0.38 (J)**	**66.6**

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] UTL = Upper tolerance limit.
[d] D = Duplicate analysis.
[e] J = Estimated result.

TABLE 5.17.5-2

RADIONUCLIDES WITH ACTIVITIES GREATER THAN BACKGROUND UTLs FOR PRS 46-004(f2)

SAMPLE ID	DEPTH (ft)	URANIUM-235 (pCi/g)	PLUTONIUM-238 (pCi/g)
SAL[a]	N/A[b]	10	27
LANL UTL[c]	N/A	0.084	0.014
AAA9130	0.5	0.0165 (J)[d]	**0.0244 (J)**
AAA9139	0.5	0.0618 (J)	**0.0268 (J)**
AAA9139D[e]	0.5	0.0217 (J)	**0.0299 (J)**
AAA9440	0.5	0.0097 (J)	**0.0246 (J)**
AAA9502	0.5	**0.0962 (J)**	NA[f]

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] UTL = Upper tolerance limit.
[d] J = Estimated result.
[e] D = Duplicate analysis.
[f] NA = Not analyzed.

5.17.6 Evaluation of Organics

Low levels of two PAHs and a pesticide were reported for this PRS (Table 5.17.6-1). These contaminants are derived from continuing sources: asphalt paving, roofing tar and routine spraying, therefore are not carried forward in the screening process.

TABLE 5.17.6-1

PRS 46-004(f2) SOIL CONCENTRATIONS FOR ORGANIC ANALYTES WITH VALUES GREATER THAN THE REPORTING LIMIT

SAMPLE ID	SVOC[a]	RESULT	SAL[b] (mg/kg)	EQL[c] (mg/kg)
AAA9440	Phenanthrene	0.38	NC	0.33
	Pyrene	0.39	2000	0.33
SAMPLE ID	**PESTICIDES**	**RESULT**	**SAL (mg/kg)**	**EQL (mg/kg)**
AAA9502	Dieldrin	0.94	0.028	0.0033
AAA9505	Dieldrin	1.2	0.028	0.0033

[a] SVOC = Semivolatile organic compound.
[b] SAL = Screening action level.
[c] EQL = Estimated quantitation level.

5.17.7 Human Health Assessment

5.17.7.1 Screening Assessment

Several constituents were detected above background UTLs but well below SALs. Inspection of the data indicates that inorganic MCE screening would yield a value less than the target limit of 1. Low levels of PAHs were reported. Because PAHs at TA-46 are attributed to ongoing sources, e.g., parking lot runoff and roofing tar, they are not carried forward in the screening process. No other contaminants were found above SALs.

5.17.7.2 Risk Assessment

No risk assessment was performed for this PRS.

5.17.8 Ecological Assessment

This PRS is recommended for NFA because no COPCs were detected. The approach to ecological assessment is discussed in Section 3.5 of this RFI report.

5.17.9 Extent of Contamination

No contaminants at concentrations of concern were detected at sampling points for this PRS.

5.17.10 Conclusions and Recommendations

Lead, mercury, and zinc were found at PRS 46-004(f2) above background UTLs, but below SALs. Inspection of the data indicates that MCE screening for noncarcinogenic or radionuclide effects would yield a result far below the target value of 1. No MCE was performed for lead or carcinogenic effects because multiple constituents for these groupings were not found above LANL UTLs. Based on NFA criterion 5, this site will not be added to the HSWA Module of the Laboratory's RCRA operating permit and is proposed for removal from the ER Project list of PRSs proposed for further investigation.

5.18 PRS 46-006(a)

PRS 46-006(a) is a storage area of concrete and asphalt and the associated ditch at the north end of the parking lot between TA-46-1 and TA-46-42. Because no contaminants associated with LANL activities were found above SALs, the PRS is recommended for NFA.

5.18.1 History

PRS 46-006(a) is discussed in RFI Work Plan for OU 1140, Subsection 5.3 (LANL 1993, 1093). The 1986 comprehensive environmental assessment and response program (CEARP) field survey crew reported fifteen 55-gallon drums at this PRS. All drums were oily-looking and some of the drums were leaking. Oil had drained north into the adjacent ditch. The drain was worked on just before the 1986 survey, making it difficult to see how far the oil had moved. The drums contained dielectric oil (Perkins 1986, 11-089).

5.18.2 Description

The pad is paved and level, but the PRS drains into an adjacent unpaved ditch leading to a culvert and outfall P on the rim of Cañada del Buey (Fig. 5.18.2-1). The ditch is approximately 5-ft deep and 15–20 ft wide. It is overgrown with grasses and sediment has collected in the bottom. The entire affected area at this PRS is approximately 70 ft x 100 ft.

5.18.3 Previous Investigations

PRS 46-006(a) was included in the DOE Los Alamos National Laboratory Sampling and Analysis Data Document. Environmental Problem 19 addressed PRS 46-006(a), the storage area west of TA-46-1 (LANL 1989, 0425). Three soil samples at depths of 0 to 6 in. were taken; one on the side of the ditch and two below it "under a pipe." Samples were analyzed for inorganics, VOCs, PCBs, pesticides, radionuclides, and high explosives. One sample taken in a stained area on the side of the ditch contained pesticides. All three samples contained PCBs (0.3 to 2 mg/kg). Thorium-232, plutonium-238, plutonium-239/240, and strontium-90 results were below EQLs (LANL 1990, 0145). Data from this study are discussed in Subsection 5.3.1.2.1 of the RFI work plan for OU 1140 (LANL 1993, 1093).

5.18.4 Field Investigation

Six samples were collected in the ditch (Fig. 5.18.2-1) for this PRS (Table 5.18.4-1). Data from outfall P, described in Section 5.15, and PRSs 46-004(c2) and 46-004(e2) were also used in the decision process for this PRS.

TABLE 5.18.4-1

SUMMARY OF SAMPLES TAKEN

SAMPLE ID	LOCATION ID	DEPTH (ft)	MATRIX	INOR-GANICS	RADIO-NUCLIDES	VOCs[a]	SVOCs[b]	PCBs[c]	PESTI-CIDES
AAA9241	46-1072	0.5	Soil	19675	20007	NA[d]	19438	19438	19438
AAA9244	46-1073	1	Soil	19675	20007	19438	19438	19438	19438
AAA9247	46-1074	0.5	Soil	19675	20007	NA	19438	19438	19438
AAA9250	46-1075	0.5	Soil	19675	20007	NA	19438	19438	19438
AAA9253	46-1076	0.3	Soil	19675	20007	NA	19438	19438	19438
AAA9466	46-1075	0.3	Soil	19675	20007	NA	19438	19438	19438

[a] VOCs = Volatile organic compounds.
[b] SVOCs = Semivolatile organic compounds.
[c] PCBs = Polychlorinated biphenyls.
[d] NA = Not analyzed.

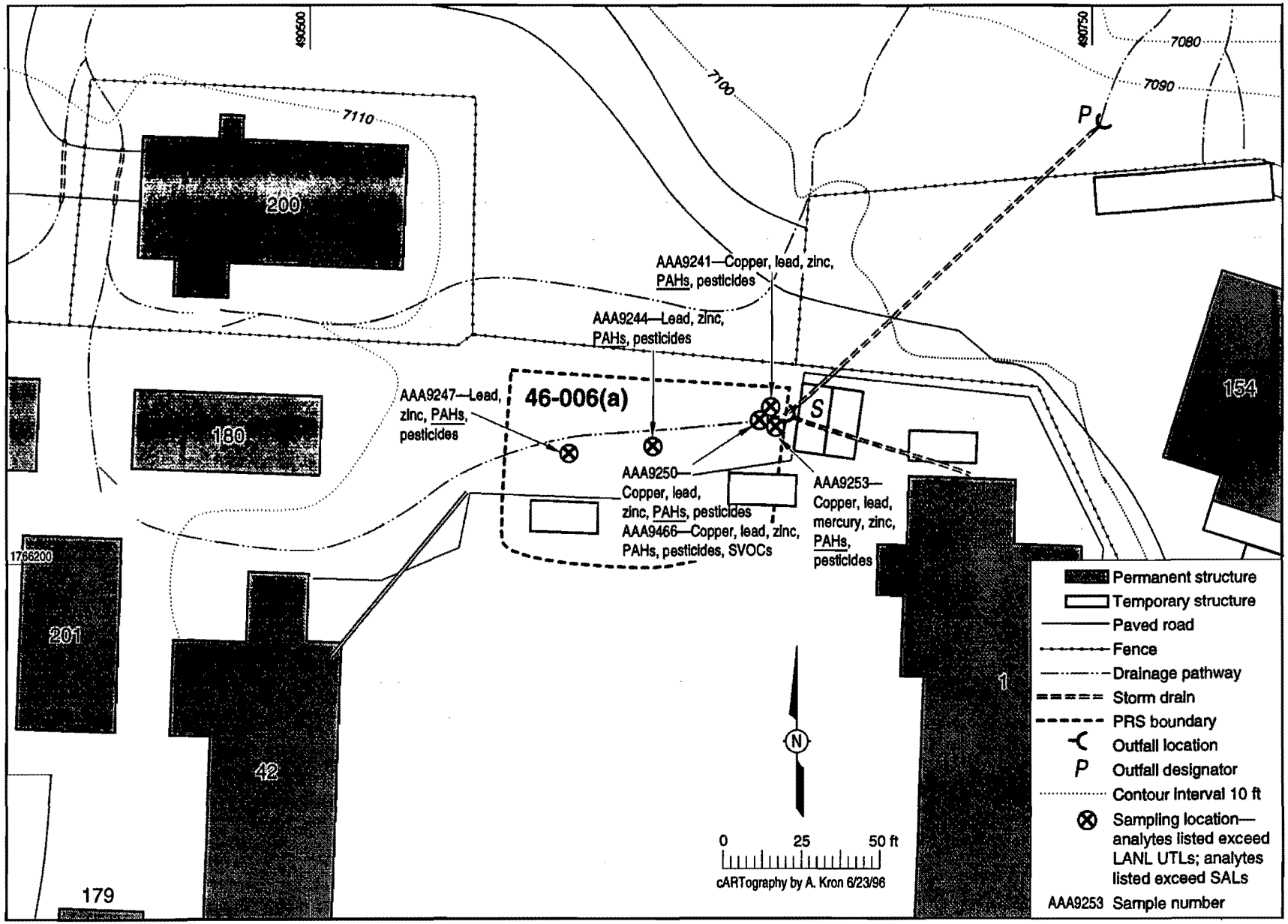


Fig. 5.18.2-1. PRS 46-006(a), drum storage.

5.18.5 Background Comparison

Four contaminants were detected above LANL background UTLs but well below SALs (Table 5.18.5-1). Although mercury results were rejected (R) based on missed holding time, the data are considered adequate to conclude that mercury is not a COPC at this PRS based on mercury recovery from QA samples (see Section 4.1 of this RFI report). No radionuclides were detected above LANL background UTLs.

TABLE 5.18.5-1

INORGANIC ANALYTES WITH CONCENTRATIONS GREATER THAN BACKGROUND UTLs FOR PRS 46-006(a)

SAMPLE ID	DEPTH (ft)	COPPER (mg/kg)	MERCURY (mg/kg)	LEAD (mg/kg)	ZINC (mg/kg)
SAL[a]	N/A[b]	2 800	23	400	23 000
LANL UTL[c]	N/A	15.5	0.1	23.3	50.8
AAA9241	0.5	**37.3**	0.06 (R)[d]	**44.7**	**99.5**
AAA9244	1	**26.6**	0.05 (R)	**31.7**	**52**
AAA9247	0.5	**27.9**	0.04 (R)	**73.5**	**98.9**
AAA9247D[e]	0.5	**18.4**	0.04 (R)	**62.8**	**102**
AAA9250	0.5	**44.4**	0.1 (R)	**45.7**	**111**
AAA9253	0.3	**50.1**	**0.19 (R)**	**92.7**	**241**
AAA9466	0.3	**50.5**	0.1 (R)	**40.4**	**90.5**

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] UTL = Upper tolerance limit.
[d] R = Rejected result.
[e] D = Duplicate analysis.

5.18.6 Evaluation of Organics

Low levels of PAHs, pesticides, and a common plasticizer were reported (Table 5.18.6-1). Several PAHs are above SALs, however, the concentrations are similar to most samples in areas exposed to asphalt paving. Dieldrin was detected above SAL in one sample.

TABLE 5.18.6-1

PRS 46-006(a) SOIL CONCENTRATIONS FOR ORGANIC ANALYTES WITH VALUES GREATER THAN THE REPORTING LIMIT

SAMPLE ID	DEPTH (ft)	SVOC [a]	RESULT (mg/kg)	SAL [b] (mg/kg)	EQL [c] (mg/kg)
AAA9241	0.5	Acenaphthene	1.5	360	0.33
AAA9241	0.5	Anthracene	6.2	19	0.33
AAA9244	0.5	Anthracene	0.45 (J) [d]	19	0.33
AAA9247	0.5	Anthracene	2.4 (J)	19	0.33
AAA9241	0.5	Benzo[a]anthracene	2.6 (J)	0.61	0.33
AAA9244	1	Benzo[a]anthracene	1 (J)	0.61	0.33
AAA9247	0.5	Benzo[a]anthracene	3.7 (J)	0.61	0.33
AAA9250	0.5	Benzo[a]anthracene	2	0.61	0.33
AAA9253	0.3	Benzo[a]anthracene	1.2 (J)	0.61	0.33
AAA9466	0.3	Benzo[a]anthracene	0.47 (J)	0.61	0.33
AAA9241	0.5	Benzo[a]pyrene	2.1 (J)	0.061	0.33
AAA9244	1	Benzo[a]pyrene	1.9 (J)	0.061	0.33
AAA9247	0.5	Benzo[a]pyrene	4.2 (J)	0.061	0.33
AAA9250	0.5	Benzo[a]pyrene	1.7 (J)	0.061	0.33
AAA9241	0.5	Benzo[b]fluoranthene	3.3 (J)	0.61	0.33
AAA9244	1	Benzo[b]fluoranthene	3.2 (J)	0.61	0.33
AAA9247	0.5	Benzo[b]fluoranthene	5.8 (J)	0.61	0.33
AAA9250	0.5	Benzo[b]fluoranthene	2.9 (J)	0.61	0.33
AAA9253	0.3	Benzo[b]fluoranthene	2.1 (J)	0.61	0.33
AAA9241	0.5	Bis(2-ethylhexyl)phthalate	1.5 (J)	32	0.33
AAA9253	0.3	Bis(2-ethylhexyl)phthalate	0.91 (J)	32	0.33
AAA9466	0.3	Bis(2-ethylhexyl)phthalate	1.1 (J)	32	0.33
AAA9241	0.5	Chrysene	2.6 (J)	24	0.33
AAA9244	1	Chrysene	1 (J)	24	0.33
AAA9247	0.5	Chrysene	4 (J)	24	0.33
AAA9250	0.5	Chrysene	1.8	24	0.33
AAA9253	0.3	Chrysene	1.2 (J)	24	0.33
AAA9466	0.3	Chrysene	0.52 (J)	24	0.33
AAA9241	0.5	Dibenzofuran	0.57	260	0.33
AAA9241	0.5	Fluoranthene	5.2	2 600	0.33
AAA9244	1	Fluoranthene	1.7	2 600	0.33
AAA9247	0.5	Fluoranthene	5.9	2 600	0.33
AAA9250	0.5	Fluoranthene	3.4	2 600	0.33
AAA9253	0.3	Fluoranthene	1.9	2 600	0.33
AAA9466	0.3	Fluoranthene	0.63	2 600	0.33
AAA9241	0.5	Fluorene	1.1	300	0.33
AAA9241	0.5	Methylnaphthalene [2-]	0.43	NC [e]	0.33
AAA9241	0.5	Naphthalene	1.8 (J)	800	0.33
AAA9241	0.5	Phenanthrene	6.2	NC	0.33
AAA9244	1	Phenanthrene	2.3	NC	0.33
AAA9247	0.5	Phenanthrene	8.8	NC	0.33
AAA9250	0.5	Phenanthrene	2.5	NC	0.33
AAA9253	0.3	Phenanthrene	1.8	NC	0.33
AAA9466	0.3	Phenanthrene	0.7	NC	0.33

TABLE 5.18.6-1 (CONTINUED)

PRS 46-006(a) SOIL CONCENTRATIONS FOR ORGANIC ANALYTES WITH VALUES GREATER THAN THE REPORTING LIMIT

SAMPLE ID	DEPTH (ft)	SVOC [a]	RESULT (mg/kg)	SAL [b] (mg/kg)	EQL [c] (mg/kg)
AAA9241	0.5	Pyrene	6.3 (J)	2 000	0.33
AAA9244	1	Pyrene	4.1 (J)	2 000	0.33
AAA9247	0.5	Pyrene	15 (J)	2 000	0.33
AAA9250	0.5	Pyrene	5.2	2 000	0.33
AAA9253	0.3	Pyrene	5.8 (J)	2 000	0.33
AAA9466	0.3	Pyrene	1.7 (J)	2 000	0.33
SAMPLE ID	**DEPTH (ft)**	**PESTICIDE**	**RESULT (mg/kg)**	**SAL [c] (mg/kg)**	**EQL [d] (mg/kg)**
AAA9253	0.3	Aldrin	0.0489 (J)	0.26	0.0017
AAA9244	1	DDE [p,p'-]	0.0155 (J)	1.3	0.0033
AAA9241	0.5	DDT [p,p'-]	0.00714	1.3	0.0033
AAA9244	1	DDT [p,p'-]	0.0129 (J)	1.3	0.0033
AAA9247	0.5	DDT [p,p'-]	0.01	1.3	0.0033
AAA9250	0.5	DDT [p,p'-]	0.0486 (J)	1.3	0.0033
AAA9253	0.3	DDT [p,p'-]	0.00828 (J)	1.3	0.0033
AAA9466	0.3	DDT [p,p'-]	0.00614 (J)	1.3	0.0033
AAA9244	1	Dieldrin	0.00788 (J)	0.028	0.0033
AAA9250	0.5	Dieldrin	0.112	0.028	0.0033
AAA9466	0.3	Dieldrin	0.00408 (J)	0.028	0.0033
AAA9241	0.5	Endosulfan II	0.00467 (J)	3.3	0.0033
AAA9244	1	Endosulfan II	0.0209 (J)	3.3	0.0033
AAA9247	0.5	Endosulfan II	0.00431 (J)	3.3	0.0033
AAA9250	0.5	Endosulfan II	0.0184	3.3	0.0033
AAA9466	0.3	Endosulfan II	0.00378 (J)	3.3	0.0033
AAA9241	0.5	Endosulfan sulfate	0.00201 (J)	NC	0.0033
AAA9466	0.3	Endosulfan sulfate	0.00175 (J)	NC	0.0033
AAA9241	0.5	Endrin	0.00352	20	0.0033
AAA9244	1	Endrin	0.0122 (J)	20	0.0033
AAA9247	0.5	Endrin	0.00918	20	0.0033
AAA9250	0.5	Endrin	0.0267 (J)	20	0.0033
AAA9466	0.3	Endrin	0.00228 (J)	20	0.0033
AAA9244	1	Endrin aldehyde	0.00314 (J)	NC	0.0033
AAA9250	0.5	Heptachlor	0.0284	0.099	0.0017
AAA9250	0.5	Heptachlor epoxide	0.0149 (J)	0.049	0.0017
AAA9244	1	Methoxychlor	0.0277 (J)	330	0.0165
AAA9247	0.5	Methoxychlor	0.0325 (J)	330	0.0165
AAA9250	0.5	Methoxychlor	282 (J)	330	0.0165
AAA9466	0.3	Methoxychlor	0.0264 (J)	330	0.0165

[a] SVOC = Semivolatile Organic Compound.
[b] SAL = Screening Action level.
[c] EQL = Estimated quantitation level.
[d] J = Estimated result.
[e] NC = Not calculated due to insufficient data.

5.18.7 Human Health

5.18.7.1 Screening Assessment

Several inorganics were detected above background UTLs at this PRS but well below SALs. Inspection of the data indicates that MCE screening would yield a value less than the target limit of 1. Low levels of PAHs were reported above SALs. Oil drums were an item of concern at this PRS. However, the PRS is adjacent to a large parking lot and receives runoff from two flat-roofed buildings, and PAH concentrations in 46-006(a) samples are consistent with samples taken sitewide. Because these contaminants are derived from asphalt paving and roofing tar they are not carried forward in the screening process. Dieldrin was found above SAL but its use as a pesticide was in accordance with established practice at TA-46. No other contaminants were found above UTLs.

5.18.7.2 Risk Assessment

No risk assessment was performed for this PRS.

5.18.8 Ecological Assessment

This PRS is recommended for NFA because no COPCs were detected. The approach to ecological assessment is discussed in Section 3.5 of this RFI report.

5.18.9 Extent of Contamination

No contaminants at concentrations of concern were detected at sampling points for this PRS.

5.18.10 Conclusions and Recommendations

Lead, mercury, silver, and zinc were found at PRS 46-006(a) above background UTLs, but below SALs. Inspection of the data indicates that MCE screening for noncarcinogenic or radionuclide effects would yield a result far below the target value of 1. No MCE was performed for lead or carcinogenic effects because multiple constituents for these groupings were not found above LANL UTLs. Because the PAH concentrations at this PRS were consistent with those throughout TA-46, they were judged to be from continuing sources rather than LANL experimental operations. Based on NFA criterion 5, a Class III permit modification is requested to remove this site from the HSWA Module of the Laboratory's RCRA operating permit.

5.19 PRS 46-006(b)

PRS 46-006(b) is the site of former storage shed TA-46-197 near TA-46-41. Because no contaminants were found above SALs, the PRS is recommended for NFA.

5.19.1 History

PRS 46-006(b) is discussed in RFI Work Plan for OU 1140, Subsection 5.3 (LANL 1993, 1093). TA-46-197 was used for short-term storage of oil drums, vacuum pumps, optical tables, other laboratory equipment, and electrical equipment with PCB-containing oil. The 1986 CEARP survey crew reported 55-gal. drums and other oily equipment stored both inside and outside of the shed (Perkins 1986, 11-089). Oil was leaking from under the back of the shed. East of the shed was an oil spill that had moved into the storm drain. Discolored soils at the canyon outfall of the storm drain were also noted. Suspected contaminants are inorganics, PCBs, SVOCs, uranium-235, uranium-238, and oils.

5.19.2 Description

The shed was once located approximately 40 ft north of TA-46-41. The entire area of the PRS is covered with asphalt and is currently a parking lot (Fig. 5.19.2-1). The lot slopes to storm drain outfall QQ approximately 30 ft southeast of the shed site. The shed was 40 ft long x 8 ft high x 8 ft deep with a sheet-metal roof and plywood sides. The north side was open. The shed was installed before 1977; it was removed in 1990.

5.19.3 Previous Investigations

No previous investigations were conducted at this PRS.

5.19.4 Field Investigation

Five samples were collected for this PRS (Table 5.19.4-1). Two samples were taken from the footprint of the shed, one sample in the drainage below the shed location, and two samples at outfall QQ (Fig. 5.19.2-1).

TABLE 5.19.4-1

SUMMARY OF SAMPLES TAKEN

SAMPLE ID	LOCATION ID	DEPTH (ft)	MATRIX	INOR-GANICS	RADIO-NUCLIDES	VOCs[a]	SVOCs[b]	PCBs[c]
AAA9288	46-1094	0.5	Soil	19672	20001	19208	19208	NA[d]
AAA9291	46-1096	0.5	Soil	19672	20001	19208	19208	NA
AAA9462	46-1128	0.5[e]	Soil[e]	19672	20001	NA	19208	19208
AAA9464	46-1129	0.5[e]	Soil[e]	19672	20001	NA	19208	19208
AAA9498	46-1137	0.5[e]	Soil[e]	19672	20001	19208	19208	NA

[a] VOCs = Volatile organic compounds.
[b] SVOCs = Semivolatile organic compounds.
[c] PCBs = Polychlorinated biphenyls.
[d] NA = Not analyzed.
[e] Under asphalt.

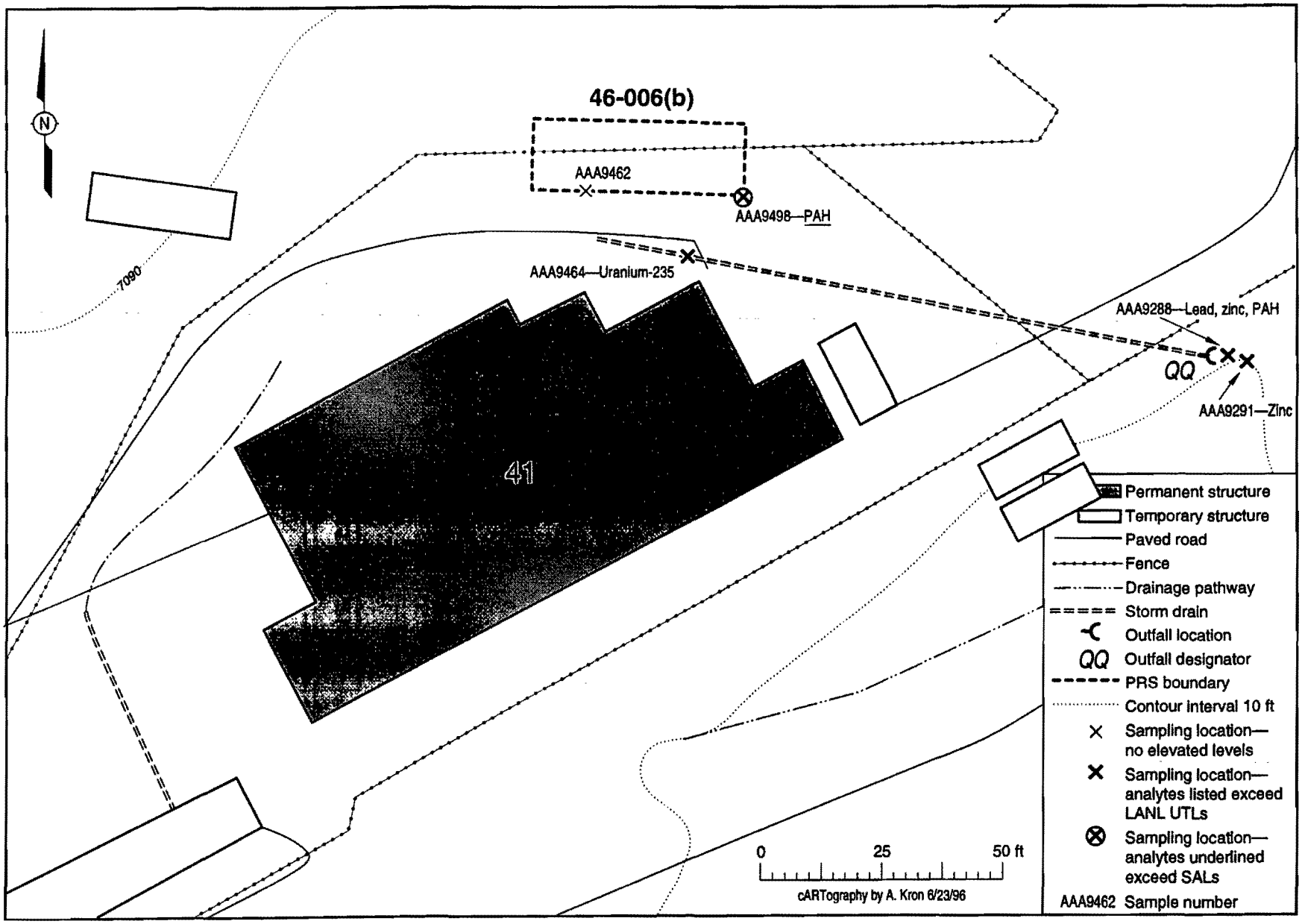


Fig. 5.19.2-1. PRS 46-006(b), general storage.

5.19.5 Background Comparison

Lead and zinc were found above LANL background UTLs, but below SALs (Table 5.19.5-1). Although some lead results were qualified as estimated (J) based on low matrix spike recoveries, values are consisted with nonqualified results in the same sample request group. Therefore, lead results are accepted as reasonable estimates indicating concentrations far below SAL. Uranium-235 was found above LANL background UTL, but below SAL (Table 5.19.5-2).

TABLE 5.19.5-1

INORGANIC ANALYTES WITH CONCENTRATIONS GREATER THAN BACKGROUND UTLs FOR PRS 46-006(b)

SAMPLE ID	DEPTH (ft)	LEAD (mg/kg)	ZINC (mg/kg)
SAL[a]	N/A[b]	400	23 000
LANL UTL[c]	N/A	23.3	50.8
AAA9288D[d]	0.5	**25.1 (J)[e]**	**148**
AAA9288	0.5	**38.2 (J)**	**146**
AAA9291	0.5	18.5 (J)	**178**

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] UTL = Upper tolerance limit.
[d] D = Duplicate analysis.
[e] J = Estimated result.

TABLE 5.19.5-2

RADIONUCLIDES WITH ACTIVITIES GREATER THAN BACKGROUND UTLs FOR PRS 46-006(b)

SAMPLE ID	DEPTH (ft)	URANIUM-235 (pCi/g)
SAL[a]	N/A[b]	10
LANL UTL[c]	N/A	0.084
AAA9464	0.5[d]	0.328

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] UTL = Upper tolerance limit.
[d] Under asphalt.

5.19.6 Evaluation of Organics

Low levels of PAHs and a plasticizer were reported for this PRS (Table 5.19.6-1). The PAH concentrations indicate that they are derived from continuing sources: asphalt paving and roofing tar.

TABLE 5.19.6-1

PRS 46-006(b) SOIL CONCENTRATIONS FOR ORGANIC ANALYTES WITH VALUES GREATER THAN THE REPORTING LIMIT

SAMPLE ID	DEPTH (ft)	SVOC [a]	RESULT (mg/kg)	SAL [b] (mg/kg)	EQL [c] (mg/kg)
AAA9498	0.5	Benzo[a]anthracene	0.63	0.61	0.33
AAA9498	0.5	Benzo[b]fluoranthene	0.6	0.61	0.33
AAA9288	0.5	Bis(2-ethylhexyl)phthalate	0.55	32	0.33
AAA9498	0.5	Chrysene	0.54	24	0.33
AAA9498	0.5	Fluoranthene	1.4	2 600	0.33
AAA9498	0.5	Phenanthrene	1.4	NC [d]	0.33
AAA9288	0.5	Pyrene	0.38	2 000	0.33
AAA9498	0.5	Pyrene	1.6	2 000	0.33

[a] SVOC = Semivolatile Organic Compound.
[b] SAL = Screening action level.
[c] EQL = Estimated quantitation level.
[d] NC = Not calculated due to insufficient data.

5.19.7 Human Health

5.19.7.1 Screening Assessment

Several constituents were detected above background UTLs at this PRS but well below SALs. No MCE screening is indicated because only one contaminant was found in each grouping. Low levels of PAHs were reported. Oil drums were associated with this PRS, however, PAH concentrations are consistent with other samples near paved areas at TA-46. Because this PRS is paved, PAHs are not carried forward in the screening process.

5.19.7.2 Risk Assessment

No risk assessment was performed for this PRS.

5.19.8 Ecological Assessment

This PRS is recommended for NFA because no COPCs were detected. The approach to ecological assessment is discussed in Section 3.5 of this RFI report.

5.19.9 Extent of Contamination

No contaminants at concentrations of concern were detected at sampling points for this PRS.

5.19.10 Conclusions and Recommendations

Lead, zinc, and uranium were found at PRS 46-006(b) above background UTLs, but far below SALs. No MCEs were indicated because only one contaminant was found for each grouping. Based on NFA criterion 5, a Class III permit modification is requested to remove this site from the HSWA Module of the Laboratory's RCRA operating permit.

5.20 PRS 46-006(c)

PRS 46-006(c) is a 15 ft x 30 ft, stained section of asphalt on the east side of TA-46-158. Because no contaminants were found above SALs, the PRS is recommended for NFA.

5.20.1 History

PRS 46-006(c) is discussed in RFI Work Plan for OU 1140, Subsection 5.3 (LANL 1993, 1093). The 1986 CEARP field survey crew noted leaking drums on the asphalt. Oil spilled into the storm drain and was moving toward the canyon (Perkins 1986, 11-089). The drums have been removed. The TA-46-158 complex housed laser experiments. Suspected contaminants at PRS 46-006(c) include inorganics, SVOCs, PCBs, and oils. Uranium was not used in or around the building.

5.20.2 Description

PRS 46-006(c) is located upslope of a grated storm drain that emerges on the side of a steep bank sloping downhill to the east (Fig. 5.20.2-1). The entire east side of the building is paved with a 25-ft-wide asphalt strip. Asphalt curbing directs all runoff from this sloping strip into the storm drain, designated outfall PP, that empties to a ditch extending approximately 100 ft across a gently sloping bench to the steep south wall of the TA-46 tributary canyon.

5.20.3 Previous Investigations

No previous investigations were conducted at this PRS.

5.20.4 Field Investigation

Six samples were collected for this PRS (Table 5.20.4-1). Two samples were taken in the drainage below the paved area and three on the slope of the TA-46 tributary canyon (Fig. 5.20.2-1). Data from samples at outfall PP were used to make the decision for this PRS.

TABLE 5.20.4-1

SUMMARY OF SAMPLES TAKEN

SAMPLE ID	LOCATION ID	DEPTH (ft)	MATRIX	INOR-GANICS	RADIO-NUCLIDES	VOCs[a]	SVOCs[b]	PCBs[c]
AAA9511	46-1149	0.5	Soil	19881	NA[d]	19416	19416	19416
AAA9512	46-1150	0.5	Soil	19881	NA	19416	19416	19416
AAA9519	46-1157	0.5	Soil	19881	20052	NA	NA	NA
AAA9520	46-1158	0.5	Soil	19881	20052	NA	NA	NA
AAA9525	46-1157	5	Soil	19881	20052	NA	NA	NA
AAA9526	46-1157	6.5	Soil	19881	20052	NA	NA	NA

[a] VOCs = Volatile organic compounds.
[b] SVOCs = Semivolatile organic compounds.
[c] NA = Not analyzed.

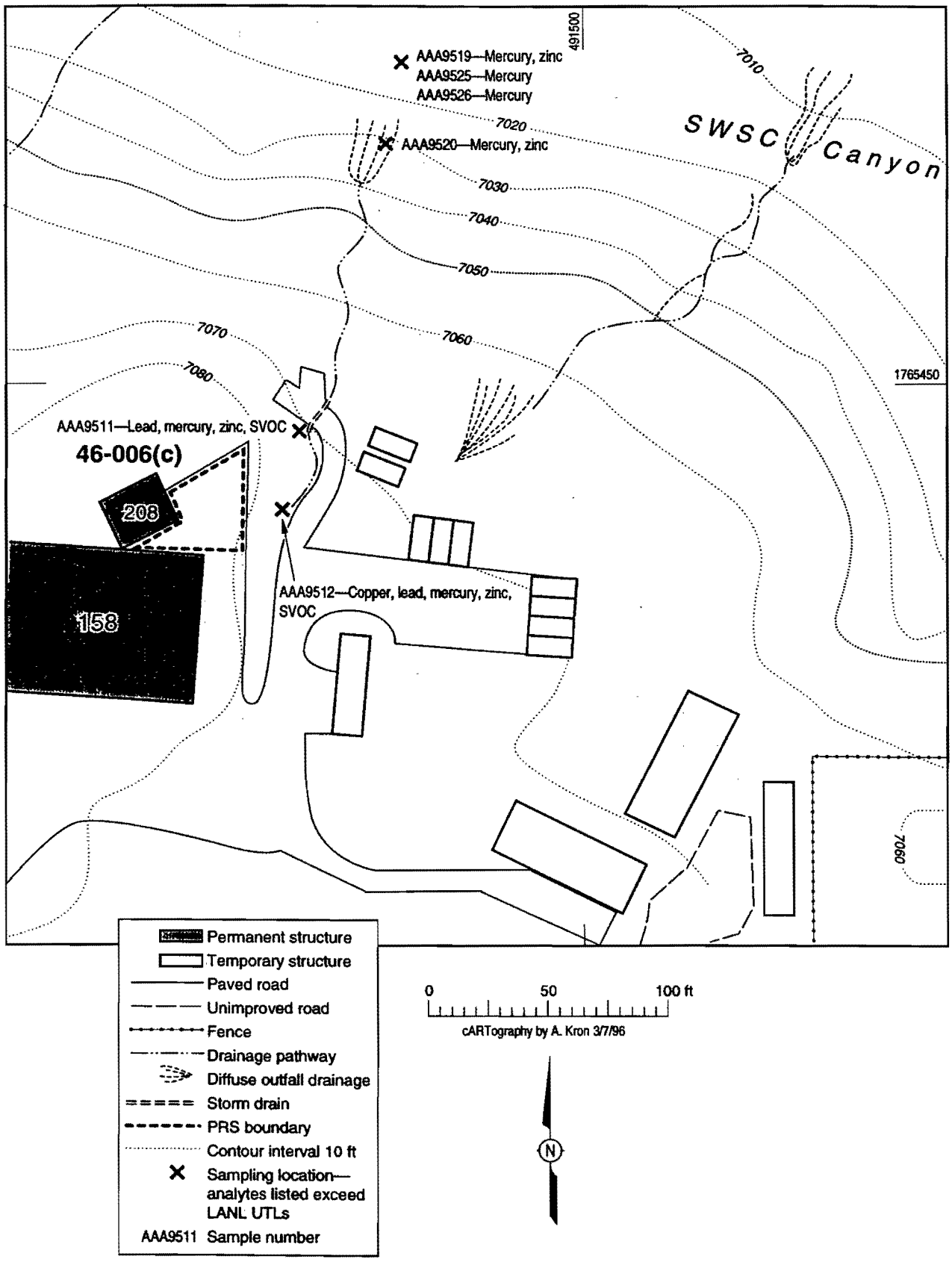


Fig. 5.20.2-1. PRS 46-006(c), drum storage at TA-46-158.

5.20.5 Background Comparison

Copper, lead, mercury, and zinc were found above LANL background UTLs, but below SALs (Table 5.20.5-1). Mercury holding times were only slightly exceeded; although results were qualified as estimated (J), these data are accepted as reasonable estimates. No radionuclides were detected above LANL background UTLs at this PRS.

TABLE 5.20.5-1

INORGANIC ANALYTES WITH CONCENTRATIONS GREATER THAN BACKGROUND UTLs FOR PRS 46-006(c)

SAMPLE ID	DEPTH (ft)	COPPER (mg/kg)	LEAD (mg/kg)	MERCURY (mg/kg)	ZINC (mg/kg)
SAL[a]	N/A[b]	2 800	400	23	23 000
LANL UTL[c]	N/A	15.5	23.3	0.1	50.8
AAA9511	0.5	14.2	**35.2**	**0.25 (J)[d]**	**179**
AAA9512	0.5	**19.2**	**34.8**	**0.45 (J)**	**287**
AAA9519	0.5	<4.6	7.7	**0.47 (J)**	**61.3**
AAA9520	0.5	<3.4	9.3	**0.28 (J)**	**58**
AAA9525	5	<2.6	7.1	**0.36 (J)**	24.7
AAA9526	6.5	<1.9	4.9	**0.43 (J)**	18.6

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] UTL = Upper tolerance limit.
[d] J = Estimated result.

5.20.6 Evaluation of Organics

Low levels of a plasticizer were reported for this PRS (Table 5.20.6-1). This analyte is a common field and laboratory contaminant and is not identified with LANL activities at this PRS.

TABLE 5.20.6-1

PRS 46-006(c) SOIL CONCENTRATIONS FOR ORGANIC ANALYTES WITH VALUES GREATER THAN THE REPORTING LIMIT

SAMPLE ID	SVOC[a]	RESULT	SAL[b] (mg/kg)	EQL[c] (mg/kg)
AAA9511	Bis(2-ethylhexyl)phthalate	0.44	50	0.33
AAA9512	Bis(2-ethylhexyl)phthalate	0.93	50	0.33

[a] SVOC = Semivolatile organic compound.
[b] SAL = Screening action level.
[c] EQL = Estimated quantitation level.

5.20.7 Human Health

5.20.7.1 Screening Assessment

Several constituents were detected above background UTLs at this PRS but well below SALs. Inspection of the data indicates that MCE screening would yield a value less than the target limit of 1.

5.20.7.2 Risk Assessment

No risk assessment was performed for this PRS.

5.20.8 Ecological Assessment

This PRS was recommended for NFA because no COPCs were present. The approach to ecological assessment is discussed in Section 3.5 of this RFI report.

5.20.9 Extent of Contamination

No contaminants at concentrations of concern were detected at sampling points for this PRS.

5.20.10 Conclusions and Recommendations

Copper, lead, mercury, and zinc were found at PRS 46-006(c) above background UTLs, but below SALs. Concentrations were low enough to indicate that MCE screening for noncarcinogenic or radionuclide effects would yield a result far below the target value of 1. No MCE was performed for lead or carcinogenic effects because multiple constituents for these groupings were not found above LANL UTLs. Based on NFA criterion 5, a Class III permit modification is requested to remove this site from the HSWA Module of the Laboratory's RCRA operating permit.

5.21 PRS 46-006(d)

PRS 46-006(d) is an unpaved disposal area located along the north side of TA-46-31. Prior to sampling, the boundary was extended beyond that described in the work plan to include the area north of laboratory TA-46-58. Because inorganics, PCBs, and radionuclides were found above SALs, 46-006(d) is recommended for Phase II sampling.

5.21.1 History

PRS 46-006(d) is discussed in RFI Work Plan for OU 1140, Subsection 5.3 (LANL 1993, 1093). TA-46-31 is a large laboratory building where many types of experiments have been conducted since 1954. It now houses laser and chemistry experiments. Oils and possibly other materials were spilled (or dumped) behind TA-46-31 by personnel stationed in the building. For the 1986 CEARP survey the inspector listed 55-gal. drums, old cans, rusty chemical storage units, and a thick layer of oil on the back porch. "All along the canyon side are evidences of oil spills. The whole area looks unused with much debris and strong smell of oil" (Perkins 1986, 11-089). Suspected contaminants were mercury and other inorganics, uranium-235, uranium-238, plutonium-238, plutonium-239/240, VOCs, SVOCs, and PCBs.

5.21.2 Description

The 50 x 350 ft unpaved area is level 5 to 15 ft north of TA-46-31, then drops steeply to the TA-46 perimeter fence (Fig. 5-21.2-1). The 50 x100-ft area north of TA-46-58 is similar. Weeds cover most of both areas. Beyond the fence the ground drops sharply 60 ft into Cañada del Buey. East and west of the PRS are asphalt paved delivery and parking areas that contain storage and handling facilities. Garbage, including laboratory equipment, beverage cans, and food wrappings, is scattered about. Engineering drawing ENG-C 42679, sheet 2, indicates that a wash down drain from Room 111A discharges onto PRS 46-006(d).

5.21.3 Previous Investigations

This area was included in the 1989 DOE investigation of potentially hazardous site at LANL as Environmental Problem 25 (LANL 1989, 0425). Six soil grab samples were collected. Sample locations were chosen on the basis of visual stains. Samples were analyzed for VOCs, SVOCs, inorganics, radionuclides, and pesticides. QC reports from the analytical laboratory indicated that data on SVOCs were imprecise because of interferences due to very high concentrations of oils in all samples. Five PAHs (phenanthrene, fluoranthene, pyrene, benzo(a)anthracene, and chrysene) found below contract-required quantitation limits in two samples may be false positives due to the high concentrations of oils. One sample near the east end of TA-46-31 contained the highest levels. No pesticides were detected. Analytical data from this study are discussed in Subsection 5.3.1.2.1 of the RFI Work Plan for OU 1140 (LANL 1993, 1093).

5.21.4 Field Investigation

Radiation screening readings for all samples and sample locations at TA-46 were less than the set action levels of 800 counts per minute (cpm) beta/gamma and 100 cpm alpha. Two sample locations at PRS 46-006(d) exhibited above-background levels of radiation. The sample locations were situated in a drainage north of TA-46-58. Sample AAA9496, located at the top of the drainage, had a direct reading of 200–250 cpm beta/gamma. Activities decreased down-drainage, and sample AAA9497, located at the bottom of the drainage on the edge of Cañada del Buey, had a direct reading of 100–140 cpm beta/gamma. These activities were above background; however, they were below action levels.

Samples collected for this PRS are listed in Table 5.21.4-1. Surface and subsurface samples were collected behind buildings TA-46-31 and TA-46-58 and in relevant drainages on the steep slope north of TA-46 (Fig. 5.21.2-1). Several hand-augered samples were collected from under asphalt.

TABLE 5.21.4-1

SUMMARY OF SAMPLES TAKEN

SAMPLE ID	LOCATION ID	DEPTH (ft)	MATRIX	INOR-GANICS	RADIO-NUCLIDES	VOCs[a]	SVOCs[b]	PCBs[c]	PESTI-CIDES
AAA9055	461006	1	Soil	19160	19598	18592	18592	NA[d]	NA
AAA9056	461006	2	Soil	19160	19598	18592	18592	NA	NA
AAA9058	461007	0.5	Soil	19160	19598	18592	18592	NA	NA
AAA9059	461007	1	Soil	19160	19598	18592	18592	NA	NA
AAA9067	46-1010	1	Soil	19448	19843	19039	19039	19039	19039
AAA9068	46-1010	1.5	Soil	19448	19843	19039	19039	19039	19039
AAA9070	46-1011	1	Soil	19448	19843	19039	19039	19039	19039
AAA9071	46-1011	2	Soil	19448	19843	19039	19039	19039	19039
AAA9073	46-1012	1	Soil	19448	19843	19039	19039	19039	19039
AAA9076	46-1013	1	Soil	19325	19848	NA	18707	18707	18707
AAA9077	46-1013	1.5	Soil	19325	19848	NA	18707	18707	18707
AAA9100	46-1021	0.3	Soil	19328	19846	NA	18708	18708	18708
AAA9103	46-1022	0.7	Soil	19328	19846	18708	18708	18708	18708
AAA9121	461030	1.5	Soil	19447	19842	18927	18927	NA	NA
AAA9122	461030	3.5	Soil	19447	19842	18927	18927	NA	NA
AAA9124	461031	0.5	Soil	19447	19842	18927	18927	NA	NA
AAA9127	461032	0.5	Soil	19322	19844	NA	18828	18828	18828
AAA9130	461033	0.5	Soil	19322	19844	NA	18828	18828	18828
AAA9139	461036	0.5	Soil	19322	19844	NA	18828	18828	18828
AAA9142	461037	0.5	Soil	19322	19844	NA	18828	18828	18828
AAA9313	461110	0.5	Soil	19507	20003	19247	19247	19247	19247
AAA9440	461036	0.5	Soil	19322	19844	NA	18828	18828	18828
AAA9465	461130	0.5	Soil	19507	20003	19247	19247	19247	19247
AAA9469	461138	0.5	Soil	19507	20003	19247	19247	19247	19247
AAA9475	461132	0.5	Soil	19673	20002	19226	19226	19226	19226
AAA9482	461133	0.5	Soil	19507	20003	19247	19247	19247	19247
AAA9483	461133	4	Soil	19507	20003	19247	19247	19247	19247
AAA9488	461131	1	Soil	19507	20003	19247	19247	19247	19247
AAA9491	461132	0.5	Soil	19673	20002	19226	19226	19226	19226
AAA9492	461132	5	Soil	19673	20002	19226	19226	19226	19226
AAA9493	461132	7	Soil	19673	20002	19226	19226	19226	19226
AAA9495	461134	0.5	Soil	19673	20002	19226	19226	19226	19226
AAA9496	461135	0.5	Soil	19673	20002	19226	19226	19226	19226
AAA9497	461136	0.5	Soil	19673	20002	19226	19226	19226	19226

[a] VOCs = Volatile organic compounds.
[b] SVOCs = Semivolatile organic compounds.
[c] PCBs = Polychlorinated biphenyls.
[d] NA = Not analyzed.

In addition to the samples listed in Table 5.21.4-1, several drainages associated with other PRSs may have received runoff from PRS 46-006(d). Table 5.21.4-2 lists these PRSs, the associated outfalls, the sections in this RFI report in which the PRSs are discussed and contaminants found above SALs.

TABLE 5.21.4-2

PRSs RECEIVING RUNOFF FROM PRS 46-006(d)

PRS	OUTFALL	SECTION	COPCs[a]
46-004(h)	A	5.4	None
46-004(u)	F	5.8	None
46-004(v)	G	5.9	None
46-004(x)	J	5.10	None
46-004(y)	K	5.11	None
46-004(z)	L	5.12	None
46-004(a2)	MM	5.13	Inorganics

[a] COPCs = Chemicals of potential concern.

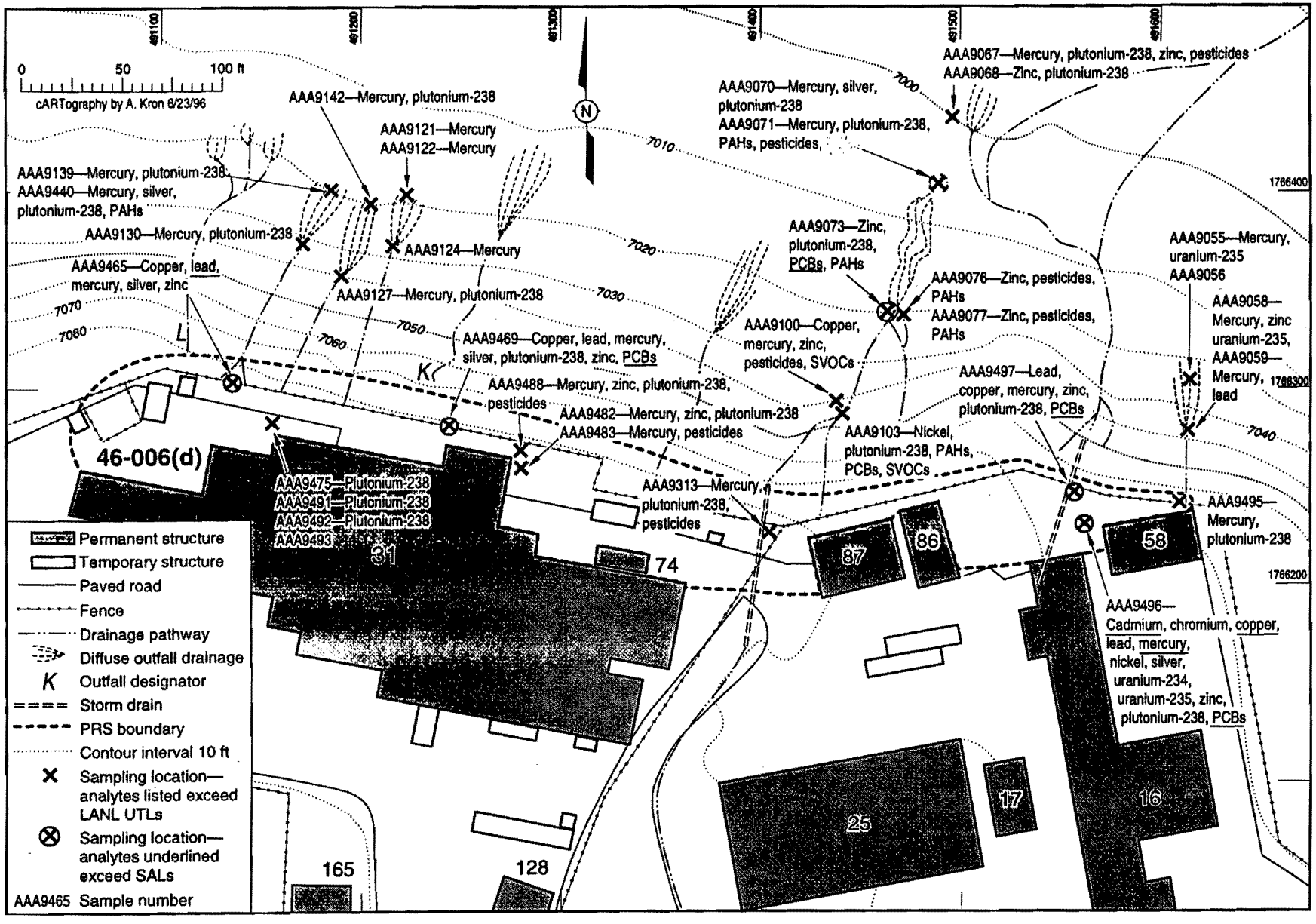


Fig. 5.21.2-1. PRS 46-006(d), surface disposal at TA-46-31.

5.21.5 Background Comparison

Sample AAA9496 contained cadmium, copper, and mercury above SALs. Lead was above SAL in sample AAA9465, but not in its duplicate. Mercury was found above background in most other samples. Seven additional inorganics found in randomly located samples displayed no obvious pattern of release. Sample AAA9496 contained three contaminants above SAL (Table 5.21.5-1). Although mercury results were rejected (R) for several samples based on missed holding time, values are consistent with nonqualified results and are accepted as reasonable estimates. Trace levels of uranium isotopes and plutonium-238 were found above background (Table 5.21.5-2).

TABLE 5.21.5-1

INORGANIC ANALYTES WITH CONCENTRATIONS GREATER THAN BACKGROUND UTLs FOR PRS 46-006(d)

SAMPLE ID	DEPTH (ft)	CADMIUM (mg/kg)	CHROMIUM (mg/kg)	COPPER (mg/kg)	LEAD (mg/kg)	MERCURY (mg/kg)	NICKEL (mg/kg)	SILVER (mg/kg)	ZINC (mg/kg)
SAL[a]	N/A[b]	38	210	2 800	400	23	1 500	380	23 000
LANL UTL[c]	N/A	2.7	19.3	15.5	23.3	0.1	15.2	ND[d]	50.8
AAA9055	1	<.78	2.4	<4.5	17.2	**0.14**	<3.3	<.8	30.8
AAA9058	0.5	<.77	2.2	5.8	19.6	**4.5**	<3.2	<.79	**52.2**
AAA9059	1	<.75	<1.9	<3.3	**29.1**	**0.93**	<3.2	<.77	31.5
AAA9067	1	<0.1 (R)[e]	6.6	14.6	17 (J)[e]	**0.42 (J)**	<4.9	<1.2	**91.5**
AAA9068	1.5	<0.07 (R)	13	7.8	8.7 (J)	**<0.12**	<8.5	<1.3	**59.2**
AAA9070	1	<0.07 (R)	5.5	<2.9	8.2 (J)	**0.51 (J)**	<5.1	<1.1	31.4
AAA9070D[f]	1	<0.07 (R)	5.4	4.1	9.5 (J)	**0.36 (J)**	5.2	**1.2**	35.4
AAA9071	2	<0.07 (R)	3	<1.5	4.3 (J)	**0.51 (J)**	<3.8	<0.78	43.5
AAA9073	1	<0.15	4.4	14.9	16.1	**1.2**	<3.3	<0.67	**100**
AAA9076	1	<0.44	2.6	13.4	16.3	<0.1	2.5	<0.67	**98.9**
AAA9076D	1	<0.12	3	13.7	14.5	<0.11	<2.1	<0.11	**102.7**
AAA9077	1.5	<0.07	4.9	11	10.3	<0.11	<3.2	<0.12	**69.1**
AAA9100	0.3	<0.36	5.6	**21.4**	**23.9**	**0.44**	<4.3	<0.13	**183**
AAA9100D	0.3	0.23	12.7	**20.3**	19.8	**0.32**	12.5	<0.13	**144**
AAA9103	0.7	<0.07	<1.9	<2.8	14.8	<0.12	23.7	<0.12	31.1
AAA9121	1.5	<.08	7	<4.8	10.8	**0.72**	<5.9	<.11	37.6
AAA9122	3.5	<.07	9.3	6.2	11.9	**0.44**	13.6	<.12	32.4
AAA9124	0.5	<.09	8.3	<4.6	9.4	**0.37**	<7.4	<.19	41.4
AAA9127	0.5	<.24	3.4	8.3	12.3	**1.6**	<7.2	<.14	33.5
AAA9130	0.5	<.07	<1.4	<2.2	5.6	**0.34**	<1.9	<.12	27.2
AAA9139	0.5	0.08	1.3	1.16	3.9	**1.6**	1.5	<.11	23.7
AAA9139D[e]	0.5	<.12	<1.6	<.99	4.6	**3.3**	9.6	NA	24.5
AAA9142	0.5	<.07	<2.1	<2.2	7.2	**0.56**	<2.2	<.12	18.9
AAA9313	0.5	<.09	7.6	<5.2	12.5	**0.82 (R)[g]**	<5.2	<.32	48.7
AAA9440	0.5	0.06	2.7	1.7	7.8	**0.28**	2.7	**0.11**	31.2
AAA9465	0.5	0.35	4.9	**152**	**335**	**0.47 (R)**	4	**3.5**	**317**
AAA9465D	0.5	<.38	5.3	**158**	**403**	**0.47 (R)**	<4.2	**4.6**	**337**
AAA9469	0.5	2.1	14.8	**43.5**	**57.7**	**11.1 (R)**	<7.9	**2.8**	**109**
AAA9482	0.5	<.23	9.9	13.2	12.3	**13.3 (R)**	<6.7	<.37	**62.1**
AAA9483	4	<.07	6.4	<2.6	4.6	**1.5 (R**	<5	<.46	23.2
AAA9488	1	<.07	5.2	11.3	11.4	**4.1 (R)**	<4.8	<.37	**54.3**
AAA9493	7	<.91	3.3	<2.3	5.6	0.08 (R)	<3.9	<2.5	19.9
AAA9495	0.5	<.69	<1.9	5.3	13.7	**7.2 (R)**	<1.7	<2.1	38.4
AAA9496	0.5	**46.8**	**34.6**	**4 830**	**169**	**48.7 (R)**	**492**	**97.4**	**1 590**
AAA9497	0.5	1.1	4.4	**34.4**	**61**	**12.9 (R)**	<1.7	<2.2	**201**

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] UTL = Upper tolerance limit.
[d] ND = Not determined.
[e] R = Rejected result.
[f] D = Duplicate analysis.
[g] R = Rejected result.

TABLE 5.21.5-2

RADIONUCLIDES WITH ACTIVITIES GREATER THAN BACKGROUND UTLs FOR PRS 46-006(d)

SAMPLE ID	DEPTH (ft)	URANIUM-234 (pCi/g)	URANIUM-235 (pCi/g)	PLUTONIUM-238 (pCi/g)
SAL[a]	N/A[b]	13	10	27
LANL UTL[c]	N/A	1.94	0.084	0.014
AAA9067	1	0.4875(J)[d]	0.0293 (J)	**0.0352 (J)**
AAA9068	1.5	0.3561(J)	0.0154 (J)	**0.0232 (J)**
AAA9070	1	0.1604 (J)	0.0085 (J)	**0.0479 (J)**
AAA9071	2	0.1409 (J)	0.0104 (J)	**0.0297 (J)**
AAA9073	1	0.1254	0.0089	**0.0313**
AAA9103	0.7	0.6549 (J)	0.0489 (J)	**0.0251**
AAA9127	0.5	0.6411 (J)	0.0252 (J)	**0.0225 (J)**
AAA9130	0.5	0.1976 (J)	0.0165 (J)	**0.0244 (J)**
AAA9139D[e]	0.5	0.181 (J)	0.0217 (J)	**0.0229 (J)**
AAA9139	0.5	0.213 (J)	0.0618 (J)	**0.0268 (J)**
AAA9142	0.5	0.2449 (J)	0.0159 (J)	**0.0182 (J)**
AAA9313	0.5	0.841	0.017	**0.029**
AAA9440	0.5	0.2139 (J)	0.0097 (J)	**0.0246 (J)**
AAA9469	0.5	0.905	0.0819	**0.0256**
AAA9475	0.5	0.85	0.0395	**0.0307**
AAA9482	0.5	0.76	0.0467	**0.0142**
AAA9488	1	0.636	0.0236	**0.0701**
AAA9491	0.5	0.813	0.0602	**0.0257**
AAA9491D	0.5	NA[f]	NA	**0.0414**
AAA9492D	5	NA	NA	**0.0431 (J)**
AAA9495	0.5	1.08	0.0573	**0.0596**
AAA9496	0.5	**4.6**	**0.175**	**0.0453**
AAA9497	0.5	0.636	0.0236	**0.023**

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] UTL = Upper tolerance limit.
[d] J = Estimated result.
[e] D = Duplicate analysis.
[f] NA = Not analyzed.

5.21.6 Evaluation of Organics

PCBs were detected at various sampling points within PRS 46-006(d) and points receiving runoff from the PRS (Table 5.21.6-1). PCBs from samples AAA9073, AAA9323, AAA9326, and AAA9329 collected for PRSs 46-004(v) and 46-004(a2) are appropriately included in the PRS 46-006(d) suite of contaminants because of their association with TA-46-31. Other contaminants above LANL UTLs from these four samples are discussed in Sections 5.9 and 5.13 of this RFI report.

Low levels of two PAHs and three pesticides were reported for this PRS (Table 5.21.6-2). These contaminants are derived from continuing sources: asphalt paving, roofing tar, and routine pesticide spraying. They are not carried forward in the screening process.

TABLE 5.21.6-1

PRS 46-006(d) SOIL CONCENTRATIONS FOR PCBs

SAMPLE ID	DEPTH (ft)	Aroclor 1260™ (mg/kg)	Aroclor 1254™ (mg/kg)
SAL[a]	N/A[b]	1	1
LANL UTL[c]	N/A	0.021	0.021
AAA9073	1	**1.95**	ND[d]
AAA9323	0.7	0.37 (J)[e]	ND
AAA9326	0.3	0.056 (J)	0.15
AAA9329	0.5	0.2 (J)	0.18 (J)
AAA9469	1	ND	**21.3**
AAA9496	0.5	ND	**22.0**
AAA9497	0.5	ND	**1.2**
AAA9502	0.5	**43.4**	ND

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] UTL = Upper tolerance limit.
[d] ND = Not detected.
[e] J = Estimated result.

TABLE 5.21.6-2

PRS 46-006(d) SOIL CONCENTRATIONS FOR
ORGANIC ANALYTES WITH VALUES GREATER THAN THE REPORTING LIMIT

SAMPLE ID	SVOC[a]	RESULT	SAL[b] (mg/kg)	EQL[c] (mg/kg)
AAA9440	Phenanthrene	0.38	3 200	0.33
	Pyrene	0.39	2 400	0.33
SAMPLE ID	**PESTICIDES**	**RESULT**	**SAL (mg/kg)**	**EQL (mg/kg)**
AAA9313	Dieldrin	0.002	0.028	0.0033
AAA9483	Methoxychlor	0.139	330	0.0165
AAA9488	Dieldrin	0.001	0.028	0.0033

[a] SVOC = Semivolatile organic compound.
[b] SAL = Screening action level.
[c] EQL = Estimated quantitation level.

5.21.7 Human Health

5.21.7.1 Screening Assessment

Inorganic constituents detected above SALs at this PRS include cadmium, copper, lead, and mercury (Table 5.21.7-1). PCBs were detected well above SALs (Table 5.21.7-2). These constituents will be carried forward through the screening assessment and addressed in the further sampling and assessment planned for this PRS.

TABLE 5.21.7-1

INORGANIC ANALYTES WITH CONCENTRATIONS
GREATER THAN SAL FOR PRS 46-006(d)

SAMPLE ID	DEPTH (ft)	CADMIUM (mg/kg)	COPPER (mg/kg)	LEAD (mg/kg)	MERCURY (mg/kg)
SAL[a]	N/A[b]	38	2 800	400	23
LANL UTL[c]	N/A	1.4	15.5	23.3	0.1
AAA9465	0.5	<0.38	158	**403**	0.47
AAA9496	0.5	**46.8**	**4 830**	169	**48.7**

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] UTL = Upper tolerance limit.

TABLE 5.21.7-2

PRS 46-006(d) PCB SOIL CONCENTRATIONS ABOVE SAL

SAMPLE ID	DEPTH (ft)	Aroclor 1260 (mg/kg)	Aroclor 1254 (mg/kg)
SAL[a]	N/A[b]	1	1
EQL[c]	N/A	0.021	0.021
AAA9073	1	**1.95**	ND[d]
AAA9469	1	ND	**21.3**
AAA9496	0.5	ND	**22.0**
AAA9497	0.5	ND	**1.2**

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] EQL = Estimated quantitation limit.
[d] ND = Not detected.

An MCE screening was performed for the remaining noncarcinogenic contaminants found at PRS 46-006(d) (Table 5.21.7-3). The result (0.9) less than 1 indicates that these contaminants need not be carried forward in the screening assessment.

TABLE 5.21.7-3

MCE FOR NONCARCINOGENIC EFFECTS AT PRS 46-006(d)

CONTAMINANT	MAXIMUM SOIL CONCENTRATION (mg/kg)	SOIL SAL[a] (mg/kg)	CONCENTRATION NORMALIZED TO SAL
Chromium	34.6	210	0.2
Nickel	492	1 500	0.3
Silver	97.4	380	0.3
Zinc	1 590	23 000	0.07
Total			**0.9**

[a] SAL - Screening action level.

5.21.7.2 Risk Assessment

No risk assessment was performed for this PRS.

5.21.8 Ecological Assessment

This PRS will be retained for further ecological analysis as discussed in Section 5.3.8 of this RFI report. The approach to ecological assessment is discussed in Section 3.5 of this RFI report.

5.21.9 Extent of Contamination

Multiple inorganics were detected at sampling points for PRS 46-006(d), with lead above SAL at one point and cadmium, copper, and mercury above SAL at another. Radionuclides were detected above background UTLs, and PCBs were found well above SALs. Contamination appears spotty but widespread.

5.21.10 Conclusions and Recommendations

Inorganics and PCBs were found above SALs at PRS 46-006(d). Because Phase I sampling did not determine the extent of contamination, Phase II sampling is recommended. The sampling plan is presented in Section 5.21.11 of this RFI report.

5.21.11 Sampling and Analysis Plan for PRSs 46-004(g), 46-004(q), and 46-006(d)

5.21.11.1 Problem Definition

This Phase II sampling and analysis plan addresses a number of concerns raised by analysis of Phase I data pertaining to areas on the north side of TA-46. The diverse activities proposed herein are included in a single plan because the resulting data must be considered as a whole in order to determine the best approach to dealing with these areas.

Initial investigation of the hillside and canyon north of TA-46 focused on identifying historical releases associated with PRSs identified at TA-46. Most samples were collected in sediment traps within well-defined drainages below the numerous outfalls. Only a few were collected on the canyon bench, where runoff sediments fanned out below the toe of the slope. On the canyon bench it is difficult to identify which outfalls contribute uniquely to various sections of the sediment accumulation areas, or even to determine the main runoff pathways because they shift seasonally.

While the highest concentrations of uranium isotopes were found on the steeper sections of the slope, one of the samples from the relatively level sediment accumulation areas on the canyon bench revealed concentrations of several inorganic chemicals, including mercury, above their SALs or background UTLs. The high concentrations in this sample, the relative undersampling of the sediment accumulation areas during the initial investigation, and the lack of samples from drainages below the sediment accumulation area or from the main Cañada del Buey channel, generated concerns addressed by this Phase II sampling and analysis plan.

Phase I sampling also identified three potential continuing sources of canyon contamination: sediments below outfall N [PRSs 46-004(g), discussed in Section 5.3 of this RFI report] and outfall B [PRS 46-004(q), Section 5.6], and surface and near-surface soil behind buildings TA-46-31 and TA-46-58 [PRS 46-006(d), Section 5.21]. This Phase II sampling and analysis plan will determine the extent of these three sources in anticipation of possible corrective actions.

In summary, this plan is intended to provide data with which to address the following questions.

1) What is the risk to human health and ecological receptors associated with contaminants released to the hillside and canyon bench north of TA-46?

2) Are contaminants reaching the main channel in quantities that could lead to violation of surface water regulations or pose a risk to human health or to other receptors?

3) Would remediation of localized areas near the edge of the mesa in PRS 46-006(d) and in the steep hillside drainages of PRSs 46-004(g,q) be a cost-effective means of removing continuing sources of contamination?

Possible decisions based on the answers to these questions include:

- Propose NFA in the canyon north of TA-46, or
- Propose corrective actions designed to remove or contain localized continuing sources of contamination affecting the canyon bottom and/or the main channel, and/or
- Propose corrective actions to reduce the overall risk associated with exposures in the area.

5.21.11.1.1 Chemicals of Potential Concern

The principal COPCs identified in Phase I samples collected on the hillside and the canyon bench include:

- Chromium, copper, lead, and mercury above SALs, and arsenic and selenium above background UTLs;
- PCBs above SAL behind TA-46-31 and TA-46-58;
- Uranium-234 and uranium-235 above their respective SALs.

Of particular concern is mercury, observed at more than 100 mg/kg in two samples from the canyon bench and hillside.

Trace levels of plutonium-238 were detected in samples collected on the hillside and canyon bench area north of TA-46-31. The levels reported are far below the SAL of 27 pCi/g but above the regional fallout maximum of 0.015 pCi/g and elevated relative to surveillance data collected at LANL on-site and perimeter stations. The origin of this contaminant is unknown; neither archival search nor interviews with long-time employees indicate the use of plutonium at TA-46. To better determine the distribution of this contaminant, additional Phase II samples will be analyzed for plutonium-238.

Chromium was found above SAL in a sediment accumulation area. Because the analysis determined only total chromium, its speciation is unknown. Chromium (VI), the more toxic oxidation state, is unstable in the environment except in highly alkaline soils. Chromium (VI) is reduced to chromium (III) in the presence of organic matter (Pendias and Pendias 1984, 11-258). Because of abundant grasses and shrubs in the sediment accumulation areas, reducing conditions are expected, and the concentration of chromium (VI) is expected to be low. However, to assess the chromium oxidation state, two Phase II samples will be analyzed for chromium (VI) and total chromium.

Trace levels of pesticides were found in most samples from the drainages of the proposed exposure unit, defined below. Because detected levels indicate that pesticides were used in accordance with standard intent and not as a result of LANL experimental activities, pesticides have been eliminated as COPCs.

PAHs were observed above detection levels, and occasionally above SALs, in a number of sediment samples. These are ascribed to runoff from continuing sources—pavement, asphalt (tar) roofing material, and other structures in this industrial TA—and are not carried forward in the screening process.

In anticipation of possible corrective action, some Phase II toxic characteristic leaching procedure (TCLP) analyses are required to identify potential waste characterization issues.

5.21.11.1.2 Exposure Scenarios for Human Health and Ecological Risk Assessment

For the assessment of human health risk, the canyon bench from the toe of the slope on the south to the main Cañada del Buey channel on the north, bounded on the west by the drainages north of TA-46-1 and on the east by those north of TA-46-58, will be treated as a single recreational exposure unit. This 5— to 6—acre area is used for hiking, running, and mountain biking, but it is unlikely to be converted to industrial or other uses. Baseline human health risk assessment will be conducted in accordance with the EPA risk assessment guidance for Superfund, Part A (EPA 1989, 0305). Exposure pathways to be evaluated for contaminants in soils and sediments include dermal contact, incidental soil ingestion, and inhalation of resuspended material. Dermal contact with standing and running water, but not its ingestion, will be included among the exposure pathways to be evaluated.

Because much of the paved area on the mesa top drains north, there are perennially moist areas on the canyon bench. These areas contain abundant grasses and shrubs that thrive on the relatively moist soils and sediments, attracting many forms of wildlife, including elk and deer, coyote and other predators, small mammals such as rabbit and squirrel, birds, birds of prey, lizards, snakes, and rodents. Most of these will be transient in the moist areas, and may also make use of the nearby stream. However, soil macrofauna, such as mites or possibly earthworms, could be an important indicator of exposure from soil; neither mites nor worms migrate. Ecological risk assessment will take into account the characteristics of the area in identifying receptors to be evaluated. The approach to ecological risk assessment is discussed in Section 3.5 of this RFI report and in more detail in Ferenbaugh et al. (1996, 1303).

5.21.11.1.3 Storm Runoff and Surface Water Concerns

Relevant levels of contamination for designated uses of surface water at TA-46 are listed in the State of New Mexico standards for livestock watering and wildlife habitat (State of New Mexico 1995, 1267). This standard may not be directly applicable to intermittent storm runoff on the hillside or canyon bench, but storm runoff data will be used to evaluate the contribution of TA-46 to contamination in the stream.

5.21.11.1.4 Localized Sources of Contamination

Hot spot cleanup on the north rim of the mesa and in selected hillside drainages may be an effective way to control contamination on the canyon bench and in the stream. Candidates for remediation identified by Phase I include short, steep sections of the drainages below outfall N [PRS 46-004(g)] and outfall B [PRS 46-004(q)] and localized areas within PRS 46-006(d) behind TA-46-31 and TA-46-58. Phase II work is designed to bound these areas to evaluate the feasibility of hot spot remediation. In particular, reasonable efforts will be made to reduce concentrations of radionuclides that exceed 30 times the appropriate limit for soil, in accordance with DOE Order 5400.5/CIV.

5.21.11.2. Sampling and Analysis Design

Fieldwork conducted under this sampling and analysis plan includes ecological and geomorphic mapping of the canyon bottom within the exposure unit defined above as well as the hillside drainages below outfalls N and B. Surface and shallow subsurface soil, sediment, and tuff samples will be collected for fixed laboratory analysis for isotopic uranium, plutonium-238, inorganics, and PCBs. PCB screening will be conducted behind buildings TA-46-31 and TA-46-58. Water samples include a series of samples to be collected in the main Cañada del Buey channel during runoff events, another series to be collected in a canyon bench drainage, and samples of standing water in the main channel.

5.21.11.2.1 Geomorphic and Ecological Surveys

Canyon bench area The exposure unit defined in Section 5.21.11.1.2 will be mapped from the toe of the slope (roughly, the 7 020-ft elevation contour line) to the main channel. The following distinct geomorphic/ecological strata will be mapped.

- Active channels north of the unimproved road that drain the bench into the main Cañada del Buey channel. These channels are lined with mobile sediments, gravel, and bedrock, and have little or no vegetation. Sediment traps that potentially could provide sample material will be identified.
- Low-lying, usually moist, sediment accumulation areas. Since the construction of TA-46, these areas, lying largely south of the unpaved road parallel to the main channel but in a few cases extending across the road, may have trapped a significant fraction of the sediments washed into the canyon by surface runoff and by water released from the outfalls on the north side of TA-46.

- Low ridges separating the sediment accumulation areas. The vegetation on these ridges is dominated by ponderosa pines and scrub oak. Apart from airborne stack emissions, they received no releases from TA-46.

The areas of each of the latter two strata within the exposure unit will be estimated, as well as the areas of each of the distinct sediment accumulation areas. Depth to tuff will be estimated by augering several points in each area, and soil profiles in these holes will be described.

In the conceptual sketch (Fig. 5.21.11-1), four sediment accumulation areas are shown, occupying a total of about 1.5 acres within the exposure unit. However, this figure is not based on a detailed survey, and there may be more or fewer distinct sediment accumulation areas, of greater or lesser size.

If intermediate zones cannot be definitively categorized as either sediment accumulation areas or separating ridges, they will be identified as sediment accumulation areas for the purposes of risk assessment calculations but avoided during sampling. This approach is expected to be conservative, as these zones will enlarge what is expected to be the more contaminated stratum for the purposes of calculation, while being represented by samples that are definitely within sediment accumulation areas. Such zones will be designated differently from the other strata on the map (Fig. 5.21.11-1).

Mapped information will be used to stratify sampling, according to methodology discussed in Gilbert, Chapter 5, and also to categorize those samples from the earlier investigations that fall within the exposure unit (1987, 0506). The relative sizes of the strata are also needed as weights for stratified estimates of mean concentrations (see Section 5.21.11.2.3). Area estimates accurate to within ±10% of the total area are needed for this purpose. For human health risk, it may be assumed that a human receptor will spend time in each stratum in proportion to its area, except that the stream channel may be deemed particularly attractive, at least relative to its almost negligible area within the exposure unit. An assumption more heavily weighted toward the moist sediment accumulation areas may be appropriate for ecological risk and will depend on the receptor being evaluated.

Distinct ecological zones within the exposure unit will be mapped to document the biological environment. This information, together with soil profile information in the sediment accumulation areas, provide data needed for ecological risk assessment.

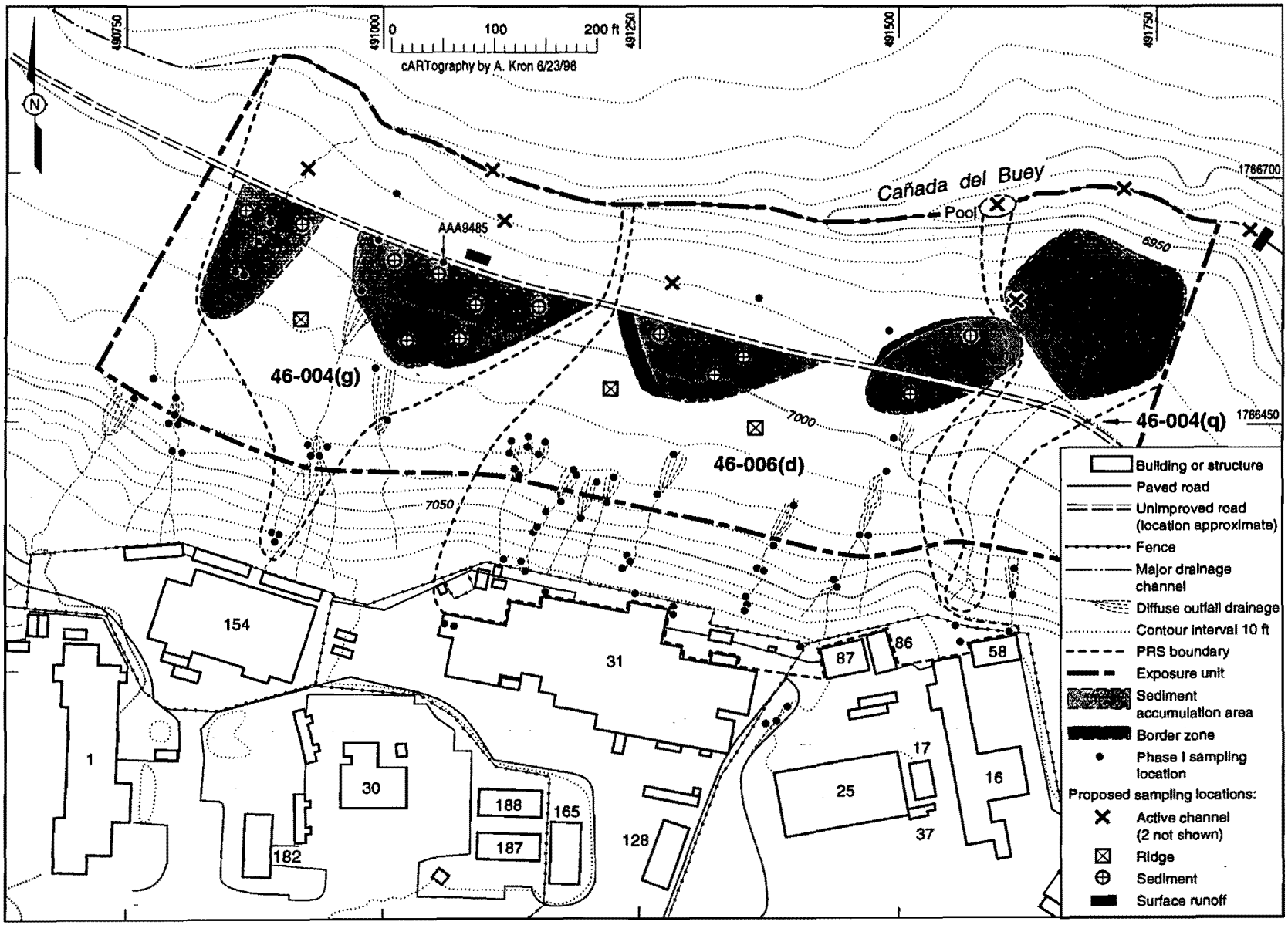


Fig. 5.21.11-1. Sampling plan for PRS 46-004(g), 46-004(q), and 46-004(d) exposure unit.

Hillside drainages The drainages below outfall N and B will be surveyed from the outfalls down to the toe of the slope to select laterally bounding sampling locations. If possible, one or two additional sediment traps will also be identified in these steep portions of the drainages. A location suitable for drilling to 2 ft will be identified in each drainage, as close as feasible to the Phase I outfall sample.

5.21.11.2.2 Structure Survey

The origin of outfall B, at present uncertain, will be determined. Outfall A appears to be the outfall serving TA-46-16, but the contaminants found at outfall B are those that were anticipated given the historical activities in that building.

5.21.11.2.3 Sampling and Analysis

The map resulting from Section 5.21.11.2.1 activities will be reviewed and the sample locations proposed below will be finalized at that time. The sample locations shown in Figs. 5.21.11-1, 5.21.11-2, 5.21.11-3, and 5.21.11-4 are representative points. The proposed samples and analyses are summarized in Table 5.21.11-1. Final numbers of samples and analyses will not be less than shown in Table 5.21.11-1 unless fewer than four sediment accumulation areas are identified.

Details concerning the use of the data described in this section to address the questions outlined in Section 5.21.11.1 are presented in Sections 5.21.11.2.3 and 5.21.11.2.4.

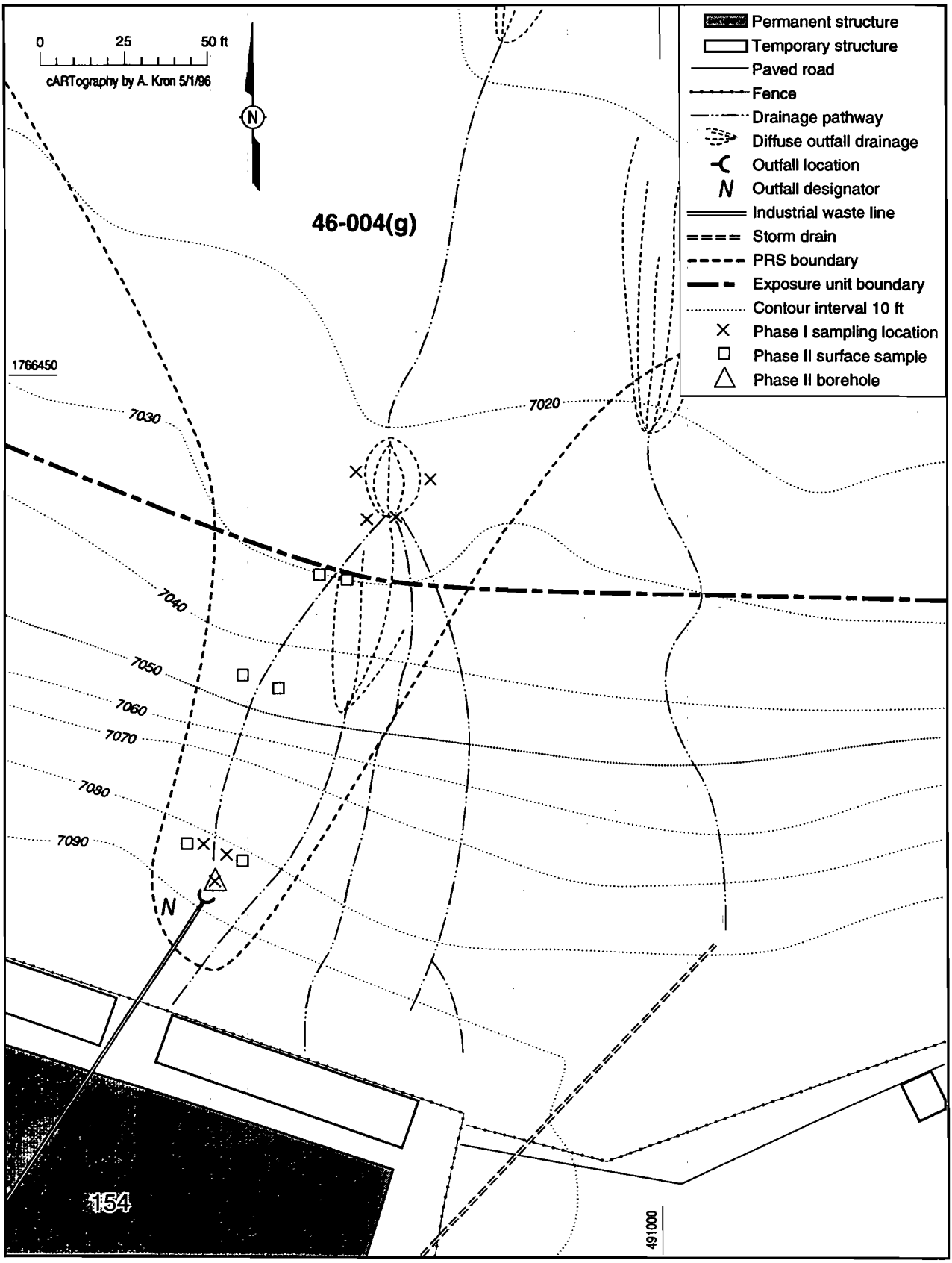


Fig. 5.21.11-2. PRS 46-004(g) sampling at outfall N.

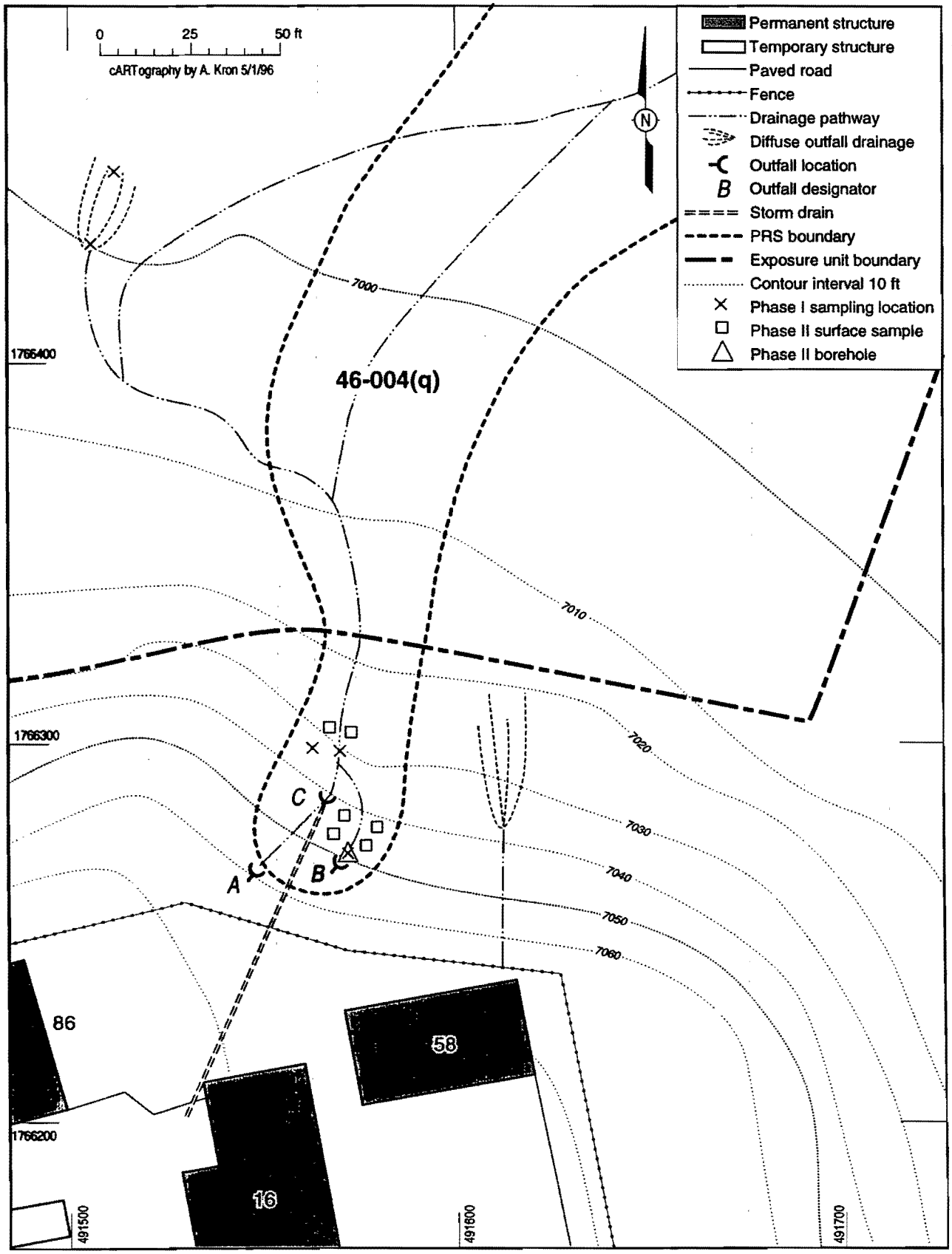


Fig. 5.21.11-3. PRS 46-004(q) sampling at outfall B.

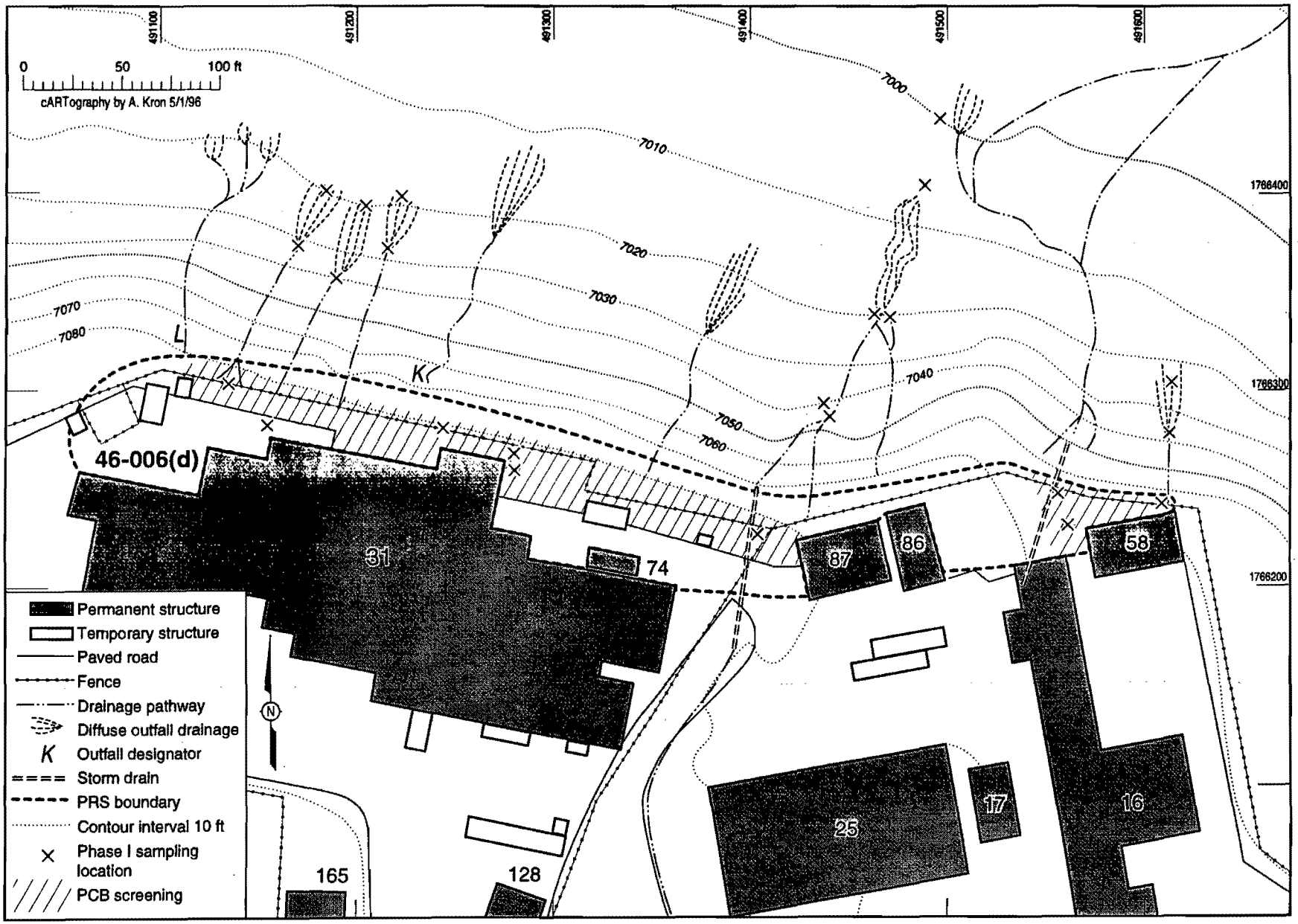


Fig. 5.21.11-4. PRS 46-006(d) PCB screening.

TABLE 5.21.11-1

SUMMARY OF SAMPLING AND ANALYSES

AREA	MEDIUM	DEPTH (in.)	Samples[b]	Analyses[a]									
				PCBs[c] by immunoassay	Isotopic uranium	Isotopic plutonium	Gross alpha	Inorganics (SW-846 or equiv.)	Inorganics (water quality)	TCLP[d] metals	TCLP organics	Chromium(VI)	PCBs (SW-846 or equiv.)
Main channel	Runoff		6				all		all				2
	Sediment	0-6	3		all	all		all					2
	Standing water		2				all		all				1
Canyon bench													
Drainages	Sediment	0-6	≥4		all	all		all					
	Runoff		6				all		all				2
Sediment accumulation areas	Soil/sediment	0-6	≥12		all	all		all		1		1	4
	Soil/sediment	20-Jun	≥4		all	all		all				1	4
	Tuff	>3 in. below interface	≥8		all			all					
Ridges	Soil/sediment	0-6	3		all	all		all					
Hillside drainages													
Outfall N	Soil/sediment	0-6	≥6		all	all		all					
	Tuff	>6	2		all	all		all					
Outfall B	Soil/sediment	0-6	≥6		all	all		all		1			
	Tuff	>6	2		all	all		all					
Mesa top													
North of TA-46-31	Soil/sediment	0-6	≥7	all				≥2		1			≥2
	Soil/sediment	20-Jun	≥7	all				≥2			1		≥2
North of TA-46-58	Soil/sediment	0-6	≥4	all	1	1		1		1			1
	Soil/sediment	20-Jun	≥4	all	1	1		1					1
West of TA-46-87	Soil/sediment	0-6	1	all				1					1
	Soil/sediment	20-Jun	1	all									

[a] See text for selection of samples to be analyzed.
[b] See text for detailed allocation of samples.
[c] PCBs = Polychlorinated biphenyls.
[d] TCLP = Toxic characteristic leaching procedure.

5.21.11.2.3.1 Main Channel

A series of water samples will be collected in the main channel of Cañada del Buey following LANL's water quality group (ESH-18) protocol for surface runoff sampling. Sediment samples will be collected from locations in which contaminant-bearing sediments may have been trapped. Standing water will be sampled from a pool which is seldom dry, even when there is little or no running water in the stream.

Runoff An automatic sampler will be installed in the main channel of Cañada del Buey east (downstream) from the confluence of the outfall B drainage with the main channel (Fig. 5.21.11-1). Both filtered and unfiltered samples will be collected at first flush during spring runoff. Subsequently, unfiltered samples only will be collected during four independent storm events, generally occurring during the summer.

Both filtered and unfiltered first flush samples will be analyzed for inorganics, gross alpha radiation, and PCBs. Subsequent runoff samples will be analyzed for inorganics and gross alpha radiation only.

Sediments Three 0–6 in. samples will be collected from sediment traps in the main channel of Cañada del Buey. One will be downstream from outfall B, as near as possible to the automatic sampler. The second will be collected near the middle of the segment of the stream defining the north boundary of the exposure unit defined in Section 5.21.11.1.2 (Fig. 5.21.11-1). The third will be collected from the bottom of the pool of standing water described below.

All sediment samples will be analyzed for uranium isotopes, plutonium-238, and inorganics, including mercury. PCBs will be analyzed in the samples collected near the automatic sampler and in the pool.

Standing water A pool which rarely dries up is located downstream from the confluence of the drainage below outfall N with the main channel. Two water samples will be collected from this pool. The first should be collected between April and June, after the snow melts but before the summer rains begin. The second should be collected after at least one summer storm has occurred. Both should be collected when the stream is low or stagnant, so that sediments at the bottom of the pool are undisturbed. If the required sediment sample is collected at the same time, the water sample must be collected first.

The two water samples will be analyzed for inorganics and gross alpha radiation. The first water sample collected will be analyzed for PCBs.

5.21.11.2.3.2 Canyon Bench

Sampling on the canyon bench includes soil and sediment samples from the sediment accumulation areas, the intervening ridges, and the channels draining the sediment accumulation areas into the main Cañada del Buey channel. Runoff samples will be collected in one of these drainages.

Drainages Between the road and the main channel of Cañada del Buey, one 0–6 in. sediment sample will be collected in the drainage of each of the sediment accumulation areas. A second subsurface sample (6–18 in. depth) will be collected from the same location if the depth of the sediments there is sufficient. (Fig. 5.21.11-1).

An automatic water sampler will be installed in the drainage below sample AAA9485 (Fig. 5.21.11-1). Both filtered and unfiltered samples will be collected at first flush during spring runoff. Subsequently, unfiltered samples only will be collected during four independent storm events, generally occurring during the summer.

All sediment samples will be analyzed for uranium isotopes, plutonium-238, and inorganics, including mercury. PCBs will be analyzed in the sediment sample from the drainages below outfalls I/G. Both filtered and unfiltered first flush runoff samples will be analyzed for inorganics, gross alpha radiation, and PCBs. Subsequent runoff samples will be analyzed for inorganics and gross alpha radiation only.

Sediment accumulation areas At least 20 surface (0–6 in.) and subsurface (6–20 in.) sediment samples from at least 12 locations will be collected in the sediment accumulation areas. No fewer than two locations and three sediment samples will be allocated to each of the distinct areas, but overall the numbers of locations and samples will be approximately proportional to the size of the area and selected at random, except as follows:

- The location of Phase I sample AAA9485 (Fig. 5.21.11-1) will be resampled.
- A subsurface collocated pair of samples will also be collected in this same sediment accumulation area.

Assuming that sampling equipment is being reused, at least one rinsate sample will be collected during sampling of this sediment accumulation area.

One location near the center or deepest area of each sediment accumulation area will be selected for a borehole to be drilled at least 18 in. into the underlying tuff. Sediment samples will be collected at the surface (0–6 in.) and at the sediment/tuff interface at this location, and tuff samples will be collected at 3–9 in. and 12-18 in. below the interface.

For the purposes of the conceptual exposure model, Fig. 5.21.11-1 and preliminary Table 5.21.11-1, five distinct sediment areas are assumed, allotted two, six, three, two, and one sample locations respectively from west to east. Actual sample locations and numbers of samples, selected after the area is mapped following the rules outlined above, may deviate from this preliminary design.

All soil and sediment samples will be analyzed for uranium isotopes, plutonium-238, and inorganics, including mercury. Tuff samples will be analyzed for uranium isotopes and inorganics. A chromium(VI) analysis will be performed on the resample of AAA9485 and on one other randomly selected sample from a sediment accumulation area. One surface and one subsurface sample from each sediment accumulation area will analyzed for PCBs.

Ridges The canyon bench stratum outside of active drainages and sediment accumulation areas is already represented by at least three samples located north of the unimproved road. These were collected to address stack emissions (Section 5.27 of this RFI report). Three additional samples will be collected from the low ridges that separate distinct sediment accumulation areas south of the road (Fig. 5.21.11-1). Locations will be selected at random but not more than one sample will be collected between any two distinct drainages.

These soil or sediment samples will be analyzed for uranium isotopes, plutonium-238, and inorganics, including mercury.

5.21.11.2.2.3 Hillside Drainages

Sampling in the drainages below outfalls N and B includes one borehole at each outfall to a depth of 2 ft, surface samples collected adjacent to the active channels, and possibly additional sediment samples in the drainages.

Boreholes will be drilled to a depth of 2 ft at or near the locations of the two Phase I outfall samples (AAA9193 at outfall N, AAA9043 at outfall B). Samples will be collected at depths of 1 and 2 ft in each hole.

Pairs of samples (three pairs at each outfall) will be collected east and west of each drainage, on the banks adjacent to the obviously active portion of the drainage.

These drainages are very steep, with few or no sediment traps beyond those already sampled in Phase I. However, if an additional sediment trap can be found between the outfall and the next set of Phase I samples taken at the toe of the slope, a sediment sample will be collected from it.

Proposed sampling locations for the drainages below outfall N at PRS 46-004(g) and outfall B at PRS 46-004(q) are shown in Figs. 5.21.11-2 and 5.21.11-3. Actual locations will be finalized after the geomorphic mapping described in Section 5.21.11.2.1 is completed.

All soil, sediment and tuff samples will be analyzed for uranium isotopes, plutonium-238 and inorganics, including mercury.

5.21.11.2.2.4 Mesa Top

PCB concentrations of about 20 mg/kg were observed in two samples, one near a back entrance to TA-46-31 (AAA9469) and one near the entrance to TA-46-58 (AAA9496) (Fig. 5.21.11-4). Screening using a PCB immunoassay kit will be conducted within a radius of 10 ft of each of these points to a depth of 2 ft (a minimum of four locations). This area will be extended as necessary, based on screening results, in order to bound areas where PCB concentrations exceed 5 mg/kg.

A minimum of three additional randomly selected mesa-top locations in unpaved areas north of TA-46-31 will provide at least six additional surface and subsurface screening samples.

A total of three field screening samples will be split and screened separately in order to obtain a measure of the replicability of PCB screening results.

One surface and one subsurface screening sample will be collected from the center of a recently uncovered, stained area at the northwest corner of TA-46-87.

Twenty-five percent of the PCB screening samples will be submitted for confirmatory laboratory PCB analysis. These must include at least one sample from the location at the northwest corner of TA-46-87 and two from behind TA-46-58, with the remainder coming from the area behind TA-46-31. They will also be selected to cover the range of field PCB measurements, including samples for which no PCBs were detected by the immunoassay kit. These samples will also be analyzed for inorganics, including mercury, and the samples from behind TA-46-58 will be analyzed for uranium isotopes and plutonium-238.

5.21.11.2.2.5 Characterization of Potential Wastes

Samples for inorganic TCLP analysis will be collected from four Phase I locations: AAA9043 below outfall B, AAA9496 behind TA-46-58, AAA9485 in the sediment accumulation area below outfall N, and AAA9469 behind TA-46-31.

5.21.11.2.3 Data Use

Water samples Data from the main channel water samples will be compared with the State of New Mexico standards for livestock watering and wildlife habitat (State of New Mexico 1995, 1267). Except for mercury, these standards apply to dissolved inorganics. Because mercury is expected to be the most problematic contaminant, this plan specifies the collection of unfiltered samples only except for the initial first flush sampling. However, the decision to collect only unfiltered samples following storm events may be reevaluated following inspection of the initial first flush data.

Data from the canyon bench drainage water samples will be used to estimate the contribution of TA-46 runoff to total contamination in the main channel stream.

Water data will also be used to evaluate a dermal contact pathway in the human health risk assessment for the canyon bench exposure unit.

Main channel and canyon bench soil and sediment samples Sediments in the main channel and adjacent drainages represent material that is leaving TA-46 and could potentially affect stream water quality or be transported beyond LANL boundaries. Data from these samples will be used to estimate the contribution of TA-46 runoff to total contamination in the main channel stream.

Data from sediment accumulation areas, the intervening ridges, and bench and main channel sediment samples will be used in human health and ecological risk assessment under the scenarios described in Section 5.21.11.1.2. Phase II data will be augmented by Phase I data collected within the exposure unit. Risk for some pathways (inhalation of resuspended contaminated soil) is assumed to be proportional to the mean contamination of soils and sediments within the exposure unit, while risk for others (dermal contact, incidental ingestion of soils) is proportional to the amount of time a receptor spends in different parts of the exposure unit. Because the various strata within the exposure unit have not been sampled uniformly, stratified estimates of means and upper confidence levels for means will be used to provide unbiased estimates for various exposure pathways and scenarios (Gilbert 1987, 0506).

Canyon bench tuff samples Data from tuff samples will not be included in risk assessment. These samples are from a stratum that is inaccessible to the human and ecological receptors considered in the exposure scenarios. Tuff samples are being collected in order to bound the vertical extent of contamination in the sediment accumulation areas. Indications from phase 1 subsurface samples are that at locations on the north side of TA-46 contaminant concentrations decrease rapidly with depth within sediments, and little or no contamination is expected below the soil/tuff interface.

Hillside drainages Data from the hillside drainages are intended to bound the extent of contamination in these two drainages both laterally and vertically. If contamination can be shown to be confined to shallow sediments in active channels below these outfalls, then well-localized hot spot remediation may be feasible and cost-effective. An alternative being investigated by the lateral samples is the possibility that these drainages have shifted over the years, even on the steep slopes directly below the outfalls, so that contaminated zones are poorly defined.

Mesa top Data from the mesa top are intended to bound the extent of PCBs and other contaminants behind buildings TA-46-31 and TA-46-58. If contamination can be shown to be confined to small areas adjacent to Phase I samples with elevated PCB concentrations, then well-localized hot spot remediation may be feasible and cost-effective. An alternative possibility is that additional sampling, especially behind TA-46-31, may reveal more widespread PCB contamination, in which case more complex remedial alternatives may have to be evaluated.

TCLP samples These samples, biased toward locations with high concentrations found in Phase I sampling, are intended to identify potential waste characterization concerns if hot spot remediation is undertaken.

5.21.11.2.4 Assumptions and Data Quality Requirements

Results of ecological and geomorphic surveys will be recorded on a base map with a resolution of at least 1 in. per 50 ft.

The numbers of sediment samples proposed above are driven by large coefficients of variation (c.v.) of magnitude 1 and larger suggested by the Phase I data, in particular for mercury and chromium. In order to obtain a 95% upper confidence level less than a target level, such as a preliminary remediation goal, when the true mean of the subpopulation being sampled is at half the target level, a sample size of at least 6 is required if the c.v. is 1, rising to 9 for c.v. = 1.5 and 14 for c.v. = 2. The proposed sample sizes should provide satisfactory precision for the major COPCs within the larger sediment accumulation areas and over the entire exposure unit, if the true means are less than half the target level.

Representative sampling for mercury in soils can be problematic because mercury tends to segregate in pore spaces after a period of time (Bloom 1992, 0979). To determine possible inhomogeneity of mercury distribution, one collocated sample pair and resampling of the location of sample AAA9485 are included in the design. Results will determine if heterogeneity affects the ability to estimate average concentrations within sediment accumulation areas and within strata.

PCB immunoassay kits are expected to provide results accurate to within ±50% in the range of 1 to 50 mg/kg. Three field splits are requested in order to provide an estimate of precision under actual field conditions. No other chlorinated compounds were identified in Phase I sampling that would interfere with these screening analyses, so bias is not expected to be a problem, but a limited number of laboratory analyses will be performed in order to evaluate kit performance. See Appendix C for PCB immunoassay specifications.

The rinsate sample or samples are intended to identify problems, if any, in decontaminating equipment used in sampling moist, fine-grained, organic-rich sediments.

In addition to these field QA samples, contract laboratories will provide standard QC measurements: surrogates, blanks, check standards, matrix spikes, etc., as specified by the analytical procedures requested and will supply complete analytical data packages supporting the reported results, as specified in the current LANL ER statement of work for contract laboratories (LANL 1995, 1278).

5.21.11.3. Sampling Plan Implementation

5.21.11.3.1 Field Methods

Land surveys Surveys will include engineering (geodetic), geomorphic, and ecological mapping activities within the exposure unit. Surveying methods used during mapping to delineate boundaries will provide area estimates within ± 10% and allow marking of strata boundaries to the correctly placed sample locations.

Engineering geodetic mapping will be used to record geomorphic/ecological sampling boundaries and sampling points. In the field the engineering survey will locate, stake, and document the boundaries of the three geomorphic/ecological strata and the locations of sample points. These data will be recorded on the base map. If repositioning a sample location becomes necessary during sample collection, this new position will be resurveyed and the revised location will be indicated on the base map. The engineering will be performed by licensed professionals working to minimum standards for land surveying in New Mexico with oversight by the field team leader.

Geomorphic data and ecological zones will be recorded on the base map.

Sample collection Prior to sampling, all sample locations will be field screened for radioactivity and VOCs to identify gross concentrations of contaminants. Appropriate health and safety precautions will be undertaken under the site-specific health and safety plan for TA-46 in accordance with 29 CFR 1910.120, the LANL radiological control manual, and the LANL generic health and safety plan.

Sampling Techniques Surface soil samples will be collected using a spade and scoop method according to LANL-ER-SOP-06.09. Subsurface sediment samples will be collected with the hand-auger and thin-walled tube sampler method according to LANL-ER-SOP-06.10. All sediment samples will be a minimum depth interval of 6 in. If the sediment is sufficiently deep, a second analytical sample will be gathered at a depth interval between 6–20 in. Borehole tuff samples will be collected using drilling techniques according to LANL-ER-SOP-04.01.

Runoff surface water samples will be collected using automatic collectors under LANL ESH-18 protocol. The automatic sampler will be located directly in the appropriate channel and water will be collected during high-flow events. In order to look at the net transport, the water samples will not be filtered. See Fig. 5.21.11-2 for planned sample locations. Standing surface water will be collected with the coliwasa sampler for liquids and slurries method according to LANL-ER-SOP-06.15.

PCB screening will be performed using D-TECH™ immunoassay kits or equivalent in accordance with the screening of PCBs in soil methods according to LANL-ER-SOP-10.01. Performance of the D-TECH kit is described in Appendix C.

5.21.11.3.2 Sample Handling, Packaging and Shipping

Samples will be handled, packaged, and shipped in accordance with the latest revisions of the applicable LANL ER Program SOPs: LANL-ER-SOP-01.01, General Instructions for Field Investigations; LANL-ER-SOP-01.02, Sample Containers and Preservation LANL-ER-SOP-01.03, Handling, Packaging, and Shipping of Samples; LANL-ER-SOP-01.04, Sample Control and Field Documentation; LANL-ER-SOP-01.05, Field Quality Control Samples. Samples will be submitted to off-site contract analytical laboratories through the ER SMO under the current statement of work.

5.21.11.3.3 Laboratory analyses

Soil, sediment and tuff samples All soil, sediment, and tuff samples submitted for laboratory analyses will be analyzed using routine laboratory contract methods under the current statement of work (LANL 1995, 1278). Inorganic analyses will be performed by EPA SW-846 method 6010 or equivalent. Analytical samples will be analyzed PCBs by EPA method 8080A (EPA 1990, 11-240). Uranium and plutonium isotopes will be analyzed by alpha spectroscopy as specified in the LANL ER QAPP (Environmental Restoration Project 1996, 1292). Chromium samples will be digested using EPA SW-846 method 3060 and analyzed by the diphenylcarbazide colorimetric method for hexavalent chromium. Total chromium will be analyzed in the same samples by potassium permanganate oxidation of all chromium to the hexavalent state and subsequent colorimetric analysis (Environmental Restoration Project 1995, 1278). The toxicity characteristic leaching procedure, SW-846 method 1311, will be used for waste characterization samples.

Water samples will be analyzed in accordance with the methods for chemical analysis of water and wastes to meet the State of New Mexico Water Quality Control Commission regulations. Sample coordination will be conducted by the LANL water quality group. QA/QC data will be provided by the analytical laboratories to enable ER-quality focused validation, if required.

5.21.11.3.4 Transmittal of results

Field Data Field data will be collected and documented in field notebooks and field sample collection logs. Additionally, required field data will be entered in the ER 4-D™ electronic field database. This electronic record will be uploaded to FIMAD at the conclusion of the sampling season.

Laboratory Data Analytical results will be returned to the SMO from off-site contract analytical laboratories. Complete data packets, adequate to support focused validation if necessary, will be provided. Data will be uploaded into the FIMAD database by the SMO (Environmental Restoration Project 1996, 1292).

5.21.11.3.5 Schedule Constraints

Geomorphic and ecological mapping will be performed after all snow has melted. Proposed sampling locations must be reviewed after mapping is completed and before any soil or sediment samples are collected. Runoff samples must be collected at the times specified by ESH-18 runoff sampling protocols. Standing water samples must be collected in periods of low flow as specified in Section 5.21.11.2.3.1.

5.21.11.4 Data Assessment

Data packages will be checked for completeness (Environmental Restoration Project 1996, 1292). Focused validation will be performed only if verification or subsequent data assessment indicates possible problems with analytes of concern. Data packages will be retained under chain-of-custody control by the SMO.

Sample coefficients of variability will be calculated within sediment accumulation areas and within strata to provide indications of how reliably within-area and within-strata means can be calculated. Where these are significantly greater than one, within-area means may not be reliably estimated, especially in the smaller sediment accumulation areas. The relative differences exhibited by the collocated pairs will be calculated in order to estimate how much of the observed variability is local, an indicator that would become important if remediation is proposed.

5.21.11.5. Administration

Records Maps will be prepared based on the ecological and geomorphic surveys discussed in Section 5.21.11.2.1.

Copies of field logs and other field information will be supplied, together with information captured in the field database. In particular, all PCB field screening results will be documented in one or both of these types of records, including PCB calibration and QC data generated by the procedure.

Reports A field summary report prepared following the field activities will be submitted to the ER records processing facility.

Training Field personnel will received training on use of the PCB field kit.

5.22 PRS 46-006(f)

PRS 46-006(f) is TA-46-36, a 20 x 30 ft metal building located 50 ft east of TA-46-1. Because no contaminants were detected above SALs, the PRS is recommended for NFA.

5.22.1 History

PRS 46-006(f) is discussed in RFI Work Plan for OU 1140, Subsection 5.3 (LANL 1993, 1093). The building and surrounding area have been used as a storage area, a disposal staging area for surplus equipment, and an unloading point for new equipment. Items included furnaces, electronic equipment, oils, alkali metals, asbestos products, beryllium alloys, potassium

dichromate, lead bricks, mercury, other inorganics, oils, and small amounts of PCBs (Erickson 1992, 11-211). Suspected contaminants included inorganics, uranium-235, uranium-238, VOCs, SVOCs, PCBs, and asbestos.

5.22.2 Description

TA-46-36 was constructed about 1955 as a metal storage building with double doors on the west and a single door on the southeast (Fig. 5.22.2-1). The paved floor is 6–8 in. below grade. An asphalt ramp slopes from the double doors to the floor. The sliding doors face an asphalt roadway. The south side of the building has an adjacent asphalt pad; the remaining area around the building is unpaved.

5.22.3 Previous Investigations

No previous investigations were conducted at this PRS.

5.22.4 Field Investigation

Three samples were collected for this PRS (Table 5.22.4-1). One sample was taken adjacent to the pavement and two samples in the drainage below the building. Sample locations are shown in Fig. 5.22.2-1. Data from samples at outfall M, described in Section 5.5 of this RFI report, were also used to make the decision for this PRS. Data from PRSs 46-004(m) and 46-004(g) were also used in the decision process for this PRS.

TABLE 5.22.4-1

SUMMARY OF SAMPLES TAKEN

SAMPLE ID	LOCATION ID	DEPTH (ft)	MATRIX	INOR-GANICS	RADIO-NUCLIDES	SVOCs[a]	PCBs[b]	PESTI-CIDES	ASBES-TOS
AAA9268	46-1081	0.5	Soil	19879	20008	19367	19367	19367	20257
AAA9269	46-1082	0.4	Soil	19879	20008	19367	19367	19367	20257
AAA9270	46-1083	0.3	Soil	19879	20008	19367	19367	19367	20257

[a] SVOCs = Semivolatile organic compounds.
[b] PCBs = Polychlorinated biphenyls.

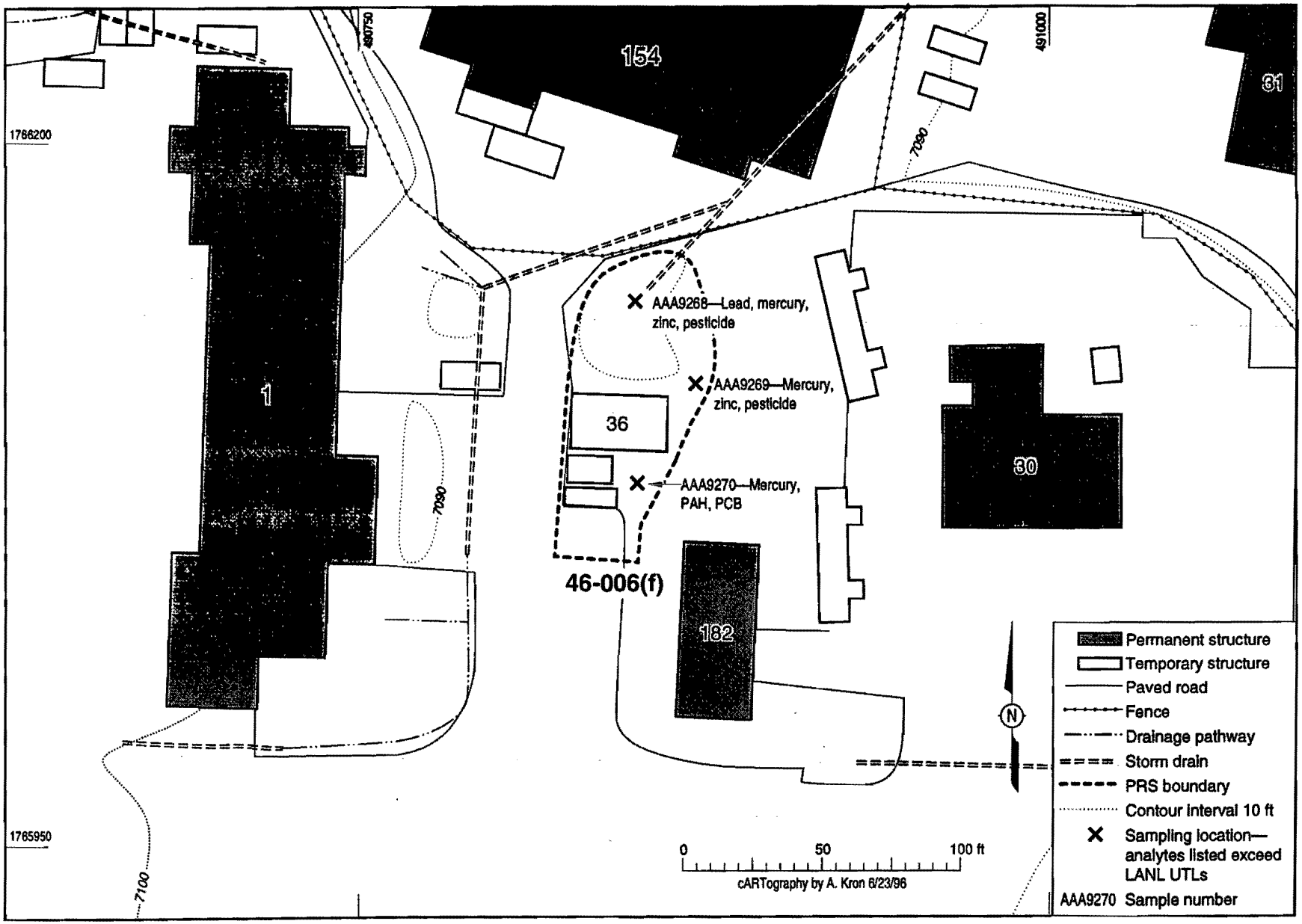


Fig. 5.22.2-1. PRS 46-006(f), storage shed at TA-46-36.

5.22.5 Background Comparison

Lead, mercury, and zinc were found above background but far below SALs (Table 5.22.5-1). Mercury results are accepted as valid because holding times were only slightly exceeded. No radionuclides were detected above LANL UTLs at this PRS.

TABLE 5.22.5-1

INORGANIC ANALYTES WITH CONCENTRATIONS GREATER THAN BACKGROUND UTLs FOR PRS 46-006(f)

SAMPLE ID	DEPTH (ft)	LEAD (mg/kg)	MERCURY (mg/kg)	ZINC (mg/kg)
SAL[a]	N/A[b]	400	23	23 000
LANL UTL[c]	N/A	23.3	0.1	50.8
AAA9268	0.5	**49.2**	**0.57 (J)[d]**	**158**
AAA9269	0.4	**11.4**	**0.79 (J)**	**93.9**
AAA9270	0.3	15.7	**0.51 (J)**	42.4

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] UTL = Upper tolerance limit.
[d] J = Estimated result.

5.22.6 Evaluation of Organics

Trace levels of PCBs were detected in sample AAA9270 (Table 5.22.6-1). Low levels of pesticides and one PAH were reported for this PRS (Table 5.22.6-2). These contaminants are derived from continuing sources and are not associated with LANL experimental activities. They are not carried forward in the screening process.

TABLE 5.22.6-1

PRS 46-006(f) SOIL CONCENTRATIONS FOR PCBs WITH VALUES GREATER THAN THE REPORTING LIMIT

SAMPLE ID	DEPTH (ft)	AROCLOR 1254™ (mg/kg)
SAL[a]	N/A[b]	1
LANL UTL[c]	N/A	0.021
AAA9270	0.3	0.786 (J)[d]

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] UTL = Upper tolerance limit.
[d] J = Estimated result.

TABLE 5.22.6-2

PRS 46-006(f) SOIL CONCENTRATIONS FOR ORGANIC ANALYTES WITH VALUES GREATER THAN THE REPORTING LIMIT

SAMPLE ID	SVOC[a]	RESULT	SAL[b] (mg/kg)	EQL[c] (mg/kg)
AAA9270	Fluoranthene	0.37	3 200	0.33
SAMPLE ID	**PESTICIDES**	**RESULT**	**SAL (mg/kg)**	**EQL (mg/kg)**
AAA9268	Endosulfan II	0.0139	NC	0.0033
AAA9269	Dieldrin	0.00796	0.028	0.0033

[a] SVOC = Semivolatile organic compound.
[b] SAL = Screening action level.
[c] EQL = Estimated quantitation level.

5.22.7 Human Health

5.22.7.1 Screening Assessment

Several constituents were detected above background UTLs but well below SALs. Inspection of the data indicates that MCE screening would yield a value less than the target limit of 1.

5.22.7.2 Risk Assessment

No risk assessment was performed for this PRS.

5.22.8 Ecological Assessment

This PRS is recommended for NFA because no COPCs were detected. The approach to ecological assessment is discussed in Section 3.5 of this RFI report.

5.22.9 Extent of Contamination

No contaminants at concentrations of concern were detected at sampling points for this PRS.

5.22.10 Conclusions and Recommendations

PCBs were found in one sample but not in two downgradient samples, indicating PCB contamination is not widespread or mobile. Lead, mercury, and zinc were found above background UTLs but below SALs. Inspection of the data indicates that MCE screening for noncarcinogenic or radionuclide effects would yield a result far below the target value of 1. No MCE was performed for lead or carcinogenic effects because multiple constituents for these

groupings were not found above LANL UTLs. Based on NFA criterion 5, a Class III permit modification is requested to remove this site from the HSWA Module of the Laboratory's RCRA operating permit.

5.23 PRS 46-006(g)

PRS 46-006(g) is storage shed TA-46-128 at the west end of TA-46-31. Because no contamination was detected above SALs, the PRS is recommended for NFA.

5.23.1 History

PRS 46-006(g) is discussed in RFI Work Plan for OU 1140, Subsection 5.3 (LANL 1993, 1093). From 1982 to 1984 the shed housed vacuum pumps used in experiments involving plasma vaporization of depleted-uranium powder. Pump oil spilled in the shed, which was later used only for storage (Anderson 1992, 11-216). Suspected contaminants included uranium-235, uranium-238, VOCs, and oils.

5.23.2 Description

The shed, attached to the west end of TA-46-31, is approximately 15 x 30 ft (Fig. 5.23.2-1). It is constructed of corrugated steel and is 8 ft high with an asphalt floor. The area around the shed is level and paved. Because the doors are not weather tight, rain and snowmelt regularly flood the floor.

5.23.3 Previous Investigations

No previous investigations were conducted at this PRS.

5.23.4 Field Investigation

Radiation screening readings for all samples and sample locations at TA-46 were less than the set action levels of 800 cpm beta/gamma and 100 cpm alpha. The two sample locations at PRS 46-006(g) were located in the storage shed (Fig. 5.23.2-1). Although the sample locations did not exhibit elevated radiation readings, several parts of the shed structure did show elevated readings of 300 to 350 cpm beta/gamma. These activities were above background but below action levels.

Two samples were collected from beneath the asphalt floor of the shed (Table 5.23.4-1).

TABLE 5.23.4-1

SUMMARY OF SAMPLES TAKEN

SAMPLE ID	LOCATION ID	DEPTH (ft)	RADIO-NUCLIDES	VOCs[a]	SVOCs[b]
AAA9307	46-1104	1[c]	20008	19367	19367
AAA9308	46-1105	1[c]	20008	19367	19367

[a] VOCs = Volatile organic compounds.
[b] SVOCs = Semivolatile organic compounds.
[c] Under asphalt.

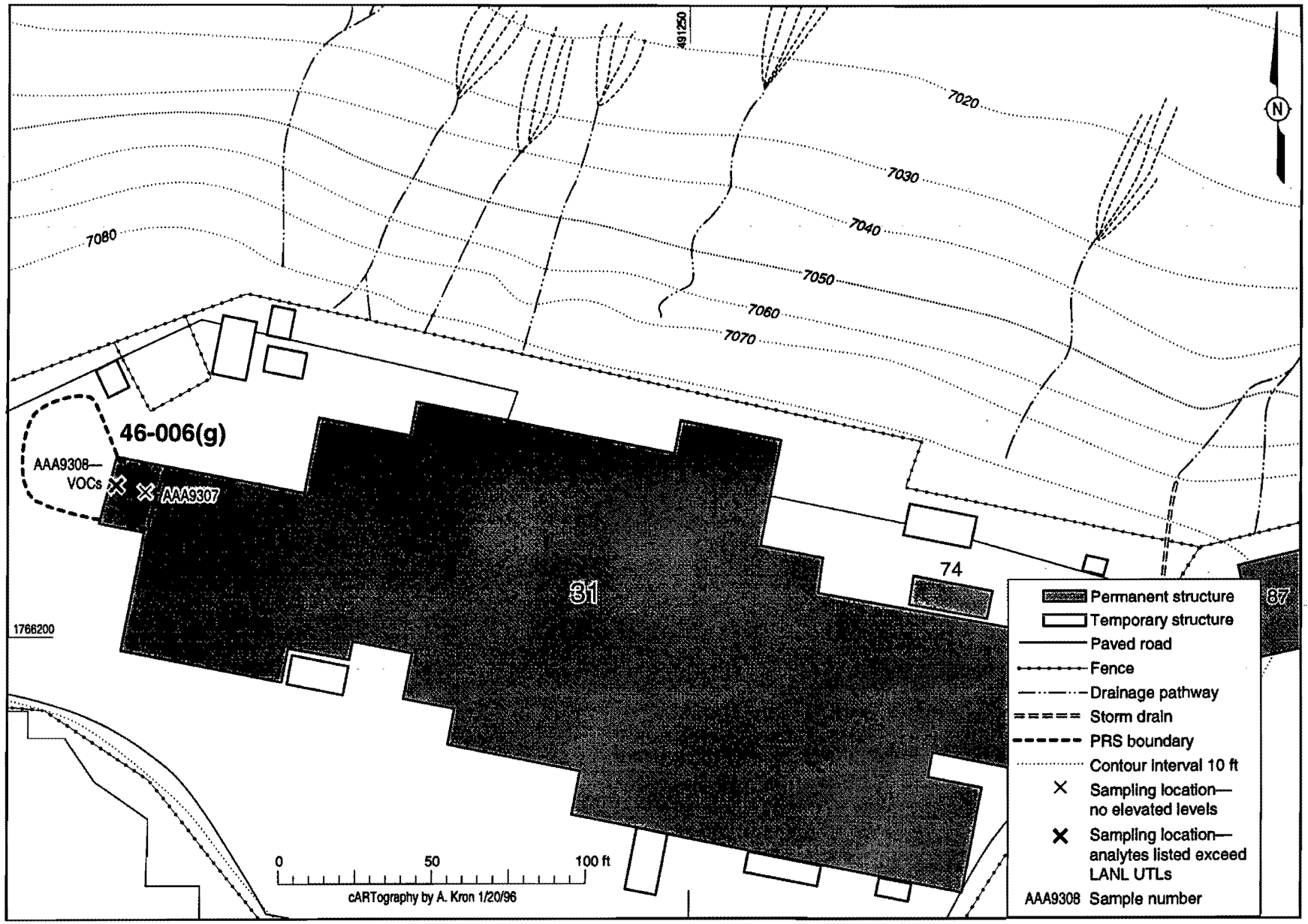


Fig. 5.23.2-1. PRS 46-006(g), storage shed at TA-46-31.

5.23.5 Background Comparison

No inorganics were analyzed for this PRS. Although field screening detected radioactivity on the asphalt surface, no radionuclides were detected above LANL UTLs in subasphalt samples.

5.23.6 Evaluation of Organics

Trace levels of two volatile organic compounds were found in sample AAA9308 (Table 5.23.6-1).

TABLE 5.23.6-1

PRS 46-006(g) SOIL CONCENTRATIONS FOR ORGANIC ANALYTES WITH VALUES GREATER THAN THE REPORTING LIMIT

SAMPLE ID	DEPTH (ft)	1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	TRICHLOROETHENE (mg/kg)
SAL[a]	N/A[b]	Not determined	3.2
EQL[c]	N/A	0.01	0.01
AAA9308	1	0.006	0.021

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] EQL = Estimated quantitation level.

5.23.7 Human Health

5.23.7.1 Screening Assessment

Two VOCs were detected above background in one sample. No MCE screening was performed because 1,1,2-trichloro-1,2,2-trifluoroethane does not have a SAL. Only trace levels of this solvent were found.

5.23.7.2 Risk Assessment

No risk assessment was performed for this PRS.

5.23.8 Ecological Assessment

This PRS is recommended for NFA because no COPCs were detected. The approach to ecological assessment is discussed in Section 3.5 of this RFI report.

5.23.9 Extent of Contamination

No contaminants at concentrations of concern were detected at sampling points. Inorganics were not considered potential contaminants at this PRS. Residual radioactive contamination will be addressed as part of decommissioning of the shed, for which no date has been set.

5.23.10 Conclusions and Recommendations

Trace levels of two solvents were found in one sample taken from the floor of the shed, indicating that solvent contamination is neither high nor widespread. Prior to sampling, radioactive screening indicated activity above background but below action levels. No radionuclides were found in subasphalt samples, indicating contamination is neither widespread nor migrating. Based on NFA criterion 5, a Class III permit modification is requested to remove this site from the HSWA Module of the Laboratory's RCRA operating permit.

5.24 PRS 46-007

PRS 46-007 is a partially paved ditch located on the south side of TA-46-1, plus the drainage path of this ditch along the east side of the building. Copper was found above SAL at one point, but not in sample locations downgradient from this point. No other contaminants were detected above SALs. The PRS is recommended for NFA.

5.24.1 History

PRS 46-007 is discussed in the RFI Work Plan for OU 1140, Subsection 5.3 (LANL 1993, 1093). During the late 1950s and early 1960s, used apparatus from a cesium-plasma diode operation was deposited in the ditch. The apparatus contained bits of highly reactive cesium or lithium metal, which were converted to harmless salts by spraying with butanol and kerosene. Researchers used only natural cesium-133, an unregulated substance, never the radioactive isotope, cesium-137. Other substances, such as solvents, were also discarded in the ditch. After the cesium plasma diode effort ended, the ditch received copper-containing waste from heat pipe research. A green stain from this operation remains on the tuff at the head of the ditch. Mercury was spilled in the south bay of TA-46-1 (Hyatt 1957, 11-003). Some floor drains [PRSs 46-004(s) and 46-004(b2)] from the building emptied into the ditch. Runoff from storage area PRS 46-008(b) also flows into the ditch. Suspected contaminants from all activities around this ditch included mercury, other inorganics, uranium-235, uranium-238, VOCs, and SVOCs.

5.24.2 Description

The ditch is one-to-several feet deep, 3–6 ft wide, and 175 ft long (Fig. 5.24.2-1). Much of the ditch is now paved with asphalt. Drainage is by man-made watercourses and culverts. The drainage path has been altered several times to accommodate construction projects. Effluent now flows to outfall M on the rim of Cañada del Buey via a culvert that daylights north of TA-46-397.

5.24.3 Previous Investigations

No previous investigations were conducted at this PRS.

5.24.4 Field Investigation

Six samples were collected for this PRS (Table 5.24.4-1). Sample AAA9461 was taken at the green rock. The remaining samples were collected in the ditch (Fig. 5.24.2-1). Data from samples AAA9169 and AAA9172 below outfall M, described in Section 5.5, were also used to make the decision for this PRS. Data for these latter two samples are presented here, but the points are not shown on Fig. 5.24.2-1. Data from PRSs 46-004(g), 46-004(m), 46-004(s), 46-004(b2), and 46-004(c2) were also used in the decision process for this PRS.

TABLE 5.24.4-1

SAMPLE ID	LOCATION ID	DEPTH (ft)	MATRIX	INOR-GANICS	RADIO-NUCLIDES	CESIUM LITHIUM	VOCs[a]	SVOCs[b]	PCBs[c]	PESTI-CIDES
AAA9169	46-1046	1	Soil	19539	19996	18999	18999	18999	18999	20256
AAA9172	46-1047	1	Soil	19539	19996	18999	18999	NA [d]	NA	20256
AAA9256	46-1077	0.5	Soil	19879	20008	21843	19367	19367	19367	19367
AAA9273	46-1086	0.5	Soil	20300	20006	21843	19281	19281	19281	19281
AAA9274	46-1087	0.5	Soil	20300	20006	21843	19281	19281	19281	19281
AAA9278	46-1089	0.5	Soil	20300	20006	21843	19281	19281	19281	19281
AAA9281	46-1090	0.5	Soil	20300	20006	21843	NA	19281	19281	19281
AAA9461	46-1126	0.5	Soil	20300	20006	21843	NA	19281	NA	NA

SUMMARY OF SAMPLES TAKEN

[a] VOCs = Volatile organic compounds.
[b] SVOCs = Semivolatile organic compounds.
[c] PCBs = Polychlorinated biphenyls.
[d] NA = Not analyzed.

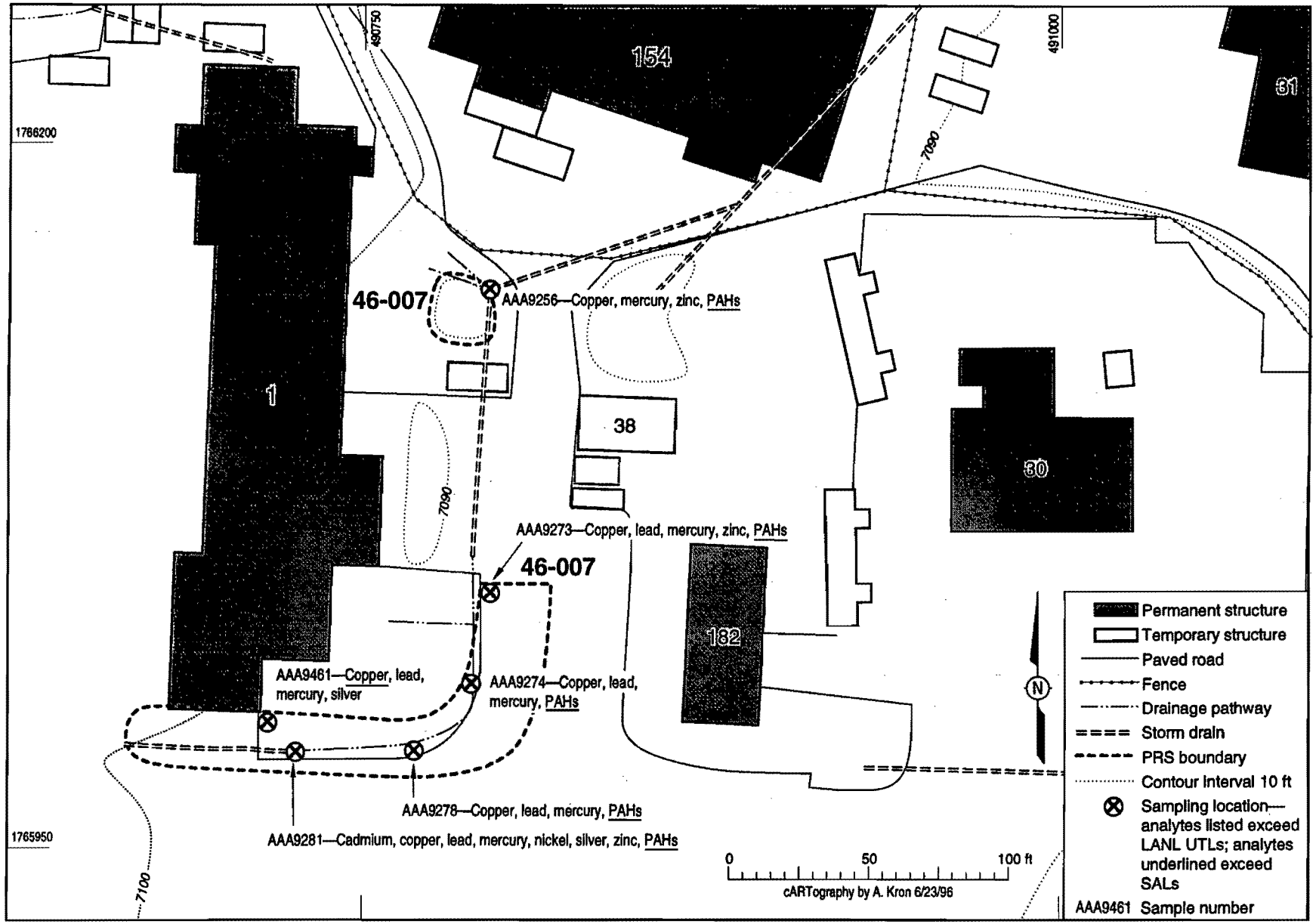


Fig. 5.24.2-1. PRS 46-007, surface disposal at TA-46-1.

5.24.5 Background Comparison

Six inorganic contaminants were found above background at this PRS. Copper was found above SAL in sample AAA9461 at the green rock (Table 5.24.5-1). Although mercury results were qualified as estimated (J) based on missed holding time, values are consistent with nonqualified results and are accepted as reasonable estimates, e.g., well below SAL. Nickel results were rejected because of very low recovery from the blind QC sample. Nickel is not considered a COPC because of its high SAL. No radionuclides were detected above LANL background UTLs at this PRS.

TABLE 5.24.5-1

INORGANIC ANALYTES WITH CONCENTRATIONS GREATER THAN BACKGROUND UTLs FOR PRS 46-007

SAMPLE ID	DEPTH (ft)	COPPER (mg/kg)	LEAD (mg/kg)	MERCURY (mg/kg)	NICKEL (mg/kg)	SILVER (mg/kg)	ZINC (mg/kg)
SAL[a]	N/A[b]	2 800	400	23	1 500	380	23 000
LANL UTL[c]	N/A	15.5	23.3	0.1	15.2	ND[d]	50.8
AAA9169	1	**17.3**	10.1	**0.2 (J)[e]**	<2.2	<0.6	**69.4**
AAA9172	1	14.4	10.7	**0.13 (J)**	<2.7	<0.59	**142**
AAA9256	0.5	**167**	18.6	**0.54 (J)**	<7	<0.43	**79.7**
AAA9273	0.5	**44.6**	67.5	**0.29 (J)**	<4.5	<0.5	**84.5**
AAA9274	0.5	**16.6**	23.8	**0.21 (J)**	<3.9 (R)[f]	<0.24	34.6
AAA9278	0.5	**30.2**	40.9	**1.1 (J)**	<5.2 (R)	<0.48	49.5
AAA9281	0.5	**291**	46.9	**11.5 (J)**	**25.9 (J)**	**9.1**	**470**
AAA9461	0.5	**4 210**	55.1	**1.5 (J)**	<5.8 (R)	**3.4**	39.9

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] UTL = Upper tolerance limit.
[d] ND = Not determined.
[e] J = Estimated result.
[f] R = Rejected result.

5.24.6 Evaluation of Organics

Pesticides and low levels of PAHs, some above SALs, were reported for this PRS (Table 5.24.6-1). The PAHs are derived from continuing sources, asphalt paving and roofing tar. Pesticides are attributed to routine, sitewide use.

TABLE 5.24.6-1

PRS 46-007 SOIL CONCENTRATIONS FOR ORGANIC ANALYTES WITH VALUES GREATER THAN THE REPORTING LIMIT

SAMPLE ID	DEPTH (ft)	SVOC [a]	RESULT (mg/kg)	SAL [b] (mg/kg)	EQL [c] (mg/kg)
AAA9256	0.5	Acenaphthene	0.58	360	0.33
AAA9274	0.5	Acenaphthene	0.67	360	0.33
AAA9256	0.5	Anthracene	0.77 (J) [d]	19	0.33
AAA9274	0.5	Anthracene	0.94 (J)	19	0.33
AAA9281	0.5	Anthracene	0.43 (J)	19	0.33
AAA9256	0.5	Benzo[a]anthracene	1.4	0.61	0.33
AAA9274	0.5	Benzo[a]anthracene	2	0.61	0.33
AAA9278	0.5	Benzo[a]anthracene	0.55	0.61	0.33
AAA9281	0.5	Benzo[a]anthracene	0.9	0.61	0.33
AAA9169	1	Benzo[a]pyrene	0.5 (J)	0.061	0.33
AAA9256	0.5	Benzo[a]pyrene	1.8	0.061	0.33
AAA9273	0.5	Benzo[a]pyrene	0.47	0.061	0.33
AAA9274	0.5	Benzo[a]pyrene	3	0.061	0.33
AAA9278	0.5	Benzo[a]pyrene	0.83	0.061	0.33
AAA9281	0.5	Benzo[a]pyrene	1.3	0.061	0.33
AAA9169	1	Benzo[b]fluoranthene	0.53	0.61	0.33
AAA9256	0.5	Benzo[b]fluoranthene	1.7	0.61	0.33
AAA9273	0.5	Benzo[b]fluoranthene	0.51	0.61	0.33
AAA9274	0.5	Benzo[b]fluoranthene	2.8	0.61	0.33
AAA9278	0.5	Benzo[b]fluoranthene	0.85	0.61	0.33
AAA9281	0.5	Benzo[b]fluoranthene	1.3	0.61	0.33
AAA9256	0.5	Benzo[g,h,i]perylene	0.96	NC [e]	0.33
AAA9274	0.5	Benzo[g,h,i]perylene	1	NC	0.33
AAA9281	0.5	Benzo[g,h,i]perylene	0.43	NC	0.33
AAA9256	0.5	Benzo[k]fluoranthene	2	6.1	0.33
AAA9273	0.5	Benzo[k]fluoranthene	0.41	6.1	0.33
AAA9274	0.5	Benzo[k]fluoranthene	3.1	6.1	0.33
AAA9278	0.5	Benzo[k]fluoranthene	0.86	6.1	0.33
AAA9281	0.5	Benzo[k]fluoranthene	1.1	6.1	0.33
AAA9169	1	Chrysene	0.49	24	0.33
AAA9256	0.5	Chrysene	1.8	24	0.33
AAA9273	0.5	Chrysene	0.36	24	0.33
AAA9274	0.5	Chrysene	2.2	24	0.33
AAA9278	0.5	Chrysene	0.66	24	0.33
AAA9281	0.5	Chrysene	0.97	24	0.33
AAA9274	0.5	Dibenzofuran	0.45	NC	0.33
AAA9256	0.5	Dibenzo[a,h]anthracene	0.45	0.061	0.33
AAA9169	1	Fluoranthene	1.3	2 600	0.33
AAA9172	1	Fluoranthene	0.47	2 600	0.33
AAA9256	0.5	Fluoranthene	4.3	2 600	0.33
AAA9273	0.5	Fluoranthene	1.3	2 600	0.33
AAA9274	0.5	Fluoranthene	7.4	2 600	0.33
AAA9278	0.5	Fluoranthene	2.4	2 600	0.33
AAA9281	0.5	Fluoranthene	3.4	2 600	0.33

TABLE 5.24.6-1 (CONTINUED)

PRS 46-007 SOIL CONCENTRATIONS FOR ORGANIC ANALYTES WITH VALUES GREATER THAN THE REPORTING LIMIT

SAMPLE ID	DEPTH (ft)	SVOC [a]	RESULT (mg/kg)	SAL [b] (mg/kg)	EQL [c] (mg/kg)
AAA9256	0.5	Fluorene	0.47 (J)	2 600	0.33
AAA9274	0.5	Fluorene	0.74 (J)	2 600	0.33
AAA9256	0.5	Indeno[1,2,3-cd]pyrene	1.2	0.61	0.33
AAA9274	0.5	Indeno[1,2,3-cd]pyrene	1.2	0.61	0.33
AAA9278	0.5	Indeno[1,2,3-cd]pyrene	0.38	0.61	0.33
AAA9281	0.5	Indeno[1,2,3-cd]pyrene	0.49	0.61	0.33
AAA9256	0.5	Naphthalene	0.47 (J)	800	0.33
AAA9274	0.5	Naphthalene	0.93 (J)	800	0.33
AAA9169	1	Phenanthrene	0.9	NC	0.33
AAA9256	0.5	Phenanthrene	3.8	NC	0.33
AAA9273	0.5	Phenanthrene	0.73	NC	0.33
AAA9274	0.5	Phenanthrene	5.3	NC	0.33
AAA9278	0.5	Phenanthrene	1.3	NC	0.33
AAA9281	0.5	Phenanthrene	2.1	NC	0.33
AAA9169	1	Pyrene	0.78 (J)	2 000	0.33
AAA9256	0.5	Pyrene	3.5 (J)	2 000	0.33
AAA9273	0.5	Pyrene	0.73 (J)	2 000	0.33
AAA9274	0.5	Pyrene	4.2 (J)	2 000	0.33
AAA9278	0.5	Pyrene	1.4 (J)	2 000	0.33
AAA9281	0.5	Pyrene	2.2 (J)	2 000	0.33
SAMPLE ID	**DEPTH (ft)**	**PESTICIDE**	**RESULT (mg/kg)**	**SAL (mg/kg)**	**EQL (mg/kg)**
AAA9172	1	Dieldrin	0.00268 (J)	0.028	0.0033
AAA9169	1	Endosulfan II	0.00249 (J)	3.3	0.0033
AAA9172	1	Endosulfan II	0.00362 (J)	3.3	0.0033

[a] SVOC = Semivolatile organic compound.
[b] SAL = Screening action level.
[c] EQL = Estimated quantitation level.
[d] J = Estimated result.
[e] NC = Not calculated.

5.24.7 Human Health

5.24.7.1 Screening Assessment

Copper was detected above SAL at the green rock (Table 5.24.7.1). Low levels of PAHs were reported above SALs. PAHs at TA-46 are attributed to continuous sources, such as parking lot runoff and roofing tar, and are not carried forward in the screening process. No other contaminants were found above SALs.

TABLE 5.24.7-1

INORGANIC ANALYTE WITH CONCENTRATION GREATER THAN SAL FOR PRS 46-007

SAMPLE ID	DEPTH (ft)	COPPER (mg/kg)
SAL[a]	N/A[b]	2 800
AAA9461	0.5	4 210

[a] SAL = Screening action level.
[b] N/A = Not applicable.

Inorganic contaminants identified to be greater than LANL background UTLs were submitted for an MCE for noncarcinogenic effects. Copper is excluded because it was detected above SAL. Lead is excluded from this grouping because its toxicity is based on the uptake of lead in children as modeled by EPA's IUBEK Model (EPA 1994, 1178). The maximum lead concentration detected at this PRS (68 mg/kg) is well below the SAL for lead. The sum of the maxima for the noncarcinogenic group is 0.66 (Table 5.24.7-2). This result is below the target value of 1, which indicates a low potential for adverse effects due to exposure to this grouping. Therefore, these contaminants are not identified as potentially hazardous. No carcinogens were detected above UTL; therefore, no MCE was performed for this grouping. No radionuclides were detected above UTL; therefore, no MCE was performed for this grouping. PAHs and pesticides were not carried forward in the screening process because they are derived from continuing sources.

TABLE 5.24.7-2

MCE FOR NONCARCINOGENIC EFFECTS AT PRS 46-007

CONTAMINANT	MAXIMUM SOIL CONCENTRATION (mg/kg)	SOIL SAL[a] (mg/kg)	CONCENTRATION NORMALIZED TO SAL
Mercury	12	23	0.522
Nickel	26	1 500	0.017
Silver	9.1	380	0.024
Zinc	470	23 000	0.120
Total			**0.683**

[a] SAL = Screening action level.

5.24.7.2 Risk Assessment

No risk assessment was performed for this PRS.

5.24.8 Ecological Assessment

This PRS is recommended for NFA because no COPCs were detected. The approach to ecological assessment is discussed in Section 3.5 of this RFI report.

5.24.9 Extent of Contamination

Copper was found above SAL at one location. No other contaminants at concentrations of concern were detected at sampling points for this PRS.

5.24.10 Conclusions and Recommendations

Copper, lead, mercury, nickel, silver, and zinc were found above background UTLs at PRS 46-007. Copper was above SAL at the point of green staining, however the concentration (4 210 mg/kg) is below an industrial cleanup level for copper, typically in the range of 6 300 mg/kg. Downgradient sampling indicated that copper is not moving into the environment. MCE screening for other noncarcinogenic effects yields a result (0.683) below the target value of 1. No MCE was performed for lead, radionuclides, or carcinogenic effects because multiple constituents for these groupings were not found above LANL UTLs. Based on NFA criterion 5, a Class III permit modification is requested to remove this site from the HSWA Module of the Laboratory's RCRA operating permit.

5.25 PRS 46-008(b)

PRS 46-008(b) was an unpaved storage area near TA-46-1. Because no contamination was detected above SALs, the PRS is recommended for NFA.

5.25.1 History

PRS 46-008(b) is discussed in RFI Work Plan for OU 1140, Subsection 5.3 (LANL 1993, 1093). The Solid Waste Management Unit (SWMU) Report identifies this area as contaminated with petroleum products, oils, and PCBs (LANL 1990, 0145). The area is no longer used for storage.

5.25.2 Description

PRS 46-008(b) is an inactive, unpaved, 20-ft-square storage area approximately 30 ft east of TA-46-1 near manholes TA-46-6 and TA-46-15 (Fig. 5.25.2-1). The ground slopes northeast to the drainage ditch of PRS 46-007. It is covered with grasses and weeds. Any spills from this location flowed into the ditch, discussed in Section 5.24 of this RFI report, and then to outfall M.

5.25.3 Previous Investigation

No previous investigations were conducted at this PRS.

5.25.4 Field Investigation

Three samples were collected for this PRS (Table 5.25.4-1). Two samples were taken from the storage area and one sample at the head of the storm drain leading from the site (Fig. 5.25.2-1). Data from samples at outfall M, described in Section 5.5 of this RFI report, were also used to make the decision for this PRS. Data from PRSs 46-004(g), 46-004(m), 46-004(s), 46-004(b2), and 46-007 were also used in the decision process for this PRS.

TABLE 5.25.4-1

SUMMARY OF SAMPLES TAKEN

SAMPLE ID	LOCATION ID	DEPTH (ft)	MATRIX	INOR-GANICS	RADIO-NUCLIDES	VOCs[a]	SVOCs[b]	PCBs[c]	PESTI-CIDES
AAA9256	46-1077	0.5	Soil	19879	20008	19367	19367	19367	NA[d]
AAA9271	46-1084	0.5	Soil	20300	20006	NA	19281	19281	19281
AAA9441	46-1370	0.5	Soil	NA	20006	NA	19281	19281	19281

[a] VOCs = Volatile organic compounds.
[b] SVOCs = Semivolatile organic compounds.
[c] PCBs = Polychlorinated biphenyls.
[d] NA = Not analyzed.

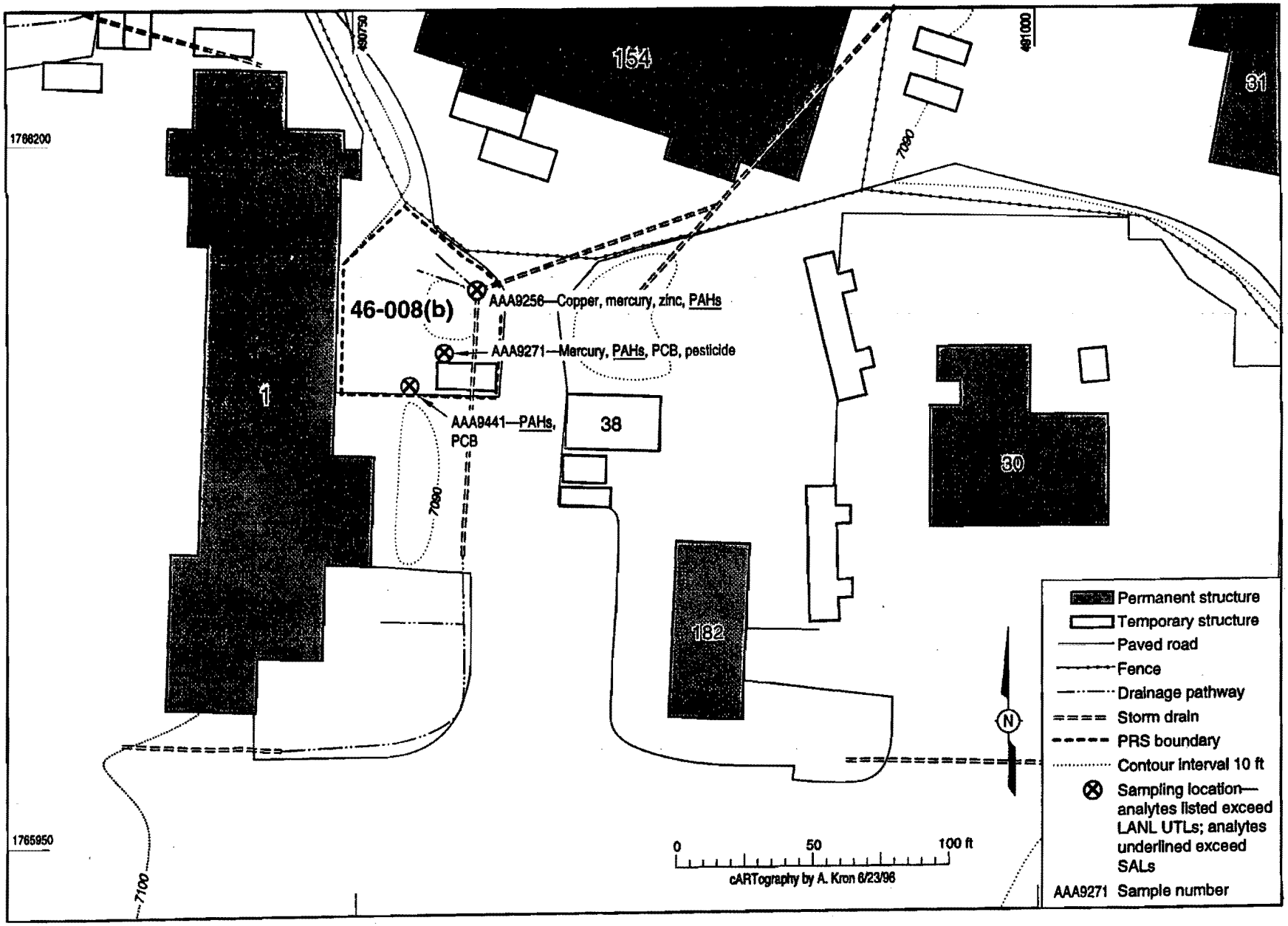


Fig. 5.25.2-1. PRS 46-008(b), storage shed at TA-46-1.

5.25.5 Background Comparison

Copper, mercury, and zinc were found above LANL background UTLs, but below SALs in sample AAA9256 (Table 5.25.5-1). Mercury results were qualified as estimated (J) based on slightly missed holding time; they are accepted as valid estimates. No radionuclides were detected above LANL UTLs at this PRS.

TABLE 5.25.5-1

INORGANIC ANALYTES WITH CONCENTRATIONS GREATER THAN BACKGROUND UTLs FOR PRS 46-008(b)

SAMPLE ID	DEPTH (ft)	COPPER (mg/kg)	MERCURY (mg/kg)	ZINC (mg/kg)
SAL[a]	N/A[b]	2 800	23	23 000
LANL UTL[c]	N/A	15.5	0.1	50.8
AAA9256	0.5	**167**	**0.54 (J)[d]**	**79.7**
AAA9271	0.5	7.8	**0.51 (J)**	40.1

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] UTL = Upper tolerance limit.
[d] J = Estimated result.

Trace levels of PCBs were found in two samples (Table 5.25.6-1). Low levels of PAHs were reported above SALs (Table 5.25.6-2). PAHs at TA-46 are attributed to ongoing sources, e.g., parking lot runoff and roofing tar.

TABLE 5.25.6-1

PRS 46-008(b) SOIL CONCENTRATIONS FOR PCBs

SAMPLE ID	DEPTH (ft)	Aroclor 1254 ™ (mg/kg)
SAL[a]	N/A[b]	1
LANL UTL[c]	N/A	0.021
AAA9271	0.5	0.219 (J)[d]
AAA9441	0.5	0.158 (J)

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] UTL = Upper tolerance limit.
[d] J = Estimated result.

TABLE 5.25.6-2

PRS 46-008(b) SOIL CONCENTRATIONS FOR ORGANIC ANALYTES WITH VALUES GREATER THAN THE REPORTING LIMIT

SAMPLE ID	DEPTH (ft)	SVOC [a]	RESULT (mg/kg)	SAL [b] (mg/kg)	EQL [c] (mg/kg)
AAA9256	0.5	Acenaphthene	0.58	360	0.33
AAA9256	0.5	Anthracene	0.77 (J) [d]	19	0.33
AAA9256	0.5	Benzo[a]anthracene	1.4	0.61	0.33
AAA9271	0.5	Benzo[a]anthracene	0.36	0.61	0.33
AAA9441	0.5	Benzo[a]anthracene	0.47 (J)	0.61	0.33
AAA9256	0.5	Benzo[a]pyrene	1.8	0.061	0.33
AAA9271	0.5	Benzo[a]pyrene	0.52	0.061	0.33
AAA9441	0.5	Benzo[a]pyrene	0.66 (J)	0.061	0.33
AAA9256	0.5	Benzo[b]fluoranthene	1.7	0.61	0.33
AAA9271	0.5	Benzo[b]fluoranthene	0.54	0.61	0.33
AAA9441	0.5	Benzo[b]fluoranthene	0.66 (J)	0.61	0.33
AAA9256	0.5	Benzo[g,h,i]perylene	0.96	NC [e]	0.33
AAA9256	0.5	Benzo[k]fluoranthene	2	6.1	0.33
AAA9271	0.5	Benzo[k]fluoranthene	0.53	6.1	0.33
AAA9441	0.5	Benzo[k]fluoranthene	0.85 (J)	6.1	0.33
AAA9441	0.5	Bis(2-ethylhexyl)phthalate	3.4 (J)	32	0.33
AAA9256	0.5	Chrysene	1.8	24	0.33
AAA9271	0.5	Chrysene	0.4	24	0.33
AAA9441	0.5	Chrysene	0.44 (J)	24	0.33
AAA9256	0.5	Dibenzo[a,h]anthracene	0.45	0.061	0.33
AAA9256	0.5	Fluoranthene	4.3	2 600	0.33
AAA9271	0.5	Fluoranthene	1.5	2 600	0.33
AAA9256	0.5	Fluorene	0.47 (J)	300	0.33
AAA9256	0.5	Indeno[1,2,3-cd]pyrene	1.2	0.61	0.33
AAA9441	0.5	Indeno[1,2,3-cd]pyrene	0.36 (J)	0.61	0.33
AAA9256	0.5	Naphthalene	0.47 (J)	800	0.33
AAA9256	0.5	Phenanthrene	3.8	NC	0.33
AAA9271	0.5	Phenanthrene	0.63	NC	0.33
AAA9256	0.5	Pyrene	3.5 (J)	2 000	0.33
AAA9271	0.5	Pyrene	0.76 (J)	2 000	0.33
AAA9441	0.5	Pyrene	0.89 (J)	2 000	0.33
SAMPLE ID	**DEPTH (ft)**	**PESTICIDE**	**RESULT (mg/kg)**	**SAL (mg/kg)**	**EQL (mg/kg)**
AAA9271	0.5	Dieldrin	0.0272 (J)	0.028	0.0033

[a] SVOC = Semivolatile organic compound.
[b] SAL = Screening action level.
[c] EQL = Estimated quantitation level.
[d] J = Estimated result.
[e] NC = Not calculated.

5.25.7 Human Health

5.25.7.1 Screening Assessment

Several inorganics and Aroclor-1254™ were detected above background UTLs but below SAL. Inspection of the inorganic data indicates that MCE screening would yield a value less than the target limit of 1. The PAHs detected are derived from continuous sources and are not carried forward in the screening process.

5.25.7.2 Risk Assessment

No risk assessment was performed for this PRS.

5.25.8 Ecological Assessment

This PRS is recommended for NFA because no COPCs were detected. The approach to ecological assessment is discussed in Section 3.5 of this RFI report.

5.25.9 Extent of Contamination

No contaminants at concentrations of concern were detected at sampling points for this PRS.

5.25.10 Conclusions and Recommendations

Trace levels of PCBs were detected in two samples. Downgradient sampling indicates that PCBs are not migrating from the site. Copper, mercury, and zinc were found at PRS 46-008(b) above background UTLs, but below SALs. Inspection of the data indicates that MCE screening for noncarcinogenic or radionuclide effects would yield a result far below the target value of 1. No MCE was performed for carcinogenic effects because multiple constituents for these groupings were not found above LANL UTLs. Based on NFA criterion 5, a Class III permit modification is requested to remove this site from the HSWA Module of the Laboratory's RCRA operating permit.

5.26 PRS 46-010(d)

PRS 46-010(d) is a storage area located on the south side of warehouse TA-46-41. Because no contaminants were detected above SALs, the PRS is recommended for NFA.

5.26.1 History

PRS 46-010(d) is discussed in RFI Work Plan for OU 1140, Subsection 5.3 (LANL 1993, 1093). This PRS is now a RCRA satellite accumulation area but has a prior history of hazardous material storage. The 1986 CEARP survey mentions unmarked and rusting drums at the site. Suspected contaminants include inorganics, VOCs, SVOCs, and PCBs.

5.26.2 Description

An asphalt walkway approximately 5 ft wide runs along the south side of the warehouse (Fig. 5.26.2-1). South of the walkway is a level, weedy strip approximately 10 ft wide. Then the grade slopes rather steeply down to the SWSC road. The satellite storage shed is located near the middle of the building on the asphalt walkway.

5.26.3 Previous Investigations

No previous investigations were conducted at this PRS.

5.26.4 Field Investigation

Two samples were collected from the unpaved area below the satellite storage shed (Table 5.26.4-1). Sample locations are shown in Fig. 5.26.2-1.

TABLE 5.26.4-1

SUMMARY OF SAMPLES TAKEN

SAMPLE ID	LOCATION ID	DEPTH (ft)	MATRIX	INORGANICS	RADIONUCLIDES	VOCs[a]	SVOCs[b]	PCBs[c]	PESTICIDES	ASBESTOS
AAA9513	461151	0.66	Soil	19881	NA[d]	19416	19416	19416	19416	20258
AAA9514	461152	1	Soil	19881	NA	19416	19416	19416	19416	20258

[a] VOCs = Volatile organic compounds.
[b] SVOCs = Semivolatile organic compounds.
[c] PCBs = Polychlorinated biphenyls.
[d] NA = Not analyzed.

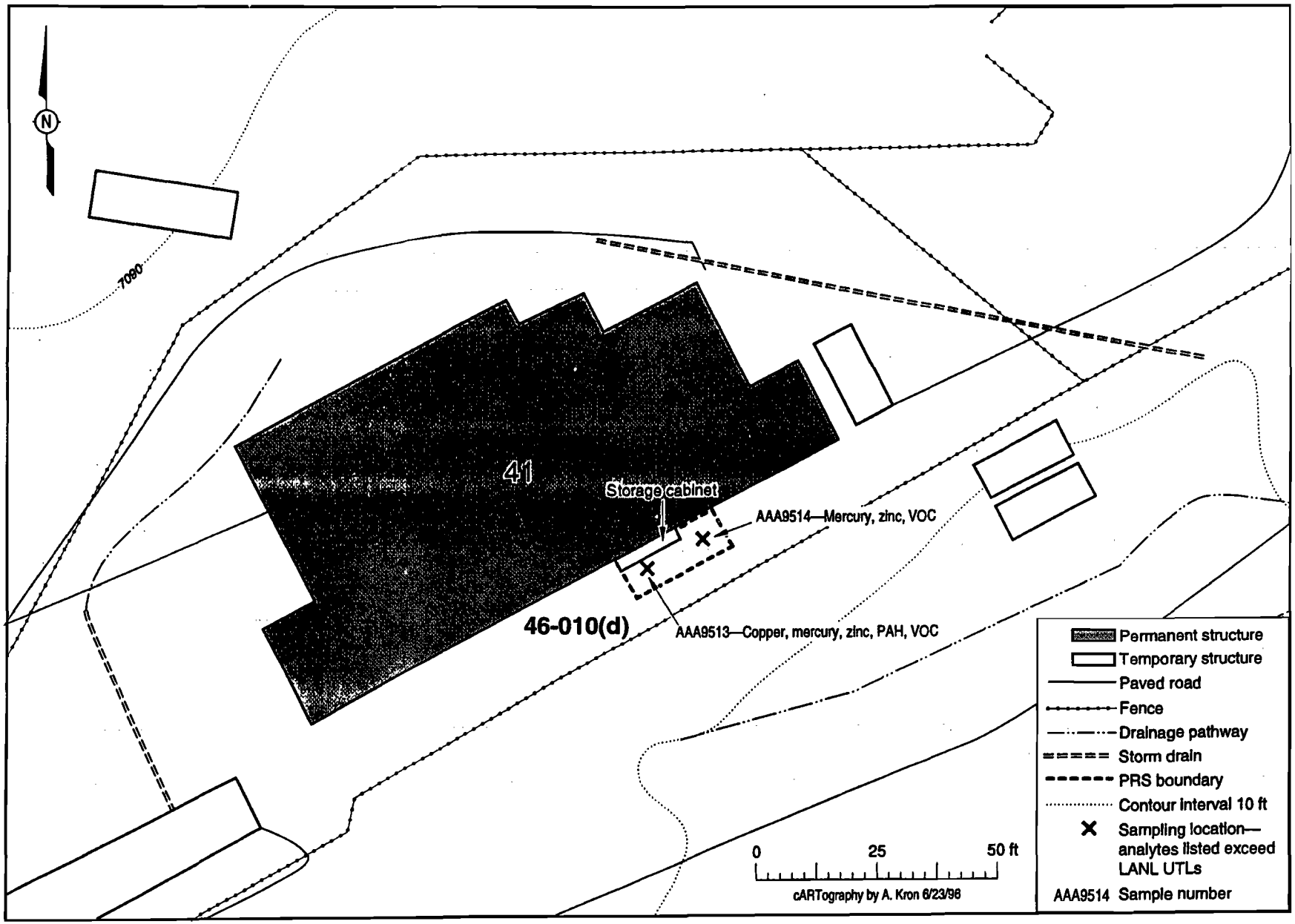


Fig. 5.26.2-1. PRS 46-010(d), drum storage at TA-46-41.

5.26.5 Background Comparison

Copper, mercury, and zinc were found above background at this PRS (Table 5.26.5-1). Mercury results were qualified as estimated (J) based on slightly missed holding time and are consisted valid. Because radionuclides were not COPCs at this PRS, no radioanalyses were performed.

TABLE 5.26.5-1

INORGANIC ANALYTES WITH CONCENTRATIONS GREATER THAN BACKGROUND UTLs FOR PRS 46-010(d)

SAMPLE ID	DEPTH (ft)	COPPER (mg/kg)	MERCURY (mg/kg)	ZINC (mg/kg)
SAL[a]	N/A[b]	2 800	23	23 000
LANL UTL[c]	N/A	15.5	0.1	50.8
AAA9513	0.66	**22.8**	**0.45(J)[d]**	**227**
AAA9513D[e]	0.66	**28.5**	**0.31(J)**	**245**
AAA9514	1	7.0	**0.22(J)**	**143**

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] UTL = Upper tolerance limit.
[d] J = Estimated result.
[e] D = Duplicate analysis.

5.26.6 Evaluation of Organics

Low levels of PAHs were reported for this PRS (Table 5.26.6-1). These contaminants are derived from continuing sources: asphalt paving and roofing tar. VOCs were detected at levels below SALs

TABLE 5.26.6-1

PRS 46-010(d) SOIL CONCENTRATIONS FOR ORGANIC ANALYTES WITH VALUES GREATER THAN THE REPORTING LIMIT

SAMPLE ID	DEPTH (ft)	SVOC[a] or VOC[b]	RESULT (mg/kg)	SAL[c] (mg/kg)	EQL[d] (mg/kg)
AAA9513	0.66	Acetone	0.004	2 000	0.02
AAA9513	0.66	Bromomethane	0.004	15	0.01
AAA9514	1	Bromomethane	4	15	0.01
AAA9513	0.66	Fluoranthene	0.57	2 600	0.33
AAA9513	0.66	Methylene chloride	0.004	11	0.005
AAA9514	1	Methylene chloride	4	11	0.005

[a] SVOC = Semivolatile organic compound.
[b] VOC = Volatile organic compound.
[c] SAL = Screening action level.
[d] EQL = Estimated quantitation level.

5.26.7 Human Health

5.26.7.1 Screening Assessment

Three inorganic constituents were detected above background UTLs but well below SALs. Low levels of VOCs were also detected. Inspection of both data sets indicates that in both cases MCE screening would yield a value less than the target limit of 1. The PAHs are derived from continuing sources and are not carried forward in the screening process.

5.26.7.2 Risk Assessment

No risk assessment was performed for this PRS.

5.26.8 Ecological Assessment

This PRS is recommended for NFA because no COPCs were detected. The approach to ecological assessment is discussed in Section 3.5 of this RFI report.

5.26.9 Extent of Contamination

No contaminants at concentrations of concern were detected at sampling points for this PRS.

5.26.10 Conclusions and Recommendations

Copper, mercury, and zinc were found at PRS 46-010(d) above background UTLs, but below SALs. Inspection of the data indicates that MCE screening for noncarcinogenic effects would yield a result far below the target value of 1. No MCE was performed for lead, radionuclides, or carcinogenic effects because multiple constituents for these groupings were not found above LANL UTLs. Based on NFA criterion 5, a Class III permit modification is requested to remove this site from the HSWA Module of the Laboratory's RCRA operating permit.

5.27 Stack Emissions Aggregate

Five PRS at TA-46 are listed as potentially contributing to contamination in the form of stack emissions (Table 5.27-1). Aggregation of these PRSs in this RFI report is based on the sampling plan approved in the RFI work plan (LANL 1993, 1093).

TABLE 5.27-1

PRSs IN THE STACK EMISSIONS AGGREGATE

PRS[a] ID	SOURCE	SUSPECTED CONTAMINANT
46-004(g)	TA-46-1	Uranium-235
46-004(h)	TA-46-16	Uranium-238
46-004(d2)	TA-46-24	Beryllium
C-46-002[b]	TA-46-31	Uranium-235
C-46-003	TA-46-30	Uranium-238

[a] PRS = Potential release site.

5.27.1 History

PRS 46-004(g) is ducts and drains from TA-46-1. The PRS is described in Section 5.3 of this RFI report. Potential stack emissions were listed as uranium isotopes.

PRS 46-004(h) is ducts and drains from TA-46-16. The PRS is described in Section 5.4 of this RFI report. Potential contaminants were listed as uranium isotopes.

PRS 46-004(d2) is possible stack emissions from experiments performed at TA-46-24 in 1960—61. The PRS is discussed in RFI Work Plan for OU 1140, Subsection 5.6. (LANL 1993, 1093). Experiments used beryllium and beryllium oxide; quantities of these constituents may have been released through building stacks (Mitchell 1960, 11-014). Air sample data sheets based on room air monitoring connected with beryllium operations at TA-46 indicate concentrations as high as 16 mg/m^3 (LASL 1960, 11-015).

PRS C-46-002 is possible stack emissions from Rover Program activities at TA-46-31. The PRS is discussed in RFI Work Plan for OU 1140, Subsection 5.6 (LANL 1993, 1093). Failure testing of fuel rods led to possible releases of uranium-235 through the stack.

PRS C-46-003 is a one-time release of approximately 5 to 10 g of depleted uranium hexafluoride (UF_6) containing uranium-237 as a tracer (Turin 1993, 11-232). The PRS is discussed in RFI Work Plan for OU 1140, Subsection 5.6 (LANL 1993, 1093). The release took place from TA-46-30 on March 29, 1978. The LANL SWMU Report stated inaccurately that the building was TA-46-158 (LANL 1990, 0145). A May 1978 report on ambient air monitoring in response to the release from TA-46-30 indicated no detectable level of uranium-237. It is not clear whether investigators looked for uranium-238 as well. Monitoring was performed downwind of TA-46-30 and at the Laboratory perimeter (Ahlquist 1978, 11-084).

5.27.2 Description

The areas considered most likely to have received stack emissions, based on prevailing wind patterns, are the west, north, and east sections of TA-46 (Fig. 5.27.2-1). Both mesa top and the bench below TA-46 in Cañada del Buey were considered potential areas of deposition.

5.27.3 Previous Investigations

No previous investigations were conducted at these PRSs.

5.27.4 Field Investigation

Nineteen samples were collected over a broad area at TA-46 for this PRS (Table 5.27.4-1). Because of the prevailing winds, sampling points are generally north of TA-46 (Fig. 5.27.2-1). Care was taken to locate sampling points in areas unaffected by other PRSs.

TABLE 5.27.4-1

SUMMARY OF SAMPLES TAKEN

SAMPLE ID	LOCATION ID	DEPTH (ft)	MATRIX	INOR-GANICS	RADIO-NUCLIDES	VOCs[a]	SVOCs[b]
AAA9037	461000	0.5	Soil	19160	19598	18592	18592
AAA9038	461000	0.2	Soil	19160	19598	18592	18592
AAA9040	461001	0.5	Soil	19160	19598	18592	18592
AAA9041	461001	0.3	Soil	19160	19598	18592	18592
AAA9437	461001	0.5	Soil	19160	19598	18592	18592
AAA9118	461027	0.5	Soil	19326	19845	NA[c]	NA
AAA9119	461028	0.5	Soil	19326	19845	NA	NA
AAA9120	461029	0.5	Soil	19326	19845	NA	NA
AAA9226	461065	0.5	Soil	19545	19998	NA	NA
AAA9227	461065	2.5	Soil	19545	19998	NA	NA
AAA9229	461066	0.5	Soil	19545	19998	NA	NA
AAA9230	461066	2.5	Soil	19545	19998	NA	NA
AAA9232	461067	0.5	Soil	19542	19997	NA	NA
AAA9235	461068	0.5	Soil	19542	19997	NA	NA
AAA9238	461069	0.5	Soil	19675	20007	NA	NA
AAA9239	461070	0.5	Soil	19675	20007	NA	NA
AAA9240	461071	0.5	Soil	19563	20000	NA	NA
AAA9335	461120	0.5	Soil	19563	20000	NA	NA
AAA9463	461067	0.25	Soil	19542	19997	NA	NA

[a] VOCs = Volatile organic compounds.
[b] SVOCs = Semivolatile organic compounds.
[c] NA = Not analyzed.

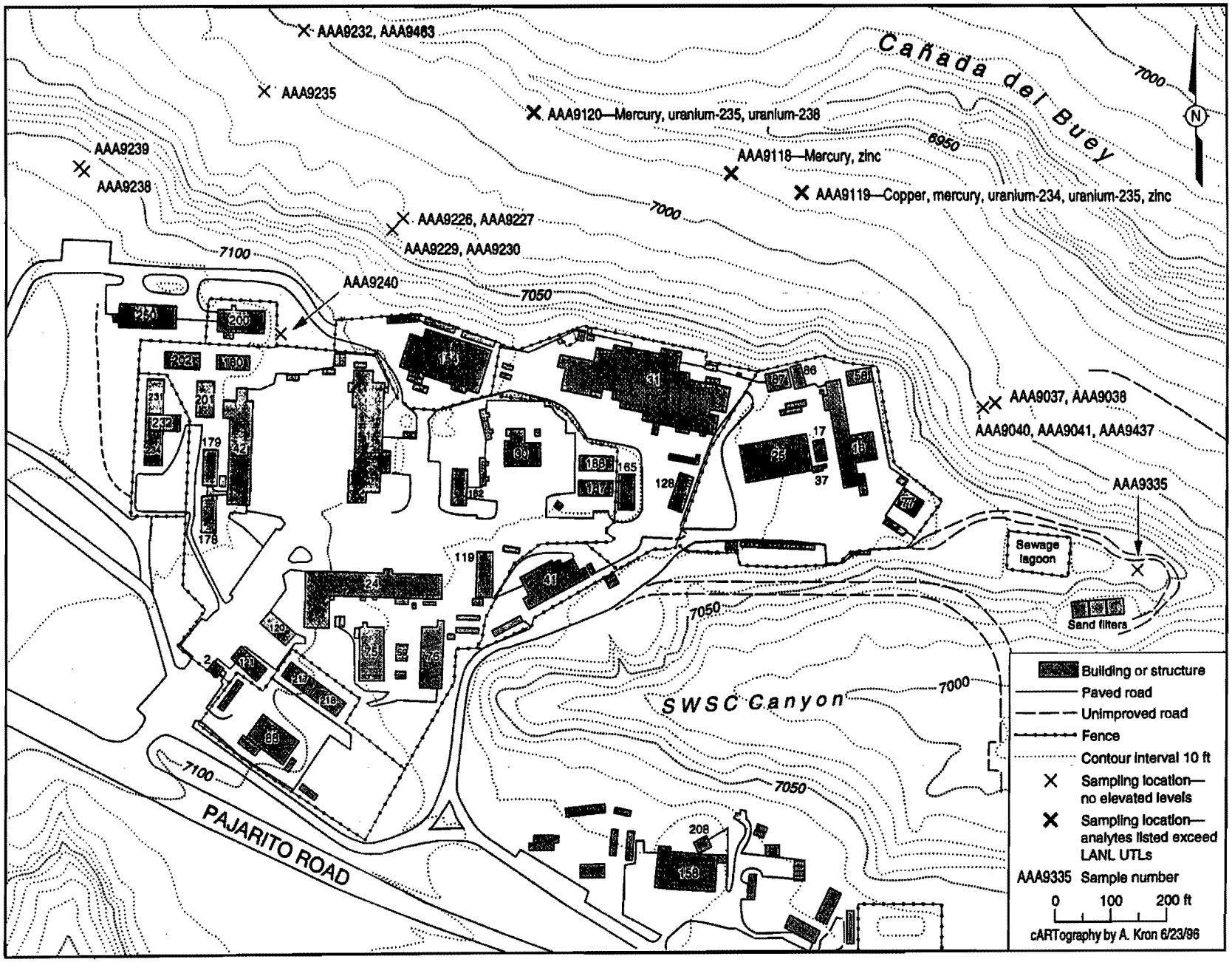


Fig. 5.27.2-1. PRSs 46-004(d2), C-46-002, and C-46-003, stack emissions.

5.27.5 Background Comparison

Low levels of mercury, silver, and zinc were found above LANL background UTLs (Table 5.27.5-1). Trace levels of radionuclides were found (Table 5.27.5-2). Uranium and plutonium results were qualified as estimated (J) based on anomalous recoveries of laboratory control samples. Values are consistent with nonqualified results and are accepted as reasonable estimates, i. e., well below SAL.

TABLE 5.27.5-1

INORGANIC ANALYTES WITH CONCENTRATIONS GREATER THAN BACKGROUND UTLs FOR THE STACK EMISSIONS AGGREGATE

SAMPLE ID	DEPTH (ft)	COPPER (mg/kg)	MERCURY (mg/kg)	SILVER (mg/kg)	ZINC (mg/kg)
SAL[a]	N/A[b]	2 800	23	380	23 000
LANL UTL[c]	N/A	15.5	0.1	ND[d]	50.8
AAA9037	0.5	<1.7	<.06	**0.79**	11.1
AAA9037D[e]	0.5	2.3	<0.05	<0.79	15
AAA9118	0.5	<0.3	**0.38**	<.27	**52.7**
AAA9119	0.5	**20.5**	0.3	<.39	**64.3**
AAA9120	0.5	<0.27	**0.21**	<.23	34.1

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] UTL = Upper tolerance limit.
[d] ND = Not determined.
[e] D = Duplicate analysis.

TABLE 5.27.5-2

RADIONUCLIDES WITH ACTIVITIES GREATER THAN BACKGROUND UTLs FOR THE STACK EMISSIONS AGGREGATE

SAMPLE ID	DEPTH (ft)	URANIUM-235 (pCi/g)
SAL[a]	N/A[b]	10
LANL UTL[c]	N/A	0.084
AAA9119	0.5	0.1183 (J)
AAA9120	0.5	0.1126 (J)

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] UTL = Upper tolerance limit.
[d] J = Estimated result.

5.27.6 Evaluation of Organics

No organics were found in samples collected for this PRS.

5.27.7 Human Health

5.27.7.1 Screening Assessment

Several constituents were detected above background UTLs at this PRS but well below SALs. Inspection of the data indicates that MCE screening would yield a value less than the target limit of 1.

5.27.7.2 Risk Assessment

No risk assessment was performed for this PRS.

5.27.8 Ecological Assessment

This PRS is recommended for NFA because no COPCs were detected. The approach to ecological assessment is discussed in Section 3.5 of this RFI report.

5.27.9 Extent of Contamination

No contamination was found at levels of concern at the stack emission sampling points at TA-46, which were chosen because no effluent from other PRS impinged upon them.

5.27.10 Conclusions and Recommendations

Copper, mercury, silver, and zinc were found above background UTLs, but below SALs, at locations selected for the stack emissions aggregate. Inspection of the data indicates that an MCE for noncarcinogenic effects would yield a result far below the target value of 1. No MCE was performed for lead, carcinogenic, or radionuclide effects because multiple constituents for these groupings were not found above LANL UTLs. Based on NFA criterion 5, the following recommendations are made for PRSs in the stack emissions aggregate.

- PRS 46-004(g) is recommended for Phase II sampling in Section 5.3 of this RFI report. Results of stack emissions aggregate sampling indicate that airborne effluents from TA-46-1 have not contributed to residual contamination from the building.

- PRS 46-004(h) is recommended for NFA under criterion 5 and removal from the HSWA Module of the RCRA operating permit in Section 5.4 of this RFI report. Results of the stack emissions aggregate support that recommendation.

- Based on NFA criterion 5, a Class III permit modification is requested to remove PRS 46-004(d2) from the HSWA Module of the Laboratory's RCRA operating permit because no residual contamination (beryllium) associated with TA-46-24 was detected at levels of concern..

- Based on NFA criterion 5, PRSs C-46-002 and C-46-003 are proposed for removal from the ER Project list of PRSs and that these sites not be added to the HSWA Module of the Laboratory's RCRA operating permit. No widespread uranium or beryllium contamination was found that could be ascribed to these areas of concern.

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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 5.x.4.1.

Inorganic Suite

Aluminum	Beryllium	Cobalt	Lead	Nickel	Sodium
Antimony	Cadmium	Copper	Magnesium	Potassium	Thalllium
Arsenic	Calcium	Cyanide	Manganese	Selenium	Vanadium
Barium	Chromium	Iron	Mercury	Silver	Zinc

Volatile Organic Compound (VOC) Suite

Acetone	1,2-Dibromoethane	p-Isopropyltoluene
Benzene	Dibromomethane	Methyl iodide
Bromobenzene	1,2-Dichlorobenzene	4-Methyl-2-pentanone
Bromochloromethane	1,3-Dichlorobenzene	Methylene chloride
Bromodichloromethane	1,4-Dichlorobenzene	n-Propylbenzene
Bromoform	Dichlorodifluoromethane	Styrene
Bromomethane	1,1-Dichloroethane	1,1,1,2-Tetrachloroethane
2-Butanone	1,2-Dichloroethane	1,1,2,2,-Tetrachloroethane
n-Butylbenzene	1,1-Dichloroethene	Tetrachloroethene
sec-Butylbenzene	cis-1,2-Dichloroethene	Toluene
tert-Butylbenzene	trans-1,2-Dichloroethene	Trichlorotrifluoroethane
Carbon disulfide	1,2-Dichloropropane	1,1,1-Trichloroethane
Carbon tetrachloride	1,3-Dichloropropane	1,1,2-Trichloroethane
Chlorobenzene	2,2-Dichloropropane	Trichloroethene
Chlorodibromomethane	1,1-Dichloropropene	Trichlorofluoromethane
Chloroethane	cis-1,3-Dichloropropene	1,2,3-Trichloropropane
Chloroform	trans-1,3-Dichloropropene	1,2,4-Trimethylbenzene
Chloromethane	Ethylbenzene	1,3,5-Trimethylbenzene
2-Chlorotoluene	Ethylene dibromide	Vinyl chloride
4-Chlorotoluene	2-Hexanone	o,m,p-Xylene (mixed)
1,2-Dibromo-3-chloropropane	Isopropylbenzene	

Semivolatile Organic Compound (SVOC) Suite

Acenaphthene	Dibenzo(a,h)anthracene	2-Methyl-4,6-dinitrophenol
Acenaphthylene	Dibenzofuran	2-Methylnaphthalene
Aniline	1,2-Dichlorobenzene	2-Methylphenol
Anthracene	1,3-Dichlorobenzene	4-Methylphenol
Benzo(a)anthracene	1,4-Dichlorobenzene	Naphthalene
Benzo(b)flouranthene	3,3'-Dichlorobenzidine	2-Nitroaniline
Benzo(k)flouranthene	2,4-Dichlorophenol	3-Nitroaniline
Benzo(g,h,i)perylene	Diethylphthalate	4-Nitroaniline
Benzo(a)pyrene	Dimethylphthalate	Nitrobenzene
Benzoic acid	Di-n-butylphthalate	2-Nitrophenol
Benzyl alcohol	Di-n-octyl phthalate	4-Nitrophenol
Bis(2-chloroethoxy)methane	2,4-Dimethylphenol	N-Nitrosodimethylamine
Bis(2-chloroethyl)ether	2,4-Dinitrophenol	N-Nitrosodiphenylamine
Bis(2-chloroisopropyl)ether	2,4-Dinitrotoluene	N-Nitroso-di-n-propylamine
Bis(2-ethylhexyl)phthalate	2,6-Dinitrotoluene	Pentachlorophenol
4-Bromophenylphenyl ether	Fluoranthene	Phenanthrene
Butylbenzylphthalate	Fluorene	Phenol
4-Chloroaniline	Hexachlorobenzene	Pyrene
4-Chloro-3-methylphenol	Hexachlorobutadiene	1,2,4-Trichlorobenzene
2-Chloronaphthalene	Hexachlorocyclopentadiene	2,4,5-Trichlorophenol
2-Chlorophenol	Hexachloroethane	2,4,6-Trichlorophenol
4-Chlorophenylphenyl ether	Indeno(1,2,3-cd)pyrene	
Chrysene	Isophorone	

Pesticide and Polychlorinated Biphenyl Suites

Aldrin	4,4'-DDE	Endrin aldehyde	Aroclor-1016
alpha-BHC	4,4'-DDT	Endrin keytone	Aroclor-1221
beta-BHC	Dieldrin	Heptachlor	Aroclor-1232
delta-BHC	Endosulfan I	Heptachlor epoxide	Aroclor-1242
gamma-BHC (Lindane)	Endosulfan II	Methoxychlor	Aroclor-1248
Chlordane	Endosulfan sulfate	Toxaphene	Aroclor-1254
4,4'-DDD	Endrin		Aroclor-1260

Radiological Suite

Americium-241	Thorium-228	Uranium-235
Cesium-137	Thorium-230	Uranium-238
Plutonium-238	Thorium-232	
Plutonium-239/240	Uranium-234	

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APPENDIX B DATA QUALITY EVALUATION TABLES

1.0 INTRODUCTION

The following tables summarize the results of quality assurance/quality control (QA/QC) data validation for all analytical results used to support recommendations in this RFI report. Also, these tables list the request number and report number associated with each sample delivery group submitted for analyses. Request numbers are referenced in Section 5.x.4 of this RFI report in the table entitled Summary of Samples Taken that is provided with the description of the field investigation for each PRS.

Summaries are included for inorganic analyses (Table B-1), volatile organic compounds (VOC) (Table B-2), semivolatile organic compounds (SVOC) (Table B-3), polychlorinated biphenyls (PCBs) and pesticides (Table B-4), and radiological analyses (Table B-5).

TABLE B-1

DATA QUALITY EVALUATION FOR INORGANIC ANALYSES AT TA-46

SUITE	REQUEST NUMBER	REPORT NUMBER	COMMENTS
Inorganics	19160	30762	Selenium recovery was 200% in one blind sample; all results were rejected. Beryllium recovery was 41%; results were J-[a] or UJ[b]-qualified.
Inorganics	19322	31777	No anomalies were noted. All data were accepted.
Inorganics	19323	31714	No anomalies were noted. All data were accepted.
Inorganics	19325	31808	No anomalies were noted. All data were accepted.
Inorganics	19326	31931	Selenium was out of control in the blind QC sample.
Inorganics	19328	31985	All analytes of interest were in control. All results are considered valid.
Inorganics	19447	31967	All analytes of interest were in control. All results are considered valid.
Inorganics	19448	31941	Cadmium results were rejected because the matrix spike was not recovered. Matrix spike recoveries were low for antimony and high for lead and mercury; results were J-qualified.
Inorganics	19450	32090	Blind recoveries were high for selenium and mercury. Those results were J-qualified.
Inorganics	19451	32107	Selenium results were rejected because of excessively high blind recovery. Blind recovery was low for mercury; results were J-qualified.
Inorganics	19507	33976	Mercury results were rejected because holding times were exceeded.

TABLE B-1 (CONTINUED)

DATA QUALITY EVALUATION FOR INORGANIC ANALYSES AT TA-46

SUITE	REQUEST NUMBER	REPORT NUMBER	COMMENTS
Inorganics	19539	34362	Percent recovery values for chromium (58.3%) in the blind QC were below 75% of actual values. Results were J-or UJ-qualified. Mercury holding time was exceeded. Results were J-qualified.
Inorganics	19542	34363	Chromium recovery was low in the laboratory control sample. Mercury recovery was high in the blind. Both analytes were J-qualified.
Inorganics	19545	33595	Selenium was out-of-control high in the blind. Mercury holding times were exceeded. Both analytes were J-qualified.
Inorganics	19563	33560	Mercury holding time was exceeded. For results above EQL[c], sample results were J-qualified. For results below EQLs results were UJ-qualified.
Inorganics	19672	31704	Because matrix spike recoveries were low, antimony, lead, and selenium values were J-qualified.
Inorganics	19673	34568	Mercury results were rejected because holding times were grossly exceeded.
Inorganics	19674	34569	Although mercury holding times were exceeded, results were not qualified. Recoveries from the laboratory control sample for cobalt and selenium were below the 80% limit but were within EPA guidelines. No results were qualified.
Inorganics	19675	34755	The blind QC sample had less than 75% recovery for arsenic and chromium. Results were J- or UJ-qualified. Mercury holding time was exceeded by 34 days; results were rejected.
Inorganics	19879	33864	Mercury holding times were slightly exceeded. Results were J- or UJ-qualified.
Inorganics	19881	33996	Mercury holding times were slightly exceeded. Results were J- or UJ-qualified.
Inorganics	19883	34017	For mercury, the holding time was exceeded by two days. Results were J-qualified. Cadmium was not spiked in sample AAA9457
Inorganics	20300	34610	Mercury holding time was exceeded. Results were J- and UJ-qualified. The blind QC met acceptance criteria for all analytes except chromium at 0.4% recovery and nickel at 01.1% recovery. Results for both analytes were rejected.
Inorganics	21843	36522	Cesium analyses only. Although holding time was exceeded, no results were qualified.

[a]J-qualified = Estimated rather than quantitated.
[b]UJ-qualified = Undetected. The quantitation limit is estimated.
[c] EQL = Estimated quantitation limit.

TABLE B-2

DATA QUALITY EVALUATION FOR VOLATILE ORGANICS AT TA-46

SUITE	REQUEST NUMBER	REPORT NUMBER	COMMENTS
VOC	18592	30306	Blank recoveries and surrogates were in control. No results were qualified.
VOC	18666	30024	No data validation was performed for this request. No QC blind was analyzed. The blank was in control. No results were qualified.
VOC	18707	30567	Recovery for one surrogate was low for sample AAA9079. Results were UJ-qualified[a] for 17 analytes.
VOC	18708	31384	Because acetone and methylene chloride were detected in the blank, the EQLs[b] were raised. Recoveries for two internal standards were low in one sample; relevant results were UJ-qualified.
VOC	18762	30224	No anomalies were noted. All data were accepted.
VOC	18828	31327	Acetone and methylene chloride were detected in the blank; the EQLs were raised and acetone was J-qualified[c]. Recoveries for two internal standards in one sample were low; relevant results were UJ-qualified.
VOC	18927	32470	For samples AAA9154 and AAA9157, the area for one internal standard did not meet minimum criteria of >50% of the average area of the continuing calibration. Both of these samples were reanalyzed and still did not meet the minimum. Relevant results were qualified as estimated. Methylene chloride and acetone were detected in the blanks. Samples AAA9122, AAA9158, AAA9124, and AAA9154 contained one or both analytes. Since the levels reported were less than 10 times the amount detected in the blanks, the data were qualified by raising the EQLs and reporting the analytes as undetected.
VOC	18999	30945	Recovery for one surrogate was low for samples AAA9175, AAA9181, and AAA9184. Relevant analytes were UJ-qualified.
VOC	19001	30169	Recovery for one surrogate was low for sample AAA9178. Results were UJ-qualified for 15 analytes and J-qualified for one analyte.
VOC	19003	30281	1,1-dichloroethane was detected in the QC sample. No other anomalies were noted. All data were accepted.
VOC	19039	30885	Recovery of three surrogates was low. Relevant analytes were UJ-qualified.
VOC	19092	31031	Recovery for two surrogates was low for samples AAA9211 and AAA9214. Relevant analytes were UJ-qualified.

TABLE B-2 (CONTINUED)

DATA QUALITY EVALUATION FOR VOLATILE ORGANICS AT TA-46

SUITE	REQUEST NUMBER	REPORT NUMBER	COMMENTS
VOC	19208	31495	Blank recoveries and surrogates were in control. No results were qualified. Because high levels of 1,1,1-trichloroethane were found, EQLs were raised for that analyte.
VOC	19226	33126	Because acetone and methylene chloride were detected in the blank, the EQL was raised in all samples. Recovery for one surrogate was low for sample AAA9495. The original data were UJ-qualified. Samples AAA9495 and AAA9496 showed low internal standard area response for one internal standard. AAA9495 was reanalyzed and met the criteria, but AAA9496 was not reanalyzed. The data from the second analysis of sample AAA9495 were reported without qualifiers. Relevant data for sample AAA9496 was UJ-qualified. The matrix spike duplicate did not meet recovery acceptance criteria for one of the five spiked analytes. Data were not qualified.
VOC	19247	31147	Recovery for one surrogate was low for sample AAA9469. The original data were UJ-qualified. All 4-methyl-2-pentanone results were rejected because it was not detected in the QC spike.
VOC	19281	32564	Recovery for one surrogate was low for sample AAA9273. The original data were UJ-qualified. All 1,2-dichlorobenzene and 4-methyl-2-pentanone results were rejected because they were not detected in the QC spike.
VOC	19367	32413	All samples were re-analyzed because of low internal standard area response. The re-analyses occurred one day past the recommended holding times. The first analyses were reported for all samples except AAA9256 because area response was not improved. The QC spike for 1,1,1-trichloroethane was not recovered. EQL was raised to 100 mg/kg.
VOC	19438	33103	One surrogate recovery was low for sample AAA9244. All results were UJ-qualified.

[a]UJ-qualified = Undetected. The quantitation limit is estimated.

[b] EQL = Estimated quantitation limit.

[c]J-qualified = Estimated rather than quantitated.

TABLE B-3

DATA QUALITY EVALUATION FOR SEMIVOLATILE ORGANICS AT TA-46

SUITE	REQUEST NUMBER	REPORT NUMBER	COMMENTS
SVOC	18592	30300	All surrogates and blanks were in control. No QC standards were analyzed. No results were qualified.
SVOC	18662	30019	All surrogates and blanks were in control. No QC standards were analyzed. No results were qualified.
SVOC	18707	30309	Recovery of 12 analytes was out of control in the blind. All surrogates were in control. No results were qualified.
SVOC	18708	31695	Recoveries of five surrogates were low in one sample. Results were J-[a] or UJ-qualified[b]. Dilutions were required for one sample because of high target concentrations. Surrogates were in control in the dilutions but not the undiluted analysis. Results from the undiluted analysis were J- or UJ-qualified.
SVOC	18762	30224	Validation could not be performed because data for the LANL QC blind sample were not provided. All analytes were under control in the blanks.
SVOC	18828	31331	Recoveries of 17 analytes from the blind QC sample were low. Results for those analytes were UJ-qualified in all samples.
SVOC	18927	32495	Recoveries from the QC blind sample were below 50% for 6 analytes. Results were UJ-qualified in all field samples.
SVOC	18999	30948	Recoveries from the QC spike were below 50% for 11 analytes. Results were J- or UJ-qualified in all field samples. Because 4-nitrophenol was not detected in the QC spike, results were rejected in all field samples.
SVOC	19001	30372	No QA blind sample was included with this request. No anomalies were noted. No results were qualified.
SVOC	19003	30285	Recoveries from the QC spike were low for 13 analytes. Results were UJ-qualified in all field samples.
SVOC	19039	30882	All surrogates and blanks were in control. No QC standards were analyzed. No results were qualified.
SVOC	19092	31025	Recoveries from the QC spike were below 50% for 8 analytes. Results were J- or UJ-qualified in all field samples.

TABLE B-3 (CONTINUED)

DATA QUALITY EVALUATION FOR SEMIVOLATILE ORGANICS AT TA-46

SUITE	REQUEST NUMBER	REPORT NUMBER	COMMENTS
SVOC	19208	31512	Samples were reextracted because surrogate recoveries were low on first extraction. Holding times were missed for the second extraction. Results were J- or UJ-qualified if surrogate recovery was low for the second extract.
SVOC	19226	33192	The initial extract for sample AAA9479 was apparently contaminated with the matrix spike sample. The sample was reextracted 42 days beyond extraction holding time. The data from the reextract were J-qualified for detected analytes and rejected for undetected analytes. Sample AAA9493 was analyzed one day after holding time. Results were UJ-qualified. No matrix spike data were reported because of laboratory error.
SVOC	19247	31177	Recoveries from the QC spike were below 50% for 10 analytes. Results were UJ-qualified in all field samples. Recoveries from the QC spike were below 10% for 3 analytes. Results were rejected in all field samples. One surrogate was out of control low in samples AAA9465 and AAA9469. Relevant results were UJ-qualified.
SVOC	19266	32677	Recoveries from the QC spike were below 50% for 10 analytes. Results were UJ-qualified in all field samples. Because of a contract laboratory tracking error, the extracts for samples AAA9326, AAA9326, and AAA9329 were analyzed beyond the 40-day holding time for extracts. Results for these samples were J- or UJ-qualified. The matrix spike of AAA9323 had a high pyrene recovery The sample probably contained this analyte and was not homogeneous. The duplicate recovery was in control. Results were not qualified. AAA9323, AAA9326, and AAA9329 had low response for one surrogate. Upon reanalysis this internal standard still showed low response. Data for the relevant analytes were J-qualified
SVOC	19281	32741	Because of low surrogate recovery, sample AAA9441 was extracted a second time beyond holding time. Surrogate recoveries were acceptable; results were not qualified.

TABLE B-3 (CONTINUED)

DATA QUALITY EVALUATION FOR SEMIVOLATILE ORGANICS AT TA-46

SUITE	REQUEST NUMBER	REPORT NUMBER	COMMENTS
SVOC	19367	32127	Recoveries from the QC spike were below 50% for 11 analytes. Results were UJ-qualified in all field samples. AAA9398 was reanalyzed due to low internal standard area response for one surrogate. Reanalysis encountered further surrogate problems. Results for the first analysis were reported with relevant analytes J-qualified.
SVOC	19416	33098	Recoveries from the QC spike failed acceptance criteria for 17 analytes. Results were J- or UJ-qualified in all field samples. Pyrene recovery was low in the matrix spike. Results were not qualified.
SVOC	19438	33188	Seven samples had low response for one surrogate. Upon reanalysis this internal standard still showed low response. Data for the relevant analytes were J- or UJ-qualified. Recoveries from the QC spike failed acceptance criteria for 11 analytes. Results were J- or UJ-qualified in all field samples.

[a]J-qualified = Estimated rather than quantitated.
[b]UJ-qualified = Undetected. The quantitation limit is estimated

TABLE B-4

DATA QUALITY EVALUATION FOR PCBs[a] AND PESTICIDES AT TA-46

SUITE	REQUEST NUMBER	REPORT NUMBER	COMMENTS
Pesticides/ PCB	18707	30646	In samples AAA9076 and AAA9077, one surrogate was not recovered and one was extremely high in column A due to interferences. For column B, recoveries were within the control limits for the two samples. Results for column B were reported. Quantitation values for several target analytes from columns A and B differed by more than 25%. The lower of the two values was obtained from column A. The reviewer used the data from column B and J-qualified[b] it. In sample AAA9076, p,p'-DDD and p,p'-DDT were detected in column A but not column B. Results were UJ-qualified[c].
Pesticides/ PCB	18708	31486	Recoveries of several surrogates were low and quantitation values from two columns differed by more than 25%, possibly due to interference. Relevant results were J- and UJ-qualified.
Pesticides/ PCB	18762	30199	No anomalies were noted. All data were accepted.
Pesticides/ PCB	18828	31328	Blank and blind samples were under control. No results were qualified.
Pesticides/ PCB	18927	32482	Recoveries of several surrogates were low on one or both columns. Relevant results were UJ-qualified.
Pesticides/ PCB	18999	31011	In samples AAA9169 one surrogate recovery was high. For samples AAA9169 and AAA9172, quantitation values for Dieldrin and Endosulfan II from columns A and B differed by more than 25%. Results were J-qualified as possible false positives.
Pesticides/ PCB	19001	30187	No QA blind sample was included with this request. No anomalies were noted. No results were qualified.
Pesticides/ PCB	19003	30365	Quantitation values for Dieldrin from two columns differed by more than 25% in four samples, indicating possible false positives. Relevant results were J-qualified. Endosulfan II was a contaminant in the QC sample but was not found in field samples. No results were qualified.
Pesticides/ PCB	19039	30909	Samples were extracted within holding times; however, one surrogate recovery was low in the method blank. The samples were reextracted 16 days beyond holding time. Results from the second extraction were reported. Positive results (Aroclor 1242, Dieldrin, alpha-BHC) were J-qualified. Undetected analytes were not qualified because the surrogate recovery from field samples was not as poor. Aroclor 1242 recovery was only 50% of the QC spike.

TABLE B-4 (CONTINUED)

DATA QUALITY EVALUATION FOR PCBs[a] AND PESTICIDES AT TA-46

SUITE	REQUEST NUMBER	REPORT NUMBER	COMMENTS
Pesticides/ PCB	19092	31074	Quantitation values for Dieldrin from columns A and B differed by more than 25%. Results were J-qualified as possible false positives. Heptachlor epoxide recovery was less than 50% of the QC spike. Results were UJ-qualified.
Pesticides/ PCB	19208	31714	No anomalies were noted. All data were accepted.
Pesticides/ PCB	19226	33160	Acceptance criteria were met on undiluted aliquots for three samples, but were not met on diluted aliquots. No results were qualified.
Pesticides/ PCB	19247	31178	Three anomalous analytes were detected in the QC sample; EQLs[d] were raised for those analytes.
Pesticides/ PCB	19266	32789	Recoveries were erratic for two surrogates; results for Aroclor were J-qualified in three samples. Two samples may have false positives.
Pesticides/ PCB	19281	32595	In sample AAA9441, Aroclor 1254 was not detected in the first extraction, but was found in a second extraction performed 25 days beyond holding time. The reviewer reported the second Aroclor result as J-qualified. For several samples, quantitation values for Dieldrin from columns A and B differed by more than 25%. The reviewer raised the EQL and UJ-qualified results. For sample AAA9271, quantitation values for Aroclor from columns A and B differed by more than 25%. Results were J-qualified as possible false positives.
Pest	19367	32644	For AAA9270, the quantitation values for Dieldrin and Aroclor 1254 from columns A and B differed by more than 25%. Results were J-qualified for the Aroclor as possible false positives. The EQL for Dieldrin was raised and reported as UJ-qualified. For AAA9268, quantitation values for Endosulfan II from the two analytical columns differed by more than 25%. Results were J-qualified as possible false positives.
Pesticides/ PCB	19416	33097	No anomalies were noted. All data were accepted.
Pesticides	19438	33833	Many analytes were not confirmed by second column analysis or differed by more than 25%. One surrogate recovery was high in the QC spike. Holding time was missed on one QC spike.

[a]PCB = polychlorinated biphenyl.
[b]J-qualified = Estimated rather than quantitated.
[c]UJ-qualified = Undetected. The quantitation limit is estimated
[d]EQL = Estimated quantitation limit.

TABLE B-5

DATA QUALITY EVALUATION FOR RADIOCHEMISTRY ANALYSIS AT TA-46

SUITE	REQUEST NUMBER	REPORT NUMBER	COMMENTS
Isotopic thorium	19598	34729	Blind QC sample results were low. Laboratory control sample results at 124% recovery were out of control above the contractual requirement of 120%. All results were J-qualified[a].
Isotopic uranium	19598	34729	Blind sample results were low due to insufficient sample, therefore all results were J-qualified. The laboratory control sample results were high out of control at 139-171% recoveries. Tracer results were low at 17.8% and 27.1% recoveries.
Cesium-137	19839	36505	No results were qualified. The data are accepted as valid.
Isotopic thorium	19839	37061	Because of low recoveries from a blind QA sample, thorium-228 results were J-qualified and thorium-232 results were rejected.
Isotopic uranium	19839	36498	The laboratory control sample results were high at 128% for uranium-234 and 127% for uranium-238. Tracer recovery was low at 23.4%, below the contractual requirement of 30%. Results were J-qualified for uranium-234 and uranium-238.
Cesium-137	19840	36495	No results were qualified. The data were accepted.
Isotopic thorium	19840	36496	Sample AAA9193 was analyzed twice because of low recovery. Both recoveries were below the contractual minimum of 30%. Result was rejected. Because of low recoveries from a blind QA sample, thorium-228 results were J-qualified and thorium-232 results were rejected.
Isotopic uranium	19840	36494	The laboratory control sample results were high at 128% for uranium-234 and 127% for uranium-238. Tracer recovery was low at 23.4%, below the contractual requirement of 30%. Results were J-qualified for uranium-234 and uranium-238.
Cesium-137	19842	34219	No results were qualified. The data were accepted.
Isotopic plutonium	19842	34220	Blind results for plutonium-238 and -239 were high out of control. Plutonium-238 results were J-qualified. Plutonium-239 results were not qualified because the blind contamination was less than the CRQL.
Isotopic thorium	19842	34220	The isotopic thorium laboratory control sample results were low by 33% for thorium-232, outside of the contractual requirement of ± 20%. Blind results were out of control low. Results were J-qualified.

TABLE B-5 (CONTINUED)

DATA QUALITY EVALUATION FOR RADIOCHEMISTRY ANALYSIS AT TA-46

SUITE	REQUEST NUMBER	REPORT NUMBER	COMMENTS
Isotopic uranium	19842	34217	The isotopic uranium laboratory control sample results were low by 38% and 51% for uranium-234 and 48% and 75% for uranium-238, outside of the contractual requirement of ± 20%. Results were J-qualified.
Isotopic cesium	19843	35602	The cesium-137 blind sample was out-of-control by more than 200%. Results were J-qualified.
Isotopic plutonium	19843	35609	Blind results for both plutonium isotopes were out-of-control low. All results were J-qualified.
Isotopic thorium	19843	35618	Blind QC sample results were low out-of-control. Results were J-qualified for all isotopes.
Isotopic uranium	19843	35612	The isotopic uranium laboratory control sample results differed from the actual value by 148% and 122% for uranium-234 and by 123% and 126% for uranium-238, outside of the contractual requirement of ± 20%. Results were J-qualified.
Cesium-137	19844	35607	The cesium-137 blind sample was out-of-control by more than 200%. Results were J-qualified.
Isotopic plutonium	19844	35610	Blind results for both plutonium isotopes were out-of-control low. All results were J-qualified.
Isotopic thorium	19844	35615	Blind QC sample results were low out-of-control. Results were J-qualified for all isotopes.
Isotopic uranium	19844	35613	The isotopic uranium laboratory control sample results differed from the actual value by 148% and 122% for uranium-234 and by 123% and 126% for uranium-238, outside of the contractual requirement of ± 20%. Results were J-qualified.
Cesium-137	19845	35142	The blind was high at the 2–3 sigma warning level. No results were qualified. The data were accepted.
Isotopic plutonium	19845	35146	Recoveries for one control sample and a blank were 0.4% and 3.4%, below the contractual minimum of 30%. Results were J-qualified.
Isotopic thorium	19845	35151	The blind QC sample results were low out of control. Results were J-qualified for all isotopes. The thorium tracer used in the quantification of the thorium isotopes had a recovery of 20.6% and 22.1% in the analysis of samples AAA9116 and AAA9119, below the contractual minimum of 30%. The associated results were J-qualified.
Isotopic uranium	19845	35144	The isotopic uranium laboratory control sample results were high by 140% for uranium-234 and by 129% for uranium-238, outside of the contractual requirement of ± 20%. Results were J-qualified.
Cesium-137	19846	35141	The blind was high at the 2–3 sigma warning level. No results were qualified. The data were accepted.

TABLE B-5 (CONTINUED)

DATA QUALITY EVALUATION FOR RADIOCHEMISTRY ANALYSIS AT TA-46

SUITE	REQUEST NUMBER	REPORT NUMBER	COMMENTS
Isotopic plutonium	19846	35152	The isotopic plutonium laboratory control sample had a tracer recovery of 0.4% and 3.4%, below the contractual minimum of 30%. Results were J-qualified.
Isotopic uranium	19846	35145	The isotopic uranium laboratory control sample results were high by 140% for uranium-234 and by 129% for uranium-238, outside of the contractual requirement of ± 20%. Results were J-qualified.
Isotopic thorium	19846	35155	The thorium tracer used in the quantification of the thorium isotopes had recoveries of 23.2%, 24.0%, 21.4%, and 29.2% in the analysis of samples AAA9100, AAA9097, AAA9106, and AAA9091, below the contractual minimum of 30%. The associated results were J-qualified. A blind QC sample was out-of-control low. Results were J-qualified.
Cesium-137	19848	34725	No anomalies were noted. No results were qualified. The data were accepted.
Isotopic plutonium	19848	34718	The isotopic plutonium laboratory control sample result differed from the actual value by 77% for plutonium-239, outside of the contractual requirement of ± 20%. Results were J-qualified.
Isotopic thorium	19848	34723	Blind QC sample results were out-of-control low. The isotopic thorium laboratory control sample results deviated from the actual value by 127% and 125% for thorium-230, outside of the contractual requirement of ±20%. Results were J-qualified.
Isotopic uranium	19848	34721	The isotopic uranium laboratory control sample results differed from the actual value by 124% and 130% for uranium-234 and 131% and 154% for uranium-238, outside of the contractual requirement of ± 20%. Results were J-qualified. Tracer recovery for sample AAA9079 was 27.7%, below the contractual requirement of 30%. The associated sample result was J-qualified.
Cesium-137	19849	34725	The data reviewer noted that a high bias was discovered for the cesium-137 blind control sample. The data were accepted despite a low bias in blind recovery.
Isotopic thorium	19849	34487	An isotopic thorium blind QC sample results were out-of-control low. Results were J-qualified for all isotopes.
Isotopic uranium	19849	34492	The isotopic uranium laboratory control sample results differed from the actual value by 149% for uranium-234 and 156% for uranium-238, outside of the contractual requirement of ± 20%. Results were J-qualified.

TABLE B-5 (CONTINUED)

DATA QUALITY EVALUATION FOR RADIOCHEMISTRY ANALYSIS AT TA-46

SUITE	REQUEST NUMBER	REPORT NUMBER	COMMENTS
Cesium-137	19996	32242	The data reviewer noted that a high bias was discovered for the cesium-137 blind control sample. The data were accepted despite a low bias in blind recovery.
Isotopic thorium	19996	32233	Because of high tracer recovery, sample AAA9163 was J-qualified. All other results were accepted.
Isotopic uranium	19996	32238	No anomalies were noted. No results were qualified.
Cesium-137	19997	35377	No anomalies were noted. All data were accepted.
Isotopic thorium	19997	35375	The isotopic thorium laboratory control sample results deviated from the actual value by 83% and 78% for thorium-230, outside of the contractual requirement of ±20%. All thorium-230 results were J-qualified. Tracer recoveries for several samples were low (13.8-29%), below the contractual requirement of 30%. The associated sample result was J-qualified.
Isotopic uranium	19996	35356	No anomalies were noted. No results were qualified.
Cesium-137	19998	34957	No anomalies were noted. All data were accepted.
Isotopic thorium	19998	34962	Because of low thorium-229 tracer recovery, many of the samples in this request were analyzed a second time. During the second analysis some samples once again were low. Both sets of results with appropriate qualifiers were reported The thorium tracer used in the quantification of the thorium isotopes had a recovery below the contractual minimum, 30%, in the initial analysis of samples AAA9215, AAA9211, AAA9220, AAA9230, and AAA9226. The associated results were J-qualified. The recovery of the matrix spike for sample AAA9227 was 73%. This was outside the 80–120% acceptance criteria mentioned in the contract. The contract does not require re-analysis because the sample may be inhomogeneous.
Isotopic uranium	19998	34957	No anomalies were noted. All data were accepted.
Cesium-137	20000	32378	The data reviewer noted that a high bias was discovered for the cesium-137 blind control sample. The data were accepted despite a low bias in blind recovery.
Isotopic thorium	20000	32349	AAA9335 for isotopic thorium resulted in a thorium-229 tracer recovery of 26.07%. For tracer recovery between 10 and 30%, associated results were J-qualified.

TABLE B-5 (CONTINUED)

DATA QUALITY EVALUATION FOR RADIOCHEMISTRY ANALYSIS AT TA-46

SUITE	REQUEST NUMBER	REPORT NUMBER	COMMENTS
Isotopic uranium	20000	32335	The CST blind results for uranium-234 and -238 were out of control at 176.7%, possibly due to double spiking. Results were out of control even with corrections. All sample results were J-qualified for those isotopes.
Cesium-137	20001	31823	No anomalies were noted. All data were accepted.
Isotopic thorium	20001	31827	The recovery of the matrix spike for sample AAA9288 was 76%. This was outside the 80–120% acceptance criteria. The contract does not require re-analysis because of the distribution of the spike may be inhomogeneous.
Isotopic uranium	20001	31829	No anomalies were noted. All data were accepted.
Cesium-137	20002	34819	The data reviewer noted that a high bias was discovered for the cesium-137 blind control sample. The data were accepted despite a low bias in blind recovery.
Isotopic plutonium	20002	34870	The tracer recovery for sample AAA9492 and duplicate was 23.2% and 24.5%, below the contractual requirement of 30%. The associated sample results were J-qualified.
Isotopic uranium	20002	34824	No anomalies were noted. All data were accepted.
Cesium-137	20003	36400	There was no evidence that a recent energy calibration had been performed. No other anomalies were noted. All data were accepted.
Isotopic plutonium	20003	36398	No anomalies were noted. All data were accepted.
Isotopic uranium	20003	36396	No anomalies were noted. All data were accepted.
Cesium-137	20005	35256	No anomalies were noted. All data were accepted.
Isotopic thorium	20005	35257	The recovery of the thorium-230 analysis of the matrix spike of sample AAA9323 was 77%, outside of the 80–120% contractual requirements. Results were J-qualified. The thorium tracer recovery for the duplicate indicated that an interference was present The associated results were rejected.
Isotopic uranium	20005	35254	No anomalies were noted. All data were accepted.
Cesium-137	20006	35138	No anomalies were noted. All data were accepted.
Isotopic thorium	20006	35136	The thorium tracer had a recovery of 16.27% and 18.83% in the analysis of samples AAA9271 and its duplicate, below the contractual minimum of 30%. The associated results were J-qualified.

TABLE B-5 (CONTINUED)

DATA QUALITY EVALUATION FOR RADIOCHEMISTRY ANALYSIS AT TA-46

SUITE	REQUEST NUMBER	REPORT NUMBER	COMMENTS
Isotopic uranium	20006	35132	The uranium tracer in sample AAA9461 had a recovery of 20.1% below the contractual minimum of 30%. The associated results were J-qualified.
Cesium-137	20007	35010	The data reviewer noted that a high bias was discovered for the cesium-137 blind control sample. The data were accepted despite a low bias in blind recovery.
Isotopic thorium	20007	34994	The thorium tracer in samples AAA9253, AAA9466, AAA9241, and its duplicate had recoveries below the contractual minimum of 30%. The associated results were J-qualified.
Isotopic uranium	20007	34999	No anomalies were noted. All data were accepted.
Cesium-137	20008	34980	The data reviewer noted that a high bias was discovered for the cesium-137 blind control sample. The data were accepted despite a low bias in blind recovery.
Isotopic thorium	20008	34979	The thorium tracer for samples AAA9256 and the duplicate of AAA9265 had recoveries below the contractual minimum of 30%. The associated results were J-qualified.
Isotopic uranium	20008	34981	No anomalies were noted. All data were accepted.
Cesium-137	20052	34678	No anomalies were noted. All data were accepted.
Isotopic thorium	20052	34682	Blind QC sample results were out-of-control for thorium-228 and -230. The associated results were J-qualified.
Isotopic uranium	20052	34672	The uranium tracer of samples AAA9515 and AAA9516 had recoveries of 22.6% and 28.6%, below the contractual minimum of 30%. The associated results were J-qualified. The blind QC sample results were out-of-control for uranium-238. Results were J-qualified. The isotopic uranium laboratory control sample results differed from the actual value by 149% for uranium-234 and by 156% for uranium-238, outside of the contractual requirement of ±20%. All results were J-qualified.

[a]J-qualified = Estimated rather than quantitated.

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APPENDIX C POLYCHLORINATED BIPHENYL IMMUNOASSAY KIT

Field testing for polychlorinated biphenyls (PCBs) will be done using the D-TECH™ PCB Field Test Kit, produced by EM Science/Strategic Diagnostics Inc. of Gibbstown, New Jersey. This kit can be used with a color comparison card in the range of 1 to 50 mg/kg, but it also comes with a hand-held reflectometer (the DETECHTOR™) for interpreting results of the tests. The reflectometer provides output in percentages, together with a suggested conversion to PCB equivalents (mg/kg) (Table C-1).

TABLE C-1

INTERPRETATION OF DETECHTOR™ READINGS

(from D-TECH™ Instruction Guide)

DETECHTOR™ READING (%)	PCB EQUIVALENTS (mg/kg)
LO-10	<0.5
10-20	0.5-1.0
20-40	1.0-4.0
40-60	4.0-15.0
60-80	15.0-50
HI	>50

Additional data on performance of the kit have been provided to LANL. These data are plotted in Fig. C-1, and show an approximately linear relationship between the DETECHTOR™ reading and the logarithm of the concentration as measured by SW-846 gas chromatography method 8080, for samples in the range of 0.1 to 120 mg/kg. The diagonal sequence of boxes shows how the samples would be classed by the algorithm of Table C-1. Samples within the boxes would be correctly classified; those above the boxes would be incorrectly classified into a lower category (8 samples out of 50), and those below would be incorrectly classified into a higher category (14 samples out of 50). As these error rates show, the algorithm is biased high, which is desirable for a screening procedure. This is also seen in Fig. C-1, where the regression line runs below the center of the boxes.

In these data, no sample above 10 mg/kg (as measured by gas chromatography) has a DETECHTOR™ reading of less than 44%. Tolerance bound calculations indicate that the probability of classifying a sample with true concentration of 10 mg/kg as "<4 mg/kg" is about 0.2, while half of samples at 10 mg/kg

will be classified as ">15 mg/kg." Both DETECHTOR™ readings and classification results per Table C-1 will be reported in terms of the classification results, with cutoffs at 4 mg/kg (40% DETECHTOR™ reading) and 15 mg/kg (60% DETECHTOR™ reading).

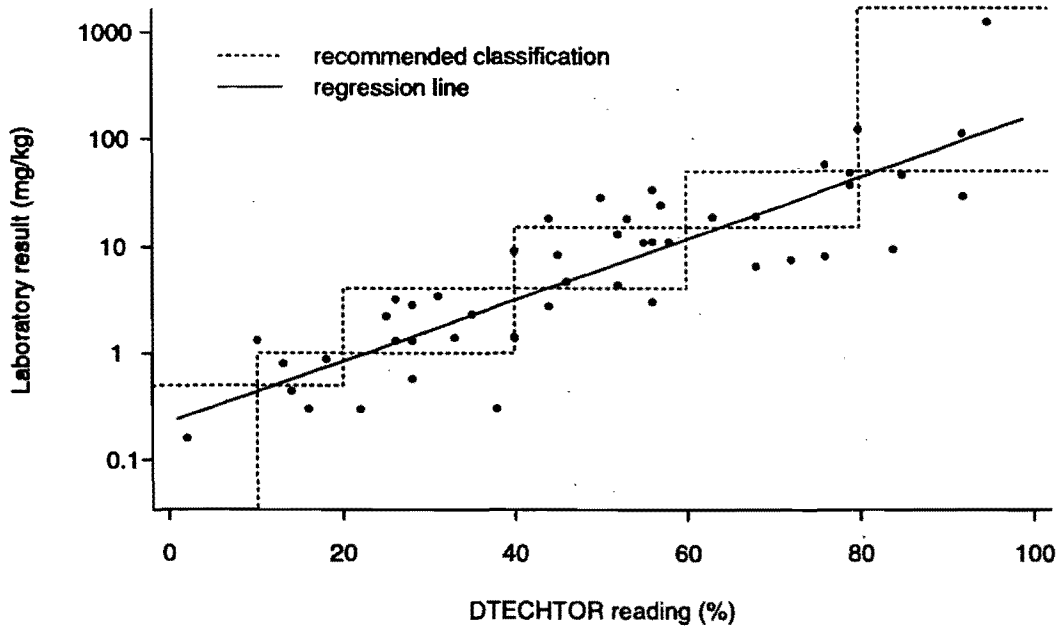

Fig. C-1. D-TECH plot.