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Date: March 15, 1996
Refer to: EM/ER:96-119

Mr. David Neleigh
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U.S. Environmental Protection Agency
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SUBJECT: SUBMITTAL OF THE RESOURCE CONSERVATION AND RECOVERY ACT FACILITY INVESTIGATION (RFI) REPORT FOR POTENTIAL RELEASE SITES (PRSs) IN TECHNICAL AREAS (TAs) 8 AND 9

Dear Mr. Neleigh:

Enclosed are two copies of the Los Alamos National Laboratory's RFI Report concerning PRSs 8-004(d), 9-005(a), 9-005(d), 9-009, 8-009(d), 8-009(e), 9-001(a), 9-001(b), 9-003(g), 9-003(h), 9-003(l), 9-001(d), and C-8-010 in TAs 8 and 9. The report documents the field work performed as detailed in the approved RFI Work Plan for OU 1157, now a part of Field Unit 5, and the results of the sampling. This RFI Report is due to your office on March 15, 1996.

Please ask your office to contact Cheryl Rofer at (505) 667-2988 or Mike Gilgosch of our staff at (505) 667-5794, respectively, if you have any questions.

Sincerely,

Jorg Jansen, Program Manager
Environmental Restoration

Sincerely,

Theodore J. Taylor, Program Manager
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JJ/TT/bp

Enclosure(s): Two copies of RFI Report for TAs 8 and 9

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

Document Title: Submittal of Resource Conservation and Recovery Act Facility Investigation Report for Technical Areas 8 and 9

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RFI Report for Potential Release Sites at TA-8 and TA-9

(located in former Operable Unit 1157)

Field Unit 5

Environmental Restoration Project

March 1996

A Department of Energy
Environmental Cleanup Program

Los Alamos
NATIONAL LABORATORY

LA-UR-96-418

EXECUTIVE SUMMARY

This RCRA Facility Investigation (RFI) report presents the results of the Phase I screening level field investigations performed at fourteen individual Potential Release Sites (PRS) located in Technical Area (TA) -8 and -9. These TAs, located near the western boundary of the Laboratory, supported some of the earliest Manhattan Project activities and facilities built at Los Alamos. The field activities that were performed are specified in the RFI Work Plan for Operable Unit (OU)1157 (LANL 1993, 1092), and the screening level analysis for the results is consistent with the strategies presented in the work plan and the draft RFI report format.

Potential Release Sites have been organized and reported as related PRS sets and individual units, with the groupings based on past operational activities, processes, or occurrences. Table ES-1 identifies the PRSs presented in this report and groups the associated PRSs into sets.

The ^{90}Sr spill set is composed of five individual PRSs, which are all potentially related to a ^{90}Sr spill that occurred in building TA-8-24 in 1954.

The individual PRSs, 08-009(d) and 08-009(e), are active outfalls that historically were associated with material radiography and photographic processing activities at TA-8-22 as well as with film processing, metallography, and fuel element polishing activities at TA-8-21.

The following PRS sets are associated with structures that were in use from 1943 to 1957 and decommissioned, removed, or otherwise decontaminated between 1959 and 1965.

The Far Point Set contains two PRSs, which were both associated with a common explosives test-firing area that was investigated as a single unit. The Old Anchor East set contains four PRSs, which were investigated under a common sampling plan intended to characterize the bulk surface soils in the area of previously decommissioned buildings TA-9-1, TA-9-2, TA-9-3, and TA-9-13. The PRS, C-8-010, is identified as the location of the previously removed drum storage structure TA-8-34.

In general, the Phase I investigations were conducted to assess whether contaminants were present at the sites, focusing on biased, worst case sampling strategies. The approach to data analysis involved data validation, followed by a screening human health assessment, which consisted of a comparison to background, evaluation of organics, comparison to screening action levels, and Multiple Chemical Evaluation (MCE). The sampling plan from the OU 1157 Work Plan was adhered to, with two minor exceptions: additional shallow subsurface samples were collected at the active outfall sites, and analyses for gross alpha and beta radiation were made by the ESH-19 Mobile Counting Facility rather than by contract analytical laboratories. The results of the data quality assessment indicate that all data are sufficient for decisions relevant to this report.

The landscape condition around the PRSs and the potential for ecological receptors to come into contact with contaminants has been evaluated. In accordance with conversations between LANL Environmental Restoration (ER) personnel and EPA Region 6 officials, further ecological risk assessment at these PRSs will be deferred until the PRSs

can be assessed as part of the new Ecological Exposure Unit (Ecozone) approach that is being developed by the Laboratory in conjunction with EPA and the NMED.

No PRS set, or individual PRS, was found to have constituents present at concentrations exceeding screening action levels (SAL). In addition, no MCE performed for a PRS resulted in a value exceeding one, which indicates little potential for adverse human health effects due to activities associated with the PRS.

Potential Release Sites presented in this report are included in the Hazardous and Solid Waste Amendments (HSWA) permit and are all being proposed for No Further Action (NFA). Table ES-1 indicates the criterion and rationale for recommending NFA for each of the PRSs.

TABLE ES-1
SUMMARY OF POTENTIAL RELEASE SITES

Set	PRS	NFA Criteria*	Rationale	Section #
^{90}Sr spill	08-004(d)	4	COPCs below SALs	5.1.1
	09-005(a)	4	COPCs within Background	5.1.2
	09-005(d)	4	COPCs below SALs	5.1.3
	09-008(b)	4	COPCs below SALs	5.1.4
	09-009	4	COPCs within Background	5.1.5
	08-009(d)	4	COPCs below SALs	5.2
	08-009(e)	4	COPCs below SALs	5.3
Far Point	09-001(a)	4	COPCs below SALs	5.4
	09-001(b)	4	COPCs below SALs	5.4
Old Anchor East	09-003(g)	4	COPCs below SALs	5.5
	09-003(h)	4	COPCs below SALs	5.5
	09-003(i)	4	COPCs below SALs	5.5
	09-001(d)	4	COPCs below SALs	5.5
	C-8-010	4	COPCs within Background	5.6

*See Project Consistency Team Policy Number 015, "No Further Action Criteria" Policy.

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ACRONYMS AND ABBREVIATIONS

AE	Old Anchor East
AOC	Area of Concern
AEC	Atomic Energy Commission
CFR	Code of Federal Regulation
COPC	Chemical of Potential Concern
COPEC	Chemical of Potential Ecotoxicological Concern
CST	Chemical Science and Technology (Division)
D&D	Decontamination and Decommissioning
EC	Expedited Cleanup
EPA	Environmental Protection Agency
EQL	Estimated Quantitation Limits
ER	Environmental Restoration
ESG	Environmental Surveillance Group
FIMAD	Facility for Information Management, Analysis, and Display
HE	High Explosives
HF	Hydrofluoric Acid
HSWA	Hazardous and Solid Waste Amendments of 1984
IWP	Installation Work Plan
LANL	Los Alamos National Laboratory
LASL	Los Alamos Scientific Laboratory
LCS	Laboratory Control Samples
MCE	Multiple Chemical Evaluation
MDA	Material Disposal Area
MRAL	Mobile Radiological Analysis Laboratory
NFA	No Further Action
NMED	New Mexico Environmental Department
NPDES	National Pollutant Discharge Elimination System
OU	Operable Unit
PRS	Potential Release Site
QA	Quality Assurance
QC	Quality Control

RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
SAL	Screening ActionLlevel
SDG	Sample Delivery Group
SNL	Sandia National Laboratory
SVOC	Semivolatile Organic Compound
SWMU	Solid Waste Management Unit
TA	Technical Area
TAL	Target Analyte List
TRU	Transuranic Waste
UTL	Upper Tolerance Lmit
VCA	Voluntary Corrective Action
VOC	Volatile Organic Compounds

1.0 INTRODUCTION

Technical Areas -8 and -9 are part of former OU 1157 in Field Unit 5, shown in Figure 1-1, which contain some of the earliest Manhattan Project facilities built at Los Alamos. They have been used for gun-firing experiments, x-ray measurements, and explosives development and testing activities. All PRSs presented in this report are located in TA-8 and -9 and are proposed for NFA.

Technical Area 8 occupies the southwestern portion of the OU and is bounded by Anchor Ranch Road on the east and by State Road 501 and the Jemez Mountains on the west. Technical Area 8, also known as Anchor West, was the site of the original Anchor Ranch homestead and contains the Manhattan Project Gun-Firing Site, as well as a Material Disposal Area (MDA Q) and other postwar facilities.

Technical Area 9 lies east of Anchor Ranch Road and encompasses three Manhattan Project sites known as Old Anchor East (AE), the Far Point firing sites, and Nu Site. Technical Area 9 also contains MDA M and the postwar site known as New Anchor East. The developed areas of both TA-8 and TA-9 lie on a broad mesa that is bounded on the north by Pajarito Canyon and on the south by Cañon de Valle. These TAs are shown in Figure 1-2.

1.1 General Site History and Overview

The Anchor Ranch site was used for development of the gun-assembled nuclear weapon known as Little Boy. Structures at TA-8 included buried concrete bunkers, which housed control rooms and various laboratory and storage facilities, and wooden structures used for office space, storage, and a carpenter's shop.

In 1949 and 1950, modern TA-8 was established north and west of the Gun-Firing Site to house Group X-1, which had been developing x-ray techniques at a location outside TA-8. Several of the original ranch buildings were removed to make way for the new construction, and the rest were abandoned in place. Seven major structures were erected in 1949 to 1950. The new buildings contained office space, photographic-processing labs, and laboratories devoted to various types of x-ray work, some involving the use of contained radioactive sources. In addition, septic and drainage systems were installed, along with water and electric utilities and transformer stations. Most of the structures erected during 1949-1950 are still in use.

Old Anchor East, the original TA-9, was established in 1943 to house explosives production, development and test experiments, and x-ray work. The main explosives manufacturing and x-ray facilities were located east and north across Anchor Ranch road from the Gun-Firing Site. There were eight major structures along with associated drains, pipes, sumps, sewers, septic tanks, manholes, and electric and steam-heating utilities. A covered walkway, with steam pipes running under the roof, connected three of the major structures. Some of the structures housed firing chambers and were shielded with earthen berms and/or covered with fill material.

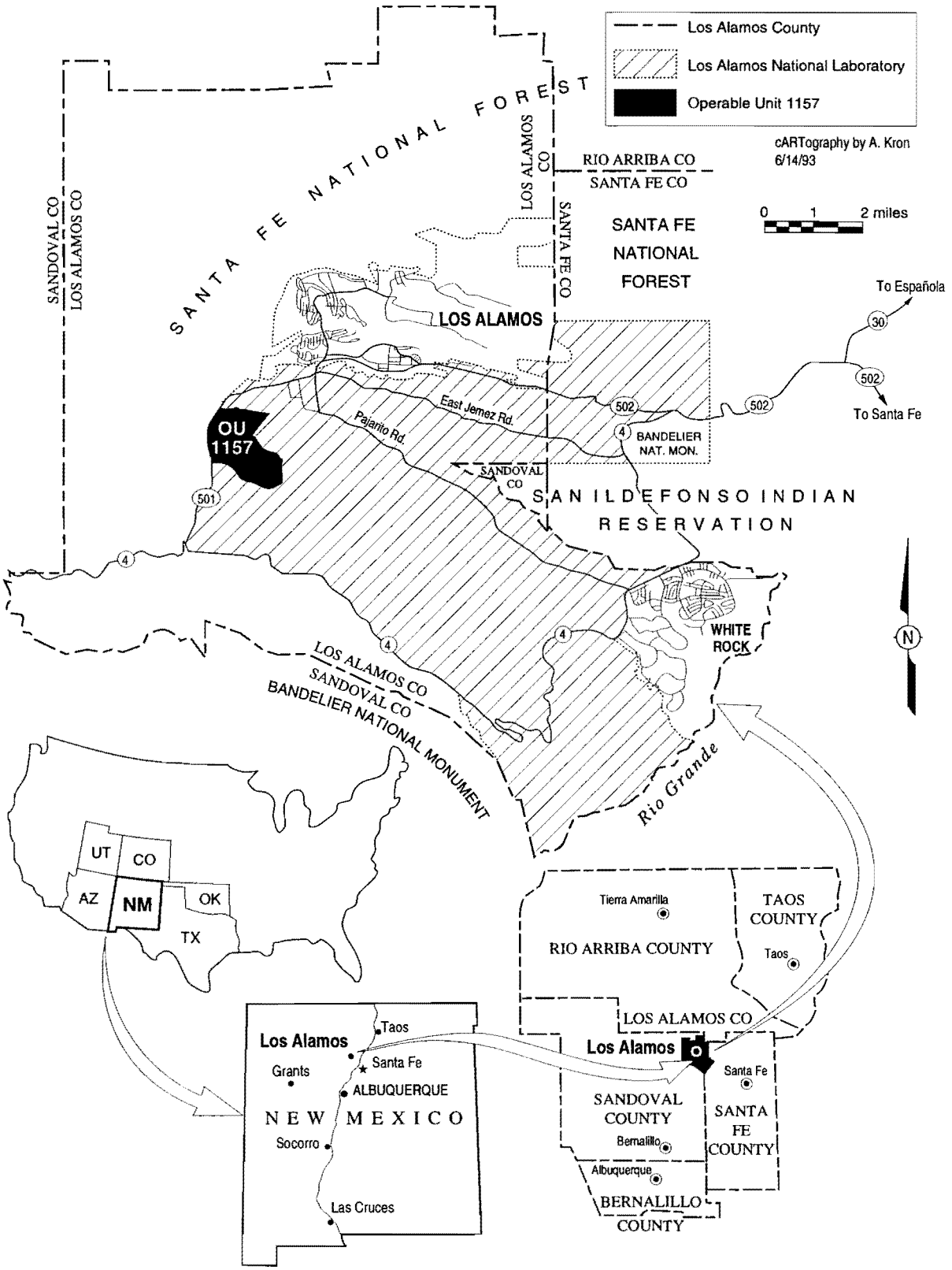


Figure 1-1 Location of Operable Unit 1157

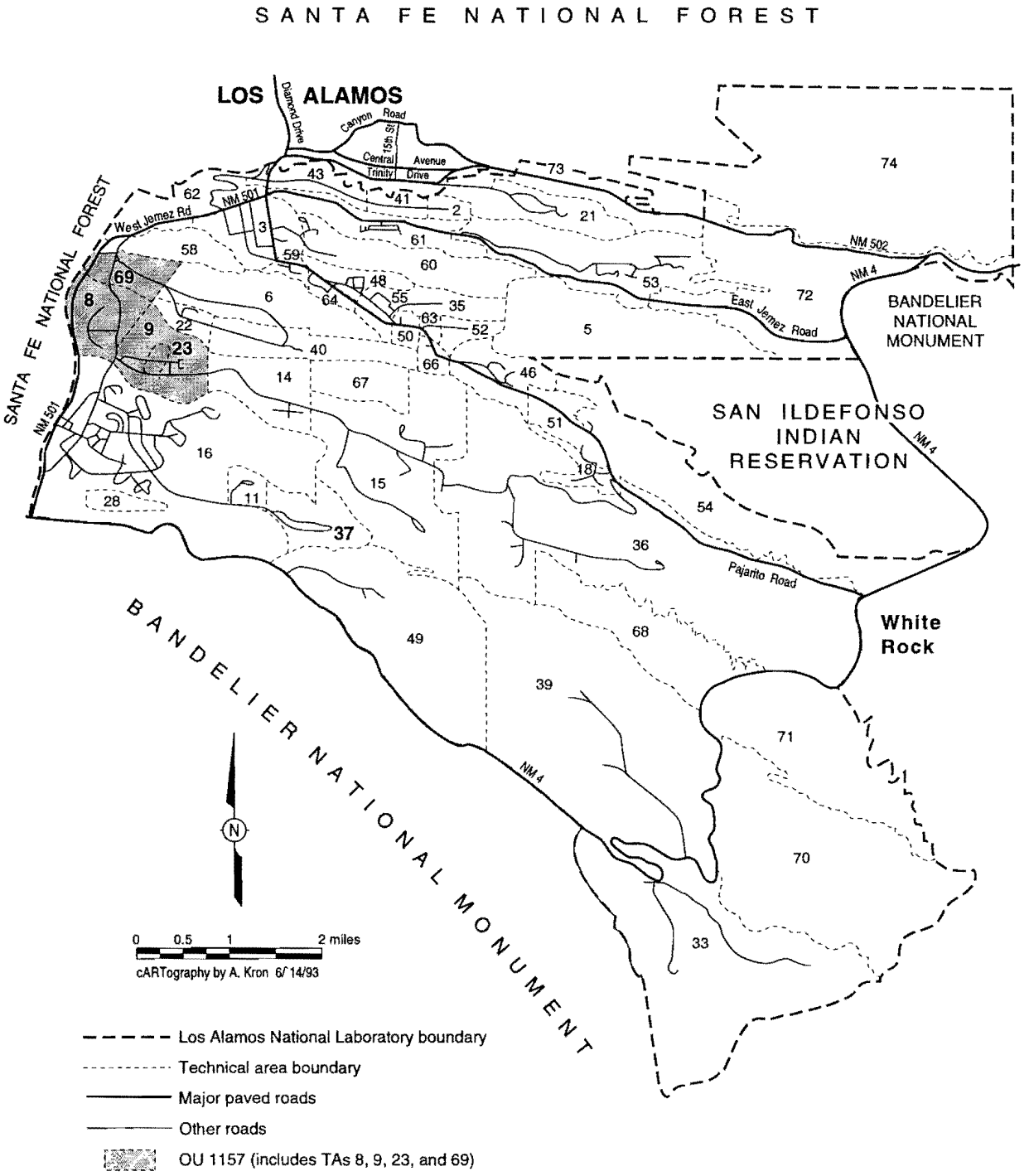


Figure 1-2 Location of Operable Unit 1157 with respect to Laboratory technical areas and surrounding landholdings.

Facilities at Old Anchor East included laboratories, offices, machine shops, storage areas, explosives magazines, and explosive assembly and testing areas. Activities continued in these facilities until the early 1950s when the modern TA-9 was constructed. Reusable structures were relocated in 1957; nonreusable structures were abandoned in place. The remaining buildings were removed beginning in 1959. Major projects to burn the remaining buildings to eliminate high-explosives contamination and to remove associated drains, sumps, pipes, and debris were conducted in 1960 and in 1965. Buildings known to contain radioactive contamination were removed and disposed of at Mesita del Buey (TA-54). Other buildings were disposed of at the nearby MDA M (PRS 9-013). When the excavations were complete, the remaining holes were filled, and the entire area was graded. Soil testing after excavation indicated no explosives contamination remained. In 1992, only broken concrete, bricks, bits of plumbing pipe, some burn pits, and some of the manholes remained at Old Anchor East. Since 1965, the surface has been disturbed numerous times for the installation of various cable, electrical, and communication lines.

Far Point was established in 1944 to conduct explosives detonation experiments. The Far Point Set reported here contains two PRSs, which were both associated with a common explosives test-firing area. The Far Point facilities were active from 1944-56, abandoned in 1959, and removed in 1965. The test-firing area was investigated as a single unit.

Construction of New Anchor East, TA-9, across Anchor Ranch Road from the Gun-Firing Site, began in 1950 immediately following the completion of construction activities at TA-8. New structures were erected, together with associated settling tanks, septic tanks, drain lines, manholes, a lagoon, and a sand filter. The main explosives manufacturing and x-ray facilities were next to Anchor Ranch Road, with the test-firing facilities several hundred yards to the east in an open meadow. Beginning in 1950, the activities that had been conducted at Old Anchor East were moved to the New Anchor East. The overall mission at the site, which is still active, has not changed significantly over the last four decades. That mission is the synthesis and formulation of energetic materials, including testing and formulating for sensitivity and performance, and monitoring for compatibility with other weapons components.

1.2 RFI Overview

This RFI report presents the results of the Phase I screening level field investigations performed at fourteen individual PRSs located in TA-8 and -9 (Figure 1-3). The PRSs have been organized and reported as related PRS sets and individual units, with the groupings based on past operational activities, processes, or occurrences. In general, the Phase I investigations were conducted to assess whether contaminants were present at the sites, focusing on biased, worst case sampling strategies. The field activities performed are specified in the RFI Work Plan for OU 1157 (LANL 1993, 1092), and the screening level analysis for the results is consistent with the strategies presented in the work plan and the draft RFI report format.

The PRS sets reported are as follows:

The ^{90}Sr spill set is composed of five individual PRSs [(08-004(d), 09-005(a), 09-005(d), 09-008(b), and 09-009)], which are all potentially related to a ^{90}Sr spill that occurred in building TA-8-24 in 1954. The sampling plan for this set addressed the conceptual

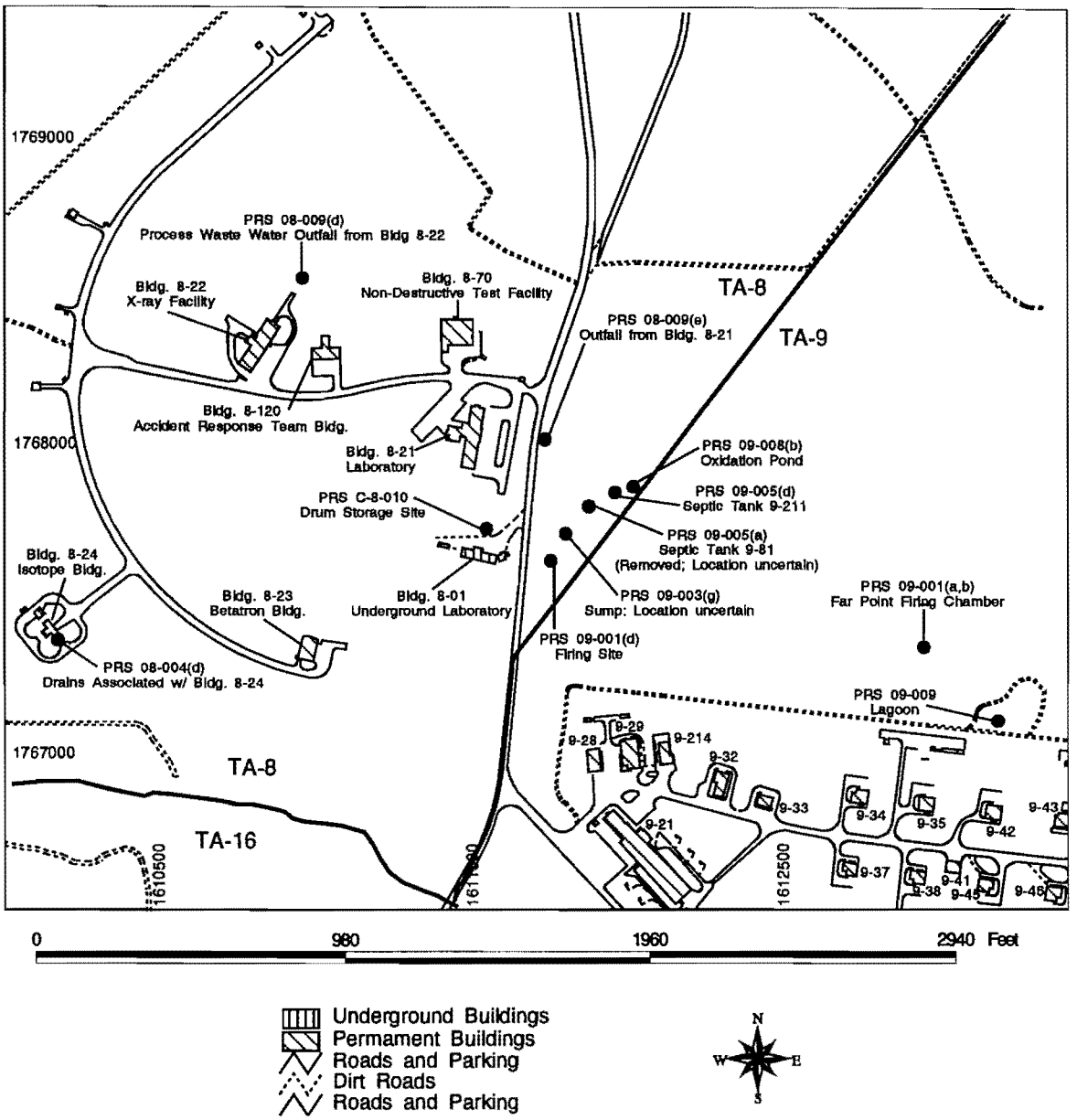


Figure 1-3 Location of Operable Unit 1157 PRSs included in this report.

release model for the ^{90}Sr spill, which included introduction of the contaminant into the sewer system at the PRS 08-004(d) drain during decontamination operations.

The characterization of additional PRSs was required to investigate the potential distribution of residual contamination throughout the system and its modifications over its operational history. Although there is no evidence that a release to the environment has occurred through the sewer system, the system is still in use, and any residual waste constituents in the pipes could have been transported to a point of environmental release. These investigations focused on ^{90}Sr as the primary potential contaminant, and the investigation was designed around biased, judgmental sampling of expected worst case depositional areas within the septic system. The goal of the investigation was to determine if residual ^{90}Sr was present and, if so, whether it presented an unacceptable risk.

The Far Point Set contains two PRSs [09-001(a) and 09-001(b)], which were both associated with a common explosives test-firing area, and was investigated as a single unit. The sampling plan for this set addressed the conceptual release model for an experimental explosives test-firing site, which considered the physical configuration of the firing pad, bermed to direct materials toward the southeast, and was designed to investigate the potential distribution of contaminants from the firing pad in that direction. The surface soils (0-0.5 ft) within a 25-yd radius of the pad were the medium of concern, and the sampling locations were biased toward the area of the firing pad that was expected to be the most contaminated.

The Old Anchor East set contains four PRSs [09-003(g), 09-003(h), 09-003(i), and 09-001(d)], which are the sites of decommissioned and removed buildings TA-9-1, TA-9-2, TA-9-3, and TA-9-13. Potential Release Site 09-001(d) was associated with two firing chambers used to study implosions of small spherical charges; and PRSs 09-003(g), (h), and (i) were primarily involved with HE processing, machining, and storage. All four structures have been demolished. The sampling plan for this set addressed the conceptual release model, which considered the limited explosive discharge of materials from PRS 09-001(d) to the environment during its operation as well as the final demolition and removal of all four facilities, with possible distribution of any associated contaminants across the landscape during earthmoving and regrading. All four PRSs were investigated under a common sampling plan intended to characterize the primary medium of concern, the bulk surface soils, in the area of the decommissioned buildings.

The Individual PRSs 08-009(d) and 08-009(e) are active outfalls that historically were associated with material radiography and photographic processing activities at TA-8-22, and with film processing, metallography, and fuel element polishing activities at TA-8-21, respectively. The conceptual release model and sampling plan for these outfalls was based on the assumption that waste constituents associated with past activities at the PRSs would sorb to particulates and accumulate in sediment depositional areas associated with the outfall. These PRSs, therefore, received biased, judgmental sampling in order to characterize expected worst case conditions within the boundaries of the outfall drainage.

The PRS, C-8-010, an Area of Concern (AOC), is identified as the location of the previously removed drum storage structure TA-8-34. The medium of concern was surficial

soil, which was investigated to assess the potential for persistent spilled volatile and semivolatile organics occurring in the area. Again, sampling was biased to represent expected worst case conditions. This AOC was recently included in the HSWA permit.

The objective of all of the sampling described in this report was to provide data sufficient for use in a screening level risk assessment as outlined in Chapter 3.0 of this report. The assessment of the PRSs would then be used to support management decisions on the following alternatives: No Further Action (NFA), Voluntary Corrective Action (VCA), Expedited Cleanup (EC), and Phase II Investigation.

1.3 Field Activities

1.3.1 Field Screening and Surveying

Field work at these PRSs began in November 1993, with land surveying of all surface sampling points. Judgmental sampling points were selected, the locations were land surveyed with a total station, electronic theodolite, and the coordinates calculated with a surveying computer software program. For random sampling, grids were calculated with the surveying software, and the sampling locations were staked out with the theodolite over the suspected locations of PRS 9-001(a), 9-001(b), 9-001(d), and 9-003(g), (h), and (i). All land surveying was completed in accordance with the LANL-ER-SOP-3.01, R1. Sample locations were electronically transferred to the FIMAD database.

In accordance with worker safety and transportation requirements, radiological and chemical screening was conducted with sample collection. During soil sampling, each site was screened for radioactivity with an ESP-1 beta/gamma meter equipped with an HP260 pancake probe, following ESH-1 SOPs ESH-1-07-85.R0 and ESH-1-07-04.R0, and for organic vapors with a photo-ionization detector (Environmental Restoration Decommissioning Project 1995, 1258), LANL ER Project Manual for H&S activities. Soil from each site was tested with a high explosives spot test kit, LANL-ER-SOP 10.06, R0. After collection, soil from each sample site was dried and screened for gross alpha and gross beta radiation using a Berthold proportional gas counting system, LANL-ER-SOP 14.01, R0. Samples for removable radiation contamination, "swipe samples," were collected using SOP ESH-1-02-02.R0.

The Modified Griess Reagent Spot Test for Explosives was used for field screening samples collected during this investigation. This test procedure, hereafter referred to as the HE spot test, is required by LANL DX Division to be completed on all solid samples collected at TA-8 and -9 to comply with Division safety requirements and Department of Transportation regulations.

1.3.2 Surface Sampling

Collection of surface soil from selected sampling points began in April 1994, and was completed by October 1994. Unless otherwise noted, all surface soil samples were collected by following LANL-ER-SOP-6.09.R0. A limited number of near-surface soil samples were collected with a hand auger, SOP-6.10.R0. Scale or sediments on solid surfaces, such as concrete, were collected in accordance with SOP-6.10.R0 and SOP-6.28.R0.

2.0 ENVIRONMENTAL SETTING

The sites in TA-8 and -9 that are discussed in this report are located on the Pajarito Plateau and, more specifically, on a mesa between Cañon de Valle and Pajarito Canyon in the western part of DOE land occupied by the Laboratory. Figure 2-1 shows the topography of these sites.

2.1 Climate

Los Alamos County has a semiarid, temperate mountain climate. Technical Areas -8 and -9 are in the western part of the county with a range of elevation between 7300 and 7800 ft above mean sea level, a higher elevation than much of the county, and can be expected to receive 20 to 22 in. of water-equivalent precipitation with approximately 50% occurring during summer thunderstorms. The wettest years have produced about 30 in. of precipitation, whereas the driest years have produced less than 10 in. There have been years with less than 20 in. of snowfall and one year with more than 153 in. (1986-1987). The average is about 50 to 60 in. of snowfall. Winds at TA-6, the nearest wind-measurement location, are predominantly from the south during midday and from the west-northwest during evening and nighttime hours. Average wind speeds are in the 3 to 5 mph range. April is usually the windy season when wind velocities are in the 10 mph range from the west during the mid-afternoon.

2.2 Geology

The rocks exposed within TA-8 and -9 are units 3 and 4 of the Tshirege Member of the Bandelier tuff. Noteworthy between units of the Tshirege Member are widespread pyroclastic surge beds (Figure 2-2). These surge beds provide useful stratigraphic markers and, because of their greater apparent permeability than the surrounding tuff, may contain perched water. Such surge deposits outcrop at Old Anchor West and in a tributary to Pajarito Canyon, also known as "Starmer Gulch," which is located in TA-9. Unit 4 of the Tshirege, as exposed in Pajarito Canyon between TA-22 and TA-9, contains a densely welded and highly fractured zone that may also have hydrologic transport potential, particularly within the zone beneath and adjacent to the flowing streams.

2.2.1 Geologic Setting

The Pajarito fault system forms the western margin of the Española Basin and has had Holocene movement and historic seismicity (LANL 1993, 1092).

The western part of TA-8 lies within the Pajarito fault zone. These fractures associated with the fault zone may provide more continuous and deeper penetrating flow paths for groundwater migration in contrast with cooling joints, tectonic fractures, flow-units, and lithologic-unit boundaries.

Minor fracture sets may be associated with either tectonic fractures or cooling joints. A fracture noted in Pajarito Canyon between TA-9 and TA-22 appears to exhibit a few inches of offset but no apparent fault gouge or standoff. This fracture (and others likely to exist in the fault zone) appears to parallel the Pajarito fault zone. Fractures in the platy welded tuff unit that outcrops in Pajarito Canyon on the north side of TA 9 are probably examples of cooling joints. That particular horizon could promote infiltration where it is exposed at or near the surface.

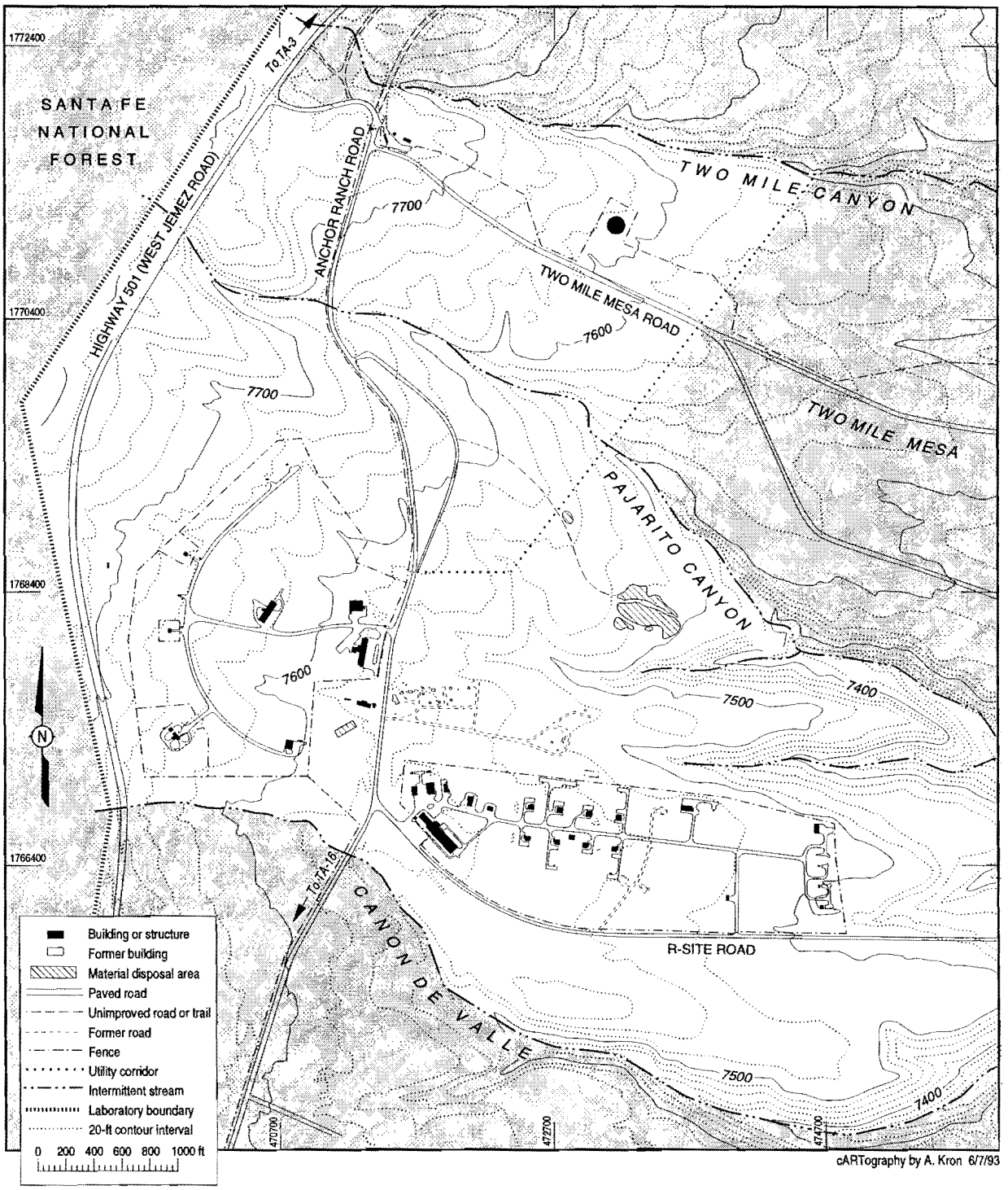


Figure 2-1 Topographic Map of OU 1157

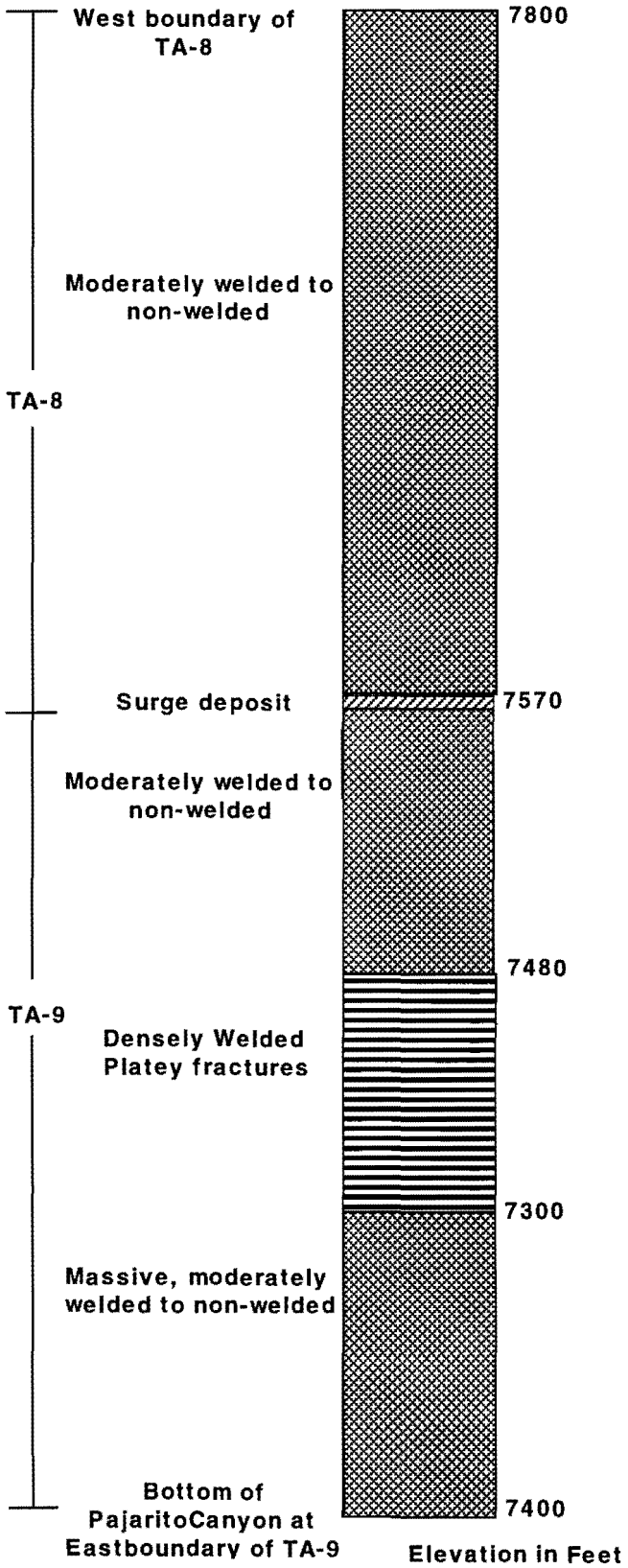


Figure 2-2 Stratigraphic Column

2.2.2 Soils

Almost all of these PRSs are on the flatter parts of the mesa surfaces where surficial deposits are colluvial sediments with a thin cover of eolian fine-grained sediments. Soils in these areas have been mapped as Carjo loam, with the soil at PRS 8-004(d) mapped as Tocal very fine sandy loam (LANL 1993, 1092). However, at all sites, construction, testing activities, and past cleanup activities have altered and mixed the soil materials so that properties and correlations to described soils have been masked.

Erosion on the mesa top is caused primarily by run-off to the relatively flat part of the mesa and by higher energy run-off in channels cut into the mesa surfaces. Erosion generally occurs where gradients steepen or where vegetation has been removed. Contaminants deposited in soils or in natural sediment traps may be transported into the canyons by extreme run-off events. However, the area is relatively stable to erosion because undisturbed or vegetated soils have low erosion potential, and there is no evidence of major recent episodes of downcutting or deposition. The fine loamy soils present at some locations may become airborne during high winds, particularly where natural vegetation has been removed or disturbed.

2.3 Hydrology

The surface and subsurface hydrology of the Pajarito Plateau is summarized in Section 2.5.2 of the IWP (LANL 1995, 1164). Conditions specific to TA-8 and -9 are discussed in some detail in the RFI Workplan for OU1157 (LANL 1993, 1092) and summarized below.

2.3.1 Surface water

Surface water movement and effects are governed by the local topography (Figure 2-1), by the degree and nature of vegetation, and by manmade diversions. Run-off on the relatively flat mesa top is generally by sheet wash, which may coalesce into small channels and eventually lead to flow in the canyon tributaries. Contaminant transport in this setting would most likely be associated with eroded sediments with subsequent collection in traps or movement into local stream channels. Erosion rates of undisturbed or vegetated soils are probably low, and there is no evidence of major recent episodes of downcutting or deposition in this area. Erosion generally occurs where gradients steepen into canyon slopes or where vegetation has been removed. Erosion in the canyon bottoms appears to be minimal; flooding in the canyons appears to result in accumulation of sediments and vegetative debris well above the current level of the stream channel.

Surface water can infiltrate into the underlying tuff along fractures. The Pajarito fault zone and the Water Canyon fault segment may have produced increased fracturing in TA-8 and -9.

Outfalls associated with PRSs 8-009(e), active drain E of TA-8-21, 8-009(d), active outfall N of TA-8-22, and 9-008(b), inactive outflow from the oxidation pond, contribute to the local surface drainage, which eventually enters Starmer Gulch, one of the shallow tributaries of Pajarito Canyon. Overland flow impacts PRSs C-8-010, abandoned bunker drum storage; 9-001(a), (b), and (d), open firing sites and chamber; and 9-003(g), sump. Inadvertent infiltration of surface or impounded water may occasionally occur or have occurred from PRSs 8-004(d), active drain; 9-003(g), sump; 9-008(b), oxidation

pond; 9-005(a) and (b), septic tanks; and 9-009, sewage lagoon, but penetration of that water to deeper horizons appears unlikely.

2.3.2 Ground water

The current understanding of the groundwater system underlying TAs -8 and -9 is described in Chapter 3 of the OU 1157 Work Plan (LANL 1993, 1092). The mesa top area overlies about 1100 ft of unsaturated volcanic tuff and sediments of the Bandelier and Puye formations and Cerros del Rio basalts. The regional groundwater aquifer occurs at about 1100 ft below land surface. The extensive thickness of the unsaturated zone minimizes the potential for downward movement of water through the Bandelier Tuff and into the main aquifer. Thus, deep penetration is considered a minor contaminant transport mechanism because of the low moisture content of the upper tuff units (LANL 1993, 1092) and the high evaporative potential and vegetative transpiration.

Infiltration can occur to perched ground water zones as evidenced by the presence of springs in Pajarito Canyon and the adjacent tributary to the south. Homestead Spring is located on the south flank of Pajarito Canyon near the north-central boundary of TA-9. Based on tritium analysis, the source of the spring water is probably recent infiltrated snow or rain. This suggests that contaminants entrained in infiltrating and percolating water will not readily move to the main aquifer.

2.4 Biological Surveys

During 1992, field surveys were conducted by the Biological Resource Evaluations Team (BRET) of the Environmental Protection Group (ESH-20) for OU 1157 to provide information on the biological components before site characterization. Biological assessments were conducted on the mesa tops in disturbed meadows, near buildings, and include sites in a drainage channel and on the south-facing slopes of the mesas where TA-8 and TA-9 are currently situated. Biological resource field surveys have been conducted at TAs -8 and -9 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; Compliance With Floodplain/Wetlands Environmental Review; and DOE Order 5400.1, General Environmental Protection Program (LANL 1993, 1092).

Vegetation within TAs -8 and -9 is primarily pine forest with dense stands of relatively young ponderosa pine to more open stands of mature ponderosa pine and mixed conifer forest. Because of restricted access to this area for nearly 50 years, it is essentially a wilderness preserve with signs of elk, deer, bear, and smaller animals common. Open grassy meadows have formed in areas that were cleared before the establishment of the Laboratory, and those areas were subsequently used for most Laboratory buildings and operations in the report area. The canyon bottoms are host to numerous old-growth ponderosa pines of remarkable size. Thick stands of locust, raspberries, and other plants are found where there is adequate water and some amount of protection.

A search of the ESH-20 database containing the habitat requirements for all state- and federally listed threatened, endangered, and sensitive plant and animal species known to occur within the boundaries of the Laboratory indicated that there are eight species of

concern for this area. These are the Jemez Mountain salamander, northern goshawk, Mexican spotted owl, meadow jumping mouse, spotted bat, Say's pond snail, checker lily, and wood lily (Table 2-1).

Although no threatened, endangered, and sensitive species were located in the transect areas at TA-8 and TA-9, use of the area by those species is still possible. As stated by Banar (LANL 1993, 1092), any mitigation involving removal of trees or shrubs must be evaluated by the biological assessment team. Failure to do so could result in destruction of habitat for one or all threatened, endangered, and sensitive species that use the TA-8 and TA-9 areas.

Further information concerning the biological field surveys for OU 1157 is contained in a report "Biological Assessment for Environmental Restoration Program, Operable Unit 1157" (LANL 1993, 1092). This report provides specific information on survey methodology, results, and mitigation measures and will also contain information that may aid in defining ecological pathways and site restoration.

TABLE 2.1
THREATENED, ENDANGERED, AND SENSITIVE SPECIES OF CONCERN FOR TA-8 AND -9

Species		Status	
Common name	*Latin name*	Federal	State
Northern goshawk	*Accipiter gentilis*	candidate	
Mexican spotted owl	*Strix occidentalis lucida*	proposed	
Spotted bat	*Euderma maculatum*	candidate	endangered
Meadow jumping mouse	*Zapus hudsonius*	candidate	endangered
Jemez Mountain salamander	*Plethodon neomexicanus*	candidate	endangered
Say's pond snail	*Lymnaea captera*		endangered
Wood lily	*Lilium philadelphicum*		endangered
Checker lily	*Fritillaria atropurpurea*		sensitive

2.5 Cultural Surveys

A cultural resource survey has been conducted in the area of TA-8 and TA-9, as required by the National Historic Preservation Act (amended) (LANL 1993, 1092).

Thirty-one archaeological/historical sites and Manhattan Project structures located within TA-8 and -9 are listed in Table 2-2. Ten of the those that are archaeological/historical sites are eligible, or potentially eligible, for inclusion on the National Register of Historic Places under Criterion D of the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation, based on their research potential. The attributes of these sites, which make them eligible, or potentially eligible, for inclusion on the National

Register, were not affected by ER sampling activities. Three sites are Manhattan Project and early Atomic Energy Commission (AEC)-era structures (circa 1942 to 1948). These structures will be evaluated for National Register eligibility prior to decommissioning.

TABLE 2-2
CULTURAL RESOURCES OF TA-8 AND -9

Site #	Site Type	Cultural Affiliation	Time Period	Eligible
LA 16808 LA 21296	HS	Euro-American	Homesteading	Yes
LA 21292	LS	Archaic	Archaic	No
LA 21293	LS	Archaic/Anasazi	Unknown	No
LA 21294	LS	Archaic/Anasazi	Unknown	No
LA 21295	LS	Archaic	Archaic	Yes
LA 21297	AS	Euro-American	Homesteading	No
LA 87428	LS	Archaic	Archaic	Yes
M-50	LS	Archaic/Anasazi	Unknown	Yes
M-51	OH -bridge	Hispanic/Euro-American	Homesteading	No
M-52	WC	Hispanic/Euro-American	Homesteading/Recent	No
M-53	RD	Hispanic/Euro-American	Homesteading	No
M-55	SS	Unknown	Unknown	No
M-56	CP	Anasazi	Unknown	PE
M-57	SH	Anasazi	Unknown	PE
M-58	CP	Anasazi	Unknown	PE
M-59	AS	Euro-American	Recent	No
M-60	OH-camp site	Hispanic/Euro-American	Homesteading	No
M-61	AS	Euro-American	Homesteading	No
M-62	AS	Euro-American	Homesteading	No
M-63	AS	Hispanic/Euro-American	Homesteading	No
M-64	AS	Hispanic/Euro-American	Homesteading	No
M-65	AS	Hispanic/Euro-American	Homesteading	No
M-66	AS	Hispanic/Euro-American	Homesteading	No
M-67 A & B	(A)OR-brick bldg. (B)IR	Hispanic/Euro-American	Homesteading/Recent	PE
M-68	AS	Hispanic/Euro-American	Homesteading	No
M-69	AS	Hispanic/Euro-American	Homesteading	No
M-70	OR-wood bldg.	Hispanic/Euro-American	Homesteading/Recent	PE
M-71	LS	Archaic/Anasazi	Unknown	PE
TA-8-1	RB	Euro-American	Manhattan Project	TBE
TA-8-2	RB	Euro-American	Manhattan Project	TBE
TA-8-3	RB	Euro-American	Manhattan Project	TBE

Codes for Site Types: AS = Artifact Scatter, CP = Cavate(s) or Cavate Pueblo, HS = Homestead, IR = Indeterminate Rubble, LS = Lithic Scatter, OH = Other Historic Site Type, OR = Other Recent Site Type, RD = Roadway, RB = Recent Building, SH = Rock Shelter, SS = Small Rock Structure, and WC = Water or Soil Control Device

Eligibility Codes: PE = Potentially Eligible, TBE = To Be Evaluated

Time Period Dates:

Archaic = 4000 B.C. - A.D. 600
Homesteading = A.D. 1890 - A.D. 1943
Manhattan Project = circa A.D. 1942 - A.D. 1948
Recent = A.D. 1944 to present

3.0 DATA ASSESSMENT AND ANALYSIS APPROACH

3.1 Introduction

The decision approach used for the PRSs described in this report involves a series of quantitative steps that occur after the field investigation, chemical analysis, and data reporting are complete. These steps begin with routine data validation and continue with a more focused data validation, if necessary. Routine validation involves comparing each data item against specific targets and adding qualifier flags to the data indicating the level of acceptance. Focused validation consists of analyzing QA/QC data for their potential impact on acceptability of the data. A simplified decision logic is provided in Figure 3-1. The following subsections provide overviews of the methods used to complete these quantitative steps.

3.2 Quality Assessment/Quality Control Methodology

All data packages are subjected to a data verification to ensure that the data packages are complete, properly organized, and in compliance with contractual requirements. This verification is followed by a routine validation during which technical qualifiers are added to those data that are potentially problematic. Approximately ten percent of the data from each analytical laboratory undergo a detailed QA check (i.e., focused data validation) to identify potential deficiencies in quality.

The usability of the analytical data was determined by examining results from QC samples (blind samples, matrix spike samples, method blanks, and surrogate spike samples), field duplicates, and Laboratory Control Samples (LCS). Results were compared to EPA-established recovery control limits. Because the screening assessment process compares analytical data for field samples with SALs, it is important to eliminate the possibility that these data may be biased low and show false negative results or be biased high and show false positive results.

Generally, there are several QC samples associated with a group, and the results may be conflicting. For example, some, but not all, of the LCS and/or blind samples, may be outside control limits, while the others are within control limits. Another example is where a matrix spike recovery is high, but the matrix spike duplicate recovery is low. Matrix and surrogate spikes are conducted on a portion of the field sample, while LCS and blind samples are prepared from distilled water or clean soil that may not be similar to the soils in the field samples. Therefore, matrix and surrogate spike analyses are more sensitive to effects caused by the sample matrix. In addition, LCS/blind recovery amounts are not reported in FIMAD; only the analysis comment that indicates an "out of control" situation is reported. Discussion regarding the direction of possible bias is restricted to samples with matrix spike recoveries outside control limits.

Usability of suspect data depends on several factors including

- the direction and degree of possible bias;
- information about all QC samples associated with the group;
- the type of decision to be made; and
- how the results will be used to support the decision.

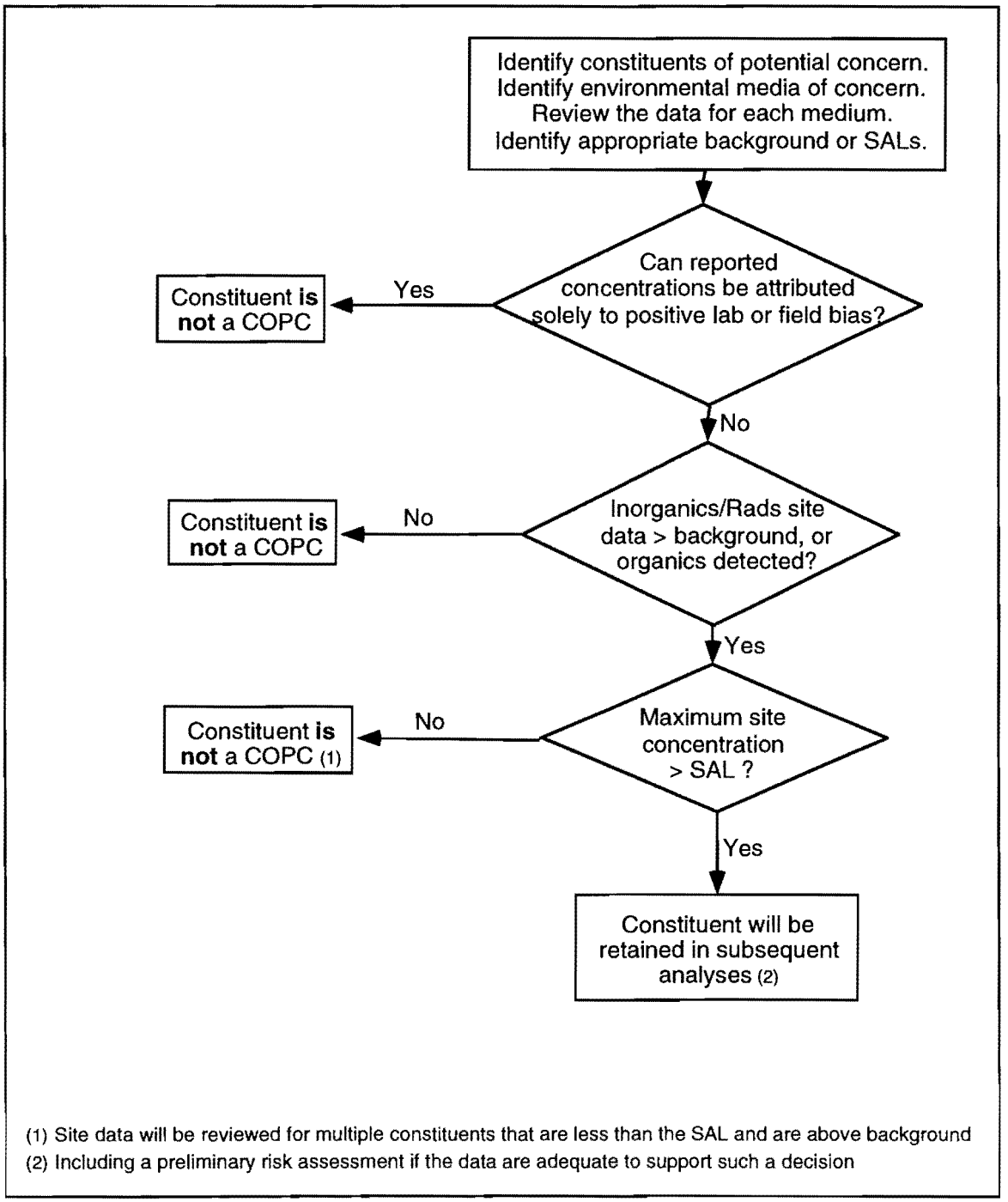


Figure 3-1. Screening Assessment Decision Logic

3.2.1 Inorganic Analysis

Blind samples were included in each group sent to the analytical laboratories. Matrix spike analyses were conducted for approximately 5% of the samples in each group. The analytical process was considered to be *in control* if at least 80%, but not more than 120%, of the spiked or known amount was recovered. When the process was *out of control*, field samples associated with that group were considered suspect and are reported in Chapter 4, Section 4.1.

3.2.2 Organic Analysis

The analytical laboratory ran method blanks with each group. QA/QC sample recoveries were compared with control limits set by the EPA (Tables 3.1 and 3.2). For matrix spikes, the process was considered to be in control if the recovery was between the lower and upper control limits. Lower and upper control limits also exist for surrogate spikes, but the following additional guidelines apply:

If one or more of the VOC surrogate spike sample results are outside the control limits, the associated field sample is labeled unusable, according to the method guidelines. For the purposes of this assessment, the associated field sample was considered to be biased, and usability was determined according to the factors listed in Section 3.2.

If no more than one of the acid extractable SVOC surrogate spike sample results and not more than one of the base/neutral SVOC surrogate spike sample results are outside the control limits, and, for all surrogate samples, at least 10% of the spiked amount was recovered, the process is considered in control.

If two or more of the acid extractable SVOC surrogate spike sample results or two or more of the base/neutral SVOC surrogate spike sample results are outside the control limits, but, for all surrogate samples, at least 10% of the spiked amount was recovered, the associated field sample result is qualified as estimated, but the process is in control.

Matrix spike analyses were conducted for approximately 5% of the samples in each group. Surrogate spike analyses were conducted for each sample. Analytical data may be biased low for samples where recoveries were less than the EPA lower limit and high for those above the EPA upper limit.

3.2.3 Radiochemistry Analysis

3.2.3.1 Field Method

Gross alpha and gross beta activities of all collected RFI soil samples were determined by gas proportional counting on a Berthold Counter at the LANL ESH-19 TA-59 Counting Facility. The primary purpose of the measurements was to determine the levels of radioactivity of the collected RFI soil samples prior to shipment of the samples to the analytical laboratories. The measurements were completed in accordance with LANL-ER-SOP 14.01, R0, "Berthold Low Alpha and Beta Activity Counter Calibration, Quality Control, Detection Limit and Use." Soil samples were dried, and 1 gram of soil was placed in individual planchets. Ten calibration standards of clean sand samples spiked with known activities of ^{241}Am (alpha) and ten calibration standards of ^{137}Cs or ^{90}Sr (beta) were measured on a daily basis prior to measurement of any collected soil samples. Control charts of the daily standard measurements are maintained. Any out of control

TABLE 3-1
MATRIX SPIKE CONTROL LIMITS ESTABLISHED BY EPA

Class	Analyte	Lower Control Limit (percent of spiked amount)	Upper Control Limit (percent of spiked amount)
VOC	Benzene	66	142
	Chlorobenzene	60	133
	Dichloroethane [1,1-]	59	172
	Toluene	59	139
	Trichloroethene	62	137
SVOC	Acenaphthene	31	137
	Chloro-3-methylphenol [4-]	26	103
	Chlorophenol [o-]	25	102
	Dichlorobenzene (1,4) [p-]	28	104
	Nitrophenol [4-]	11	114
	Nitrosodi-n-propylamine [N-]	41	126
	Pentachlorophenol	17	109
	Phenol	26	90
	Pyrene	35	142
	Trichlorobenzene [1,2,4-]	38	107

TABLE 3-2
SURROGATE SPIKE CONTROL LIMITS ESTABLISHED BY EPA

Class	Analyte	Lower Control Limit (percent of spiked amount)	Upper Control Limit (percent of spiked amount)
VOC	Dichloroethane d4 [1,2-]	70	121
	Toluene d8	81	117
	Bromofluorobenzene [4-]	74	121
SVOC (acid extractable)	Fluorophenol [2-]	25	121
	Phenol-d6	24	113
	Tribromophenol [2,4,6-]	19	122
SVOC base/neutrals	Nitrobenzene-d5	23	120
	Fluorobiphenyl [2-]	30	115
	Terphenyl-d14	18	137

measurements required the operator to take corrective action prior to measurement of the prepared soil samples. Certified ^{239}Pu and ^{90}Sr commercial standards were included with the RFI soil samples as an additional quality control measure. The quality control records are kept at the Counting Facility.

3.2.3.2 Laboratory Methods

All samples were analyzed using EPA SW-846 Methods, or equivalent, and/or radiological methods as described in Quality Control Data Use. A blind sample was included with the field samples for PRSs 08-004(d), 09-005(a), 09-005(d), and 09-008(b). No QC samples were analyzed with the samples for PRS 09-009. Results for blind samples were considered to be within control limits if the analytical error did not exceed two standard deviations based on counting statistics, using the assumption that count distribution is Poisson.

3.2.4 High Explosives Analysis

Either no QC samples were analyzed with the batch or QC results were not reported.

3.3 Screening Assessment Methodology

Screening assessment consists of several sequential decisions that are used to determine if chemicals have been released to the environment as a result of historical laboratory operations at levels that may be hazardous to human health or the environment. Several measures are involved in the screening assessment decision. Screening assessment is generally supported by chemical analyses of environmental samples (e.g., soil, water) for a broad range of chemicals. At this stage, it is convenient to think of the chemicals included in the broad scan as chemicals of potential concern to human health (COPCs) and chemicals of potential ecotoxicological concern (COPECs). The objective at each of the decision points in the screening assessment is to determine which chemicals should be retained as COPCs or COPECs for the next step and which chemicals may be removed from further consideration. If COPCs or COPECs remain at the end of the screening assessment process, then, in general, further action will be proposed. Further action may include a human health or ecotoxicological risk assessment as described in Sections 3.4 and 3.5, at which point chemicals other than those that remain at the conclusion of the screening assessment may be reintroduced. If no COPCs or COPECs remain, NFA will be proposed. The following sections provide guidance on how the screening assessment process is performed. The process is meant to provide a standard basic approach but is also meant to be flexible. Deviations from the process will be dealt with on a PRS-specific basis in Chapter 5.

3.3.1 Background Comparisons

Once the data validation process is complete and the site data are finalized, the next step in the process is to compare site data to available background data. The results of a focused data validation should exclude from consideration for background comparison any contaminant that is identified as an artifact of laboratory or field contamination, analytical interference, or improper analyte identification or quantitation. The purpose of this decision step is to determine if chemicals that have natural or anthropogenic background distributions should be retained as COPCs and COPECs or eliminated from further consideration. Background data are available from two sources: 1) 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); and 2) 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 (LANL 1993, 1092).

Comparisons between site data and background data are initially performed by comparing each observed concentration datum to an upper tolerance limit (UTL) estimated from background data. Upper Tolerance Limits are used to represent reasonable values for the high end of the background distribution. The UTL used in the LANL ER Project for each chemical is the estimated 95% upper confidence bound on the 95th percentile of the chemical's background concentration distribution. When a large proportion of data in the background set for a given chemical are nondetect, the maximum reported background concentration is used instead of an UTL. 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, Comparisons to Background, Part I (Environmental Restoration Project Assessments Council 1995, 1218).

If a chemical has a reported concentration that exceeds its UTL or fails other statistical background comparison tests (i.e., the site data are statistically greater than background data), then that chemical is carried forward to the screening assessment process. If a chemical does not have a reported concentration that exceeds the UTL, then that chemical is removed from further consideration.

3.3.2 Preliminary Evaluation of Organic Chemicals

Background data are not available for organic chemicals. This preliminary evaluation of organic chemicals considers detected chemicals and chemicals that were analyzed for, but not detected in, any sample. The purpose of this decision step is to determine if organic chemicals should be retained as COPCs and COPECs or eliminated from further consideration based on detection status. Detection status is determined using estimated quantitation limits (EQLs) as points for comparison. It should be noted that EQLs are dependent on a number of factors (e.g., the presence of other chemicals and matrix interference) and may vary from chemical to chemical or from analysis to analysis. Therefore, the actual EQL for a particular chemical for a particular analysis must be used in this comparison.

If a chemical has a reported concentration that exceeds its EQL, then that chemical is generally carried forward through the screening assessment process. If a chemical does not have a reported concentration that exceeds its EQL, then that chemical is generally removed from further consideration. Exceptions to these general rules may be made if compelling site-specific process knowledge so indicates. A chemical that is detected may be removed from further consideration if it can be determined that its presence is not due to Laboratory operations, and a chemical that is not detected in any sample may be carried through the decision process if there is a compelling reason that the chemical can be expected to be present at the site based on historical operations.

3.3.3 Comparison with Human Health Screening Action Levels

Following the background comparisons and identification of detected organic chemicals, the screening methodology for human and ecological health risks diverge. This section focuses on the methods used to complete the human health screening assessment; the methods used to complete the ecotoxicological screening assessment are discussed in Section 3.5. The purpose of this decision step is to determine if chemicals should be retained as COPCs or eliminated from further consideration based on comparisons with SALs. This is the last step in the screening assessment process for human health concerns. If COPCs remain after this step, then further action may be proposed (including a risk assessment, if appropriate). If no COPCs remain after this step, then NFA may be proposed based on human health concerns. Screening Action Levels are medium-specific concentrations that are calculated using chemical-specific toxicity information and conservative, default exposure assumptions. A complete description of the methods used to generate SALs is provided in a LANL ER Project Assessments Council guidance document (LANL 1995, 1218). For those chemicals for which SALs are available, each observed concentration datum is compared to the chemical's SAL. If a chemical has a reported concentration greater than its SAL, then that chemical is retained as a COPC pending further evaluation. If a chemical does not have a reported concentration greater than, or equal to, its SAL, then that chemical is generally removed from further consideration. If more than one chemical is present at the site, this decision is deferred pending the results of the MCE, described below. The decision to identify a chemical as a COPC when a SAL is not available is made on a case-by-case basis, taking into account the availability of process knowledge and toxicological information.

The preceding discussion addresses comparisons for single chemicals. It is possible that COPCs should be retained because of the combined adverse health effects of several chemicals. This possibility is evaluated in the MCE, in which the reported concentration for each chemical is divided by its respective SAL, and the resulting "normalized" values are incorporated into a simple additive model. If the sum of the normalized values, referred to as "the total normalized value," is 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.

Only those chemicals that exceed background concentration thresholds (certain inorganics and radionuclides) or EQLs (organics) in at least one sample at a PRS are included in the MCE. These chemicals are divided into three classes: noncarcinogens, chemical carcinogens, and radionuclides. Additive effects are assumed within each class, but each class is evaluated separately.

The MCE can be conducted in one of two ways:

- Calculate a single total normalized value using the maximum detected concentration for each chemical at a PRS, regardless of sample location (i.e., "sum-of-max" approach). This approach may be overly conservative for some PRSs if the sampling locations are widely spaced. The total normalized value according to the sum-of-max approach is calculated using the following equation:

$$M_s = \sum_i \left\{ \max_j \{C_{i,j}\} \Big/ SAL_i \right\}$$

where,

M_s	=	sum of maximum normalized concentrations
i	=	COPC index
j	=	sample index
$C_{i,j}$	=	concentration of COPC i in sample j
SAL_i	=	chemical-specific SAL for COPC i

- Calculate a total normalized value for each sample location and identify the maximum value ("max-of-sum" approach). This value will always be less than or equal to the value from the sum-of-max approach. This approach is more realistic than the sum-of-max approach when sampling locations are widely spaced but may not be appropriate when all of the data are collected within a relatively small area (e.g., an area equal to the size of a single room). The total normalized value according to the max-of-sum approach is calculated using the following equation:

$$M_m = \max_j \left\{ \sum_i C_{i,j} \Big/ SAL_i \right\}$$

where,

M_m	=	maximum of sum of normalized concentrations

The MCE is first conducted according to the sum-of-max approach. As stated previously, this approach may be overly conservative for some PRSs and is considered a screening-level approach to the evaluation of multiple chemical effects. If the total normalized concentration is below one, then no further evaluation is required. However, if the total normalized concentration is greater than one, professional judgment is used to determine if the max-of-sum, or some other evaluation scheme, is more appropriate.

3.4 Human Health Risk Assessment

Based on the results of the screening assessments performed for the PRSs presented in this report, no human health risk assessments were found necessary. Sample analysis indicates that no chemical detected at a reported PRS was present at a concentration

exceeding its SAL. In addition, no MCE for any reported PRS was found to exceed the threshold value of 1.0.

3.5 Ecological Assessment

An ecological risk assessment will be conducted when an approach has been approved by our regulators. Potential for threatened and endangered species and sensitive habitats around the PRSs have been identified based on field surveys (Section 2.4). A qualitative habitat screening model was applied to each PRS to evaluate the potential for exposure to ecological receptors. The model evaluates potential ecological risk by ranking general landscape condition and the potential for receptors to access COPCs, as described in the draft policy paper.

4.0 RESULTS OF QUALITY ASSURANCE/QUALITY CONTROL ACTIVITIES

Field samples were processed by analytical laboratories in batches. Field samples and the associated QA/QC sample results are linked by report number. Anomalous QA/QC results are summarized in the Data Quality Evaluation Table in Appendix B.

4.1 Inorganic Analysis

4.1.1 Strontium-90 Spill Set: PRS 08-004(d), 09-005(a), 09-005(d), 09-008(b), 9-009

Strontium-90

No inorganic analyses were performed for the ^{90}Sr spill set because ^{90}Sr was the only potential contaminant expected.

4.1.2 Potential Release Site 08-009(d)

Potential Release Site 08-009(d) data are fully usable to support screening decisions. While these results are somewhat erratic, antimony was not detected at PRS 08-009(d). The same report indicated a high lead matrix spike recovery (390%) and may indicate that lead results associated with that group are biased high. However, those 2 sample results were 14.4 and 17.6 mg/kg, a full order of magnitude below the SAL. Matrix spike recovery for silver was low (78%). Two sample results associated with that group may be biased low, but the sample results, 78.8 and 86.7 mg/kg, are a full order of magnitude below the SAL. One LCS/blind vanadium result was outside the limits, but the other 2 were within limits. Vanadium was detected in the 2 field samples at 35.5 and 28.3 mg/kg, a full order of magnitude below the SAL.

4.1.3 Potential Release Site 08-009(e)

Potential Release Site 08-009(e) data are fully usable to support screening decisions. Matrix spike recovery for antimony was low on report 28445 (57%) and erratic on report 26528 (64% and 110%), but antimony was not detected at the PRS. One of three LCS/blind arsenic recoveries was outside limits, but the matrix spike recovery was within limits. The maximum field sample value was 1/4 the UTL for arsenic. One of 3 calcium LCS/blind recoveries was outside limits, but calcium was not identified as an indicator parameter and is commonly found in soils. Matrix spike recoveries for lead on 2 reports (26528 and 28445) were high (390% and 540%). Field sample results for lead on report 26528 were 78.8 and 85.7 mg/kg, and 177 and 115 mg/kg on report 28445. These results, while probably biased high, are still below the SAL. The mercury matrix spike recovery for report 28445 was very low (9.8%), and there were no additional QC samples analyzed with the group. Sample values were 0.18 mg/kg and a nondetect with the reporting limit of 0.13 mg/kg. If 9.8% of the amount actually present in the field sample was recovered and reported, the true concentration would still be an order of magnitude below the SAL. One matrix spike recovery (report 28445) for selenium was high (180%), but selenium was not detected in samples associated with that report. The matrix spike recovery for silver on report 26528 was low (78%). Field sample results are an order of magnitude below the SAL.

4.1.4 Far Point Set: PRS 09-001(a) and 09-001(b)

Potential Release Site 09-001(a) and 09-001(b) data are fully usable to support screening decisions. One LCS/blind lead recovery was outside limits, but 3 were within

limits. There were no lead matrix spikes. Lead values ranged from 16.3 to 33.9 mg/kg, a full order of magnitude below the SAL. Selenium LCS/blind recovery was outside the limits in 1 of 3 LCS/blind samples, and there were no selenium matrix spikes. No selenium was detected in samples from this PRS. Thallium recovery was outside the limits on 2 of 4 LCS/blinds, and there were no thallium matrix spikes. Thallium was not detected in samples from this PRS.

4.1.5 Old Anchor East Set: PRS 09-001(d), 09-003(g), 09-003(h), and 09-003(i)

Potential Release Site 09-001(d), 09-003(g), 09-003(h), and 09-003(i) data are fully usable to support screening decisions. Recovery on one LCS/blind for nitrate was outside limits, but the other 2 LCS/blinds were within limits. Detected sample values ranged from 2 to 45 mg/kg; there were 3 samples where nitrates were not detected. The maximum detected value is 4 orders of magnitude below the SAL.

4.1.6 Potential Release Site 09-008(b)

Potential Release Site 09-008(b) had no inorganic analyses because ^{90}Sr was the only contaminant of concern related to this PRS.

4.1.7 Potential Release Site 09-009

Potential Release Site 09-009 had no inorganic analyses.

4.1.8 Potential Release Site C-8-10

Potential Release Site C-8-10 had no inorganic analyses.

4.2 Organic Analysis

4.2.1 Strontium-90 Spill Set: PRS 08-004(d), 09-005(a), 09-005(d), 09-008(b), 9-009

No organic analyses were conducted for these PRSs.

4.2.2 Potential Release Site 08-009(d)

Potential Release Site 08-009(d) data are fully usable to support screening decisions. Semivolatile organic compound (SVOC) results were on report 27548. The pyrene matrix spike recovery was high (190%), and its duplicate was also high (340%). The only SVOC detected at PRS 08-009(d) was bis(2-ethylhexyl) phthalate in 2 samples at 1.1 and 1.067 mg/kg, a full order of magnitude below the SAL. Volatile organic compound (VOC) results were on report 27910. Methylene chloride was detected at .05 and .09 mg/kg in 2 of the blanks and in one sample, AAB2798, at .018 mg/kg. The methylene chloride in the sample is presumed to be laboratory contamination. Recovery on the VOC spike bromofluorobenzene was high in 2 samples (120% and 130%). Acetone (0.076 mg/kg), isopropylbenzene (0.057 mg/kg), 4-isopropyltoluene (1.1 mg/kg), and trichloro-1,2,2,-trifluoroethane [1,1,2-] (0.017 mg/kg) were the only VOCs detected in samples from this PRS. If sample results are biased, the bias would be high. There is no SAL for 4-isopropyltoluene. The other 3 are at least 2 orders of magnitude below SALs.

4.2.3 Potential Release Site 08-009(e)

Potential Release Site 08-009(e) data are fully usable to support screening decisions. Semivolatile organic compound results were on report 27548. The pyrene matrix spike recovery was high (190%), and its duplicate was also high (430%). However, no SVOCs were detected at PRS 08-009(e).

4.2.4 Far Point Set: PRS 09-001(a) and 09-001(b)

Potential Release Site 09-001(a) and 09-001(b) data are fully usable to support screening decisions. There were some SVOC LCS/blind sample results outside limits, but there were no SVOCs detected in samples from these PRSs.

Either no QC samples were analyzed with HE samples or those results were not reported to FIMAD.

4.2.5 Old Anchor East Set: PRS 09-001(d), 09-003(g), 09-003(h), and 09-003(i)

Either no QC samples were analyzed with HE samples or those results were not reported to FIMAD

4.2.6 Potential Release Site 09-008(b)

Potential Release Site 09-008(b) had no organics analyses because there were no organic indicator parameters.

4.2.7 PRS 09-009

Potential Release Site 09-009 had no organics analyses because there were no organic indicator parameters.

4.2.8 PRS C-8-10

Potential Release Site C-8-10, an AOC, had no anomalous QC results.

4.3 Radiochemistry Analysis

4.3.1 Strontium-90 Spill Set: PRS 08-004(d), 09-005(a), 09-005(d), 09-008(b), and 9-009

There were no anomalous QC results associated with this set of PRSs.

4.3.2 Potential Release Site 08-009(d)

Potential Release Site 08-009(d) had no radiochemistry analyses because it had no radionuclide indicator parameters.

4.3.3 Potential Release Site 08-009(e)

Potential Release Site 08-009(e) had no radiochemistry analyses because it had no radionuclide indicator parameters.

4.3.4 Far Point Set: PRS 09-001(a) and 09-001(b)

Potential Release Sites 08-001(a) and 09-001(b) had no radiochemistry analyses because it had no radionuclide indicator parameters.

4.3.5 Old Anchor East Set: PRS 09-001(d), 09-003(g), 09-003(h), and 09-003(i)

Potential Release Sites 09-001(d), 09-003(g), 09-003(h), and 09-003(i) had no radiochemistry analyses because it had no radionuclide indicator parameters.

4.3.6 Potential Release Site 09-008(b)

There were no anomalous QC results associated with PRS 09-008(b).

4.3.7 Potential Release Site 09-009

There were no anomalous QC results associated with PRS 09-0089.

4.3.8 Potential Release Site C-8-10

Potential Release Site C-8-10 had no radiochemistry analyses because it had no radionuclide indicator parameters.

5.0 Specific Results, Conclusions, and Recommendations

5.1 Potential Release Sites 08-004(d), 09-005(a), 09-005(d), 09-008(b), 9-009

This PRS set has been identified in order to present the results of Phase I screening field investigations related to a ^{90}Sr spill that occurred in 1954. The PRS set is composed of a waste water septic system that has been modified over the years consisting of a sink drain and sewage line [PRS 08-004(d), in place and active]; one primary receiving septic tank (removed) and tile field system (in place and inactive)[PRS 09-005(a)]; a septic tank (in place and inactive)[PRS 09-005(d)] and oxidation pond system (in place and inactive) [PRS 09-008(b)]; and a waste lagoon with sand filter system (in place and inactive)(PRS 09-009). Figure 5-1 provides a general aerial view of the PRSs contained in the ^{90}Sr set. Figures 5-2, 5-3, and 5-5 provide enhanced aerial views of individual PRSs identified in Figure 5.1 and the associated sampling locations. Figures 5-4 and 5-6 provide additional sample location resolution and site topography information for aerial photographs in Figures 5-3 and 5-5, respectively.

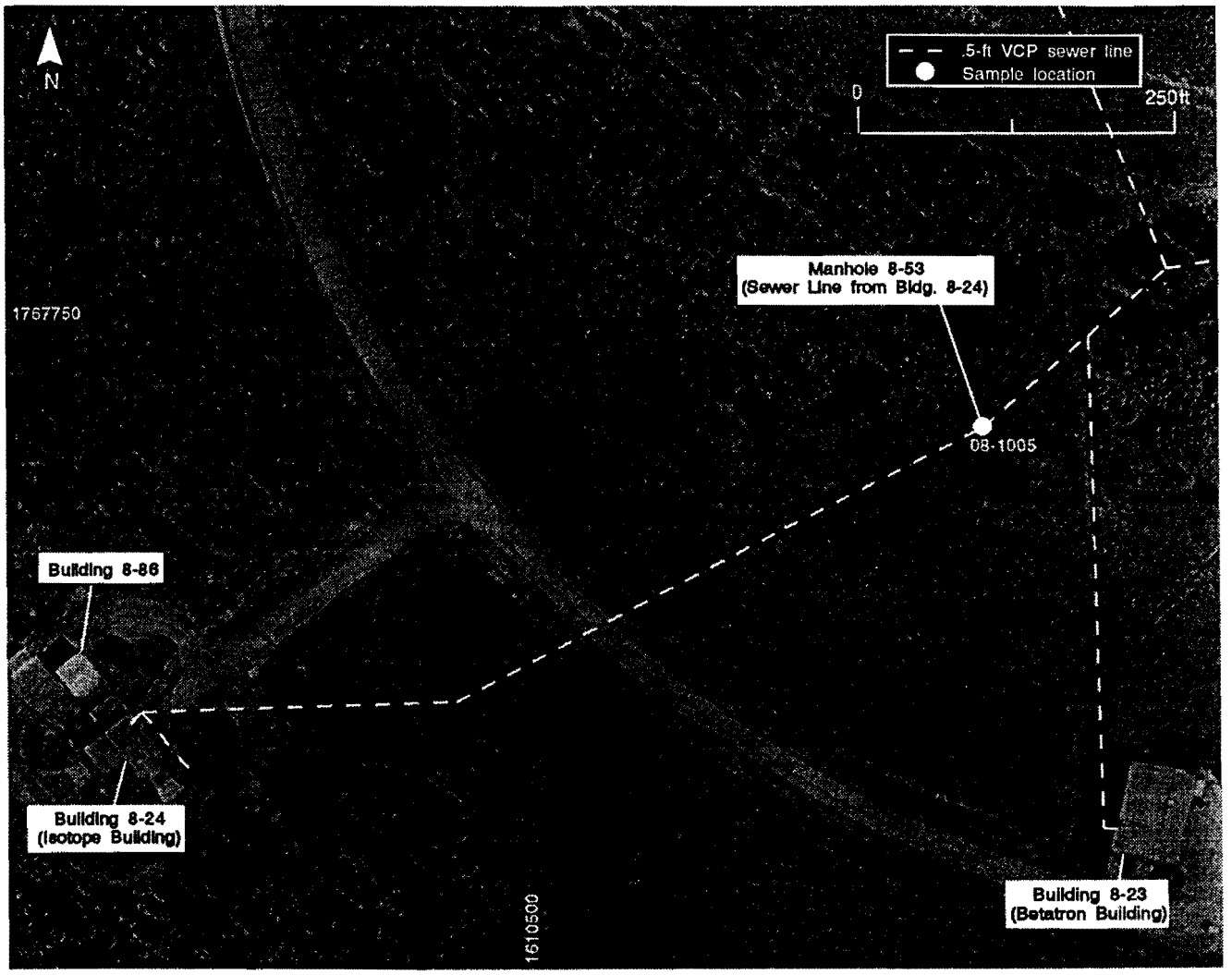
The PRS set was investigated because of a 1954 spill of a suspected strontium salt outside building TA-8-24 and resulting cleanup activities by the involved workers. The chemical investigated for this unit is ^{90}Sr, which is believed to have been released into the sink drain [PRS 08-004(d)] by workers washing their hands after cleaning up the spill, with potential distribution throughout the sewage system subsequent to this activity.

Samples collected for this PRS set included sludges and/or sediments and may not be representative soil samples. Therefore, it is not appropriate to use a background LANL soil comparison as a screening criteria for these PRSs, and no screening decision was made based on this criteria. The sludge, chip, or sediment sample concentrations were screened against soil SAL criteria due to the absence of sludge-based SALs and consistent with the workplan screening assessment strategy. This strategy stated that SALs would be used to determine whether contaminants of concern exist at a PRS. The screening action levels are based upon a residential exposure scenario that is very conservative (protective) compared to other exposure scenarios. Because of this conservatism, chemical concentrations below SALs are unlikely to be of concern from the perspective of human health, regardless of future land use.

The field investigations failed to identify concentrations above background and/or SAL levels for ^{90}Sr at expected worst case depositional areas in the individual PRSs. The screening assessment results for the individual PRSs in this set indicate limited potential for adverse effects. The PRS set is, therefore, recommended for NFA.

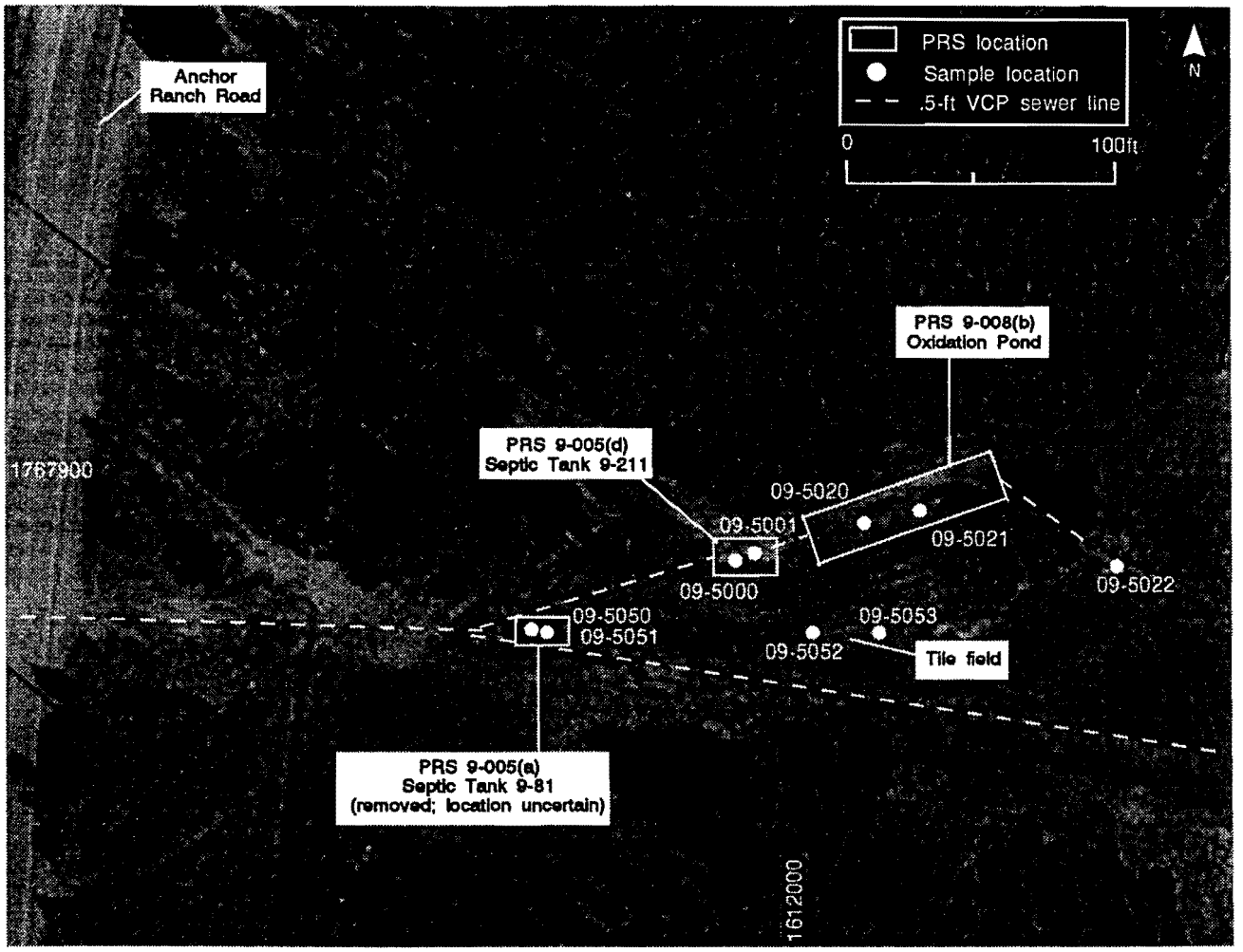
Individual PRS summary reports follow in Sections 5.1.1 [PRS 08-004(d)], 5.1.2 [PRS 09-005(a)], 5.1.3 [(PRS 09-005(d)], 5.1.4, [PRS 09-008(b)], 5.1.5 (PRS 09-009).

Figure 5-1. General PRS sites for Sr-90 Set: 08-004(d), 09-005(a), (d), 09-008(b) and 09-009.



Loc Id	Depth	Analyte	Value	Bkgd Crit	SAL	Units
08-1005	In Sewer	Sr-90	4.04	1.00	4.40	pCi/g

Figure 5-2. Surrounding features and sample locations for PRS 08-004(d), drains associated with building TA-8-24. Table indicates data results > soil background UTL.



Loc. Id.	Depth	Analyte	Value	Background	SAL	Units
09-5020	0-.5	Sr-90	1.73	1.00	4.40	pCi/g
09-5021	0-.5	Sr-90	1.24	1.00	4.40	pCi/g

Figure 5-3. Surrounding features and sample locations for PRSs 09-008(b), 09-005(a), (d), septic tanks, tile field and oxidation pond. Table indicates data results > soil background UTL.

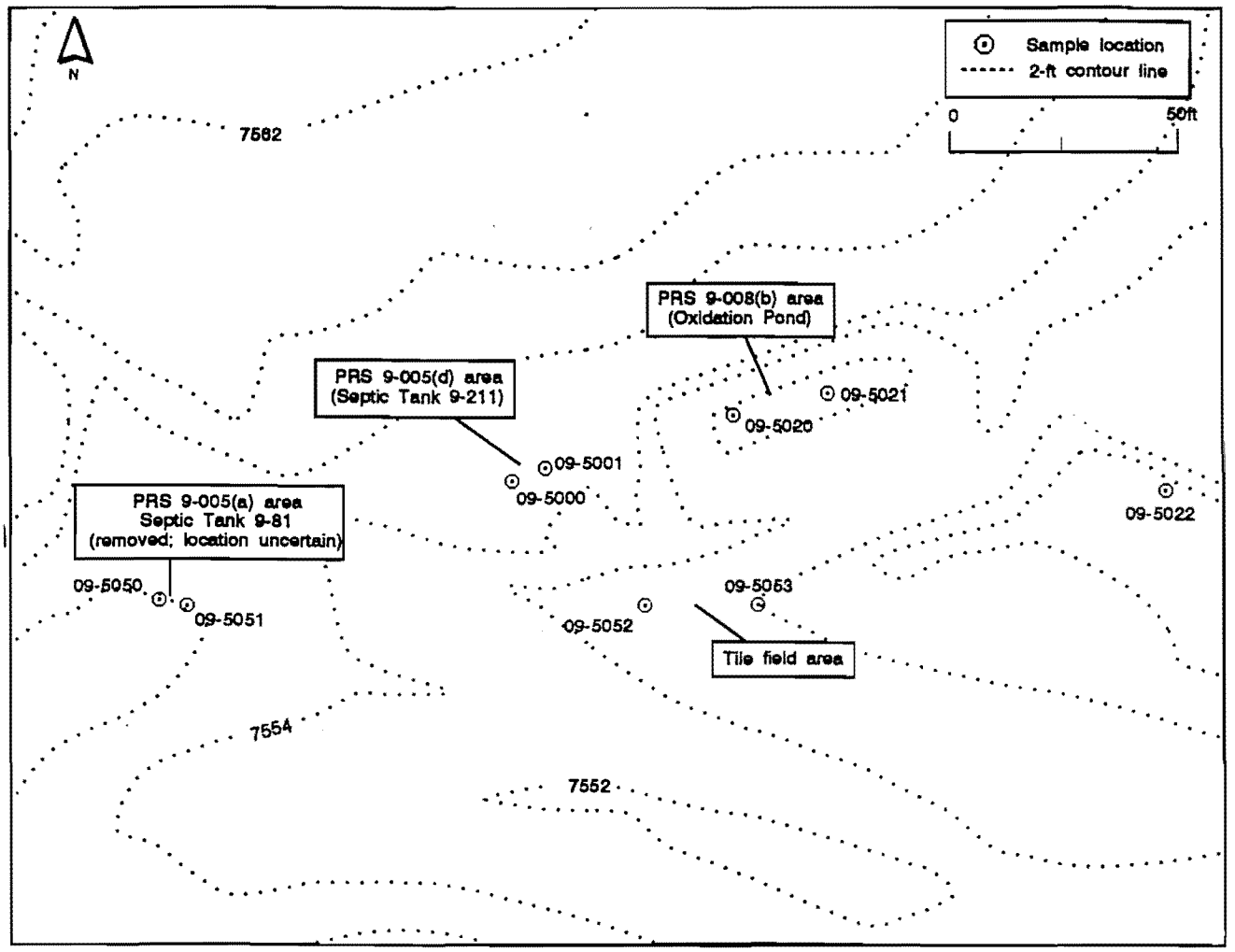


Figure 5-4. Topographic map and sample locations for PRSs 09-008(b), 09-005(a), (d), septic tanks, tile field and oxidation pond. Enlargement of Figure 5-3.

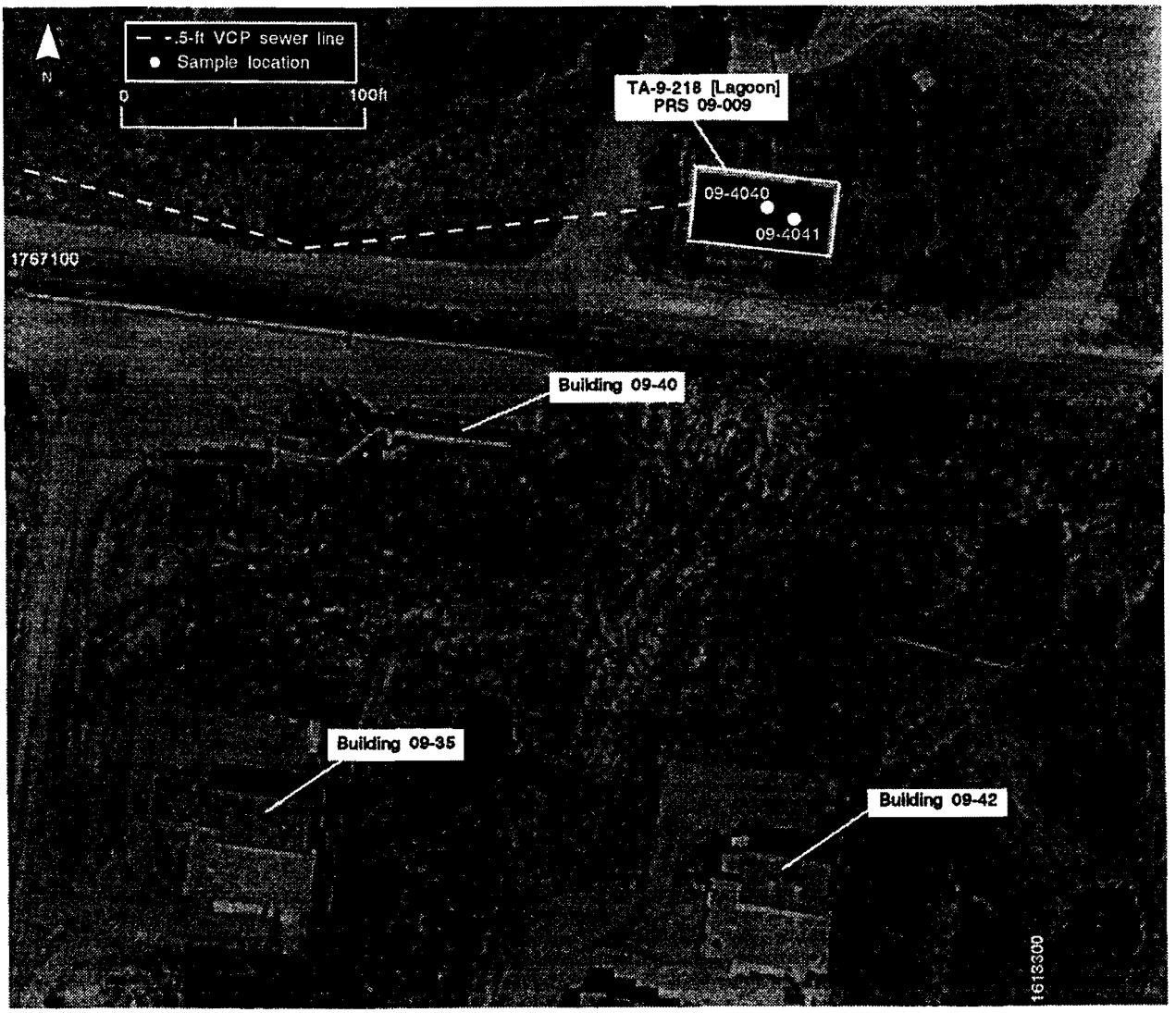


Figure 5-5.Surrounding features and sample locations for PRS 09-009, lagoon.

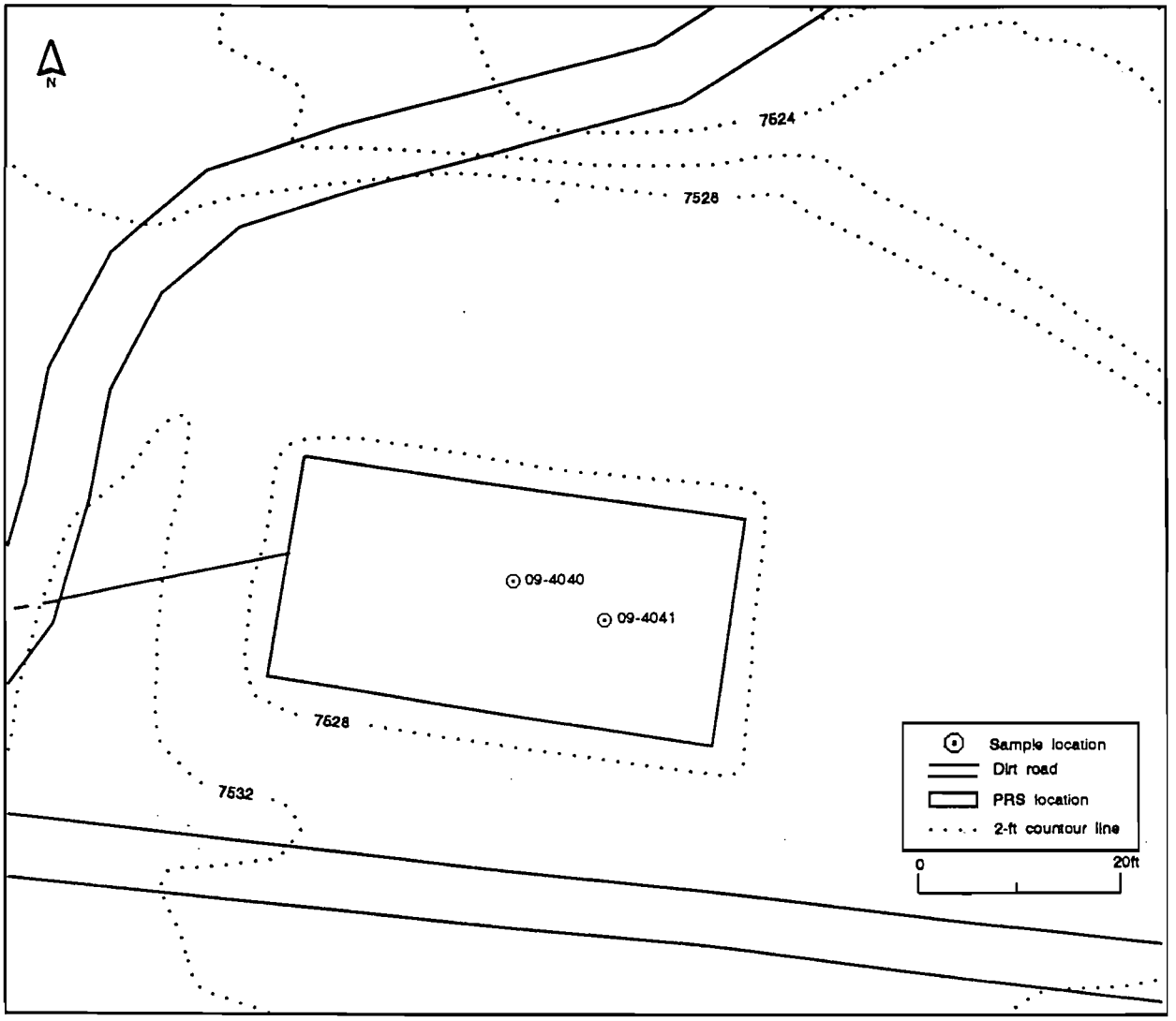


Figure 5-6. Topographic map and sample locations for 09-009, lagoon. Enlargement of Figure 5-5

5.1.1 Potential Release Site 08-004(d

5.1.1.1 History

Potential Release Site 08-004(d) is an active sink drain associated with building TA-8-24, which is currently used for storage of nonhazardous materials. The drain in this facility was contaminated with ^{90}Sr, as the result of a spill on 29 March 1954. Building TA-8-24 was used to radiograph nuclear fuel elements from 1950 to 1971, and the spill occurred during the unloading of a heavily shielded metal container when the container slipped, dumping a white powder (presumably containing a salt of ^{90}Sr) on the loading dock. Following the incident, the facility was decontaminated, and inaccessible residual contamination in cracks and recesses was sealed with fresh concrete to eliminate further spread of contamination.

When the spill occurred, the involved workers used the sink and drain [PRS 08-004(d)] to decontaminate their hands. Although a considerable volume of water has passed through the drain and associated sewer line since the incident occurred, residual contamination of both the drain and sewer line is possible.

This PRS is discussed in further detail in Sections 5.1.1.1 and 6.1.4 of the RFI work plan (LANL 1993, 1092).

5.1.1.2 Description

No further site specific information on geology, hydrology, soils, or wildlife habitat associated with this PRS is required.

5.1.1.3 Previous Investigation

In April 1954, a survey of the area indicated that the only remaining contamination resulting from the spill was in a crack in the concrete loading dock and in recesses between sections of the dock (LANL 1993, 1092). These areas were sealed with fresh concrete to prevent the spread of contamination.

5.1.1.4 Field Investigation.

The sampling strategy for this unit focused on the biased sampling of two locations, the sink trap in building TA-8-24 and an associated downgradient sewer line manhole. The objective of the investigation was to determine if residual contamination from the historical release of ^{90}Sr exists and presents an unacceptable risk. Strontium-90 was the only constituent of concern for this PRS. The sampling was designed to focus on expected worst case conditions by sampling at potential accumulation points in the sewer drainage; specifically, the active drain and a downgradient manhole. See Figure 5-2 for the location of sampling points at this PRS.

The field investigation and sampling of PRS 08-004(d) occurred on 3 May 1994. The building TA 8-24 active drain was found to be associated with a large utility sink with a cast iron P-trap type drain. The P trap had a circular port that allowed access to the interior of the drain pipe. The outside of the drain was screened for beta/gamma radiation and was found to be at, or below, Laboratory background. The inside of the drain could not be screened due to its size and configuration. The port was opened and the interior of the trap was found to contain no significant sediment or scale; therefore, no sludge or chip

samples were obtainable for radiochemical analysis. Due to the inability to recover material from the trap, a swipe sample was collected from the trap by swabbing the inside of the drain pipe with a 2-in. diameter standard filter media following LANL -SOP-ESH 1-02-02, R0.

The swipe sample was analyzed by the ESH-1 Health Physics Analytical Laboratory, which reported no detectable alpha or beta activity.

The TA-8-53 manhole provides access to the building TA-8-24 sewer line about 750 ft downgradient of the facility. The bottom of the manhole is a concrete slab approximately 8 ft below land surface with an open sewer channel approximately 2-3 in. in diameter connecting the up and down stream sides of the manhole. The channel surface was screened with a hand held ESP-1 meter and pancake probe that indicated 191 cpm beta/gamma, which is within normal Laboratory background (150-250 cpm).

At the time of the sampling (3 May 1994), the sewer line was dry with a thin accumulation of carbonate-like scale. The scale was sampled (AAB0865) by scraping with a stainless steel scoop. The scale material was field tested with a Modified Griess Reagent Spot Test for Explosives . This test procedure, hereafter referred to as the HE spot test (required by LANL DX Division to be completed on all solid samples collected at TAs 8 and 9 to comply with Division safety requirements and Department of Transportation regulations), indicated the absence of HE. In addition, a swipe sample of the drainage channel was taken for analysis by the ESH-1 Health Physics Analytical Laboratory and found to have no detectable alpha or beta radioactivity.

A second clay pipe was found, entering the manhole approximately 3.4 ft above the floor of the manhole. This pipe extended approximately 1.5 ft laterally away from the manhole, and a sludge sample (AAB0864 and duplicate sample AAB0864D) were collected from this pipe. Table 5-1 shows the summary of samples taken for TA-8-53.

TABLE 5-1
SUMMARY OF SAMPLES TAKEN

LOCATION ID	SAMPLE ID	DEPTH (ft)	MATRIX	VOCs	SVOCs	HE	INORG	RAD
08-1005	AAB0864	na	Sludge					X
08-1005	AAB0865	na	Chip					X

5.1.1.5 Background Comparison.

No representative soil samples were collected at this PRS; however, when compared to the LANL soil UTL background levels, one "sludge" sample was found to contain ^{90}Sr at a level greater than background (see Table 5-2). Therefore, ^{90}Sr will be evaluated in the human health screening assessment.

TABLE 5-2
RADIONUCLIDE CONCENTRATIONS IN SLUDGE SAMPLES COMPARED TO BACKGROUND UTL FOR PRS 08-004(d)

Potential Release Site 08-004(d)					
Sample Id	Location Id	Depth	Matrix	Units	Sr-90
AAB0864	08-1005	NA	sludge	pCi/g	0.3
AAB0864D	08-1005	NA	sludge	pCi/g	4.04
AAB0865	08-1005	NA	chip	pCi/g	0.59
Soil SAL				pCi/g	4.4
Soil Bkgd UTL				pCi/g	1

5.1.1.6 Evaluation of Organic Constituents.

Strontium-90 was the single potential contaminant identified for investigation for this PRS; no organic constituents were identified for analysis.

5.1.1.7 Human Health Assessment.

5.1.1.7.1 Screening Assessment.

The constituent (^{90}Sr) was screened against the associated LANL soil SAL. The ^{90}Sr sludge concentration did not exceed the SAL, and the maximum detected concentration of this constituent divided by the SAL results in a normalized value of 0.92, less than the threshold value of 1. The results are summarized in Table 5-3.

TABLE 5-3
PRS 08-004(d) COMPARISON OF DETECTED CONCENTRATIONS TO SAL FOR RADIOLOGIC EFFECTS

Potential Release Site 08-004(d) Radiologic Effects			
Analyte	Max. Concentration (pCi/g)	Soil SAL (pCi/g)	Normalized to SAL
Sr-90	4.04	4.4	0.92
Total			0.92

5.1.1.7.2 Risk Assessment

Based on the result of the screening assessment, no risk assessment was performed.

5.1.1.8 Ecological Assessment

The general landscape condition around this PRS is highly developed, and there is no potential for receptors to come in contact with contaminants. Therefore, there are no ecotoxicological risk concerns at this PRS.

5.1.1.9 Extent of Contamination

The objective of this investigation was to perform a site screening to determine if constituents from a historical release were present. The plan was not designed to define the extent of contamination.

5.1.1.10 Conclusions and Recommendations

This study provides evidence that ^{90}Sr was released through the drainline; however, no human health COPCs or ecotoxicological contaminants were identified based on the screening of this PRS, and NFA is recommended. This recommendation is based on the NFA criterion 4 (Los Alamos National Laboratory, Environmental Restoration Department, Project Consistency Team Policy number 015) which states, "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 risk under the projected future land use. The determination of acceptable risk and future land use has considered stakeholder involvement." A Class III permit modification should be requested to remove this site from HSWA Module of the Laboratory's RCRA operating permit.

Radiologic constituents not regulated under RCRA may be evaluated further by DOE for additional management activities.

5.1.1.11 Sampling and Analysis Plan for PRS 08-004(d)

Due to the Conclusions and Recommendations presented for this PRS, no further investigation requiring a sampling and analysis plan is recommended at this time.

5.1.2 PRS 09-005(a):

This PRS is a decommissioned septic tank and tile field that served Buildings TA-8-20, -21, -22, -23, and -24. The PRS potentially received contamination resulting from a ^{90}Sr spill at TA-8-24. The PRS is recommended for NFA.

5.1.2.1 History

This PRS acted as the receiving septic system for waste water from TA-8-24 at the time of a ^{90}Sr spill at that building in 1954. The septic tank was abandoned in place in 1970, filled with soil, and later removed during a sewage system upgrade in 1985. Although the tank has been decommissioned, the surrounding soils may have been contaminated by leaks from the tank, and the associated tile field may have conducted the constituent of concern (^{90}Sr) to the surrounding soil media. This PRS is discussed in further detail in Sections 5.5.1.10 and 6.5.5 of the RFI work plan (LANL 1993, 1092).

The location of the tile field was uncertain, and there were no topographical features at the site to suggest the presence of the field. Two boring locations were selected based on the engineering drawings. Sample 0509-95-0013 was collected on 9 May 1995 using a hollow stem auger drill rig from location 09-5052 at a depth of 3 to 4 ft. A piece of brown clay

pipe was found at this location, which suggested that this was the correct location of the tile field.

No further site specific information on geology, hydrology, soils, or wildlife habitat associated with this PRS is required.

5.1.2.3 Previous Investigation.

No previous investigations have been performed at this site.

5.1.2.4 Field Investigation.

The objective of the Phase I field investigation was to determine if ^{90}Sr, which may have been released at TA-8-24 in 1954, had been transported to the PRS via the sewage system in service at that time. Since the septic tank was removed in 1985, the investigation focused on collection and analysis of soils from judgmental samples taken at borings advanced at the location of the decommissioned septic tank and from within the area of the tile field. See aerial photograph Figure 5-3 and topographic Figure 5-4 for the location of sampling points at this PRS.

Two samples were collected by hand augering on 25 April 1995. Sample 0509-96-0010 was collected at location 09-5050 from a depth of 2.0 to 6.2 ft. Sample 0509-95-0012 was collected at location 09-5051 from 2.0 to 4.2 ft. Field beta/gamma measurements of the samples ranged from 173 to 216 cpm (LANL background 150-250 cpm); the field PID measurements were <1 ppm for volatile organic compounds. The samples were negative for HE using the HE spot test.

Two additional borings were conducted in the tile field in order to determine if ^{90}Sr had discharged from the septic tank to the surrounding soils. These additional samples were also analyzed for HE, volatile organics, and inorganic constituents. The location of the tile field was uncertain, and there were no topographical features at the site to suggest the presence of the field. Two boring locations were selected based on the engineering drawings. Sample 0509-95-0013 was collected on 9 May 1995 using a hollow stem auger drill rig from location 09-5052 at a depth of 3 to 4 ft. A piece of brown clay pipe was found at this location, which suggested that this was the correct location of the tile field. A second sample, 0509-95-0014, was collected at 09-5053 at a depth of 4 to 5 ft. Field beta/gamma measurements of the samples ranged from 163 to 218 cpm (LANL background 150-250 cpm); the field PID measurements were <1 ppm for volatile organic compounds. The samples were negative for HE using the HE spot test.

Additional gross alpha/beta screening data were acquired from sample screening performed prior to shipment of the samples to the analytical laboratory. Minimum, average, and maximum gross radioactivities for PRS 09-005(a) samples were 4.29, 5.14, and 5.99 pCi/g for gross alpha and 2.36, 2.98, and 3.60 pCi/g for gross beta, respectively. No LANL background UTL has been established for gross alpha or gross beta activity; however, these data can be compared to LANL Environmental Surveillance data (1993) for offsite and onsite sampling locations. At seven offsite monitoring locations minimum, average, and maximum gross alpha activities were 2, 5, and 10 pCi/g; and gross beta activities were 3, 3, and 4 pCi/g, respectively. At six onsite monitoring locations minimum, average, and maximum gross alpha activities were 3, 4, and 8 pCi/g,

and gross beta activities were 3, 5, and 8 pCi/g. The absence of elevated gross alpha and gross beta activities in the screened samples would indicate that no significant ^{90}Sr concentrations were present. Table 5-4 shows the summary of samples taken at PRS 09-005(a) and the requested analytes.

Table 5-4
SUMMARY OF SAMPLES TAKEN

LOCATION ID	SAMPLE ID	DEPTH (ft)	MATRIX	VOCs	SVOCs	HE	INORG	RAD
09-5050	0509-96-0010	2.0 - 6.2	Soil					X
09-5051	0509-95-0012	2.0 - 4.2	Soil					X
09-5052	0509-95-0013	3.0 - 4.0	Soil	X		X	X	X
09-5053	0509-95-0014	4.0 - 5.0	Soil	X		X	X	X

5.1.2.5 Background Comparison.

The results of inorganic chemical analysis of samples 0509-95-0013 and 0509-95-0014 are presented in Table 5-5. Silver was found to be present at concentrations that exceed LANL UTL background. Mercury was not detected in any sample but was reported in one sample as less than the reporting limit of 0.11 mg/kg. This is only slightly greater than the LANL UTL, and both constituents were carried forward in the sreening assessment.

Strontium-90 analysis of soil samples 0509-95-0010 and 0509-95-0012 indicates that ^{90}Sr is not present at a level that exceeds the background soil UTL concentration (see Table 5-6). Based on the background screening criteria defined in Chapter 3, no further analysis of the ^{90}Sr contamination is required for this report. Due to the fact that this PRS is part of a larger ^{90}Sr PRS set, the maximum detected ^{90}Sr concentration has been included in the screening assessment for information purposes.

TABLE 5-5
INORGANICS RESULTS COMPARED TO BACKGROUND UTL FOR PRS 09-005(a)

Potential Release Site 09-005(a)

Sample Id	Location Id	Depth (ft)	Units	Ag	Al	As	Ba	Be	Ca	Cd	Co
0509-95-0013	09-5052	3.0-4.0	mg/kg	18.4	6280	3.6	77.7	<0.52	<1120.	<0.35	<3.6
0509-95-0014	09-5053	4.0-5.0	mg/kg	20.9	6110	4.1	135	<0.59	<1140	<0.38	<5.8
Soil SAL			mg/kg	380	77000	NA	5300	NA	NA	38	4600
Soil Bkgd UTL			mg/kg	1.61	38700	7.82	315	1.95	6120	2.7	19.2

Sample Id	Location Id	Depth (ft)	Units	Cr	Cu	Fe	Hg	K	Mg	Mn	Na
0509-95-0013	09-5052	3.0-4.0	mg/kg	6.1	6.5	9670	<0.08	<792	<922	217	<87.1
0509-95-0014	09-5053	4.0-5.0	mg/kg	7.9	6.0	10800	<0.11	<881	<971	262	<85.3
Soil SAL			mg/kg	210	2800	NA	23	NA	NA	NA	NA
Soil Bkgd UTL			mg/kg	19.3	30.7	21300	0.1	3410	4610	714	915

Sample Id	Location Id	Depth (ft)	Units	Ni	NO3	Pb	Sb	Se	Tl	V	Zn
0509-95-0013	09-5052	3.0-4.0	mg/kg	<4.5	<1.0	10.2	<0.61	1.4	<0.61	13.2	35.7
0509-95-0014	09-5053	4.0-5.0	mg/kg	<5.3	<1.0	16.0	<0.59	<1.1	<0.59	21.2	29.9
Soil SAL			mg/kg	1500	100000	400	31	380	6.4	540	23000
Soil Bkgd UTL			mg/kg	15.2	NA	23.3	1	1.7	1	41.9	50.8

TABLE 5-6
RADIONUCLIDE CONCENTRATIONS IN SOIL SAMPLES COMPARED TO UTL FOR PRS 09-005(a)

Potential Release Site 09-005(a)
(-) value refers to measurements below instrument background value

Location Id	Depth (ft)	Units	Sr-90
09-5050	2.0-6.2	pCi/g	0.1
09-5050	2.0-6.2	pCi/g	0.49
09-5051	2.0-4.2	pCi/g	0.72
09-5051D	2.0-4.2	pCi/g	-0.08
Soil SAL		pCi/g	4.4
Bkgd Soil UTL		pCi/g	1

5.1.2.6 Evaluation of Organic Constituents.

No HE was detected at locations 09-5052 or 09-5053. Toluene was detected in 09-5052 and 09-5053 at 0.011 and 0.012 mg/kg respectively, and isopropylbenzene (cumene)

was detected at location 09-5053 at 0.008 mg/kg. No other organic constituents were found to be present at concentrations greater than their EQL. Table 5-7 presents the results of the organic constituent evaluation.

TABLE 5-7
PRS 09-005(a) SOIL CONCENTRATIONS FOR ORGANIC ANALYTES WITH VALUES GREATER THAN THE EQL

Potential Release Site 09-005(a)

Sample Id	Location Id	Depth (ft)	Analyte Name	Sample Value (mg/kg)	SAL (mg/kg)
0509-95-0013	09-5052	3.0-4.0	Toluene	0.011	1900
0509-95-0014	09-5053	4.0-5.0	Toluene	0.012	1900
0509-95-0014	09-5053	4.0-5.0	Isopropylbenzene	0.008	49

5.1.2.7 Human Health Assessment.

5.1.2.7.1 Screening Assessment

Two organic constituents, toluene and isopropylbenzene, were determined to be present at concentrations exceeding their EQL. Two inorganic constituents, silver and mercury, were also found to be present at concentrations exceeding LANL UTL background. These constituents did not exceed their associated SALs but were submitted to MCE; the results are summarized in Table 5-8. Table 5-9 presents the analysis of the maximum detected ^{90}Sr concentration normalized to the SAL for radiologic effects. The total normalized values for noncarcinogenic and radiologic effects are both less than the threshold value of 1, which indicates little potential for adverse effect.

TABLE 5-8
PRS 09-005(a) COMPARISON OF DETECTED CONCENTRATIONS TO SAL FOR NONCARCINOGENIC EFFECTS

Potential Release Site 09-005(a)
Noncarcinogenic Effects

Analyte	Max. Concentration (mg/kg)	Soil SAL (mg/kg)	Normalized to SAL
Silver	20.9	380	0.055
Mercury	<0.11	23	0.0048
Isopropylbenzene	0.008	49	0.00016
Toluene	0.012	1900	0.0000063
Total			**0.06**

TABLE 5-9
PRS 09-005(a) COMPARISON OF DETECTED CONCENTRATIONS TO SAL FOR RADIOLOGIC EFFECTS

Potential Release Site 09-005(a) Radiologic Effects			
Analyte	Max. Concentration (pCi/g)	Soil SAL (pCi/g)	Normalized to SAL
Sr-90	0.72	4.4	0.16
Total			**0.16**

5.1.2.7.2 Risk Assessment.

Based on the result of the screening assessment, no risk assessment was performed.

5.1.2.8 Ecological Assessment

The general landscape condition around this PRS is moderately developed, and there is moderate potential for receptors to come in contact with contaminants. Therefore, this PRS will be included in the ecological risk assessment. An ecological risk assessment that considers contaminants with concentrations greater than UTLs will be conducted when that approach has been approved. Threatened and endangered species and /or sensitive habitat, listed in Chapter 2, will be evaluated in the ecological risk assessment.

5.1.2.9 Extent of Contamination

The objective of this investigation was to perform a site screening to determine if constituents from a historical release were present. The plan was not designed to define the extent of contamination.

5.1.2.10 Conclusions and Recommendations.

No human health COPCs were identified based on the screening of this PRS, and NFA is recommended, based on human health considerations. This recommendation is based on the NFA criterion 4 (Los Alamos National Laboratory, Environmental Restoration Department, Project Consistency Team Policy number 015) which states, "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 risk under the projected future land use. The determination of acceptable risk and future land use has considered stakeholder involvement." An ecological risk assessment that considers contaminants with concentrations greater than UTLs will be conducted when that approach has been approved. A Class III permit modification should be requested to remove this site from the HSWA Module of the Laboratory's RCRA operating permit.

5.1.2.11 Sampling and Analysis Plan for PRS 09-005(a)

Due to the Conclusions and Recommendations presented for this PRS, no further investigation requiring a sampling and analysis plan is necessary at this time.

5.1.3 PRS 09-005(d)

This PRS is a septic tank that was installed as a system upgrade to replace septic tank PRS 09-005(a), which served Buildings TA-8-20, -21, -22, -23, and -24. The septic tank was connected in 1970 to the same sewer line (from building TA-8-24) that received the ^{90}Sr spill in 1954 and, therefore, may also have been contaminated subsequent to that incident.

The PRS is recommended for NFA.

5.1.3.1 History.

This PRS acted as the receiving septic tank for waste water from TA-8-24 from 1970 until it was abandoned in place in 1988. Due to its association with the TA-8-24 sewer line, the potential existed for release of residual contamination from the 1954 spill to the PRS, and, therefore, was investigated for the single constituent of concern, ^{90}Sr. This PRS is discussed in further detail in Sections 5.5.1.11 and 6.5.5 of the RFI work plan (LANL 1993, 1092).

5.1.3.2 Description.

No further site specific information on geology, hydrology, soils, or wildlife habitat associated with this PRS is required.

5.1.3.3 Previous Investigation

No previous investigations have been performed at this site.

5.1.3.4 Field Investigation

The objective of the Phase I investigation was to determine if ^{90}Sr is present in the waste material that is present in the tank. If no ^{90}Sr is found at a level exceeding threshold values, no further action will be taken. This tank had been partially decommissioned by the removal of the tank contents and the three manholes that extended from the top of the tank's three access ports to the ground surface, after which sand was backfilled over the tank. Prior to the RFI sampling event, the backfilled sand over the tank's inlet and center compartments was excavated by hand. The access ports to the inlet (location 09-5000) and center (09-5001) compartments were found to be open, and the compartments were partially filled with mounds of sand that had fallen into the tank. See aerial photograph Figure 5-3 and topographical Figure 5-4 for the location of sampling points used at this PRS.

The inlet compartment contained 1 to 2 in. of a wet sludge or soil material. A sample of this sludge/soil (AAB0787) was collected on 21 April 1994 from the bottom, northwest corner of the tank away from the sand mound using a long-handled stainless steel scoop. A sample (AAB0788) of the sludge/soil material was also collected from the center compartment (09-5001) by hand augering through the sand mound to the tank bottom. The inside walls of the tank were visible from the access ports. These walls were stained brown from the tank bottom up to the level of the inlet pipe. The brown stained surface undoubtedly corresponded to the tank's liquid operating level. Chip samples of the

stained concrete surface of the north wall of the inlet (AAB0789) and center (AAB0790) compartments were collected by chipping away approximately the outer 1/8 in. of the surface using a stainless steel hammer. Field beta/gamma measurements of the samples ranged from 200 to 218 cpm (LANL background 150-250 cpm); the field PID measurements were <1 ppm for volatile organic compounds. The samples were negative for HE using the HE spot test. Table 5-10 shows the summary of samples taken for this PRS.

TABLE 5-10
SUMMARY OF SAMPLES TAKEN

LOCATION ID	SAMPLE ID	DEPTH (ft)	MATRIX	VOCs	SVOCs	HE	INORG	RAD
09-5000	AAB0787	na	Sludge/Soil					X
09-5000	AAB0789	na	Chip					X
09-5001	AAB0788	na	Sludge/Soil					X
09-5001	AAB0790	na	Chip					X

5.1.3.5 Background Comparison.

The analysis of sludge samples taken at PRS 09-005(d) indicate that ^{90}Sr is present in one sample at a level above LANL background UTL for soil, as indicated in Table 5-11. Therefore, ^{90}Sr will be evaluated in the human health screening assessment.

TABLE 5-11
RADIONUCLIDE CONCENTRATIONS IN SLUDGE SAMPLES COMPARED TO BACKGROUND UTL FOR PRS 09-005(d)

Potential Release Site 09-005(d)
(-) value refers to measurements below instrument background value

Sample Id	Location Id	Depth	Matrix	Units	Sr-90	
AAB0787	09-5000	NA	Sludge	pCi/g	1.43	
AAB0788	09-5001	NA	Sludge	pCi/g	0.17	
AAB0789	09-5000	NA	Chip	pCi/g	-0.57	
AAB0790	09-5001	NA	Chip	pCi/g	0.47	
SAL					4.4	
Soil Bkgd UTL					1	

5.1.3.6 Evaluation of Organic Constituents.

Strontium-90 was the sole constituent of potential concern for this PRS; no organic constituents of concern were identified for analysis in the workplan.

5.1.3.7 Human Health Assessment.

5.1.3.7.1 Screening Assessment.

The ^{90}Sr sludge concentration was screened against the associated LANL soil SAL. The COPC did not exceed the SAL, and the total normalized value is 0.32. This is less than the threshold value of 1, which would indicate little potential for adverse effect. The results are summarized Table 5-12.

TABLE 5-12
PRS 09-005(d) COMPARISON OF DETECTED CONCENTRATIONS TO SAL FOR RADIOLOGIC EFFECTS

Potential Release Site 09-005(d)
Radiologic Effects

Analyte	Max. Concentration (pCi/g)	Soil SAL (pCi/g)	Normalized to SAL
Sr-90	1.43	4.4	0.32
Total			**0.32**

5.1.3.7.2 Risk Assessment

Based on the result of the screening assessment, no risk assessment was performed.

5.1.3.8 Ecological Assessment

The general landscape condition around this PRS is highly developed, and there is no potential for receptors to come in contact with contaminants. Therefore, there are no ecotoxicological risk concerns at this PRS.

5.1.3.9 Extent of Contamination.

The objective of this investigation was to perform a site screening to determine if constituents from a historical release were present. The plan was not designed to define the extent of contamination.

5.1.3.10 Conclusions and Recommendations.

No human health COPCs or ecotoxicological contaminants were identified based on the screening of this PRS, and NFA is recommended. This recommendation is based on the NFA criterion 4 (Los Alamos National Laboratory, Environmental Restoration Department, Project Consistency Team Policy number 015) which states, "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 risk under the projected future land use. The determination of acceptable risk and future land use has considered stakeholder involvement." A Class III permit modification should be requested to remove this site from the HSWA Module of the Laboratory's RCRA operating permit.

5.1.3.11 Sampling and Analysis Plan for PRS 09-005(d).

Due to the Conclusions and Recommendations presented for this PRS, no further investigation requiring a sampling and analysis plan is necessary at this time.

5.1.4 PRS 09-008(b)

This PRS is an inactive oxidation pond that received sanitary waste from septic tank TA-9-211 [PRS 09-005(d)], which serviced Old Anchor Sites East and West and building TA-8-24. Due to a ^{90}Sr spill at building TA-8-24 and the fact that sanitary drainage from that building is connected to the oxidation pond, the pond and outfall were investigated for potential ^{90}Sr contamination.

This PRS is recommended for NFA.

5.1.4.1 History.

No documented releases of hazardous or radioactive materials have occurred to the environment within the TA-9 Decommissioned Area, and the probability of a significant release is considered to be small. However, due to the ^{90}Sr spill at building TA-8-24 and the possibility of transport through the sanitary sewer to the oxidation pond, a Phase I investigation was executed. This PRS is discussed in further detail in Sections 5.5.1.14 and 6.5.1 of the RFI work (LANL 1993, 1092).

5.1.4.2 Description.

No further site specific information on geology, hydrology, soils, or wildlife habitat associated with this PRS is required.

5.1.4.3 Previous Investigation

No previous investigations have been performed at this site.

5.1.4.4 Field Investigation.

The Phase I investigation of this PRS focused on limited, worst case sampling of the lagoon and associated receiving drainage to determine if ^{90}Sr was present. **See aerial photograph Figure 5-3** and topographical Figure 5-4 for the location of sampling points at this PRS.

Two surface (0-0.5 ft.) sediment samples and one field replicate were collected from the oxidation pond bottom on 21 April 1994. Sample point 09-5020 (AAB0784) was located at the western end of the pond near the pond inlet pipe, while sample point 08-5021 (AAB0785, AAB0786) was approximately in the center of the pond. The top 1 in. of sample material was a dark brown, organic sediment followed by 5 in. of a reddish-brown clay. A fourth surface soil sample (0-0.25 ft.) was collected on 9 June 1994 from the pond's receiving drainage outfall. The sampling site, 09-5022 (AAB2806) was approximately 15 ft east and downstream from the pond's outlet pipe. The sampled soil, a brown silt, had a thick grass covering. The sample depth was limited to 0.25 ft because tuff was encountered. Each sampling site was field screened using a PID, HE spot test, and beta/gamma meter. Field beta/gamma measurements of the samples ranged from 240 to 293 cpm (LANL background 150-250 cpm); the field PID measurements were <1 ppm for volatile organic compounds. The samples were negative for HE using the HE spot test.

All samples were analyzed for ^{90}Sr only. See Table 5-13 for a summary of samples taken.

TABLE 5-13
SUMMARY OF SAMPLES TAKEN

LOCATION ID	SAMPLE ID	DEPTH (ft)	MATRIX	VOCs	SVOCs	HE	INORG	RAD
09-5020	AAB0784	0 - 0.5	Soil					X
09-5021	AAB0785	0 - 0.5	Soil					X
09-5021	AAB0786	0 - 0.5	Soil					X
09-5022	AAB2806	0 - 0.25	Soil					X

5.1.4.5 Background Comparison.

The analysis of ^{90}Sr from samples taken at PRS 09-008(b) indicate that ^{90}Sr is present at levels above LANL background UTL; therefore, this is considered to be a COPC for evaluation in the human health screening assessment (See Table 5-14).

TABLE 5-14
RADIONUCLIDES WITH CONCENTRATIONS GREATER THAN BACKGROUND UTL FOR PRS 09-008(b)

Potential Release Site 09-008(b)

Sample Id	Location Id	Depth (ft)	Units	Sr-90
AAB0784	09-5020	0-0.5	PCI/G	1.73
AAB0784D	09-5020	0-0.5	PCI/G	<0.23
AAB0785	09-5021	0-0.5	PCI/G	0.71
AAB0786	09-5021	0-0.5	PCI/G	1.24
AAB2806	09-5022	0-0.25	PCI/G	0.93
Soil Sal			PCI/G	4.4
Soil Bkgd UTL			PCI/G	1

5.1.4.6 Evaluation of Organic Constituents.

No organic constituents were identified for analysis at this PRS based on historical process knowledge and as documented in the RFI work plan.

5.1.4.7 Human Health Assessment.

5.1.4.7.1 Screening Assessment

The COPC (^{90}Sr) identified to be greater than LANL background UTL was screened against the associated LANL SAL. The COPC did not exceed the SAL, and the total normalized value is 0.39. This is less than the threshold value of 1, which would indicate little potential for adverse effect. The results are summarized in Table 5-15.

TABLE 5-15
PRS 09-008(b) COMPARISON OF DETECTED CONCENTRATIONS TO SAL FOR RADIOLOGIC EFFECTS

Potential Release Site 09-008(b)
Radiologic Effects

Analyte	Max. Concentration (pCi/g)	Soil SAL (pCi/g)	Normalized to SAL
Sr-90	1.73	4.4	0.39
Total			**0.39**

5.1.4.7.2 Risk Assessment.

Based on the result of the screening assessment, no risk assessment was performed.

5.1.4.8 Ecological Assessment

The general landscape condition around this PRS is moderately developed, and there is high potential for receptors to come in contact with contaminants. Therefore, this PRS will be included in the ecological risk assessment. An ecological risk assessment that considers contaminants with concentrations greater than UTLs will be conducted when that approach has been approved. Threatened and endangered species and /or sensitive habitat, listed in Chapter 2, will be evaluated in the ecological risk assessment.

5.1.4.9 Extent of Contamination.

The objective of this investigation was to perform a site screening to determine if constituents from a historical release were present. The plan was not designed to define the extent of contamination.

5.1.4.10 Conclusions and Recommendations.

No human health COPCs were identified based on the screening of this PRS, and NFA is recommended, based on human health considerations. This recommendation is based on the NFA criterion 4 (Los Alamos National Laboratory, Environmental Restoration Department, Project Consistency Team Policy number 015) which states, "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 risk under the projected future land use. The determination of acceptable risk and future land use has considered stakeholder involvement." An ecological risk assessment that considers contaminants with concentrations greater than UTLs will be conducted when that approach has been approved. A Class III permit modification should be requested to remove this site from the HSWA Module of the Laboratory's RCRA operating permit.

5.1.4.11 Sampling and Analysis Plan for PRS 09-008(b)

Due to the Conclusions and Recommendations presented for this PRS, no further investigation requiring a sampling and analysis plan is necessary at this time.

5.1.5 PRS 09-009

Structure TA-9-218 is a sanitary waste treatment lagoon built in 1961 to treat the sanitary waste effluent from buildings TA-9-20, -21, -28, -29, -32, -33, -34, -35, -37, and -38. The lagoon and associated sand filters also were used to treat sanitary wastewater from TA-8 and may have been contaminated with ^{90}Sr after being connected to the sewer lines from TA-8 in 1986.

This PRS is recommended for NFA.

5.1.5.1 History.

The lagoon measures 60-ft long by 32-ft wide by 7-ft deep, with concrete sides and bentonite bottom. The sand filters contain a flexible membrane liner and are surrounded by a concrete lip. Sanitary waste that previously entered the lagoon and sand filters is now diverted to a site-wide sanitary wastewater systems consolidation line. Although the lagoon and sand filters were intended to receive only sanitary waste, the facility may have received ^{90}Sr after it was connected to the sewer line from TA-8 in 1986. This PRS is discussed in further detail in Sections 5.4.1.24 and 6.4.4 of the RFI work plan (LANL 1993, 1092).

5.1.5.2 Description.

No further site specific information on geology, hydrology, soils, or wildlife habitat associated with this PRS is required.

5.1.5.3 Previous Investigation.

No previous investigations have been performed at this site.

5.1.5.4 Field Investigation.

The objective of this investigation was to assess the potential contamination of the site resulting from a past release of ^{90}Sr. The presence of a bentonite liner in the lagoon minimizes migration of water to the surrounding soils and provides good sorptive capacity for many contaminants. Any contaminants of concern would be expected to be concentrated in this area; thus the biased sampling effort focused on the sludge/clay layer. See aerial photograph Figure 5-5 and topographical Figure 5-6 for the location of sampling points at this PRS.

Two sludge samples were collected from the sewage lagoon on 28 April 1994. At the time of sampling, the concrete-lined sewage lagoon contained from approximately 0.25 to 3 ft of water-saturated sludge. At sample point 09-4040 (sample number AAB0847), a sludge sample was collected with a hand auger at the pond bottom at 3 ft. At the sample point 09-4041(AAB0848), a sludge sample was collected at the surface from 0 to 0.3 ft. Each sampling site was field screened using a PID, HE spot test, and a beta/gamma meter. The PID measurements were < 1 ppm; the beta/gamma measurements averaged 131 counts per minute (LANL background 150-250 cpm); and the HE spot tests were negative.

The samples were analyzed for ^{90}Sr, the only contaminant of concern at this PRS. See Table 5-16 for a summary of samples taken.

TABLE 5-16
SUMMARY OF SAMPLES TAKEN

LOCATION ID	SAMPLE ID	DEPTH (ft)	MATRIX	VOCs	SVOCs	HE	INORG	RAD
09-4040	AAB0847	2.5-3.0	Sludge					X
09-4041	AAB0848	0 - 0.3	Sludge					X

5.1.5.5 Background Comparison.

The analysis of ^{90}Sr from samples taken at PRS 09-009 indicate that ^{90}Sr is present at levels below LANL background UTL (see Table 5-17). Based on the criteria stated in Section 3.2, Background Comparisons, no further consideration of this chemical is required. However, due to the atypical nature of the sample (septic tank sludge) and the consideration of this PRS as part of a PRS set, ^{90}Sr will be carried through the human health screening assessment for consistency and information purposes.

TABLE 5-17
RADIONUCLIDE CONCENTRATIONS IN SLUDGE SAMPLES COMPARED TO BACKGROUND UTL FOR PRS 09-009

Potential Release Site 09-009				
Sample Id	Location Id	Depth (ft)	Units	Sr-90
AAB0847	09-4040	2.5-3.0	PCI/G	0.25
AAB0848	09-4041	0-0.3	PCI/G	0.57
Soil SAL			PCI/G	4.4
Soil Bkgd UTL			PCI/G	1

5.1.5.6 Evaluation of Organic Constituents.

No organic constituents were targeted for analysis at this PRS based on historical process knowledge and as documented in the RFI work plan.

5.1.5.7 Human Health Assessment.

5.1.5.7.1 Screening Assessment.

Strontium-90 sludge concentrations were screened against soil SAL levels. Table 5-18 presents this comparison and the normalized value of the maximum detected concentration relative to the SAL. This value, 0.13, is less than the threshold value of 1, which would indicate little potential for adverse effects. The result of this analysis is found in Table 5-18.

TABLE 5-18
PRS 09-009 COMPARISON OF DETECTED CONCENTRATIONS TO SAL FOR RADIOLOGIC EFFECTS

Potential Release Site 09-009 Radiologic Effects			
Analyte	Max. Concentration (pCi/g)	Soil SAL (pCi/g)	Normalized to SAL
Sr-90	0.57	4.4	0.13
Total			**0.13**

5.1.5.7.2 Risk Assessment.

Based on the result of the screening assessment, no risk assessment was performed.

5.1.5.8 Ecological Assessment

There are no ecotoxicological risk concerns because there are no contaminants above the UTLs.

5.1.5.9 Extent of Contamination.

The objective of this investigation was to perform a site screening to determine if constituents from a historical release were present. The plan was not designed to define the extent of contamination.

5.1.5.10 Conclusions and Recommendations.

No human health COPCs or ecotoxicological contaminants were identified based on the screening of this PRS, and NFA is recommended. This recommendation is based on the NFA criterion 4 (Los Alamos National Laboratory, Environmental Restoration Department, Project Consistency Team Policy number 015) which states, "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 risk under the projected future land use. The determination of acceptable risk and future land use has considered stakeholder involvement." A Class III permit modification should be requested to remove this site from the HSWA Module of the RCRA operating permit.

5.1.5.11 Sampling and Analysis Plan for PRS 09-009.

Due to the Conclusions and Recommendations presented for this PRS, no further investigation requiring a sampling and analysis plan is necessary at this time.

5.2 PRS 08-009(d)

Potential Release Site 08-009(d) consists of a drain outfall serving building TA-8-22. The building is an active facility, and the drains flow to a permitted outfall, TA-8-22-OPN-1, which discharges into a tributary of Pajarito Canyon. Based on the human health screening assessment, NFA is recommended for this PRS.

5.2.1 History

Building TA-8-22 was built in 1950 to house x-ray facilities for use in material radiography processes. As a result of these processes, photo development solutions, containing silver salts, were disposed into a dedicated drain at TA-8-22. In addition, these processes may have released chromium and pentachlorophenol into the waste stream. Therefore, silver, chromium, and pentachlorophenol were identified as indicator parameters for this PRS, and samples collected at the PRS were analyzed for inorganic compounds and semivolatile organics.

Radionuclides were also identified as indicator parameters in the work plan but were not specifically analyzed based on field screening results.

The permitted outfall associated with the drain in this active facility is monitored bimonthly, and no violations have been reported.

This PRS is discussed in further detail in Sections 5.1.1.9 and 6.1.6 of the RFI work plan (LANL 1993, 1092).

5.2.2 Description

No further site specific information on geology, hydrology, soils, or wildlife habitat associated with this PRS is required.

5.2.3 Previous Investigation

No previous investigations have been performed at this site.

5.2.4 Field Investigation

The objective of the field investigation of PRS 08-009(d) was to determine if historical discharges of waste water at this outfall may have resulted in the contamination of environmental media, resulting in an unacceptable risk based on screening assessment criteria. The sampling plan was designed and executed to focus on potential areas of sedimentation and retention of constituents in the outfall drainage. See aerial photograph Figure 5-7 and topographical Figure 5-8 for the location of sampling points at this PRS.

Two surface (0-0.5 ft) sediment samples were collected from the ditch bottom at points 3 ft (08-1000, AAB0854) and 6 ft (08-1001, AAB0855) downstream from the end of the 8-009(d) outfall pipe. The sediment samples were taken from within the outfall channel. These sampling locations were selected because of accumulations of sediment in the ditch bottom in order to evaluate the potential downstream constituent migration. The outfall was discharging water to the ditch at a rate of a few gallons per minute at the time of sampling. The samples were dark brown to black, organic rich, saturated soils. Field beta/gamma measurements of the samples ranged from 200 to 204 cpm (LANL background is 150 to 250 cpm); the field PID measurements were <1 ppm for volatile organic compounds. The samples were negative for HE using the HE spot test kit.

In response to a notice of deficiency from EPA Region VI, dated 5 April 1994, additional soil/sediment samples were collected by hand augering at location 08-1000 on 9 June 1994. The sampling plan stipulated the collection of additional soil samples at 1-ft depth intervals to a maximum depth of 5 ft or until tuff bedrock was encountered. Arrangements were made with the TA-8-22 building manager to have the water discharge stopped from the 8-009(d) outfall the evening prior to the soil sampling event. The sediment/soil from

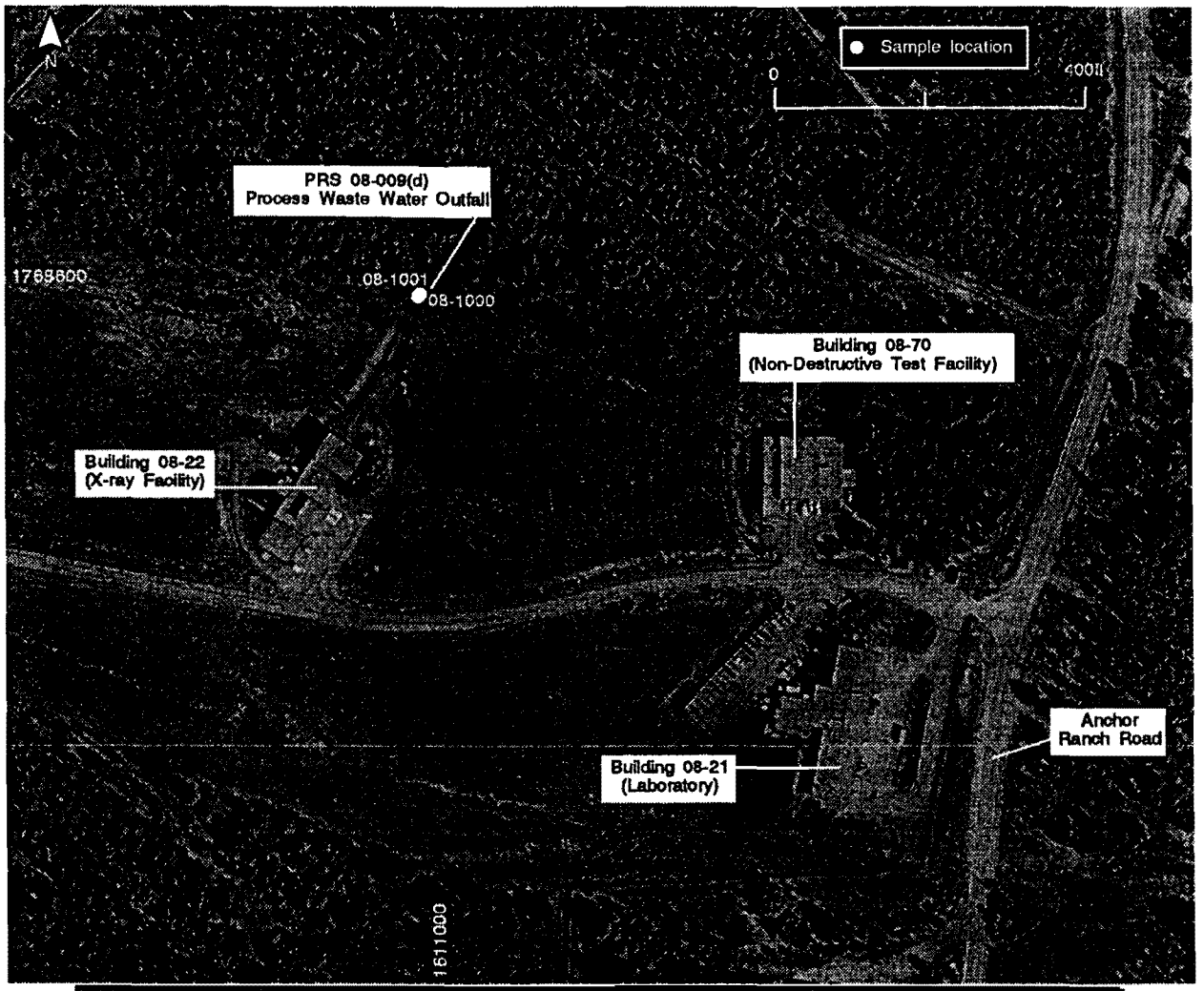
the augered hole was water saturated; the first 0.5 ft was a black, organic-rich sediment followed by a dark brown, gravely clay soil to a depth of 1.4 ft. Tuff was encountered at a depth of 1.4 ft, so only two intervals were sampled: 0 to 1.0 ft. (AAB2798) and 1.0 to 1.4 ft (AAB2799). The PID measurement at this augered hole was < 1 ppm; the beta/gamma measurement ranged from 350 to 625 cpm (LANL background 150-250 cpm), and the HE spot tests were all negative. Consultation with personnel in TA-8-22 indicated that the elevated beta/gamma measurement may have been due to stray radiation from activities being conducted at the time of sampling at the nearby building TA-8-22. See Table 5-19 for a summary of samples taken during this investigation.

The conclusion that the elevated beta/gamma measurements were caused by an extraneous source is supported by the gross beta measurements conducted on the actual samples. The gross beta minimum, average, and maximum activities for the set of samples, 08-1000 and 08-1001, were 4.6, 7.9, and 14.7 pCi/g, respectively. No LANL background UTL has been established for gross beta activity; however, these data can be compared to LANL Environmental Surveillance data (1993) for offsite and onsitesampling locations. At seven offsite monitoring locations minimum, average, and maximum gross beta activities were 3, 3, and 4 pCi/g. At six onsite monitoring locations minimum, average, and maximum, and gross beta activities were 3, 5, and 8 pCi/g. The relative gross alpha and gross beta activity detected in the screened samples would indicate no significant radionuclide contamination at the PRS.

Furthermore, sample locations 08-1000 and 08-1001 were again hand-augered, and the sediments were resurveyed on 1 December 1995. The beta/gamma measurements on that date ranged from 151 to 258 cpm. The absence of elevated gross beta activity in the screened samples and the follow-up beta/gamma measurements of 01 December 1995 indicate the elevated 9 June 1994 beta/gamma measurements were spurious readings.

TABLE 5-19
SUMMARY OF SAMPLES TAKEN

LOCATION ID	SAMPLE ID	DEPTH (ft)	MATRIX	VOCs	SVOCs	HE	INORG	RAD
08-1000	AAB0854	0 - 0.5	Soil		X		X	
08-1000	AAB2798	0 - 1	Soil	X	X		X	
08-1000	AAB2799	1.0 - 1.4	Soil	X	X		X	
08-1001	AAB0855	0 - 0.5	Soil		X		X	



Sample Id	Depth (ft)	Analyte	Value	Units	Bkgd UTL	SAL
08-1000	0-.5	Ag	78.80	mg/kg	1.61	383.40
08-1001	0-.5	Ag	85.70	mg/kg	1.61	383.40
08-1000	0-1	Ag	177.00	mg/kg	1.61	383.40
08-1000	1-2	Ag	115.00	mg/kg	1.61	383.40
08-1000	0-.5	Cr	39.80	mg/kg	19.30	210.00
08-1000	0-.5	Cr	72.80	mg/kg	19.30	210.00
08-1000	0-1	Cr	40.10	mg/kg	19.30	210.00
08-1000	0-.5	Hg	0.19	mg/kg	0.10	23.00

Figure 5-7. Surrounding features and sample locations for PRS 08-009(d), drains and outfall serving building TA-8-22. Table indicates data results > soil background TL

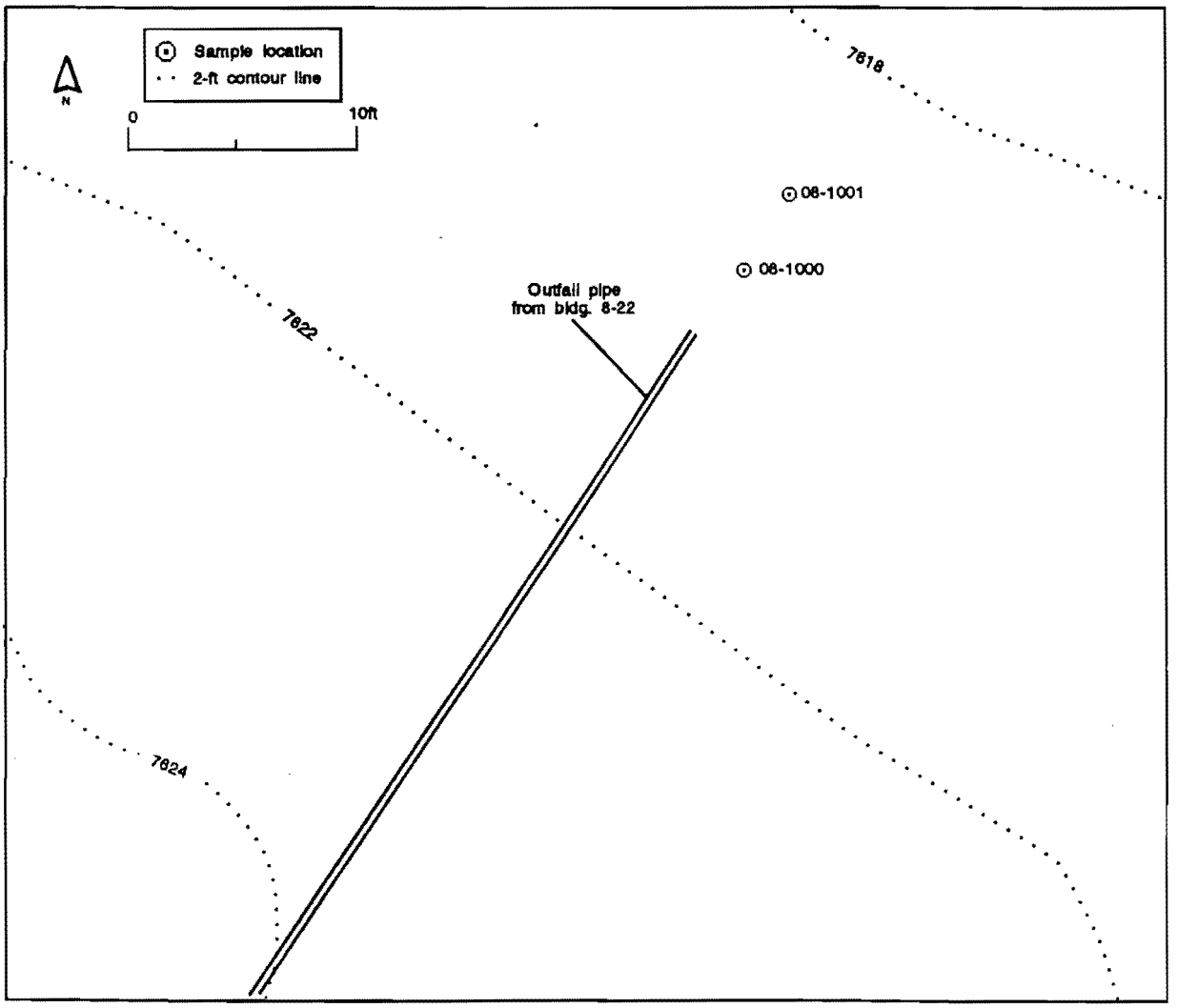


Figure 5-8. Topographic map and sample locations for 08-009(d), drains and outfall serving building TA-8-22. Enlargement of Figure 5-7

5.2.5 Background Comparison

The inorganic analysis results for the sediment samples taken at PRS 08-009(d) were compared with LANL background UTL. Silver, chromium, and mercury were found to be present at concentrations above UTL background for LANL soil. Antimony was undetected in all analyses; however, the analytical reporting limit for antimony exceeds its background UTL, and this constituent was included in the screening assessment.

The specific results of the sample analyses for inorganic constituents at PRS 08-009(d), by sample and interval, are indicated in Table 5-20.

5.2.6 Evaluation of Organic Constituents

All analyses of pentachlorophenol were determined to be less than the EQL for that constituent and, therefore, it was dropped from further consideration at this PRS. The following organic constituents, bis(2-ethylhexyl)phthalate, acetone, isopropylbenzene, isopropyltoluene[4], and trichloro-1,2,2-trifluoroethane were determined to be present at concentrations exceeding the EQL (see Table 5-21); therefore, these constituents were

TABLE 5-20
INORGANIC RESULTS COMPARED TO BACKGROUND UTL FOR PRS 08-009(d)

Potential Release Site 08-009(d)

Sample Id	Location Id	Depth (ft)	Units	Ag	Al	As	Ba	Be	Ca	Cd	Co
AAB0854	08-1000	0-0.5	mg/kg	78.8	11900	3.4	182	<1.1	<1340	1.6	<13.6
AAB0855	08-1001	0-0.5	mg/kg	85.7	10200	<3.3	80.9	<0.64	<1440	<1.8	<2.1
AAB2798	08-1000	0-1	mg/kg	177	NA	NA	NA	NA	NA	NA	NA
AAB2799	08-1000	1.0-1.4	mg/kg	115	NA	NA	NA	NA	NA	NA	NA
Soil SAL			mg/kg	380	77000	NA	5300	NA	NA	38	4600
Soil Bkgd UTL			mg/kg	1.61	38700	7.82	315	1.95	6120	2.7	19.2

Sample Id	Location Id	Depth (ft)	Units	Cr	Cu	Fe	Hg	K	Mg	Mn	Na
AAB0854	08-1000	0-0.5	mg/kg	39.8	15.4	13900	0.19	<1500	1860	681	<96.8
AAB0855	08-1001	0-0.5	mg/kg	72.8	22.7	10200	<0.05	<1310	<1600	85.8	<91.7
AAB2798	08-1000	0-1	mg/kg	40.1	NA	NA	NA	NA	NA	NA	NA
AAB2799	08-1000	1.0-1.4	mg/kg	2.7	NA	NA	NA	NA	NA	NA	NA
Soil SAL			mg/kg	210	2800	NA	23	NA	NA	NA	NA
Soil Bkgd UTL			mg/kg	19.3	30.7	21300	0.1	3410	4610	714	915

Sample Id	Location Id	Depth (ft)	Units	Ni	NO3	Pb	Sb	Se	Tl	V	Zn
AAB0854	08-1000	0-0.5	mg/kg	<5.6	NA	17.6	<6.6	<1.3	<0.62	35.5	36.3
AAB0855	08-1001	0-0.5	mg/kg	<6.3	<0.6	14.4	<8.3	<0.82	<0.78	28.3	29.1
AAB2798	08-1000	0-1	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
AAB2799	08-1000	1.0-1.4	mg/kg	NA	NA	NA	NA	NA	NA	NA	NA
Soil SAL			mg/kg	1500	100000	400	31	380	6.4	540	23000
Soil Bkgd UTL			mg/kg	15.2	NA	23.3	1	1.7	1	41.9	50.8

considered to be detected at the PRS. No detected organic constituent exceeded its associated SAL; isopropyltoluene has no established SAL value, and none of the organic constituents detected at the PRS were identified to be associated with operations at the PRS.

TABLE 5-21
PRS 08-009(d) SOIL CONCENTRATIONS FOR ORGANIC ANALYTES WITH VALUES GREATER THAN THE EQL

Potential Release Site 08-009(d)					
Sample Id	Location Id	Depth (ft)	Analyte Name	Sample Value (mg/kg)	SAL (mg/kg)
AAB0854	08-1000	0-0.5	Bis(2-ethylhexyl)phthalate	1.1	32
AAB0855	08-1001	0-0.5	Bis(2-ethylhexyl)phthalate	1.067	32
AAB2798	08-1000	0-1	Acetone	0.076	2000
AAB2798	08-1000	0-1	Isopropylbenzene	0.057	49
AAB2798	08-1000	0-1	Isopropyltoluene [4-]	1.1	NA
AAB2798	08-1000	0-1	Trichloro-1,2,2-trifluoroethane	0.017	3600

5.2.7 Human Health Assessment

5.2.7.1 Screening Assessment

None of the inorganic constituents that exceeded LANL background were found to exceed their associated SAL. The MCE of site contaminants for noncarcinogenic and carcinogenic effects is found in the Tables 5-22 and 5-23, respectively. The sum of the normalized values for both noncarcinogenic (0.75) and carcinogenic (0.38) effects was determined to be less than the threshold value of one, which would indicate limited potential for adverse effects. This total normalized value for noncarcinogenic effects includes consideration of the contribution by antimony, which was undetected in all samples but whose reporting limit exceeds the LANL background UTL.

5.2.7.2 Risk Assessment.

Based on the result of the screening assessment, no risk assessment was performed.

5.2.8 Ecological Assessment

The general landscape condition around this PRS is moderately developed, and there is high potential for receptors to come in contact with contaminants. Therefore, this PRS will be included in the ecological risk assessment. An ecological risk assessment that considers contaminants with concentrations greater than UTLs will be conducted when that approach has been approved. Threatened and endangered species and /or sensitive habitat, listed in Chapter 2, will be evaluated in the ecological risk assessment.

TABLE 5-22
PRS 08-009(d) COMPARISON OF DETECTED CONCENTRATIONS TO SAL FOR NONCARCINOGENIC EFFECTS

Potential Release Site 08-009(d)
Noncarcinogenic Effects

Analyte	Max. Concentration (mg/kg)	Soil SAL (mg/kg)	Normalized to SAL
Silver	177	380	0.47
Mercury	0.19	23	0.0083
Antimony	<8.3	31	<0.27
Acetone	0.076	2000	0.000038
Isopropylbenzene	0.057	49	0.0012
Trichloro-1,2,2-trifluoroethane	0.017	3600	0.0000047
Total			**<0.75**

TABLE 5-23
PRS 08-009 (d) COMPARISON OF DETECTED CONCENTRATIONS TO SAL FOR CARCINOGENIC EFFECTS

Potential Release Site 08-009(d)
Carcinogenic Effects

Analyte	Max. Concentration (mg/kg)	Soil SAL (mg/kg)	Normalized to SAL
Chromium	72.8	210	0.35
Bis(2-ethylhexyl)phthalate	1.1	32	0.034
Total			**0.38**

5.2.9 Extent of Contamination

The objective of this investigation was to perform a site screening to determine if constituents from a historical release were present. The plan was not designed to define the extent of contamination.

5.2.10 Conclusions and Recommendations

No human health COPCs were identified based on the screening of this PRS, and NFA is recommended, based on human health considerations. This recommendation is based on the NFA criterion 4 (Los Alamos National Laboratory, Environmental Restoration Department, Project Consistency Team Policy number 015) which states, "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 risk under the projected future land use. The determination of acceptable risk and future land use has considered stakeholder involvement." An ecological risk assessment that considers contaminants with concentrations greater than UTLs will be conducted when that approach has been approved. A Class III permit modification should be requested to remove this site from the HSWA Module of the Laboratory's RCRA operating permit.

5.2.11 Sampling and Analysis Plan for PRS 08-009(d)

Due to the Conclusions and Recommendations presented for this PRS, no further investigation requiring a sampling and analysis plan is necessary at this time.

5.3 PRS 08-009(e)

This PRS is an active drain outfall (NPDES permit EPA-06A075) area associated with active building TA-8-21. The waste water from this building may have been contaminated as a result of the various activities, which include film processing, metallography laboratory operations, and radioactive fuel element polishing that have occurred at this facility over the years before NPDES permitting. The potential constituents of concern for analysis of the soils at the outfall were identified as inorganics and semivolatile organics.

Based on the human health screening assessment and regular monitoring of the permitted outfall, NFA is recommended for this PRS.

5.3.1 History

The outfall at PRS 08-009(e) served Building TA-8-21, which had several uses including film processing, a metallography laboratory, and radioactive fuel element polishing. In about 1982 or 1983, the metallography lab was decontaminated and the floor removed and replaced. Within the last five years, this area of the building was converted to office space, and now only the photo lab and the dark rooms remain in place.

The present process waste water stream meets the NPDES criteria.

This PRS is discussed in further detail in Sections 5.1.1.10 and 6.1.7 of the RFI work plan (LANL 1993, 1092).

5.3.2 Description

No further site specific information on geology, hydrology, soils, or wildlife habitat associated with this PRS is required.

5.3.3 Previous Investigation

No previous investigations have been performed at this site.

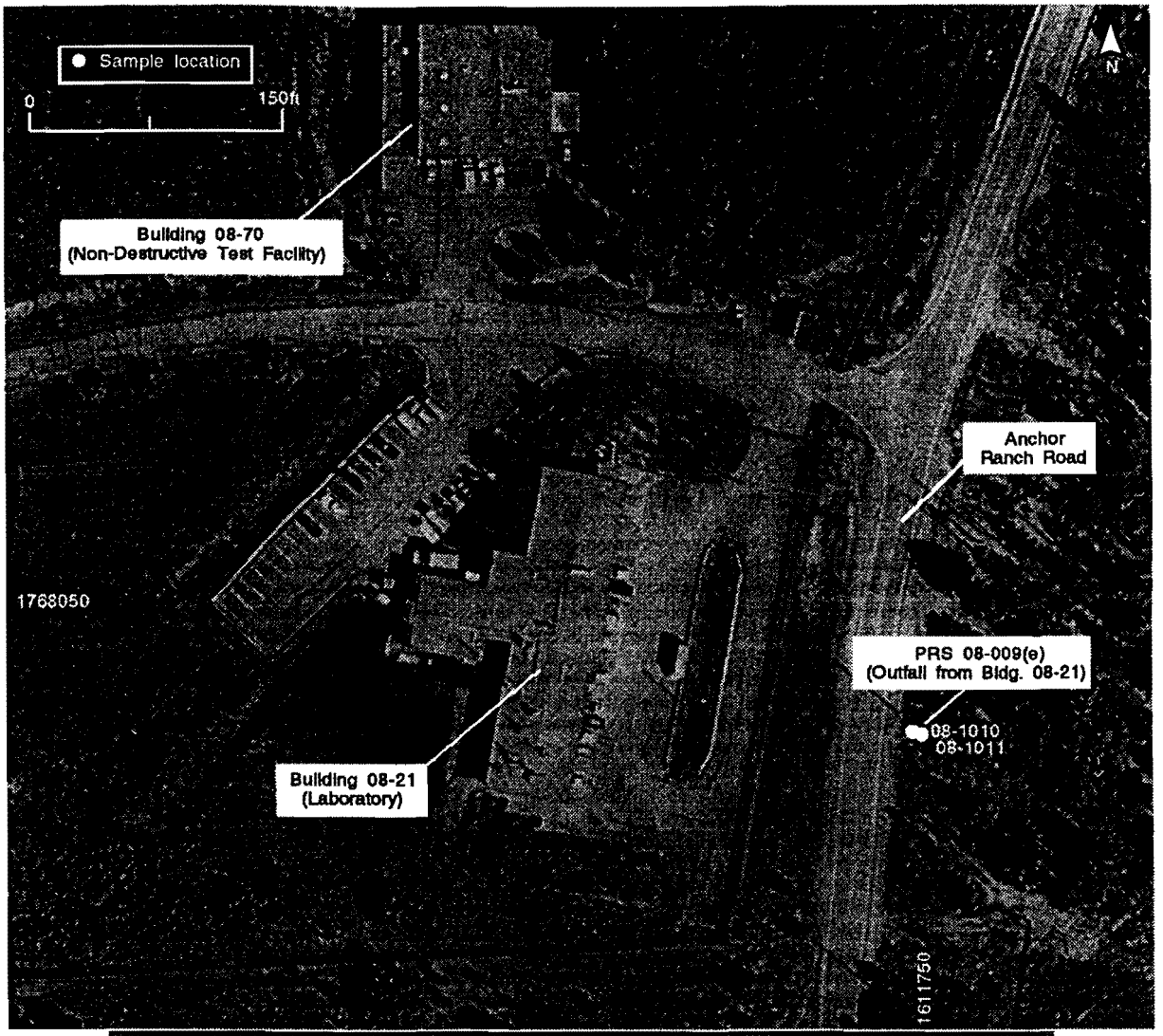
5.3.4 Field Investigation

The objective of the investigation at this PRS was to determine if the potential constituents of concern are present in the outfall area at levels above background and/or threshold levels. The location of sampling points was determined on a biased, judgmental basis in order to maximize the likelihood of detecting contamination in areas of accumulation or retention in the drainage area. See aerial photograph Figure 5-9 and topographical Figure 5-10 for sampling points and the location of PRS 08-009(e) relative to buildings and topographical features.

Two surface (0-0.5 ft.) sediment samples were collected on 3 May 1994, from drainage at 4 ft (08-1010, AAB0868) and 8 ft (08-1011, AAB0869) east and downstream from the end of the Anchor Ranch Road culvert. These sampling locations were selected because of the significant accumulations of sediment in those areas. The ditch, which did not have well defined banks, opened into a small wetlands area. Water from the 8-009(e) outfall was flowing out of the culvert to the ditch at a rate of a few gallons per minute at the time of sampling. The collected sediments were light brown, water-saturated, sandy, clay sediments. Each sampling site was field screened using a PID, HE spot test, and a beta/gamma meter. Field beta/gamma measurements of the samples ranged from 187 to 204 cpm (LANL background, 150-250 cpm); the field PID measurements were <1 ppm for volatile organic compounds. The samples were negative for HE using the HE spot test.

Additional gross alpha/beta screening data were acquired from sample screening performed, prior to sample shipment to the analytical laboratory. Minimum, average, and maximum activities for PRS 08-009(e) samples were 0.93, 1.46, and 4.94 pCi/g alpha and 4.85, 9.3, and 14.9 pCi/g beta, respectively. No LANL background UTL has been established for gross alpha/beta activity; however, these data can be compared to LANL Environmental Surveillance data (1993) for offsite and onsite sampling locations. At seven offsite monitoring locations, minimum, average, and maximum gross alpha activities were 2, 5, and 10 pCi/g; and gross beta activities were 3, 3, and 4 pCi/g. At six onsite monitoring locations, minimum, average, and maximum gross alpha activities were 3, 4, and 8 pCi/g, and gross beta activities were 3, 5, and 8 pCi/g. The relative gross alpha and gross beta activity present in the screened samples would indicate no significant radionuclide contamination at the PRS.

In response to a notice of deficiency, additional soil/sediment samples were collected by hand augering at location 08-1010 on 9 June 1994. The sampling plan stipulated the collection of additional soil/sediments samples at 1-ft depth intervals to a maximum depth of 5 ft or until tuff bedrock was encountered. The sediments from the 1- to 2-ft (AAB2800) and 2- to 3-ft (AAB2801) intervals were water-saturated, anoxic, organic soils, each with a slight hydrogen sulfide odor. Sampling was stopped at 3 ft because the presence of a rock layer prevented further augering. PID measurements at this augered hole were < 1 ppm; the beta/gamma measurements ranged from 226 to 245 cpm (LANL background 150-250 cpm), and the HE spot tests were all negative. See Table 5-24 for a summary of samples taken.



Sample Id	Depth	Analyte	Symbol	Value	Units	Bkgd UTL	SAL
08-1010	0-.5	Ag		25.90	mg/kg	1.61	383.40
08-1010	0-.5	Ag		30.10	mg/kg	1.61	383.40
08-1010	1-2	Ag		20.50	mg/kg	1.61	383.40
08-1010	2-3	Ag		10.30	mg/kg	1.61	383.40
08-1011	0-.5	Ag		7.00	mg/kg	1.61	383.40
08-1010	1-2	Hg		0.18	mg/kg	0.10	23.00
08-1010	2-3	Hg	<	0.13	mg/kg	0.10	23.00
08-1010	0-.5	Zn		82.90	mg/kg	50.80	23003.70
08-1010	0-.5	Zn		95.60	mg/kg	50.80	23003.70
08-1010	1-2	Zn		56.10	mg/kg	50.80	23003.70
08-1010	2-3	Zn		144.00	mg/kg	50.80	23003.70
08-1011	0-.5	Zn		69.30	mg/kg	50.80	23003.70

Figure 5-9. Surrounding features and sample locations for PRS 08-009(e), drains and outfall serving building TA-8-21. Table indicates data results> soil background UTL.

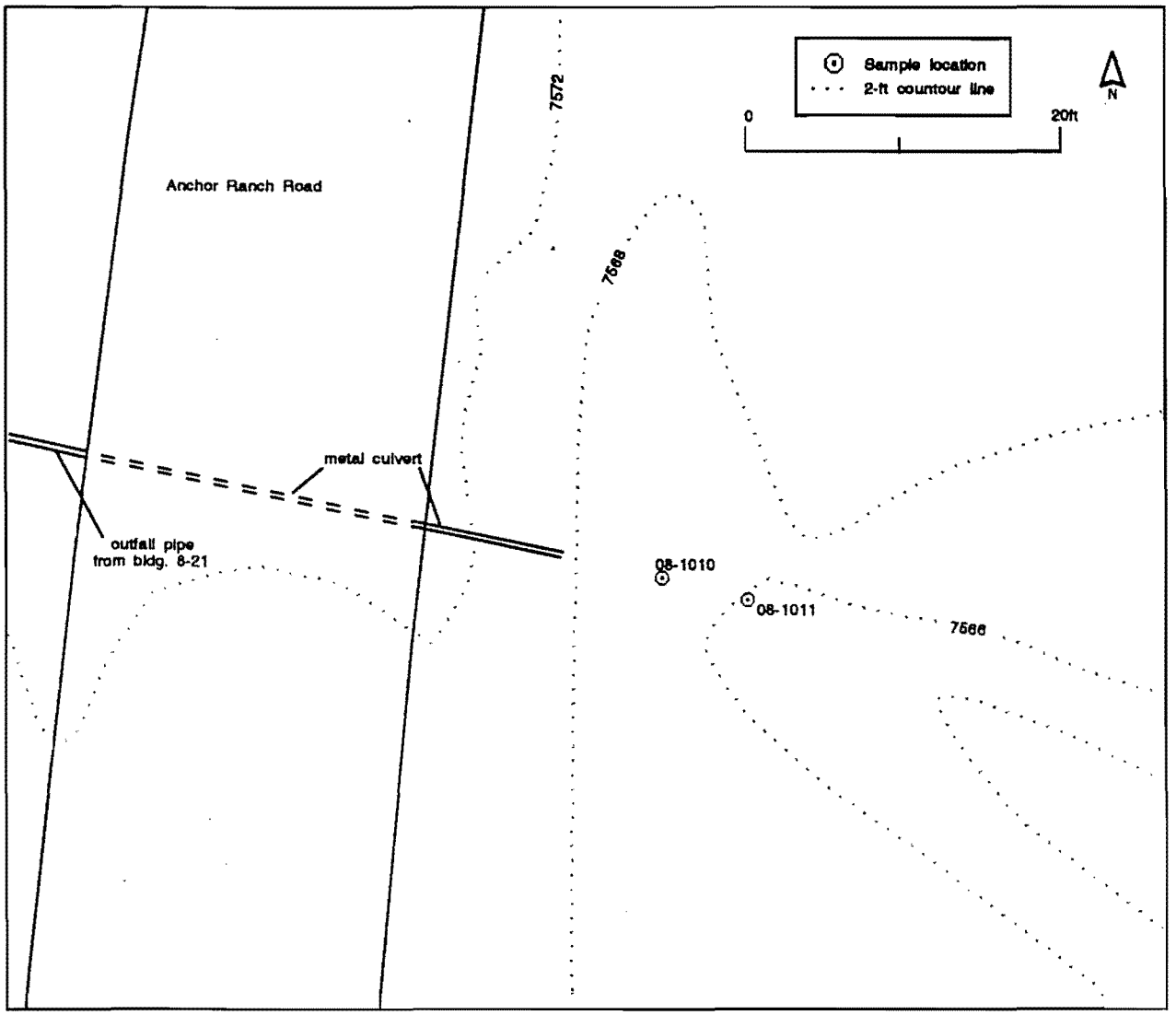


Figure 5-10. Topographic map and sample locations for 08-009(e), drains and outfall serving building TA-8-21. Enlargement of Figure 5-9.

TABLE 5-24
SUMMARY OF SAMPLES TAKEN

LOCATION ID	SAMPLE ID	DEPTH (ft)	MATRIX	VOCs	SVOCs	HE	INORG	RAD
08-1010	AAB0868	0 - 0.5	Soil		X		X	
08-1010	AAB2800	1 - 2	Soil		X		X	
08-1010	AAB2801	2 - 3	Soil		X		X	
08-1011	AAB0869	0 - 0.5	Soil		X		X	

5.3.5 Background Comparison

The analysis of inorganic constituents from samples taken at PRS 08-009(e) indicate that silver, mercury, and zinc are present at levels above LANL background UTL. These are therefore, considered to be COPCs for evaluation in the human health screening assessment (see Table 5-25). Antimony was undetected in all analyses; however, the analytical reporting limit for antimony exceeds its background UTL concentration, and this constituent was included in the screening assessment.

5.3.6 Evaluation of Organic Constituents

No organic constituent analyzed from samples taken at this PRS was found to be present at concentrations exceeding its EQL. Therefore, no organic constituents were carried through the screening assessment.

5.3.7 Human Health Assessment

5.3.7.1 Screening Assessment

The COPCs identified to be greater than LANL background UTL were screened against LANL SALs and submitted for MCE of noncarcinogenic effects. No COPC exceeded its associated SAL, and the sum of the normalized values for the group is 0.27. This is less than the threshold value of 1, which would indicate little potential for adverse effect. This total normalized value includes consideration of the contribution by antimony, which was undetected in all samples but whose reporting limit exceeds the LANL background UTL. The results are summarized in Table 5-26.

5.3.7.2 Risk Assessment

Based on the result of the screening assessment, no risk assessment was performed.

5.3.8 Ecological Assessment

The general landscape condition around this PRS is moderately developed and there is high potential for receptors to come in contact with COPCs. Therefore, this PRS will be included in the ecological risk assessment. An ecological risk assessment that considers contaminants with concentrations greater than UTLs will be conducted when that approach has been approved. Threatened and endangered species and /or sensitive habitat, listed in Chapter 2, will be evaluated in the ecological risk assessment.

TABLE 5-25
INORGANIC RESULTS COMPARED TO BACKGROUND UTL FOR PRS 08-009(e)

Potential Release Site 08-009(e)

Sample Id	Location Id	Depth (ft)	Units	Ag	Al	As	Ba	Be	Ca	Cd	Co
AAB0868	08-1010	0-0.5	mg/kg	25.9	8220	<1.9	95.6	<0.65	2110	<0.76	<3.5
AAB0868D	08-1010	0-0.5	mg/kg	30.1	6052	2.1	86.3	0.38	1931	<0.76	2.6
AAB0869	08-1011	0-0.5	mg/kg	7	4580	<1.2	52.8	<0.38	1720	<0.74	<2.6
AAB2800	08-1010	1-2	mg/kg	20.5	4670	<2	85.5	<0.21	2310	<0.46	<3.2
AAB2801	08-1010	2-3	mg/kg	10.3	15900	3.6	170	<1.4	3990	<0.47	<11.5
Soil SAL			mg/kg	380	77000	NA	5300	NA	NA	38	4600
Soil Bkgd UTL			mg/kg	1.61	38700	7.82	315	1.95	6120	2.7	19.2

Sample Id	Location Id	Depth (ft)	Units	Cr	Cu	Fe	Hg	K	Mg	Mn	Na
AAB0868	08-1010	0-0.5	mg/kg	19.1	11	9590	<0.03	<1030	1610	173	<113
AAB0868D	08-1010	0-0.5	mg/kg	15	11.3	7005	<0.03	868	1367	146	96
AAB0869	08-1011	0-0.5	mg/kg	8.8	8	6370	<0.03	<675	<1150	151	<85.3
AAB2800	08-1010	1-2	mg/kg	10.5	<6.1	6560	0.18	<810	1430	74.5	<269
AAB2801	08-1010	2-3	mg/kg	9.5	8.6	13200	<0.13	1630	2210	305	<126
Soil SAL			mg/kg	210	2800	NA	23	NA	NA	NA	NA
Soil Bkgd UTL			mg/kg	19.3	30.7	21300	0.1	3410	4610	714	915

Sample Id	Location Id	Depth (ft)	Units	Ni	Pb	Sb	Se	Tl	V	Zn	
AAB0868	08-1010	0-0.5	mg/kg	<7.2	21	<5.6	<0.52	<0.52	23	82.9	
AAB0868D	08-1010	0-0.5	mg/kg	6.3	19.8	<5.6	0.93	<0.52	17.5	95.6	
AAB0869	08-1011	0-0.5	mg/kg	<4.8	12.7	<5.4	<0.51	<0.51	14	69.3	
AAB2800	08-1010	1-2	mg/kg	<2.6	10	<5.7	<0.54	<0.54	16.5	56.1	
AAB2801	08-1010	2-3	mg/kg	<5.5	23	<5.7	<0.55	<0.55	24.1	144	
Soil SAL			mg/kg	1500	400	31	380	6.4	540	23000	
Soil Bkgd UTL			mg/kg	15.2	23.3	1	1.7	1	41.9	50.8	

TABLE 5-26
PRS 08-009(e) COMPARISON OF DETECTED CONCENTRATIONS TO SAL FOR NONCARCINOGENIC EFFECTS

Potential Release Site 08-009(e)
Noncarcinogenic Effects

Analyte	Max. Concentration (mg/kg)	Soil SAL (mg/kg)	Normalized to SAL
Ag	30.1	380	0.079
Hg	0.18	23	0.0078
Sb	<5.7	31	<0.18
Zn	144	23000	0.0063
Total			**<0.27**

5.3.9 Extent of Contamination

The objective of this investigation was to perform a site screening to determine if constituents from a historical release were present. The plan was not designed to define the extent of contamination.

5.3.10 Conclusions and Recommendations

No human health COPCs were identified based on the screening of this PRS, and NFA is recommended, based on human health considerations. This recommendation is based on the NFA criterion 4 (Los Alamos National Laboratory, Environmental Restoration Department, Project Consistency Team Policy number 015) which states, "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 risk under the projected future land use. The determination of acceptable risk and future land use has considered stakeholder involvement." An ecological risk assessment that considers contaminants with concentrations greater than UTLs will be conducted when that approach has been approved. A Class III permit modification should be requested to remove this site from the HSWA Module of the RCRA operating permit.

5.3.11 Sampling and Analysis Plan for PRS 08-009(e)

Due to the Conclusions and Recommendations presented for this PRS, no further investigation requiring a sampling and analysis plan is necessary at this time.

5.4 Far Point Set: PRS 09-001(a) and PRS 09-001(b)

The Far Point firing site is located approximately 300 ft north of Buildings TA-9-36 and-40. The Far Point set consists of two firing control chambers, buildings TA 9-4 and TA 9-5, which were used to shelter personnel during firing tests conducted in an open meadow between the two chambers. As stated in the work plan, these buildings would not have been contaminated because no potential contaminants would have been present;

however the firing site, TA-9-57, located in the open meadow was investigated as part of Phase 1. TA-9-4 and 9-5 were removed in 1965.

Based on the human health screening assessment, NFA is recommended for this PRS set.

5.4.1 History

The Far Point firing site was used for testing explosive charges. The explosive shots were conducted on a concrete pad with a protective barrier, which reflected debris to the southeast, and contaminants may have been scattered in that direction from the pad.

Materials used for shots fired at PRS 09-001(a) include: steel, torpex, tamped tetryl, composition B, pentolite, aluminum, depleted uranium, beryllium, and tungsten carbide. Major contaminants expected to be present in the soil are depleted uranium, HE, and beryllium (LANL 1993, 1092).

A plastic-bonded explosive (PBX), which contained barium, RDX, polystyrene, and dioctyl phthalate, was developed and tested at the PRS 09-001(b) site. This PRS set is discussed in detail in Sections 5.6.1 and 6.6.4 of the RFI work (LANL 1993, 1092).

5.4.2 Description

No further site specific information on geology, hydrology, soils, or wildlife habitat associated with this PRS Set is required.

5.4.3 Previous Investigation

No previous investigations have been performed at this site.

5.4.4 Field Investigation

The objective of this investigation was to determine if the maximum concentration of any analytical parameter associated with activities at the PRS set exceeds both background and risk-based thresholds. The potential constituents of concern for analysis of the soils at the firing site were inorganics, high explosives, and semivolatile organics. Although depleted uranium was identified in the work plan as a major contaminant expected to be present at the site, no specific analysis from this constituent was performed. The firing site was a ground surface, outdoor facility that could have hazardous materials scattered over a wide area. Therefore, residual surface or near-surface soil contamination may be present at the firing site.

The sampling program was designed to acquire a sufficient number of samples to result in a 95% probability of detecting contamination, if as much as 30 percent of the area is contaminated. Ten randomly placed samples were required to meet the sampling objectives. Instead, the placement of the ten samples was biased toward the firing pad in order to exceed the objectives. Surface soil samples were collected in the vicinity of the firing pad associated with PRS 09-001 (a) and (b) analyzed for constituents that may have been scattered during firing experiments. See aerial photograph Figure 5-11 and topographical Figure 5-12 for the location of the PRS, general site surroundings, and sampling locations.

The sampling sites were selected within a 75-ft radius of the firing pad. Because a barrier at the firing pad directed debris to the southeast, the sample locations were restricted to a semicircular area oriented in that direction. Surface soil (0-0.5 ft) was selected as the

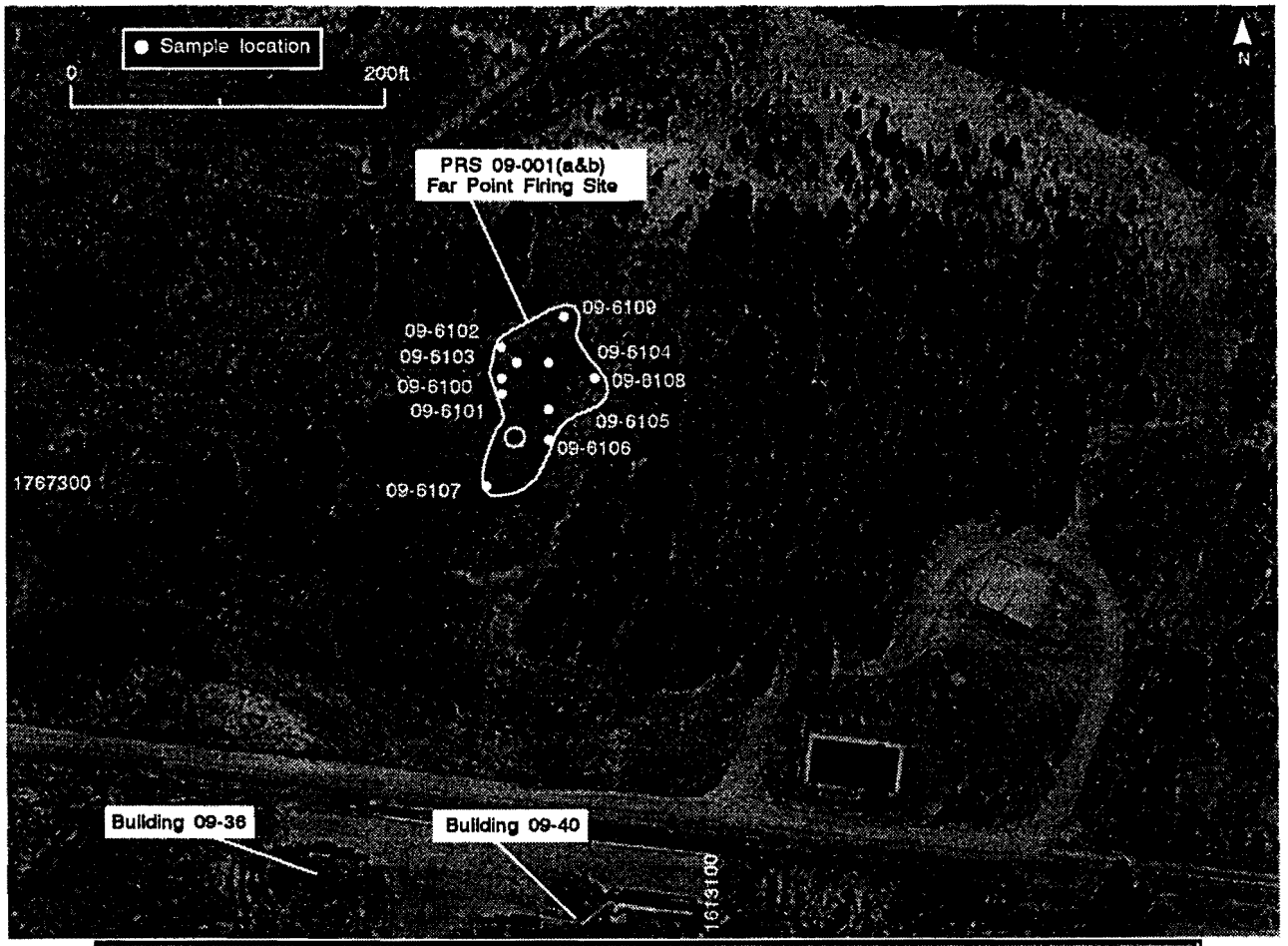
medium for sampling due to the likelihood that any contamination from test firings at these sites would have been deposited on the surface.

Ten surface soil samples (AAB0748 through AAB0757) and one field replicate (AAB0758) were collected on 19 April 1994, from a 10-ft by 10-ft sampling grid, which was land surveyed over the TA-9 Far Point Firing Site. The sample locations were identified as 09-6100 to 09-6109. See Table 5-27 for a summary of samples taken. Each sampling site was field screened using a PID, HE spot test, and a beta/gamma meter. The PID measurements were < 1 ppm, the beta/gamma measurements ranged from 217 to 283 cpm (which were within or near the LANL background of 150-250 cpm), and the HE spot tests were negative.

Additional gross alpha/beta screening data were acquired from sample screening performed prior to shipment of the samples to the analytical laboratory. Minimum, average, and maximum radioactivities for PRS 09-001 (a) and (b) samples were 0.34, 4.4, and 11.7 pCi/g gross alpha and 4.7, 11.2, and 20.7 pCi/g gross beta. No LANL background UTL has been established for gross alpha or gross beta activity; however, these data can be compared to LANL Environmental Surveillance data (1993) for offsite and onsite sampling locations. At seven offsite monitoring locations, minimum, average, and maximum gross alpha activities were 2, 5, and 10 pCi/g, and gross beta activities were 3, 3, and 4 pCi/g. At six onsite monitoring locations minimum, average and maximum gross alpha activities were 3, 4, and 8 pCi/g; and gross beta activities were 3, 5, and 8 pCi/g. The gross alpha and gross beta activities present in the screened samples would indicate no significant radionuclide contamination at the PRS.

TABLE 5-27
SUMMARY OF SAMPLES TAKEN

LOCATION ID	SAMPLE ID	DEPTH (ft)	MATRIX	VOCs	SVOCs	HE	INORG	RAD
09-6100	AAB0748	0 - 0.5	Soil		X	X	X	
09-6101	AAB0749	0 - 0.5	Soil		X	X	X	
09-6102	AAB0750	0 - 0.5	Soil		X	X	X	
09-6103	AAB0751	0 - 0.5	Soil		X	X	X	
09-6104	AAB0752	0 - 0.5	Soil		X	X	X	
09-6105	AAB0753	0 - 0.5	Soil		X	X	X	
09-6106	AAB0754	0 - 0.5	Soil		X	X	X	
09-6107	AAB0755	0 - 0.5	Soil		X	X	X	
09-6108	AAB0756	0 - 0.5	Soil		X	X	X	
09-6109	AAB0757	0 - 0.5	Soil		X	X	X	
09-6109	AAB0758	0 - 0.5	Soil		X	X	X	



Loc. Id.	Depth (ft)	Analyte	Value	Bkgd (mg)	SAL	Units
09-6108	0-.5	Ba	525.00	315.00	5340.00	mg/kg
09-6106	0-.5	Ca	8390.00	6120.00	NA	mg/kg
09-6101	0-.5	Cu	33.40	30.70	2848.2	mg/kg
09-6105	0-.5	Cu	70.50	30.70	2848.2	mg/kg
09-6107	0-.5	Cu	32.40	30.70	2848.2	mg/kg
09-6108	0-.5	Cu	71.90	30.70	2848.2	mg/kg
09-6105	0-.5	Pb	33.90	23.30	400	mg/kg
09-6105	0-.5	Zn	142.00	50.80	23003.7	mg/kg
09-6106	0-.5	Zn	58.10	50.80	23003.7	mg/kg
09-6108	0-.5	Zn	65.50	50.80	23003.7	mg/kg
09-6109	0-.5	Zn	121.00	50.80	23003.7	mg/kg
09-6109	0-.5	Zn	112.00	50.80	23003.7	mg/kg

Figure 5-11. Surrounding features and sample locations for PRS 09-001(a), (b), firing sites. Table indicates data results > soil background UTL.

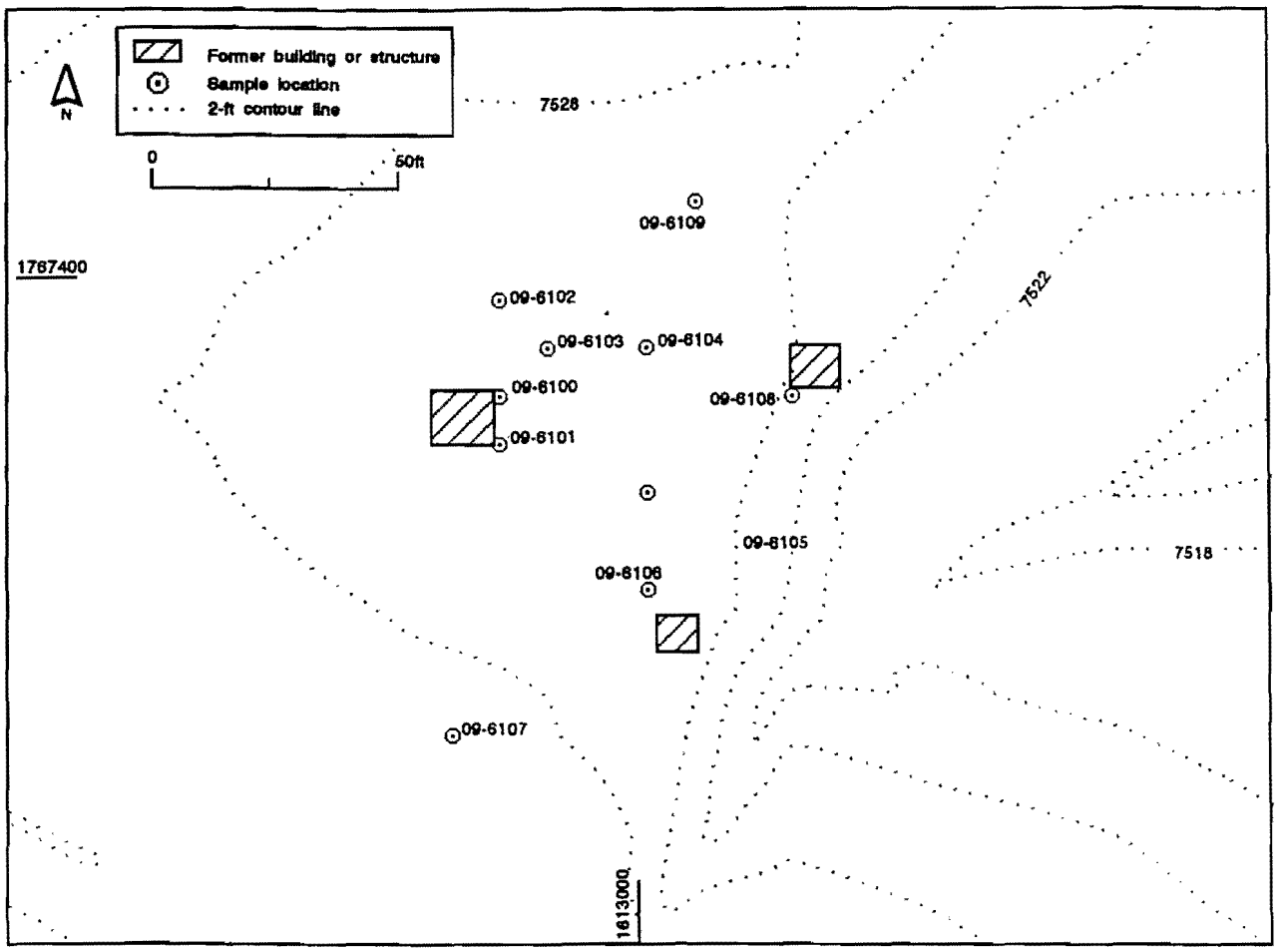


Figure 5-12. Topographic map and sample locations for PRS 09-001(a), (b), firing sites. Enlargement of Figure 5-11.

5.4.5 Background Comparison

The analysis of inorganic constituents from samples taken at PRS 09-001(a) and (b) indicate that barium, copper, lead, and zinc are present at levels above LANL background UTL (see Table 5-28). These are, therefore, considered to COPCs for evaluation in the human health screening assessment. Antimony was undetected in all analyses; however, the analytical reporting limit for antimony exceeds its background UTL concentration, and this constituent was included in the screening assessment. Calcium was also detected in one sample; however, it was not carried forward to the screening assessment due to the fact that it is an essential nutrient with no SAL and no toxic effects.

5.4.6 Evaluation of Organic Constituents

Review of the FIMAD database indicated that no organic constituent analyzed from samples taken at this PRS was found to be present at concentrations exceeding its estimated quantitation limit. Therefore, no organic constituents were carried through the screening assessment.

5.4.7 Human Health Assessment.

5.4.7.1 Screening Assessment.

The COPCs identified to be greater than LANL background UTL were screened against LANL SALs and submitted for MCE of noncarcinogenic effects (see Table 5-29). No COPC exceeded its associated SAL, and the sum of the normalized values for the group is <0.39. This is less than the threshold value of 1, which would indicate little potential for adverse effect. This total normalized value includes consideration of the contribution by antimony, which was undetected in all sarnples but whose reporting limit exceeds the LANL background UTL. The results are summarized in Table 5-29.

5.4.7.2 Risk Assessment.

Based on the result of the screening assessment, no risk assessment was performed.

5.4.8 Ecological Assessment

The general landscape condition around this PRS is moderately developed and there is high potential for receptors to come in contact with contaminants. Therefore, this PRS will be included in the ecological risk assessment. An ecological risk assessment that considers contaminants with concentrations greater than UTLs will be conducted when that approach has been approved. Threatened and endangered species and /or sensitive habitat, listed in Chapter 2, will be evaluated in the ecological risk assessment.

5.4.9 Extent of Contamination

The objective of this investigation was to perform a site screening to determine if constituents from a historical release were present. The plan was not designed to define the extent of contamination.

TABLE 5-28
INORGANIC RESULTS COMPARED TO BACKGROUND UTL FOR PRS SET 09-001(a) AND (b)

Potential Release Site 09-001(a) & (b)

Sample Id	Location Id	Depth (ft)	Units	Ag	Al	As	Ba	Be	Ca	Cd	Co
AAB0748	09-6100	0-0.5	mg/kg	<0.66	6310	<1.9	253	<0.57	1890	<0.68	<4.2
AAB0749	09-6101	0-0.5	mg/kg	<0.64	8050	<1.8	264	<0.64	1930	<0.66	<5.6
AAB0750	09-6102	0-0.5	mg/kg	<0.67	7450	<2	196	<0.67	2040	<0.69	<5.9
AAB0751	09-6103	0-0.5	mg/kg	<0.63	8940	<3.1	311	<0.71	2000	<0.66	<5.4
AAB0752	09-6104	0-0.5	mg/kg	<0.66	7480	<2.6	313	<0.68	2240	<0.69	<5.4
AAB0753	09-6105	0-0.5	mg/kg	<0.64	7220	<1.9	291	<0.61	2870	<0.66	<5.4
AAB0754	09-6106	0-0.5	mg/kg	<0.68	9250	<1.9	313	<0.74	8390	<0.7	<5.1
AAB0755	09-6107	0-0.5	mg/kg	<0.66	8110	<1.9	197	<0.68	2580	<0.68	<4.8
AAB0756	09-6108	0-0.5	mg/kg	<0.62	7710	<1.8	525	<0.59	2180	<0.64	<4.1
AAB0757	09-6109	0-0.5	mg/kg	<0.67	7500	<1.9	310	<0.62	2220	<0.69	<4.8
AAB0758	09-6109	0-0.5	mg/kg	<0.66	7060	<1.9	306	<0.62	2040	<0.68	<5
Soil SAL			mg/kg	380	77000	NA	5300	NA	NA	38	4600
Soil Bkgd UTL			mg/kg	1.61	38700	7.82	315	1.95	6120	2.7	19.2

Sample Id	Location Id	Depth (ft)	Units	Cr	Cu	Fe	Hg	K	Mg	Mn	Na
AAB0748	09-6100	0-0.5	mg/kg	5.3	30.5	7190	<0.03	1220	1180	310	<80.2
AAB0749	09-6101	0-0.5	mg/kg	5.9	33.4	8010	<0.03	1520	1490	366	101
AAB0750	09-6102	0-0.5	mg/kg	5.5	27.7	7790	<0.03	1310	1390	372	<79.3
AAB0751	09-6103	0-0.5	mg/kg	6.5	29.8	8480	<0.03	1600	1590	344	<81.9
AAB0752	09-6104	0-0.5	mg/kg	5.1	25.4	8200	<0.03	1430	1410	380	<80.3
AAB0753	09-6105	0-0.5	mg/kg	5	70.5	7810	<0.03	1260	1400	350	<124
AAB0754	09-6106	0-0.5	mg/kg	6.9	29.8	8870	<0.03	1390	1640	369	<88.4
AAB0755	09-6107	0-0.5	mg/kg	6	32.4	7800	<0.03	1590	1390	326	<74.9
AAB0756	09-6108	0-0.5	mg/kg	4.9	71.9	7730	<0.04	<1090	1510	325	<111
AAB0757	09-6109	0-0.5	mg/kg	5.3	23.4	8010	<0.03	1270	1550	357	<109
AAB0758	09-6109	0-0.5	mg/kg	4.9	21.8	7580	<0.03	1210	1410	334	<95.5
Soil SAL			mg/kg	210	2800	NA	23	NA	NA	NA	NA
Soil Bkgd UTL			mg/kg	19.3	30.7	21300	0.1	3410	4610	714	915

Sample Id	Location Id	Depth (ft)	Units	Ni	NO3	Pb	Sb	Se	Tl	V	Zn
AAB0748	09-6100	0-0.5	mg/kg	<4	6.6	23.2	<5	<0.47	<0.47	15	35.8
AAB0749	09-6101	0-0.5	mg/kg	<5.4	1.3	19.7	<4.8	<0.46	<0.46	16.9	46.2
AAB0750	09-6102	0-0.5	mg/kg	<5.5	<0.6	20.6	<5.1	<0.48	<0.48	17	40.8
AAB0751	09-6103	0-0.5	mg/kg	<5.6	0.7	20.1	<4.8	<0.45	<0.45	18.1	36.5
AAB0752	09-6104	0-0.5	mg/kg	<6.6	0.8	21	<5	<0.47	<0.47	17.6	37.4
AAB0753	09-6105	0-0.5	mg/kg	<4.7	0.6	33.9	<4.8	<0.46	<0.46	16.9	142
AAB0754	09-6106	0-0.5	mg/kg	<5.5	9.5	17.8	<5.2	<0.54	<0.49	17.6	58.1
AAB0755	09-6107	0-0.5	mg/kg	<4.3	3.3	16.3	<5	<0.98	<0.47	16.5	39
AAB0756	09-6108	0-0.5	mg/kg	<4.8	<0.6	17.3	<4.7	<0.44	<0.44	16.9	65.5
AAB0757	09-6109	0-0.5	mg/kg	<4.8	1.8	17.4	<5	<0.62	<0.48	17.4	121
AAB0758	09-6109	0-0.5	mg/kg	<4.3	1.6	19.5	<5	<0.54	<0.47	16.3	112
Soil SAL			mg/kg	1500	100000	400	31	380	6.4	540	23000
Soil Bkgd UTL			mg/kg	15.2	NA	23.3	1	1.7	1	41.9	50.8

TABLE 5-29
PRS 09-001 (a) and (b) COMPARISON OF DETECTED CONCENTRATIONS TO SAL FOR NONCARCINOGENIC EFFECTS

Potential Release Site 09-001(a) and 09-001(b)
Noncarcinogenic Effects

Analyte	Max. Concentration (mg/kg)	Soil SAL (mg/kg)	Normalized to SAL
Ba	525	5300	0.099
Cu	71.9	2800	0.026
Pb	33.9	400	0.085
Sb	<5.2	31	<0.17
Zn	142	23000	0.0062
Total			**<0.39**

5.4.10 Conclusions and Recommendations

No human health COPCs were identified based on the screening of this PRS, and NFA is recommended, based on human health considerations. This recommendation is based on the NFA criterion 4 (Los Alamos National Laboratory, Environmental Restoration Department, Project Consistency Team Policy number 015) which states, "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 risk under the projected future land use. The determination of acceptable risk and future land use has considered stakeholder involvement." An ecological risk assessment that considers contaminants with concentrations greater than UTLs will be conducted when that approach has been approved. A Class III permit modification should be requested to remove these sites from the HSWA Module of the Laboratory's RCRA operating permit.

Radiologic constituents not regulated under RCRA may be evaluated further by DOE for additional management activities.

5.4.11 Sampling and Analysis Plan for PRS 09-001 (a) and (b)

Due to the Conclusions and Recommendations presented for this PRS, no further investigation requiring a sampling and analysis plan is necessary at this time.

5.5 Old Anchor East Set: PRS 09-001(d), 09-003(g), 09-003(h), and 09-003(i).

This PRS set was associated with decommissioned buildings TA-9-1, TA-9-2, TA-9-3, and TA-9-13. The set was grouped as a result of the past activities and subsequent demolition and decommissioning associated with the buildings. The sampling plan was designed to characterize the bulk surface soils in the area of the decommissioned buildings. These soils may have been contaminated by releases from firing site 09-

001(d) and from the redistribution of potentially contaminated soils following the facility's demolition and retrieval of underground sumps and pipe at PRSs 09-003(g), 09-003(h), and 09-003(i).

This PRS set is recommended for NFA.

5.5.1 History

This PRS set is located in an area of the Laboratory that was previously used for HE research, development, and testing. Therefore, the COPCs were HE but also included inorganics, semivolatiles, and gross alpha and gross beta.

Potential Release Site 09-001(d) includes the area of decommissioned building TA-9-1 (formerly A-2), an x-ray facility that was used to study implosions of small spherical charges. Associated with the facility were two firing areas, one open and the other enclosed. The open chamber is believed to have had a 3-lb limit for explosive test shots and tested positive for radioactive contamination (^{238}U) in the walls, ceiling, and floors. Both chambers were roofed. Building TA-9-1 was flashed (i.e., quick burn at high temperature to eliminate HE), and the open firing chamber was taken to Mesita del Buey and buried (LANL 1993, 1092).

Potential Release Site 09-003(g) consists of an area of previously decommissioned sumps and pipes associated with building TA-9-2. This building was a dark room and boiler plant built in 1943 and in use until 1947. The building was intentionally destroyed by fire in January 1960, and the associated sumps and pipes were removed in 1965 (LANL 1993, 1092).

Potential Release Site 09-003(h) consists of an area of previously decommissioned sumps and pipes associated with building TA-9-3. The building was variously used as an HE-casting facility; as a magazine; to store solvents; and to process, press and machine explosives. Hazardous materials used at TA-9-3 included solvents, cyanogen, acid baths, plasticizer, depleted uranium, and organics. The building was also used for a period of time to store radioactive-contaminated equipment. The building was abandoned in place in 1959 and was destroyed in 1965 with the removal of the concrete floors, sump, drains, and walls (LANL 1993, 1092).

Potential Release Site 09-003(i) consists of an area of previously decommissioned sumps and pipes associated with building TA-9-13. This building was referred to in site documents as a machine shop and as the Charge Preparation Building. It was used from 1945 to 1956 for HE research and development and was considered to be HE-contaminated, including the sump and drains. The building was scheduled for destruction by flashing in 1960 but failed to flash. The building was burned in 1965, and its associated sump and drains were removed, cleaned, and disposed of at Mesita del Buey (LANL 1993, 1092).

These PRSs are discussed in further detail in Sections 5.5.1. and 6.5.6 of the RFI work plan (LANL 1993, 1092).

5.5.2 Description

No further site specific information on geology, hydrology, soils, or wildlife habitat associated with this PRS set is required.

5.5.3 Previous Investigation

No previous investigations have been performed at this site.

5.5.4 Field Investigation

The investigation of this PRS set utilized a bulk soil sampling strategy, which is based on the premise that previous release mechanisms may have resulted in the distribution of materials on the surrounding soil surface. Earthmoving activities resulting from the D&D (decontamination and decommissioning) of these facilities may have further distributed these materials across the surrounding landscape.

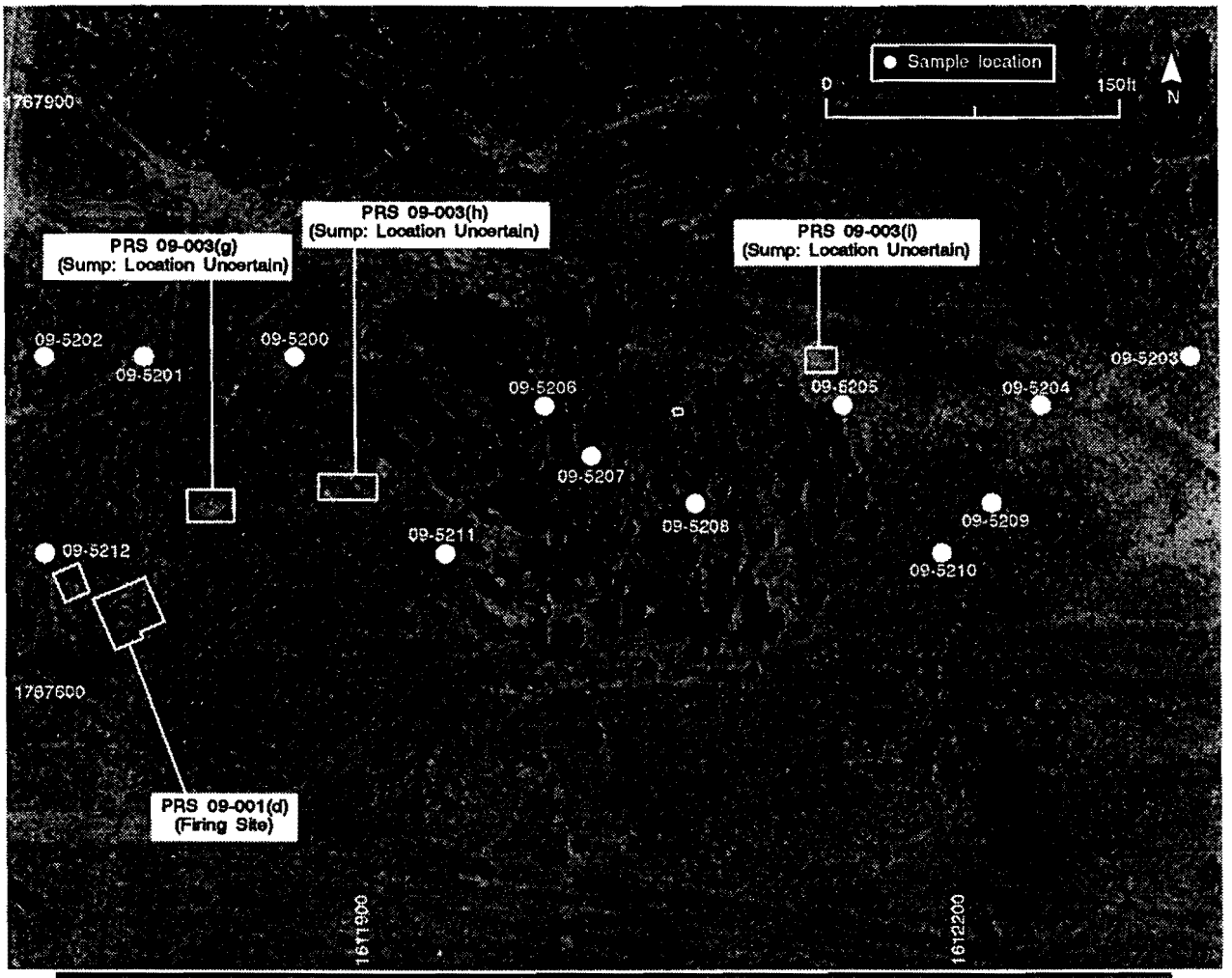
The constituents of concern were identified as: inorganics, HE, and semivolatile organics. Although depleted uranium was identified as being associated with two PRSs in the set, specific radionuclide analysis was not requested in the work plan. Gross alpha and gross beta screening analysis was performed, and the results are reported in this section.

The sampling plan was designed so that if 25% of the area is contaminated, there is, at most, a 5% probability of failing to detect the contamination. The sampling design for this PRS Set called for 13 randomly placed samples. Aerial photograph Figure 5-13 shows the location of the individual PRSs, general site surroundings, and sampling locations.

The potential for release from the facilities was evaluated by random sampling of the bulk distributed soils and by judgmental sampling of unvegetated areas that may be associated with the PRS set.

Thirteen surface (AAB0770 to AAB0782) soil samples and one field replicate (AAB0783) were collected on 21 April 1994, from a 25-ft by 25-ft sampling grid, which was land-surveyed over the TA-9 Decommissioned Area as described in the RFI work plan (LANL 1993, 1092). The sample locations were identified as 09-5200 to 09-5212. See Table 5-30 for a summary of samples taken. Each sampling site was field screened using a PID, HE spot test, and a beta/gamma meter. The PID measurements were < 1 ppm; the beta/gamma measurements ranged from 187 to 323 cpm, which were within or near the LANL background of 150-250 cpm. The HE spot tests were all negative.

Additional gross alpha and gross beta screening data were acquired from sample screening performed prior to sample shipment to the analytical laboratory. Minimum, average, and maximum activities for PRS 09-001(d) and 09-003(g) samples were 1.05, 2.6, and 6.25 pCi/g gross alpha and 10.1, 17.5, and 27.1 pCi/g gross beta. No LANL background UTL has been established for gross alpha /beta activity; however, these data can be compared to LANL Environmental Surveillance data (1993) for offsite and onsite sampling locations. At seven offsite monitoring locations minimum, average, and maximum gross alpha activities were 2, 5, and 10 pCi/g, and gross beta activities were 3, 3, and 4 pCi/g. At six onsite monitoring locations minimum, average, and maximum gross alpha activities were 3, 4, and 8 pCi/g; and gross beta activities were 3, 5, and 8 pCi/g. The relative gross alpha and gross beta activity present in the screened samples would indicate no significant radionuclide contamination at the PRS.



Location	Depth (ft)	Analyte	Value	Background	BAV	Units
09-5200	0-.5	Ag	7.50	1.61	383.4	mg/kg
09-5200	0-.5	Ag	7.80	1.61	383.4	mg/kg
09-5204	0-.5	Ag	2.50	1.61	383.4	mg/kg
09-5208	0-.5	Ca	7880.00	6120.00	NA	mg/kg
09-5212	0-.5	Ca	8900.00	6120.00	NA	mg/kg
09-5206	0-.5	Cd	14.00	2.70	38.4	mg/kg
09-5202	0-.5	Hg	0.25	0.10	23	mg/kg
09-5200	0-.5	Pb	37.00	23.30	400	mg/kg
09-5200	0-.5	Pb	37.20	23.30	400	mg/kg
09-5202	0-.5	Pb	27.20	23.30	400	mg/kg
09-5209	0-.5	Pb	35.50	23.30	400	mg/kg
09-5210	0-.5	Pb	44.30	23.30	400	mg/kg
09-5212	0-.5	Pb	25.20	23.30	400	mg/kg
09-5200	0-.5	Zn	56.60	50.80	23003.7	mg/kg
09-5200	0-.5	Zn	54.41	50.80	23003.7	mg/kg
09-5206	0-.5	Zn	177.00	50.80	23003.7	mg/kg
09-5208	0-.5	Zn	60.30	50.80	23003.7	mg/kg
09-5209	0-.5	Zn	57.30	50.80	23003.7	mg/kg
09-5212	0-.5	Zn	72.40	50.80	23003.7	mg/kg
09-5212	0-.5	Zn	104.00	50.80	23003.7	mg/kg

Figure 5-13. Surrounding features and sample locations for PRS 09-001(d), 09-003(g), (h), and (i) firing site and sumps. Table indicates data results > soil background UTL.

TABLE 5-30
SUMMARY OF SAMPLES TAKEN

LOCATION ID	SAMPLE ID	DEPTH (ft)	MATRIX	VOCs	SVOCs	HE	INORG	RAD
09-5200	AAB0770	0 - 0.5	Soil		X	X	X	
09-5201	AAB0771	0 - 0.5	Soil		X	X	X	
09-5202	AAB0772	0 - 0.5	Soil		X	X	X	
09-5203	AAB0773	0 - 0.5	Soil		X	X	X	
09-5204	AAB0774	0 - 0.5	Soil		X	X	X	
09-5205	AAB0775	0 - 0.5	Soil		X	X	X	
09-5206	AAB0776	0 - 0.5	Soil		X	X	X	
09-5207	AAB0777	0 - 0.5	Soil		X	X	X	
09-5208	AAB0778	0 - 0.5	Soil		X	X	X	
09-5209	AAB0779	0 - 0.5	Soil		X	X	X	
09-5210	AAB0780	0 - 0.5	Soil		X	X	X	
09-5211	AAB0781	0 - 0.5	Soil		X	X	X	
09-5212	AAB0782	0 - 0.5	Soil		X	X	X	
09-5212	AAB0783	0 - 0.5	Soil		X	X	X	

5.5.5 Background Comparison

The analysis of inorganic constituents from samples taken during the bulk cover soils sampling indicate that silver, calcium, cadmium, mercury, lead, and zinc are present at levels above LANL background UTL (see Table 5-31). These are, therefore, considered to be COPCs for evaluation in the human health screening assessment. Antimony was undetected in all analyses; however, the analytical reporting limit for antimony exceeds its background UTL concentration, and this constituent was included in the screening assessment.

5.5.6 Evaluation of Organic Constituents

Review of the FIMAD database indicated that no organic constituent analyzed from samples taken during the bulk cover soils sampling was found to be present at concentrations exceeding its EQL. Therefore, no organic constituents were carried through the screening assessment.

5.5.7 Human Health Assessment

5.5.7.1 Screening Assessment

The COPCs identified to be greater than LANL background UTL were screened against LANL SALs and submitted for MCE of noncarcinogenic effects. No COPC exceeded its associated SAL, and the total normalized value for the group is <0.72 (see Table 5-32). This is less than the threshold value of 1, which would indicate little potential for adverse effect. This total normalized value includes consideration of the contribution by antimony, which was undetected in all samples but whose reporting limit exceeds the LANL background UTL.

TABLE 5-31
INORGANIC RESULTS COMPARED TO BACKGROUND UTL FOR THE OLD ANCHOR EAST SET

Old Anchor East Set: Potential Release Sites 09-001(d), 09-003(g), 09-003(h), and 09-003(i)

Sample Id	Location Id	Depth (ft)	Units	Ag	Al	As	Ba	Be	Ca	Cd	Cyanide	Co
AAB0770	09-5200	0-0.5	mg/kg	7.5	9220	2.8	141	<0.69	1890	<0.64	<0.55	<6.3
AAB0770D	09-5200	0-0.5	mg/kg	7.8	8693	2.75	133	0.69	1723	<0.64	NA	4.9
AAB0771	09-5201	0-0.5	mg/kg	<0.6	4580	<0.97	86.4	<0.64	1960	<0.62	<0.53	<4.6
AAB0772	09-5202	0-0.5	mg/kg	<0.82	4980	<2.7	135	<0.51	4630	<0.84	<0.73	<2.7
AAB0773	09-5203	0-0.5	mg/kg	<0.61	7850	2.2	122	<0.69	1450	<0.64	<0.55	<7
AAB0774	09-5204	0-0.5	mg/kg	2.5	9480	2.4	120	<0.68	1920	<0.63	<0.54	<4.8
AAB0775	09-5205	0-0.5	mg/kg	<0.62	13200	2.8	164	<1.1	1940	<0.64	<0.55	<6.1
AAB0776	09-5206	0-0.5	mg/kg	<0.88	15600	3.4	160	<1.2	4090	14	<0.65	<5.7
AAB0777	09-5207	0-0.5	mg/kg	<1	14200	3.2	133	<1.1	2580	<0.69	<0.59	<6.1
AAB0778	09-5208	0-0.5	mg/kg	<0.63	13400	3.3	119	<1	7880	<0.65	<0.56	<4.7
AAB0779	09-5209	0-0.5	mg/kg	<0.61	7250	<1.8	135	<0.69	1630	<0.63	<0.55	<6.5
AAB0780	09-5210	0-0.5	mg/kg	<0.63	6900	<2	118	<0.71	1540	<0.66	<0.57	<5.8
AAB0781	09-5211	0-0.5	mg/kg	<0.62	5600	<1.2	91.9	<0.66	2110	<0.64	<0.55	<3.4
AAB0782	09-5212	0-0.5	mg/kg	<0.65	11000	2.5	127	<1	5360	<0.68	<0.58	<5.3
AAB0783	09-5212	0-0.5	mg/kg	<0.65	13200	2.6	149	<1.1	8900	<0.67	NA	<5.7
Soil SAL			mg/kg	380	77000	NA	5300	NA	NA	38	1300	4600
Soil Bkgd UTL			mg/kg	1.61	38700	7.82	315	1.95	6120	2.7	NA	19.2

Sample Id	Location Id	Depth (ft)	Units	Cr	Cu	Fe	Hg	K	Mg	Mn	Na
AAB0770	09-5200	0-0.5	mg/kg	6.4	10.7	11800	<0.04	1360	1370	434	<74.2
AAB0770D	09-5200	0-0.5	mg/kg	6.5	10.9	10216	0.04	1304	1339	391	66
AAB0771	09-5201	0-0.5	mg/kg	4.7	<5	4910	<0.03	<800	<1010	126	<161
AAB0772	09-5202	0-0.5	mg/kg	3	8.7	11200	0.25	<1330	<1330	162	<73.2
AAB0773	09-5203	0-0.5	mg/kg	6.4	6.1	9780	<0.03	1480	1430	482	<70
AAB0774	09-5204	0-0.5	mg/kg	7.6	7.1	12000	<0.03	1300	1430	339	<73.1
AAB0775	09-5205	0-0.5	mg/kg	9	6	12600	<0.03	1700	1790	474	<68.4
AAB0776	09-5206	0-0.5	mg/kg	10.4	13.6	14900	<0.05	2790	2730	354	<82
AAB0777	09-5207	0-0.5	mg/kg	9.8	9.3	12800	<0.03	1890	2290	365	<57.9
AAB0778	09-5208	0-0.5	mg/kg	7.5	12.3	12500	<0.03	1620	2190	281	<56.4
AAB0779	09-5209	0-0.5	mg/kg	6.5	8.5	9710	<0.03	1710	1350	524	<47.9
AAB0780	09-5210	0-0.5	mg/kg	5.4	7.3	8770	<0.03	1330	1230	515	<54.7
AAB0781	09-5211	0-0.5	mg/kg	4.7	7.7	8020	<0.03	<968	<1060	345	<77.3
AAB0782	09-5212	0-0.5	mg/kg	7.8	27.4	10700	<0.03	1710	1800	354	<63.4
AAB0783	09-5212	0-0.5	mg/kg	8	27.8	13100	<0.03	2000	2210	369	<74.4
Soil SAL			mg/kg	210	2800	NA	23	NA	NA	NA	NA
Soil Bkgd UTL			mg/kg	19.3	30.7	21300	0.1	3410	4610	714	915

Sample Id	Location Id	Depth (ft)	Units	Ni	N03	Pb	Sb	Se	Tl	V	Zn
AAB0770	09-5200	0-0.5	mg/kg	<5.9	6.4	37	<4.7	<0.45	<0.44	24.6	56.6
AAB0770D	09-5200	0-0.5	mg/kg	4.4	NA	37.2	<4.7	0.49	<0.44	18.5	54.41
AAB0771	09-5201	0-0.5	mg/kg	<4.6	<0.5	17.4	<4.5	<0.43	<0.43	12.5	22.8
AAB0772	09-5202	0-0.5	mg/kg	<4.6	45	27.2	<6.2	<0.58	<0.58	<9.1	28.8
AAB0773	09-5203	0-0.5	mg/kg	<5.3	5.1	16.3	<4.6	<0.44	<0.44	20.6	33.4
AAB0774	09-5204	0-0.5	mg/kg	<3.7	7	19.6	<4.6	<0.43	<0.43	18.8	30.8
AAB0775	09-5205	0-0.5	mg/kg	<6.2	1.1	16	<4.7	<0.44	<0.44	25	29.6
AAB0776	09-5206	0-0.5	mg/kg	<7.8	<0.5	7.6	<5.5	<0.52	<0.52	26.6	177
AAB0777	09-5207	0-0.5	mg/kg	<9	<0.5	19.3	<5	<0.48	<0.48	24.8	33.7
AAB0778	09-5208	0-0.5	mg/kg	<6.9	4.2	21.9	<5.6	<0.45	<0.45	21.8	60.3
AAB0779	09-5209	0-0.5	mg/kg	<4.8	2	35.5	<4.6	<0.44	<0.44	20.2	57.3
AAB0780	09-5210	0-0.5	mg/kg	<5.6	3.2	44.3	<4.8	<0.45	<0.45	18.9	38.8
AAB0781	09-5211	0-0.5	mg/kg	<3.6	1.8	12.1	<4.7	<0.44	<0.44	15.1	30.7
AAB0782	09-5212	0-0.5	mg/kg	<6.2	11	25.2	<4.9	<0.47	<0.47	18.7	72.4
AAB0783	09-5212	0-0.5	mg/kg	<6.8	15	19.6	<4.9	<0.46	<0.46	22.4	104
Soil SAL			mg/kg	1500	100000	400	31	380	6.4	540	23000
Soil Bkgd UTL			mg/kg	15.2	NA	23.3	1	1.7	1	41.9	50.8

TABLE 5-32
OLD ANCHOR EAST SET— COMPARISON OF DETECTED CONCENTRATIONS TO SAL FOR NONCARCINOGENIC EFFECTS

Old Anchor East Set: PRSs 09-001(d), 09-003(g), 09-003(h), 09-003(i)
Noncarcinogenic Effects

Analyte	Max. Concentration (mg/kg)	Soil SAL (mg/kg)	Normalized to SAL
Ag	7.8	380	0.021
Cd	14	38	0.37
Hg	0.25	23	0.011
Pb	44.3	400	0.11
Sb	<6.3	32	<0.2
Zn	177	23000	0.0077
Total			**<0.72**

5.5.7.2 Risk Assessment.

Based on the results of the screening assessment, no risk assessment was performed.

5.5.8 Ecological Assessment

The general landscape condition around this PRS is moderately developed, and there is moderate potential for receptors to come in contact with contaminants. Therefore, this PRS will be included in the ecological risk assessment. An ecological risk assessment that considers contaminants with concentrations greater than UTLs will be conducted when that approach has been approved. Threatened and endangered species and/or sensitive habitat, listed in Chapter 2, will be evaluated in the ecological risk assessment.

5.5.9 Extent of Contamination

The objective of this investigation was to perform a site screening to determine if constituents from a historical release were present. The plan was not designed to define the extent of contamination.

5.5.10 Conclusions and Recommendations

No human health COPCs were identified based on the screening of this PRS set, NFA is recommended, based on human health considerations. This recommendation is based on the NFA criterion 4 (Los Alamos National Laboratory, Environmental Restoration Department, Project Consistency Team Policy number 015) which states, "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 risk under the projected future land use. The determination of acceptable risk and future land use has

considered stakeholder involvement." An ecological risk assessment that considers contaminants with concentrations greater than UTLs will be conducted when that approach has been approved. A Class III permit modification should be requested to remove these sites from the HSWA Module of the RCRA operating permit.

Radiologic constituents not regulated under RCRA may be evaluated further by DOE for additional management activities.

5.5.11 Sampling and Analysis Plan for the Old Anchor East Set

Due to the Conclusions and Recommendations presented for this PRS Set, no further investigation requiring a sampling and analysis plan is necessary at this time.

5.6 Potential Release Site C-8-010

Areas of Concern are PRSs that were not identified as solid waste management units (SWMUs). Potential Release Site C-8-010 is identified in the SWMU Report (LANL 1993, 1092) as the location of a drum storage building associated with Building TA-8-34, which was removed in 1947. A 31 October 1983, memo from HSE-8 states that no known hazardous materials were used in Building TA-8-34; however, if drums leaked, semivolatile organic compounds may have remained in the soil (LANL 1993, 1092).

This PRS is recommended for No Further Action.

5.6.1 History

This PRS is discussed in detail in Sections 5.9.1.1 and 6.9 of the RFI work plan (LANL 1993, 1092). Building TA-8-34 was located at the foot of a stairway that once connected Building TA-8-8 with TA-8-1 and other buildings at the abandoned bunker site. Although the building was removed, its location is relatively easy to establish from other existing landmarks and photographs. The SWMU Report references a report that indicated the possibility of a release to the environment if the drums leaked and/or contained hydrocarbons or solvents (LANL 1993, 1092).

5.6.2 Description

No further site specific information on geology, hydrology, soils, or wildlife habitat associated with this PRS is required.

5.6.3 Previous Investigation

No previous investigations have been performed at this site.

5.6.4 Field Investigation

The objective of the field investigation at PRS C-8-010 was to determine whether contamination from hydrocarbon/solvent spills was present.

The waste constituents likely to have been present at C-8-010 are petroleum hydrocarbons and organic solvents. Therefore, site samples were analyzed for VOCs and SVOCs. As the RFI Work Plan states, TPH was not analyzed as stated in the RFI work plan because the VOC and SVOC analyses provide the pertinent information on potential soil contamination that may have occurred at this site. See aerial photograph Figure 5-14 and topographical Figure 5-15 for the location of sampling points associated with this PRS.

Four soil samples were collected on 5 May 1994, from two sites at the suspected location of the C-8-010 drum storage building north of the TA-8-1 Abandoned Bunker. The drum storage building site was found to have a covering of 0.66 to 0.75 ft of silt. Below the silt was found a heavier, clay soil with a few small pieces of asphalt. One near surface sample for SVOC analysis (AAB0888) and one for VOC analysis (AAB0889) were collected at sample location 08-9000 from the clay soil. At 08-9001, one surface sample for SVOC analysis (AAB0890) and one for VOC analysis (AAB0891) were collected from the clay soil. See Table 5-33 for a summary of samples taken. Field beta/gamma measurements of the samples ranged from 252 to 307 cpm (LANL background 150 -250 cpm); the field PID measurements were <1 ppm for volatile organic compounds. The samples were negative for HE using the HE spot test.

TABLE 5-33
SUMMARY OF SAMPLES TAKEN

LOCATION ID	SAMPLE ID	DEPTH (ft)	MATRIX	VOCs	SVOCs	HE	INORG	RAD
08-9000	AAB0888	0.67 - 1	Soil		X			
08-9000	AAB0889	0.67 - 1	Soil	X	X			
08-9001	AAB0890	0.75 - 1.25	Soil		X			
08-9001	AAB0891	0.75 - 1.25	Soil	X	X			

5.6.5 Background Comparison

No inorganic parameters were identified for analysis at this PRS and, therefore, no comparison to background is appropriate or necessary for this PRS.

5.6.6 Evaluation of Organic Constituents

Review of the FIMAD database indicated that no organic constituent analyzed from samples taken at this PRS was found to be present at concentrations exceeding its estimated quantitation limit. Therefore, no organic constituents were carried through the screening assessment.

5.6.7 Human Health Assessment

5.6.7.1 Screening Assessment

No organic constituents were identified at this PRS to be present at levels that exceed its estimated quantitation limit, and, therefore, no organic constituents were carried through the screening assessment process.

5.6.7.2 Risk Assessment

5.6.8 Ecological Assessment

There are no ecotoxicological risk concerns because there are no contaminants above the UTLs.

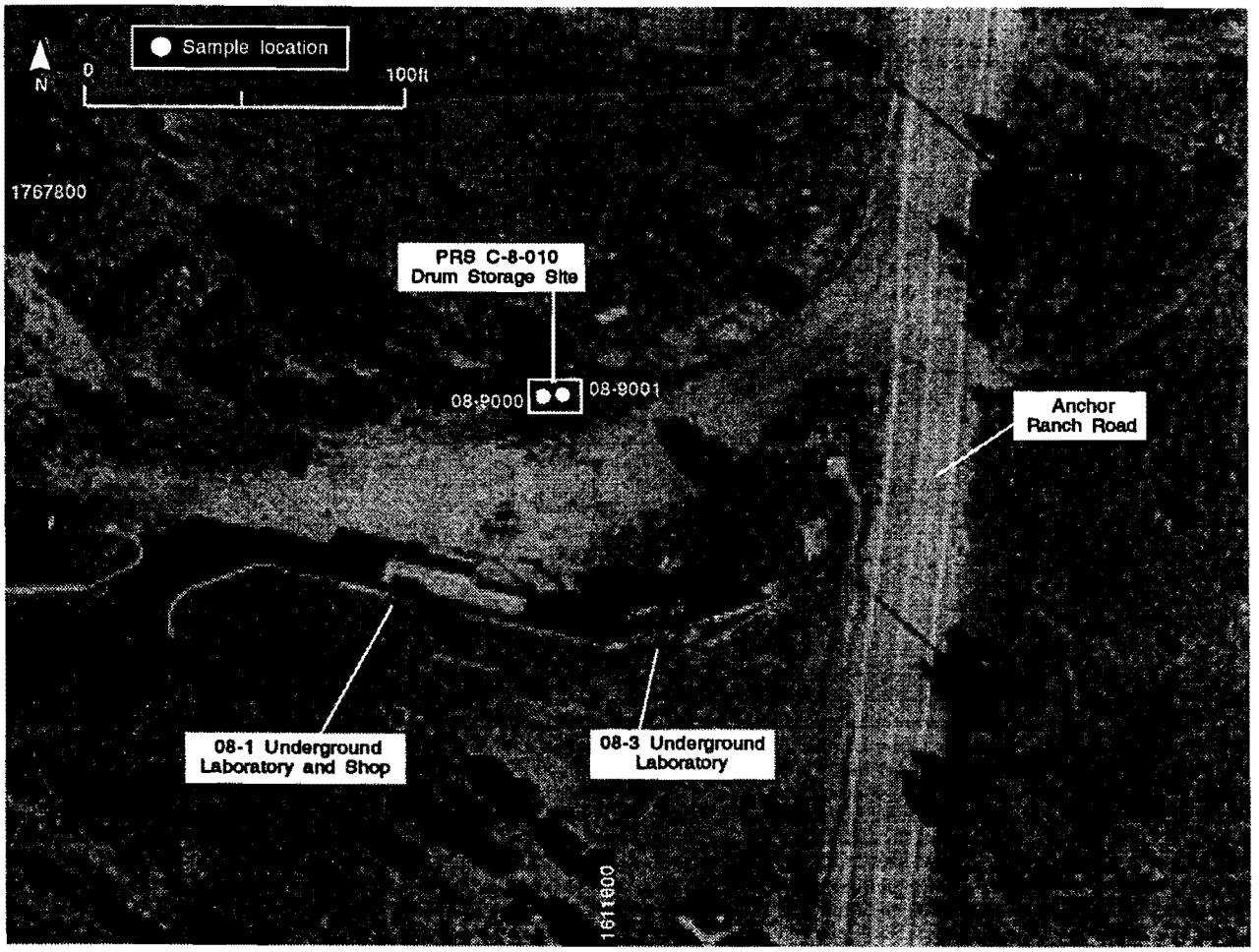


Figure 5-14. Surrounding features and sample locations for C-8-010, drum storage site

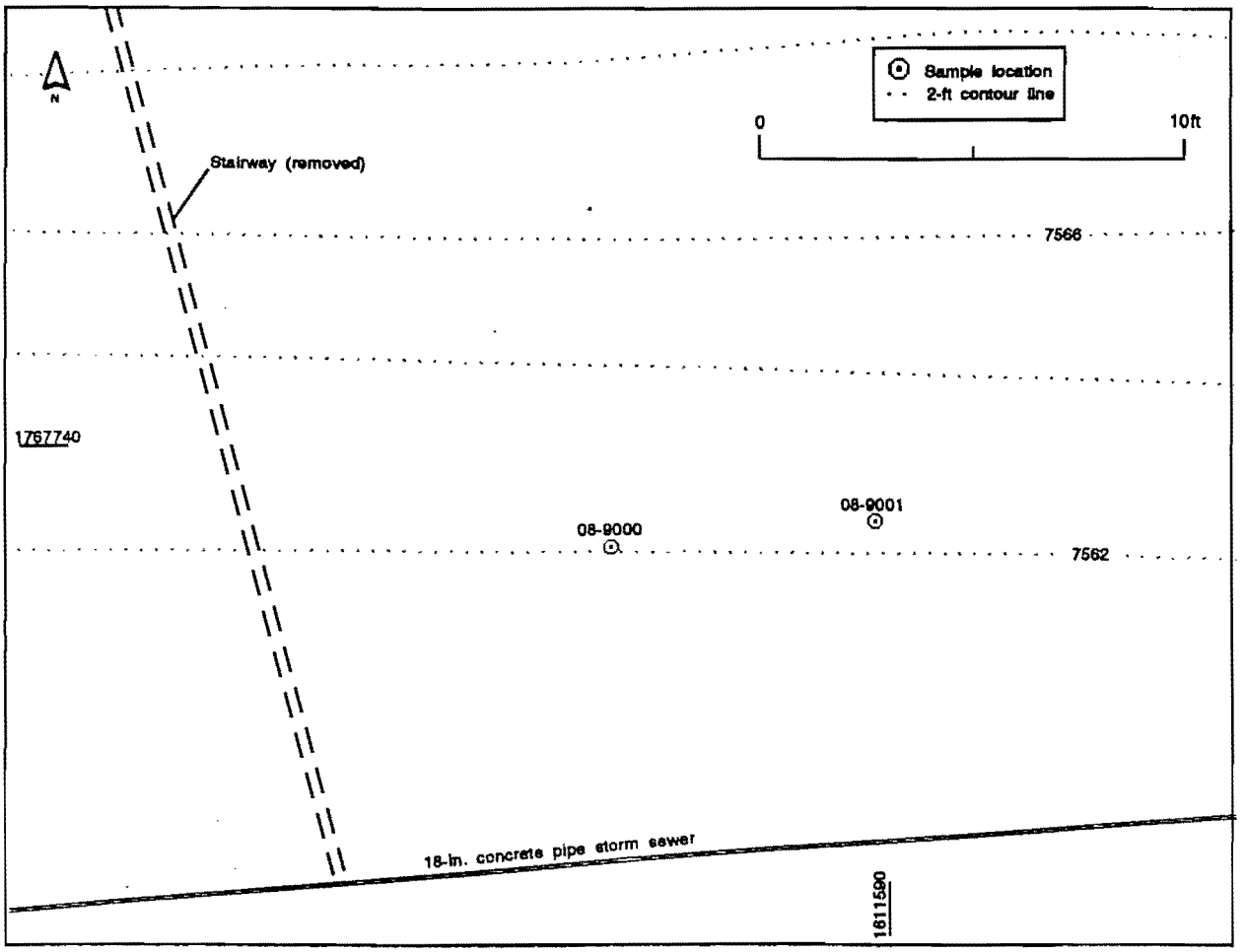


Figure 5-15. Topographic map and sample for C-8-010, drum storage site. Enlargement of Figure 5-14

5.6.9 Extent of Contamination

The objective of this investigation was to perform a site screening to determine if constituents from a historical release were present. The plan was not designed to define the extent of contamination.

5.6.10 Conclusions and Recommendations

No human health COPCs or ecotoxicological contaminants were identified based on the screening of this PRS, and NFA is recommended., This recommendation is based on the NFA criterion 4 (Los Alamos National Laboratory, Environmental Restoration Department, Project Consistency Team Policy number 015) which states, "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 risk under the projected future land use. The determination of acceptable risk and future land use has considered stakeholder involvement." A Class III permit modification should be requested to remove this site from the HSWA Module of the Laboratory's RCRA operating permit.

5.6.11 Sampling and Analysis Plan for PRS C-8-010

Due to the Conclusions and Recommendations presented for this PRS, no further investigation requiring a sampling and analysis plan is necessary at this time.

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Appendix A ANALYTICAL DATA

All analytical data are available on FIMAD. If FIMAD is not accessible, data will be provided upon request. A hard copy of the data is available from the RPF RFI Report for PRSs in TA-8 and -9.

Appendix B DATA QUALITY EVALUATION TABLE

PRS 08-009(d)

Antimony	26528	08-1000 and 08-1001	AAB0854 and AAB0855	All 3 LCS/blinds within limits. Matrix spike recovery was low (64%), but the matrix spike duplicate was within limits at 110%.
Lead	26528	08-1000 and 08-1001	AAB0854 and AAB0855	All 3 LCS/blinds within limits. Matrix spike recovery was high (390%).
Silver	26528	08-1000 and 08-1001	AAB0854 and AAB0855	All 3 LCS/blinds within limits. Matrix spike recovery was low (78%).
Vanadium	26528	08-1000 and 08-1001	AAB0854 and AAB0855	One LCS/blinds outside limits; 2 within limits.
SVOCs	27548	08-1000 and 08-1001	AAB0854 and AAB0855	Matrix spike Pyrene recovery was high (190%), and the matrix spike duplicate was also high (340%).
VOCs	27910	08-1000	AAB2798	Laboratory contamination by methylene chloride

PRS 08-009(e)

Antimony	26528	08-1010 and 08-1011	AAB0868 and AAB0869	Matrix spike recovery low (64%), but the matrix spike duplicate recovery was high (110%). All 3 LCS/blinds within limits.
Antimony	28445	08-1010	AAB2800 and AAB2801	Matrix spike recovery was low (57%). All 3 LCS/blinds were within limits.
Arsenic	28445	08-1010	AAB2800 and AAB2801	One LCS/blind outside limits; 2 LCS/blinds within limits. Matrix spike within limits.

Calcium	28445	08-1010	AAB2800 and AAB2801	One LCS/blind outside limits; 2 LCS/blinds within limits.
Lead	26528	08-1010 and 08-1011	AAB0868 and AAB0869	Matrix spike recovery high (390%). All 3 LCS/blinds within limits.
Lead	28445	08-1010	AAB2800 and AAB2801	Matrix spike recovery was high (540%). All 3 LCS/blinds were within limits.
Mercury	28445	08-1010	AAB2800 and AAB2801	Matrix spike recovery was low (9.8%). No LCS/blinds were analyzed.
Selenium	28445	08-1010	AAB2800 and AAB2801	Matrix spike recovery was high (180%). All 3 LCS/blinds were within limits.
Silver	26528	08-1010 and 08-1011	AAB0868 and AAB0869	Matrix spike recovery low (78%). All 3 LCS/blinds within limits.
SVOCs	27548	08-1010	AAB2800 and AAB2801	Matrix spike pyrene recovery was high (190%), and the matrix spike duplicate recovery was also high (430%). Both LCS/blinds were within limits.

PRSs 09-001(a) and 09-001(b)

Lead	26444	09-6100 through 09-6109	AAB0748 through AAB0758	One LCS/blind recovery was outside the limits; 3 were within limits. No matrix spikes.
Selenium	26444	09-6100 through 09-6109	AAB0748 through AAB0758	One LCS/blind recovery was outside the limits; 2 were within limits. No matrix spikes.
Thallium	26444	09-6100 through 09-6109	AAB0748 through AAB0758	Recoveries on 2 LCS/blinds were outside limits; recoveries on the other 2 LCS/blinds were within limits. No matrix spikes.

SVOCs	26099	09-6100 and 09-6107	AAB0748 and AAB0755	Both LCS samples for trichlorobenzene [1,2,4-] were out of control. Blinds and matrix spikes were under control. One LCS sample for nitrosodi-n-propylamine [N-] was out of control. The other LCS, the blinds and the matrix spikes, were under control.

09-001(d), 09-003(g), 09-003(h), and 09-003(i)

Nitrates	26468	09-5200 through 09-5212	AAB0770 through AAB0783	Recovery on one LCS/blind outside limits. Two other LCS/blinds within limits.
VOCs	27910	08-1000	AAB2798	Laboratory contamination of by methylene chloride

Appendix C Risk assessment calculations

No risk assessment was performed on PRSs being reported.