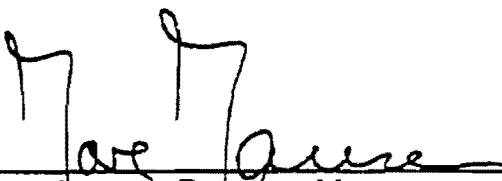


CERTIFICATION

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

Document Title: RFI Report for TAs 6, 8, 22, and 40 (Former OUs 1111 and 1157)

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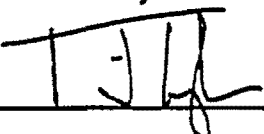
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**RFI Report
for
Potential Release Sites
at
TAs -6, -8, -22, and -40**

**(located in former
Operable Units 1157 and 1111)**

Field Unit 5

Environmental Restoration Project

September 1997

**A Department of Energy
Environmental Cleanup Program**

Los Alamos
NATIONAL LABORATORY

LA-UR-97-3316

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EXECUTIVE SUMMARY

Twenty PRSs in the Explosives Area at Los Alamos National Laboratory (the Laboratory) were investigated to assess whether contaminants were present at the sites; to evaluate the potential for release and redistribution into the surrounding soils or outflow areas; and to determine if any contamination posed an unacceptable risk to human health. The evaluation focused on biased, worst-case scenario sampling strategies. Although radionuclides are regulated by the Department of Energy (DOE) and are not regulated under the Resource Conservation and Recovery Act (RCRA), it is more efficient and cost effective to investigate all types of potential contamination during a single site characterization. Therefore, radiochemical concerns are addressed in this report as well as RCRA-regulated chemicals. No Further Action (NFA) is recommended for all 20 Potential Release Sites (PRS), using a risk-based screening assessment approach.

The part of the Explosives Area considered in this RCRA Facility Investigation (RFI) Report is located in the northwestern portion of the Laboratory and encompasses approximately 8.5 square miles. It includes PRSs in TA-6 (Two-Mile Mesa Site South), former TA-7 (Gomez Ranch Site, now considered part of TA-6), TA-8 (Anchor West Site or GT Site), TA-22 (Trap Door Site), and TA-40 (Detonator Firing Site). All of these Technical Areas (TAs) have been used in support of gun-firing experiments, explosives research and development, and explosives testing activities starting in the early 1940s and continuing to the present.

Sampling events occurred during June through September of 1994, in March 1996, and in April 1997. Surface soil, core, sludge, and water samples were collected, processed, and analyzed in accordance with the Environmental Restoration Quality Assurance/Quality Control program. Holding times were exceeded for some of the samples scheduled for high explosives (HE) analysis. HE samples were recollected at some, but not all, of the PRSs. High explosives samples from all sampling events had been kept frozen while awaiting analyses, and it was determined that the quality of the HE data was sufficient for making site decisions through a screening-level risk assessment, even where holding times were missed. The resampling confirmed that the original data were sufficiently reliable for meeting these purposes. The quality of other data, including volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), inorganics, and radionuclides, was also determined sufficient for making site decisions.

Screening Action Levels (SAL) were exceeded at one or more samples at PRSs 08-002, 06-003(c), 06-003(f), 06-003(g), decision set 06-003(a)/06-008/C-6-019, and 06-007(g). There was no evidence of widespread contamination in any of those eight PRSs. Specifically, at PRS 08-002, the SAL for lead was exceeded in one sample of five at the source but in no samples in the immediate vicinity of the source. At 06-003(c), the SAL for Uranium-234 was exceeded in a single sample of six taken at the source but in no samples taken from the perimeter. At PRS 06-003(f), the SAL for thallium was exceeded in one sample of seven taken at the source, but in no samples taken from the perimeter. At PRS 06-003(g), the SAL for copper was exceeded in one of six samples taken at the source, and the SAL for lead was exceeded in another one of six samples taken at the source; but neither SAL was exceeded in samples taken from the perimeter. At 06-003(a)/06-008/C-6-019, the SAL for Cesium-137 was exceeded in 2 of 4 samples taken from inside the source but not in any perimeter samples. At PRS 06-007(g), only one of 6 samples contained concentrations of copper and lead that exceeded SAL. In addition, no human exposure pathways were identified at any of these PRSs. No SALs were exceeded at the remainder of the PRSs.

PRS No.	HSWA ^a	Radionuclide Component ^b	NFA Criterion	Further Action ^c	Add to HSWA Module ^d	Rationale	Section No.
08-002	X		4			RCRA contaminants present below unacceptable human health risk levels.	5.1.11
07-001(a)	X	X	4			RCRA and radionuclide contaminants below SALs.	5.2.11
07-001(b)	X	X	4			RCRA and radionuclide contaminants below SALs.	5.3.11
07-001(c)	X	X	4			RCRA and radionuclide contaminants below SALs.	5.4.11
07-001(d)	X	X	4			RCRA and radionuclide contaminants below SALs.	5.5.11
06-003(c)	X	X	4			No widespread distribution of contaminants at levels that would result in human health risk.	5.6.11
06-003(f)	X	X	4			Small total area of the site and low frequency of samples with contaminants exceeding background or SAL; site presents no unacceptable human health risk.	5.7.11
06-003(g)	X	X	4			Small size of site and limited contamination; no unacceptable human health risk.	5.8.11
06-003(a), 6-008, C-6-019	X (not 6-008, C-6-019)	X	4			No widespread contamination; no unacceptable human health risk.	5.9.11
06-001(a)	X		4			RCRA contaminants below SALs.	5.10.11
06-001(b)	X		4			RCRA contaminants below SALs.	5.11.8
22-010(a)	X		4			RCRA contaminants below SALs.	5.12.11

PRS No.	HSWA ^a	Radionuclide Component ^b	NFA Criterion	Further Action ^c	Add to HSWA Module ^d	Rationale	Section No.
22-010(b), 22-016	X		4			RCRA contaminants below SALs.	5.13.11
40-005	X		4			RCRA contaminants below SALs.	5.14.11
22-014(a)	X		4			RCRA contaminants below SALs.	5.15.11
22-014(b)	X		4			RCRA contaminants below SALs.	5.16.11
06-007(g)	X	X	4			There is no indication of broad significant contamination. No viable exposure areas or pathways; no unacceptable human health risk under current or future conditions.	5.17.11

- a. An X in this column indicates that the site is listed on the Hazardous and Solid Waste Amendments (HSWA) Module (Module VIII) of the Laboratory's RCRA operating permit.
- b. An X in this column indicates that the site has a radionuclide component.
- c. VCA, EC, further investigation, or CMS.
- d. An X in this column indicates that hazardous constituents were confirmed at a site not already listed on the HSWA Module. The site requires further action; therefore, the site needs to be added to the Module.

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ACRONYMS AND ABBREVIATIONS

AEC	Atomic Energy Commission
AOC	Area of Concern
CLP	Contract Laboratory Program
COPC	chemicals of potential concern
Cs	Cesium
DOE	Department of Energy
EC	Expedited Cleanup
EDL	estimated detection limits
EPA	Environmental Protection Agency
EQL	estimated quantitation limits
ER	Environmental Restoration
ESG	Environmental Surveillance Group
ESH	Environmental, Safety, and Health (Division)
FIMAD	Facility for Information Management, Analysis and Display
HE	high explosive
HMX	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
HSWA	Hazardous and Solid Waste Amendments of 1984
ICP	inductively coupled plasma
IWP	Installation Work Plan
LCS	laboratory control sample
MCE	multiple chemical evaluation
NFA	No Further Action
NMED	New Mexico Environment Department
NMSP	New Mexico State Plane
OU	Operable Unit
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyls
PETN	Pentaerythritol Tetranitrate
PRG	preliminary remediation goals
PRS	Potential Release Site
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	quality control
RCRA	Resource Conservation and Recovery Act
RDA	recommended daily allowance
RDX	Hexahydro-1,3,5-trinitro-1,3,5-triazine
RFI	RCRA Facility Investigation
RN	Request Number

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RPD	relative percent difference
RSD	relative standard deviation
SAL	screening action level
SMO	Sample Management Office
SOP	standard operating procedure
Sr	Strontium
SVOC	semivolatile organic compounds
TA	Technical Area
the Laboratory	Los Alamos National Laboratory
U	Uranium
UTL	upper tolerance limit
VOC	volatile organic compounds

1.0 INTRODUCTION

Los Alamos National Laboratory (the Laboratory) was established during World War II to design, construct, and test components of the first nuclear weapons. During the 1950s, 1960s, and early 1970s, Laboratory programs and facilities, most of which focused on nuclear weapons research and development, experienced significant growth. These programs produced various types of waste, which contained radioactive, high explosive (HE), and hazardous components.

Waste sites at the Laboratory are collectively organized by geographical location into areas known as Operable Units (OUs). Operable Units consist of one or more Technical Areas (TAs), and waste sites in those TAs are identified as Potential Release Sites (PRSs). Within the Environmental Restoration (ER) Project, PRSs are numbered and cataloged as a means of identifying and locating waste sites [e.g., PRS 06-007(g) refers to waste site 007(g) located at TA-6].

The part of the Explosives Area considered in this RFI Report, which is located in the northwestern portion of the Laboratory, encompasses approximately 8.5 square miles. This includes, among other sites, TA-6 (Two-Mile Mesa Site South), TA-7 (Gomez Ranch Site), which is now considered part of TA-6, TA-8 (Anchor West Site or GT Site), TA-22 (Trap Door Site), and TA-40 (Detonator Firing Site). All of these TAs have been used in support of gun-firing experiments, explosives research and development, and explosives testing activities.

The 20 PRSs presented in this report are organized according to past operational activities, processes, or occurrences. Those 20 PRSs are identified as:

- Sand Butts 08-002;
- Inactive Firing Sites 06-003(a), 06-003(c), 06-003(f), 06-003(g), 06-008, 7-001(a), 07-001(b), 07-001(c), and 07-001(d), and C-6-019;
- Septic Systems 06-001(a), 06-001(b), 22-010(a), 22-010(b), and, 22-016,
- Active Explosives Sumps 22-014(a) and 22-014(b), 40-005; and
- Surface Disposal Area 06-007(g).

This RCRA facility investigation (RFI) report presents the results of the Phase I screening level field investigations performed for the 20 PRSs investigated and presents recommendations for NoFurther Action (NFA) based on sampling results and data assessments.

1.1 General Site History

The Explosives Area, which includes TAs -6 (Two-Mile Mesa), -7 (Gomez Ranch Site), -8 (Gun Firing Site), -22 (Trap Door Site), and -40 (Detonator Firing Site), is located in Los Alamos County in north-central New Mexico (on the plateau on the eastern flank of the Jemez Mountains) on property owned by the Department of Energy (DOE). Technical Area 58 (Two-Mile Mesa North Site) and TA-62 (Northwest Site), which were established in 1989 from acreage acquired from surrounding TAs, act as buffer areas between Laboratory operations and the US Forest Service lands to the west and private lands to the north. Figure 1.1-1 shows the location of the TAs discussed in this report with respect to the Laboratory, New Mexico, and the United States. Figure 1.1-2 shows

the location of OU 1111 and OU 1157 with respect to Laboratory technical areas and surrounding landholdings.

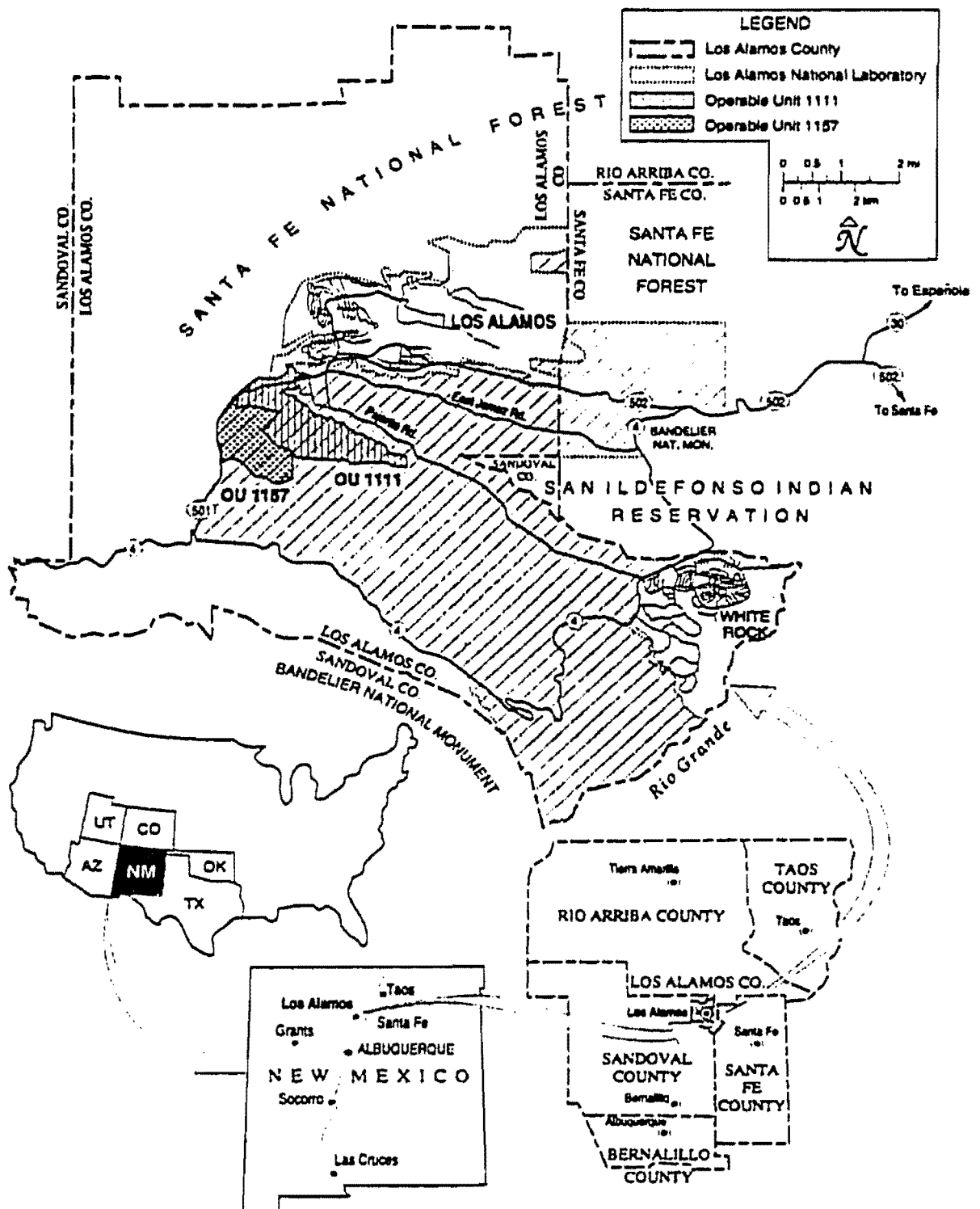


Figure 1.1-1. Location map of Operable Unit 1111 and Operable Unit 1157.

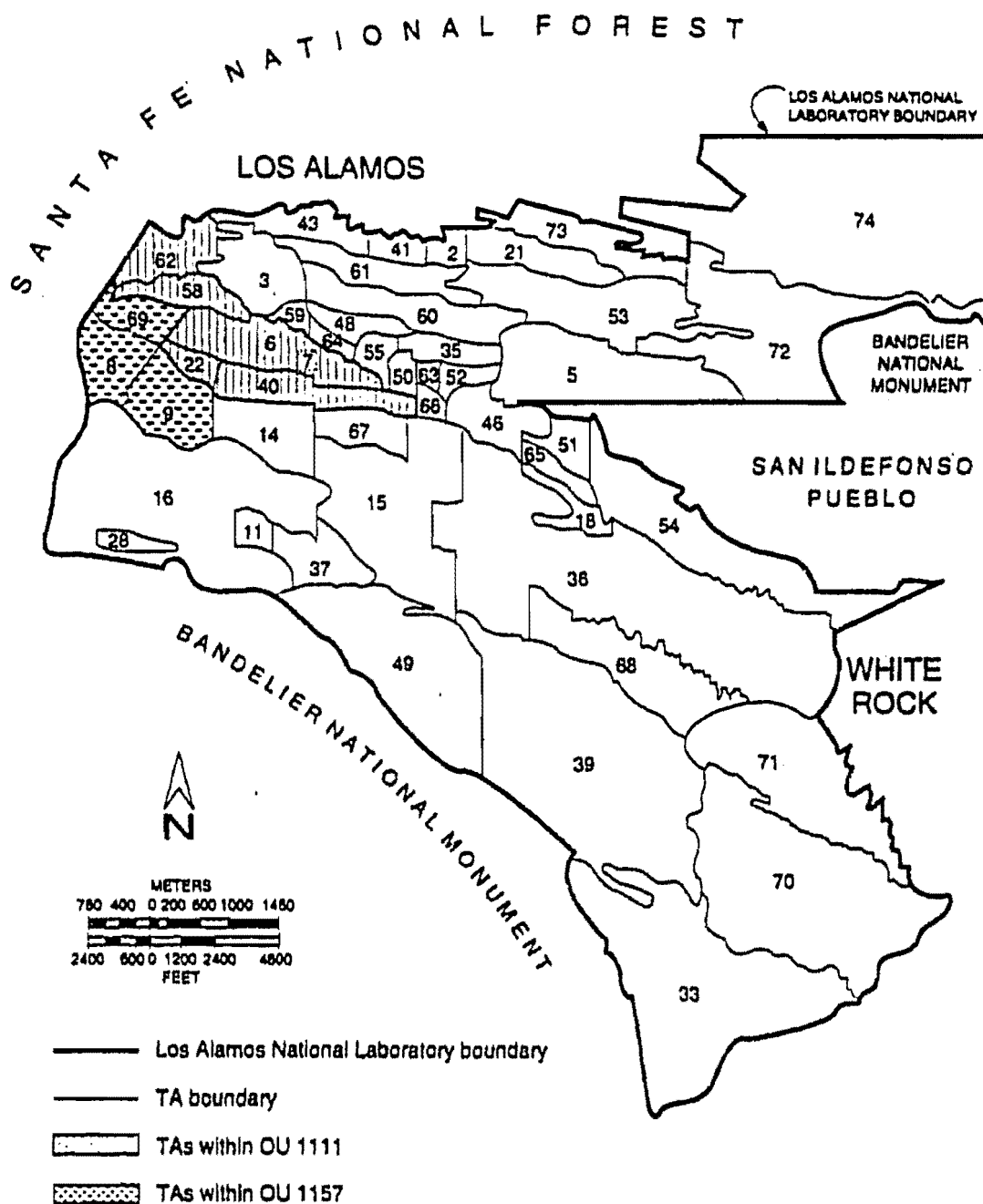


Figure 1.1-2. Location of Operable Unit 1111 and Operable Unit 1157 with respect to Laboratory technical areas and surrounding landholdings.

All Laboratory lands, including the Explosives Area, were requisitioned for Manhattan Project use in 1943. The earliest work (in OU 1111) was on Two-Mile Mesa (TA-6) and began at the Gomez Ranch Site (TA-7) where 20 mm shells were fired into various targets as part of the gun assembly method. Two above-ground pits were constructed by berming soil. Their original purpose is unknown, but one pit was used in the late 1940s for destruction of explosive scrap. This work lasted for only a short time before the activities were moved to other locations off Two-Mile Mesa.

Shortly after the gun-testing activities began, a number of experiments involving detonator timing and recovery methods also began west of the Gomez Ranch Site. The recovery experiments resulted from concerns that the limited amount of fissionable material available would be lost if the implosion weapon failed. Various methods to contain the material were attempted and ultimately led to the building of a prototype containment vessel known as the Jumbo. Experiments were conducted on Jumbinos, which were scaled-down versions of the Jumbo, at Two-Mile Mesa to improve the design of the Jumbo vessel.

Late in 1944, Gadget (G) Division constructed four buildings on the south edge of Two-Mile Mesa to assemble conventional explosives for the Fat Man weapon, which was later dropped on Nagasaki. The buildings were abandoned after the weapon was assembled. This area is now known as Trap Door (TD) Site and TA-22. By 1945, 25 new structures were added in TA-6; however, by 1948 more room was needed for assembly. To meet this need, detonator fabrication activities, offices, and support facilities were relocated to the abandoned TA-22 facilities.

Test-firing operations continued at TA-6 until 1950 when TA-40 was built to replace it. During this interval, the eastern pit at TA-7 was used for destruction of scrap (explosives and associated materials) that were no longer needed. Scrap destruction activities were relocated to TA-40 in 1950, and the pit was subsequently abandoned. For more detailed information refer to Chapters 2 and 5 of the OU 1111 RFI Work Plan (LANL 1993, 26068).

The Anchor Ranch site (located in OU 1157) 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, a carpenter's shop, and security protection of the gun emplacement. Beginning in September 1943, gun testing was conducted at TA-8 with specially designed naval guns, which were mounted on concrete pads. Experimental projectiles (6 in. by 15 in.) were fired into targets placed in sand butts (bermed piles of graded sand) at the Gun-Firing Site. For more detailed information see Chapters 2 and 5 of the RFI Work Plan for OU 1157 (LANL 1993, 20949).

The **Sand Butts** are two wooden-sided sand piles identified as PRS 08-002. These sand butts were used to hold targets and capture projectiles fired from the specially designed guns a few meters away. Both sand butts and surrounding areas were expected to contain similar distributions of materials; the investigation focused primarily on metals.

The **Inactive Firing Sites** are PRSs 06-003(a), 06-003(c), 06-003(f), 06-003(g), 7-001(a), 7-001(b), 7-001(c), and 7-001(d), C-6-019, and 06-008. These are similar because of similarities in potentially hazardous materials used and not recovered and similar dispersal mechanisms. PRS 06-008, the location of an underground storage tank, and PRS C-6-019, the former site of a generator building, are included because of their proximity to the concrete bowl firing site (PRS 06-003(a)). This investigation focused on Sr-90 and Cs-137, isotopic U, metals, volatile (VOC) and semivolatile (SVOC) organic materials, and HE.

The **Septic Systems** are the five inactive septic systems: PRSs 06-001(a), 06-001(b), 22-010(a), 22-010(b), and 22-016. These septic systems include the septic tank, drain lines, and outfalls or leach fields that served laboratories where operations involved detonator assembly and HE processing. This investigation focused on metals, VOCs, SVOCs, and HE.

The **Active Explosives Sumps** are PRSs 22-014(a), 22-014(b), and 40-005, which are associated with the removal of solid explosives from wastewater. The sumps and feed lines are still active, but the sumps' outflow pipes have been plugged; the accumulated contents are removed periodically and disposed in approved facilities. The concern is to determine the presence, concentration, and location of sump contents that may have been discharged to the surrounding area or associated outfalls prior to plugging and for more recent possible undetected leaks or overflows. This investigation focused on HE at PRS 22-014(a); metals, VOCs, SVOCs, HE, nitrates/nitrites, fluoride, and cyanide at PRS 22-014(b); and VOCs and HE at PRS 40-005.

The **Surface Disposal Area** is a small area of accumulated spent initiators. Designated PRS 06-007(g), it is described as an approximately 5-ft-square surface disposal area that was formerly identified as Area of Concern (AOC) C-6-004, associated with the former site of Building TA-6-12. This investigation focused on metals, VOCs, SVOCs, and HE.

The objective of the efforts described in this report was to provide data of sufficient quality for decisions in a screening-level risk assessment as outlined in Chapter 3.0 of this RFI report. The assessment of the analytical results associated with each individual PRSs was then used to evaluate whether further actions should be taken at the site or whether a determination of NFA was appropriate. In several of the PRSs, the presence of radionuclides was suspected. Although radionuclides are regulated by the DOE and are not regulated under RCRA, it is more efficient and cost effective to investigate all types of potential contamination during a single site characterization. Therefore, radiochemical concerns are addressed in this report.

1.2 RFI Overview

Nineteen PRSs located in TAs -6 (-7), -22, and -40 within OU 1111 and 1 PRS located in TA-8 within OU 1157 were investigated to assess whether contaminants were present at the sites; to evaluate the potential for release and redistribution into the surrounding soils or outflow areas; and to determine if they posed an unacceptable risk. The evaluation focused on biased, worst-case scenario sampling strategies resulting in all 20 PRSs being proposed for NFA status. This proposal is based upon screening level risk assessments performed for each of the 20 PRSs discussed in this report.

The field activities performed and decisions regarding chemicals of potential concern (COPCs) that were investigated at each PRS are specified in the RFI Work Plan for OU 1111 (LANL 1993, 26068) and for OU 1157 (LANL 1993, 20949). The screening level analysis of the results is consistent with the strategies presented in the work plans and the draft RFI report format.

1.3 Field Activities

Field activities at the 20 PRSs commenced June 1994 and ended in September 1994. Some additional sampling was required that occurred during March 1996 and April 1997. Activities consisted of land surveys, onsite screening, and sampling. Details of sampling performed at each PRS are provided in Chapter 5.

All sample locations were field surveyed by conventional land-surveying methodologies employing a Wild, TC 1000 theodolite system. Land surveying was completed in accordance with LANL-ER-SOP-3.01.R1. All field sample locations were also referenced according to the New Mexico State Plane (NMSP) coordinate system and this information archived in the Laboratory's Facility for Information Management, Analysis and Display (FIMAD). All applicable LANL ER SOPs (LANL 51575) were followed, unless otherwise noted in Chapter 5.

Radioactivity, volatile chemical, and HE screening were conducted at each sample location in accordance with worker safety and transportation requirements. Prior to sample collection, each sample location was screened for radioactivity with an ESP-1 beta-gamma meter equipped with an HP 260 pancake probe and a Ludlum 139 alpha meter following ESH-1 SOPs (ESH-1-07-85.R0 and ESH-1-07-04.R0). Each sample location was also screened for organic vapors with a photoionization detector following guidance established by LANL ER Project Manual for H&S activities. Soil material from each sample location was additionally tested for HE with an HE spot test kit (SOP 10.06, R0) according to the Modified Griess Reagent Spot Test for Explosives. This procedure is required by the Laboratory's Dynamic Experimentation (DX) Division on all solid samples collected at TAs -6 (-7), -8, -9, -22, and -40 in compliance with Division safety requirements and Department of Transportation regulations.

All surface (0-6 in.) soil samples were collected as discrete samples using a stainless-steel scoop (ER-SOP-06.09, Spade and Scoop Method for Collection of Soil Samples) and a stainless-steel hand auger (ER-SOP-06.10, Hand Auger and Thin-Wall Tube Sampler) for collection of subsurface (>6 in.) samples. Soil samples exceeding 8 ft in depth were collected with a CME-45 drill rig (ER-SOP-04.01, Drilling Methods and Drill Site Management and ER-SOP-06.26, Core Barrel Sampling for Subsurface Earth Material). Maximum depth of soil samples collected with the CME-45 drill rig was 28 ft at the seepage pit at PRS 22-014(a). Discrete, clean stainless-steel scoops, bucket augers, and split spoon core barrels were dedicated for collection of soil material at each sampling location to preclude any possibility of cross-contamination. Care was exercised to exclude rocks, twigs, leaves, and other nonrepresentative material from the soil prior to samples being placed into appropriate sample containers. All samples were collected according to ER sampling protocol, which insures all sample containers are labeled, sealed, and submitted under chain-of-custody, placed in a locked cooler (at 4°C), and promptly delivered to an analytical laboratory coordinated through the Sample Management Office (SMO).

At several PRSs, resampling was conducted because certain analyses were unintentionally omitted in the first sampling (e.g., SVOC, PETN in the HE suite), or because the samples missed holding times at the analytical laboratory. In certain cases, HE was analysed on the new samples in order to confirm HE results in the original sampling.

Upon collection and prior to being submitted to SMO, one-gram aliquots of all sample material were screened for gross alpha/beta radioactivity. This was performed by gas proportional counting employing a Berthold (Model LB 770) ten-channel low-level counter in accordance with LANL ER-SOP 14.01. R0 (Berthold Low Alpha and Beta Activity Counter Calibration, Quality Control, Detection Limit and Use). This method was also used to detect the presence of elevated alpha/beta radiation as an indication of elevated uranium levels at PRSs 08-002, 06-008, and C-6-019. Elevated alpha/beta radiation indicated that samples should be submitted for total or isotopic uranium analysis.

All applicable LANL ER SOPs (LANL 51575) were followed unless otherwise noted in Chapter 5.

2.0 ENVIRONMENTAL SETTING

The environmental setting of the Laboratory is described in Section 2.4 of the Installation Work Plan (IWP) for Environmental Restoration (LANL 1995, 49822). A detailed discussion of the environmental setting for the Explosives Area, which comprises OU 1111 and OU 1157, including climate, geology, hydrology, and a conceptual hydrogeologic model for the area and its surroundings, is presented in the RFI Work Plans (LANL 1993, 20949; LANL 1993, 26068). A summary is presented in the following sections.

Potential Release Sites in the Explosives Area are located on the Pajarito Plateau and, more specifically, between Cañon del Valle, on the south, and Two-mile Canyon, on the north, near the western boundary of the Laboratory.

Operable Unit 1111 is bounded by Laboratory land on the north, south, and east and by OU 1157 on the west. Operable Unit 1157 is bounded by Laboratory land on the north, south, and east and by US Forest Service land on the west. These two units together include Two-Mile Canyon and Cañon del Valle and portions of upper Pajarito Canyon. Two-Mile Canyon joins Water Canyon at the eastern border of OU 1082, which is directly south of OU 1157.

The designation "Two-Mile" applies to a mesa and a canyon in the western portion of Laboratory property. It is commonly used in Laboratory documentation and is used throughout this report. However, the alternative versions, Twomile (U.S. Geological Survey), Two Mile, and 2-Mile, have also been used.

2.1 Climate

Los Alamos County has a semiarid, temperate mountain climate. Summers are generally sunny with moderate, warm days and cool nights. High altitude, light winds, clear skies, and dry atmosphere allow summer temperatures to range between 50 and 86° F. During the winter, temperatures typically range between 15 and 50° F. The average annual rainfall is approximately 18 in. for OU 1111 and 20 to 22 in. for OU 1157 with approximately half occurring during summer thunderstorms. Stream flow in canyons can occur as a result of these storms. Spring snowmelt runoff may also induce streamflow in the area canyons.

Winds at a weather station within OU 1111 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 7 mph range. Spring is usually the windy season when wind velocities are in the 10 mph range from the west during the mid-afternoon and wind gusts typically reach 50 mph.

2.2 Geology

2.2.1 Geologic Setting

A detailed discussion of the geology of the entire Los Alamos area can be found in Section 2.5.1 of the IWP (LANL 1995, 49822). A summary of the geologic setting of the Explosives Area is presented below.

The Explosives Area ranges in elevation between 7100 ft above mean sea level at the easternmost boundary and 7800 ft along the western edge. This area has a varied topography, consisting primarily of mesa tops and canyons ranging from steep slopes and cliffs to broad, moderately sloping mesa tops. Most of the canyon systems are relatively undisturbed; however, locations that have exhibited varying degrees of disturbance on the mesa tops include roads (paved and unpaved), drainages, cleared

fields, and Laboratory facilities (explosive test sites, decommissioned and rehabilitated sites, and current buildings).

The rocks exposed within the Explosives Area are units of the Tshirege Member of the Bandelier Tuff. Noteworthy between units of the Tshirege Member are widespread pyroclastic surge beds (Figure 2.2.1-1). 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 in TA-8 and in a tributary to Pajarito Canyon located in TA-9 and were observed in a shallow borehole in TA-22 during a PRS field investigation. Unit 4 of the Tshirege, which is 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.

The Pajarito fault system forms the western margin of the Española Basin and has had Holocene movement and historic seismicity (LANL 1993, 20949).

The western part of the area discussed in this report lies within the Pajarito fault zone. Fractures associated with the fault zone might provide continuous and deeper penetrating flow paths for groundwater migration, whereas the local cooling joints, tectonic fractures, flow-units, and lithologic-unit boundaries likely would not.

Figure 2.2.1-1. Explosives Area Stratigraphy

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. Most fractures in the platy welded tuff unit that outcrops in Pajarito Canyon are probably examples of cooling joints. That particular horizon could promote infiltration where it is at or near the surface.

2.2.2 Soils

A detailed discussion of the soils in the Los Alamos area can be found in Section 2.5.3.1 of the IWP (LANL 1995, 49822) as described by Nyhan et al. (1976, 5702) and in Section 3.4.3 of the Work Plan for OU 1111 (LANL 1993, 26068) and Section 3.4.3 for OU 1157 (LANL 1993, 20949). A summary of that material specific to the Explosives Area is presented below.

Information related to the soils and soil characteristics that might influence contaminant transport is limited for the Explosives Area. Potential Release Sites that are located on mesa tops in TA-8 and TA-22 are within the Carjo soil series. Potential Release Sites in TA-6 (-7) and TA-40 are also within the Carjo soil series except for 06-001(b), part of which is located on a steeper slope near a major drainage more likely represented by the Tocal soil series. The Carjo soil series is similar to, but deeper than, the Tocal series; depth to tuff/soil interface is nominally 24 in. and 16 in. for the Carjo and Tocal series, respectively. The upper horizon (8-10 in.) of these two soils is typically a loam or a fine sandy loam with a clay-rich horizon at about 10 in. Soils near the center of the mesa are more likely to show such a horizon than those closer to the mesa edge. However, at almost all sites, construction, testing, or past cleanup activities have altered and mixed the soil materials so that properties associated with described soils have been obscured.

Erosion on the mesa tops is caused primarily by runoff to the relatively flat part of the mesa and by higher energy runoff 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 runoff events. However, the areas are relatively stable with regard to erosion because undisturbed or vegetated soils have low erosion potential and there is no evidence of major recent episodes of downcutting or deposition. Natural erosion rates increase with proximity to canyon walls, as indicated by decreasing depth of soils. Thus, transport of contaminants may be less for PRSs located farther from the edges of the mesa. Soils on the edge of mesas and on the canyon walls are generally poorly developed and can trap sediments and contaminants eroded from the mesa tops. The fine loamy soils present at some locations may become airborne during high winds, particularly where natural vegetation has been removed or disturbed.

Surface runoff from the areas of buildings TA-22-34 and TA-22-93 flows to a marsh area, which also acts as a sediment trap for materials eroding from PRS 22-010(a), 22-010(b), and 22-014(a). Sampling was conducted in the marsh area; results are discussed as part of PRS 40-005 in Chapter 5.

2.3 Hydrology

The surface and subsurface hydrology of the Pajarito Plateau is summarized in Section 2.5.2 of the IWP (LANL 1995, 49822). Conditions specific to TA-6 (-7), -8, -22, and -40 are discussed in some detail in Section 3.5 of the RFI Work Plan for OU 1111 (LANL 1993, 26068) and in Section 3.5 for OU 1157 (LANL 1993, 20949) and are summarized below.

2.3.1 Surface water

Surface water movement and effects are governed by the local topography, by the degree and nature of vegetation cover, and by manmade diversions or catchments. Figure 2.3.1-1 shows the topography of the northern Explosives Area.

Runoff on the relatively flat mesa tops 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 soil traps or marshes and subsequent movement into local stream channels. There is no evidence of major recent episodes of downcutting or deposition in the area of the PRSs; thus, erosion rates of the undisturbed or vegetated soil are probably low. 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 from small catchments and along fractures associated with the Pajarito fault zone. The Water Canyon fault segment may have produced increased fracturing in TA-8, and the Rendija Canyon and Guaje Mountain fault segments may extend through TA-6 (-7) and -40. A catchment (marsh area) receives runoff from the main facilities at TA-22 and is downgradient from 22-014(a) and (b), and 22-010(a). Another catchment is the concrete bowl at 06-003(a). Water in this bowl is accumulated directly (no additional runoff from outside the bowl) from rainfall or melted snowfall and may be percolating to deeper horizons, eventually encountering either a perched region or the regional groundwater zone. This bowl provides a perennial source of water for wildlife; it also supports the Tiger salamander. Other potential sources of percolating water are the seepage pits and outfalls associated with septic or HE collection systems. These systems have received outflow from sumps that have since been plugged. The amount of water in these features was quite small, so that percolation to deeper horizons appears minimal.

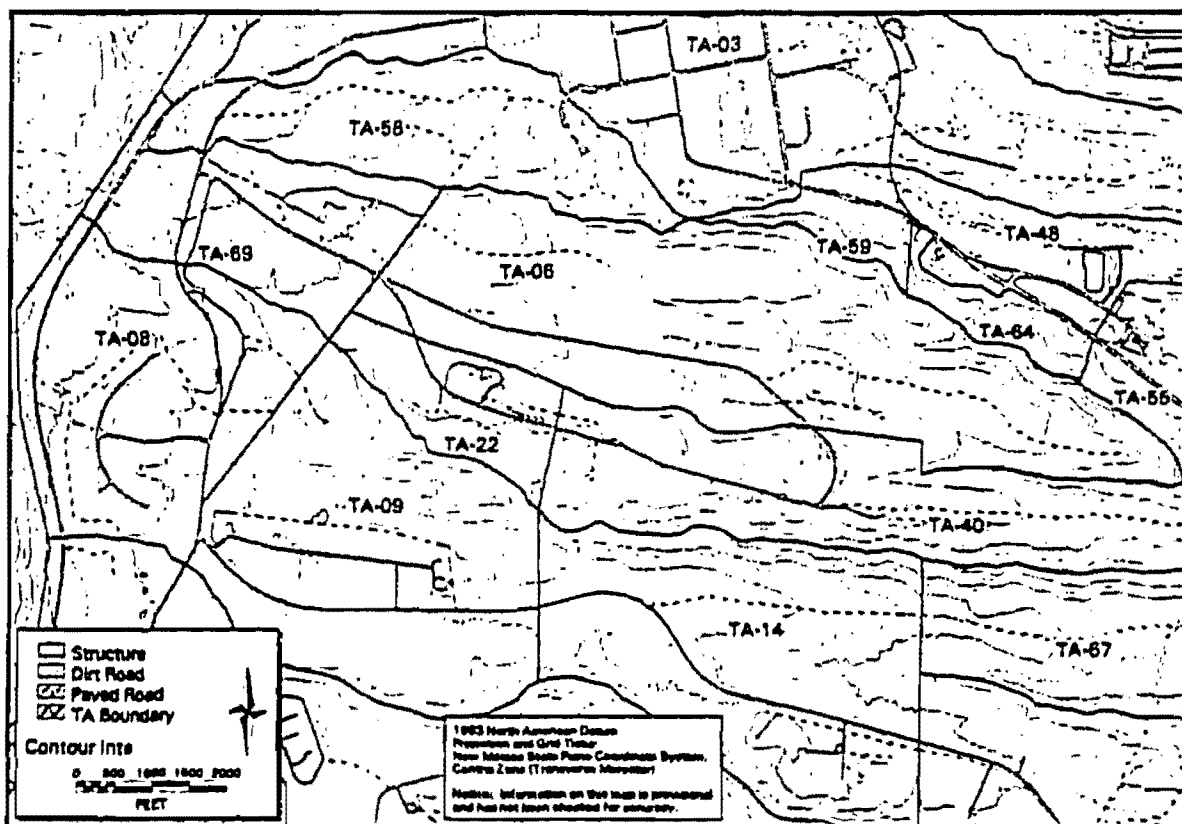


Figure 2.3.1-1 Explosives Area Topography

Overland flow from storm runoff in the open areas and from buildings and paved parking areas impacts many of the PRSs. Inadvertent infiltration of surface or impounded water may occasionally occur, or have occurred, in depressions at the firing sites, but penetration of that water to deeper horizons appears unlikely.

2.3.2 Ground water

The current understanding of the groundwater system underlying TA-6, -8, -22, and -40 is described in Chapters 3 of the OU 1111 Work Plan (LANL 1993, 26068) and OU 1157 Work Plan (LANL 1993, 20949). Based on extrapolations from test wells several miles from OU 1111, the depth to the water table is estimated to be between 1025 and 1285 ft; the intervening volcanic tuff and sediments of the Bandelier and Puye formations and Cerros del Rio basalts appear to be unsaturated. Recent drilling efforts near OU 1111 suggest that there may be an aquifer at a depth of 800 ft below the mesa top. Depth to water at OU 1157 appears to be between 800 and 1100 ft. 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, 20949) and the high evaporation potential and vegetative transpiration.

Infiltration can occur to perched groundwater 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

Biological resource field surveys have been conducted in the Explosives Area 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 Requirements (DOE 1979, 0633); and DOE Order 5400.1, General Environmental Protection Program (DOE 1988, 0075).

The results of these surveys and the habitat description will be included in the ecological report for the exposure units for the PRSs in OU 1111 and OU 1157, prepared by the Decision Support Council Ecological Risk Assessment Team.

During 1992, field surveys were conducted by the Biological Resource Evaluations Team (BRET) of the Environmental Protection Group for OU 1111 (Salisbury 1995, 55596) and OU 1157 (Banar 1996, 55592) to provide information on the biological components before site characterization. The purpose of the field surveys was to determine whether habitats for endangered species or the species themselves were present and whether sites needed to be protected as cultural resources.

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 in TA-8. Habitat information gathered during the biological survey was compared with habitat requirements for species of concern. See Tables 3-2 and 3-3 in the OU 1111 Work Plan and Table 3-1 in the OU 1157 Work Plan for lists of species of concern and their habitats.

2.4.1 Habitat Description for the Explosives Area

Vegetation within the Explosives Area is primarily pine forest with dense stands of relatively young ponderosa pine to more open stands of mature ponderosa pine and mixed conifer forest, with varying understory vegetation types found throughout each series depending on aspect and exposure. 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. Variation in plant composition is also affected by north- and south-facing slopes where White fir, Douglas fir, Ponderosa pine, and Limber pine may be present on the northern exposures. Ponderosa pine, one-seed juniper, and, to a lesser extent, Douglas fir, may be present on south-facing slopes.

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. The vegetation in canyon bottoms contains overstory trees found on mesa tops and slopes such as Ponderosa Pine and White fir but also includes trees characteristic of riparian communities such as Rocky Mountain maple, Gambel oak, Aspen, and water Birch. Thinleaf Alder is also present at some sites at low frequencies. In addition to Gambel oak, other overstory shrubs observed at many sites are Wax currant, Mountain Mahogany, Fendler barberry, Cliffbush, etc., depending on location and exposure.

The common shrub types are Gambel oak and Fendler's rose. Willow is included as a major overstory vegetation only in the drainage channel, and barberry is present as a major species on the north-facing slopes of the site. Other dominant species in the drainage channel are rush species, bluegrass, and rose species. Open meadows are dominated by bluegrass, false tarragon and trailing fleabane. The canyon tributary near TA-9 is dominated by Mountain muhly, red top, bluegrass, and sedge. The farther

canyon tributary is dominated by moss, Mountain muhly, and Red Top. The north-facing slope of Pajarito Canyon is dominated by carex species, Mountain muhly, pussy-toes, and Western Yarrow. Prairie Junegrass, Soil crust, Mountain muhly, Desert trumpet, and Little bluestem grass are also found on mesa tops. Banar (1996) lists a large number of other plant species found at the Explosives Area.

Over 70 species of birds (Appendix B, Banar 1996) visit or are residents of the Explosives Area, including the Mountain chickadee, Three-toed Woodpecker, Pygmy nuthatch, Wren, Olive-sided flycatcher, Chipping sparrow, etc. In addition, Banar (1996) includes a listing extracted from Travis (1992) that numbers the species of birds, including the house sparrow, Stellar's Jay, Mourning Dove, etc., that are listed for Los Alamos County.

Reptiles and amphibians observed in the region include the Bull snake, Eastern fence lizard, Tiger salamander, rattlesnakes, and common garter snakes. Tiger salamanders, and the Stripped chorus frog and Canyon Treefrog have been observed to inhabit portions of the site.

Because of restricted access to the Explosives Area, it is essentially a wilderness preserve with signs of elk, mule deer, bear, coyotes, and smaller animals common. Small mammals observed and studied, which are present at the site, are listed in Appendix B of Banar (1996) and include Cottontail rabbit, Deer mouse, Abert's squirrel, Montane vole, Hoary bat, the long-tailed vole, mountain vole, white-footed mouse, Colorado chipmunk, brush mouse, and western harvest mouse, with deer mice having the highest capture rate in these studies.

2.4.2 Threatened, Endangered, and Sensitive Species in the Explosives Area

Threatened, endangered, and sensitive species studied for potential habitat at the site are the Wood Lily, which has been found in upper Pajarito Canyon in Ponderosa pine to mixed-conifer areas, the Helleborine Orchid, and the Willow Flycatcher. The Jemez Mountain salamander has also been in various montane locations and in the general location of upper Pajarito Canyon (Banar 1996, 55592). Threatened, endangered and sensitive species also studied at the site include the Northern Goshawk, Spotted Bat (13 other species of bats were observed), Mexican Spotted Owl, and Meadow Jumping Mouse. Of these, the Spotted Bat, Spotted Owl, and the Meadow Jumping Mouse were not observed; however, the presence of the Spotted Owl cannot be ruled out on the basis of the short observation period.

Banar (1996) concluded that the following threatened and endangered plant and animal species can be dismissed due to low occurrence and the absence of habitat: Checker Lily, Pagosa Phlox, and Sandia Alumroot for plants, and, for animals, the Black Hawk, Bald Eagle, Mississippi Kite, Peregrine Falcon, Broad-billed Hummingbird, and the Say's Pond Snail.

2.4.3 Wetland and Floodplain Criteria at OU 1111 and OU 1157

Springs, and perennial reaches of streams below the springs, meet wetland criteria in the Explosives Area, as does the cattail pond in TA-22 east of Building 91 (marsh area), although no wetlands appear on the National Wetlands Inventory (NWI) for OU 1111 (Salisbury 1995, 55596) or for OU 1157 (Banar 1996, 55592). In addition, certain outfalls within OU 1157 may be classified as wetlands (Banar 1996, 55592). Potential floodplains in the Explosives Area were identified using floodplain maps generated by McLin (1992, 12014). Floodplains in this area are located in the canyon bottoms of Two-Mile, Los Alamos, Pajarito and Cañon del Valle canyons. Flooding does occur during heavy summer rainstorms. However, all facilities are located on the mesa tops above the floodplains.

2.5 Cultural Surveys

Cultural resource surveys were conducted in both OUs as required by the National Historic Preservation Act (amended) (LANL 1993, 20949).

Thirty-one archaeological/historical sites and Manhattan Project structures located within TA-8 are listed in Table 2-2 in the OU 1157 Work Plan. Ten of 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 (LANL 1993, 20949), based on their research potential. 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.

Thirty archaeological or historical sites are identified in Table 3-4 of the OU 1111 Work Plan. Five of these sites are eligible for inclusion on the National Register of Historical Places based on their research potential. One structure, TA-22-1, the Fat Man Assembly Building, has been determined to be eligible for inclusion. Fifteen Manhattan Project and early AEC-era structures (circa 1942 to 1948) will be evaluated for eligibility before they are decommissioned (LANL 1993, 26068). The attributes of these sites, which make them eligible, or potentially eligible, for inclusion on the National Register, were not affected by ER investigation and sampling activities.

3.0 APPROACH TO DATA ASSESSMENT AND ANALYSES

The approach to data assessment used by the ER Project is described in the policy document Risk-Based Corrective Action Process (Dorries 1996, 55575). The approach includes

- sampling and analysis design,
- field investigation and collection of field and QA samples,
- chemical and radiochemical analyses of samples and reporting of analytical data,
- baseline verification and validation of analytical data,
- organization of field and analytical data into PRS-specific data sets,
- exploratory data analysis,
- focused validation when necessary to further assess questionable data,
- comparison of validated analytical results with Laboratory background data,
- comparison of validated analytical results with SALs,
- evaluation of sufficiency of data sets to support site decisions, and
- assessment of human health risk.

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

3.1 Sample Analyses

Samples were collected in accordance with sample design specified in the RFI Work Plans for OU 1111 and OU 1157 (LANL 1993, 26068; LANL 1993, 20949), with exceptions identified in Chapter 5 of this report. All samples requiring chemical and radiochemical analyses and chain-of-custody documentation were submitted to the sample management office (SMO) for analyses.

Field screening for gross alpha and gross beta/gamma radioactivity, HE, and VOCs was used throughout the PRSs primarily for health and safety purposes during field sample collection activities. However, samples were dried and screened at a fixed laboratory to provide measurements of radioactivity for shipping and sample consignment and to detect the presence of elevated alpha or beta radiation as indicators of elevated uranium concentrations at PRSs 08-002, 06-008, and C-6-019. Elevated gross beta/gamma or alpha radiation levels were used as indicators that samples should be submitted for isotopic uranium analysis so that the presence of depleted uranium could be detected. Details of the field screening and laboratory radioactivity evaluations are presented in Section 5.1.4.

3.1.1 Analytical Methods

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

All samples were analyzed by contract analytical laboratories using methods specified in ER SMO analytical subcontracts (LANL 1995, 49738) and using the LANL DX-2 high explosives field test kit. The field test kit was used in accordance with LANL-ER-SOP-10.06. At the time of use (it has since been reformulated to lower the detection limits), the kit had a detection limit less than or equal to 1000 mg/Kg for pentaerythritoltetranitrate and other HE compounds (Johnston 1997; 55595). The allowed fixed laboratory methods are current EPA SW-846 and Contract Laboratory Program (CLP) methods, or equivalent, for inorganic chemicals, PCBs as Aroclors, VOCs, and SVOCs. Prior to analysis for inorganic chemicals, solid samples were

digested according to EPA SW-846 method 3050 or equivalent (EPA 1992, 40070). SW-846 analysis methods were used for fixed laboratory determination of HE target analytes. The subcontracts specify Laboratory-approved methods for radiochemical analyses according to the technologies identified in the subcontract (e.g., americium-241 by alpha spectroscopy, tritium by liquid scintillation, or multiple isotopes by gamma spectroscopy). Analytical method selection is described in Appendix IV of the ER Project Quality Assurance Project Plan Requirements for Sampling and Analysis (QAPP) (LANL 1996, 54609). For each analyte, quantitation or detection limits are specified as contract-required estimated quantitation limits (EQLs) for organic chemicals and radionuclides and estimated detection limits (EDLs) for inorganic chemicals. These limits are included in Appendix III of the ER Project QAPP along with the target analytes for each analytical suite.

3.1.2 Data Validation

Data verification and baseline validation procedures are used to determine whether data packages received from the analytical laboratory were generated according to specifications and contain the information necessary to determine data sufficiency for decision-making. For analytical data used for decisions discussed in this RFI report, baseline data validation under the ER protocol was performed as described in the QAPP (LANL 1996, 54609).

During the course of these investigations, the baseline data validation process was changed. The older validation process (applied to samples whose sample identification numbers begin with "AAA" or "AAB") produced reports in which one of the following validation flags could have been assigned to data, if a potential deficiency was identified:

J: Reported value is an estimated quantity. The analyte was detected in the sample, but there were one or more QC parameters associated with this sample whose values were outside of established quality limits. Therefore, the analytical uncertainty or bias could be greater than would be expected if all QC parameters are within established acceptance limits.

R: Reported value is rejected. The data are qualified as not usable because one or more of the QC parameters associated with the data exhibited values that were outside of established limits to such a degree that the reported value is highly questionable.

U: The analyte was not positively identified in the sample, and the associated value is the sample-specific EQL/EDL.

UJ: Reported value is an undetected, estimated quantity. The analyte was not detected in the sample, but there were one or more QC parameters associated with this sample whose values were outside of established quality limits.

The current baseline data validation process produced validation reports, with an expanded list of data qualifiers used to designate potential data deficiencies. That process was applied to samples whose sample identification numbers are of the format xxxx-xx-xxxx, with x's indicating numerical digits. Each data qualifier is accompanied by a reason code that provides information about the deficiency that led to qualification of the data.

Data qualifiers used in the current Laboratory ER Project baseline validation process are:

A The data required for data review and evaluation are not available.

U The analyte was not positively identified in the sample, and the associated value is the sample-specific EQL/EDL.

J The analyte was positively identified, and the associated numerical value is estimated to be more uncertain than would normally be expected for that analysis.

J+ The analyte was positively identified, and the result is likely to be biased high.

J- The analyte was positively identified, and the result is likely to be biased low.

UJ The analyte was not positively identified in the sample, and the associated value is an estimate of the sample-specific EQL/EDL.

RPM Without further review of the raw data, the sample results are unusable due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. Presence or absence cannot be verified. NOTE: Any results qualified as RPM must be evaluated for relevance to data use.

P Professional judgment should be applied to using the data in decision-making.

PM Professional judgment should be applied to using the data in decision-making. A manual review of raw data is recommended to determine if the defect impacts data use for decision-making.

In both cases, the baseline validation reports were used in the decision-making process and to direct the focused validations required to evaluate the usability of the data for this report.

Data were qualified (i.e., one or more of the qualifiers indicated above were associated with the data) for a variety of reasons during the baseline validation process. The baseline validation procedure used for routine analytical services provides information about the reason the qualifier was applied and its potential impact on the affected data. The purpose is not to reject data but rather to ensure that the relative quality of the data is understood so that the data may be used appropriately.

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

- the data are qualified as deficient or as requiring professional judgment during the verification/baseline validation process. For example, when holding times are exceeded or interferences are present, a focused validation may be required to assist in determining data adequacy for the intended use; and
- the data quality assessment process requires additional information about the
 - variability or uncertainty of the reported data or
 - data quality prior to making a data use decision because of anomalies detected in a data set.

Details of quality assurance/quality control activities are presented in Chapter 4 of this RFI report. Qualifiers resulting from baseline and focused validation are shown in the analytical results tables included in Chapter 5 of this report. Summaries of data quality evaluations and focused validation of analytical data relevant to this report are given in Appendix B. The RPM, P, and PM qualifiers do not appear in Chapter 5 data tables, nor in Appendix B, because they are replaced during focused validation according to the data use.

3.2 Process for the Identification of COPCs

3.2.1 Inorganic Chemicals

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

- soil, sediment, and tuff samples collected throughout Los Alamos County for which chemical analyses were performed for certain inorganic (metal) chemicals (Longmire et al. 1995, 55115 and 52227). The all-soil-horizons background data set was used because the soil master horizon was not identified when the samples were collected.

Comparisons between site data and background data are initially performed by comparing each observed concentration datum with a chemical-specific background screening value that is the upper tolerance limit (UTL), or the maximum reported concentration, or the detection limit of a nondetected chemical. These background screening values are derived from Laboratory-wide soil, sediment and/or tuff background data, and details on the calculation of these values are presented in Longmire et al. (1995, 52227). Certain inorganic chemicals in certain media have no Laboratory-wide background data. For these exceptions, PRS sample-specific detection limits are used as nominal background screening values. In this report, chemicals that lack background data include silver.

3.2.2 Radionuclides

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

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

Detected radionuclides are retained as COPCs or eliminated from further consideration based on a comparison with natural or anthropogenic background distributions. The radionuclide background data used in this RFI report are from the following sources:

- soil, sediment, and/or tuff samples collected throughout Los Alamos County for which chemical analyses were performed for certain naturally occurring radioactive chemicals (Longmire et al. 1995, 55115; 1995, 52227). The all-soil-horizons background data set was used because the soil master horizon was not identified when the samples were collected.
- background concentrations of radioactive chemicals associated with global fallout from atmospheric nuclear testing (e.g., plutonium, cesium, strontium, and tritium) reported in LANL Environmental Surveillance reports (Purtymun et al. 1987, 6687; ESG 1988, 6877; ESG 1989, 6894; Environmental Protection Group 1990, 6995; Environmental Protection Group 1992, 7004).

Comparisons between site data and background data are initially performed by comparing each observed concentration datum with a radionuclide-specific background screening value that is either the UTL or the maximum reported activity. These background screening values are derived from Laboratory-wide soil, sediment, and/or tuff background data, and details on the calculation of these values are presented in Longmire et al. (1995, 52227). Certain radionuclides in certain media have no Laboratory-wide background data. For these exceptions, PRS sample-specific minimum detectable activities are used as nominal background screening values. In this report, radionuclides that lack background data include Sr-90 and Cs-137.

3.2.3 Organic Chemicals

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

3.2.4 Risk-Based Screening Assessment

Inorganic chemicals and radionuclides that exceed background and organic chemicals positively identified in one or more samples require further evaluation if they also exceed SALs. SALs for nonradioactive chemicals are based on EPA Region 9 preliminary remediation goals (PRGs) for residential soil and tap water. Where appropriate, certain EPA Region 9 water PRGs are replaced by Native American Pueblo, New Mexico state or federal water quality standards. Soil and water media have separate SALs for each chemical. The decision to identify a chemical as a COPC when a SAL is not available is made on a case-by-case basis, taking into account the availability of process knowledge and toxicological information.

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

If COPCs remain after the screening assessment, several options exist for the PRS. A further site-specific evaluation may lead to eliminating a COPC without going into a formal risk assessment. The site may be proposed for further sampling to more completely characterize the site or for remediation if it is cost effective to proceed without a risk assessment. A risk assessment may be conducted to determine if the remaining COPCs present an unacceptable human health risk.

3.3 Human Health Risk Assessment

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

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

inorganic chemicals, background intakes may be near a toxicity threshold such that incremental intakes associated with contamination may be unacceptable.

Background risk estimates provided in Table 3.3.1-1 were calculated using the same exposure assumptions by which SALs are calculated. SALs are based on health-protective assumptions for a residential scenario (EPA 1995, 53970). For soil exposure, the pathways include incidental soil ingestion, inhalation of resuspended dust, and dermal contact with soil. The background soil data used for these calculations were collected from several soil horizons at geographically diverse locations. Background risks are estimated for two statistics. One statistic is the median of the observed contaminant concentrations, which represents the midpoint in the concentration range (technically, the median is the concentration value that divides the results into two equal groups or where half of the data are above and half are below this value). The second statistic represents the upper range on background concentration values and is either calculated as a UTL or a maximum concentration value.

UTLs and maximum concentration values are identical to those described in Section 3.2.1 (Inorganic Chemicals).

The background risks based on the Laboratory SAL residential exposure model are provided in Table 3.3.1-1. Risks due to exposure to chemicals at background concentrations are presented for both noncarcinogenic and carcinogenic outcomes. The potential for adverse noncarcinogenic health effects is estimated by computing a hazard quotient. A chemical intake leading to a hazard quotient of up to 1 is not associated with adverse health effects. None of the median background concentrations result in hazard quotients greater than 1. The hazard quotient of the UTL concentration for manganese exceeds 1 (1.9). However, exposure to naturally occurring manganese is not expected to have significant health consequences because of the unlikely occurrence of the UTL concentration over an entire exposure area, the conservative assumptions used in the exposure assessment, and the margin of safety incorporated into the reference dose.

Three of the background inorganic chemicals provided in Table 3.3.1-1 are also carcinogens. Applying the default exposure assumptions used for SALs, the lifetime cancer risks due to residential soil exposure to background concentrations (UTL column) are estimated at approximately 1 excess case of cancer in 100,000 people for beryllium, 2 in 100,000 for arsenic, and 2 in 1,000,000,000 for cadmium (Cd is carcinogenic only by Inhalation). EPA uses a range of 1 excess case of cancer in 10,000 people to 1 in 1,000,000 as guidance for an acceptable range of cancer risk (EPA 1990, 55594).

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

TABLE 3.3.1-1
RISK DUE TO BACKGROUND CONCENTRATIONS OF INORGANIC CHEMICALS IN
SOIL ASSUMING A RESIDENTIAL SCENARIO^a

Soil Inorganic	Background Soil Concentration ^b mg/kg		Hazard Quotient		Lifetime Cancer Risk	
	Median	UTL	Median	UTL	Median	UTL
Aluminum	10 000	38 700	0.1	0.5	NC ^c	NC
Antimony	0.6	1 ^d	0.02	0.03	NC	NC
Arsenic	4	7.82	0.2	0.4	1×10^{-4}	2×10^{-5}
Barium	130	315	0.03	0.06	NC	NC
Beryllium	0.895	1.95	0.003	0.006	6×10^{-4}	1×10^{-5}
Cadmium ^e	0.2	2.6 ^d	0.005	0.07	1×10^{-10}	2×10^{-6}
Chromium ^f	8.6	19.3	0.00009	0.0002	NC	NC
Cobalt	6	19.2	0.001	0.004	NC	NC
Copper	5.75	15.5	0.002	0.01	NC	NC
Lead ^g	12	23.3	0.03	0.06	NC	NC
Manganese	320	714	0.8	1.9	NC	NC
Mercury	0.05	0.1 ^d	0.002	0.004	NC	NC
Nickel	7	15.2	0.005	0.01	NC	NC
Selenium	0.3	1.7 ^d	0.0008	0.005	NC	NC
Thallium	0.2	1 ^d	0.03	0.2	NC	NC
Uranium	0.9	1.87	0.004	0.008	NC	NC
Vanadium	21	41.9	0.04	0.08	NC	NC
Zinc	30.7	50.8	0.001	0.002	NC	NC

a. Risk estimates are based on reference doses, slope factors, and EPA Region 9 default exposure assumptions effective April 1996

b. Background concentrations taken from the Longmire et al. all soil horizons data set (1995, 55115).

c. NC = noncarcinogen

d. maximum detected background value.

e. Cancer risks for cadmium are based solely on inhalation of resuspended dust.

f. Naturally occurring chromium is assumed to exist in a trivalent state.

g. Hazard quotient based on biokinetic uptake model.

3.3.2 Risk Assessment

No human health risk assessments were performed for these PRSs.

3.4 Ecological Assessment

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

4.0 RESULTS OF QUALITY ASSURANCE/QUALITY CONTROL ACTIVITIES

Samples were collected, processed, and analyzed in accordance with the Environmental Restoration Quality Assurance/Quality Control (QA/QC) program documented in the Site-Specific Quality Assurance Project Plan (QAPJP), Annex II of the RFI Work Plans for OU 1111 and OU 1157. The QA objectives (precision, accuracy, etc.) for measured data were based on the Laboratory Quality Program Plan for Environmental Restoration Activities (LANL 1991, 7651).

Several types of QC samples were used on a routine basis as analytical data quality indicators. These include:

- laboratory and field blanks that indicate whether samples might have been contaminated during the sampling or analysis processes;
- laboratory and field duplicate samples used to estimate the degree of heterogeneity of samples and PRSs and to estimate analytical precision, as appropriate;
- laboratory control samples (LCSs) and check standards that were analyzed to ensure that the calibration of an instrument continued to be acceptable;
- surrogate compounds and matrix spikes that indicate the potential for chemical or physical interferences or other effects that could affect an observed analyte concentration relative to its true value; and
- QC samples generated external to the analytical laboratory (ER Project QC blind samples) that are analyzed by the laboratory and evaluated by the ER Project to determine if the overall measurement system is functioning properly.

Data packages generated from the analytical process were reviewed for compliance with ER requirements from both an administrative and technical quality perspective. Administrative checks, or data verification, typically assure users that the required results have been provided by the laboratories and that the data packages supplied by the laboratories are complete. The technical quality review, or baseline data validation, which focuses on identifying actual or potential problems associated with sample handling and analyses, requires the QC data to be reviewed against numerical acceptance criteria. At this time there are no numerical acceptance criteria for field QC samples. The baseline validation process results in qualifiers being assigned to data, as appropriate, as described in Chapter 3 of this report. This process is based on the US EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (EPA 1994, 48640) and on the US EPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (EPA 1994, 48639).

Data qualifiers provide a simple way to identify potential data quality problems, but the limited number of qualifiers dictates that the classifications are gross, at best. A 1% change in analyte recovery could cause an analyte to be reclassified from one category (e.g., estimated value, J) to another category (e.g., rejected value, R), yet a 1% change in analyte recoveries is insignificant. Thus, the reader is cautioned not to interpret data validation qualifiers too literally. This situation is especially important in the case of the "R" qualifier assigned under the old validation system whose definition would suggest that data associated with "R" qualifiers are unusable. The "R" qualification is used to indicate to the data user that a potentially severe data deficiency exists. However, in accord with the US EPA "National Functional Guidelines," qualified data may be used with an understanding of the limitations on the data quality that have caused them to be qualified (i.e., using professional judgment). For example, a common reason for qualifying data as rejected is because of not analyzing a sample within the prescribed or recommended holding time. However, holding times, while often developed with best

professional judgment, frequently have no basis in scientific fact and could be too short or too long, depending on the analyte, the sample preservation method or conditions, and the storage conditions. Therefore, exceeding a holding time should not automatically prohibit the use of the data under appropriate circumstances. What is "appropriate" should be determined based upon the decisions to be made, the sample handling and storage conditions, and the reported analyte concentrations. This usually means taking into consideration the potential for an unusually high or low bias or an unusual degree of uncertainty in the data. All data are typically examined relative to the entire data set when deciding if the use of qualified data is appropriate. This allows the data analyst and decision makers to assess whether a potential deficiency identified during baseline validation appears to make sense in the context of the entire data set and whether the potential deficiency adversely impacts the decisions that must be based on the data.

Two general conditions exist under which data qualifiers are assigned. At times, baseline data validation causes qualifiers to be associated with the results for a given analyte in an entire batch of samples that were analyzed together under similar conditions. For example, data from the analysis of QC blind samples or analytical method blanks might indicate the potential for a high or low bias in an entire sample batch. The appropriate qualifier(s) would then be associated with results in all of the samples belonging to that batch. At other times, the QC information applies only to the analytes in a particular sample, and qualifiers are added accordingly. For example, SVOC analyses require that certain non-naturally occurring monitoring compounds (surrogate compounds) be added to each sample to indicate how well the analytical system was performing during the preparation and analysis of that particular sample. In those cases, qualifiers added to the results based on surrogate compound data alone are specific to that sample. Typically, one would expect sample-specific analytical performance information to be similar for samples analyzed in a given batch unless sample-specific factors such as matrix interferences or preparation factors cause differences.

The evaluation of QC data from individual site investigations is limited to indicating whether the data appear to have been generated in a technically sound manner. The site-specific investigation QC data alone are generally insufficient for quantifying components of measurement error or for quantifying the degree of bias in individual sample results. Because of those limitations, it is the policy of the Laboratory's ER Project not to adjust data values for apparent biases, although comparisons of site data with action levels may take into account apparent biases. Therefore, where biases are likely to exist or have the potential to exist, it is noted in the QC data evaluations.

Data reviews that occur after baseline data validation qualifiers have been associated with the data (i.e., focused validations) can take a number of pathways. Those pathways depend on the intended use(s) of the data and the apparent condition of the data as indicated by, for example, the data validation qualifiers. The approaches taken are often so problem-specific that only a general description of this focused data validation process can be provided here. The first step is typically to manually investigate the QC data, calibration data, etc., associated with the data set in question. The reviewer judges the technical validity of the data by drawing inferences about the relationship of the quality control data relative to the environmental data. For example, if an analyte value is qualified as being potentially biased high, the high bias could lead to conservative decisions that are overly protective of human or ecological concerns. Similarly, if a potentially low bias is observed, the data users might be cautioned to consider the apparent low bias when comparing contaminant concentrations to action levels. Failure to take a low bias into consideration might not be protective enough of human or ecological concerns. The reviewer generally looks for anomalies that might

not be identified during the baseline data validation process or investigates further problems that were identified during baseline validation.

This chapter summarizes the findings of the data quality evaluations performed as described above. Textual discussions of the data quality are arranged by analyte class (Inorganic, Radiochemical, and Organic) and by PRS within each analyte class. Complementary to those discussions are data tables in Appendix B. Those tables are arranged by PRS. The tables identify those sampling locations and samples within each PRS for which a data quality problem might exist as indicated by baseline data validation qualifiers. Exceptions include data for which inclusion in the table were considered not to be of value when the reader could glean all that is necessary from the textual description of data quality for that PRS. Generally, reasons for the qualification of the data are presented in the tables, and indications of the magnitudes of the potential problems are presented. For example, surrogate compound and matrix spike recoveries are documented to provide the reader an indication of the degree of potential biases in analyte concentrations. However, in keeping with Laboratory ER policy, environmental contaminant concentration biases are not computed on a per sample basis, and data are not adjusted to account for apparent biases. In cases that appear to be particularly severe or troublesome, cautions to the data user are provided in the tables. The tabulated data should not be reviewed without a review of the corresponding text that is referenced in footnotes associated with each table.

At the beginning of each of the three analyte class sections below (Inorganic, Radiochemical, and Organic), general observations and conclusions that apply to each PRS in that section are presented first. Then PRS-specific information is presented as a series of subsections. Chemical symbols are used throughout when referring to chemical elements.

4.1 Inorganic Analyses

The selenium (Se) results for many QC blind samples across all PRSs fall well outside of control limits, whereas the Se matrix spike data are generally acceptable. Moreover, the reported concentrations for most other inorganic species in the QC blind samples are frequently acceptable, or they do not lie very far outside of acceptance windows as detailed below. This situation has raised questions across the ER Project concerning the validity of the QC blind sample Se data. Therefore, QC blind sample acceptance limits were not used in evaluating the quality of Se data in environmental samples, and Se data that were qualified based on QC blind recoveries alone are not listed in the Appendix B tables, nor are they discussed here.

Certain metal recoveries in soil matrix spikes were frequently greater than expected by a factor of 1.5 to 3 and, occasionally, greater than a factor of three. In many cases, this is because the matrix spike levels prescribed in the standard analytical method are too low relative to the native metal concentration in the soils to yield accurate spike recoveries. Thus, the apparently poor analytical performance is only an artifact of the analytical spiking process, and the high recoveries do not indicate poor analytical performance. The metals for which this high matrix spike recovery situation is most likely to exist are the metals that have relatively high native soil concentrations—aluminum (Al), calcium (Ca), iron (Fe), magnesium (Mg), potassium (K), and sodium (Na). Because those metals are not typically of significant environmental concern, poor spike recoveries for those metals are not discussed except in extreme cases, or where it is unclear if the problem is due only to low spiking levels, or if it is an actual analytical performance problem. On occasion, the low matrix spike problem was encountered for other metals besides the metals listed above. In those cases, the low matrix spike problem is identified, where appropriate.

Cyanide (CN) results for soil matrix spikes were often lower than expected, indicating a potential low bias for cyanide data. The cause of this is suspected to be the high iron content of Laboratory soils. Cyanide and iron can combine to form a very tightly bound chemical complex that is difficult to decompose. A portion of the CN might thus be difficult to detect in the chemical analysis. If one considers that chemical analysis subjects the soil samples to much more rigorous conditions than those encountered in the environment, it is logical to assume that CN bound in an iron complex in the environment will be largely nontoxic because it is bound to the iron. Therefore, a low bias for iron-bound cyanide is not considered to be cause for concern. In addition, the CN results typically reported for these PRSs (<1 ppm) are far below any levels of concern and therefore are not of interest.

Evaluation of quality control data associated with fluoride, nitrate/nitrite, sulfide, and total dissolved solids results revealed that data for those analytes are usable as reported. Data quality for these analytes is generally not discussed further in this chapter.

4.1.1 PRS 06-001(a)

Nineteen soil samples, AAA8861 through AAA8879, were analyzed for metals and cyanide under Request Number 18511. Holding times were exceeded for those samples. QC blind samples 94.18836 and 94.18837 were analyzed with the environmental samples for metals and revealed high recoveries for arsenic (As) and antimony (Sb), and low recoveries for chromium (Cr). The QC blind sample 94.18836 As result was more than five times greater than the expected value, yet the other QC blind As result was 106% (within 6% of the expected value of 100%). Inspection of the raw data revealed that the QC blind sample 94.18836 result was incorrectly reported and that the correct value of 575 mg/Kg yielded a recovery of 107%. Matrix spike data for these metals were within 21% of the accepted values.

High recoveries in the QC blind samples indicate a potential, though slight, high bias in the analytical results, and the data may be used with knowledge of a potential high bias for As and Sb. The low Cr recovery indicates a potential, though relatively small, low bias for Cr. Cyanide was detected in samples AAA8869, AAA8878, and AAA8879. Percent recoveries for CN in QC blind samples 94.1880 and 94.18841 were within the control limits. The matrix spike recovery for CN was 93%.

These QC data appear not to have been adversely affected by the exceeded holding times because the QC values are generally within acceptable limits. These data indicate that the environmental sample data are acceptable, though there is a potential for slight high bias in the As and Sb results and relatively slight low bias in the Cr results.

4.1.2 PRS 06-001(b)

Twenty-one soil samples(AAA8882 through AAA8902) and four water samples (AAA8903 through AAA8906) were analyzed for metals and cyanide under Request Number 18217. The associated QC data were acceptable as reported, and none of the data are qualified.

4.1.3 PRS 06-003(a), 6-008, C-6-019

Ten soil samples, AAB7839 through AAB7848, were analyzed for metals and cyanide under Request Number 18523. Sixteen samples, AAB7891 through AAB7906, were analyzed for metals and cyanide under Request Number 18776.

The QC blind samples for Request Number 18523 exhibited low recoveries ranging from 57% to 90% recovery for CN, vanadium (V), thallium (Tl), and Cr, with at least one value for each analyte less than 80% recovery. These data, by themselves, indicate a potential for low bias in the results. Recoveries were reported incorrectly for the two

laboratory control samples for mercury (Hg) and were later determined to be 95% for both samples. Percent recoveries for CN, V, Ti, and Cr in two different matrix spike samples were 91% and 102%, 96% and 98%, 72% and 91%, and 97% and 100%, respectively. Duplicate analysis data also show good agreement (all values within 30% of average). Therefore, all data under Request Number 18523 may be used as reported.

Under Request Number 18776, three QC blind samples, 94.20862 through 94.20864, were analyzed for CN analysis, and three QC blind samples, 94.20855 through 94.20857, were analyzed for metals. The CN recoveries for samples 94.20863 and 94.20864 were 33%; the CN recovery for sample 94.20862 was 82%, which is just inside the $100\% \pm 20\%$ acceptance window. These QC data indicate a potential low bias in the CN data. On QC blind samples 94.20855 through 94.20857, certain metal analyte recoveries fell outside of the $100\% \pm 20\%$ acceptance window. The Al results fell between 67% and 74% (samples 94.20855 through 94.20857), the As results ranged from 125% and 145% (sample 94.20855), the Cr results ranged from 55% and 74% (samples 94.20855 through 94.20857), the V results were approximately 60% (samples 94.20855 and 94.20856), and the Ti results ranged from 63% and 67% (samples 94.20855 and 94.20856). Sb was correctly reported as <10 mg/Kg on two QC blind samples but incorrectly reported as 12.8 mg/Kg on another QC blind sample. For environmental samples analyzed with each of the affected QC blind samples, this caused the results to be qualified as estimated (J) if detected in a sample or, if the recovery was less than 80%, to be qualified as undetected estimated (UJ) if not detected in the sample.

The field duplicate results for Request Number 18776 were generally within 30% relative percent difference (RPD) although manganese (Mn) and lead (Pb) results exhibited 57% and 37% RPD, respectively. Laboratory duplicate RPD values ranged from 10% to 33% for Mn and from 4% to 13% for Pb. The matrix spike data were generally unacceptable for copper (Cu) (138% on sample AAB7881 and 101% on sample AAB7897), Fe (1188% on sample AAB7881 and 1710% on sample AAB7897), Pb (594% on sample AAB7881 and 66% on sample AAB7897) and Sb (59% on sample AAB7881 and 41% on sample AAB7897). Otherwise, the matrix spike results for metals were within 20% of the 100% recovery expected. The "unacceptable" high matrix spike performance for Cu, Fe, and Pb is attributed to spiking the samples at concentrations that are too low relative to the native Cu, Fe, and Pb concentrations. The matrix spike recovery values do not, therefore, indicate poor analytical performance.

In summary, for Request Number 18776, CN, Al, Cr, Sb, Ti, and V results should be considered to be biased low. Based on the matrix spike and QC blind sample recoveries, As data should be considered to be biased high. An apparent high bias observed for Na results (approximately 50% higher than expected) is of no importance for this PRS. All other data may be used as reported.

During the resampling of April, 1997, an additional soil sample (0506-97-0001) was collected for metals analyses under Request Number 3044R. No problems were experienced with those data except an elevated (140% recovery) for sodium in the laboratory control sample. The metals data for Request Number 3044R are useable as reported with the understanding that sodium results might be biased slightly high.

4.1.4 PRS 06-003(c)

Thirteen soil samples, AAB7849 through AAB7861, were analyzed for metals and cyanide under Request Number 18523. Data quality for this Request Number is discussed in Section 4.1.3.

4.1.5 PRS 06-003(f)

Thirteen soil samples, AAB7862 through AAB7874, were analyzed for metals and cyanide under Request Number 18755. The matrix spikes exhibited low recoveries for As, Cu, Cr, Sb, Se, and Zn (64%, 11%, 49%, 43%, 36%, and 60%, respectively), indicating a potential low bias in the results for those metals caused by sample matrix interferences. The recovery of Cr in one of six QC blind samples (QC blind sample 94.20700) was also low (62%). The baseline data validation report identified the reported As result for QC blind sample 94.20700 as being 650 mg/Kg, whereas that was a reporting error and the actual arsenic value was 13.3 mg/Kg. The As concentration reported for QC blind sample 94.20699 was 3.2 mg/Kg, yielding a recovery of 0.6%. Inspection of the raw data revealed that the reported value for QC blind 94.20699 is incorrect and should be 650 mg/Kg, yielding a recovery of 113%. These QC data indicate a potential low bias for Cr with no apparent bias for As. The "R" qualification of As data is being revoked, but the As results are viewed as more uncertain than normal because of the conflicting indications regarding high and low biases between the matrix spike and QC blind data. The expected values for Ag and Tl values in QC blind sample 94.20700 were 1.4 and 2.2 times higher than the detection limits, respectively, but Ag and Tl were not detected in that sample. These data, combined with the matrix spike data, indicate a potential low bias for Ag, Cu, Cr, Sb, Se, Tl, and Zn, although only the Cu results appear to exhibit a severe low bias. Arsenic data may be viewed as being less certain than would normally be expected. The CN matrix spike recovery was 76%, which is just outside the 100% $\pm$ 20% acceptance window. Other QC data for CN are acceptable, so CN data may be used without qualification.

4.1.6 PRS 06-003(g)

Four soil samples, AAB7875 through AAB7878, were analyzed for metals and cyanide under Request Number 18755. Ten soil samples, AAB7881 through AAB7890, were analyzed for metals and cyanide under Request Number 18776. The matrix spike and QC blind data quality associated with Request Number 18755 are summarized in Section 4.1.5. The matrix spike and QC blind data associated with Request Number 18776 are summarized in Section 4.1.3.

In summary, for Request Number 18755, a potential low bias is indicated for silver (Ag), Cu, Cr, Sb, Se, Tl, and Zn, although only the Cu results may exhibit a severe low bias. Arsenic data may be viewed as being less certain than would normally be expected.

In summary, for Request Number 18776, CN, Al, Cr, Sb, Tl, and V results should be considered to be biased low, and As results should be considered to be biased high. An apparent high bias observed for Na results is of no importance for this PRS. All other data may be used as reported.

4.1.7 PRS 06-007(g)

Six soil samples, AAA8832 through AAA8837, were analyzed for metals and cyanide under Request Number 18039. Because of low recoveries on QC blind samples, the Ag and CN results were qualified as undetected estimated (UJ) if not detected in the sample, and as estimated (J) if detected in a sample. The matrix spike recoveries for Ag, and CN were 69% and 100%, respectively. Arsenic results were originally qualified as rejected (R) because of only 1.02% recovery on QC blind sample 94.14034. However, review of the raw data and communication with the analytical laboratory indicate that a 100-fold sample dilution was not accounted for when reporting the As QC blind sample result and that the correct percent recovery value is 102%. Lead results for samples AAA8832 and AAA8834 were also reported incorrectly and should have been reported as 1,410 mg/Kg and 22.5 mg/Kg, respectively, as determined using ICP analysis. In addition, the matrix spike recovery for As is 110%. The sample preparation for Hg

analysis of the QC blind sample failed during the first preparation attempt, and insufficient sample remained for another attempt, so no QC blind data are available for Hg. However, the matrix spike recovery for Hg was 94%, indicating acceptable analytical performance for this metal. All data may be used as reported.

4.1.8 PRS 07-001(a)

Thirteen soil samples, AAB7909 through AAB7921, were analyzed for metals and cyanide under Request Number 18808. If detected in a sample, Al, CN, Cr, Ti, and V results are qualified as estimated (J); if not detected in a sample, those results are qualified as estimated undetected (UJ), because of analyte recoveries in QC blind samples 94.21166, 94.21167, and 94.21168 that fall within the range of 10 to 75% recovery. This indicates a potential low bias for these analytes. Arsenic and sodium results are qualified as estimated (J) because of 120% to 138% recovery on QC blind samples 94.21166, 94.21167, and 94.21168, indicating a potential high bias for those two metals. Except for Sb, matrix spike data were generally within 20% of the expected values indicating no significant matrix interferences. The Sb spike recoveries were 56% and 67%. All Al, Cr, Sb, Ti, and CN data should be viewed as potentially biased low; As and Na results should be viewed as potentially biased high.

4.1.9 PRS 07-001(b)

Twelve soil samples, AAB7922 through AAB7933, were analyzed for metals and cyanide under Request Number 18808. Data quality for this Request Number is discussed in Section 4.1.8.

4.1.10 PRS 07-001(c)

Three soil samples, AAB7934 through AAB7936, were analyzed for metals and cyanide under Request Number 18983. Aluminum, barium (Ba), Mg, and potassium (K) results were qualified as estimated (J) because concentrations were outside the upper calibration range. This is an indication that the results could be biased low. All QC blind data for those analytes were within specified acceptance limits. Moreover, all matrix spike recoveries of those metals were within 12% of the 100% target value. If the potential low bias caused by exceeding the calibration range was significant, the matrix spike results would be expected to deviate more significantly from the 100% target value.

Matrix spike recoveries for Fe (176%), Pb (128%), Sb (50%), and Se (78%) fell outside $\pm 20\%$ of the expected values; the QC blind data were within the $\pm 20\%$ control limits. The recovery value for Cr on QC blind samples 94.22067 and 94.22068 was 66% for both samples; the matrix spike recovery was 96%. Only Cr and Sb show a potentially significant low bias; the potential high bias of Fe and Pb are not of consequence for this PRS.

Mercury (Hg) and CN results were qualified as undetected estimated (UJ) because of low recovery of those analytes (47% and 73%, respectively) in QC blind samples 94.22072 (Hg) and 94.22070 (CN). However, the matrix spike recoveries were 89% to 99% (CN) and 103% (Hg).

Duplicate results for all analytes discussed above showed excellent agreement (generally within 10% relative percent difference). The data for all of the metals and CN discussed above may be used as reported with due consideration given to the potential low bias for Cr, Hg, and CN evident from low recoveries in QC blind samples.

4.1.11 PRS 07-001(d)

Thirteen soil samples, AAB7937 through AAB7949, were analyzed for metals and cyanide under Request Number 18983. Data quality for this Request Number is discussed in Section 4.1.10.

4.1.12 PRS 08-002

Fourteen soil samples, AAB0791 through AAB0794 and AAB0801 through AAB0810, were analyzed for metals under Request Number 17335. With the exception of a high recovery (215%) on the Pb matrix spike, all quality control results were acceptable. The Pb results were not qualified during baseline validation because the high matrix spike recovery is an artifact of spiking the sample at too low a concentration relative to the native Pb concentration in the soil. None of the data for Request Number 17335 require qualification.

4.1.13 PRS 22-010(a)

Seventeen soil samples, AAA8909, AAA8911, and AAA8913 through AAA8927, were analyzed for metals and cyanide under Request Number 18247. Three water samples, AAA8910, AAA8912, and AAA8927, were analyzed for metals under this same Request Number. For the soil samples, Pb results are qualified as rejected (R) because of an extreme high bias (640%) on QC blind sample 94.16066. However, the Pb recovery for QC blind sample 94.16065 was 80%. Review of the raw data revealed a reporting error and that the correct value for the Pb concentration of QC blind sample 94.16066 was 5.15 mg/Kg, a recovery of 128%. The soil laboratory control sample (LCS) concentrations were higher than the acceptable upper limit for Cr, cobalt (Co), Cu, Pb, Mg, Se, Na, Tl, and V. Matrix spike recoveries for Al, Fe, Mn, Pb, and Se were 400%, 650%, 170%, 64%, and 51%, respectively; otherwise, matrix spike recoveries were within 15% of expected values. For the three water samples, the matrix spike exhibited a low recovery for As (75%), cadmium (Cd) (66%), Sb (76%), Se (25%), and Pb (38%), indicating a potential low bias for those metals, especially Se and Pb. The Al, Fe, and Mn spikes were determined to be too low relative to the native metal concentrations in the soils and do not indicate poor analytical performance.

Based on the QC data, the Se and Pb results for the soil samples may be used with the expectation that the reported concentration values are less certain than would normally be expected. These two metals should not necessarily be expected to be biased high or low. The Al, Co, Cu, Fe, Mg, Na, Tl, and V appear to be biased high, based on the LCS recoveries and, in some cases, matrix spike data. For water samples, Se, Cd, and Pb exhibit potentially significant low biases.

During the resampling of April 1997, six additional soil samples, 0522-97-0001 through 0522-97-0006, were collected for metals analyses under Request Number 3050R. The matrix spike for manganese was approximately twice the expected value (215% recovery), indicating a potential high bias for the manganese results of the other field samples in this Request Number. In addition, the relative percent difference (RPD) for laboratory duplicate samples was +34%, which exceeds the nominal validation criteria of $\pm 20\%$ RPD yet is within the bounds ($\pm 35\%$ RPD) commonly observed for Laboratory soils. The laboratory duplicate Pb and Al results, 25% RPD and 70% RPD, respectively, also exceeded the $\pm 20\%$ RPD criterion, yet their matrix spike recoveries were within acceptance criteria. The manganese results are qualified as J+ (estimated with potential high bias) and the lead and aluminum results are qualified as J (estimated).

4.1.14 PRS 22-010(b)

Twenty-nine soil samples, AAA8930 through AAA8952 and AAA8975 through AAA8980, were analyzed for metals and cyanide under Request Number 18514. Aluminum (Al), Cr, Hg, Tl, and V under Request Number 18514 are qualified as either estimated (J) if detected in a sample, or undetected estimated (UJ) if not detected in the sample, because some QC blind sample recoveries were between 50% and 75% of expected values. Lead and sodium for Request Number 18514 were qualified as estimated (J) when detected in a sample because of high recoveries on a QC blind sample (155% and 162% for Na and Pb, respectively). Two matrix spike samples exhibited only 60% and 67% recovery for Sb whereas the QC blind sample results are within acceptance limits for Sb. Lead and sodium results for Request Number 18514 should be viewed as potentially biased high; Hg, Al, Cr, Tl, and V results could be viewed as being biased slightly low relative to the true concentrations.

Eighteen soil samples, AAA8953 through AAA8970, were analyzed for metals and cyanide under Request Number 18260. If detected in the sample, Cr, Mn, Pb, and V results under Request Number 18260 are qualified as estimated (J) because of high recovery of those metals on the soil laboratory control sample. This indicates that the reported concentrations for those metals could be biased high. All matrix spike values and QC blind recoveries ranged from 62% to 121% except for Fe, which had a matrix spike recovery of 169%. In general, the indications from QC data for Request Number 18260 are that the reported metal concentrations could be slightly higher than the true concentrations.

4.1.15 PRS 22-014(a)

No inorganic analyses were performed at this site.

4.1.16 PRS 22-014(b)

Twenty samples, AAA8678 through AAA8697, were analyzed for metals and cyanide under Request Number 17827. Lead (Pb) results on QC blind samples 94.12416 and 94.12417 exhibited extreme low recoveries of 0.94% and 0.88%, respectively, yet the Pb matrix spike exhibited a recovery of 86%. Inspection of the raw data and communication with the analytical laboratory revealed that those low recovery values are reporting errors and that the correct QC blind recovery values are 99.2% and 87.5%, respectively. Lead (Pb) data were originally qualified as rejected (R), but the qualification is being revoked and the Pb data are usable as reported. CN data are qualified as undetected estimated (UJ) because of approximately 73% and 75% recovery on two QC blind samples. Most matrix spike recoveries are acceptable with Mn, Sb, and Se being the exceptions (156%, 127%, and 53% recovery, respectively). Laboratory duplicate sample analysis results are comparable; two pairs of field duplicate sample results (sample pairs AAA8692/AAA8693 and AAA8696/AAA8697) were within 35% of the average value of the two results. All data may be used as reported, with the cognizance of a potential low bias in Sb results.

Soil samples AAA8678, AAA8680 through AAA8683, AAA8686, AAA8688 through AAA8690, AAA8692 through AAA8694, AAA8696, and AAA8697 were analyzed for nitrate + nitrite as nitrogen by the cadmium reduction method (American Public Health Association et al. 1989, 55591). No nitrate nor nitrite was detected in any of the samples. All QC data are acceptable and results may be used as reported.

4.1.17 PRS 40-005

No inorganic analyses were performed at this site.

4.1.18 Marsh (PRS 40-005)

Six soil samples, AAA8805 through AAA8810, were analyzed for metals and cyanide under Request Number 18037. Aluminum (Al) and Na data are qualified as estimated (J) because of an approximately 50% high bias (150% recovery) on the laboratory control sample. Arsenic (As) results were originally qualified as rejected (R) because of an extreme low bias on the recovery of As from the QC blind sample. However, inspection of the raw data and communication with the analytical laboratory revealed the reported values to be incorrect. The correct recovery for As in the QC blind sample is 111%. The As data qualification is being revoked, and the As data as well as the other metals data are usable as reported.

4.2 Radiochemical Analyses

4.2.1 PRS 06-001(a)

No radiochemical analyses were performed at this site.

4.2.2 PRS 06-001(b)

No radiochemical analyses were performed at this site.

4.2.3 PRS 06-003(a), 06-008, and C-6-019

Ten soil samples, AAB7839 through AAB7848, were analyzed for Cs-137, Sr-90, and isotopic uranium under Request Number 18979. Cs-137, U-234, and U-238 data greater than the minimum detectable activity are qualified as estimated (J) because of QC blind sample results outside of the 3-sigma acceptance limits. The Cs-137 QC blind sample recoveries were 128% and 134% for samples 94.22047 and 94.22048, respectively. The recoveries for U-234 were 72% and 77% for samples 94.22045 and 94.22046, respectively; the recoveries for U-235 were 36% and 136% for samples 94.22045 and 94.22046, respectively; the recoveries for U-238 were 74% and 79% for samples 94.22045 and 94.22046, respectively. These quality control sample data indicate a likely slight low bias for U-234 results and a likely slight high bias for Cs-137 and U-238 results. They also indicate that the U-235 data are more uncertain than would normally be expected. These data may be used with consideration of the potential data deficiencies identified above.

Sixteen samples, AAB7891 through AAB7906, were also analyzed for Cs-137, Sr-90, and isotopic uranium under Request Number 18981. Cs-137 and Sr-90 results greater than the minimum detectable activity are qualified as estimated (J) because of two QC blind recoveries that exceeded the 80% to 120% acceptance window for Cs-137 and two QC blind recoveries that exceeded the 75% to 125% acceptance window for Sr-90. Recoveries for the three QC blind samples were 118%, 125%, and 127% for Cs-137 and 124%, 127%, and 129% for Sr-90, indicating a potential for a slight high bias. The consistent, but slight, high biases for Cs-137 and Sr-90 results under Request Number 18981 indicate that those analyte results may be used as reported with the understanding that a slight high bias is indicated.

As part of the April 1997 resampling, an additional soil sample (0506-97-0001) was collected and submitted for a gamma scan, strontium analysis, and isotopic uranium analysis under Request Number 3045R. The quality control data for these analyses are within acceptance criteria, and the data may be used as reported.

4.2.4 PRS 06-003(c)

Thirteen soil samples, AAB7849 through AAB7861, were analyzed for Cs-137, Sr-90, and isotopic uranium under Request Number 18979. Cs-137, U-234, and U-238 data

greater than the minimum detectable activity are qualified as estimated (J) because QC blind sample results were outside of the 3-sigma acceptance limits. The Cs-137 QC blind sample recoveries were 128% and 134% for samples 94.22047 and 94.22048, respectively. The recoveries for U-234 were 72% and 77% for samples 94.22045 and 94.22046, respectively; the recoveries for U-235 were 36% and 136% for samples 94.22045 and 94.22046, respectively; the recoveries for U-238 were 74% and 79% for samples 94.22045 and 94.22046, respectively. These quality control sample data indicate a likely slight low bias for U-234 results and a likely slight high bias for Cs-137 and U-238 results. They also indicate that the U-235 data are more uncertain than would normally be expected. These data may be used with consideration of the potential data deficiencies identified above.

4.2.5 PRS 06-003(f)

Thirteen soil samples, AAB7862 through AAB7874, were analyzed for gamma isotopes, isotopic uranium, and Sr-90 under Request Number 18980. Sr-90 results greater than the minimum detectable activity are qualified as estimated (J) because two of the laboratory control samples for Sr-90 analysis had recoveries outside of the 80% to 120% acceptance window at 122% and 123% recovery, respectively. The exceeding of acceptance criteria is minimal and indicates a slight potential for positive bias in Sr-90 data. Cs-137 data are not qualified, although a potential for a slight high bias has been noticed for Cs-137 analyses by the laboratory at which these samples were analyzed.

4.2.6 PRS 06-003(g)

Four soil samples, AAB7875 through AAB7878, were analyzed for Cs-137, Sr-90, and isotopic uranium under Request Number 18980, and ten soil samples, AAB7881 through AAB7890, were analyzed for Cs-137, Sr-90 and isotopic uranium under Request Number 18981. Cs-137 and Sr-90 results greater than the minimum detectable activity are qualified as estimated (J) because of two QC blind recoveries that exceeded the 80% to 120% acceptance window for Cs-137 and two QC blind recoveries that exceeded the 75% to 125% acceptance window for Sr-90. Recoveries for the three QC blind samples were 118%, 125%, and 127% for Cs-137 and 124%, 127%, and 129% for Sr-90, indicating a potential for a slight high bias. The consistent, but slight, high bias for Cs-137 and Sr-90 results indicates that those results may be used as reported with the understanding that a slight high bias is indicated.

4.2.7 PRS 06-007(g)

Six soil samples, AAA8832 through AAA8837, were analyzed for Cs-137 and Sr-90 under Request Number 18832. The Cs-137 results greater than the minimum detectable activity are qualified as estimated (J) because the QC blind sample analyzed with the environmental samples exhibited a 126% recovery, which exceeded the acceptance window. A potential for a slight high bias is indicated, and data may be used with that understanding.

4.2.8 PRS 07-001(a)

Thirteen soil samples, AAB7909 through AAB7921, were analyzed for Cs-137, Sr-90, and isotopic uranium under Request Number 19119. None of the data require qualification, although a potential for a slight high bias has been noticed for Cs-137 analyses by the laboratory at which these samples were analyzed. Therefore, the Cs-137 results may be used as reported with the understanding that the data could be biased slightly high.

4.2.9 PRS 07-001(b)

Twelve soil samples, AAB7922 through AAB7933, were analyzed for Cs-137, Sr-90, and isotopic uranium under Request Number 19119. None of the data require qualification, although a potential for a slight high bias has been noticed for Cs-137 analyses by the laboratory at which these samples were analyzed. Therefore, the Cs-137 results may be used as reported with the understanding that the data could be biased slightly high.

4.2.10 PRS 07-001(c)

Three soil samples, AAB7934 through AAB7936, were analyzed for gamma isotopes, isotopic uranium, and Sr-90 under Request Number 19118. None of the data require qualification, although a potential for a slight high bias has been noticed for Cs-137 analyses by the laboratory at which these samples were analyzed. Therefore, the Cs-137 results may be used as reported with the understanding that the data could be biased slightly high.

4.2.11 PRS 07-001(d)

Thirteen soil samples, AAB7937 through AAB7949, were analyzed for gamma isotopes, isotopic uranium, and Sr-90 under Request Number 19118. None of the data require qualification, although a potential for a slight high bias has been noticed for Cs-137 analyses by the laboratory at which these samples were analyzed. Therefore, the Sr-90 may be used as reported with the understanding that the data could be biased slightly high.

4.2.12 PRS 08-002

No radiochemical analyses were performed at this site.

4.2.13 PRS 22-010(a)

No radiochemical analyses were performed at this site.

4.2.14 PRS 22-010(b) and PRS 22-016

No radiochemical analyses were performed at this site.

4.2.15 PRS 22-014(a)

No radiochemical analyses were performed at this site.

4.2.16 PRS 22-014(b)

No radiochemical analyses were performed at this site.

4.2.17 PRS 40-005

No radiochemical analyses were performed at this site.

4.2.18 Marsh (PRS 40-005)

Six soil samples, AAA8805 through AAA8810, were analyzed for gamma isotopes, isotopic uranium, and Sr-90 under Request Number 18982. None of the data require qualification and are usable as reported.

4.3 Organic Analyses

This section addresses the data quality of HE, SVOCs, and VOCs. A particular data quality problem exists for HE compounds. Because of limited laboratory capacity, many

samples submitted for HE analyses were held in the laboratory (in a frozen state and in the dark) beyond the allowed extraction holding time (14 days for soils; 7 days for water, from date of sample collection) before being extracted. In some cases, the soil extracts were held beyond the prescribed analytical holding time (40 days after extraction for soils and water) before they were analyzed. In those samples, few HE compounds were detected. This might suggest that analyte degradation resulting from exceeding the holding times caused the analytes to go undetected. Several research papers and memoranda were investigated to identify to what extent exceeding holding times might affect HE analyses (EPA 1993, 55601; Walsh 1990, 55597; Walsh 1992; Dubois and Baytos 1991, 6994; Harris et al. 1989, 6887).

The documents that were investigated relative to HE holding times offer conflicting information concerning analyte stabilities. This is, at least in part, because the research investigations were performed under a variety of conditions on a variety of soils and waters. However, some generalities can be summarized concerning degradation of HE compounds prior to solvent extraction (i.e., prior to preparation for analysis). Tetryl is very labile and can decompose completely within hours of soil or water sample collection, despite proper sample storage. Tetryl is especially unstable in liquid samples. RDX and HMX are reported to be stable-to-aerobic degradation conditions. Aerobic conditions would be present in typical surface and near-surface environmental samples and in environmental samples exposed to the air through transfer to sample containers. RDX is subject to significant biotransformation under anaerobic conditions, but HMX is less susceptible to anaerobic biotransformation. Biodegradation of nitroaromatic compounds (i.e., nitrobenzenes and nitrotoluenes) in soils results in the formation of amino compounds (e.g., 4-aminodinitrobenzene and 2-aminodinitrotoluene), which would be expected to appear in the SW-846 Method 8330 HPLC analyses performed on the samples in these PRSs. Trinitrobenzene (TNB) is relatively persistent in soils and waters, whereas dinitrobenzene (DNB) is relatively labile in those media. The SW-846 Method 8330 HE compounds are most stable when protected from light (especially ultraviolet light) and temperatures exceeding 30 °C (86 °F).

The above observations notwithstanding, it was concluded that the best way to evaluate the effect, if any, of exceeding holding times on laboratory samples is to compare the results of the original samples for which holding times were exceeded with the results of samples collected at the same locations but which are analyzed within prescribed holding times. Therefore, several sample locations were resampled, and those samples were analyzed within the prescribed holding times. It should be noted that the recommended 14-day extraction holding time for soils is only a holding time and is not a requirement.

The results for the HE resamples, which primarily indicate no detectable HE compounds, are comparable to the results for the original samples. This comparability of results indicates that analyte degradation probably did not cause analytes to go undetected in the original samples. Rather, the analyte concentrations in the original samples were probably less than analytical detection limits prior to sample collection. Moreover, if degradation of HE analytes had occurred, one would expect to detect degradation products, and these were not generally detected at significant concentrations. Finally, freezing a sample should minimize or prevent chemical and biological degradation. All samples (resamples and original samples) were chilled to 0-4° C immediately upon collection. If labile analytes were not detected in the frozen, light-protected samples, those analytes would not be expected to persist under the more severe environmental conditions at a PRS (i.e., chemical oxidation/reduction, microbial action, and, for surface soils, photolysis). The conclusion is that analyte degradation was not significant in the frozen samples and those data, unless qualified for reasons other than exceeded

extraction holding times, are usable as reported. Where sampling points at a PRS were resampled for HE, this is indicated in the appropriate section below.

Where review of duplicate environmental sample analyses aided in the assessment of data quality, reference is made to the results for field duplicate samples. Because few SVOC and VOC environmental contaminants were detected, the analysis of field duplicates for SVOCs and VOCs provided little useful information other than to confirm that environmental SVOC and VOC contaminants were not detected.

4.3.1 PRS 06-001(a)

Eleven soil samples (AAA8867 through AAA8877) were analyzed for VOCs, and nineteen soil samples (AAA8861 through AAA8879) were analyzed for SVOCs under Request Number 18265. Only one sample, AAA8871, had detectable target VOCs in it, and none of the VOC data under this Request Number required qualification. Two samples, AAA8864 and AAA8871, showed detectable target SVOCs. Chrysene was detected in sample AAA8864, and that value is qualified as estimated (J) because of low surrogate recoveries which indicate a potential low bias in the results. All other analytes were undetectable, and low surrogate recoveries indicate a potential for low bias on selected analytes.

Nineteen soil samples, AAA8861 through AAA8879, were analyzed for HE under Request Number 18519. All samples were received at the laboratory 15 days after the prescribed 14-day extraction holding time. They were then kept frozen and protected from light for five months, until extraction. After extraction, the samples were kept refrigerated until analysis 7 days after the prescribed 40-day analytical holding time had expired. No HE compounds were detected in any of the samples. Recoveries of the surrogate compound in all samples in the analysis batch were generally low (62% $\pm$ 20% recovery after eliminating one outlier).

In each of two pairs of field duplicate samples for HE analyses, AAA8867/AAA8868 and AAA8874/AAA8875, one of the duplicate samples had all analytes qualified as rejected (R), and the other had all analytes qualified as undetected estimated (UJ) during baseline validation. The rejected data should not be used for decision making because duplicate data of ostensibly higher quality are available. However, in all four samples, the HE target analytes were reported as being not detectable. In another pair of HE field duplicate samples, AAA8878/AAA8879, all data for both samples were qualified as rejected. Except for environmental sample AAA8861 (170% surrogate recovery), the surrogate recoveries and the missed holding times suggest that the HE results are biased low and may be used accordingly.

No HE data are included in Appendix B Table B-1 for this PRS, as the above discussion is sufficient.

4.3.2 PRS 06-001(b)

Nine soil samples (AAA8894 through AAA8902) were analyzed for VOCs, and twenty-five samples (AAA8882 through AAA8906) were analyzed for SVOCs under Request Number 18182. Samples AAA8903 through AAA8906 were water samples; the rest were soils. No target VOCs were detected in any of the samples. Three samples, AAA8882, AAA8884, and AAA8897, showed detection of the SVOC, di-n-butylphthalate, at 1.2, 1.2, and 10 mg/Kg, respectively. While phthalates are common laboratory contaminants, this compound was not detected as a contaminant in the QC blind samples or the blanks, so it should be considered present in these samples at the indicated concentrations. All other target SVOC analytes were undetectable, and low QC blind sample recoveries indicate a potential for a general low bias on selected analytes, rendering them qualified as undetected estimated (UJ). The apparent low bias

is potentially attributable to improper sample preparation or storage of the QC blind samples, because surrogate recoveries, which indicate analytical measurement system performance in each environmental sample, were generally acceptable.

Twenty-one soil samples, AAA8882 through AAA8902, and four water samples, AAA8903 through AAA8906, were analyzed for HE under Request Number 18184. No HE target compounds were detected in any of the samples. The soil samples were frozen within two days of sample collection and protected from light until extraction nine weeks later (55 days after the 14-day extraction holding time had expired). The soil samples were analyzed approximately four months after the 40-day analytical holding time had expired. The water samples were extracted 46 days after the 7-day extraction holding time had expired, and they were analyzed three days after the 40-day analytical holding time had expired. All water sample results were qualified during baseline validation as rejected (R) based solely on the exceeded holding times. All water sample surrogate recoveries were within the recovery acceptance range (50% to 150%). It should be expected that nitroaromatic compounds and Tetraol could be biased very low, but that HMX and RDX would not be expected to suffer the same fate. The surrogate recoveries for all soil samples were acceptable except for environmental sample AAA8901 (48% recovery) and QC blind samples 94.15446 and 94.15447 (48% and 170% recovery, respectively). In QC blind sample 94.15446, the nitrotoluenes exhibited recoveries between 17% and 30%. All analyte recoveries for QC blind sample 94.15447 were in control except 2,6-dinitrotoluene (false positive) and nitrobenzene (44%).

A third HE QC blind sample, 94.15445, was analyzed with this group of samples. This sample was extracted within three days of receipt at the laboratory, and the extract was analyzed nearly ten months later. The surrogate and all analytes were in control for this sample except 2,6-dinitrotoluene (false positive). The HE data for soil and water samples under Request Number 18184 are usable as reported with a potential for low bias (as much as 30% of expected values) for the nitrotoluenes in soil samples and an expected very low bias on all but HMX and RDX for the water samples.

The four water samples were actually two duplicate sample pairs. The data for all four samples were qualified as rejected (R) during baseline validation. See above for data quality interpretation.

No HE data are included in Appendix B Table B-2 for this PRS, as the above discussion should be sufficient.

4.3.3 PRS 06-003(a), 6-008, and C-6-019

Six soil samples, AAB7901 through AAB7906, were analyzed for PCBs, VOCs, and SVOCs under Request Number 18639. No PCBs were detected in these samples. The quality control data for PCB analyses were acceptable, indicating that the PCB results may be used as reported without qualification. VOCs were detected in samples AAB7901, AAB7903, and AAB7904. Two compounds that could be laboratory contaminants, methylene chloride and 1,1,2-trichloro-1,2,2-trifluoroethane, were detected in sample AAB7901, and those results are qualified as estimated (J) because of an apparent high bias indicated by a high surrogate compound recovery. The three late eluting VOC internal standards (phenanthrene-d₁₀, chrysene-d₁₂ and perylene-d₁₂) exhibited low recoveries, causing the 33 SW-846 analyte results quantitated against those standards to be qualified as undetected estimated (UJ). Otherwise, the target VOC results under Request Number 18639 require no qualification. Target SVOC results are qualified only for sample AAB7902, which is potentially subject to a low-target analyte bias; otherwise all target SVOC results are usable as reported.

Ten soil samples, AAB7839 through AAB7848, were analyzed for HE under Request Number 18504. The samples were frozen approximately one week after collection and

protected from light until extraction, but the 14-day extraction holding time was exceeded by 56 days. The 40-day analytical holding time was exceeded by approximately five months. HMX was detected only in sample AAB7841, and the result is qualified as estimated (J) because of an apparent high bias. Surrogate recoveries and data for QC blind sample 94.18813 were generally acceptable to higher-than-expected, indicating a potential high bias for the environmental analytes. Only HMX was detected, and the concentration reported for this analyte should be considered to be potentially biased high (as much as 300% higher than expected).

Sixteen soil samples, AAB7891 through AAB7906, were analyzed for HE under Request Number 18665. The samples were frozen within two days of collection and protected from light until extraction 52 days after the 14-day extraction holding time had expired. The 40-day analytical holding time was exceeded by 4.5 months. No HE target compounds were detected in any of the samples under Request Number 18665. The surrogate recoveries for most samples were acceptable (within the 50% to 150% range), with samples AAB7889 and AAB7892 exhibiting a 46% and 160% surrogate recovery, respectively. QC blind samples 94.20175, 94.20176, and 94.20163 exhibited surrogate recoveries of 151%, 224%, and 180%, respectively, indicating a potential high bias in the environmental results. Blind QC sample 94.20176 exhibited 32% and 40% recoveries for 2-nitrotoluene and 3-nitrotoluene, respectively, but these low analyte recoveries appear to be isolated to this sample. Because no analytes were detected in the environmental samples and the expected bias is a high bias, all environmental HE data may be used as reported.

Two pairs of soil field duplicate samples, AAB7847/AAB7848 and AAB7899/AAB7900, were analyzed, and all HE target analytes were undetectable in all four samples. See the previous paragraph for data quality interpretation.

Only selected HE data are included in Appendix B Table B-3 for this PRS, as the above discussion should be otherwise sufficient.

As part of the April 1997 resampling, one additional soil sample (0506-97-0001) was collected and analyzed for SW-846 Method 8330 target analytes and for nitroglycerine and PETN under Request Number 3043R. RDX and TNT were detected in that sample at concentrations of 0.49 mg/Kg and 0.50 mg/Kg, respectively. The data are usable as reported.

4.3.4 PRS 06-003(c)

Thirteen soil samples, AAB7849 through AAB7861 were analyzed for HE under Request Number 18504. 1,3-dinitrobenzene was detected in sample AAB7859, and the result is qualified as estimated (J) because of the exceeded holding times and because of an overall slight high bias in surrogate recoveries exhibited for this request number ($125\% \pm 26\%$). However, the concentration for 1,3-dinitrobenzene in QC blind sample 94.18813 was 74%, and the surrogate recovery for that sample was 66%, both of which are within acceptance limits. No HE target compounds were detected in any of the other samples under Request Number 18504 for this PRS. Additional details relative to data quality for Request Number 18504 appear in Section 4.3.3. HE data for this request number may be used as reported with no qualification.

Soil samples AAB7860 and AAB7861 are field duplicates. No HE target compounds were detected in either sample. Refer to the previous paragraph for a data quality interpretation.

No HE data are included in Appendix B Table B-4 for this PRS, as the above discussion should be sufficient.

4.3.5 PRS 06-003(f)

Thirteen soil samples, AAB7862 through AAB7874, were analyzed for HE under Request Number 18664. The extraction holding time was exceeded by 31 days, although the samples were frozen and protected from light until the extraction date. The 40-day analytical holding time was exceeded by 5.5 months. No HE target compounds were detected in these samples. However, all but 2,4-dinitrotoluene results are qualified as rejected (R) because of failure to recover several compounds from a QC blind sample, sporadic recovery of surrogate compounds, and apparent solvent evaporation from sample extracts. The method blank, free from chemical interferences, also exhibited low (45%) surrogate recovery. It is questionable whether any analyte other than 2,4-dinitrotoluene could have been detected in these samples.

Soil samples AAB7867 and AAB7868 are field duplicates in which HE target compounds were not detected. See above paragraph for an interpretation of data quality.

No HE data are included in Appendix B Table B-5 for this PRS, as the above discussion is sufficient.

4.3.6 PRS 06-003(g)

Four soil samples, AAB7875 through AAB7878, were analyzed for VOCs under Request Number 18636, and ten soil samples, AAB7881 through AAB7890, were analyzed for VOCs under Request Number 18639. Two compounds that could be laboratory contaminants (methylene chloride and 1,1,2-trichloro-1,2,2-trifluoroethane) were detected in some of the samples, and those sample results are qualified as estimated (J). Surrogate recoveries for dibromofluoromethane and toluene- d_8 ranged from 85% to 117% indicating good recoveries for most target analytes. The other surrogate recoveries range from 96% to 133%. These surrogate recovery data suggest a potential high bias for VOC compounds. However, except for methylene chloride, all target analytes were undetected. There was a low recovery of internal standards chlorobenzene (samples AAB7875 and AAB7877) and 1,4-dichlorobenzene (samples AAB7875, AAB7877, and AAB7878), which might indicate a target analyte low bias under different circumstances. However, with generally good-to-high quantitation of the surrogate compounds, this is viewed as inconsequential, and data may be used as reported with the understanding that reported methylene chloride concentrations could be biased high due to laboratory contamination.

Four soil samples, AAB7875 through AAB7878, were analyzed for HE under Request Number 18664 and ten soil samples, AAB7881 through AAB7890, were analyzed for HE under Request Number 18665. HE target compounds were not recovered adequately from the QC blind sample associated with Request Number 18664, and holding times were missed for both Request Numbers. No HE compounds were detected in the samples under Request Number 18664. Moreover, all but 2,4-dinitrotoluene results are qualified as rejected (R) for Request Number 18664 because of failure to recover several compounds from a QC blind sample, sporadic recovery of surrogate compounds, and apparent solvent evaporation from sample extracts. It is questionable whether any analyte other than 2,4-dinitrotoluene could have been detected in the samples associated with Request Number 18664.

Samples analyzed for HE analytes under Request Number 18665 did not suffer from the same questionable performance as those under Request Number 18664. The results for Request Number 18665 are typically qualified as estimated (J) if detected in a sample or undetected estimated (UJ) if not detected, only because of missed holding times. The surrogate recoveries for these analyses are generally within the $\pm 50\%$ recovery acceptance window. Moreover, QC blind data are generally in control with no

apparent systematic errors. The results for Request Number 18665 are judged to be acceptable as reported.

Only selected HE data are included in Appendix B Table B-6 for this PRS, as the above discussion should be otherwise sufficient.

As part of the April 1997, resampling, 14 additional soil samples, 0506-97-0002 through 0506-97-0015, were collected and analyzed for SW-846 Method 8330 target analytes and for nitroglycerine and PETN under Request Number 3043R. RDX was detected in samples 0506-97-0004, 0506-97-0005, and 0506-97-0007 at concentrations of 0.18 mg/Kg, 0.39 mg/Kg and 0.44 mg/Kg, respectively. TNT and 4-amino-2,6-dinitrotoluene were detected in sample 0506-97-0004 at concentrations of 0.12 mg/Kg and 0.16 mg/Kg, respectively. 2,4-dinitrotoluene was detected in sample 0506-97-0006 at 0.07 mg/Kg. The quality control data are within acceptance criteria for this Request Number, and the HE data may be used as reported.

Six soil samples (AAB7901-AAB7906) were analyzed for PCBs under request number 18639. QC results were within acceptance limits, and data may be used as reported.

4.3.7 PRS 06-007(g)

Three soil samples, AAA8833, AAA8835, and AAA8837, were analyzed for VOCs, and six soil samples, AAA8832 through AAA8837, were analyzed for SVOCs, under Request Number 18064. The only contaminants detected in these samples were typical VOC laboratory contaminants (acetone and methylene chloride) and typical SVOC contaminants, bis(2-ethylhexyl)phthalate and di-n-butylphthalate, which were also detected in laboratory blanks during those analyses. The contaminant concentrations in the environmental samples are comparable to the blank contamination, so it appears that those data are due to laboratory contamination.

Six soil samples, AAB8832 through AAB8837, were analyzed for HE under Request Number 18075. The samples were frozen one week after collection and protected from light until extraction 62 days after the extraction holding time had expired. The extracts were analyzed approximately four months after the analytical holding time had expired. No HE target compounds were detected in any of the samples. Sample AAA8837, exhibited acceptable, though slightly low, surrogate recoveries (81% average $\pm$ 12% RSD). Based on the surrogate data, the missed holding times, and data from QC blind samples numbered 94.14331 and 94.14332, which generally exhibited low analyte recoveries, all results for the environmental sample should be considered usable as reported, though potentially biased low.

All other HE results in Request Number 18075 were originally qualified as rejected (R) because of low surrogate recoveries (42% average $\pm$ 12% RSD) and missed holding times. However, applying the same logic to AAA8837 discussed above, the results are considered to be usable but potentially biased low.

No HE data are included in Appendix B Table B-7 for this PRS, as the above discussion should be sufficient.

4.3.8 PRS 07-001(a)

Thirteen soil samples, 0507-96-0029 through 0507-96-0041, were analyzed for SVOCs under Request Number 1906. Primarily common laboratory contaminants were detected in these samples, and those contaminants are classified as not detected based on contamination present in the method blank. Benzoic acid was detected below the EQL in sample 0507-96-0033. That result is qualified as an estimated (J).

Thirteen soil samples, AAB7909 through AAB7921, were analyzed for HE under Request Number 18693. The holding times of those samples were exceeded, so the

sampling locations were resampled, resulting in the collection of thirteen additional soil samples, 0507-96-0029 through 0507-96-0041. The second group of samples was analyzed for HE under Request Number 1907. No holding times were exceeded for the resamples. No HE target compounds were detected in either the original samples or the resamples in this PRS. All QC results for the resamples were acceptable (e.g., surrogate recoveries averaged 104% with RSD = 8%), indicating that the results are usable as reported. The resample data support the original results indicating that no HE target compounds are detectable in the samples collected at this PRS.

Samples AAB7920 and AAB7921 are field duplicates in which no HE target compounds were detected. See the above paragraph for a discussion of data quality. No HE data are included in Appendix B Table B-8 for this PRS, as the above discussion should be sufficient.

4.3.9 PRS 07-001(b)

Twelve soil samples, 0507-96-0042 through 0507-96-53, were analyzed for SVOCs under Request Number 1906. Common laboratory contaminants, di-n-butylphthalate and bis(2-ethylhexyl)phthalate, were detected in several samples at concentrations comparable to blank values and are considered to be due to laboratory contamination and not to environmental contamination. Surrogates 2-fluorophenol, 1,2-dichlorobenzene and nitrobenzene exhibited 8.7%, 10.7%, and 15.1% recoveries, respectively, on sample 0507-96-0051. Because those three surrogates of various chemical character are out of control in sample 0507-96-0051, results for this sample should be considered unusable. Sample 0507-96-0042 exhibited detectable concentrations of 1,2-dichlorobenzene, 1,3-dichlorobenzene, 2-chloronaphthalene, hexachlorobenzene, phenanthrene, pyrene, benzo[a]anthracene, di-n-octylphthalate, and benzo[k]fluoranthene. However, the detectable analytes are attributed to carryover from the laboratory control sample and should be considered to have gone undetected because they followed a standard sample of high concentration and are representative of the analyte on the LCS. All SVOC target analytes should be considered nondetectable in the other samples analyzed under Request Number 1906.

Twelve soil samples, AAB7922 through AAB7933, were analyzed for HE compounds under Request Number 18693. The holding times for those samples were exceeded, so twelve more soil samples, 0507-96-0042 through 0507-96-0053, were collected from the same locations and were analyzed for HE compounds under Request Number 1907. Tetryl was detected in sample AAB7933 at a concentration of 49.8 mg/Kg. However, the resampling of that location (sample number 0507-96-0043) yielded a Tetryl value of 1.5 mg/Kg. A detailed review of the associated data packages confirms that Tetryl is present at the reported concentrations in both cases. Further detailed data package review reveals that the amino-dinitrotoluene degradation products, the 2,4,6-TNT and the RDX, are not confirmed as being present in samples AAB7925 and AAB7927. All of these conclusions are based on comparisons of chromatographic peak retention times for TNT and RDX in the samples relative to the retention times for those peaks in the confirmation standards that bracketed the samples. They are also based on evaluations of calibration and blank data. Aside from the indications above, no HE target compounds were detected in any of the other samples for this PRS. See Section 4.3.8 for additional details related to data quality for this Request Number.

Only selected HE data are included in Appendix B Table B-9 for this PRS, as the above discussion should be otherwise sufficient.

4.3.10 PRS 07-001(c)

Three soil samples, AAB7934 through AAB7936, were analyzed for HE compounds under Request Number 18842. The extraction holding time was exceeded by 54 days;

the analytical holding time was exceeded by 37 days. See discussion in Section 4.3.11. No HE target compounds were detected in any of the samples. All QC results are acceptable (e.g., 83% average recovery $\pm$ 6% RSD), and data are usable as reported.

No HE data are included in Appendix B Table B-10 for this PRS, as the above discussion should be sufficient.

4.3.11 PRS 07-001(d)

Thirteen soil samples, AAB7937 through AAB7949, were analyzed for HE compounds under Request Number 18842. The extraction holding time was exceeded by 54 days; the analytical holding time was exceeded by 37 days. No HE target compounds were detected in any of the samples. All QC results are acceptable (e.g., 83% average recovery $\pm$ 6% RSD), and data are usable as reported.

Samples AAB7941 And AAB7942 are field duplicates. No HE analytes were detected in either sample. See the previous paragraph for a discussion of data quality.

No HE data are included in Appendix B Table B-11 for this PRS, as the above discussion should be sufficient.

4.3.12 PRS 08-002

No organic analyses were performed at this site.

4.3.13 PRS 22-010(a)

Three water samples, (AAA8925 through AAA8927), and thirteen soil samples (AAA8909 through AAA8924), were analyzed for VOCs under Request Number 18242. Nineteen soil and water samples, AAA8909 through AAA8927, were analyzed for SVOCs and HE compounds under Request numbers 18242 and 18245, respectively. Acetone and methylene chloride were detected in the VOC analysis method blank at <5 times the EQL. No qualification of VOC data is required under Request Number 18242.

During resampling in April 1997, six soil samples, 0522-97-0001 through 0522-97-0006, were analyzed for VOCs and SVOCs under Request Number 3049R. An aqueous field blank (0522-97-0007) was also analyzed for VOCs under Request Number 3049R. The reported laboratory receipt date (29 March 97) for VOCs indicates that the holding times for those samples were exceeded. However, the reported receipt date is in error and should be 11 April 1997. The soil samples were analyzed within the 14-day soil VOC holding time. The aqueous field blank holding time actually was exceeded by seven days, but this is of no concern because very few VOCs were detected in the field samples, indicating no significant potential for contamination. Except as noted below, no VOC analytes were detected in the field samples. Acetone was detected in the soil blank, and all acetone results have been qualified as undetected (U) as a result, indicating a strong likelihood that any low-level acetone detected in the samples originated from laboratory contamination. The methylene chloride results for all field samples except 0522-97-0005 and 0522-97-0006 are qualified as estimated (J) because the reported values are less than the quantitation limit. This "J" qualification does not indicate a problem with the data. Trichlorofluoroethane was detected in samples 0522-97-0005 and 0522-97-0006 at 8 ug/Kg and 6 ug/Kg. Although the field blank holding time was exceeded, the results of the field blank have no bearing on the quality of the soil samples that were analyzed within the prescribed 14-day holding time and that demonstrate little-to-no contamination. All VOC data may be used as reported.

SVOC data are qualified in the case of sample AAA8927, although an apparent low bias of approximately 30% is evident for the SVOC data. In sample AAA8927, results for analytes recovered from the acidic sample fraction are qualified as rejected (R) because

adequate recovery of the surrogate compounds with similar chemical properties was not demonstrated. In addition, the highest surrogate recovery was only 50%, indicating a potential for significant low bias in SVOC data for that sample. Recovery of surrogates in resample 0522-97-0006 was also unacceptably low, indicating a severe low bias in those results. All surrogate values were less than 8%, and the laboratory believes the poor recoveries are due to an extraction error, but the sample was not re-extracted. The SVOC data for sample 0522-97-0006 are qualified as rejected (R) and are not used for decision making. Otherwise, the quality control data are within acceptance criteria, and the SVOC data for the April 1997, samples may be used as reported.

The 7-day HE extraction holding time for aqueous samples was exceeded by 43 days; the samples were analyzed 9 days after extraction—well within the 40-day analytical holding time. No aqueous QC blind samples were analyzed with the aqueous environmental samples; the surrogate recoveries for the three aqueous samples ranged from 95% to 105% recovery. Because of the exceeded holding times and known relatively high lability of HE target analytes in water, the Tetryl and mono- and di-nitroaromatic compound concentrations should be viewed as being biased low. The 14-day extraction holding time for soil samples was exceeded by 31 days; the 40-day analytical holding time was exceeded by four months. HMX, detected only in sample AAA8926, was the only detected HE target analyte. A review of the raw data revealed at least one contaminant interfering with the HMX chromatographic peak, which would cause the reported HMX value to be biased high. In addition, significant laboratory blank contamination was recorded, which would also have a tendency to bias high the reported concentrations for HMX and other HE target analytes if the contamination was also present in the environmental samples. In summary, because of exceeded holding times, low surrogate recoveries (35% to 53%) and low soil QC blind analyte recoveries (16% to 38%), the soil sample HE results for all compounds (other than HMX in sample AAA8926) are considered to be biased low. The HMX results should be considered to be biased high in sample AAA8926, perhaps by as much as a factor of five.

Only selected HE data are included in Appendix B Table B-13 for this PRS, as the above discussion should be otherwise sufficient.

Samples AAA8921 and AAA8922 are soil field duplicate samples, and neither sample exhibited detectable analytes. The biotransformation products, 2-ADNT and 4-ADNT, were qualified as rejected (R) based on holding times alone but should be used as reported, because those compounds would be expected to be detectable if selected HE target analytes had undergone biotransformation.

During the resampling effort of April 1997, six additional soil samples, 0522-97-0001 through 0522-97-0006, were collected and analyzed for SW-846 Method 8330 target analytes, nitroglycerine, and PETN. No HE compounds were detected in those samples. The quality control data are within acceptance criteria, and the HE data may be used as reported.

4.3.14 PRS 22-010(b) and 22-016

Seven soil samples, AAA8932, AAA8934, AAA8936, and AAA8949 through AAA8952, were analyzed for VOCs under Request Number 18357; seventeen soil samples, AAA8953 through AAA8969, were analyzed for VOCs under Request Number 18261. Twenty-nine soil samples, AAA8930 through AAA8952 and AAA8975 through AAA8980, were analyzed for SVOCs under Request Number 18357 and for HE compounds under Request Number 18439. Seventeen soil samples (AAA8953 through AAA8969), and one water sample (AAA8970) were analyzed for SVOCs under Request Number 18261 and for HE compounds under Request Number 18267.

In general, there exists an apparent low bias in the SVOC results as evidenced by surrogate recoveries typically <100% and low (<50%) recoveries of selected analytes from QC blind samples. Sample AAA8945 (Request Number 18357) is a notable exception with a 207% recovery for the surrogate terphenyl- d_{10} , indicating that the related analyte results could be biased high. Except for analytes that are chemically similar to terphenyl- d_{10} in sample AAA8945 (Request Number 18357), the SVOC results appear to be biased low. Sample AAA8949 results for anthracene, 2,4-dichlorophenol, and 2-methylphenol results for sample AAA8949 were qualified as rejected (R), results for naphthalene, o-dichlorobenzene, 2-nitrophenol, pentachlorophenol, phenol, 1,2,4-trichlorobenzene, and 2,4,6-trichlorophenol results qualified as undetected estimate (UJ), and results for benzo[a]pyrene and pyrene results qualified as estimated (J) due to low QC blind recoveries. Sample AAA8965 had low QC blind recoveries so anthracene, 4-bromophenylphenyl ether, o-dichlorobenzene, 2-methylphenol and 2,4,6-trichlorophenol results qualified as rejected (R), and benzo[b]fluoranthene, o-chlorophenol, dibenzofuran, 2,4-dichlorophenol, 2,4-dinitrotoluene, fluorene, 2-methylnaphthalene, naphthalene, 2-nitrophenol, pentachlorophenol, phenol, pyrene and 1,2,4-trichlorobenzene results qualified as undetected estimated (UJ).

In general, surrogate recoveries for VOC analyses are acceptable. Methylene chloride was detected in two of the three method blanks under Request Number 18261, causing the results for those analytes to be qualified as estimated (J) with a potential for high bias in those results. However, the blank concentrations were within a factor of three of the EQL. Internal standard area counts were low for several samples, yet the recoveries of the surrogate compounds indicate no purging efficiency problem. This indicates that the chromatographic/mass spectrometric system sensitivity had probably changed. No adverse impact on quantitation is expected, however, except for those compounds that were undetected because the presence of the internal standards allowed the system quantitation to compensate for the apparent sensitivity change. For undetected compounds, the reduced sensitivity causes the compounds to be qualified as undetected estimated (UJ). Although originally scheduled for VOC analysis, sample AAA8970 was not analyzed for VOCs.

Several problems are evident with the HE data set. The 14-day extraction holding time was exceeded by nearly two months; the 40-day analytical holding time was exceeded by nearly four months. Data are qualified because of exceeding holding times and low surrogate recoveries (33% average $\pm$ 6% RSD) on environmental and QC blind samples. In one QC blind sample, 94.18174, selected nitroaromatic analytes were not detected, but the reported detection limit was 3 times the expected detection limit. In two other QC blind samples, 94.18175 and 94.18176, several target analytes were detected but at concentrations only 12% to 29% of the expected values. 4-ADNT, 2-ADNT, 2,6-DNT, HMX, Tetryl, and all mononitrotoluenes are qualified as rejected (R). All other analyte values are qualified as undetected estimated (UJ). While exceeding holding times would not normally be expected to be a significant problem for these samples, the failure to adequately recover selected analytes from the QC blind sample is evidence of significant deterioration of the sample analytes. These data are useful only as a gross qualitative indication that HE target analyte concentrations for samples collected at this PRS are probably biased low.

Samples AAA8930 and AAA8931 are soil field duplicates for HE analysis. No HE target compounds were detected in these samples. Refer to the previous paragraph for a discussion of data quality.

Only selected HE data are included in Appendix B Table B-1 for this PRS, as the above discussion should be otherwise sufficient.

4.3.15 PRS 22-014(a)

Sixteen soil samples (AAA8645 through AAA8660), and two sludge samples (AAA8674 and AAA8675) were analyzed for HE compounds under Request Number 17760. Nine soil samples, AAA8661 through AAA8663, AAA8665 through AAA8667, and AAA8669 through AAA8671, were analyzed for HE compounds under Request Number 17908. Three samples from Request Number 17760 exhibited detectable HE target compounds.

There was a general low bias in the quantitation of HE target compounds for Request Number 17760 as evident by low surrogate compound across the data set, including QC blind and blank samples. In addition, the analytes in QC blind samples 94.11763, 94.11764, 94.11765, and 94.11766 were not detected. These two conditions cause the data to be qualified as rejected (R). However, the QC blind sample analyte concentrations were generally within a factor of two of the detection limit. This, combined with the low surrogate recovery, indicates that the actual detection limit for these analyses is probably approximately two times the normally reported detection limit. Data may be used with this understanding that HE target analytes at higher concentrations could well have been detected, but probably with a low bias. Specifically, the analyte concentrations reported for those samples that exhibited detectable analytes (HMX in samples AAA8648, AAA8650 and AAA8656, and RDX in sample number AAA8650) are probably lower than the true values. An investigation of the raw data confirmed that the HMX and RDX were, indeed, detected in the samples at the reported concentrations.

For Request Number 17908, the 14-day extraction holding time was exceeded by 27 days; the 40-day analytical holding time was exceeded by 14 weeks. The analyte quantitations in this Request Number were considerably better than for Request Number 17760. The data for Request Number 17908 are qualified as undetected estimated only because holding times were exceeded. However, surrogate recoveries range from 98% to 106%, and the exceeded holding times are not expected to have adversely impacted the ability to detect HE compounds to a significant degree. The QC blind sample 94.13081 analyte recoveries for 2,6-dinitrotoluene and 1,3,5-trinitrobenzene were low (14% and 29%, respectively). Therefore, the results for these analytes should be considered to be biased low. Otherwise the HE data may be used without qualification.

Samples AAA8659 and AAA8660 are soil duplicate field samples, and samples AAA8674 and AAA8675 are sludge duplicate field samples. No HE target compounds were detected in any of these duplicate samples. Refer to the previous paragraph for a discussion of HE analysis data quality.

Only selected HE data are included in Appendix B Table B-15 for this PRS, as the above discussion should be otherwise sufficient.

4.3.16 PRS 22-014(b)

Sixteen soil samples, AAA8678 through AAA8693, were analyzed for VOCs under Request Number 17773. Twenty soil samples, AAA8678 through AAA8697, were analyzed for SVOCs under Request Number 17773 and for HE compounds under Request Numbers 17760.

VOC target analytes were detected in samples AAA8681, AAA8690, AAA8692, and AAA8693. However, the detected VOCs are common laboratory contaminants. All other VOC target analytes were not detectable. All data for these samples are qualified as either estimated (J, for the detected common laboratory contaminants) or undetected estimated (UJ, for all other VOCs) because of low internal standard areas. The low internal standard areas indicate a drop in analytical system sensitivity, and the generally acceptable and even slightly high surrogate recoveries indicate proper quantitation of the

VOCs despite the sensitivity loss. The sensitivity loss could have caused analytes near the detection limit to be rendered undetectable, but this effect is expected to be minimal (less than a factor of 3 times the detection limit).

SVOC compounds were detected in three samples, AAA8681, AAA8687, and AAA8693. There was a general problem in detecting anthracene and 2-methylphenol in the QC blind samples, causing those reported analyte values to be qualified as rejected (R). Several other analyte values are qualified as undetected estimated because of low surrogate recoveries associated with those analytes, which indicates a potential low bias. Results may be used with attention to the associated qualifiers.

Only sample AAA8694 exhibited a detectable HE compound, HMX. There was a general low bias in the quantitation of HE compounds for Request Number 17760 as evidenced by an approximately 50% recovery of the surrogate compound. In addition, the QC blind analytes were not detected. These two conditions cause the data to be qualified as rejected (R). However, the QC blind sample analyte concentrations were generally within a factor of two of the detection limit. This, combined with the 50% surrogate recovery, indicates that the actual detection limit for these analyses is probably about two times the normally reported detection limit, and the reported HMX value could be approximately twice the reported value. The data may be used with this understanding.

Samples AAA8692 and AAA8693 and AAA8696 and AAA8697 are soil duplicate field samples. No HE target compounds were detected in any of these duplicate samples. Refer to the previous paragraph for a discussion of HE data quality.

Only selected HE data are included in Appendix B Table B-16 for this PRS, as the above discussion should be otherwise sufficient.

4.3.17 PRS 40-005

Fifteen soil samples, AAA8780 through AAA8790 and AAA8792 through AAA8795, were submitted for VOC analyses under Request Number 17884 but were lost and never analyzed. A second set of sixteen soil samples, 0540-96-0001 through 0540-96-0016, was submitted for VOC analysis under Request Number 1915. All samples submitted for VOC analysis were analyzed. In some cases, because of laboratory quality assurance problems, one or both of the vials for each sample were re-analyzed. In general, results for the common laboratory contaminant acetone that exceed the detection limit are qualified as estimated (J) because of poor internal standard recovery. Low internal standard areas, which translate to abnormally high-target analyte results, are evident for many of the samples analyzed under this request number. Analytes quantitated against an internal standard exhibiting low area counts (See Appendix B, Table B-17) should be considered to be biased high.

Nineteen soil samples, AAA8780 through AAA8790, AAA8792 through AAA8795, and AAA8801 through AAA8804, were analyzed for HE compounds under Request Number 17907. 4-ADNT, 2-ADNT, nitrobenzene, all mononitrotoluenes, and Tetryl results are qualified as rejected (R) based on missed holding times and the fact that 4-ADNT, 2-ADNT, the mononitrotoluenes, and Tetryl were not included as components of the QC blind sample. However all surrogate recoveries under Request Number 17907 range from 78% to 115% except for samples AAA8805 (437%) and AAA8785 (143%). Nitrobenzene and 1,3,5-TNB exhibited low bias in QC blind samples; other analytes exhibited reasonable recoveries. Therefore, data from Request Number 17907 may be used as reported with the understanding that nitrobenzene and 1,3,5-TNB could be biased low. Because holding times were missed on the first set of samples, sixteen additional soil samples, 0540-96-0001 through 0540-96-0016, were collected and analyzed for HE compounds under Request Number 1917. No HE target compounds

were found in those samples, and the quality control data are acceptable. Therefore, data may be used as reported.

No HE data are included in Appendix B Table B-17 for this PRS, as the above discussion should be sufficient.

4.3.18 PRS 40-005 (Marsh)

Six soil samples, AAA8805 through AAA8810, were submitted for VOC analyses but were lost and never analyzed. Six replacement soil samples, 0540-96-0021 through 0540-96-0026, that were collected from the same locations as the original samples, were submitted for VOC analyses under Request Number 1915.

While some laboratory quality control problems associated with low internal standard recoveries were encountered for VOC analyses, reanalyses generally solved those problems. However, surrogate recoveries in sample 0540-96-0024 continued to be low, causing the data for that sample to be qualified as undetected estimated (UJ) with an expectation of low bias.

Six soil samples, AAA8805 through AAA8810, were analyzed for HE compounds under Request Number 17907, and six soil samples, 0540-96-0021 through 0540-96-0026, were analyzed for HE compounds under Request Number 1917. 4-ADNT, 2-ADNT, nitrobenzene, all mononitrotoluenes, and Tetryl results are qualified as rejected (R) for Request Number 17907 based on missed holding times and the fact that 4-ADNT, 2-ADNT, the mononitrotoluenes and Tetryl were not included as components of the QC blind sample. However, all surrogate recoveries under Request Number 1917 were reasonable except for samples AAA8805 (437%) and AAA8785 (143%). Nitrobenzene and 1,3,5-TNB results exhibited a low bias in QC blind samples analyzed under Request Number 17907; other analytes exhibited reasonable recoveries. The quality control data generated under Request Number 1917 were all within acceptance limits indicating that the resample data are acceptable as reported. The resample data support the indications from the original data that no HE target analytes were detectable in the samples collected at this PRS.

No HE data are included in Appendix B Table B-18 for this PRS, as the above discussion should be sufficient.

5.0 SPECIFIC RESULTS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Potential Release Site - 08-002

PRS 08-002 is an inactive gun-firing site located in TA-8 to the south of buildings TA-8-1, -2, and -3. Lead was the only contaminant observed at the site. This PRS is recommended for NFA.

5.1.1 History

PRS 08-002 is discussed in detail in Sections 5.2 and 6.2 of the RFI Work Plan for OU 1157 (LANL 1993, 20949).

PRS 08-002 includes two sand butts, which were used during the experimental testing for the Little Boy weapon. The sand butts were retained by heavy wooden beams on three sides and were used to receive experimental shots fired from guns mounted on concrete pads a few yards to the northeast of each butt. The sand butts generally received inert projectiles for recovery and examination; however, projectiles were occasionally fired at targets placed in the sand butts. The target tests occasionally resulted in the fragmentation of targets or projectiles, scattering debris for distances of up to 75 yds. At the present time, all that remains of the site are two piles of sand at the locations of the butts and the concrete gun pads.

The projectiles and targets used in testing were made of various combinations of steel, tungsten carbide, depleted uranium, copper, and lead. Plutonium and enriched uranium were never present in the projectiles or targets. In some instances, small components made of beryllium and polonium were incorporated into the targets, but there are no indications in the records that any of these materials escaped the targets. The explosive propellant commonly used in the tests was cordite (containing nitroglycerin and nitrocellulose fabricated with acetone). The propellant would have been consumed during firing, is not expected to be present, and, therefore, was not identified for analysis.

Primary contaminants at the site are considered to be lead, copper, and beryllium, which were components of the targets and/or projectiles. Depleted uranium may also be present based on its reported use in targets and projectiles.

5.1.2 Description

No further site-specific information on geology, hydrology, soils, or wildlife habitat associated with this PRS is required. General area geology, hydrology, soils, or wildlife habitat information associated with this PRS is presented in Chapter 2.

5.1.3 Previous Investigation

No previous investigations have been performed at this site.

5.1.4 Field Investigation

The objective of the investigation at PRS 08-002 was to determine if contaminants are present at the site and present an unacceptable risk based on the result of background and/or SAL comparison. The conceptual release model for the site includes two release scenarios. The first scenario is the release of fragments or fine metallic particles into the emplaced sand during the firing of inert projectiles into the sand butts. The second scenario includes the fragmentation and release of metal particles from projectiles and targets onto the surrounding surface soils during target testing. Potential release away from the sand butts to the surface soils is possible in this scenario with contaminant concentration decreasing with distance from the sand butt. This scenario would result in

the distribution of relatively inert metal particles ranging in size from powders to centimeter-size fragments across the surface soil within a 75-yd radius of a sand butt. The site is relatively level, well vegetated with grasses, and shows little evidence of surface erosion or lateral migration of material away from the site. Significant vertical migration of suspected site contaminants is not expected due to their general low mobility, and the field investigation, therefore, focused on surface soils.

Remnants of the sand butts remain at the site and are approximately 3-ft high and spread out over an area approximately 10 by 20 ft. Field sampling activities were completed on 26 April 1994. The sampling activity was focused on two areas, the residual sand butts and surrounding surface soil within a 75-meter radius of the sand butts. Two locations were sampled from each sand butt along the longitudinal axis that would have been followed by the projectile and subsequent recovery activities (locations 08-2000 through 08-2003). One interval, representing the standing material placed above the native soil horizon, was sampled at each location. Sample intervals from the sand butts ranged from 0-1.7 to 0-4.0 ft in length. See Figure 5.1.4-1 for the location of sampling points at this PRS.

The investigation of surface soils specified the collection of 10 samples at 10 locations (08-2200 through 08-2209) within the area prescribed by a 75-yd radius from each sand butt. A separate surface soil sampling event on 26 April 1994 resulted in the collection of an additional six samples at five locations (08-2100 through 08-2104) west of the sand butts. These samples were collected to support the characterization of MDA-Q but fall within the potentially impacted area of 08-002 and have been included in the data set.

All samples collected during this investigation were analyzed for a limited set of contaminants, which included beryllium, copper, and lead. The potential contamination by depleted uranium was evaluated by gross alpha and gross beta scans.

All sample locations were field screened for radiological, chemical, and HE contaminants prior to collection. All field screening results were negative or at background levels.

The presence of depleted uranium was evaluated by the gross alpha and gross beta radioactivity measurements. Minimum, average, and maximum radioactivities of the samples were 0, 3, and 12 pCi/g gross alpha and 0, 10, and 23 pCi/g gross beta. No site background UTL has been established for gross alpha or gross beta radioactivity; however, these data can be compared to background measurements obtained from TA-22 adjacent to the TA-8 area. Minimum, average, and maximum background radioactivities were 0, 2, and 5 pCi/g gross alpha and 5, 10, and 17 pCi/g gross beta. The absence of elevated radioactivities in the samples indicates no significant concentrations of depleted uranium at the PRS.

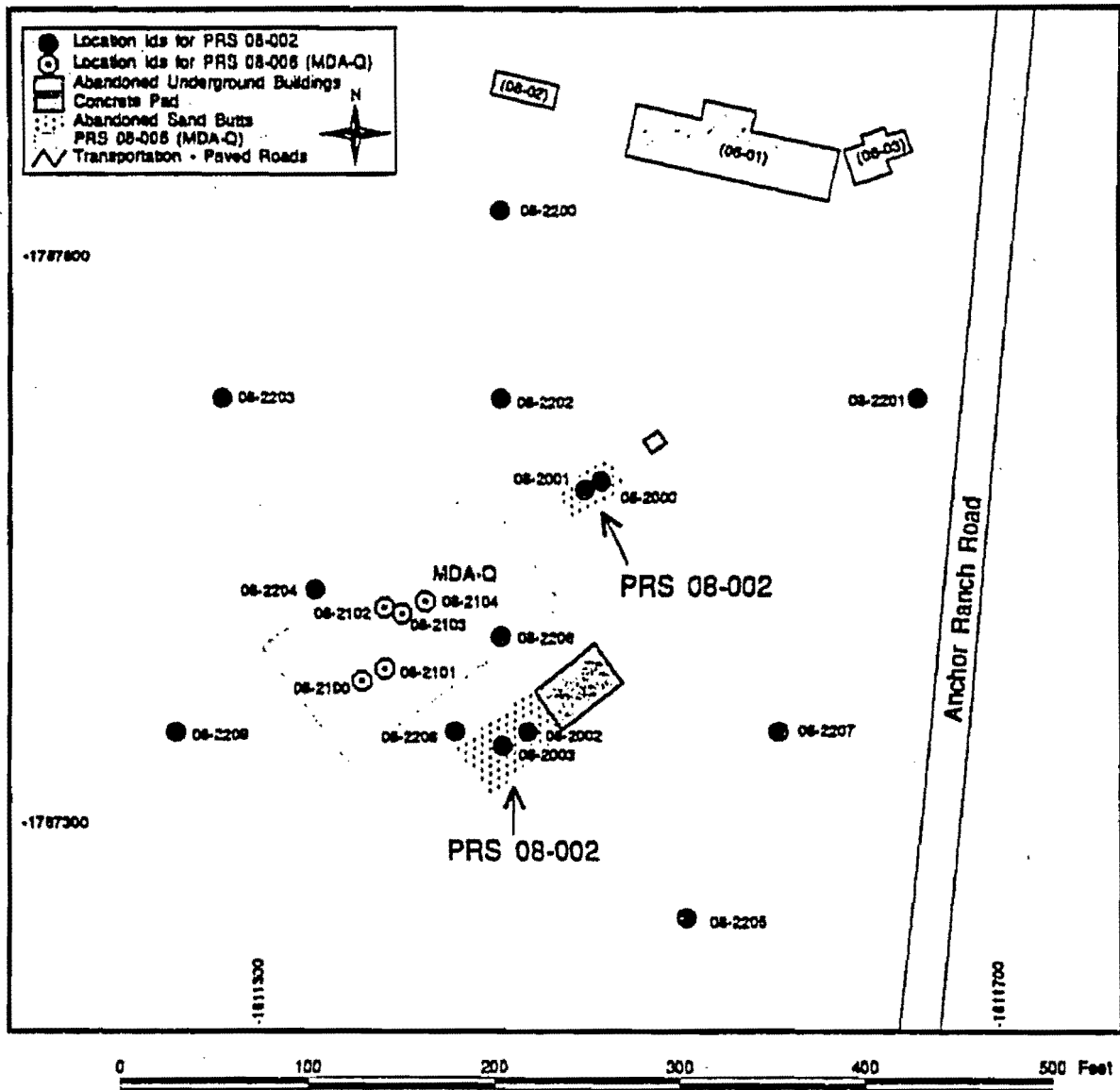


Figure 5.1.4-1. Locations of PRS 08-002 samples.

Table 5.1.4-1 presents a summary of the samples taken for PRS 08-002.

**TABLE 5.1.4-1
SUMMARY OF SAMPLES TAKEN**

Location ID	Sample ID	Depth (ft)	Media	Inorganic Chemicals*
Sand Butts				
08-2000	AAB0791	0-1.7	SOIL	17335
08-2001	AAB0792	0-3.6	SOIL	17335
08-2002	AAB0793	0-2.7	SOIL	17335
08-2003	AAB0794	0-4	SOIL	17335
Surface Soils				
08-2200	AAB0801	0-0.5	SOIL	17335
08-2201	AAB0802	0-0.5	SOIL	17335
08-2202	AAB0803	0-0.5	SOIL	17335
08-2203	AAB0804	0-0.5	SOIL	17335
08-2204	AAB0805	0-0.5	SOIL	17335
08-2205	AAB0806	0-0.5	SOIL	17335
08-2206	AAB0807	0-0.5	SOIL	17335
08-2207	AAB0808	0-0.5	SOIL	17335
08-2208	AAB0809	0-0.5	SOIL	17335
08-2209	AAB0810	0-0.5	SOIL	17335
08-2100	AAB0795	0-0.5	SOIL	17335
08-2101	AAB0796	0-0.5	SOIL	17335
08-2102	AAB0797	0-0.5	SOIL	17335
08-2103	AAB0798	0-0.5	SOIL	17335
08-2104	AAB0799	0-0.5	SOIL	17335
08-2104	AAB0800	0-0.5	SOIL	17335

* Request Number

5.1.5 Evaluation of Inorganic Chemicals

A summary of inorganic chemicals reported at concentrations greater than background screening levels is presented in Table 5.1.5-1 and plotted on Figure 5.1.5-1. However, the data are usable for site-specific decisions. As stated in Section 4.1.12, the data for all metals may be used as reported without qualification.

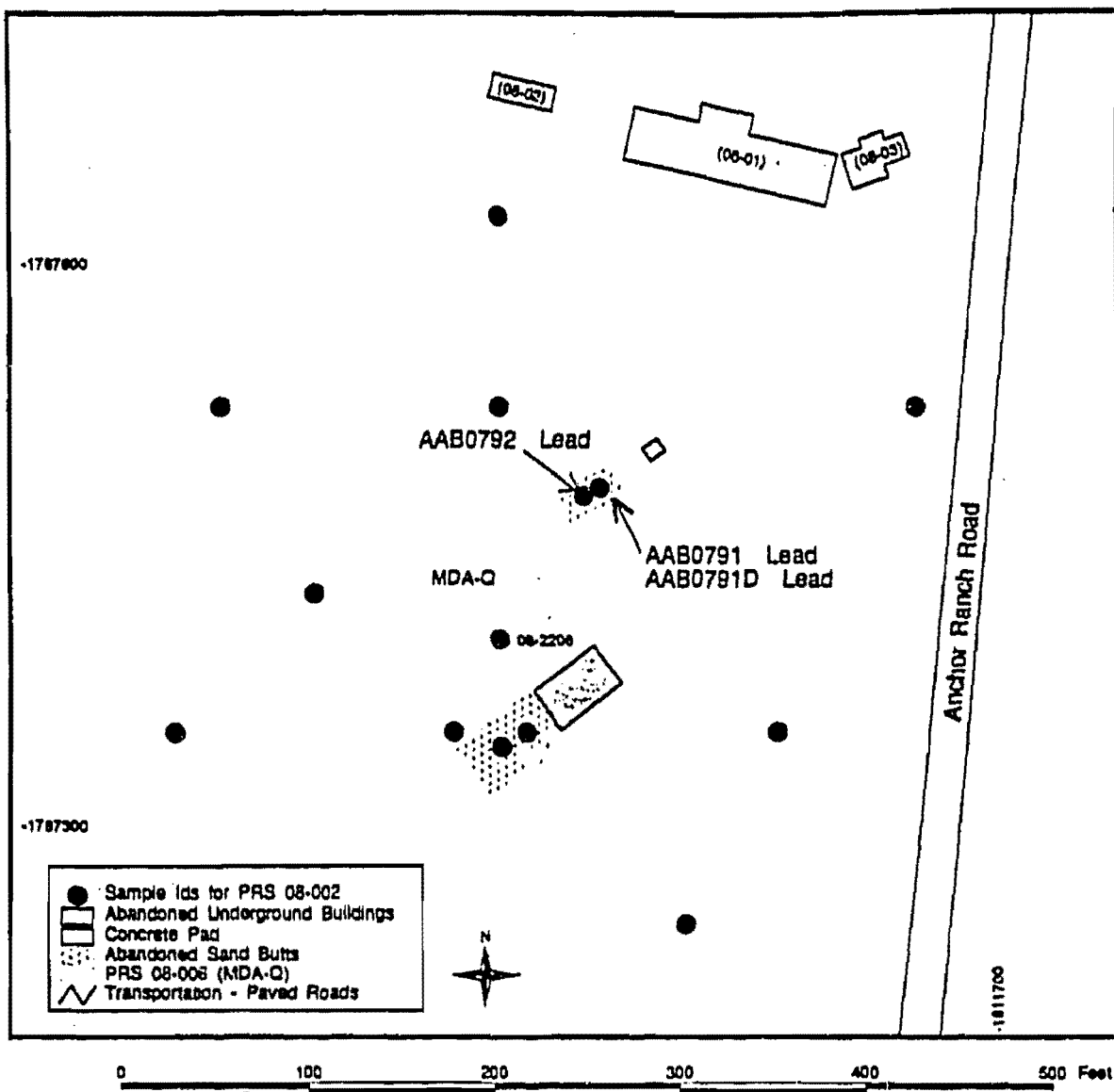


Figure 5.1.5-1. Locations of analytes that exceed background (UTLs and EQLs) and/or that exceed SALs at PRS 08-002.

Lead was reported in two samples collected from the northernmost sand butt at levels that exceed Laboratory-background UTL. No other inorganic contaminants were identified in any surface soil samples collected outside the sand butts at levels greater than Laboratory-background UTL. Lead has been identified as a COPC based on the background screening and will be carried forward for further evaluation in the risk-based screening assessment. Table 5.1.5-1 presents a summary of inorganic chemical results for PRS 08-002.

**TABLE 5.1.5-1
INORGANIC CHEMICALS WITH CONCENTRATIONS AT OR ABOVE
BACKGROUND SCREENING VALUES FOR PRS 8-002**

Sample ID	Depth (ft)	Media	Lead (mg/kg)
SAL	N/A ^b	N/A ^b	400
soil UTL ^a	N/A ^b	N/A ^b	23.3
Sand Butts			
AAB0791	0-1.7	soil	23.5
AAB0791D ^c	0-1.7	soil	27.1
AAB0792	0-3.6	soil	420
AAB0793	0-2.7	soil	14.8
AAB0794	0-4	soil	15.5
Surface Soils			
AAB0795	0-0.5	soil	14.9
AAB0796	0-0.5	soil	13.2
AAB0797	0-0.5	soil	15.5
AAB0798	0-0.5	soil	16.9
AAB0799	0-0.5	soil	15.5
AAB0800	0-0.5	soil	14.7
AAB0801	0-0.5	soil	16.8
AAB0802	0-0.5	soil	19.7
AAB0803	0-0.5	soil	17.4
AAB0804	0-0.5	soil	12.7
AAB0805	0-0.5	soil	12.4
AAB0806	0-0.5	soil	18.8
AAB0807	0-0.5	soil	13.7
AAB0808	0-0.5	soil	16.9
AAB0809	0-0.5	soil	17.7
AAB0810	0-0.5	soil	11.8

a. Upper tolerance limit of Laboratory-wide soil background data from A, B, and C horizons.

b. N/A = not applicable

c. Laboratory Duplicate

5.1.6 Evaluation of Radionuclides

No radionuclide analyses were requested for this PRS.

5.1.7 Evaluation of Organic Chemicals

No organic constituents were identified for analysis in the investigation of this PRS.

5.1.8 Risk-Based Screening Assessment

One sample taken from the northernmost sand butt contained lead at a concentration that exceeds the lead SAL. The lead SAL (400 mg/kg) was exceeded in a single sample (420 mg/kg) by 5%; the sample was located in the remaining bulk sand pile that received the projectiles during testing. No samples from the southern sand butt or the surface soil exposure area surrounding the sand butts contained contaminants above SAL or background. A summary of the analytical results that exceed SAL is presented in Table 5.1.8-1.

TABLE 5.1.8-1
PRS 8-002 INORGANICS WITH CONCENTRATIONS IN SOIL THAT EXCEED SALs

Sample ID	Location ID	Depth (ft)	Media	Lead (mg/kg)
SAL	N/A*	N/A*	N/A*	400
AAB0792	08-2001	0-3.6	soil	420

* N/A = not applicable

5.1.9 Human Health Risk Assessment

No human health risk assessment was performed for PRS 08-002 because the risk-based screening assessment indicated that a risk assessment was not warranted.

5.1.10 Preliminary Ecological Assessment

In cooperation with the NMED and EPA Region 6, the Laboratory ER Project is developing an approach for ecological risk assessment. Further ecological risk assessment at PRS 08-002 will be deferred until the site can be assessed as part of the ecological exposure unit methodology currently being developed.

5.1.11 Conclusions and Recommendations

Review of the Phase I data indicates no widespread, general distribution of site-related potential contaminants at the PRS. Two inorganic constituents, beryllium and copper, identified as potentially site-related due to process knowledge, were not reported in any sample at levels greater than background UTL. In addition, radiological field screening detected no elevated gross alpha or gross beta activity, confirming the absence of depleted uranium, another suspected site-related contaminant.

One COPC, lead, was identified in the screening process to be present in one site sample (420 mg/kg) at a level that exceeds SAL (400 mg/kg). The Laboratory lead SAL of 400 mg/kg is based on the EPA Integrated Exposure Uptake Biokinetic Model and uses default exposure parameters for the establishment of a soil concentration protective of the sensitive 6-84 month-old resident child subpopulation. This standard has clearly been identified as a screening level that may generally be used to determine which sites or portions of sites do not require further study. The screening concentration further represents an average soil concentration that would not present an unacceptable risk when distributed across a typical residential exposure area (approximately 500 square meters).

One sample taken from the southernmost sand butt was found to have a lead level at 420 mg/kg, approximately 5% greater than the SAL. One additional sample also taken

from the sand butt was found to have lead at a concentration slightly greater than, but in the range of, lead background UTL (duplicate analysis reported 27.1 and 23.5 mg/kg lead). No statistical background distributional analysis was performed on this data set.

This site is not expected to present an unacceptable human health risk and is recommended for NFA because of the following: (1) the low overall frequency at which background or SAL was exceeded; (2) the conservative residential exposure assumptions used versus the expected current and future Laboratory use of the area, i.e., industrial use with the industrial lead SAL of 1000 mg/kg; (3) the SAL was exceeded in a single sample by 5% in a data set that is recognized as potentially biased high; and (4) the small size of the contaminated area relative to an assumed residential exposure area.

This recommendation is based on the NFA criterion 4 (Los Alamos National Laboratory, Environmental Restoration Department, Project Consistency Team Policy number 015) that 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 will be requested to remove this site from the HSWA Module of the Laboratory's RCRA operating permit.

5.1.12 Sampling and Analysis Plan for PRS 08-002

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

Potential Release Site 7-001(a) is a circular depression surrounded by an annular berm that is about 4-ft high. The original use of the site is unknown. In the 1950s, this site was used for destruction of scrap detonators and explosives. Scrap detonators and explosives were mixed with Composition B scraps or flaked TNT, and the mixture was detonated (LANL 1993, 26068). Experiments were also performed to determine optimum conditions for disposing of scrap detonators (LANL 1993, 26068). This waste operation was moved to a burning and detonation area about 450 ft east of Building TA-40-15 in the 1950s (LANL 1993, 26068).

These processes and activities, along with the fact that the original use of the site is unknown, contributed to the identification of HE, metals, radionuclides, and SVOCs as potential contaminants to be investigated at the site.

5.2.2 Description

No further site-specific information on geology, hydrology, soils, or wildlife habitat associated with this PRS is required. General area geology, hydrology, soils, or wildlife habitat information associated with this PRS is presented in Chapter 2.

5.2.3 Previous Investigation(s)

Previous field investigations indicate that explosives fragments were found around the pit in 1959, and spent detonators have washed out of the soil berms through an access portal during rainstorms (LANL 1993, 26068).

5.2.4 Field Investigation

The field activities at PRS 07-001(a) were Phase I reconnaissance-type investigations biased toward sampling media in areas most likely to be contaminated from past activities. The initial field sampling activity at this PRS was completed on 24 August 1994. The objective was to determine if chemicals are present at the firing site at levels that exceed screening action levels and present an unacceptable human health risk.

The conceptual release model for this PRS is consistent with firing-site where an explosive or combustive release occurred, distributing materials at the site. Any released contaminants would be expected to be concentrated at the center of the site and diminish radially. It is also assumed that residual contaminants, if present, would be retained in the surficial soils due to their relative insolubility (metals fragments, organics) and affinity for the fine organic soil fraction at the surface. Sampling locations were selected by field personnel in areas where contaminants were judged most likely to be present based on physical conditions and field screening.

The sampling plan provided general guidance and specified the collection of soil samples at two intervals, surface soil (0-0.5 ft) and subsurface soil (3 ft or at the turf/soil interface). Three borings were collected and sampled from the central part of the firing site (inside the annular berm). These borings were arranged in a triangular pattern within a central circular area (approximate 15 ft diameter) of the firing site. The outer perimeter of the site, consisting of the area approximately 7 to 30 ft from the center, was divided into three equal segments. The annular berm was contained within this perimeter area. One boring was collected and sampled from each of the segments. Two of these borings were located outside the annular berm, and the third was located inside the annular berm.

The analytical laboratory missed the holding times for all HE analyses of samples collected during the August field investigation. In addition, sampling for semivolatile analytes was inadvertently overlooked during this investigation, despite being identified as possible site contaminants. Therefore, a second set of samples was collected from

points associated with the original sampling locations and depths. These samples were analyzed for HE and SVOCs.

See Figure 5.2.5-1 for the location of sampling points at this PRS.

Table 5.2.4-1 presents a summary of samples taken for PRS 7-001(a). Samples with Sample ID designations AABxxxx were collected during the original field investigation in August of 1994; samples with Sample ID designations 0507-96-xxxx were collected during the resampling activity of 22 March 1996.

All sample locations were field screened for HE, organics, and radionuclides prior to sample collection. All screening results were negative or at background levels.

**TABLE 5.2.4-1
SUMMARY OF SAMPLES TAKEN**

Location ID	Sample ID	Depth (ft)	Media	SVOCs *	High Explosives*	Inorganic Chemicals*	Radionuclides*
Firing Pad Center							
07-4041	AAB7909	0-0.5	SOIL	NA	18693	18808	19119
07-4041	AAB7910	2-3	SOIL	NA	18693	18808	19119
07-4041	0507-96-0029	0-0.5	SOIL	1906	1907	NA	NA
07-4041	0507-96-0030	2.75-3	SOIL	1906	1907	NA	NA
07-4042	AAB7911	0-0.5	SOIL	NA	18693	18808	19119
07-4042	AAB7912	2-3	SOIL	NA	18693	18808	19119
07-4042	0507-96-0031	0-0.5	SOIL	1906	1907	NA	NA
07-4042	0507-96-0032	2.3-3	SOIL	1906	1907	NA	NA
07-4043	AAB7913	0-0.5	SOIL	NA	18693	18808	19119
07-4043	AAB7914	2-3	SOIL	NA	18693	18808	19119
07-4043	0507-96-0033	0-0.5	SOIL	1906	1907	NA	NA
07-4043	0507-96-0034	2.3-3	SOIL	1906	1907	NA	NA
Firing Pad Perimeter							
07-4044	AAB7915	0-0.5	SOIL	NA	18693	18808	19119
07-4044	AAB7916	2-3	SOIL	NA	18693	18808	19119
07-4044	0507-96-0035	0-0.5	SOIL	1906	1907	NA	NA
07-4044	0507-96-0036	2.5-3.2	SOIL	1906	1907	NA	NA
07-4045	AAB7917	0-0.5	SOIL	NA	18693	18808	19119
07-4045	AAB7918	2-3	SOIL	NA	18693	18808	19119
07-4045	0507-96-0037	0-0.5	SOIL	1906	1907	NA	NA
07-4045	0507-96-0038	2.5-3.2	SOIL	1906	1907	NA	NA
07-4046	AAB7919	0-0.5	SOIL	NA	18693	18808	19119
07-4046	AAB7920	0-0.5	SOIL	NA	18693	18808	19119
07-4046	AAB7921	2-3	SOIL	NA	18693	18808	19119
07-4046	0507-96-0039	0-0.5	SOIL	1906	1907	NA	NA
07-4046	0507-96-0040	0-0.5	SOIL	1906	1907	NA	NA
07-4046	0507-96-0041	2.5-3.2	SOIL	1906	1907	NA	NA

* Request Number

NA = not analyzed

5.2.5 Evaluation of Inorganic Chemicals

A summary of inorganic chemicals reported at concentrations greater than background screening levels is presented in Table 5.2.5-1 and plotted on Figure 5.2.5-1. The qualifiers shown in the table have been assigned during baseline data validation. However, the data are usable for site-specific decisions. As stated in Section 4.1.8, analytical results for aluminum, antimony, cyanide, chromium, thallium, and vanadium are potentially biased low, and the results for arsenic and sodium are potentially biased high. None of these chemicals were reported at concentrations that exceed background UTL. Therefore, the potential bias would not alter the decision to exclude these chemicals from further evaluation because the maximum reported value for aluminum was less than one-third the SAL, for antimony, less than one-fifth the SAL, for cyanide, 3 orders of magnitude less than SAL, for chromium, less than one-half the SAL, and for thallium and vanadium, 1 order of magnitude less than SAL. All other metals data are usable as reported.

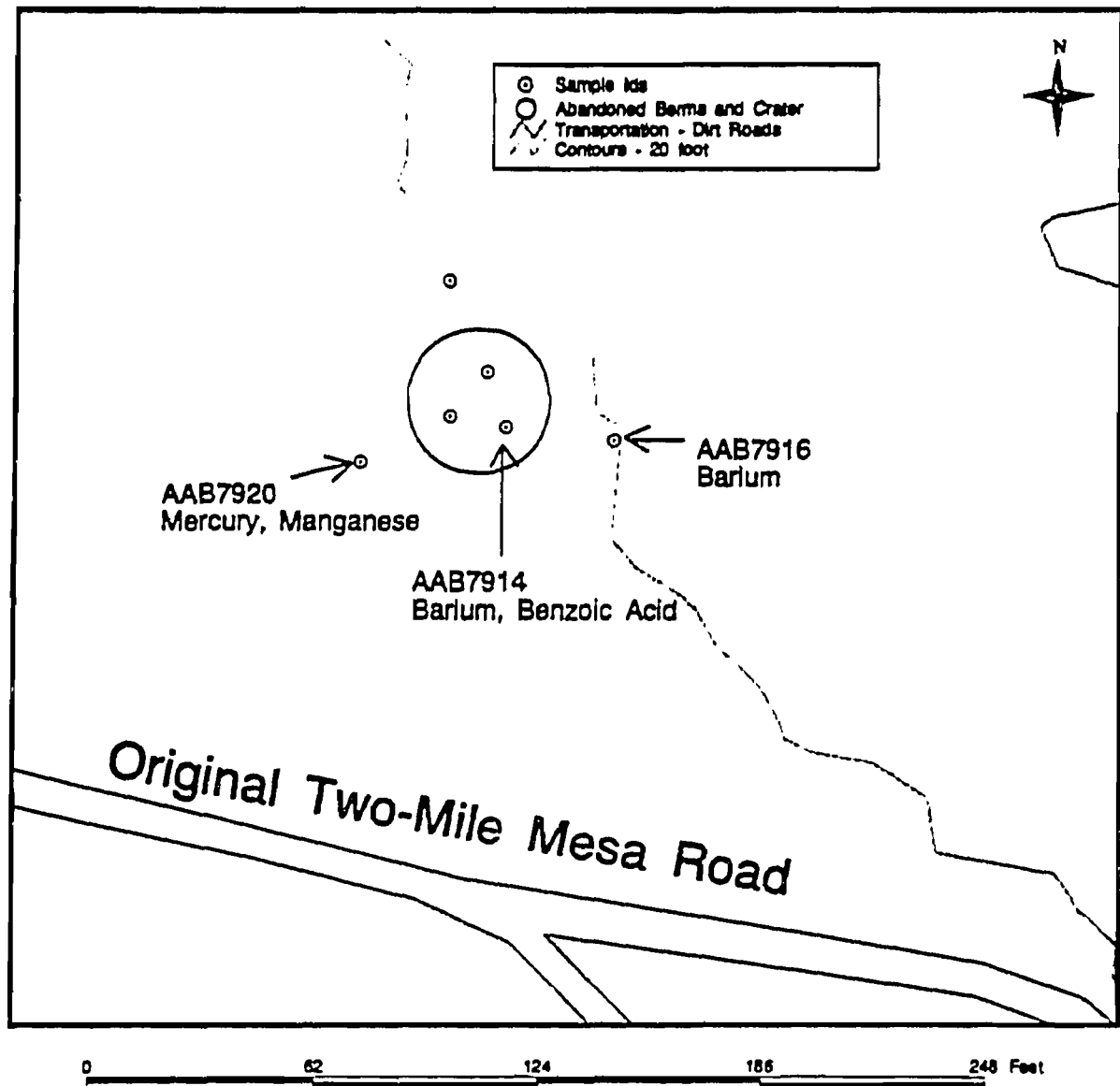


Figure 5.2.5-1. Locations of analytes that exceed background (UTLs and EQLs) and/or that exceed SALs at PRS 07-001(a).

Four inorganic chemicals, barium, calcium, manganese, and mercury, were reported in at least one sample at a concentration that exceeds background UTL. Antimony was reported as undetected in all samples at a detection limit greater than background. These elevated detection limits are a function of the analytical method; antimony was not expected to be associated with the site and was eliminated from further consideration.

Calcium is an essential nutrient that has no established SAL. A conservative estimate of calcium intake for the most limiting receptor, an infant 0-12 months of age, would result in a 2.4-mg intake per day. This estimate is based on the default soil intake of 200 mg/day and the maximum observed soil concentration of 12,000 milligrams calcium per kilogram soil. This daily intake via soil ingestion and independent of all other sources would represent less than one percent of the 400-600 mg/day Recommended Daily Allowance of calcium for that age group. Due to its essential nutrient status and the limited potential contribution from the site, calcium was eliminated from further consideration. Barium, manganese, and mercury were detected above Laboratory-background UTL in a limited number of samples. No additional statistical testing of the background distribution was performed, and these chemicals were identified as COPCs for evaluation in the screening assessment.

Inorganic chemicals with concentrations above background are summarized in Table 5.2.5-1. The qualifiers shown in the table have been assigned during baseline data validation. However, the data are usable for site-specific decisions, as stated in the rationale below. A focused validation of the inorganic chemical results indicates no need to qualify any data for the identified COPCs. Aluminum, chromium, antimony, thallium, and cyanide data are viewed as potentially biased low, while arsenic and sodium results are viewed as potentially biased high. These contaminants, at their reported concentrations, do not enter into site decisions.

**TABLE 5.2.5-1
INORGANIC CHEMICALS WITH CONCENTRATIONS AT OR ABOVE
BACKGROUND SCREENING VALUES FOR PRS 7-001(a)**

Sample ID	Depth (ft)	Media	Barium (mg/kg)	Mercury (mg/kg)	Manganese (mg/kg)
SAL	N/A ^b	N/A ^b	5300	23	3200
Soil UTL ^a	N/A ^b	N/A ^b	315	0.1	714
Firing Pad Center					
AAB7909	0-0.5	soil	173	<0.07	630
AAB7910	2-3	soil	158	<0.06	683
AAB7911	0-0.5	soil	126	<0.02	454
AAB7911D	0-0.5	soil	160	<0.02	569
AAB7912	2-3	soil	134	<0.02	152
AAB7913	0-0.5	soil	148	<0.08	508
AAB7914	2-3	soil	384	<0.08	339
Firing Pad Perimeter					
AAB7915	0-0.5	soil	148	<0.06	527
AAB7916	2-3	soil	604	<0.06	279
AAB7917	0-0.5	soil	120	<0.07	496
AAB7918	2-3	soil	103	<0.06	438
AAB7918D	2-3	soil	NA	NA	NA
AAB7919	0-0.5	soil	123	<0.09	626
AAB7920	0-0.5	soil	149	0.2	794
AAB7921	2-3	soil	142	<0.03	496

a. Upper tolerance limit of Laboratory-wide soil background data from A, B, and C horizons.

b. NA = not analyzed. N/A = not applicable.

5.2.6 Evaluation of Radionuclides

No radionuclides were reported in any samples taken at PRS 7-001(a) with an activity that exceeds Laboratory-background UTL or the maximum reported background value from Environmental Surveillance data (LANL 1997, 56186). As stated in Section 4.2.8, none of the radionuclide data require qualification, although a potential for high bias was identified for Cs-137 analyses. The data are usable for site decisions, and no radiological COPCs were identified at the site.

5.2.7 Evaluation of Organic Constituents

Table 5.2.7-1 presents a summary of the organic constituents detected in site samples. Figure 5.2.5-1 plots locations of detected organic constituents. The qualifier shown in the table has been assigned during baseline validation; however, the data are usable for site decisions. As stated in Section 4.3.8, SVOC results, except benzoic acid, are not qualified. In addition, the resampled HE data require no qualification, and those results are consistent with the original sampling results that exceeded analytical holding time.

No HE constituents were reported to be positively detected in any site sample. Benzoic acid was the only detected organic constituent reported from site samples. It is a naturally occurring organic acid and was reported in a single sample at an estimated concentration of 0.187(J) mg/kg. This is an order of magnitude less than its EQL and six orders of magnitude less than its SAL. Therefore benzoic acid was eliminated from further consideration, and no organic COPCs were identified at the site.

**TABLE 5.2.7-1
DETECTED ORGANIC CHEMICALS FOR PRS 7-001(a)**

Sample ID	Depth (ft)	Benzoic Acid (mg/kg)
SAL	N/A	100000
EQL	N/A	3.3
Firing Pad Center		
0507-96-0033	0-0.5	0.187(J)

N/A = not applicable

5.2.8 Risk-Based Screening Assessment

No chemicals were reported at the PRS at levels equal to or greater than their SAL. Three inorganic chemicals, barium, manganese, and mercury, were reported in samples taken at the site at levels that exceed Laboratory-background UTL. These chemicals are identified as eliciting noncarcinogenic effects, and the total normalized MCE for manganese, mercury, and barium is 0.4. Table 5.2.8-1 presents the results of the MCE for these constituents.

**TABLE 5.2.8-1
MULTIPLE CHEMICAL EVALUATION FOR SOIL SAMPLES AT PRS 7-001(a)**

Chemical	Location ID	Sample ID	Maximum Sample Value	Soil SAL ^a	Normalized Value
Noncarcinogenic Effects (mg/kg)					
Barium	07-4044	AAB7916	604	5300	0.11
Manganese	07-4046	AAB7920	794	3200	0.25
Mercury	07-4046	AAB7920	0.2	23	0.01
				Total ^b	0.4

a. SAL = screening action level

b. Total may not equal sum of normalized values due to rounding

5.2.9 Human Health Risk Assessment

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

5.2.10 Preliminary Ecological Assessment

In cooperation with the NMED and EPA Region 6, the Laboratory ER Project is developing an approach for ecological risk assessment. Further ecological risk assessment at PRS 07-001(a) will be deferred until the site can be assessed as part of the ecological exposure unit methodology currently being developed.

5.2.11 Conclusions and Recommendations

Qualitatively, based on the Phase I data, there is no indication of general contamination or release of hazardous materials at this site. The Phase I sampling plan, as executed, addressed relevant, biased sampling of exposure media and has adequately characterized the site. Background UTL for barium from samples taken at the center of the firing site was exceeded in one sample, the expected most contaminated area. There were three individual occurrences in which barium, manganese, and mercury UTLs were exceeded in samples taken in the perimeter area. The total normalized MCE for noncarcinogenic effects of these chemicals is 0.4, which indicates that the site as characterized does not present an unacceptable human health risk. No human health COPCs have been identified for further evaluation based on the screening of this PRS, and the site is recommended for NFA.

This recommendation is based on the NFA criterion 4 (Los Alamos National Laboratory, Environmental Restoration Department, Project Consistency Team Policy number 015) that 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 will be requested to remove this site from the HSWA Module of the Laboratory's RCRA operating permit.

5.2.12 Sampling and Analysis Plan for PRS 07-001(a)

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

5.3 Potential Release Site - 07-001(b)

PRS 07-001(b), shown in Figure 5.2-1, is an inactive firing site that is not associated with any present buildings or structures and is located approximately 240 ft southeast of PRS 07-001(a). Two organic compounds, including one HE constituent, were reported as detected at levels greater than their EQL. Four inorganic constituents (cadmium, copper, lead, and zinc) were detected at levels exceeding their background UTL. No contaminant was reported at a level that exceeds its SAL. This PRS is recommended for NFA.

5.3.1 History

This PRS is discussed in further detail in Section 5.4.1 of the RFI Work Plan for OU 1111 (LANL 1993, 26068).

Potential Release Site 7-001(b) is a circular depression surrounded by an annular berm that is about 4-ft high. The original use of the site is unknown. In the 1950s, this site was used for destruction of scrap detonators and explosives. Scrap detonators and explosives were mixed with Composition B scraps or flaked TNT, and the mixture was detonated (LANL 1993, 26068). Experiments were also performed to determine optimum conditions for disposing of scrap detonators (LANL 1993, 26068). The waste operation was moved to a burning and detonation area about 450 ft east of Building TA-40-15 in the 1950s (LANL 1993, 26068).

These processes and activities contributed to the identification of HE, metals, radionuclides, and SVOCs as potential contaminants to be investigated at the site.

5.3.2 Description

No further site-specific information on geology, hydrology, soils, or wildlife habitat associated with this PRS is required. General area geology, hydrology, soils, or wildlife habitat information associated with this PRS is presented in Chapter 2.

5.3.3 Previous Investigation(s)

Previous field investigations indicate that explosives fragments were found around the pit in 1959, and spent detonators have washed out of the soil berms during rainstorms through depressions in the berm (LANL 1993, 26068).

5.3.4 Field Investigation.

The field activities at this PRS were Phase I reconnaissance-type investigations biased toward sampling media in areas most likely to be contaminated from past activities. The objective was to determine if chemicals are present at the firing site at levels that exceed background and/or SAL.

The conceptual release model for this PRS is consistent with firing sites where it is assumed that an explosive or combustive release of material occurred, distributing material at the site. Any released contaminants would be expected to be concentrated at the center of the site and diminish radially. It is also assumed that residual contaminants (metals fragments, organics), if present, would be retained in the surficial soils due to their relative insolubility and affinity for the fine organic soil fraction at the surface. The sampling plan provided general guidance and specified the collection of soil samples at two intervals: surface soil and subsurface soil (3 ft or at the tuff/soil interface). Sampling locations were selected by field personnel in areas where contaminants were judged most likely to be present based on physical conditions and field screening.

The initial field sampling activity at this PRS was completed on 29 August 1994. Three borings were collected and sampled from the central part of the firing site (inside the annular berm). These borings were arranged in a regular triangular pattern within the central circular depression (diameter approximately 15 ft) of the firing site. The outer perimeter of the site, consisting of the area approximately 16 to 30 ft from the center, was divided into three equal segments. The annular berm was contained within this perimeter area. One boring was collected and sampled from each of the segments. Two of these borings were located outside the annular berm, and the third was located inside the annular berm.

The analytical laboratory missed the holding times for the HE analyses of samples collected during the August field activity. In addition, sampling for semivolatile analytes was inadvertently overlooked during the investigation, despite their being identified as possible site contaminants. Therefore, a second set of samples was collected from points associated with the original sampling locations and depths. These samples were analyzed for HE and SVOCs. Figure 5.2-1 shows the location of sampling points at this PRS.

Table 5.3.4-1 presents a summary of samples taken for PRS 7-001(b). Samples with Sample ID designations AABxxxx were collected during the original field investigation in August of 1994; samples with Sample ID designations 0507-96-xxx were collected during the resampling activity of 22 March 1996.

All sample locations were field screened for HE, organics, and radionuclides prior to sample collection. All field screening results were negative or at background levels.

**TABLE 5.3.4-1
SUMMARY OF SAMPLES TAKEN**

Location ID	Sample ID	Depth (ft)	Media	SVOCs*	High Explosives*	Inorganic Chemicals*	Radionuclides *
Firing Pad Center							
07-4047	AAB7922	0-0.5	soil	NA	18693	18808	19119
07-4047	AAB7923	2-3	soil	NA	18693	18808	19119
07-4047	0507-96-0042	0-0.5	soil	1906	1907	NA	NA
07-4047	0507-96-0043	2.5-3.2	soil	1906	1907	NA	NA
07-4048	AAB7924	0-0.5	soil	NA	18693	18808	19119
07-4048	AAB7925	2-3	soil	NA	18693	18808	19119
07-4048	0507-96-0044	0-0.5	soil	1906	1907	NA	NA
07-4048	0507-96-0045	2.5-3.2	soil	1906	1907	NA	NA
07-4049	AAB7926	0-0.5	soil	NA	18693	18808	19119
07-4049	AAB7927	2-3	soil	NA	18693	18808	19119
07-4049	0507-96-0046	0-0.5	soil	1906	1907	NA	NA
07-4049	0507-96-0047	2.5-3.2	soil	1906	1907	NA	NA
Firing Pad Perimeter							
07-4050	AAB7928	0-0.5	soil	NA	18693	18808	19119
07-4050	AAB7929	2-3	soil	NA	18693	18808	19119
07-4050	0507-96-0048	0-0.5	soil	1906	1907	NA	NA
07-4050	0507-96-0049	2.5-3.2	soil	1906	1907	NA	NA
07-4051	AAB7930	0-0.5	soil	NA	18693	18808	19119
07-4051	AAB7931	2-3	soil	NA	18693	18808	19119
07-4051	0507-96-0050	0-0.5	soil	1906	1907	NA	NA
07-4051	0507-96-0051	2.6-3.3	soil	1906	1907	NA	NA
07-4052	AAB7932	0-0.5	soil	NA	18693	18808	19119
07-4052	AAB7933	2-3	soil	NA	18693	18808	19119
07-4052	0507-96-0052	0-0.5	soil	1906	1907	NA	NA
07-4052	0507-96-0053	2.6-3.3	soil	1906	1907	NA	NA

* Request Number
NA = not analyzed

5.3.5 Evaluation of Inorganic Chemicals

A summary of inorganic chemicals reported at concentrations greater than background screening levels is presented in Table 5.3.5-1 and plotted on Figure 5.3.5-1. The qualifiers shown in the table have been assigned during baseline data validation. However, the data are usable for site-specific decisions. As reviewed in Section 4.1.9 and stated in Section 4.1.8, analytical results for aluminum, antimony, cyanide, chromium, thallium, and vanadium are potentially biased low, and the results for arsenic and sodium are potentially biased high. None of these chemicals were reported at concentrations that exceed background UTL, and the potential bias would not alter the decision to exclude these chemicals from further evaluation. All other metals data are usable as reported.

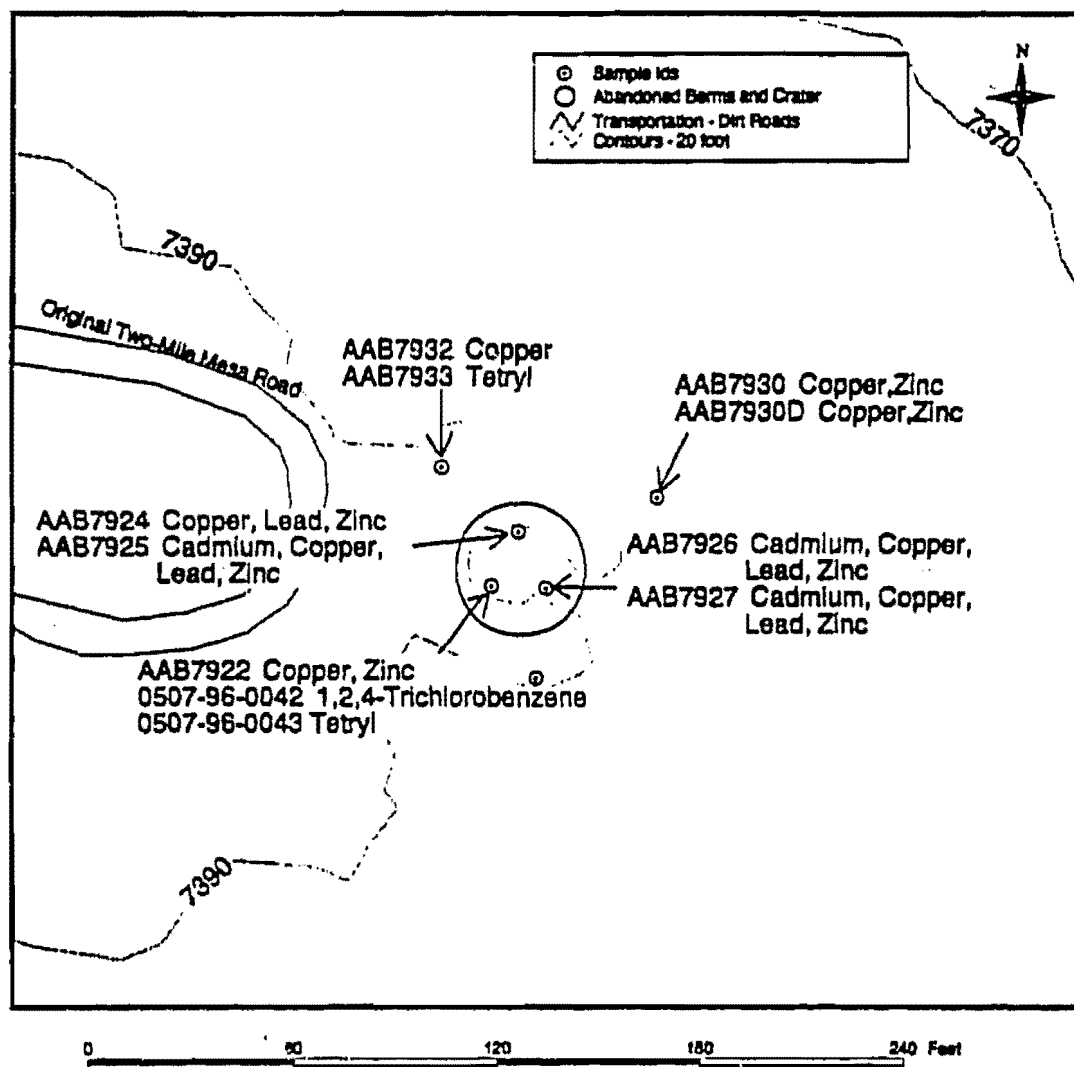


Figure 5.3.5-1. Locations of analytes that exceed background (UTLs and EQLs) and/or that exceed SALs at PRS 07-001(b).

Four inorganic chemicals, cadmium, copper, lead, and zinc, were reported as detected in at least one sample at a concentration that exceeds Laboratory-background UTL. Antimony was reported as undetected in all samples at an estimated quantitation limit greater than background. These elevated detection limits are a function of the analytical

method; antimony was not expected to be associated with the site and was eliminated from further consideration. No additional statistical testing of the background distribution was performed for the data set at this PRS, and cadmium, copper, lead and zinc were identified as COPCs for evaluation in the screening assessment.

The inorganic chemicals with concentrations above background are summarized in Table 5.3.5-1. The qualifiers shown in the table have been assigned during baseline data validation. However, the data are usable for site-specific decisions. A focused validation of the inorganic chemical results indicates no need to qualify any data for the identified COPCs. Aluminum, chromium, antimony, thallium, and cyanide data are viewed as potentially biased low, while arsenic and sodium results are viewed as potentially biased high. These contaminants, at their reported concentrations, do not enter into site decisions.

5.3.6 Evaluation of Radionuclides

No radionuclides were reported in any samples taken at PRS 7-001(b) with an activity that exceeds Laboratory-background UTL or the maximum reported background value from Environmental Surveillance data. As stated in Section 4.2.9, none of the radionuclide data require qualification, although a potential for high bias was identified for Cs-137 analyses. Because all results are below screening levels, the potential high bias would not alter the screening decision, the data are usable for site decisions, and no radiological COPCs were identified at the site.

**TABLE 5.3.5-1
INORGANIC CHEMICALS WITH CONCENTRATIONS AT OR ABOVE
BACKGROUND SCREENING VALUES FOR PRS 7-001(b)**

Sample ID	Depth (ft)	Media	Cadmium (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Zinc (mg/kg)
SAL	N/A	N/A	38	2800	400	23000
Soil UTL ^a	N/A	N/A	2.7 ^b	15.5	23.3	50.8
Firing Pad Center						
AAB7922	0-0.5	soil	<0.91	44.3	12.2	56.7
AAB7923	2-3	soil	<0.88	31.9	11.2	41.9
AAB7924	0-0.5	soil	2.3	452	30.8	177
AAB7925	2-3	soil	3.7	535	54.6	557
AAB7926	0-0.5	soil	3.4	153	23	123
AAB7927	2-3	soil	3.5	309	71.3	318
Firing Pad Perimeter						
AAB7928	0-0.5	soil	<0.7	15.4	11.3	27.5
AAB7929	2-3	soil	<0.65	6.9	11.9	26.4
AAB7930	0-0.5	soil	<0.78	106	19.7	80.1
AAB7930D	0-0.5	soil	0.69	103	19.2	79
AAB7931	2-3	soil	<0.77	14.3	14.2	30.8
AAB7932	0-0.5	soil	<0.4	91.9	13.1	50.5
AAB7932D	0-0.5	soil	NA	NA	NA	NA
AAB7933	2-3	soil	<0.4	11.3	10.9	22.2

a. Upper tolerance limit of Laboratory-wide solid background data from A, B, and C horizons.

b. Maximum detected background concentration.

N/A = not applicable

5.3.7 Evaluation of Organic Constituents

As stated in Section 5.3.4, two sampling activities were carried out in the investigation of this PRS. SVOC collection and analysis were inadvertently overlooked during the first sampling event, and all HE analyses exceeded analytical holding time. A second sampling event occurred on 22 March 1996, at which time a second set of samples was collected from points associated with the original sampling locations and depths.

Table 5.3.7-1 presents a summary of the organic chemicals reported above EQL at PRS 07-001(b), and Figure 5.3.5-1 plots their locations. The qualifiers shown in the table have been assigned during baseline validation. However, the data are usable for site-specific decisions, as stated in the rationale below.

One SVOC, 1,2,4-trichlorobenzene, was reported as detected in sample 0507-96-0042 at an estimated concentration of 0.368(J) mg/kg, which exceeds its EQL. This result was reviewed during the focused data validation, and its presence in this sample was

attributed to instrument carryover from a previous Laboratory Control Sample (LCS) analysis. Insufficient sample volume remained for re-analysis. Based on the focused validation, 1,2,4-trichlorobenzene was eliminated from further consideration.

Two HE compounds, tetryl (methyl-2,4,6-trinitrophenylnitramine) and RDX, were reported at concentrations that exceed their EQL from analysis of the first set of soil samples collected at the site. Tetryl was reported above its EQL in one sample collected and analyzed from the second set of samples. Therefore, tetryl was carried forward for evaluation in the screening assessment. RDX was not reported above its EQL in any sample from the second set. Therefore, RDX is considered absent because RDX was not reported above EQL in any resampled soils.

No other HE contaminants were reported above EQL in any sample analyzed from the site. All other organic compounds were reported as detected at estimated concentrations less than or within the range of their EQL and were eliminated from further evaluation.

**TABLE 5.3.7-1
DETECTED ORGANIC CHEMICALS FOR PRS 7-001(b)**

Sample ID	Depth (ft)	Tetryl (mg/kg)	1,2,4-Trichlorobenzene (mg/kg)
SAL	N/A	650	620
EQL	N/A	0.65	0.33
Firing Pad Center			
AAB7925	2-3	<0.33(R)	NA
AAB7927	2-3	<0.33(UJ)	NA
0507-96-0042	0-0.5	<0.65	0.368(J)
0507-96-0043	2.5-3.2	1.5	<0.356
0507-96-0044	0-0.5	<0.65	<0.366
0507-96-0046	0-0.5	<0.65	<0.370
0507-96-0047	2.5-3.2	<0.65	<0.390
Firing Pad Perimeter			
AAB7933	2-3	49.8(J)	NA
0507-96-0050	0-0.5	<0.65	<0.362
0507-96-0052	0-0.5	<0.65	<0.330

N/A = not applicable

NA = not analyzed

5.3.8 Risk-Based Screening Assessment

No chemicals were detected in any site samples at levels that exceed their associated SAL. Four inorganic chemicals were reported at levels that exceed background, and one organic chemical was reported at a concentration that exceeds its EQL. All five chemicals are recognized to elicit noncarcinogenic effects, and the maximum reported concentrations were utilized in the MCE. The total normalized MCE for the site is 0.6. A summary of the MCE is presented in Table 5.3.8-1.

**TABLE 5.3.8-1
MULTIPLE CHEMICAL EVALUATION FOR SOIL SAMPLES AT PRS 7-001(b)**

Chemical	Location ID	Sample ID	Maximum Sample Value	Soil SAL ^a	Normalized Value
Noncarcinogenic Effects (mg/kg)					
Cadmium	07-4048	AAB7925	3.7	38	0.1
Copper	07-4048	AAB7925	535	2800	0.19
Lead	07-4049	AAB7927	71.3	400	0.18
Zinc	07-4048	AAB7925	557	23000	0.02
Tetryl	07-4047	0507-96-0043	49.8	650	0.08
				Total ^b :	0.6

a. SAL = screening action level

b. Total may not equal normalized values due to rounding

5.3.9 Human Health Risk Assessment

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

5.3.10 Preliminary Ecological Assessment

In cooperation with the NMED and EPA Region 6, the Laboratory ER Project is developing an approach for ecological risk assessment. Further ecological risk assessment at PRS 07-001(b) will be deferred until the site can be assessed as part of the ecological exposure unit methodology currently being developed.

5.3.11 Conclusions and Recommendations

In the RFI investigation at PRS 7-001(b), the results showed no occurrences in which SAL was exceeded and indicate no substantial release of hazardous materials at the site. The Phase I investigation was biased and focused on sampling site locations and media that would have had the greatest potential to receive and retain contaminants from previous activities. The total normalized MCE of 0.6, which is based on the residential exposure scenario and maximum site-contaminant concentrations, indicates that the site presents little potential for unacceptable human health effects.

The site is, therefore, recommended for NFA. This recommendation is based on the NFA criterion 4 (Los Alamos National Laboratory, Environmental Restoration Department, Project Consistency Team Policy number 015) that 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 will be requested to remove this site from the HSWA Module of the Laboratory's RCRA operating permit.

5.3.12 Sampling and Analysis Plan for PRS 7-001(b)

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

5.4 Potential Release Site - 07-001(c)

PRS 07-001(c), shown in Figure 5.2-1, is an inactive firing site. The site is not associated with any former buildings or structures. During preliminary site investigations, lead disks with imbedded bullets were found in the area. This PRS is recommended for NFA.

5.4.1 History

This PRS is discussed in further detail in Section 5.4 of the RFI Work Plan for OU 1111 (LANL 1993, 26068).

PRS 7-001(c) is a small amphitheater-like area located approximately 600 ft east-southeast of PRS 7-001(a) and 380 ft east of PRS 07-001(b). Soft metal disks (presumably lead) imbedded with bullets were found in the area, and it is possible that ballistic tests were carried out at 7-001(c) related to the development of nuclear initiators. The site may have been used briefly to study ballistic initiation of critical mass through the study of projectiles fired at lead plates. Full testing of initiators was considered sufficiently hazardous that an enclosed facility was built elsewhere for this purpose. The site probably was not used for explosives testing; thus, it is unlikely that any site contamination would be widely dispersed. The primary COPCs at the site are metals and, specifically, lead. Site contamination would have resulted from fragmentation and weathering of ballistic test materials left at the site. Metals, HE, and radionuclides were selected as potential contaminants for evaluation at the PRS.

5.4.2 Description

No further site-specific information on geology, hydrology, soils, or wildlife habitat associated with this PRS is required. General area geology, hydrology, soils, or wildlife habitat information associated with this PRS is presented in Chapter 2.

5.4.3 Previous Investigation(s)

No previous investigations have been performed at this site.

5.4.4 Field Investigation

The conceptual model for the site recognized the potential fragmentation and surface distribution of metals at the site during the ballistic testing, with subsequent oxidation and weathering of materials left discarded at the site. The objective of the investigation was to determine if surficial soils contain unacceptable levels of contamination by field screening and sampling of soils in the immediate vicinity of lead fragments remaining at the site. The field investigation of 7-001(c) was a reconnaissance-level effort that included the collection of biased, judgmental soil samples in proximity to observed metal disks or fragments. A metal detector was used to locate surface and buried metal debris followed by surface soil sampling adjacent to the metal debris.

Activities at the site were completed on 24 August 1994. Three surface soil samples (0-0.5 ft) were collected at locations (07-4053 through 07-4055) containing pieces of metal debris where contaminants were judged most likely to be present. One location, 07-4053 was adjacent to a metal disc that apparently had a projectile fired into it (Figure 5.2-1). Samples were submitted for gamma spectrometry (Cs-137) and metals, isotopic uranium, HE, and Sr-90 analyses. Table 5.4.4-1 presents a summary of samples collected at this PRS.

All sample locations were field screened for radioactivity, organic vapors, and HE prior to sample collection. All field screening results were negative or at background levels.

**TABLE 5.4.4-1
SUMMARY OF SAMPLES TAKEN**

Location ID	Sample ID	Depth (ft)	Media	High Explosives*	Inorganic Chemicals*	Radionuclides*
07-4053	AAB7934	0-0.5	SOIL	18842	18983	19118
07-4054	AAB7935	0-0.5	SOIL	18842	18983	19118
07-4055	AAB7936	0-0.5	SOIL	18842	18983	19118

* Request number

5.4.5 Evaluation of Inorganic Chemicals

Table 5.4.5-1 presents a summary of inorganic chemicals at reported levels that exceed Laboratory-background UTL. However, the data are usable for site-specific decisions. As stated in Section 4.1.10, the data for all metals and cyanide may be used as reported with the understanding that the potential for low bias exists for chromium, mercury, and cyanide. The reported results for these chemicals are sufficiently below their screening level that the potential bias would not alter the screening result. The results of the MCE calculation are summarized in Table 5.4.8-1.

The results of inorganic analyses at the site indicate that lead was present in two soil samples at levels that exceed Laboratory-background UTL (Figure 5.4.5-1). No additional statistical evaluation of the results was performed, and lead was identified as a COPC for further evaluation.

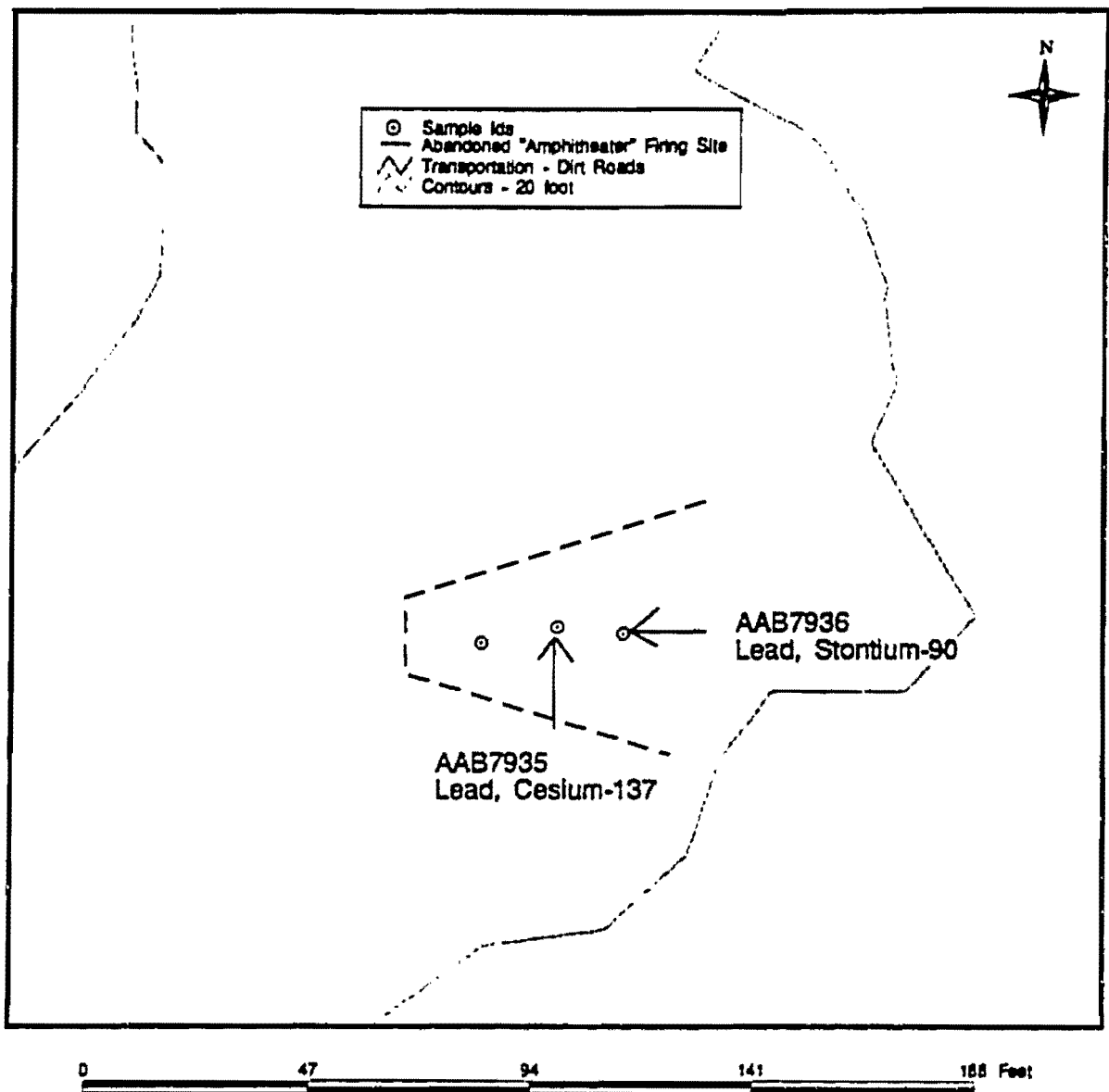


Figure 5.4.5-1. Locations of analytes that exceed background (UTLs and EGLs) and/or that exceed SALs at PRS 07-001(c).

Antimony was not detected in any samples, but the reporting levels exceed background UTL. This elevated reporting limit is a function of the analytical method; antimony was not operationally associated with the site and was eliminated from further consideration. A summary of the lead concentrations that exceed of background UTL is presented in Table 5.4.5-1.

5.4.6 Evaluation of Radionuclides

Radionuclides with activities above background screening values are presented in Table 5.4.6-1 and plotted on Figure 5.4.5-1. However, the data are usable for site-specific decisions. As stated in Section 4.2.10, none of the radionuclide data require qualification, although a potential for a slight high bias has been identified for Cs-137.

**TABLE 5.4.5-1
INORGANIC CHEMICALS WITH CONCENTRATIONS AT OR ABOVE
BACKGROUND SCREENING VALUES FOR PRS 7-001(c)**

Sample ID	Depth (ft)	Lead (mg/kg)
SAL	N/A ^b	400
soil UTL ^a	N/A ^b	23.3
AAB7934	0-0.5	21
AAB7935	0-0.5	96.5
AAB7936	0-0.5	28.4

a. Upper tolerance limit of Laboratory-wide soil background data from A, B, and C horizons

b. N/A = not applicable

Radionuclide analyses indicate that Cs-137 and Sr-90 were present at two sampling locations at levels that slightly exceed reported background levels. No additional statistical evaluation of the data set occurred and, although the results are probably within the range of Laboratory background, these radionuclides were identified as COPCs for further evaluation.

**TABLE 5.4.6-1
RADIONUCLIDES WITH CONCENTRATIONS AT OR ABOVE BACKGROUND
SCREENING VALUES FOR PRS 7-001(c)**

Sample ID	Depth (ft)	Cesium-137 (pCi/g)	Strontium-90 (pCi/g)
SAL	N/A ^b	5.1	4.4
Soil UTL ^a	N/A ^b	1.4 ^c	1 ^c
AAB7934	0-0.5	0.166	0.15
AAB7935	0-0.5	1.491	-0.58
AAB7936	0-0.5	1.097	1.15

a. Upper tolerance limit of Laboratory-wide background data from A, B, and C horizons.

b. N/A = not applicable

c. Maximum detected background value from Environmental Monitoring data

5.4.7 Evaluation of Organic Constituents

No VOCs or SVOCs were identified for analysis at this PRS. Samples were collected for HE analysis, and no HE was reported above the EQL in any sample. All HE analyses associated with this PRS exceeded analytical holding time. However, as stated in Section 4.3.10, all QC results for HE analytical samples were acceptable, and the HE data are usable as reported. Therefore, no organic chemicals were identified as COPCs for this PRS.

5.4.8 Risk-Based Screening Assessment

Lead was observed in two of three samples at levels that exceed Laboratory-background UTL of 23.3 mg/kg. Neither sample contained lead at a concentration that exceeded the lead SAL of 400 mg/kg, and no further evaluation of this single inorganic chemical is required. No inorganic COPCs are identified for the site.

Cesium-137 and Strontium-90 were detected in individual site samples at activities that slightly exceed reported background levels. Neither sample's maximum activity for cesium or strontium exceeded its associated SAL of 5.1 or 4.4 pCi/g, respectively. MCE for these maximum radionuclide activities result in a total normalized value of 0.6 for radiological effects, shown below in Table 5.4.8-1.

**TABLE 5.4.8-1
MULTIPLE CHEMICAL EVALUATION FOR SOIL SAMPLES AT PRS 7-001(c)**

Chemical	Location ID	Sample ID	Maximum Sample Value	Soil SAL ^a	Normalized Value
Carcinogenic Effects of Radionuclides (pCi/g)					
Cesium-137	07-4054	AAB7935	1.491	5.1	0.29
Strontium-90	07-4055	AAB7936	1.15	4.4	0.26
				Total ^b :	0.6

a. SAL = screening action level

b. Total may not equal normalized values due to rounding

5.4.9 Human Health Risk Assessment

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

5.4.10 Preliminary Ecological Assessment

In cooperation with the NMED and EPA Region 6, the Laboratory ER Project is developing an approach for ecological risk assessment. Further ecological risk assessment at PRS 07-001(c) will be deferred until the site can be assessed as part of the ecological exposure unit methodology currently being developed.

5.4.11 Conclusions and Recommendations

The sample locations chosen at this PRS were selected based on field screening with metal detectors and field team observation. These should reasonably represent the maximum expected contaminant concentrations existing at the site. No inorganic contaminants were reported greater than SAL, and no HE constituents were reported from any site samples. Two radionuclides, Cs-137 and Sr-90, were reported at the site with activities that are 6 to 15% greater than Laboratory Environmental surveillance data maximum values. There is no established background UTL for these radionuclides, but within the limitations of this Phase I investigation, it is not unreasonable to believe that these represent background and are not indicative of a local release.

Regardless, the conservative total normalized MCE calculation for radiologic effects of 0.6 indicates that the site poses no unacceptable human health risk, and the site is recommended for NFA. This recommendation is based on the NFA criterion 4 (Los Alamos National Laboratory, Environmental Restoration Department, Project Consistency Team Policy number 015) that 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 will be requested to remove this site from the HSWA Module of the Laboratory's RCRA operating permit.

5.4.12 Sampling and Analysis Plan for PRS 07-001(c)

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

5.5 Potential Release Site - 07-001(d)

PRS 07-001(d) is an inactive firing site that is not associated with any present buildings or structures. No HE contaminants were observed at the site. One inorganic chemical, copper, was reported at concentrations that exceed Laboratory-background UTL. This PRS is recommended for no further action.

5.5.1 History

PRS 07-001(d) is discussed in further detail in Section 5.4.1 of the RFI Work Plan for OU 1111 (LANL 1993, 26068).

PRS 7-001(d) is a large crater located about 120 ft south of PRS 07-001(c) and about 360 ft east-southeast of PRS 07-001(b) (Figure 5.2-1). This crater is approximately 20 ft in diameter and 3-ft deep and may have been formed by explosives testing. Detonator parts have been found in the vicinity of the crater. No additional operational history is documented in the work plan for this PRS. Informal verbal history at the Laboratory indicates that the site probably was the location of a one-time "celebratory shot" upon the occasion of the Japanese surrender in 1945. The activities at this site have resulted in the identification of metals, HE, and radionuclides as potential contaminants.

5.5.2 Description

No further site-specific information on geology, hydrology, soils, or wildlife habitat associated with this PRS is required. General area geology, hydrology, soils, or wildlife habitat information associated with this PRS is presented in Chapter 2.

5.5.3 Previous Investigation(s)

No previous investigations have been performed at this site.

5.5.4 Field Investigation

The field activities at this PRS were Phase I reconnaissance type investigations biased toward sampling media in areas most likely to be contaminated from past activities. The objective was to determine if chemicals are present at the firing site at levels that exceed background and/or SAL and present an unacceptable human health risk.

The conceptual release model for this PRS is consistent with firing-site activities where it is assumed that an explosive or combustive release of material occurred at the site. Any released material would be expected to be concentrated at the center of the site and diminish radially. It is also assumed that residual contaminants, if present, would be retained in the surficial soils due to their relative insolubility (metals fragments, organics) and affinity for the fine organic soil fraction at the surface.

The sampling plan provided general guidance and specified the collection of soil samples at two intervals, surface soil and subsurface soil (3 ft or at the tuff/soil interface). Final sampling locations were selected by field personnel in areas where

contaminants were judged most likely to be present based on physical conditions and field screening.

Activities at the site were completed on 29 August 1994. Sample locations, shown in Figure 5.2-1, were selected to be in areas where contaminants were judged most likely to be present. Surface soil samples (0-0.5 ft) and subsurface soil (hand auger borings to 2-3 ft) at locations 07-4062 through 07-4064 were collected from the central part of the firing site (within a 10-ft radius). The perimeter area, 10 ft beyond the crater, was divided into three equal sectors, and one sample location was installed in each sector. The perimeter locations, 07-4065 through 07-4067, were sampled at the surface (0-0.5 ft) and at depth of 2 to 3 ft. Samples were submitted for gamma spectrometry and metals, isotopic uranium, and HE analyses. Table 5.5.4-1 presents a summary of samples taken for this PRS.

All sample locations were field screened for radioactivity, organic vapors, and HE prior to sample collection. All field screening results were negative or at background levels.

**TABLE 5.5.4-1
SUMMARY OF SAMPLES TAKEN**

Location ID	Sample ID	Depth (ft)	Media	High Explosives*	Inorganic Chemicals*	Radionuclides*
Firing Pad Center						
07-4062	AAB7937	0-0.5	soil	18842	18983	19118
07-4062	AAB7938	2-3	soil	18842	18983	19118
07-4063	AAB7939	0-0.5	soil	18842	18983	19118
07-4063	AAB7940	2-3	soil	18842	18983	19118
07-4064	AAB7941	0-0.5	soil	18842	18983	19118
07-4064	AAB7942	0-0.5	soil	18842	18983	19118
07-4064	AAB7943	2-3	soil	18842	18983	19118
Firing Pad Perimeter						
07-4065	AAB7944	0-0.5	soil	18842	18983	19118
07-4065	AAB7945	2-3	soil	18842	18983	19118
07-4066	AAB7946	0-0.5	soil	18842	18983	19118
07-4066	AAB7947	2-3	soil	18842	18983	19118
07-4067	AAB7948	0-0.5	soil	18842	18983	19118
07-4067	AAB7949	2-3	soil	18842	18983	19118

* Request number

5.5.5 Evaluation of Inorganic Chemicals

A summary of inorganic chemicals reported at concentrations greater than background screening levels is presented in Table 5.5.5-1 and plotted in Figure 5.5.5-1. However, the data are usable for site-specific decisions. As stated in Section 4.1.11, the data for all metals and cyanide may be used as reported with the understanding that the potential for low bias exists for chromium, mercury, and cyanide. The reported results for these chemicals are sufficiently below their screening level that the potential bias would not alter the screening decision.

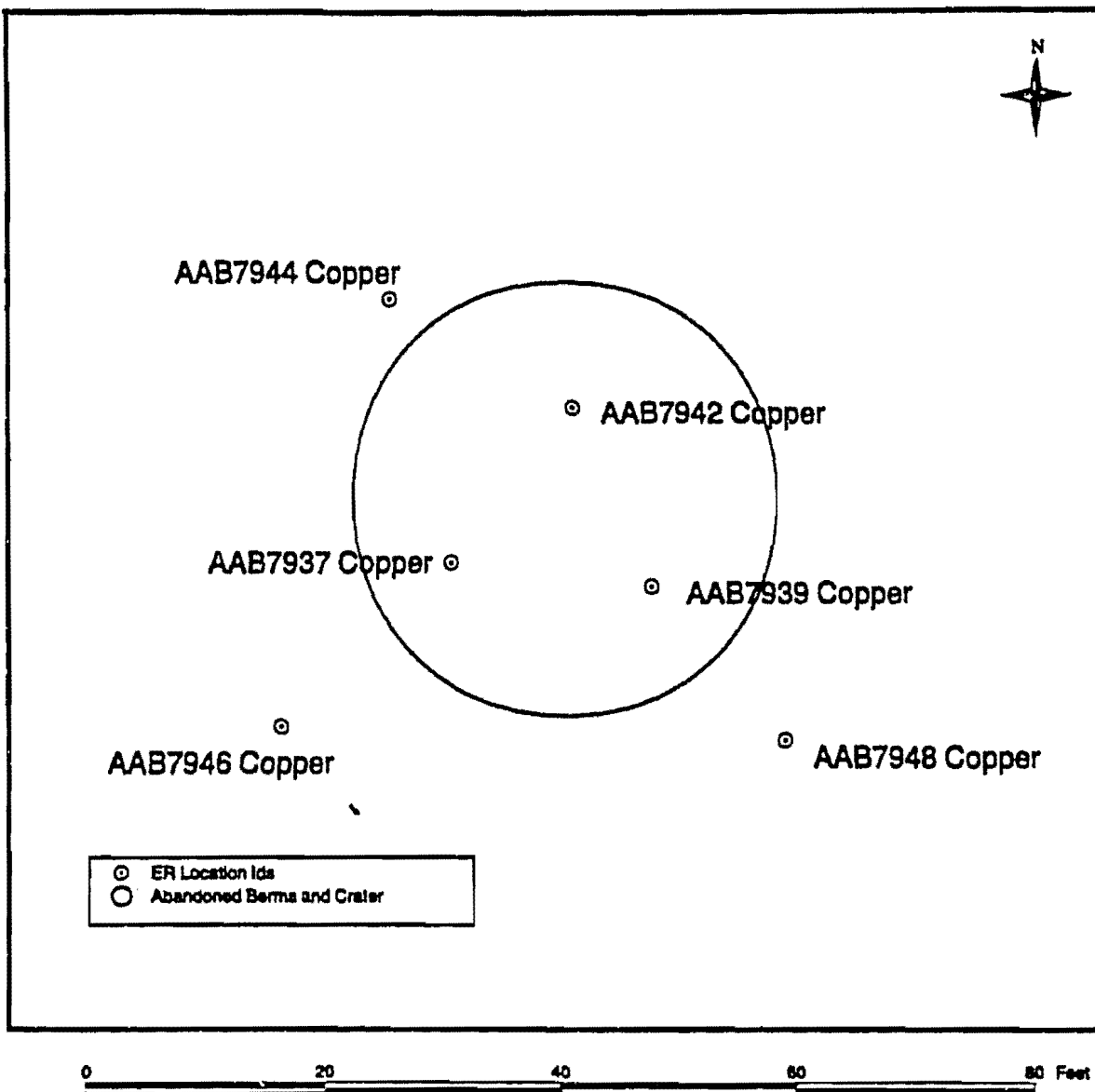


Figure 5.5.5-1. Locations of analytes that exceed background (UTLs and EGLs) and/or that exceed SALs at PRS 07-001(d).

Antimony was not detected in any samples, but the reporting limit exceeds background UTL. This elevated reporting limit is a function of the analytical method; antimony was not operationally associated with the site and was eliminated from further consideration.

One inorganic constituent, copper, was reported in site samples at concentrations that exceed background UTL. No additional statistical evaluation of the results was performed, and copper was identified as a COPC for further evaluation.

**TABLE 5.5.5-1
INORGANIC CHEMICALS WITH CONCENTRATIONS AT OR ABOVE
BACKGROUND SCREENING VALUES FOR PRS 7-001(d)**

Sample ID	Depth (ft)	Copper (mg/kg)
SAL	N/A ^a	2800
Soil UTL ^a	N/A ^a	15.5
Firing Pad Center		
AAB7937	0-0.5	16.1
AAB7938	2-3	9.6
AAB7939	0-0.5	61.1
AAB7939D	0-0.5	NA ^b
AAB7940	2-3	14.4
AAB7941	0-0.5	14.3
AAB7942	0-0.5	16
AAB7943	2-3	6.1
Firing Pad Perimeter		
AAB7944	0-0.5	82.6
AAB7945	2-3	10.7
AAB7946	0-0.5	32.8
AAB7946D	0-0.5	32
AAB7947	2-3	8
AAB7948	0-0.5	85.3
AAB7948D	0-0.5	NA
AAB7949	2-3	9.1

a. Upper tolerance limit of Laboratory-wide soil background data from A, B, and C horizons.

b. NA = not analyzed. N/A = not applicable

5.5.6 Evaluation of Radionuclides

No radionuclides were reported at this site with activities that exceed Laboratory-background UTL for U-234, U-235, and U-238, or the Laboratory Environmental Surveillance data maximum detected background activity for Sr-90 and Cs-137. As stated in Section 4.2.11, none of the data require qualification, and the potential high bias for Cs-137 would not alter the screening decision. Therefore, no radiological COPCs were identified for further evaluation at this PRS.

5.5.7 Evaluation of Organic Chemicals

All HE analyses for site samples exceeded analytical holding times. However, these results have undergone focused validation and, as stated in Section 4.3.11, all QC results are acceptable, and the HE data were determined to be usable for the decisions

required at this site. No HE contaminants were reported at levels that exceed their EQL, and no organic COPCs were identified for further evaluation at this PRS.

5.5.8 Risk-Based Screening Assessment

No chemicals were reported at concentrations that exceed their associated SAL. The only chemical reported above Laboratory-background UTL at the site was copper. Because only one chemical was reported above background, no MCE is required in the evaluation of this site, and no COPCs were identified for this PRS.

5.5.9 Human Health Risk Assessment

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

5.5.10 Preliminary Ecological Assessment

In cooperation with the NMED and EPA Region 6, the Laboratory ER Project is developing an approach for ecological risk assessment. Further ecological risk assessment at PRS 07-001(d) will be deferred until the site can be assessed as part of the ecological exposure unit methodology currently being developed.

5.5.11 Conclusions and Recommendations

This site was characterized according to the sampling design detailed in the RFI Work Plan for OU 1111. The design focused on sampling site media and locations that the conceptual model indicated had the highest probability of containing residual contamination. No contaminants were reported at levels that exceed SAL, and, qualitatively, the sampling results indicate that the site is virtually uncontaminated. The only constituent reported above Laboratory-background UTL was copper, which is an essential human nutrient with low specific toxicity. Although all HE analyses exceeded analytical holding time, a focused validation indicates that the data are usable. No HE was reported in any sample taken, and further analysis or resampling of the site is not warranted based on the low overall degree of contamination present and the current understanding of the site.

No human health COPCs 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) that 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 will be requested to remove this site from the HSWA Module of the Laboratory's RCRA operating permit.

5.5.12 Sampling and Analysis Plan for PRS 07-001(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.

5.6 Potential Release Site - 06-003(c)

PRS 06-003(c), shown in Figure 5.6-1, is an inactive firing site located just south of Two-Mile Mesa Road about 1800 ft west of PRS 06-003(a). Contaminants reported at the site include inorganics chemicals (arsenic, lead, and zinc), radionuclides (U-234, U-235, and U-238), and one organic compound (dinitrobenzene). This PRS is recommended for NFA.

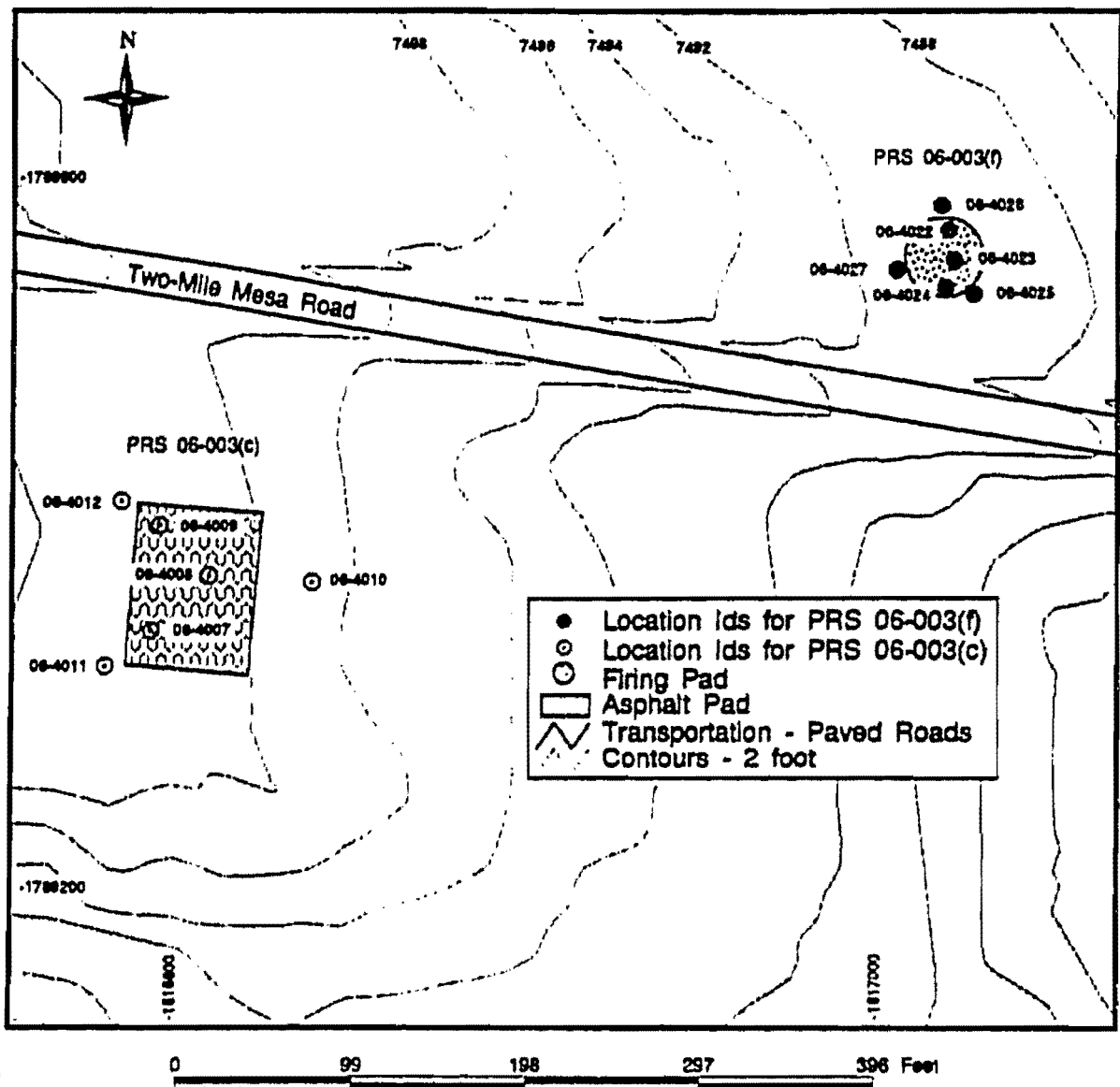


Figure 5.6-1. Locations of PRSs 06-003(c) and 06-003(f) samples.

5.6.1 History

This PRS is discussed in further detail in Section 5.4 of the RFI Work Plan for OU 1111 (LANL 1993, 26068).

PRS 6-003(c) is an asphalt pad, approximately 40 ft by 60 ft, with a rectangular concrete-lined pit (2 ft by 5 ft by 2-ft deep) located toward the east side (LANL 1993, 26068). Water recovery shots using depleted uranium and nonradioactive cobalt as tracers were probably carried out at the asphalt pad during the summer of 1944. In these tests, explosive shots were detonated in a container of water on the pad. The water was intended to slow metal fragments and minimize dispersion of test components. The concrete-lined pit may have been used to catch metal fragments when the pad was washed down after a shot. There are metal plates on top of the asphalt; the asphalt is now cracked and deteriorating; the pit contains metal and wood debris. Some of the concrete around the edge of the pit is reported to have been chiseled away, possibly in an attempt to remove contaminants (LANL 1993, 26068).

However, during field visits, there was no indication of chiseling found. Rather, irregularities in the concrete appear to be the result of weathering and general deterioration.

5.6.2 Description

No further site-specific information on geology, hydrology, soils, or wildlife habitat associated with this PRS is required. General area geology, hydrology, soils, or wildlife habitat information associated with this PRS is presented in Chapter 2.

5.6.3 Previous Investigation(s)

The pad was monitored in 1978 and found to contain 3- to 6-times background uranium (LANL 1993, 26068). A part of the pad was monitored with a highly sensitive alpha radiation detector during the summer of 1993 (LANL 1993, 26068). Previous radiation measurements show low levels of uranium and Cs-137 present on the asphalt.

5.6.4 Field Investigation

The objective of the investigation at PRS 06-003(c) was to determine if COPCs are present at the inactive firing site and surrounding media at levels that exceed background and/or SALs and present an unacceptable risk at the site. Reconnaissance sampling was performed to characterize the site based on the conceptual release model of a firing site that recognizes the explosive release of particulates and fragments. It is assumed that the released materials would decrease in concentration with increasing distance, particularly since the tests were designed to contain and recover materials from the firing-pad area.

The field sampling activity at PRS 6-003(c) was completed on 10 August 1994. Sample locations, shown in Figure 5.6-1, were selected in areas where contaminants were judged most likely to be present based on screening instrumentation and field observation. Three locations (06-4007 through 06-4009) were sampled from within the area of the asphalt pad: location 06-4007 near the concrete pit, location 06-4008 under one metal plate, and location 06-4009 from the area that had previously been identified as having high alpha-count rates (LANL 1993, 26068). The 0-0.5 ft surface samples at these locations consisted of a mixture of soil and deteriorating asphalt material. Subsurface soils at the 2- to 3-ft interval were also collected. An additional three locations (06-4010 through 06-4012) were sampled from within a 10-ft perimeter of the asphalt pad. The perimeter was divided into three equal sectors, and one location was sampled in each sector. Perimeter soil samples were collected at two intervals, 0-0.5 ft and 2-3 ft. A metal detector survey was used to further define sample locations within the perimeter area, and samples were taken from areas that indicated magnetic anomalies.

Soil samples were submitted for gamma spectrometry and isotopic uranium, metals, and HE analyses. Table 5.6.4-1 presents a summary of samples taken at PRS 6-003(c).

All sample locations were field screened for radioactivity, organic vapors, and HE prior to sample collection. All field screening results were negative or at background levels.

**TABLE 5.6.4-1
SUMMARY OF SAMPLES TAKEN**

Location ID	Sample ID	Depth (ft)	Media	High Explosives*	Inorganic Chemicals*	Radionuclides*
Firing Pad						
06-4007	AAB7849	0-0.5	soil	18504	18523	18979
06-4007	AAB7850	2-3	soil	18504	18523	18979
06-4008	AAB7851	0-0.5	soil	18504	18523	18979
06-4008	AAB7852	2-3	soil	18504	18523	18979
06-4009	AAB7853	0-0.5	soil	18504	18523	18979
06-4009	AAB7854	2-3	soil	18504	18523	18979
Firing Pad Perimeter						
06-4010	AAB7855	0-0.5	soil	18504	18523	18979
06-4010	AAB7856	2-3	soil	18504	18523	18979
06-4011	AAB7857	0-0.5	soil	18504	18523	18979
06-4011	AAB7858	2-3	soil	18504	18523	18979
06-4012	AAB7859	0-0.5	soil	18504	18523	18979
06-4012	AAB7860	2-3	soil	18504	18523	18979
06-4012	AAB7861	2-3	soil	18504	18523	18979

* Request numbers

5.6.5 Evaluation of Inorganic Chemicals

Table 5.6.5-1 presents a summary of inorganic chemicals reported for the PRS at concentrations at or above background screening values. Figure 5.6.5-1 plots their locations. The qualifiers shown in the table have been assigned during baseline data validation. However, the data are usable for site decisions. As stated in Section 4.1.4 (referenced to Section 4.1.3), all (inorganics) data under Request Number 18523 may be used as reported.

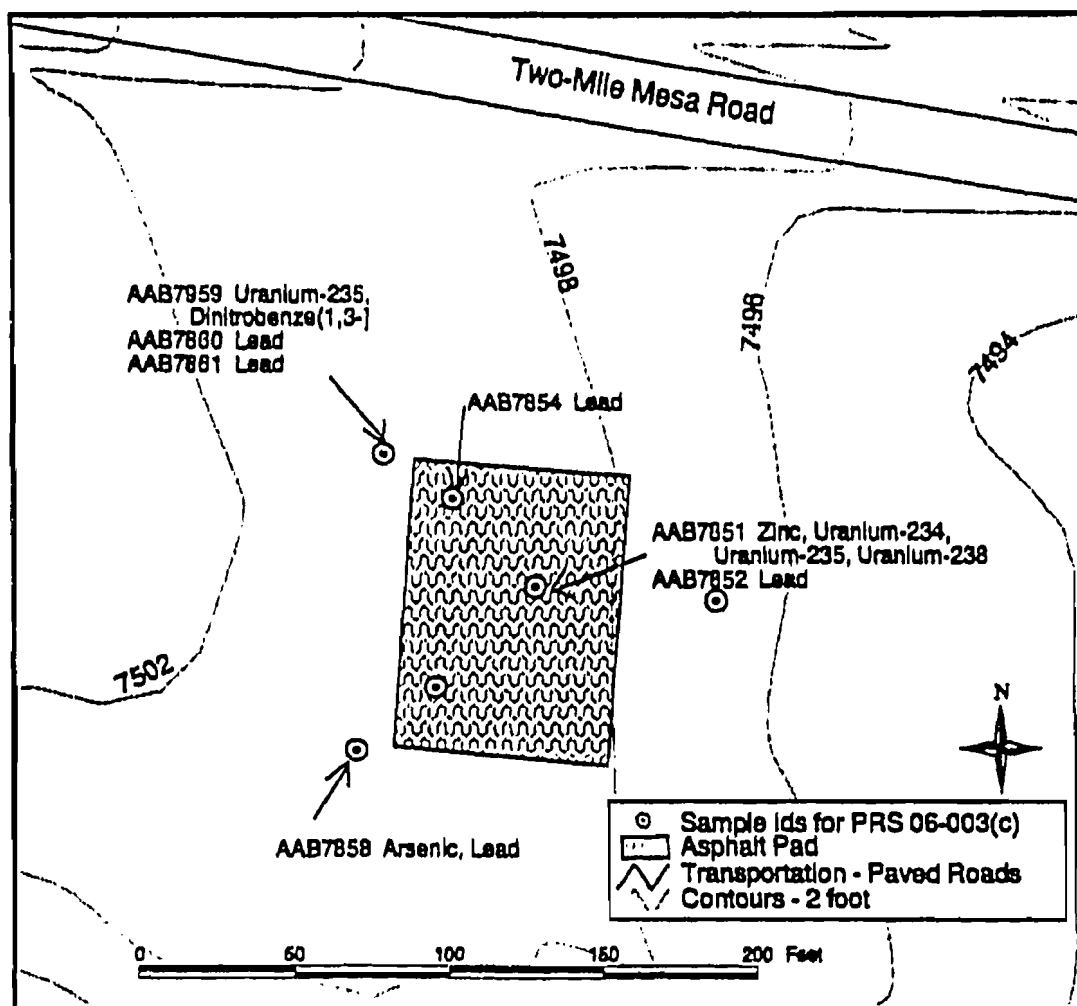


Figure 5.6.5-1. Locations of analytes that exceed background (UTLs and EQLs) and/or that exceed SALs at PRS 06-003(c).

Three inorganic chemicals, arsenic, lead, and zinc, were reported in at least one site sample at a concentration that exceeds Laboratory-background UTL. Arsenic was reported in one subsurface sample taken from the firing-pad perimeter at a concentration greater than background. Arsenic has no established SAL because its calculated SAL is less than Laboratory background. The maximum and single reported arsenic value greater than background would correspond to a risk of $3.5E-5$ relative to the Laboratory-background arsenic risk of $2.0E-5$ (Table 3.3.1-1). This is within the range of acceptable cancer risk recognized in EPA guidance. Arsenic was eliminated from further consideration at the site because arsenic is not operationally associated with the site, was reported above background at a low frequency (one out of fourteen samples), and is not substantially greater than background.

Zinc was reported in one surface sample taken on the pad at a level that is less than 2% greater than its Laboratory-background UTL and is probably within the range of background, although no statistical testing against a background distribution was performed. Lead was the only inorganic chemical that was found to exceed background in more than one site sample. Therefore, lead and zinc were identified as COPCs for further evaluation.

**TABLE 5.6.5-1
INORGANIC CHEMICALS WITH CONCENTRATIONS AT OR ABOVE
BACKGROUND SCREENING VALUES FOR PRS 6-003(c)**

Sample ID	Depth (ft)	Arsenic (mg/kg)	Lead (mg/kg)	Zinc (mg/kg)
SAL	N/A ^a	N/A	400	23000
Soil UTL ^a	N/A ^a	7.82	23.3	50.8
Firing Pad				
AAB7849	0-0.5	<0.4	1(J)	6.9
AAB7850	2-3	3.1	22.6(J)	31.6
AAB7851	0-0.5	<1.1	7.8(J)	51.5
AAB7852	2-3	4.3	28.9(J)	26.9
AAB7853	0-0.5	<0.97	7.8(J)	19.2
AAB7854	2-3	7.5	52.7(J)	41
Firing Pad Perimeter				
AAB7855	0-0.5	3.9	17(J)	29.7
AAB7856	2-3	2.5	10.7(J)	20.3
AAB7857	0-0.5	2.5	13.8(J)	21.8
AAB7858	2-3	13.6	63.4(J)	34.7
AAB7859	0-0.5	<2.1	12.1(J)	26.9
AAB7859D	0-0.5	4.2	19	26.4
AAB7860	2-3	<4.6	42.8(J)	37.4
AAB7861	2-3	<5.7	159(J)	37.7

a. Upper tolerance limit of Laboratory-wide soil background data from A, B, and C horizons.

b. NA = not analyzed. N/A = not applicable.

5.6.6 Evaluation of Radionuclides

Table 5.6.6-1 presents a summary of radionuclides reported for the PRS at concentrations at or above background screening values, and Figure 5.6.5-1 plots their locations. The qualifiers shown in the table have been assigned during baseline data validation. However, the data are usable for site decisions.

Uranium isotopes, U-234, U-235, and U-238, were reported with activities greater than background UTL in one surface sample taken from within the area of the asphalt pad. This sample was analyzed in duplicate by the laboratory, and U-234 was reported in one duplicate at an activity slightly greater than SAL. Uranium-235 was also reported in one sample taken from the outer perimeter of the pad at an activity that is just slightly above background UTL. This surface sample (AAB7859), located off the firing pad, reported a U-235 activity of 0.086 pCi/g, which is only slightly above and probably not different from background UTL, although no statistical analysis of this limited data set was performed.

TABLE 5.6.6-1
RADIONUCLIDES WITH CONCENTRATIONS AT OR ABOVE BACKGROUND
SCREENING VALUES FOR PRS 6-003(c)

Sample ID	Depth (ft)	Uranium-234 (pCi/g)	Uranium-235 (pCi/g)	Uranium-238 (pCi/g)
SAL	N/A ^a	13	10	67
Soil UTL ^a	N/A ^a	1.94	0.084	1.82
Firing Pad				
AAB7849	0-0.5	0.854(J)	0.045	0.867(J)
AAB7850	2-3	0.831(J)	0.038	0.901(J)
AAB7851	0-0.5	12.234(J)	0.475	11.847(J)
AAB7851D	0-0.5	14.3	0.676	14.196
AAB7852	2-3	0.863(J)	0.036	0.975(J)
AAB7852D	2-3	0.937	0.043	0.971
AAB7853	0-0.5	0.977(J)	0.038	1.018(J)
AAB7853D	0-0.5	NA	NA	NA
AAB7854	2-3	0.554(J)	0.025	0.698(J)
Firing Pad Perimeter				
AAB7855	0-0.5	1.302(J)	0.043	1.426(J)
AAB7856	2-3	0.502(J)	0.041	0.577(J)
AAB7857	0-0.5	0.964(J)	0.052	1.149(J)
AAB7858	2-3	0.664(J)	0.034	0.642(J)
AAB7859	0-0.5	1.376(J)	0.086	1.574(J)
AAB7859D	0-0.5	NA	NA	NA
AAB7860	2-3	0.664(J)	0.034	0.673(J)
AAB7861	2-3	0.637(J)	0.038	0.75(J)
AAB7861D	2-3	NA	NA	NA

a. Upper tolerance limit of Laboratory-wide soil background data from A, B, and C horizons.

b. NA = not analyzed

All analyses of strontium and cesium reported activities less than the maximum reported background activity from the Laboratory Environmental Monitoring report, and they were eliminated from further consideration. Based on this screening, U-234, U-235, and U-238 were identified as COPCs for further evaluation.

5.6.7 Evaluation of Organic Chemicals

Table 5.6.7-1 presents a summary of organic chemicals reported for the PRS at concentrations greater than EQL, and Figure 5.6.5-1 plots the locations. The qualifier shown in the table has been assigned during baseline data validation. However, the data are usable for site decisions with the recognition that the reported concentrations are potentially biased high.

One organic compound, dinitrobenzene [1,3-], was reported in one sample at a level that exceeds its EQL. This compound is a potential transformation product of HE in soil and was identified as a COPC for further evaluation.

**TABLE 5.6.7-1
DETECTED ORGANIC CHEMICALS FOR PRS 06-003(c)**

Sample ID	Depth (ft)	Dinitrobenzene [1,3-] (mg/kg)
SAL	NA ^a	6.5
EQL	NA ^a	0.25
Firing Pad Perimeter		
AAB7859	0-0.5	0.54(J)

a. NA = not analyzed.

5.6.8 Risk-Based Screening Assessment

Table 5.6.8-1 presents a summary of radionuclides reported for the PRS at concentrations above SAL. The qualifiers shown in the table have been assigned during baseline data validation. However, the data are usable for site decisions.

**TABLE 5.6.8-1
PRS 06-003(c) RADIONUCLIDES WITH CONCENTRATIONS IN SOIL GREATER THAN SALs**

Sample ID	Location ID	Depth (ft)	Uranium-234 (pCi/g)
SAL	N/A ^a	N/A ^a	13
Firing Pad			
AAB7849	06-4007	0-0.5	0.854(J)
AAB7850	06-4007	2-3	0.831(J)
AAB7851	06-4008	0-0.5	12.234(J)
AAB7851D	06-4008	0-0.5	14.3
AAB7852	06-4008	2-3	0.863(J)
AAB7852D	06-4008	2-3	0.937
AAB7853	06-4009	0-0.5	0.977(J)
AAB7853D	06-4009	0-0.5	NA
AAB7854	06-4009	2-3	0.554(J)
Firing Pad Perimeter			
AAB7855	06-4010	0-0.5	1.302(J)
AAB7856	06-4010	2-3	0.502(J)
AAB7857	06-4011	0-0.5	0.964(J)
AAB7858	06-4011	2-3	0.664(J)
AAB7859	06-4012	0-0.5	1.376(J)
AAB7859D	06-4012	0-0.5	NA
AAB7860	06-4012	2-3	0.664(J)
AAB7861	06-4012	2-3	0.637(J)
AAB7861D	06-4012	2-3	NA

a. NA = not analyzed. N/A = not applicable

One radionuclide, U-234, was reported in one analysis from a pair of laboratory duplicates at an activity that exceeds its SAL. This sample was located on the asphalt pad. Depleted uranium was believed to have been used in tests at the site.

No organic or inorganic chemicals were reported at levels that exceed their associated SALs. However, lead, zinc, and dinitrobenzene[1,3-] have previously been identified as COPCs requiring evaluation of noncarcinogenic MCEs. In addition, total uranium was included in the MCE calculation to evaluate its noncarcinogenic toxic effects. The isotopic uranium concentrations were calculated using the maximum reported activity

and the specific activity for each isotope; the total uranium activity represents the sum of the calculated individual isotope concentrations. The total normalized MCE for noncarcinogenic effects for these constituents is 0.7.

Uranium-235 and -238 were also reported at activities less than SAL requiring multiple chemical evaluation of radiologic effects. The total normalized MCE for radiological effects of these radionuclides is 0.3. These MCE results are summarized in Table 5.6.8-2.

**TABLE 5.6.8-2
MULTIPLE CHEMICAL EVALUATION FOR SOIL SAMPLES AT PRS 6-003(C)**

Chemical	Location ID	Sample ID	Maximum Sample Value	Soil SAL ^a	Normalized Value
Noncarcinogenic Effects (mg/kg)					
Lead	06-4012	AAB7861	159	400	0.4
Uranium	06-4008	AAB7851D	42.8 ^c	230	0.2
Zinc	06-4008	AAB7850	51.5	23000	0.002
Dinitrobenzene [1,3-]	06-4012	AAB7859	0.54	6.5	0.08
				Total ^b :	0.7
Carcinogenic Effects of Radionuclides (pCi/g)					
U235	06-4008	AAB7851D	0.676	10	0.07
U238	06-4008	AAB7851D	14.196	67	0.2
				Total ^b :	0.3

a. SAL = screening action level

b. Total may not equal sum of normalized values due to rounding

c. Total uranium calculated from isotopic activity

5.6.9 Human Health Risk Assessment

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

5.6.10 Ecological Assessment

In cooperation with the NMED and EPA Region 6, the Laboratory ER Project is developing an approach for ecological risk assessment. Further ecological risk assessment at PRS 06-003(c) will be deferred until the site can be assessed as part of the ecological exposure unit methodology currently being developed.

5.6.11 Conclusions and Recommendations

PRS 6-003(c) was characterized using a biased sampling design that was weighted toward sampling media from the most potentially contaminated area of the site. The actual field sampling was further biased by the use of metal detectors and other field screening techniques to further focus sample collection in areas of potential contamination.

Based on the results of the characterization, the site appears not to have been impacted by previous activities with no widespread distribution of contaminants at levels that would result in human health risk. Lead was the only constituent reported in more than one sample at levels greater than background and contributes an MCE value of 0.4. Analysis of isotopic uranium reported U-234, U-235, and U-238 above background UTL in duplicate analysis from one sample (AAB7851) taken on the firing pad. The uranium isotopic ratios reported at the site are indicative of natural uranium, and the maximum calculated total uranium concentration for sample AAB7851D is 42.8 mg/kg. This calculated concentration was incorporated into the noncarcinogenic MCE calculation, which resulted in a total normalized value of 0.7, indicating little potential for adverse human health effects.

Uranium-234 was reported in one duplicate analysis at a level 10% greater than SAL; no other uranium isotope or radiologic constituent was reported at a level greater than SAL. The total normalized radionuclide carcinogenic MCE for constituents less than SAL is 0.3. The addition of the maximum normalized U-234 value that exceeded SAL to the total normalized radiological MCE would result in a total of 1.4. The Laboratory radiologic SALs have been established based on a target dose that is one tenth of the DOE's annual effective dose rate limit of 100 mrem/yr from all sources. Recognition of this safety factor results in a maximum site dose at 14% of the DOE limit. Along with the limited (single) observation of activity above SAL, the Laboratory SAL was exceeded by only 10%, which supports the conclusion that the site, as characterized, presents little potential for adverse human health effects.

Based on the results of the screening assessment as well as the conclusions and recommendations outlined above, no human health COPCs have been identified at 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) that 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 will be requested to remove this site from the HSWA Module of the Laboratory's RCRA operating permit.

5.6.12 Sampling and Analysis Plan for PRS 06-003(c)

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

5.7 Potential Release Site - 06-003(f)

PRS 06-003(f), shown in Figure 5.6-1, is an inactive firing site located in TA-6 on the north side of Two-Mile Mesa road approximately 1900 ft west of PRS 06-003(a). Limited inorganic contamination was observed at one location, and the site is recommended for NFA.

5.7.1 History

PRS 06-003(f) is discussed in further detail in Section 5.4 of the RFI Work Plan for OU 1111 (LANL 1993, 26068).

Experiments to determine the dispersal of material from explosions were conducted at PRS 6-003(f), a sand/gravel pad. These experiments used metal parts made of irradiated copper. After a shot, the dispersed copper fragments were located with radiation detectors, retrieved, and sent to another TA for analysis. Few shots were fired

because the radioactivity decayed too quickly, making the metal debris difficult to find. Nonradioactive cobalt was also used as a tracer.

Based on this site history, metals (from shrapnel or fragments), radionuclides, and HE were identified as potential contaminants at this site.

5.7.2 Description

No further site-specific information on geology, hydrology, soils, or wildlife habitat associated with this PRS is required. General area geology, hydrology, soils, or wildlife habitat information associated with this PRS is presented in Chapter 2.

5.7.3 Previous Investigation(s)

No previous investigations have been performed at this site.

5.7.4 Field Investigation

The objective of the investigation was to determine if contaminants are present at the site and present an unacceptable risk based on the result of background and or SAL comparison. The PRS location is a level, sparsely vegetated area surrounding a relatively circular, fine gravel pad approximately 25 ft in diameter.

The PRS sampling design was based on a conceptual release model in which an explosive release of material occurred at the site. Solid debris including metals (shrapnel) would be thrown some distance, and a dust cloud of other constituents would be formed. Generally, materials from the detonation would be deposited in decreasing concentrations away from the site center. Most contamination from shots would be uniformly distributed to unshielded areas around the pad. An objective of the tests was the recovery of metal fragments, and while recovery was never complete, it would reduce the level of residual contamination expected at the site.

Residual contamination would be expected to be retained in surface and near-surface soils.

The field sampling activities at PRS 6-003(f) were completed on 10 August 1994. Sample locations, shown in Figure 5.6-1, were selected to be in areas where contaminants were judged most likely to be present. The field investigation required the collection of samples from two soil intervals, the surface (0-0.5 ft) and the subsurface at the 2.0- to 3.0-ft. interval or soil/tuff interface, whichever was shallower. A total of six cores was collected at the PRS. Three cores (06-4022 through 06-4024) were collected from within the area of the gravel pad. A perimeter was defined extending 10 ft beyond the firing site. This perimeter was divided into three equal sectors, and at least one additional core (locations 06-4025 through 06-4027) was collected from each sector. The PRS was surveyed radiologically and with a metal detector prior to sampling. The results of these surveys aided in the selection of final sample locations for the biased sampling of the PRS.

All sample locations were field screened for radioactivity, organic vapors, and HE prior to sample collection. All field screening results were at background levels.

Table 5.7.4-1 presents a summary of samples taken for PRS 6-003(f).

**TABLE 5.7.4-1
SUMMARY OF SAMPLES TAKEN**

Location ID	Sample ID	Depth (ft)	Media	High Explosives*	Inorganic Chemicals*	Radionuclides*
Firing Pad						
064022	A AB 7862	0-0.5	soil	18664	18755	18980
064022	A AB 7863	2-3	soil	18664	18755	18980
064023	A AB 7864	0-0.5	soil	18664	18755	18980
064023	A AB 7865	1.5-2.5	soil	18664	18755	18980
064024	A AB 7866	0-0.5	soil	18664	18755	18980
064024	A AB 7867	2-3	soil	18664	18755	18980
064024	A AB 7868	2-3	soil	18664	18755	18980
Firing Pad Perimeter						
064025	A AB 7869	0-0.5	soil	18664	18755	18980
064025	A AB 7870	2-3	soil	18664	18755	18980
064026	A AB 7871	0-0.5	soil	18664	18755	18980
064026	A AB 7872	2-3	soil	18664	18755	18980
064027	A AB 7873	0-0.5	soil	18664	18755	18980
064027	A AB 7874	2-3	soil	18664	18755	18980

* Request number

5.7.5 Evaluation of Inorganic Chemicals

A summary of inorganic chemicals with concentrations at or above background screening levels is presented in Table 5.7.5-1, and the locations are plotted in Figure 5.7.5-1. The qualifiers shown in the table have been assigned during baseline data validation. However, the data are usable for site-specific decisions. As stated in Section 4.1.5, the potential for low bias in the reported data exists for silver, copper, chromium, antimony, selenium, thallium, and zinc. The arsenic data were also identified as being somewhat uncertain and possibly biased low. These analytes were infrequently reported above screening values and not substantially above screening values when reported. Therefore, the potential analytical bias is not considered to be so severe as to alter the decisions based on the data. Data for all other analytes are usable as reported.

Calcium and magnesium were reported in individual subsurface soil samples at levels slightly above, and probably not different from, Laboratory-background UTL, although no statistical evaluation was performed. These chemicals are essential human nutrients, which have no established SAL. Exposure to these maximum reported concentrations of calcium and magnesium would result in 0.3% and less than 3.0% of the Recommended Daily Allowance (RDA) for calcium and magnesium respectively. This is based on an assumed 200 mg/dy soil intake by the most sensitive population, the 0- to 12-month old infant. These constituents were, therefore, eliminated from further consideration.

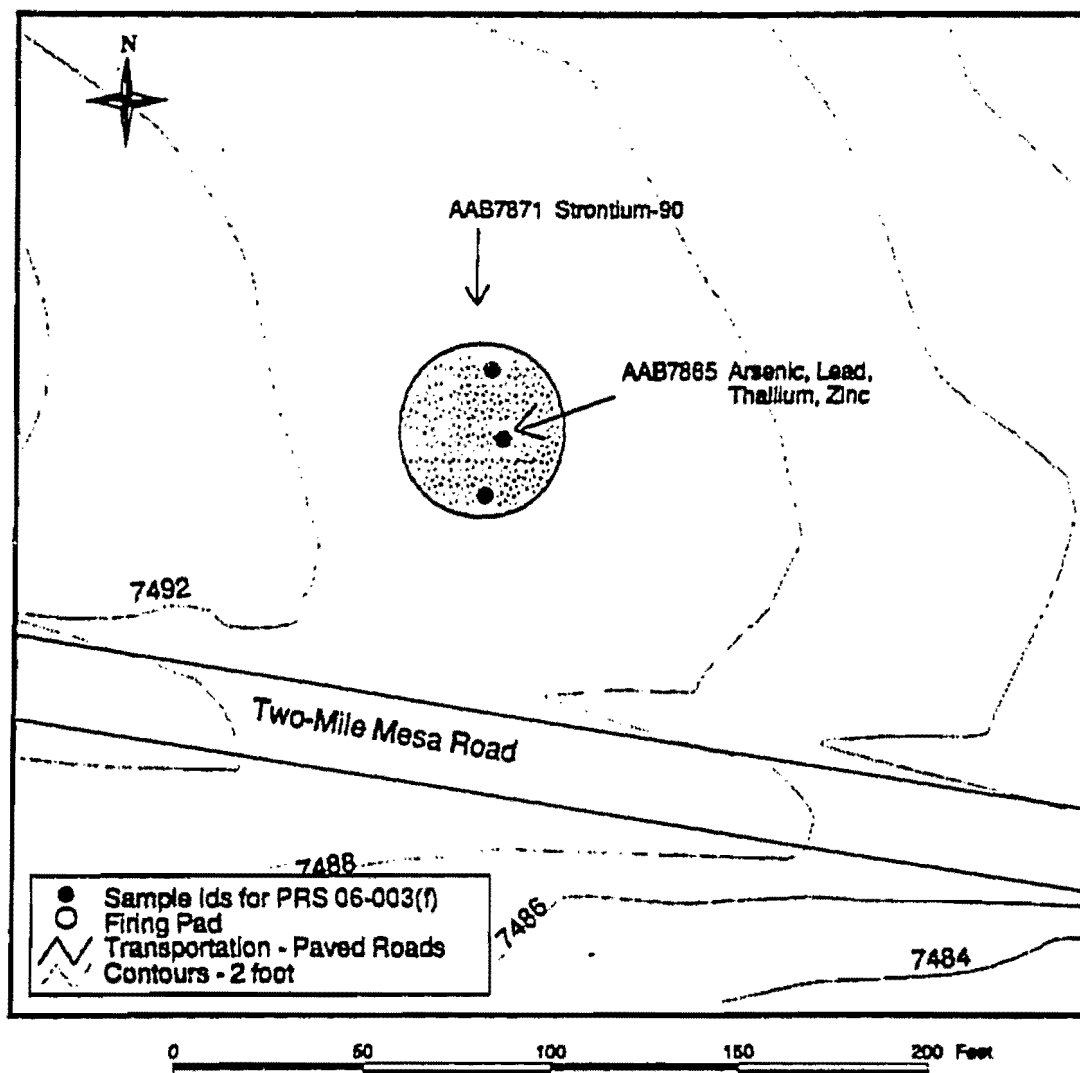


Figure 5.7.5-1. Locations of analytes that exceed background (UTLs and EQLs) and/or that exceed SALs at PRS 06-003(f).

Four additional inorganic chemicals, arsenic, lead, thallium, and zinc, were reported in one subsurface soil sample collected at the site at concentrations that exceed Laboratory-background UTL. Arsenic was reported in one sample at 9.6 mg/kg relative to its background UTL of 7.82 mg/kg. Arsenic has no established SAL because its calculated SAL is less than Laboratory background. The maximum and single reported arsenic value greater than background would correspond to a risk of $2.5E-5$ relative to the Laboratory-background arsenic risk of $2.0E-5$ (Table 3.3.1-1). This is within the range of acceptable cancer risk recognized in EPA guidance. Due to the fact that arsenic is not operationally associated with the site, was reported above background at a low frequency (one out of thirteen samples), and is not substantially greater than background, it was eliminated from further consideration at the site.

Lead, thallium, and zinc were therefore identified as COPCs for further evaluation at this site.

**TABLE 5.7.5-1
INORGANIC CHEMICALS WITH CONCENTRATIONS AT OR ABOVE
BACKGROUND SCREENING VALUES FOR PRS 6-003(f)**

Sample ID	Depth (ft)	Arsenic (mg/kg)	Lead (mg/kg)	Thallium (mg/kg)	Zinc (mg/kg)
SAL	N/A ^a	N/A	400	6.4	23000
Soil UTL ^a	N/A ^a	7.82	23.3	1	50.8
Firing Pad					
AAB7862	0-0.5	<0.56	3.8	<0.27	18.1
AAB7863	2-3	<1.7	6.9	<0.3	22
AAB7864	0-0.5	<1.1	4.2	<0.27	16.5
AAB7865	1.5-2.5	9.6	109	6.8	56.8
AAB7866	0-0.5	<0.88	4.7	<0.27	22.3
AAB7867	2-3	<1.2	3.9	<0.33	19.9
AAB7868	2-3	<1.2	3.5	<0.33	21.6
Firing Pad Perimeter					
AAB7869	0-0.5	3.4	10.4	<0.28	18.1
AAB7869D	0-0.5	NA	NA	NA	NA
AAB7870	2-3	3.3(R)	7.5	<0.63	24.4
AAB7871	0-0.5	<1.5	5.3	<0.27	15
AAB7872	2-3	2.8	10.3	<0.35	16.5
AAB7873	0-0.5	<1.6	4.6	<0.26	17.7
AAB7874	2-3	3.2	5.7	<0.4	19.4

a. Upper tolerance limit of Laboratory-wide soil background data from A, B, and C horizons.

b. NA = not analyzed N/A = not applicable

5.7.6 Evaluation of Radionuclides

A summary of radionuclides with activities at or above background screening values is presented in Table 5.7.6-1 and plotted in Figure 5.7.5-1. The qualifiers shown in the table have been assigned during baseline data validation. However, the data are usable for site-specific decisions. As reviewed in Section 4.2.5, the radionuclide data are usable with the recognition that the potential exists for slight high bias in the Sr-90 and Cs-137 results.

No sample taken at this PRS was reported with U-234, U-235, U-238, or Cs-137 activity greater than background screening levels.

Strontium-90 was reported in one surface soil sample at an activity of 1.1 pCi/g. This only slightly exceeded the maximum detected value from the Laboratory Environmental Surveillance data of 1.0 pCi/g. Further statistical analysis of the Sr-90 data is not possible because there are inadequate Laboratory-background data available for this analyte to perform distributional analysis. The single Sr-90 result that exceeded background is an estimated (J) qualified value due to the potential for high analytical bias in the result; i.e., the actual activities of Sr-90 in the site samples are probably lower than the reported activities. Due to the overall absence of activity above background for all radionuclides analyzed (gamma spectroscopy and isotopic uranium) and the very low

degree to which Sr-90 exceeded SAL in one sample, this data point is considered to be within the range of Laboratory background, and Sr-90 is eliminated from further consideration. No radionuclides are identified as COPCs for further evaluation this PRS.

TABLE 5.7.6-1
RADIONUCLIDES WITH CONCENTRATIONS AT OR ABOVE BACKGROUND
SCREENING VALUES FOR PRS 6-003(f)

Sample ID	DEPTH (ft)	Sr-90 (pCi/g)
UTL ^a	N/A ^b	1 ^c
SAL	N/A ^b	4.4
Firing Pad		
AAB7862	0-0.5	0.41(J)
AAB7863	2-3	0.07(J)
AAB7864	0-0.5	0.87(J)
AAB7864D	0-0.5	-0.08
AAB7865	1.5-2.5	0.87(J)
AAB7866	0-0.5	0.2(J)
Firing Pad Perimeter		
AAB7867	2-3	-0.32(J)
AAB7867D	2-3	-0.15
AAB7868	2-3	0.48(J)
AAB7869	0-0.5	0.06(J)
AAB7869D	0-0.5	NA
AAB7870	2-3	0.08(J)
AAB7871	0-0.5	1.1(J)
AAB7872	2-3	0.87(J)
AAB7873	0-0.5	0.91(J)
AAB7874	2-3	0.4(J)

a. Upper tolerance limit of Laboratory-wide soil background data from A, B, and C horizons.

b. N/A = not applicable

c. Maximum detected value from Environmental Surveillance data

5.7.7 Evaluation of Organic Chemicals

No VOCs or SVOCs were identified for analysis at this PRS. No organic constituents analyzed in the HE suite of chemicals were reported at levels that exceed their laboratory EQL; however, all analyses exceeded holding time. The focused data validation, summarized in Section 4.3.5, revealed further analytical quality control problems with the HE data set and concluded that it is questionable whether any analyte other than 2,4-dinitrotoluene could have been detected in the samples.

5.7.8 Risk-Based Screening Assessment

Table 5.7.8-1 summarizes the noncarcinogenic chemicals that were reported above SAL at PRS 06-003(f). Thallium was the only chemical reported above SAL at the PRS, and that occurred in a single subsurface soil sample taken within the firing pad.

TABLE 5.7.8-1
PRS 6-003(f) NONCARCINOGENS WITH CONCENTRATIONS IN SOIL WHICH EXCEED SALs

Sample ID	LOCATION ID	DEPTH (ft)	Thallium (mg/kg)
SAL	N/A ^a	N/A ^a	5.4
Firing Pad			
AAB7862	06-4022	0-0.5	<0.27
AAB7863	06-4022	2-3	<0.3
AAB7864	06-4023	0-0.5	<0.27
AAB7865	06-4023	1.5-2.5	6.8
AAB7866	06-4024	0-0.5	<0.27
AAB7867	06-4024	2-3	<0.33
AAB7868	06-4024	2-3	<0.33
Firing Pad Perimeter			
AAB7869	06-4025	0-0.5	<0.28
AAB7869D	06-4025	0-0.5	NA
AAB7870	06-4025	2-3	<0.63
AAB7871	06-4026	0-0.5	<0.27
AAB7872	06-4026	2-3	<0.35
AAB7873	06-4027	0-0.5	<0.26
AAB7874	06-4027	2-3	<0.4

a. N/A = not applicable

Three additional inorganic chemicals, arsenic, lead, and zinc, were reported in the same subsurface soil sample at concentrations that exceed background UTL but do not exceed SAL. As previously discussed in Section 5.7.5, arsenic has no established SAL and was eliminated as a COPC due to the fact that it was reported above background in only one sample. It was not reported at a concentration substantially greater than background and would not represent a substantial incremental risk when compared to Laboratory-background risk.

Lead and zinc were evaluated for noncarcinogenic MCE, and the total normalized noncarcinogenic MCE is 0.3. The results of the MCE are presented in Table 5.7.8-2.

**TABLE 5.7.8-2
MULTIPLE CHEMICAL EVALUATION FOR SOIL SAMPLES AT PRS 6-003(f)**

Chemical	Location ID	Sample ID	Maximum Sample Value	Soil SAL ^a	Normalized Value
Noncarcinogenic Effects (mg/kg)					
Lead	06-4023	AAB7865	109	400	0.3
Zinc	06-4023	AAB7865	56.8	23000	0.0
				Total:	0.3

a. SAL = screening action level

b. Total may not equal sum of the normalized values due to rounding.

5.7.9 Human Health Risk Assessment

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

5.7.10 Ecological Assessment

In cooperation with the NMED and EPA Region 6, the Laboratory ER Project is developing an approach for ecological risk assessment. Further ecological risk assessment at PRS 06-003(f) will be deferred until the site can be assessed as part of the ecological exposure unit methodology currently being developed.

5.7.11 Conclusions and Recommendations

PRS 6-003(f) has been characterized through the execution of a Phase I RFI sampling plan. Generally, the sampling design was intended to characterize biased worst case, rather than average, conditions at a relatively small, isolated firing site. Qualitatively, the existing data reveal no patterns or widespread distribution of hazardous constituents at the site.

Specifically, there are no radiologic COPCs identified at the site. Inorganic analyses determined that a single sample taken at location 06-4023 (1.5- to 2.5-ft interval), contained arsenic, lead, and zinc at levels that exceed background UTL; and thallium, which also exceeded SAL, in a single sample. No statistical analysis of the data was performed; however, zinc and arsenic are probably within the range of background based on visual inspection of the data.

A worst-case interpretation of the human health risk from these constituents would result in a carcinogenic risk, based on the maximum single observation of arsenic of 2.5E-5, relative to the natural background UTL lifetime cancer risk of 2.0E-5. Lead and zinc were reported in a single sample at levels greater than background UTL, and the noncarcinogenic MCE for these chemicals is 0.3, with lead acting as the risk driver. Thallium, a noncarcinogen, was also reported in the same sample at 6.8 mg/kg relative to the most conservative thallium SAL of 5.4 mg/kg, resulting in a normalized sample/SAL value of 1.26. While this exceeds the SAL, it does not absolutely indicate that the site presents an unacceptable human health risk due to the limited number of detected contaminants and the overall history and nature of the site. In addition, the maximum reported concentration of thallium (6.8 mg/kg) is much less than the industrial PRG of 120 mg/kg which would indicate the site presents no hazard under the most reasonable and realistic industrial future use scenario."

Final evaluation of the PRS is complicated by the outcome of the HE analysis. The focused data validation concluded that the HE data are extremely questionable and, therefore, a limiting factor in this evaluation. Generally, HE has not been detected at the firing sites investigated and evaluated in this report. PRS 06-003(f) is not dissimilar from other firing sites investigated in OU 1111. The site is small, was used for the active recovery of detonation products, and was not used extensively or for large-scale explosives testing. It is reasonable to assume that the explosives used at this site were largely consumed in the testing and that HE contamination would be similar to the levels of contamination at other sites reported here. No significant HE contamination has been found at other firing sites in this operable unit. The assumption that no substantial HE contamination is present at the PRS is supported by, and consistent with, the inorganic and radiologic results reported for the site.

The MCE calculation that forms the basis of the screening assessment utilizes SAL comparisons. The SALs are conservative and incorporate residential exposure assumptions. Furthermore, the residential SALs are based on average concentrations across an exposure unit as opposed to the evaluation of a single maximum observation in the MCE; and the SAL incorporates conservative reference dose concentrations that include significant safety and uncertainty factors in their calculation. Finally, consideration of the small total area of the site, along with the low frequency of samples (one out of thirteen) with contaminants exceeding background or SAL, supports the conclusion that the site presents no unacceptable human health risk and is recommended for NFA.

PRS 6-003(f) is recommended for NFA. This recommendation is based on the NFA criterion 4 (Los Alamos National Laboratory, Environmental Restoration Department, Project Consistency Team Policy number 015) that 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 will be requested to remove this site from the HSWA Module of the Laboratory's RCRA operating permit.

5.7.12 Sampling and Analysis Plan for PRS 06-003(f)

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

5.8 Potential Release Site - 06-003(g)

PRS 06-003(g), shown in Figure 5.8-1, is an inactive firing site and PETN recrystallization area, which is located approximately 400 ft south of building TA-6-6. Lead and copper were detected above SAL at locations sampled on the firing pad. This PRS is recommended for NFA.

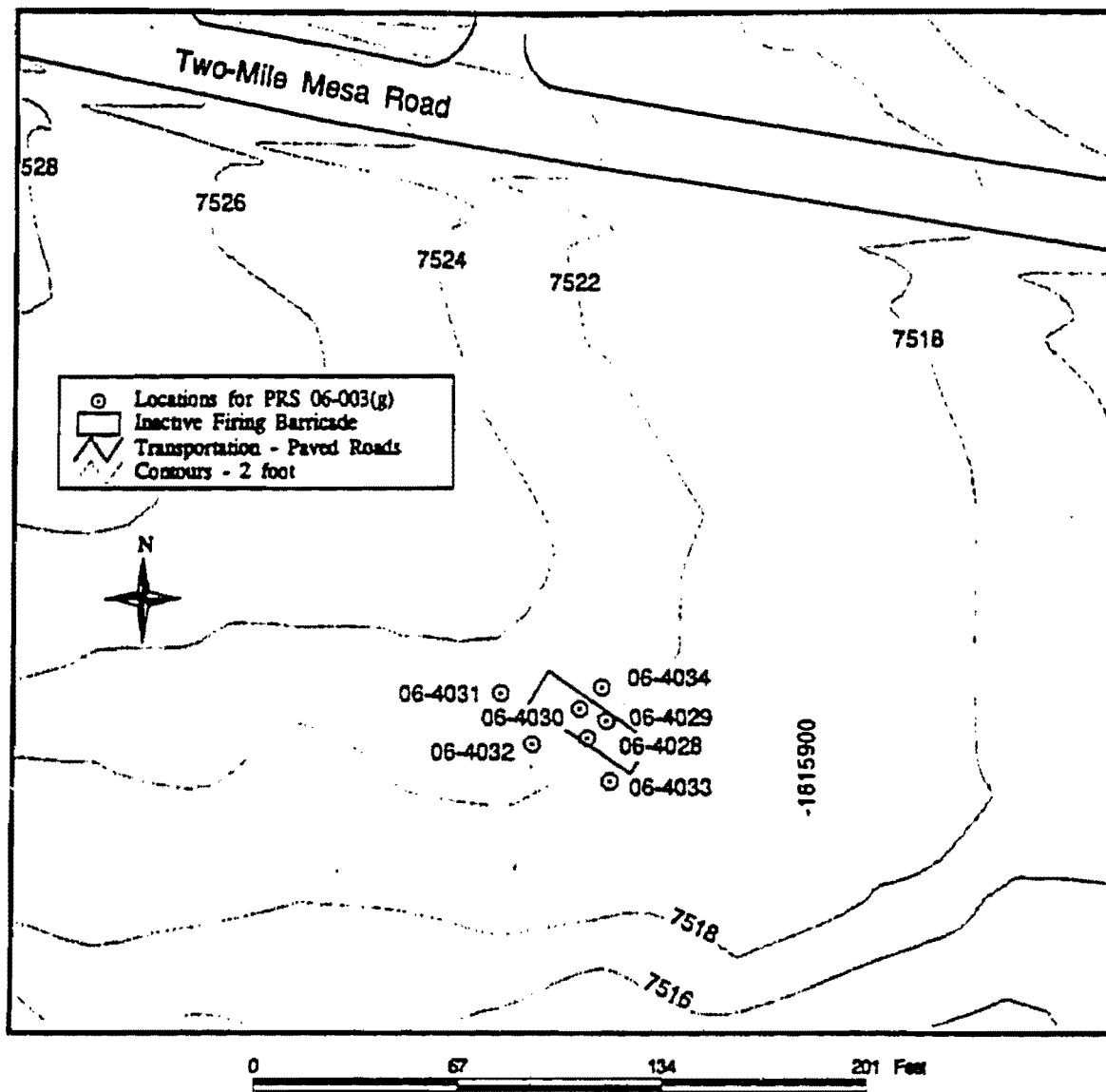


Figure 5.8-1. Locations of PRS 06-003(g) samples.

5.8.1 History

This PRS is discussed in further detail in Section 5.4 of the RFI Work Plan for OU 1111 (LANL 1993, 26068).

PRS 6-003(g) is identified as an inactive firing pad, which was probably used for early primacord detonator timing experiments and Model I Jumbino testing. The actual firing pad is a rectangular gravel area approximately 10 by 15 ft in dimension. During the primacord testing, the pad was barricaded on the north and west sides with steel plates. The pad and barricade structure was used for a relatively short time, probably a few months.

Upon termination of the detonator experiments, structure number TA-6-10 was constructed at the site, incorporating the western steel-plate barricade in its structure. This structure was used for PETN recrystallization. The PETN recrystallization process utilized acetone and carbon tetrachloride as solvents and discharged to a septic system (PRS 06-002) that has been removed. The building used for PETN recrystallization was

decommissioned by burning in 1960. The drain line from PRS 06-003(g) to the 06-002 septic tank is still in place.

These past activities resulted in VOCs and HE being identified as contaminants for investigation related to the PETN recrystallization process. Inorganic metals and HE were the potential contaminants investigated as a result of firing pad tests and the primacord or electronic components utilized in the tests. Lead, in the form of lead bricks, was also commonly used during the detonator testing for shielding and as weights. Based on this site history, potential contaminants include metals, VOCs, HE, uranium, and radionuclides.

5.8.2 Description

No further site-specific information on geology, hydrology, soils, or wildlife habitat associated with this PRS is required. General area geology, hydrology, soils, or wildlife habitat information associated with this PRS is presented in Chapter 2.

5.8.3 Previous Investigation(s)

No previous investigations have been performed at this site.

5.8.4 Field Investigation

The investigation of PRS 6-003(g) was designed to characterize site media that may have been impacted by the explosive or combustive release of materials at the firing pad during detonator testing. In addition, the investigation was intended to characterize soils related to the potential release of HE and solvents at the TA-6-10 drain pipe. The sampling program was reconnaissance in nature, intended to sample worst-case locations at the site. The objective of the investigation was to determine if contaminants are present and pose unacceptable risk at the site, based on the results of a screening risk assessment. The site release model includes the explosive or combustive release of materials at the firing pad during primacord detonator testing and the release of HE and solvents into the surrounding soils through joints or breaks in the drain pipe during PETN recrystallization operations at building TA-6-10. Detonator testing may have dispersed debris over a limited area, and a dust cloud formed as a result of the operations may have further dispersed debris in the area. Generally, particulate materials from the testing would be deposited in decreasing concentrations with distance from detonation point.

The initial field investigation of the firing pad was completed on 18 August 1994 and included surface (0-0.5 ft) and subsurface (2-3 ft) soil sampling from three hand-augered locations (06-4028 through 06-4030) within the pad area (Figure 5.8-1). Surface gravel on the firing pad was included in surface soil samples. An additional three samples were collected from within a 10-ft perimeter of the firing pad. The perimeter was divided into three equal sectors, and each sector was sampled at the surface and at depth (3 ft or soil/tuff interface). Sample locations were chosen based on field screening by metal detector or radiation survey. If field screening was inconclusive, judgmental samples were collected by the field team.

The investigation of the drain pipe included soil sampling at one location within 6 ft of the drain pipe. Samples were collected from the surface and at the 3-ft interval.

All samples from the 1994 sampling were analyzed for VOCs, HE, inorganics, and radionuclides (isotopic uranium, Sr-90 and Cs-137). A technical oversight was identified during data validation when it was found that PETN is not included in the suite of HE analyzed by method SW 8330. This resulted in a resampling of the PRS on 8 April 1997. At that time, all previous locations were resampled at the surface (0-0.5 ft) and subsurface (3.0-3.7 ft). All samples were analyzed for HE (including PETN) in order to

eliminate the PETN data gap and fully characterize the site. Sample locations during both sampling activities were field screened for radiological, chemical, and HE contaminants prior to collection. All field screening results were negative or at background levels.

Table 5.8.4-1 presents a summary of samples taken for PRS 6-003(g). Samples with sample ID format AABxxxx were collected during the 1994 investigation, while the 0506-97-xxxx format indicates 1997 investigation samples.

**TABLE 5.8.4-1
SUMMARY OF SAMPLES TAKEN**

Location ID	Sample ID	Depth (ft)	Media	VOCs*	High Explosives*	Inorganic Chemicals*	Radionuclides*
Firing Pad							
06-4028	AAB7875	0-0.5	SOIL	18636	18664	18755	18980
06-4028	AAB7876	2-3	SOIL	18636	18664	18755	18980
06-4029	AAB7877	0-0.5	SOIL	18636	18664	18755	18980
06-4029	AAB7878	2-3	SOIL	18636	18664	18755	18980
06-4030	AAB7881	0-0.5	SOIL	18639	18665	18776	18981
06-4030	AAB7882	1-2	SOIL	18639	18665	18776	18981
06-4028	0506-97-0002	0-0.5	SOIL	NA	3043R**	NA	NA
06-4028	0506-97-0003	3.0-3.7	SOIL	NA	3043R**	NA	NA
06-4029	0506-97-0004	0-0.5	SOIL	NA	3043R**	NA	NA
06-4029	0506-97-0005	3.0-3.7	SOIL	NA	3043R**	NA	NA
06-4030	0506-97-0006	0-0.5	SOIL	NA	3043R**	NA	NA
06-4030	0506-97-0007	3.0-3.7	SOIL	NA	3043R**	NA	NA
Drain Pipe							
06-4031	AAB7883	0-0.5	SOIL	18639	18665	18776	18981
06-4031	AAB7884	2-3	SOIL	18639	18665	18776	18981
06-4031	0506-97-0008	0-0.5	SOIL	NA	3043R**	NA	NA
06-4031	0506-97-0009	3.0-3.7	SOIL	NA	3043R**	NA	NA
Firing Pad Perimeter							
06-4032	AAB7885	0-0.5	SOIL	18639	18665	18776	18981
06-4032	AAB7886	1-2	SOIL	18639	18665	18776	18981
06-4033	AAB7887	0-0.5	SOIL	18639	18665	18776	18981
06-4033	AAB7888	2-3	SOIL	18639	18665	18776	18981
06-4034	AAB7889	0-0.5	SOIL	18639	18665	18776	18981
06-4034	AAB7890	2-3	SOIL	18639	18665	18776	18981
06-4032	0506-97-0010	0-0.5	SOIL	NA	3043R**	NA	NA
06-4032	0506-97-0011	3.0-3.7	SOIL	NA	3043R**	NA	NA
06-4033	0506-97-0012	0-0.5	SOIL	NA	3043R**	NA	NA
06-4033	0506-97-0013	3.0-3.7	SOIL	NA	3043R**	NA	NA
06-4034	0506-97-0014	0-0.5	SOIL	NA	3043R**	NA	NA
06-4034	0506-97-0015	3.0-3.7	SOIL	NA	3043R**	NA	NA

* Request number

** HE Includes PETN

NA = not analyzed

5.8.5 Evaluation of Inorganic Chemicals

Inorganic chemicals with concentrations at or above background at PRS 06-003(g) are presented in the Table 5.8.5-1 and plotted in Figure 5.8.5-1. The qualifiers shown in the table have been assigned during baseline data validation. However, the data are usable for site-specific decisions. As summarized in Section 4.1.6, a potential low bias is

indicated for the results of copper, chromium, antimony, and zinc analysis from samples AAB7875 - AAB7877D. A potential high bias is indicated for chromium and lead in the remaining samples. These issues, however, do not alter the final evaluation of the site.

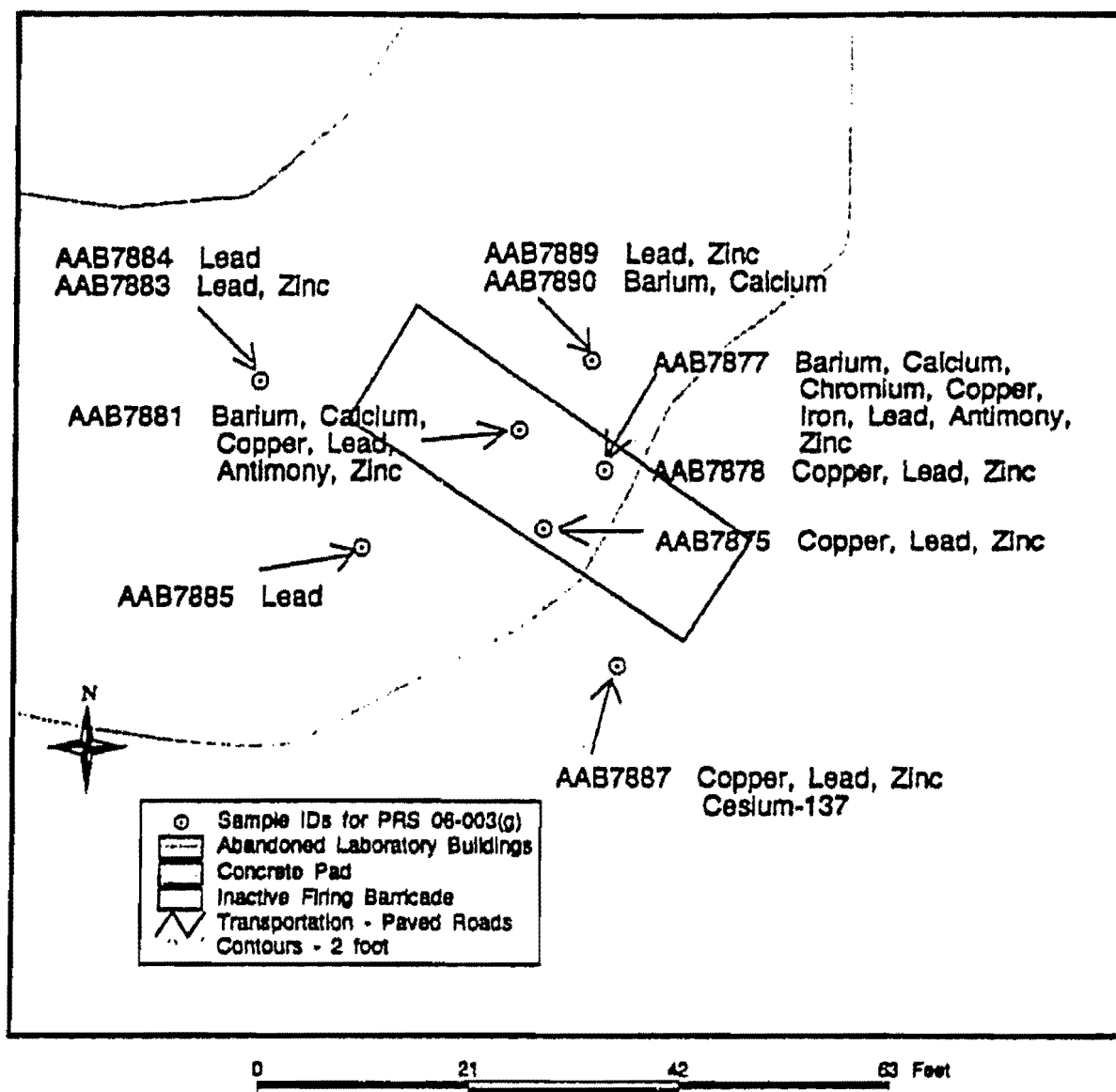


Figure 5.8.5-1. Locations of inorganic and radiochemical analytes that exceed background (UTLs and EQLs) and/or that exceed SALs at PRS 06-003(g).

Eight inorganic chemicals, barium, calcium, chromium, copper, iron, lead, antimony, and zinc, were detected at levels greater than background UTL in samples collected during the investigation of PRS 6-003(g). Calcium and iron are essential nutrients that have no established SAL. At the assumed default residential soil intake rate of 200 mg/day, ingestion of the maximum reported concentrations of each of these constituents at the site would result in 6% and 75% of the Recommended Daily Allowance (RDA) for calcium and iron, respectively. The RDAs used for comparison in this evaluation are for infants age 0-12 months, the most sensitive population, and based on the results, calcium and iron were eliminated from further consideration.

Copper and lead were reported at concentrations greater than SAL at individual surface sample locations within the pad. Chromium, barium, antimony, and zinc were also present in site samples at levels greater than background, and these constituents were carried forward to the screening assessment.

TABLE 5.8.5-1
INORGANIC CHEMICALS WITH CONCENTRATIONS AT OR ABOVE
BACKGROUND SCREENING VALUES FOR PRS 6-003(g)

Sample ID	Depth (ft)	Barium (mg/kg)	Chromium (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Antimony (mg/kg)	Zinc (mg/kg)
SAL	N/A ^b	5300	210	2800	400	31	23000
Soil UTL ^a	N/A	315	19.3	15.5	23.3	1	50.8
Firing Pad							
AAB7875	0-0.5	250	12.5(J)	5760	82	<10.5	262
AAB7876	2-3	85.3	3.6(J)	13.7	8	<4.9	19.6
AAB7877	0-0.5	1870	104(J)	203	891	18	1500
AAB7877D	0-0.5	1410	59	157	1002	19	1347
AAB7878	2-3	97.5	9.5(J)	34.3	34.1	<4.6	71.7
AAB7881	0-0.5	334	15.6(J)	67.7	199	16.9	417
AAB7881D	0-0.5	284	11.1	71.5	176	20.4	338
AAB7882	1-2	182	10.9(J)	10.8	13.5	<4.9	29
Drain Pipe							
AAB7883	0-0.5	135	10.4(J)	8	101	<4.9	206
AAB7884	2-3	133	8.5(J)	7.4	31.7	<5.8	48
AAB7884D	2-3	NA	NA	NA	NA	NA	NA
Firing Pad Perimeter							
AAB7885	0-0.5	149	4.4(J)	29.6	35.7	<4.8	30.2
AAB7886	1-2	65.2	5.5(J)	<4.5	8.1	<4.6	14.8
AAB7887	0-0.5	146	5(J)	56.6	26	<4.9	62.9
AAB7888	2-3	297	4.6(J)	<5.7	8.9	<4.9	17.6
AAB7888D	2-3	NA	NA	NA	NA	NA	NA
AAB7889	0-0.5	148	7.6(J)	13.7	35.9	<5	53.5
AAB7890	2-3	333	9.7(J)	7.9	14.1	<5.1	24.3

a. Upper Tolerance Limit of Laboratory-wide background data from A, B, and C horizons.

b. NA = Not analyzed. N/A = Not applicable.

5.8.6 Evaluation of Radionuclides

Radionuclides with concentrations at or above background screening values are presented in Table 5.8.6-1 and the locations plotted in Figure 5.8.5-1. The qualifiers shown in the table have been assigned during baseline data validation. However, the data are usable for site-specific decisions. As stated in Section 4.2.6, a consistent but slight high bias was observed in all Cs-137 and Sr-90 results, and the results may be used as reported.

**TABLE 5.8.6-1
RADIONUCLIDES WITH CONCENTRATIONS AT OR ABOVE BACKGROUND
SCREENING VALUES FOR PRS 6-003(g)**

Sample ID	Depth (ft)	Cesium-137 (pCi/g)
SAL	N/A ^b	5.1
Soil UTL ^a	N/A	1.4 ^c
Firing Pad		
AAB7875	0-0.5	0.739
AAB7876	2-3	0.011
AAB7877	0-0.5	0.99
AAB7877D	0-0.5	0
AAB7878	2-3	0.169
AAB7881	0-0.5	.72(J)
AAB7881D	0-0.5	NA
AAB7882	1-2	.042(J)
Drain Pipe		
AAB7883	0-0.5	.909(J)
AAB7883D	0-0.5	0.841
AAB7884	2-3	.152(J)
AAB7884D	2-3	NA
Firing Pad Perimeter		
AAB7885	0-0.5	.313(J)
AAB7886	1-2	-0.015
AAB7887	0-0.5	2.068(J)
AAB7888	2-3	-0.002
AAB7889	0-0.5	.938(J)
AAB7890	2-3	0.022

a. Upper Tolerance Limit of Laboratory-wide background data from A, B, and C horizons.

b. N/A = not applicable

c. Maximum detected value from Environmental Surveillance data

All samples collected at PRS 6-003(g) were analyzed for isotopic uranium, Sr-90, and Cs-137. No uranium isotope or strontium analyses were reported with activities greater than either Laboratory-background UTL for U-234, U-235, or U-238 or the Laboratory Environmental Surveillance's maximum reported background value for Sr-90

Cesium-137 was reported in one perimeter sample at an activity of 2.068 pCi/g. Cesium-137 has no established background UTL, and this result is slightly above Laboratory Environmental Surveillance's maximum reported background value of 1.4 pCi/g. Due to the overall absence of elevated radionuclide activity in site samples, the previously discussed potential high bias in the reported data, the fact that no historical information or field screening results have ever indicated the presence of radionuclides,

and the slight elevation of the maximum reported value for Cs-137 in one site sample, all radionuclides, including Cs-137, were eliminated from further consideration at this site.

5.8.7 Evaluation of Organic Chemicals

Detected organic chemicals from both the 1994 and 1997 sampling of PRS 06-003(g) are presented in Table 5.8.7-1 and the locations plotted in Figure 5.8.7-1. The qualifiers shown in the table have been assigned during baseline data validation. As presented in Section 4.3.6, the focused data validation indicates that site VOC data are usable as reported. The results for methylene chloride, the only detected VOC, may be biased high due to laboratory contamination. Review of the 1994 HE data indicates that it is questionable whether any HE component other than 2,4-dinitrotoluene could have been detected in four of the five samples taken within the firing pad. The HE results for samples AAB7831 through AAB7890 are generally good and judged to be acceptable as reported. The lack of PETN analysis was addressed through the 1997 sampling and HE analysis. Focused validation of this data indicates that it is fully usable as reported.

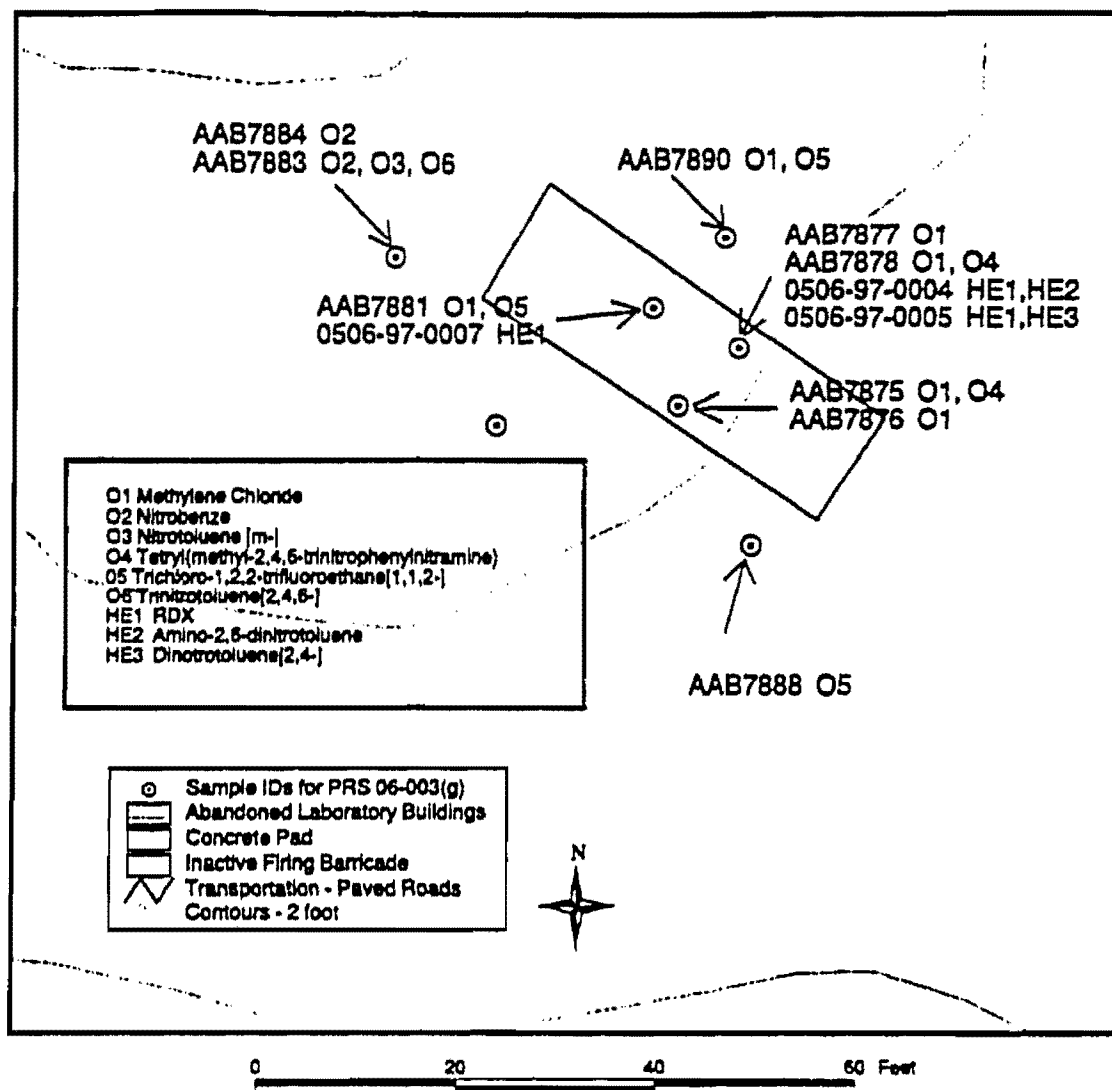


Figure 5.8.7-1. Locations of organic analytes that exceed background (UTLs and EQLs) and/or that exceed SALs at PRS 06-003(g).

Six organic chemicals were reported at concentrations greater than EQL in at least one sample taken at PRS 6-003(g).

Trichloro-1,2,2-trifluoroethane[1,1,2] was reported as detected in three 1994 samples at concentrations up to the maximum of 0.015 mg/kg, which is three times its EQL. This compound has a saturation-based SAL (i.e., the risk-based concentration may exceed the soil saturation limit) of 4100 mg/kg. The maximum reported concentration at the site is more than five orders of magnitude less than the SAL, and, at the reported levels, would not affect the outcome of the screening assessment. Therefore, this constituent was eliminated from further consideration at the site.

Amino 2,6-dinitrotoluene was reported in one 1997 sample at a concentration of 0.162 mg/kg which is less than its EQL of 0.26 mg/kg. This analyte is a TNT degradation product, which has no established SAL. Due to these facts, the low frequency of its detection at the PRS, and the trace presence of HE contamination at the site overall, this constituent was eliminated from further consideration.

The 1997 HE sampling confirmed the presence of trace levels of TNT but did not report tetryl or nitrobenzene. While data validation review of the 1997 data clearly indicates they are of higher quality than the 1994 data, all six remaining organic compounds, methylene chloride, nitrobenzene, RDX, 2,4 dinitrotoluene, tetryl, and trinitrotoluene[2,4,6-], were carried forward to the screening evaluation.

**TABLE 5.8.7-1
DETECTED ORGANIC CHEMICALS FOR PRS 6-003(g)**

Sample ID	Depth (ft)	Methylene chloride (mg/kg)	Nitrobenzene (mg/kg)	RDX (mg/kg)	2,4 DNT (mg/kg)	Tetryl (mg/kg)	Trichloro-1,2,2-trifluoroethane [1,1,2-] (mg/kg)	Trinitrotoluene [2,4,6-] (mg/kg)
SAL	NA ^a	11	33	4.0	15	650	4100	15
EQL	NA ^a	0.005	0.26	1.0	0.25	0.33	0.005	0.25
Firing Pad								
AAB7875	0-0.5	0.018	<0.13(R)	0.5(U)	0.13(U)	8(J)	<0.006	<0.13(R)
AAB7876	2-3	0.007	<0.13(R)	0.5(U)	0.13(U)	<0.33(R)	<0.006	<0.13(R)
AAB7877	0-0.5	0.019	<0.13(R)	0.5(U)	0.13(U)	<0.33(R)	<0.006	<0.13(R)
AAB7878	2-3	0.006	<0.13(R)	0.5(U)	0.13(U)	18.4(J)	<0.006	<0.13(R)
AAB7881	0-0.5	0.008(J)	<0.13(UJ)	0.5(UJ)	0.13(UJ)	<0.33(U)	0.015(J)	<0.13(UJ)
0506-97-0004	0-0.5	NA	0.09(U)	0.18	0.06(U)	0.1(U)	NA	0.123
0506-97-0005	3.0-3.7	NA	0.1(U)	0.389	0.07	0.1(U)	NA	0.1(U)
0506-97-0007	3.0-3.7	NA	0.1(U)	0.44	0.07(U)	0.1(U)	NA	0.09(U)
Drain Pipe								
AAB7883	0-0.5	<0.006	0.18(J)	0.5(UJ)	0.13(UJ)	<0.33(U)	<0.006	0.29(J)
AAB7884	2-3	<0.007	0.35(J)	0.5(UJ)	0.13(UJ)	<0.33(U)	<0.007	<0.13(UJ)
Firing Pad Perimeter								
AAB7888	2-3	<0.006	<0.13(UJ)	0.5(UJ)	0.13(UJ)	<0.33(U)	0.011	<0.13(UJ)
AAB7890	2-3	0.008	<0.13(UJ)	0.5(UJ)	0.13(UJ)	<0.33(U)	0.01	<0.13(UJ)

a. NA = not analyzed. N/A = not applicable

5.8.8 Risk-Based Screening Assessment

Twelve chemicals detected at the site were carried forward to the risk-based screening assessment, including six inorganic chemicals, antimony, barium, chromium, copper, lead, and zinc, and six organic compounds, methylene chloride, nitrobenzene, 2,4 dinitrotoluene, RDX, tetryl, and trinitrotoluene. No radionuclides were identified as COPCs for evaluation.

Copper and lead were reported exceeding SAL at individual surface sampling locations within the firing-pad area. Lead was reported above SAL in laboratory duplicate analyses at location 06-4029. Copper was reported above SAL at location 06-4028. The inorganic chemicals that exceed SAL are presented in Table 5.8.8-1.

TABLE 5.8.8-1
PRS 6-003(g) INORGANICS WITH CONCENTRATIONS THAT EXCEED SALs

Sample ID	Location ID	Depth (ft)	Copper (mg/kg)	Lead (mg/kg)
SAL	N/A	N/A	2800	400
Firing Pad				
AAB7875	06-4028	0-0.5	5760	82
AAB7876	06-4028	2-3	13.7	8
AAB7877	06-4029	0-0.5	203	891
AAB7877D	06-4029	0-0.5	157	1002
AAB7878	06-4029	2-3	34.3	34.1
AAB7881	06-4030	0-0.5	67.7	199
AAB7881D	06-4030	0-0.5	71.5	176
AAB7882	06-4030	1-2	10.8	13.5
Drain Pipe				
AAB7883	06-4031	0-0.5	8	101
AAB7884	06-4031	2-3	7.4	31.7
AAB7884D	06-4031	2-3	NA	NA
Firing Pad Perimeter				
AAB7885	06-4032	0-0.5	29.6	35.7
AAB7886	06-4032	1-2	<4.5	8.1
AAB7887	06-4033	0-0.5	56.6	26
AAB7888	06-4033	2-3	<5.7	8.9
AAB7888D	06-4033	2-3	NA	NA
AAB7889	06-4034	0-0.5	13.7	35.9
AAB7890	06-4034	2-3	7.9	14.1

NA = not analyzed. N/A = not applicable.

The ten additional chemicals that did not exceed SAL in any sample were evaluated for MCE. Antimony, barium, 2,4 dinitrotoluene, RDX, nitrobenzene, tetryl, and zinc are identified as eliciting noncarcinogenic effects, while chromium, methylene chloride and 2,4,6-trinitrotoluene are identified as eliciting carcinogenic effects. The total noncarcinogenic MCE is slightly greater than 1.0 at 1.1; the total carcinogenic MCE is less than 1.0 at 0.6.

The results are summarized in Table 5.8.8-2.

TABLE 5.8.8-2
MULTIPLE CHEMICAL EVALUATION FOR SOIL SAMPLES AT PRS 6-003(g)

Chemical	Location ID	Sample ID	Maximum Sample Value	Soil SAL ^a	Normalized Value
Noncarcinogenic Effects (mg/kg)					
2,4 DNT	06-4029	0506-97-0005	0.066	130	0.0005
Barium	06-4029	AAB7877	1870	5300	0.35
Antimony	06-4030	AAB7881D	20.4	31	0.66
Nitrobenzene	06-4031	AAB7884	0.35	33	0.01
Tetryl	06-4029	AAB7878	18.4	650	0.03
Zinc	06-4029	AAB7877	1500	23000	0.07
				Total ^b :	1.1
Carcinogenic Effects of Chemicals (mg/kg)					
RDX	06-4030	0506-97-0007	0.441	4.0	0.1
Chromium	06-4029	AAB7877	104	210	0.50
Methylene chloride	06-4029	AAB7877	0.019	11	0
Trinitrotoluene [2,4,6-]	06-4031	AAB7883	0.29	15	0.02
				Total ^b :	0.6

a. screening action level

b. Total may not equal the sum of normalized values due to rounding

5.8.9 Human Health Risk Assessment

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

5.8.10 Preliminary Ecological Assessment

In cooperation with the NMED and EPA Region 6, the laboratory ER Project is developing an approach for ecological risk assessment. Further ecological risk assessment at PRS 06-003(g) will be deferred until the site can be assessed as part of the ecological exposure unit methodology currently being developed.

5.8.11 Conclusions and Recommendations

PRS 6-003(g), as defined by the Phase I characterization sampling, is a relatively small site in TA-6. The firing pad, which was the focus of the site activity, is approximately 150-sq ft in area. The total investigated site area including the firing pad perimeter is approximately 30 by 35 ft in dimension, for a total area of 1050 sq ft.

The characterization results support the conceptual release model for firing sites, which, at this site, includes the release of particles or fragments over the limited area of the

firing pad. The release resulted from small-scale testing of primacord and detonator explosives along with associated electrical testing components.

The characterization appears to have adequately defined the nature and extent of contamination at the site. No particular overland migration pathways are apparent based on local topography. The site is relatively level and sparsely vegetated with no obvious impacts to the environment excluding the physical presence of the remaining foundation structure defining the firing pad. No radionuclide contamination was found, and no substantial HE or other organic contaminants were reported. The site was specifically identified in the work plan as processing and recrystallizing PETN. The original field investigation overlooked this constituent; however, a resampling addressed the data gap.

The major contaminants and risk drivers at the PRS, indicated by the SAL levels that were exceeded and MCE calculation, are metals, specifically lead, copper, chromium, barium, and antimony. Based on the characterization data, these contaminants, which are limited to the 10- by 15-ft firing pad, are retained in the upper 6 in. of the soil column. No substantial metal contamination in the perimeter samples was found; antimony was not detected in any sample; chromium did not exceed background; barium slightly exceeded background in one sample; and lead was not substantially greater than background.

Copper and lead were found to exceed SAL at separate individual locations within the firing pad. Copper was 210% of SAL in a single sample with the next highest copper concentration at approximately 7% of SAL. Copper is relatively nontoxic, and ingestion of the maximum reported concentration of copper (5760 mg/kg) at the default soil intake rate of 200 mg/day would not exceed the Estimated Safe and Adequate Daily Dietary Intake for children (age 1-10) or adults.

Lead was 2.5 times SAL for the maximum reported value of duplicate analyses taken at one sample location on the pad. The next highest concentration, also on the pad, was 199 mg/kg, which is 50% of SAL. No other sample locations exceeded 25% of SAL for lead.

Both copper and lead would contribute to noncarcinogenic health effects. The noncarcinogenic MCE for the other detected constituents slightly exceeded the threshold of 1.0 at 1.1. Barium and antimony are the risk drivers (1.01 MCE) at 35% and 66% of SAL, respectively. All concentrations contributing to the MCE were associated with samples taken within the firing pad, and no samples beyond the pad showed elevated concentrations relative to background.

The soil SALs used by the Laboratory are based on conservative residential exposure parameters and represent an acceptable average contaminant concentration across a half acre (>20,000 sq ft) residential lot (exposure unit). In contrast, PRS 6-003(g) is approximately 1,000 sq ft and would represent less than 5% of the assumed exposure unit area. Furthermore, the actual firing pad at 150 sq ft represents an area less than 1% of the assumed residential exposure unit area. Integration of the contaminated area across the otherwise unimpacted area surrounding the firing site would result in a proportionally reduced exposure and hazard potential.

Therefore, due to the small size and limited contamination of the area, the conservative nature of the screening assessment, and the recognition that significant safety and uncertainty factors have been incorporated in the upper-bound exposure estimates and toxicological criteria used in establishing the SALs, the conclusion is that the PRS does not present an unacceptable present or future human health risk and is recommended for NFA.

This recommendation is based on the NFA criterion 4 (Los Alamos National Laboratory, Environmental Restoration Department, Project Consistency Team Policy number 015) that 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 will be requested to remove this site from the HSWA Module of the Laboratory's RCRA operating permit.

5.8.12 Sampling and Analysis Plan for PRS 06-003(g)

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

5.9 Concrete Bowl Decision Set—Potential Release Sites: 06-003(a), 6-008, and C-6-019

This decision set has been identified as an aggregate of PRSs (see Figure 5.9-1) associated with activities at the inactive firing site PRS 06-003(a) and includes a former underground storage tank (PRS 6-008) and a former generator building site (C-6-019). This decision set is not associated with other buildings or structures. Contamination observed at the site includes HE, metals, organics, and radionuclides. This PRS is recommended for NFA.

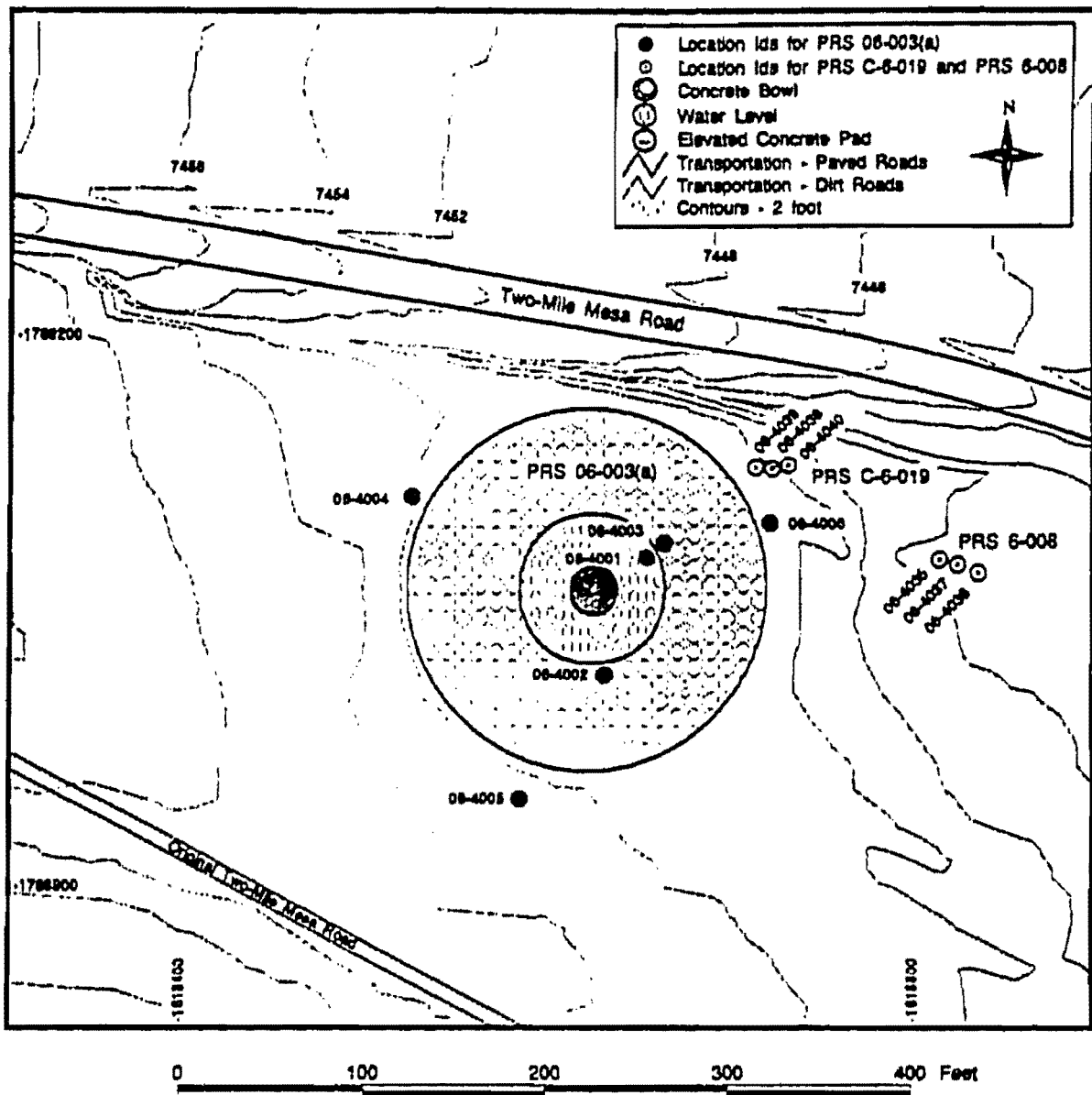


Figure 5.9-1. Locations of PRS 06-003(a) samples.

5.9.1 History

This PRS is discussed in further detail in Section 5.4 of the RFI Work Plan for OU 1111 (LANL 1993, 26068).

PRS 6-003(a) is a large concrete bowl, 100 ft in radius, which was constructed to test nuclear material recovery methods early in the Trinity test development. This facility was constructed for the purpose of testing water recovery methods and investigated the dispersal of material from small-scale detonation tests designed to simulate a nuclear implosion. Testing of the water recovery method required the detonation of explosive shots in a container of water to slow metal fragment dispersal, followed by collection of the metal fragments from the concrete bowl. No fissionable materials were used in the tests, which continued until the spring of 1945. Shake tests, probably of explosives assemblies, were also conducted in this structure in 1945.

The concrete bowl was constructed in sections with expansion joints running radially from the center of the bowl to the perimeter. The bowl contains a central raised area on which the explosive tests, contained in water vessels, were detonated.

In order to recover the test materials, the bowl was washed down following each test. The wash water and test debris were collected in a ring-shaped depression in the bottom of the bowl. Records indicate that at some point in the wash operation, the wash material was filtered through glass fiber and sand filter media presumably contained in a square sump constructed in the basin bottom (LANL 1993, 26068). Metal debris would be available for recovery from the filter media. The wash water was apparently collected in underground storage tank 6-008. No information is available regarding disposal of the wash water. Considerable effort apparently went into recovery of material from the basin and subsequent preparation for the next shot, as cited in the work plan (LANL 1993, 26068): "To prepare the basin all the dirt has to be scrubbed off and washed down. Then all the joints in the concrete have to be sealed with tar and for this operation the concrete has to be dry and warm."

Because the purpose of many of the tests carried out at the site was the recovery of metal fragments, little of this contamination should remain. Explosives used in testing should mostly be consumed in the test, and any residues and unexploded material would be expected to be recovered with the metal fragments.

PRS 6-008 is the location of a former underground storage tank (UST) that received material washed out of the concrete bowl. It was removed in 1987. PRS C-6-019 is the former site of a generator building that was removed by burning in 1960. These PRSs are included in this aggregate due to their operational association and their proximity to the concrete bowl.

The water recovery shots used depleted uranium. Based on these past activities, parameters for investigation at PRS 06-003(a) included HE, metals, isotopic uranium, and gamma spectroscopy.

Potential Release Site 6-008 received wash water from the concrete bowl, and parameters for investigation similarly included HE, metals, isotopic uranium, and gamma spectroscopy.

Potential Release Site C-6-019 was investigated for HE, metals, isotopic uranium, and gamma spectroscopy as well as the additional parameters associated with generator dielectric oils (VOCs, SVOCs, and PCBs).

5.9.2 Description

No further site-specific information on geology, hydrology, soils, or wildlife habitat associated with this PRS is required. General area geology, hydrology, soils, or wildlife habitat information associated with this PRS is presented in Chapter 2.

5.9.3 Previous Investigation(s)

The area was monitored with a Phoswich counter in 1978; no radiation above background was found (LANL 1993, 26068).

5.9.4 Field Investigation.

The field activities at the PRSs included in this decision set were Phase I reconnaissance-type investigations, biased toward sampling media in areas most likely to be contaminated from past activities. The objective was to determine if chemicals are present at the firing site or associated facilities at levels that exceed background and/or SALs and present an unacceptable human health risk. The decision set was characterized and assessed based on the results of two field activities. The primary

activity, completed in 1994, was supplemented by the collection of a single sample from the bottom of the concrete bowl filter pit in 1997.

Initial field activities at PRS 06-003(a) were conducted between 15 June 1994 and 7 September 1994 and focused on sampling media that would be most likely to retain residual contamination. The concrete bowl of the firing site has accumulated rainfall and sediments in its central depression, resulting in a local ponded area. The filter sump discussed in Section 5.9.1 is associated with the central depression. It represents the lowest physical feature in the bowl into which the ponded water and sediments ultimately accumulate.

The investigation at 6-003(a) included the sampling of accumulated sediments within the bowl and soils from the perimeter area surrounding the bowl that would most likely have become contaminated by dispersed metal fragments and unconsumed HE during the tests. Three locations inside the bowl were sampled (06-4001 through 06-4003). Location 06-4001 fell within the ponded area and consisted of sediment accumulation occurring on a shelf within and near the surface of the sump. The bottom of the sump was not sampled in 1994 due to a misunderstanding regarding disturbing the salamander inhabitants. This was regarded as a data gap because the sump represents the final receiving area for contaminants within the structure both during and subsequent to its operation. Samples collected at locations 06-4002 and 06-4003 consisted of sediment that had accumulated in asphalt expansion joints of the concrete surface. Perimeter soil samples, taken outside the bowl at locations 06-4004 through 06-4006, were collected at the surface (0 to 0.5 ft) and subsurface (2.0 to 3.0 ft).

The investigation of the UST (06-0008) required the collection of three soil cores (locations 06-4035 through 06-4037) from the former location of the tank. The cores were sampled at three intervals: the surface, the soil/tuff interface (depth varied), and at a middle depth of 1.5 to 2.5 ft.

The investigation of C-6-019 required the collection of three soil cores (locations 06-4038 through 06-4040) from the location of the former generator building. The work plan specified the collection of three surface soil samples at the location of the former building; however, two intervals, the surface and a subsurface sample at the soil/tuff interface (approximately 5-6 ft), were collected for analysis from the three cores taken at the PRS.

In order to eliminate the data gap created by the absence of filter pit characterization, one additional sample was collected on 8 April 1997 at the bottom of the filter pit. This sample consisted of the upper 4 in. of accumulated sediments below 10 ft of standing water in the pit (location 06-4001). This sample was intended to allow the characterization of what could reasonably be considered the most impacted part of the concrete bowl. The sample was analyzed for HE (including PETN), radionuclides, and metals.

Samples with sample ID format AABxxxx were collected during the 1994 investigation, while the 0506-97-xxxx format indicates 1997 investigation samples. All sample locations were field screened for radioactivity, organic vapors, and HE prior to sample collection. All field screening results were negative or at background levels.

Table 5.9.4-1 presents a summary of samples taken for this decision set.

**TABLE 5.9.4-1
SUMMARY OF SAMPLES TAKEN**

Location ID	Sample ID	Depth (ft)	Media	VOCs •	SVOCs •	PCBs*	High Explosives •	Inorganic Chemicals •	Radionuclides*
Concrete Bowl Sediments									
06-4001	AAB7839	0-0.5	soil	NA	NA	NA	18504	18523	18979
06-4002	AAB7840	0-0.5	soil	NA	NA	NA	18504	18523	18979
06-4003	AAB7841	0-0.5	soil	NA	NA	NA	18504	18523	18979
06-4001	0506-97-0001	0-0.3	sediment	NA	NA	NA	3043R**	3044R	3045R
Concrete Bowl Perimeter									
06-4004	AAB7842	0-0.5	soil	NA	NA	NA	18504	18523	18979
06-4004	AAB7843	2-3	soil	NA	NA	NA	18504	18523	18979
06-4005	AAB7844	0-0.5	soil	NA	NA	NA	18504	18523	18979
06-4005	AAB7845	2-3	soil	NA	NA	NA	18504	18523	18979
06-4006	AAB7846	0-0.5	soil	NA	NA	NA	18504	18523	18979
06-4006	AAB7847	2-3	soil	NA	NA	NA	18504	18523	18979
06-4006	AAB7848	2-3	soil	NA	NA	NA	18504	18523	18979
Former Underground Storage Tank									
06-4035	AAB7891	0-0.5	soil	NA	NA	NA	18665	18776	18981
06-4035	AAB7892	1.5-2.5	soil	NA	NA	NA	18665	18776	18981
06-4035	AAB7893	2.5-3.5	soil	NA	NA	NA	18665	18776	18981
06-4036	AAB7894	0-0.5	soil	NA	NA	NA	18665	18776	18981
06-4036	AAB7895	1.5-2.5	soil	NA	NA	NA	18665	18776	18981
06-4036	AAB7896	2-3	soil	NA	NA	NA	18665	18776	18981
06-4036	AAB7896 D	2-3	soil	NA	NA	NA	18665	18776	18981
06-4037	AAB7897	0-0.5	soil	NA	NA	NA	18665	18776	18981
06-4037	AAB7897 D	0-0.5	soil	NA	NA	NA	18665	18776	18981
06-4037	AAB7898	1.5-2.5	soil	NA	NA	NA	18665	18776	18981
06-4037	AAB7899	3-4	soil	NA	NA	NA	18665	18776	18981
06-4037	AAB7900	3-4	soil	NA	NA	NA	18665	18776	18981
Former Generator Building									
06-4038	AAB7901	0-0.5	soil	18639	18639	18639	18665	18776	18981
06-4038	AAB7902	5-6	soil	18639	18639	18639	18665	18776	18981
06-4039	AAB7903	0-0.5	soil	18639	18639	18639	18665	18776	18981
06-4039	AAB7904	5-6	soil	18639	18639	18639	18665	18776	18981
06-4040	AAB7905	0-0.5	soil	18639	18639	18639	18665	18776	18981
06-4040	AAB7906	4.8-5.8	soil	18639	18639	18639	18665	18776	18981

* Request number

**HE suite includes PETN

5.9.5 Evaluation of Inorganic Chemicals

Inorganic chemicals with concentrations at or above background at the PRS aggregate are presented in the Table 5.9.5-1 and plotted in Figure 5.9.5-1. The qualifiers shown in the table have been assigned during baseline data validation. However, as presented in Section 4.1.3, review of the data packages indicates that, in general, the data may be used as reported. Any bias or uncertainty indicated for specific analytes in the focused validation would not impact the site-specific decisions.

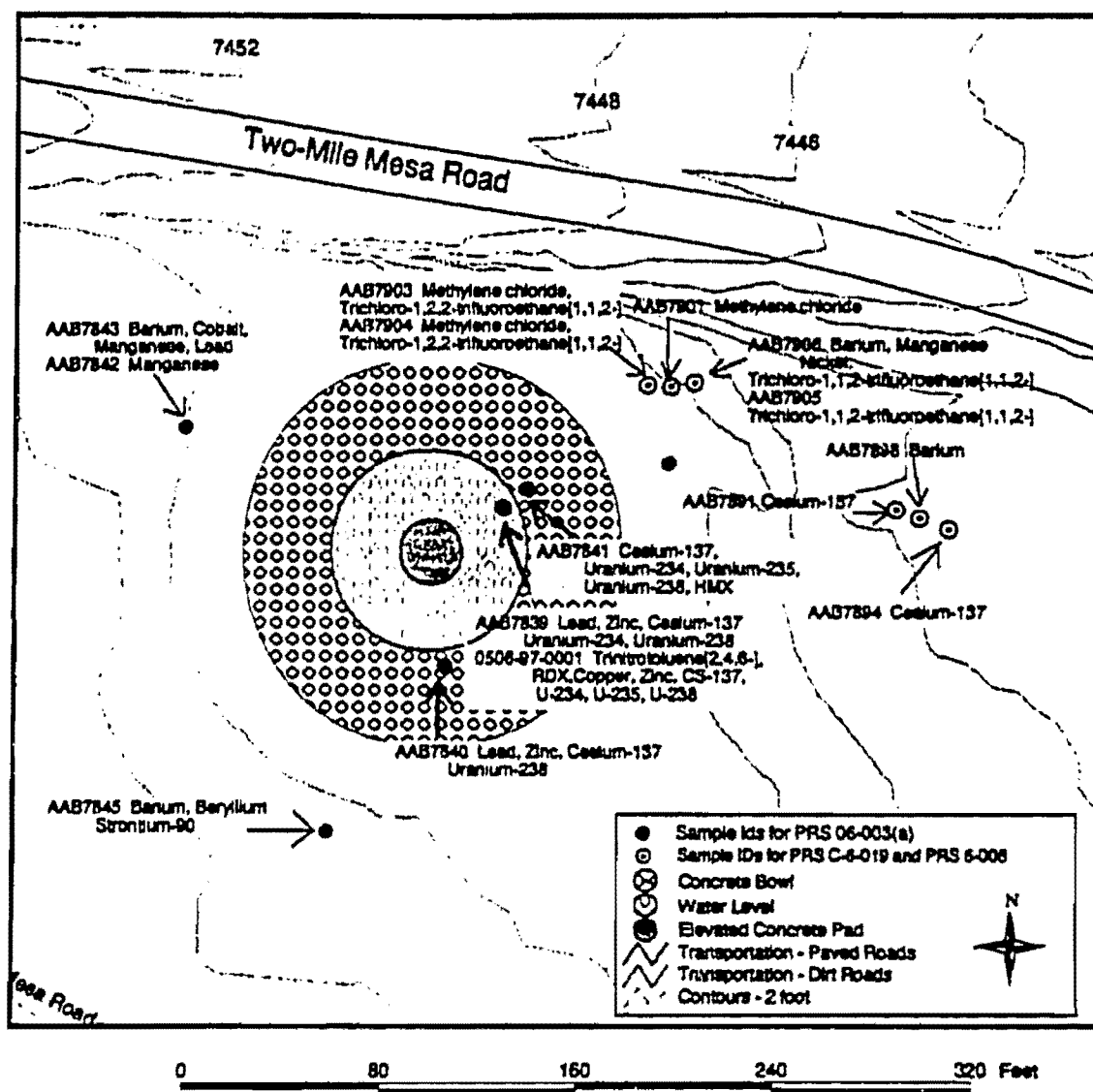


Figure 5.9.5-1. Locations of analytes that exceed background (UTLs and EQLs) and/or that exceed SALs at PRS 06-003(a).

Review of inorganic analyses for all media sampled during the 1994 investigation of this decision set indicates that barium, beryllium, calcium, cobalt, copper, iron, magnesium, manganese, sodium, nickel, lead, and zinc are present in at least one sample at a concentration that exceeds Laboratory-background UTL for soil. Antimony was undetected in all samples but was reported by the analytical laboratory at EQLs greater

than background UTL. This is an analytical method limitation, and because antimony was not positively detected in any site sample, antimony was eliminated from further consideration.

Calcium, iron, magnesium, and sodium were reported at levels above Laboratory-background UTL. These chemicals have no established SAL and are essential human nutrients with established recommended daily allowances (RDA) or recommended intakes. Based on the default soil intake rate of 200 mg/day, ingestion of the maximum reported concentration of any of these chemicals would not exceed the RDAs for calcium, iron, or magnesium, or the average adult daily intake of sodium. The maximum iron concentration would result in an intake of approximately 40% the RDA; all others would result in less than 3% of the RDA. Because these chemicals are essential nutrients and were not reported at unusually high concentrations in single samples or across the site, they were eliminated from further consideration.

Beryllium was reported in one sample at a concentration of 2.1 mg/kg, which slightly exceeds its associated background UTL of 1.95 mg/kg. The Laboratory has no established SAL for beryllium because its risk-based soil concentration is less than the Laboratory-background UTL. The lifetime cancer risk due to beryllium exposure at the UTL concentration, presented in Section 3.3.1, is $1.0\text{E-}5$. Risk due to exposure to the maximum reported site beryllium concentration would be less than $1.08\text{E-}5$. This is just slightly greater than the background risk for beryllium and remains in the generally acceptable $1\text{E-}4$ to $1\text{E-}6$ risk range. Based on this background risk information, the low frequency (one sample) and degree to which background UTL was exceeded, and the lack of general beryllium contamination at the PRS aggregate, beryllium was eliminated from further consideration at this site.

Barium, cobalt, copper, manganese, nickel, lead, and zinc were reported in 1994 samples at levels that exceed their Laboratory-background UTL, and these chemicals were carried forward to the screening assessment process. Review of inorganic analysis of the single filter pit sample collected in 1997 indicates that copper and zinc are present at 43.3 and 112 mg/kg, respectively. Both chemicals were previously identified as COPCs; however, these concentrations exceed the previously observed maximum reported values of the 1994 sampling and were included in the screening risk assessment. A summary of the analytical results for these constituents in decision set samples is presented in Table 5.9.5-1.

**TABLE 5.9.5-1
INORGANIC CHEMICALS WITH CONCENTRATIONS AT OR ABOVE BACKGROUND SCREENING VALUES—PRS
AGGR. 6-003(a)**

Sample ID	Depth (ft)	Barium (mg/kg)	Beryllium (mg/kg)	Cobalt (mg/kg)	Copper (mg/kg)	Manganese (mg/kg)	Nickel (mg/kg)	Lead (mg/kg)	Zinc (mg/kg)
SAL	N/A ^b	5300	NA	4600	2800	3200	1500	400	23000
soil UTL ^a	N/A	315	1.95	19.2	15.5	714	15.2	23.3	50.8
Concrete Bowl Sediments									
AAB7839	0-0.5	<88	<1	<4.3	19.6	108(J)	<5.8	28.7(J)	66.8
AAB7839D	0-0.5	87	1	3.8	21	112	7.1	29.4	66.1
AAB7840	0-0.5	202	<1	<5.4	23.3	218(J)	<9	39.1(J)	74.1
AAB7841	0-0.5	105	<1.1	<4.3	16.8	97.5(J)	<9	23.2(J)	50.7
0506-97-0001	0-0.3	140	2.27(U)	6.18(B)	43.3	128	8.52(U)	12.5	112
Concrete Bowl Perimeter									
AAB7842	0-0.5	146	<1.1	<10.1	<4.6	759(J)	9	14.4(J)	28.9
AAB7842D	0-0.5	NA	NA	NA	NA	NA	NA	NA	NA
AAB7843	2-3	630	<0.98	25	<3.9	2350(J)	12.3	33(J)	25.3
AAB7844	0-0.5	121	<0.49	<3.7	<4.9	439(J)	<5.1	7.7(J)	20
AAB7845	2-3	653	2.1	12.7	7	449(J)	13.4	19.2(J)	43.2
AAB7846	0-0.5	127	<1	<5.9	6.3	450(J)	<6.6	17.8(J)	35.3
AAB7847	2-3	121	<0.97	<7.4	<2.5	568(J)	<6.7	14(J)	24.4
AAB7847D	2-3	NA	NA	NA	NA	NA	NA	NA	NA
AAB7848	2-3	118	<0.99	<7	<2.6	519(J)	<7.4	13.3(J)	25
Former Underground Storage Tank									
AAB7891	0-0.5	124	<0.92	<5.4	7.9	358	<6.6	19.5	35.4
AAB7892	1.5-2.5	261	1.9	<3.5	8.1	92.8	13.8	11.5	36.9
AAB7893	2.5-3.5	74.7	<0.75	<1.8	<2.3	49.1	<7.9	4.1	18.4
AAB7894	0-0.5	138	<1	<6.1	9.1	387	<7.9	16.4	38.1
AAB7895	1.5-2.5	153	1.5	<4	<5.2	139	10.3	14.8	27.9
AAB7896	2-3	<18.6	<0.62	<1.6	<1.4	49.9	<5.2	6.1	18.6
AAB7896D	2-3	NA	NA	NA	NA	NA	NA	NA	NA
AAB7897	0-0.5	126	<0.94	<4.6	7	287	<7.2	16.3	29.8
AAB7897D	0-0.5	143	1.03	6.3	7.9	404	9.1	17	33
AAB7898	1.5-2.5	331	<1.2	<2.2	<4.8	59.4	<9.2	11	27.4
AAB7899	3-4	<47	<0.79	<1.2	<1.4	42.8	<5	4.2	14.4
AAB7900	3-4	73.8	<0.95	<1.9	<2	108	<8	6.1	16.4
Former Generator Building									
AAB7901	0-0.5	122	<0.93	<8.3	10.8	486	<7.8	18.6	47.4
AAB7902	5-6	138	1.5	14.7	11.3	683	11.9	15.5	39.5
AAB7903	0-0.5	113	<1	<7.8	6.5	574	<7.6	11.3	33.1
AAB7904	5-6	138	1.4	<3.8	7.4	114	9.9	10.4	45.1
AAB7905	0-0.5	115	<0.78	<8	<5.1	473	<5.7	20.7	27.3
AAB7906	4.8-5.8	438	1.6	11.4	11.7	1450	23.3	13.8	42.1

a. Upper tolerance limit of Laboratory-wide background data from A, B, and C horizons b. NA = not analyzed N/A = not applicable..

5.9.6 Evaluation of Radionuclides

Radionuclides with concentrations at or above background at the PRS Aggregate are presented in the Table 5.9.6-1 and plotted in Figure 5.9.5-1. The qualifiers shown in the table have been assigned during baseline data validation. However, as presented in Section 4.2.3, review of the data packages indicates that in general the data may be used as reported. Any bias or uncertainty indicated for specific analytes in the focused validation would not impact the site-specific decisions.

Five radionuclides were reported in aggregate 6-003(a) samples collected in 1994 with activities that exceed Laboratory-background UTL values or the maximum detected background value from Environmental Surveillance data. U-234, U-235, and U-238 were reported in sediment samples collected from the concrete bowl at activities that exceed Laboratory-background UTL. The isotopic profile of these uranium analyses is consistent with that of depleted uranium, which is known to have been utilized in tests at the site. Therefore, the uranium isotopes as well as total uranium were carried forward for further evaluation.

Strontium-90 and Cesium-137 have no established Laboratory-background UTL, and their reported activities were screened against the maximum detected background value from Environmental Surveillance data. Cesium-137 was reported above background in several samples taken from the concrete bowl and underground storage tank areas. This constituent was also reported above SAL in one concrete bowl sample and was, therefore, carried forward for further evaluation. Strontium-90 was reported above background at one of the twenty-six locations sampled for the aggregate. The reported activity of 1.12 pCi/g is just slightly greater than the maximum reported background value of 1.0 pCi/g. Strontium-90 was eliminated from further consideration due to the following: the radionuclide was reported above background in a low number of sample locations, the single occurrence in which background was exceeded is not substantially (no statistical comparison was possible) greater than background, the single occurrence was less than SAL, and Sr-90 has no documented association with the site.

The results of radionuclide analysis from the 1997 filter pit sampling are consistent with the previous 1994 sampling results. U-234, U-235, U-238, and Cs-137 were reported with activities greater than background screening values. In addition, the uranium isotopes were reported with activities slightly greater than the previously reported maximum values.

TABLE 5.9.6-1
RADIONUCLIDES WITH CONCENTRATIONS AT OR ABOVE BACKGROUND SCREENING
VALUES
FOR AGGREGATE 6-003(a)

Sample ID	Depth (ft)	CS-137 (pCi/g)	SR-90 (pCi/g)	U-234 (pCi/g)	U-235 (pCi/g)	U-238 (pCi/g)
UTL ^a	N/A ^b	1.4 ^c	1 ^c	1.94	0.084	1.82
SAL	N/A ^b	5.1	4.4	13	10	67
Concrete Bowl						
AAB7839	0-0.5	3.31(J)	0.84	2.11(J)	0.072	2.552(J)
AAB7839D	0-0.5	NA ^b	NA ^b	2.011	0.083	2.236
AAB7840	0-0.5	3.96(J)	0.34	1.426(J)	0.063	1.782(J)
AAB7840D	0-0.5	4.15	NA ^b	1.77	0.063	2.252
AAB7841	0-0.5	12.5(J)	0.03	2.18(J)	0.108	3.617(J)
AAB7841D	0-0.5	NA ^b	0.33	NA ^b	NA ^b	NA ^b
0506-97-0001	0.0.3	7.33	0.06	3.67	0.197	4.22
Concrete Bowl Perimeter						
AAB7842	0-0.5	0.487(J)	0.57	1.054(J)	0.041	1.083(J)
AAB7843	2-3	0.004(J)	0.35	0.624(J)	0.029	0.649(J)
AAB7844	0-0.5	0.449(J)	-0.25	1.209(J)	0.052	1.187(J)
AAB7845	2-3	0.001	1.12	0.743(J)	0.041	0.8(J)
AAB7846	0-0.5	0.604(J)	0.65	1.115(J)	0.061	1.194(J)
AAB7847	2-3	0.017	-0.08	0.935(J)	0.043	0.993(J)
AAB7848	2-3	-0.002	0.6	0.98(J)	0.054	0.957(J)
Former Underground Storage Tank						
AAB7891	0-0.5	1.676(J)	0.26(J)	1.126	0.054	1.212
AAB7892	1.5-2.5	0.035(J)	0.06(J)	1.135	0.056	1.182
AAB7893	2.5-3.5	-0.01	0.08(J)	0.986	0.045	1.088
AAB7893D	2.5-3.5	NA ^b	NA ^b	1	0.038	1.016
AAB7894	0-0.5	2.201(J)	0.4(J)	1.173	0.061	1.547
AAB7895	1.5-2.5	0.022	-0.1(J)	0.894	0.045	0.914
AAB7896	2-3	-0.085	-0.36(J)	0.777	0.041	0.856
AAB7897	0-0.5	0.804(J)	-0.01(J)	1.45	0.07	1.651
AAB7898	1.5-2.5	-0.028	0.51(J)	0.775	0.043	0.845
AAB7898D	1.5-2.5	0.053	0.33(J)	NA ^b	NA ^b	NA ^b
AAB7899	3-4	-0.052	0.27(J)	0.892	0.043	0.948
AAB7900	3-4	0.001	0.27(J)	0.948	0.032	0.991
Former Generator Building						
AAB7901	0-0.5	0.411(J)	-0.15(J)	0.892	0.045	1.032
AAB7901D	0-0.5	NA ^b	-0.14(J)	NA ^b	NA ^b	NA ^b
AAB7902	5-6	-0.026	-0.53(J)	0.655	0.034	0.687
AAB7903	0-0.5	0.079(J)	-0.04(J)	0.876	0.027	0.901
AAB7904	5-6	0.055(J)	0.04(J)	0.865	0.056	0.935
AAB7905	0-0.5	0.197(J)	0.11(J)	0.93	0.07	0.955
AAB7906	4.8-5.8	-0.024	-0.28(J)	0.732	0.025	0.741

a. Upper tolerance limit of Laboratory-wide background data from A, B, and C horizons.

b. NA = not analyzed N/A = not applicable.

c. Maximum detected background value from Environmental Surveillance data

5.9.7 Evaluation of Organic Chemicals

Detected organic chemicals at PRS aggregate 06-003(a) are presented in Table 5.9.7-1, and the locations are plotted in Figure 5.9.5-1. The qualifiers shown in the table have been assigned during baseline data validation. However, as presented in Section 4.3.3,

review of the data packages indicates that, in general, the data may be used as reported. Any bias or uncertainty indicated for specific analytes in the focused validation would not impact the site-specific decisions.

Three organic chemicals were reported as detected in samples taken at PRS aggregate 6-003(a). HMX is an HE contaminant that was reported as positively detected in one sample at an estimated (J) concentration of 1.95 mg/kg. This reported value is less than its EQL of 2.2 mg/kg and was (J) qualified because of potential high analytical bias as indicated by a high surrogate compound recovery. HMX was eliminated from further consideration due to the following: it was reported in only one sample at a concentration less than its EQL; the single reported concentration is more than three orders of magnitude less than SAL; and the data were determined to be usable following a focused data validation.

Two additional VOCs, methylene chloride and trichloro-1,2,2-trifluoroethane[1,1,2-], were reported as being positively detected in soil samples associated with the former generator building area. Neither volatile constituent was reported at a level substantially greater than its EQL. The maximum reported methylene chloride concentration of 0.015 mg/kg is three times its EQL of 0.005 mg/kg and three orders of magnitude less than its SAL. The maximum reported trichloro-1,2,2-trifluoroethane[1,1,2-] concentration of 0.01 mg/kg is twice its EQL of 0.005 mg/kg and more than five orders of magnitude less than SAL. Due to the overall low frequency of reported organic contamination at the PRS aggregate and the very low reported concentrations of these volatile chemicals relative to their EQL and SAL, these contaminants were eliminated from further consideration.

Two HE compounds were detected in the filter pit sample collected in 1997. RDX and TNT were reported at 0.485 and 0.498 mg/kg respectively. These chemicals were identified as COPCs for further evaluation.

**TABLE 5.9.7-1
DETECTED ORGANIC CHEMICALS FOR PRS AGGREGATE 6-003(a)**

Sample ID	Depth (ft)	HMX (mg/kg)	RDX (mg/kg)	TNT (mg/kg)	Methylene chloride (mg/kg)	Trichloro-1,2,2-trifluoroethane[1,1,2-] (mg/kg)
SAL	N/Aa	3300	4.0	15	11	4100
EQL	N/Aa	2.2	1.0	0.25	0.005	0.005
Concrete Bowl Sediment						
AAB7841	0-0.5	1.95(J)	0.5(UJ)	0.13(UJ)	NAa	NAa
0506-97-0001	0-0.3	0.218(U)	0.485	0.498	NA	NA
Former Generator Building						
AAB7901	0-0.5	<1.1(UJ)	0.5(UJ)	0.13(UJ)	0.006	<0.006
AAB7903	0-0.5	<1.1(UJ)	0.5(UJ)	0.13(UJ)	0.015	0.006
AAB7904	5-6	<1.1(UJ)	0.5(UJ)	0.13(UJ)	0.008	0.007
AAB7905	0-0.5	<1.1(UJ)	0.5(UJ)	0.13(UJ)	<0.006	0.007
AAB7906	4.8-5.8	<1.1(UJ)	0.5(UJ)	0.13(UJ)	<0.007	0.01

a. NA = not analyzed. N/A = not applicable.

5.9.8 Risk-Based Screening Assessment

One radionuclide, Cs-137, was reported in two concrete bowl sediment samples at activities that exceed its SAL of 5.1 pCi/g. Cesium was also reported in additional concrete bowl sediment samples at levels that exceed background UTL. Reported radionuclides with activities that exceed SAL are presented in Table 5.9.8-1.

TABLE 5.9.8-1
AGGREGATE 6-003(a) RADIONUCLIDES WITH ACTIVITIES IN SOIL THAT EXCEED SAL

SAMPLE ID	LOCATION ID	DEPTH (ft)	CS-137 (pCi/g)
SAL	N/A*	N/A*	5.1
Concrete Bowl Sediment			
AAB7839	06-4001	0-0.5	3.31(J)
AAB7839D	06-4001	0-0.5	NA
AAB7840	06-4002	0-0.5	3.96(J)
AAB7840D	06-4002	0-0.5	4.15
AAB7841	06-4003	0-0.5	12.5(J)
AAB7841D	06-4003	0-0.5	NA
0506-97-0001	06-4001	0-0.3	7.33
Concrete Bowl Perimeter			
AAB7842	06-4004	0-0.5	0.487(J)
AAB7843	06-4004	2-3	0.004(J)
AAB7844	06-4005	0-0.5	0.449(J)
AAB7845	06-4005	2-3	0.001
AAB7846	06-4006	0-0.5	0.604(J)
AAB7847	06-4006	2-3	0.017
AAB7848	06-4006	2-3	-0.002
Former Underground Storage Tank			
AAB7891	06-4035	0-0.5	1.676(J)
AAB7892	06-4035	1.5-2.5	0.035(J)
AAB7893	06-4035	2.5-3.5	-0.01
AAB7893D	06-4035	2.5-3.5	NA
AAB7894	06-4036	0-0.5	2.201(J)
AAB7895	06-4036	1.5-2.5	0.022
AAB7896	06-4036	2-3	-0.085
AAB7897	06-4037	0-0.5	0.804(J)
AAB7898	06-4037	1.5-2.5	-0.028
AAB7898D	06-4037	1.5-2.5	0.053
AAB7899	06-4037	3-4	-0.052
AAB7900	06-4037	3-4	0.001
Former Generator Building			
AAB7901	06-4038	0-0.5	0.411(J)
AAB7901D	06-4038	0-0.5	NA
AAB7902	06-4038	5-6	-0.026
AAB7903	06-4039	0-0.5	0.079(J)
AAB7904	06-4039	5-6	0.055(J)
AAB7905	06-4040	0-0.5	0.197(J)
AAB7906	06-4040	4.83-5.83	-0.024

* N/A = not applicable

No organic compounds were identified in the organic chemical evaluation, Section 5.9.7, as COPCs requiring further evaluation in the risk-based screening assessment.

Seven inorganic chemicals, barium, cobalt, copper, lead, manganese, nickel, and zinc, were reported in site samples at levels that exceed Laboratory-background UTL. None of these constituents exceeded SAL in any sample, and the seven chemicals were

evaluated for noncarcinogenic MCE. The toxic effect of total uranium was also evaluated as part of the noncarcinogenic MCE. This required the conversion of isotopic uranium activities (pCi/g) to concentrations (mg/kg) followed by summing to estimate the total uranium concentration for inclusion in the MCE. The total noncarcinogenic and radiologic MCEs were determined to be 1 and 0.4, respectively. The results of the MCE calculations are presented in Table 5.9.8-2.

TABLE 5.9.8-2
MULTIPLE CHEMICAL EVALUATION FOR SOIL SAMPLES AT PRS AGGREGATE 6-003(a)

Chemical	Location ID	Sample ID	Maximum Sample Value	Soil SAL ^a	Normalized Value
Noncarcinogenic Effects (mg/kg)					
Barium	06-4005	AAB7845	653	5300	0.12
Cobalt	06-4004	AAB7843	25	4600	0.01
Copper	06-0001	0506-97-0001	43.3	2800	0.02
Lead	06-4002	AAB7840	39.1	400	0.10
Manganese	06-4004	AAB7843	2350	3200	0.73
Nickel	06-4040	AAB7906	23.3	1500	0.02
Zinc	06-4002	AAB7840	112	23000	0.005
Uranium	06-4003	0506-97-0001	12.71	230	0.05
				Total ^b :	1.1
Carcinogenic Effects of Chemicals (mg/kg)					
RDX	06-0001	0506-97-0001	0.485	4.0	0.12
TNT	06-0001	0506-97-0001	0.498	15	0.03
				Total ^b :	0.2
Carcinogenic Effects of Radionuclides (pCi/g)					
Uranium-234	06-0001	0506-97-0001	3.67	13	0.28
Uranium-235	06-0001	0506-97-0001	0.197	10	0.02
Uranium-238	06-0001	0506-97-0001	4.22	67	0.06
				Total ^b :	0.4

a. SAL = screening action level

b. Total may not equal sum of normalized values due to rounding

5.9.9 Human Health Risk Assessment

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

5.9.10 Preliminary Ecological Assessment

In cooperation with the NMED and EPA Region 6, the Laboratory ER Project is developing an approach for ecological risk assessment. Further ecological risk

assessment at PRS Aggregate 06-003(a) will be deferred until the site can be assessed as part of the ecological exposure unit methodology currently being developed.

5.9.11 Conclusions and Recommendations

PRS aggregate 6-003(a) has been characterized through the analysis and evaluation of Phase I RFI sampling activities. This characterization was reconnaissance in nature and intended to sample media most likely to have been maximally impacted by previous site activities. Based on existing site information, presented in the Work Plan, this was achieved, particularly with the additional sampling of sediment material from the filter pit.

The filter pit is significant in that it represents the lowest point for physical migration of materials within the concrete bowl. In addition, site documents indicate that operational activities included direction of test materials toward the sump for recovery in its filter media.

Based upon review of the entire data set for all media across the aggregate, there is no apparent widespread distribution of any constituents at concentrations substantially greater than background. No RCRA-regulated constituents were reported in any PRS aggregate sample at a level that exceeds SAL. One radionuclide, Cs-137, was reported at the site exceeding SAL. This radionuclide is a nuclear fission product that was not associated with the testing activities performed at the site. Its presence probably results from the deposition and accumulation of atmospheric fallout within the basin. This scenario is reasonable, particularly upon further consideration of the physical properties of the site and Cs-137.

Cesium-137 from atmospheric fallout would tend to become strongly associated with surface soil particles, particularly clay fragments. These surface soil particles would be mobile in the relatively windy northern New Mexico area, and the windblown soil would tend to collect and be retained in the physical depression created by the concrete bowl. Cesium-137 does not strongly adsorb to concrete, and it would tend to further accumulate and be concentrated in the ponded sediments of the bowl. Soil material entering the bowl would also tend to be retained through the sedimentation and soil building processes occurring within the bowl.

In the period since its active use, various plant species have successfully colonized parts of the bowl structure. In particular the expansion joints have become inhabited by grasses, herbaceous plants, sumac, and willow species. This vegetative succession has resulted in the deposition of an organic layer 12- to 18-in. wide and 2- to 3-in. deep over the expansion joints of the concrete bowl. Cesium is known to become incorporated into plant biomass following foliar deposition during fallout (Lane 1989, 56382). This process would act to further accumulate and retain cesium within the relatively closed system of the concrete-bowl environment. Based on these properties and the lack of direct operational association with the site, it is believed that the reported Cs-137 concentrations are the result of global fallout and do not represent a site release.

Cesium-137 is not regulated under RCRA, and the processes outlined above reasonably account for its presence at somewhat elevated levels. Furthermore, the Laboratory radionuclide SALs are based on a conservative target dose level of 10 mrem/yr, one tenth of the annual effective dose rate of 100 mrem/yr established by DOE as the limit for environmental exposure to the public from all sources. The maximum reported Cs-137 activity at the site would, therefore, represent less than 25% of the 100 mrem/yr DOE limit for a person occupying the bowl for one year. Cesium-137 is not considered to be a COPC at this PRS, nor does its presence prevent a proposal of NFA for the following reasons: (1) Cs-137 at the site does not appear to be present due to PRS activities; (2) Cs-137 is present above the conservative risk-based SAL in one sample; and, (3) based on site access controls and an assumed 30-yr operational and

institutional control of the PRS by DOE, one half of the Cs-137 will decay during this time, further reducing its activity.

A conservative evaluation of all other site-related COPCs has been performed through the screening assessment process. Two HE compounds, TNT and RDX, were reported at low levels in the filter pit sediment sample. All other reported organic compounds were evaluated and eliminated in Section 5.9.7. The total normalized carcinogenic MCE of 0.2 for the remaining chemicals indicates little potential for risk regardless of the limited exposure area and pathways presented at the site.

Depleted uranium, which was associated with the PRS, was evaluated for radionuclide-induced carcinogenic effects. The maximum reported activities of U-234, -235, and -238, when incorporated into the MCE, result in a total normalized value of 0.4, which is less than the threshold of 1.0, and indicates little potential for adverse human health effects due to exposure to these radionuclides.

COPCs eliciting noncarcinogenic effects, including total uranium, were evaluated through the calculation of a noncarcinogenic MCE. As previously stated, there was no widespread or general pattern of contaminant release at the PRS and the noncarcinogenic MCE represents the evaluation of the maximum observed concentrations across the PRS. The total normalized MCE of 1.1 slightly exceeded the threshold of unity. Manganese is the apparent risk driver in this calculation, contributing an individual normalized value of 0.7 to the total of 1.1. Manganese was reported in two PRS locations at concentrations above Laboratory-background UTL. Both locations were at depth, i.e., subsurface samples taken from the concrete bowl perimeter and the former generator building area. This constituent is not operationally associated with the areas or soil intervals investigated and probably represents anomalies or natural variability. Manganese is an essential human nutrient with a recognized Estimated Safe and Adequate Daily Dietary Intake (National Research Council). It is not extremely toxic with a residential soil SAL of 3200 mg/kg. Ingestion of the maximum reported site soil concentration at the default intake rate of 200 mg/day would not exceed the Estimated Safe and Adequate Daily Dietary Intake for any age group. Therefore, it is concluded that the slightly elevated noncarcinogenic MCE does not indicate an unacceptable human health risk under current or future conditions, and the site is proposed for NFA.

This recommendation is based on the NFA criterion 4 (Los Alamos National Laboratory, Environmental Restoration Department, Project Consistency Team Policy number 015) that 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 will be requested to remove this site from the HSWA Module of the Laboratory's RCRA operating permit.

5.9.12 Sampling and Analysis Plan for Concrete Bowl Decision Set, PRSs 06-003(a) 6-008 and C-6-019

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

5.10 Potential Release Site - 06-001(a)

PRS 06-001(a), shown in Figure 5.10-1, is an inactive septic tank and runoff area. The system served buildings TA-6-1 and TA-6-3. Contaminants observed include inorganics and low-level organic compounds. The PRS is recommended for NFA. As a best

management practice, it is recommended that the tank be filled with clean material and left in place.

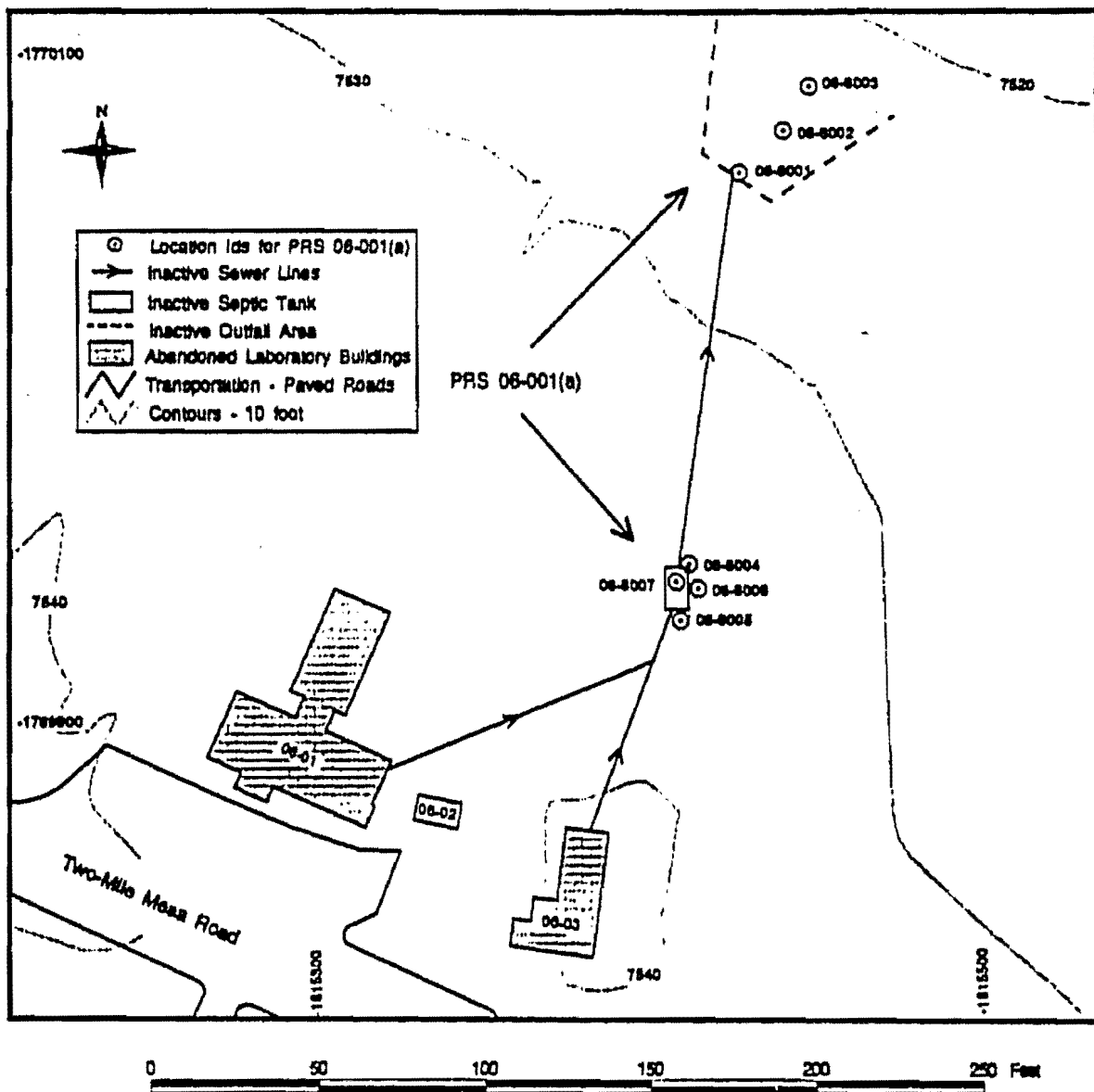


Figure 5.10-1. Locations of PRS 06-001(a) samples.

5.10.1 History

PRS 06-001(a) is discussed in further detail in Section 5.6 of the RFI Work Plan for OU 1111 (LANL 1993, 26068).

Building TA-6-1 housed a laboratory and a carpenter shop. The laboratory was used in 1944 to develop analytical procedures for nonradioactive cobalt tracer tests. An acid-resistant workbench containing a lead sink connected to the septic system suggests that chemical wastes may have been discharged into the septic system.

Building TA-6-3 contained a darkroom and a laboratory with a lead-lined sink. Diethyl ether was used for a short time in the laboratory in the analysis of cobalt tracer shots. From 1948 until the early 1950s, the building contained a firing control panel and a

bridgewire-testing laboratory. Testing involved the use of industrial chemicals such as alcohol, acetone, carbon tetrachloride, and dilute acids. In 1972, it was remodeled into a printed circuit shop with a darkroom. The printed-circuit operation used solvents and etching chemicals. The building was later used as a silk-screen facility involving paints, inks, and solvents; that operation continued until the mid 1980s. Archival information suggests that levels of contaminants at this PRS are likely to be low due to limited operational use of hazardous materials.

Septic system 6-001(a) is inactive, and the drain line was plugged in 1988. Prior to capping, effluent from the tank discharged through drain lines to an outfall. Inspection of the septic tank in July 1992, showed that it was empty. Potential areas of concern for investigation include: the tank, soil surrounding the tank, soil surrounding tank influent and effluent drain lines, and the outfall area. Possible contaminants in this septic system are silver, darkroom chemicals, paint, ink, diethyl ether, acids, lead, etching chemicals, explosives and their residues, and solvents (alcohol, acetone, and carbon tetrachloride).

5.10.2 Description

No further site-specific information on geology, hydrology, soils, or wildlife habitat associated with this PRS is required. General area geology, hydrology, soils, or wildlife habitat information associated with this PRS is presented in Chapter 2.

5.10.3 Previous Investigation(s)

No previous investigations have been performed at this site.

5.10.4 Field Investigation

The objective of the investigation was to determine if COPCs are present in the inactive septic tank, in media surrounding the septic tank, or in the runoff area of the system; and, if present, do the COPCs represent an unacceptable human health risk based on the result of a comparison to SAL and/or MCE. The conceptual release model for the PRS is based on the design and operation of a septic tank and outfall system. Operationally, waste material is conveyed to the tank via the influent piping. Biological material is degraded in the tank while nonbiodegradable materials, such as metals, are allowed to settle out of solution and be retained in the tank as sediment for occasional removal. Effluent with a substantially reduced waste loading is then released via the tank's effluent piping to an outfall or seepage area where percolation of liquids into the surrounding strata occurs. Accumulation of any solutes or solids contained in the effluent would be expected to occur in the outfall area.

The septic tank, drain lines, and outflow areas are the primary sources of potential contamination, and the sampling plan was designed to investigate the potential release of materials to the surrounding media through cracks or leaks in the septic system. Laboratory documents indicate that a sand filter was installed at PRS 06-001(a) and received effluent discharged from the septic tank. A field reconnaissance conducted on 15 April 1994, prior to sampling, determined that no sand filter was in fact present, and sampling of the outfall occurred within the surface drainage area.

Field sampling activities at PRS 06-001(a) were completed on 18 July 1994. The septic tank was essentially empty at the time of the investigation, and two sludge samples were obtained from the interior of the tank for analysis (three samples were specified in the work plan for collection, but there was only sufficient material for 2 samples).

The investigation of the soils surrounding the septic tank required the collection of samples from core (locations 06-6004 through 06-0006) taken at the tank inlet, the outlet, and at a third location judged by field personnel most likely to contain

contaminants. These cores were sampled at the depth of the tank outlet, the tank bottom, and 3 ft below the bottom of the tank.

Three locations were sampled in the runoff area (locations 06-6001 through 06-6003) at the surface (0-0.5 ft) and subsurface (0.5-1.5 ft) for analysis. One sample location was within 6 ft of the outfall. The other two locations were no more than 15 ft from the outfall, and samples were collected from sediment accumulations or along the outflow channel if no sediment accumulations were available. Samples were submitted for metals, VOCs, SVOCs, and HE analyses.

All sample locations were field screened for radioactivity, organic vapors, and HE prior to sample collection. All field screening results were negative or at background levels.

See Figure 5.10-1 for the location of sampling points at this PRS.

Table 5.10.4-1 presents a summary of samples taken for PRS 06-001(a).

**TABLE 5.10.4-1
SUMMARY OF SAMPLES TAKEN**

Location ID	Sample ID	Depth (ft)	Media	VOCs*	SVOCs*	High Explosives*	Inorganic Chemicals*
Outfall Drainage							
06-6001	AAA8861	0-0.5	soil	NA*	18265	18519	18511
06-6001	AAA8862	0.5-1.5	soil	NA*	18265	18519	18511
06-6002	AAA8863	0-0.5	soil	NA*	18265	18519	18511
06-6002	AAA8864	0.5-1.5	soil	NA*	18265	18519	18511
06-6003	AAA8865	0-0.5	soil	NA*	18265	18519	18511
06-6003	AAA8866	0.5-1.5	soil	NA*	18265	18519	18511
Tank Area							
06-6004	AAA8867	2-3	soil	18265	18265	18519	18511
06-6004	AAA8868	2-3	soil	18265	18265	18519	18511
06-6004	AAA8869	5.5-6.5	soil	18265	18265	18519	18511
06-6004	AAA8870	8.5-9.5	soil	18265	18265	18519	18511
06-6005	AAA8871	1-2.6	soil	18265	18265	18519	18511
06-6005	AAA8872	5-6	soil	18265	18265	18519	18511
06-6005	AAA8873	8-9	soil	18265	18265	18519	18511
06-6006	AAA8874	1.5-2.6	soil	18265	18265	18519	18511
06-6006	AAA8875	1.5-2.6	soil	18265	18265	18519	18511
06-6006	AAA8876	5-6	soil	18265	18265	18519	18511
06-6006	AAA8877	8.5-9.5	soil	18265	18265	18519	18511
Tank Sludge							
06-6007	AAA8878	0-0.17	sludge	NA*	18265	18519	18511
06-6007	AAA8879	0-0.17	sludge	NA*	18265	18519	18511

* Request number

a. NA = not analyzed

5.10.5 Evaluation of Inorganic Chemicals

Inorganic chemicals with concentrations at or above background at PRS 06-001(a) are presented in Table 5.10.5-1, and the locations are plotted in Figure 5.10.5-1. All inorganic analyses for this PRS exceeded holding times, and the qualifiers shown in the table have been assigned during baseline data validation. However, as presented in Section 4.1.1, review of the data packages indicates that the results do not appear to have been adversely affected by the extended holding time. The data indicate that the environmental sample data are acceptable, although there is a potential slight high bias in the arsenic and antimony results and a slight low bias in chromium results. Any bias or uncertainty indicated for specific analytes in the focused validation would not impact the site-specific decisions.

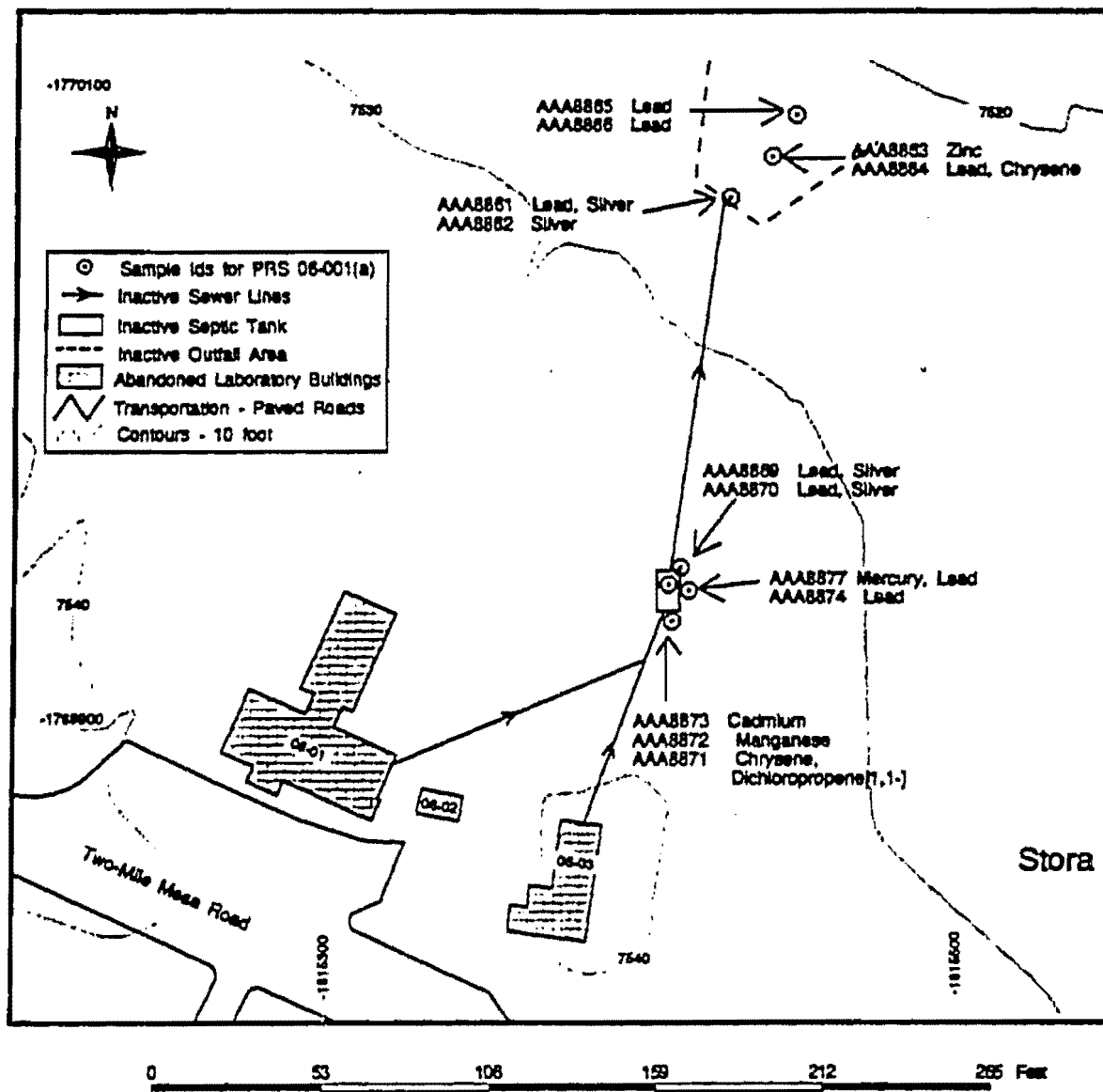


Figure 5.10.5-1. Locations of analytes that exceed background (UTLs and EQLs) and/or that exceed SALs at PRS 06-001(a).

Eighteen inorganic chemicals were detected in septic tank contents. Tank contents cannot be compared to soil background values or soil SALs.

As stated in Section 5.10.4, Field Activities, there was a very limited amount of sludge material remaining in the tank at the time of the field investigation. Only one sludge sample and field duplicate could be obtained due to this lack of material. The tank contents samples with their associated inorganic chemicals were eliminated from further consideration because of the following conditions: (1) very little contaminated sludge remains in the tank; (2) the tank is proposed to be backfilled with clean material and abandoned in place; and (3) there is no viable exposure pathway to the tank contents under current or future conditions.

Six inorganic chemicals were reported in soil samples collected outside the tank and in the outfall area at elevated concentrations. No additional statistical testing of the data was performed; however, cadmium, mercury, manganese, lead, and zinc all exceeded Laboratory-background UTL for at least one sample. Silver was also reported at somewhat elevated levels in three samples. These chemicals were identified COPCs for further evaluation in the risk-based screening assessment process.

TABLE 5.10.5-1
INORGANIC CHEMICALS WITH CONCENTRATIONS AT OR ABOVE BACKGROUND
SCREENING VALUES FOR PRS 06-001(A)

Sample ID	Depth (ft)	Silver (mg/kg)	Arsenic (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Copper (mg/kg)	Iron (mg/kg)	Mercury (mg/kg)
Tank Contents								
AAA8878	0-0.17	99	47.1(J)	2.5	190(J)	1170	77700	341(J)
AAA8879	0-0.17	102	62.3(J)	2.1	164(J)	935	72700	23.2(J)
SAL		380	N/A	38	210	2800	N/A	23
Soil UTL *		2^a	7.82	2.7	19.3	15.5	21300	0.1
Tank Area								
AAA8867	2-3	<1.6	2.2(J)	2.4	9.1(J)	7.4	12900	<0.04(UJ)
AAA8868	2-3	<1.7	2.4(J)	2.2	8.8(J)	6.9	12400	<0.04(UJ)
AAA8869	5-5-6.5	4.9	<0.99	1.3	11(J)	7.9	7410	<0.03(UJ)
AAA8870	8.5-9.5	9.3	<1.2	<1.1	6.3(J)	<4.5	9090	<0.04(UJ)
AAA8871	0-2.6	<0.76	2.2(J)	<0.77	6.5(J)	<4.8	10700	<0.03(UJ)
AAA8871D	0-2.6	NA	NA	NA	NA	NA	NA	NA
AAA8872	5-6	<0.89	<1.1	<1.1	3.5(J)	<5.1	8830	<0.03(UJ)
AAA8872D	5-6	<0.89	0.7	0.8	4.7	5	9172	<0.03(UJ)
AAA8873	8-9	<0.92	<0.98	3.8	4(J)	<4.6	9350	<0.03(UJ)
AAA8874	1.5-2.6	<0.82	3.9(J)	1.6	11.9(J)	9.8	18100	<0.03(UJ)
AAA8875	1.5-2.6	<0.82	4(J)	1.4	10.9(J)	8.1	17700	<0.03(UJ)
AAA8876	5-6	<0.94	<0.51	<0.82	2.5(J)	<1.4	5620	<0.3(UJ)
AAA8877	8.5-9.5	<1.1	<0.87	<0.9	3.4(J)	<2.7	7190	0.58(J)
Drainage area								
AAA8861	0-0.5	3.8	3.9(J)	<0.57	9.7(J)	6.8	11100	<0.09(UJ)
AAA8862	0.5-1.5	<1.2	2.8(J)	1.9	7(J)	7.9	9820	<0.03(UJ)
AAA8862D	0.5-1.5	1.1	2.7	1.1	5.3(J)	5.1	7666	0.04(UJ)
AAA8863	0-0.5	<0.75	2.4(J)	1.1	5.7(J)	6.5	8420	<0.04(UJ)
AAA8864	0.5-1.5	<1.8	6.1	<0.91	11.1(J)	10.9	16800	<0.09(UJ)
AAA8865	0-0.5	<0.76	3.6(J)	<0.82	7.5(J)	7.4	11900	<0.03(UJ)
AAA8866	0.5-1.5	<0.9	4.3(J)	<0.62	9.1(J)	6.8	14700	<0.08(UJ)
a. Upper tolerance limit of Laboratory-wide background data from A, B, and C horizons. b. NA = not analyzed N/A = not applicable c. Background data not available; sample-specific detection limit (DL) used as screening criteria								

**TABLE 5.10.5-1 (cont.)
INORGANIC CHEMICALS WITH CONCENTRATIONS AT OR ABOVE
BACKGROUND SCREENING VALUES FOR PRS 06-001(a)**

Sample ID	Depth (ft)	Manganese (mg/kg)	Lead (mg/kg)	Antimony (mg/kg)	Selenium (mg/kg)	Vanadium (mg/kg)	Zinc (mg/kg)
Tank Contents							
AAA8878	0-0.17	31.2	2820	17.8(J)	4.1	184	129
AAA8879	0-0.17	33.9	3160	16.6(J)	4.4	191	115
SAL		3200	400	31	380	540	23000
Soil UTL *		714	23.3	1	1.7	41.9	50.8
Tank Area							
AAA8867	2-3	262	15.2	<4.5	0.43	<21.7	26.4
AAA8868	2-3	315	14.6	<5.9	0.43	<22.1	23.5
AAA8869	5-5-6.5	64.6	38.6	<5.2	0.5	<4.7	37.5
AAA8870	8.5-9.5	68.6	49.5	<5.3	0.5	<7	46.3
AAA8871	0-2.6	324	13.2	<4.3	<0.41	20.9	19.1
AAA8871D	0-2.6	NA	NA	NA	NA	NA	NA
AAA8872	5-6	660	11	<5.1	1.5	<8.6	27.2
AAA8872D	5-6	754	8.83	<5.1	0.7	8.6	27.2
AAA8873	8-9	251	11.5	<5.2	1.3	<6.8	38.9
AAA8874	1.5-2.6	271	34.8	<4.7	<0.53	29.2	32.4
AAA8875	1.5-2.6	270	19.6	<4.7	<0.44	27.7	31.7
AAA8876	5-6	78.2	16.7	<5.3	<0.66	<3.5	39.9
AAA8877	8.5-9.5	113	39.9	<5.4	<0.51	<6.6	45.3
Drainage Area							
AAA8861	0-0.5	338	64.2	<4.3	<0.6	21.2	41.1
AAA8862	0.5-1.5	166	12.8	<4.6	<0.62	16.1	37.8
AAA8862D	0.5-1.5	244	14	<4.6	0.8	12.2	39
AAA8863	0-0.5	226	17.7	<4.3	<0.59	17.6	54.5
AAA8864	0.5-1.5	136	88.4	<6	<0.44	26.3	39
AAA8865	0-0.5	362	30.4	<4.3	<0.41	22.1	36.5
AAA8866	0.5-1.5	169	27.4	<5.1	<0.49	22.2	36.9

a. Upper tolerance limit of Laboratory-wide background data from A, B, and C horizons.

b. NA = not analyzed N/A = not applicable.

5.10.6 Evaluation of Radionuclides

No radionuclide analyses were requested for this PRS.

5.10.7 Evaluation of Organic Chemicals

Detected organic chemicals at PRS 06-001(a) are presented in Table 5.10.7-1, and the locations are plotted in Figure 5.10.5-1. The qualifiers shown in the table have been assigned during baseline data validation. The results of the focused data validation, presented in Section 4.3.1, indicate that the VOC data are usable without qualification, and the SVOC data are potentially biased low but usable as reported with that consideration. All HE analyses exceeded the prescribed holding times, and the focused validation indicates that the HE results are biased low and may be used accordingly. Review of the data determined that any bias or uncertainty indicated for specific analytes in the focused validation would not impact the site-specific decisions.

One VOC, 1,1-dichloropropene, was reported above its EQL in one soil sample collected at the PRS. This compound was reported at 0.006 mg/kg relative to its EQL of 0.005 mg/kg. Because this compound was reported at a concentration that is virtually the same as its EQL, was positively reported in only one site sample, has no established SAL, and there is no indication of additional VOC contamination at the site, 1,1-dichloropropene was eliminated from further consideration.

One SVOC, chrysene, was reported in two site samples at levels that just exceed its EQL. Chrysene is a polycyclic aromatic hydrocarbon (PAH), which is a family of common environmental contaminants associated with the combustion of coal, engine exhaust, open burning, and asphalt products. Chrysene was identified for further evaluation at the PRS.

No HE compounds were detected in any site samples, and all samples missed analytical holding times. Focused data validation, as reported in Section 4.3.1, indicates that while the HE results may be biased low, they are usable for site decisions. Because no HE was reported above EQL in any sample and the investigation was biased toward sampling maximally contaminated media including tank contents, the conclusion is that no HE contamination is present at the site. HE was, therefore, eliminated from further consideration at the PRS.

**TABLE 5.10.7-1
DETECTED ORGANIC CHEMICALS FOR PRS 06-001(a)**

Sample ID	Depth (ft)	Chrysene (mg/kg)	Dichloropropene [1,1-] (mg/kg)
SAL	N/A ^a	61	N/A
EQL	N/A ^a	0.33	0.005
Drainage			
AAA8864	0.5-1.5	0.39(J)	NA ^a
Tank Area			
AAA8871	1-2.6	<0.34	0.006

a. NA = not analyzed. N/A = not applicable.

5.10.8 Risk-Based Screening Assessment

The screening assessment for PRS 6-001(a) is being limited to those COPCs identified outside the septic tank. This includes the inorganics, silver, cadmium, mercury, manganese, lead, and zinc as well as the single organic compound, chrysene. None of the six inorganic chemicals exceed SAL in any sample taken outside the septic tank. All six are associated with noncarcinogenic effects and result in a total normalized MCE of 0.6.

Chrysene, the single organic compound identified in Section 5.10.7 above EQL, is associated with carcinogenic effects. The maximum reported concentration (0.39 mg/kg) was only 2% of the SAL of 61 mg/kg (normalized value < 0.02). Because no other carcinogenic compounds were identified previously, no MCE or further evaluation of chrysene is required.

The results of the MCE for PRS 6-001(a) are presented in Table 5.10.8-1.

**TABLE 5.10.8-1
MULTIPLE CHEMICAL EVALUATION FOR SOIL SAMPLES AT PRS 6-001(a)**

Chemical	Location ID	Sample ID	Maximum Sample Value	Soil SAL ^a	Normalized Value
Noncarcinogenic Effects (mg/kg)					
Silver	06-6004	AAB8870	9.3	380	0.02
Cadmium	06-6005	AAB8873	3.8	38	0.1
Mercury	06-6006	AAB8877	0.58(J)	23	0.03
Manganese	06-6005	AAB8872D	754	3200	0.24
Lead	06-6002	AAB8864	88.4	400	0.22
Zinc	06-6002	AAB8863	54.5	23000	0.002
				Total ^b	0.6

a. SAL = screening action level

b. Total may not equal sum of normalized values due to rounding

Based on the result of the screening assessment, no COPCs have been identified for further assessment, and no further evaluation is required.

5.10.9 Human Health Risk Assessment

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

5.10.10 Preliminary Ecological Assessment

In cooperation with the NMED and EPA Region 6, the Laboratory ER Project is developing an approach for ecological risk assessment. Further ecological risk assessment at PRS 06-001(a) will be deferred until the site can be assessed as part of the ecological exposure unit methodology currently being developed.

5.10.11 Conclusions and Recommendations

PRS 6-001(a) has been characterized and assessed based on the results of a Phase I, reconnaissance level investigation. Qualitatively, the results indicate that the system operated as intended, with substantial concentrations of inorganic contaminants retained in the limited septic sludge remaining in the tank. No general organic chemical

contamination is indicated by the sampling results, further supporting the effective operation of the system. Due to the limited volume of residual sludge material, its location in an apparently intact septic tank, and the proposed Laboratory management action of backfilling the empty tank with clean material, further minimizing future migration or exposure potential, the sludge media and its contaminants are not considered to present a human health risk under current or future conditions.

Qualitatively, a review of the soil sampling data indicates no substantial leakage of waste material from the tank to the surrounding soil media. The only consistent association between tank-sludge contaminants and non-tank soil contaminants is evidenced in three elevated silver results and eight lead results somewhat elevated relative to background UTL. No pattern of release and unacceptable contamination of media outside the tank is indicated by the sampling results.

In addition, samples taken within the effluent drainage do not indicate a general release of contaminants from the tank in the waste effluent. The drainage sampling appears to adequately addresses the extent of contamination and shows no increasing trends in contaminant concentration downgradient.

Based on the location and limited volume of hazardous material within the inactive septic tank, the recommendation for this PRS is to fill the septic tank with clean material and leave in place. NFA is recommended for the remaining media at PRS 06-001(a).

This recommendation is based on the NFA criterion 4 (Los Alamos National Laboratory, Environmental Restoration Department, Project Consistency Team Policy number 015) that 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 will be requested to remove this site from the HSWA Module of the Laboratory's RCRA operating permit.

5.10.12 Sampling and Analysis Plan for PRS 06-001(a)

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

5.11 Potential Release Site - 06-001(b)

PRS 06-001(b), shown in Figure 5.11-1, includes an inactive septic tank, filter trench, and outfall area that served buildings TA-6-5, -6-6, and -6-8. Contaminants observed at the site include inorganics and one SVOC. The recommendation for the PRS is NFA. The management option of filling the septic tank with clean material and leaving in place will be considered at the site.

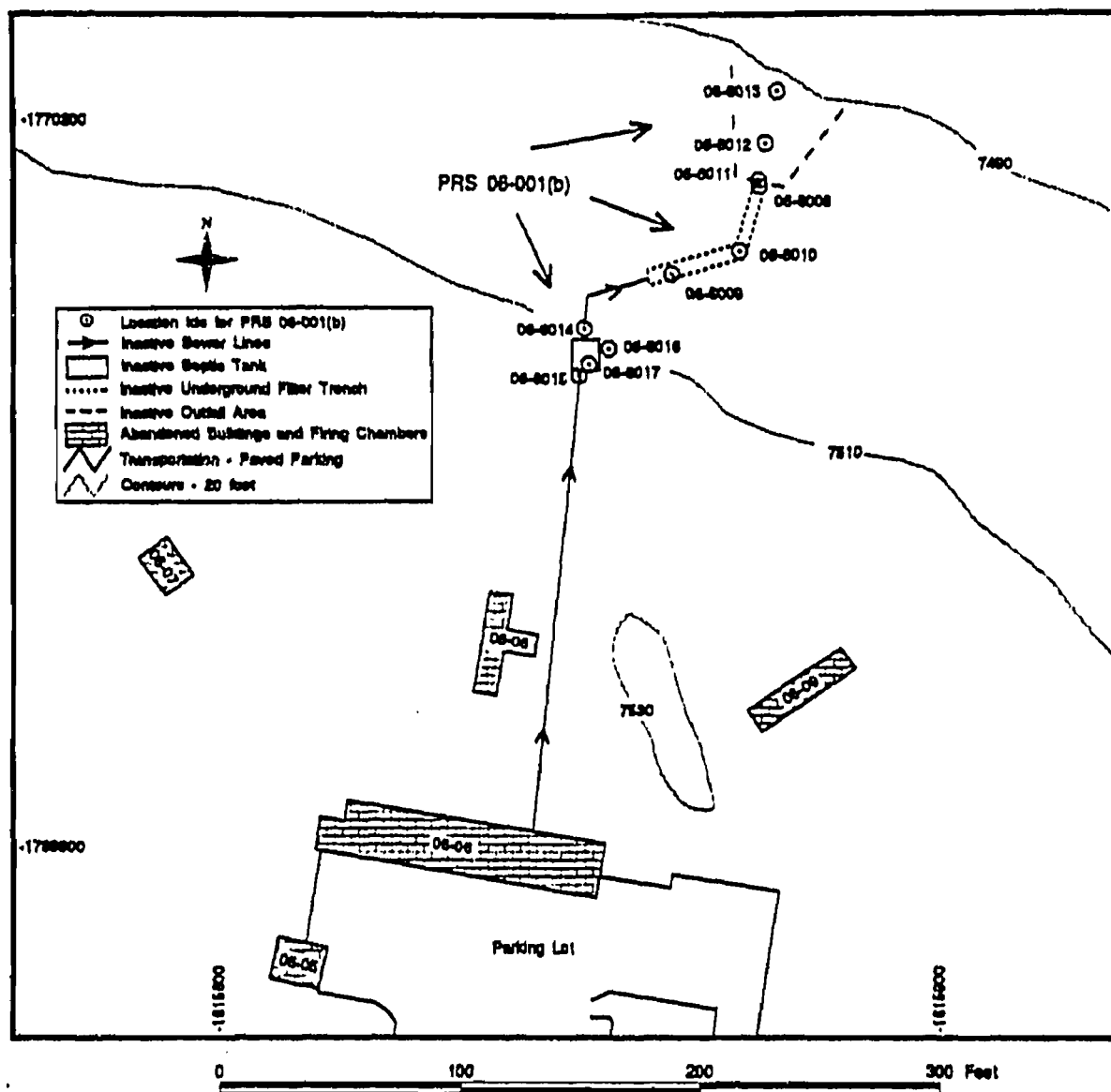


Figure 5.11-1. Locations of PRS 06-001(b) samples.

5.11.1 History

PRS 06-001(b) is discussed in further detail in Section 5.6 of the RFI Work Plan for OU 1111 (LANL 1993, 26068).

PRS 06-001(b) served Buildings TA-6-6, TA-6-5, and TA-6-8 at various times until its deactivation in 1989. Building TA-6-6 originally housed Laboratory operations relating to detonator assembly, an electronics work room, a chemistry laboratory, darkrooms, and rest rooms. Soldering and metal cleaning with nitric acid also took place in TA-6-6. The janitors' sink in TA-6-6 frequently received rinsate from copper, brass, and steel parts dipped in strong (5 molar, +/-) nitric acid for removal of silver solder flux and oxidized metals. Carbon tetrachloride and other solvents may have been used in the detonator assembly process.

Sinks in Buildings TA-6-5 and TA-6-8 also drained to 6-001(b). From 1972 through 1976, uranium hexafluoride was used in experiments at TA-6-8. The isotopically natural uranium hexafluoride was used in an apparatus installed inside the frame-constructed

portion of TA-6-8 and on its concrete apron. There was a temporary plywood shelter for a vacuum pump along the south wall of the eastward frame extension of TA-6-8 associated with these experiments. There is no indication that UF₆ was released to the septic system during these experiments, and radionuclides were not identified for analysis at this PRS.

Explosives were present in these facilities in partial assemblies; however, it is unlikely any release of explosives occurred because they were in the form of pressed pellets and subject to careful handling and accountability procedures. Possible contaminants in this septic system include darkroom chemicals, acids, metals, carbon tetrachloride, and solvents.

5.11.2 Description

No further site-specific information on geology, hydrology, soils, or wildlife habitat associated with this PRS is required. General area geology, hydrology, soils, or wildlife habitat information associated with this PRS is presented in Chapter 2.

5.11.3 Previous Investigation(s)

No previous investigations have been performed at this site.

5.11.4 Field Investigation

The objective of the investigation at PRS 06-001(b) was to determine if COPCs are present in the inactive septic tank, in media surrounding the septic tank, the sand filter trench, or outfall area of the system, and pose an unacceptable human health risk based on the results of the screening assessment process. Archival information suggests that levels of contaminants at this PRS are likely to be low due to limited operational use of hazardous materials. The septic tank, drain lines, filter trench, and outflow areas are the primary sources of potential contamination, and the sampling plan was designed to investigate the potential release of materials to the surrounding media during normal operations as well as through cracks or leaks in the system.

The conceptual model for the PRS is based on the operational design of a septic system. In this model, waste material is conveyed through a piping system to the septic tank. The tank is intended to provide an environment for the biological degradation of organic waste as well as a containment area to allow the settling and retention of inorganic material in the form of sludge. Retained sludge was expected to have been periodically removed from the tank during its operating life. The settled and relatively "clean" tank effluent was released to a filter trench and outfall area where potential contaminants in the form of solutes may be retained, followed by the percolation of the aqueous phase into the surrounding soil strata. The field investigation was intended to preferentially sample locations and media associated with the septic tank, sand filter trench, and outfall area most likely to have received and retained chemical contaminants. Areas of concern for sampling include septic tank inlet and outlet connections, effluent release points, and outfall sedimentation areas.

Field sampling activities at PRS 06-001(b) were completed on 20 July 1994. The investigation of the septic tank required the collection of core samples at the tank inlet, the outlet, and at a third location judged most likely to contain contaminants (locations 06-6014 through 06-6016). These cores were sampled at the depth of the tank outlet, the tank bottom, and 3 ft below the bottom of the tank.

Three locations were specified for sampling in the filter trench, one as close as possible to the outfall pipe, one at the center of the trench, and one at the point of lowest elevation within the trench. These locations (06-6008, 06-6009, and 06-6010) were sampled at the surface (0-0.5 ft) and subsurface (3 ft below the depth of the outfall drain

or at the soil-tuff interface). An additional three locations were identified for sampling in the filter trench runoff area. These locations included one sample as close as possible to the filter trench effluent pipe (and no further than 6 ft from the pipe) and two additional locations at 15-ft intervals downgradient in likely sedimentation areas. These locations (06-6011 through 06-6013) were sampled at the surface and at the 0.5- to 1.5-ft interval.

The RFI Work Plan specified the collection of three widely spaced samples from each layer of sludge or liquid inside the tank. Due to the absence of sludge in the tank, only two duplicate samples of the septic tank's liquid contents (sample number AAA8903, AAA8404, AAA8905, and AAA8906) were obtained at the surface and at the 2-ft-depth bottom of the tank, and the sampled contents were analyzed and reported as liquid matrices.

Chemicals identified for analysis in the RFI Work Plan included: metals, SVOCs, VOCs, and HE. All sample locations were field screened for radioactivity, organic vapors, and HE prior to sample collection. All field screening results were negative or at background levels.

See Figure 5.11-1 for the location of sampling points at this PRS.

A summary of samples taken at PRS 06-001(b) is presented in Table 5.11.4-1.

**TABLE 5.11.4-1
SUMMARY OF SAMPLES TAKEN**

Location ID	Sample ID	Depth (ft)	Media	VOCs*	SVOCs*	High Explosives*	Inorganic Chemicals*
Filter Trench							
06-6008	AAA8882	0-0.5	soil	NA	18182	18184	18217
06-6008	AAA8883	1.5-2.5	soil	NA	18182	18184	18217
06-6009	AAA8884	0-0.5	soil	NA	18182	18184	18217
06-6009	AAA8885	2-3	soil	NA	18182	18184	18217
06-6010	AAA8886	0-0.5	soil	NA	18182	18184	18217
06-6010	AAA8887	1.8-2.8	soil	NA	18182	18184	18217
Runoff Area							
06-6011	AAA8888	0-0.5	soil	NA	18182	18184	18217
06-6011	AAA8889	0.5-1.5	soil	NA	18182	18184	18217
06-6012	AAA8890	0-0.5	soil	NA	18182	18184	18217
06-6012	AAA8891	0.5-1.5	soil	NA	18182	18184	18217
06-6013	AAA8892	0-0.5	soil	NA	18182	18184	18217
06-6013	AAA8893	0.5-1.5	soil	NA	18182	18184	18217
Tank Area							
06-6014	AAA8894	1-2	soil	18182	18182	18184	18217
06-6014	AAA8895	6.5-7.5	soil	18182	18182	18184	18217
06-6014	AAA8896	9.5-10.5	soil	18182	18182	18184	18217
06-6015	AAA8897	1-2	soil	18182	18182	18184	18217
06-6015	AAA8898	6.5-7.5	soil	18182	18182	18184	18217
06-6015	AAA8899	9.5-10.5	soil	18182	18182	18184	18217
06-6016	AAA8900	1-2	soil	18182	18182	18184	18217
06-6016	AAA8901	6.5-7.5	soil	18182	18182	18184	18217
06-6016	AAA8902	9.5-10.5	soil	18182	18182	18184	18217
Tank Contents							
06-6017	AAA8903	0-0	water	NA	18182	18184	18217
06-6017	AAA8904	0-0	water	NA	18182	18184	18217
06-6017	AAA8905	2-2	water	NA	18182	18184	18217
06-6017	AAA8906	2-2	water	NA	18182	18184	18217

* Request numbers

5.11.5 Evaluation of Inorganic Chemicals

Inorganic chemicals with concentrations at or above background at PRS 06-001(b) are presented in Table 5.11.5-1, and their locations are plotted in Figure 5.11.5-1. As stated in Section 4.1.2, the data for this PRS require no qualification, are acceptable as reported, and usable for site-specific decisions.

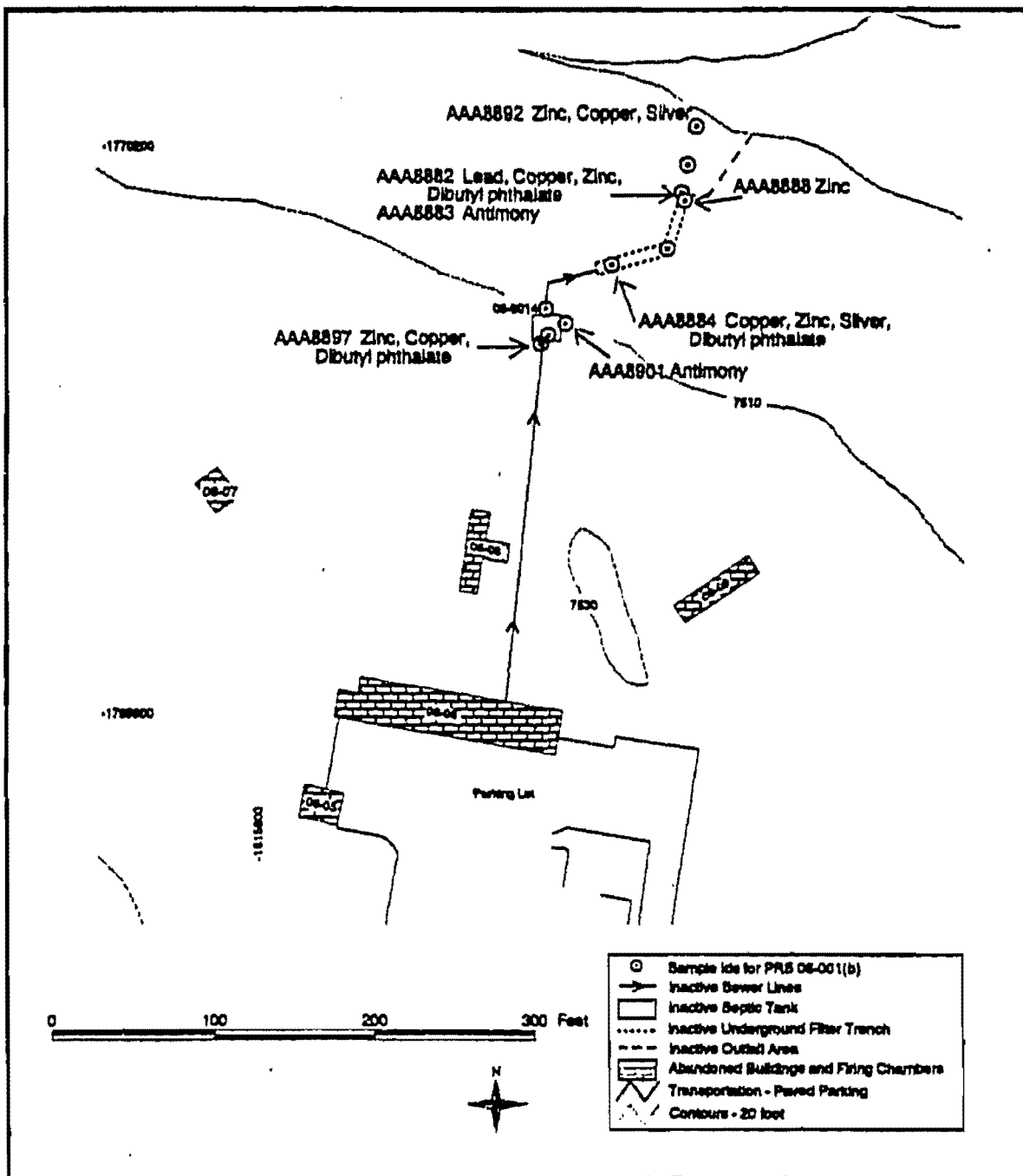


Figure 5.11.5-1. Locations of analytes that exceed background (UTLs and EQLs) and/or that exceed SALs at PRS 06-001(b).

Review of the tank contents analyses found no significant concentrations of hazardous constituents in the liquid material sampled. Most analyses resulted in nondetects with

values reported as less than the reporting limit. The septic tank outlet has been blocked, and no further release of tank contents is occurring; therefore, these data were eliminated from further consideration in this report.

The following inorganic chemicals, copper, lead, antimony, and zinc, were reported in soil samples collected during the investigation at concentrations that exceed their established Laboratory-background UTL. In addition, silver, which is operationally associated with the PRS, was reported in two samples at 2.5 and 5.4 mg/kg. Silver has no established background UTL, and, because these concentrations exceed the EDL, silver was identified for further evaluation. No additional statistical testing of site data was performed. The five listed inorganic chemicals were included as COPCs for further evaluation in the screening assessment.

**TABLE 5.11.5-1
INORGANIC CHEMICALS WITH CONCENTRATIONS AT OR ABOVE
BACKGROUND SCREENING VALUES FOR PRS 06-001(b)**

Sample ID	Depth (ft)	Silver (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Antimony (mg/kg)	Zinc (mg/kg)
SAL	N/A ^b	380	2800	400	31	23000
Soil UTL ^a	N/A	2 ^c	15.5	23.3	1	50.8
Filter Trench						
AAA8882	0-0.5	<0.74	27.6	23.5	<4.2	73.8
AAA8882D	0-0.5	<0.74	25.3	26	<4.2	64.3
AAA8883	1.5-2.5	<0.83	<5.2	8.4	<6	44.7
AAA8883D	1.5-2.5	<0.83	5.3	9.6	5.5	43.1
AAA8884	0-0.5	2.5(J)	33.1	19.6	<4.5	73.5
AAA8884D	0-0.5	NA	NA	NA	NA	NA
AAA8885	2-3	<0.87	<3.1	4.3	<6	17.3
AAA8886	0-0.5	<0.81	13.4	17.7	<4.6	37.8
AAA8887	1.8-2.8	<0.78	13.8	7.8	<5.9	31.4
Runoff Area						
AAA8888	0-0.5	<1.2	15.4	16.9	<6.1	51.1
AAA8889	0.5-1.5	<1.9	9.2	16	<4.9	43.1
AAA8890	0-0.5	<1.6	11.8	11.7	<6	50.4
AAA8891	0.5-1.5	<0.89	<2.6	6.1	<5.1	33.6
AAA8892	0-0.5	5.4(J)	18.5	21.7	<7.6	58.4
AAA8893	0.5-1.5	<0.89	<1.6	3.3	<4.8	32.7
Tank Area						
AAA8894	1-2	<1.4	14.2	11.3	<4.4	42.4
AAA8895	6.5-7.5	<1.1	<1.2	1.5	<5.5	15.2
AAA8896	9.5-10.5	<1	<1.2	2.1	<5.8	30.9
AAA8897	1-2	<1.1	22.1	10.5	<4.8	64.1
AAA8898	6.5-7.5	<0.84	<1.6	1.6	<4.8	27.7
AAA8899	9.5-10.5	<1	<1.5	1.2	<4.7	19.8
AAA8899D	9.5-10.5	NA	NA	NA	NA	NA
AAA8900	1-2	<0.8	<3	7.1	<5.8	15.8
AAA8901	6.5-7.5	<0.84	<1.5	1.6	6	10.8
AAA8901D	6.5-7.5	<0.84	1.3	2.2	NA	10
AAA8902	9.5-10.5	<0.93	<1.4	1.9	<7.6	13.6
AAA8902D	9.5-10.5	NA	NA	NA	NA	NA

a. Upper tolerance limit of Laboratory-wide background values from A, B, and C horizons.

b. N/A = not applicable. NA = not analyzed.

c. Background data not available; Estimated Detection Limit (EDL) used as screening value.

5.11.6 Evaluation of Radionuclides

No radionuclides were identified for analysis at this PRS.

5.11.7 Evaluation of Organic Chemicals

Detected organic chemicals at PRS 06-001(b) are presented in Table 5.11.7-1, and their locations are plotted in Figure 5.11.5-1. The qualifiers shown in the table have been assigned during baseline data validation. The results of the focused data validation, presented in Section 4.3.2, indicate that the VOC data are acceptable as reported without qualification; the SVOC data are potentially biased low with the low bias possibly attributable to improper preparation and storage of QC blind samples. Surrogate recoveries were generally acceptable, and the SVOC data were determined to be usable

as reported. All HE analyses exceeded the prescribed holding times, and the focused validation indicates that the HE results are usable as reported with potential for low bias for nitrotoluenes in soil samples and an expected very low bias on all but HMX and RDX in water samples. No HE contaminants were detected in any site samples, and HE constituents were eliminated from further consideration at the PRS.

One SVOC, dibutyl phthalate, was detected in soil samples at levels that exceed laboratory EQL. Although dibutyl phthalate is a common laboratory contaminant, it was not detected in any associated blank samples and is considered to be present at the reported concentration. This SVOC was, therefore, carried forward in the screening assessment process.

No other VOC, SVOC, or HE constituents were reported in soil samples at levels that exceed their EQL. The focused data validation indicates a potential for low bias in site organic and HE data. However, due to (1) general absence of detected organic compounds, (2) the overall lack of evidence that any additional organic constituents are present in any samples taken at PRS 06-001(a), and (3) the operational history indicating limited use of HE and SVOCs associated with the PRS, no additional organic compounds have been identified for further evaluation.

**TABLE 5.11.7-1
DETECTED ORGANIC CHEMICALS FOR PRS 06-001(b)**

Sample ID	Depth (ft)	Dibutyl phthalate (mg/kg)
SAL	N/A ^a	6500
EQL	N/A ^a	0.33
Filter Trench		
AAA8882	0-0.5	1.2
AAA8884	0-0.5	1.2
Tank Area		
AAA8897	1-2	10

a. N/A = not applicable

5.11.8 Risk-Based Screening Assessment

No chemicals reported in PRS 06-001(b) soil samples exceeded their associated SAL. The five inorganic chemicals and one organic chemical carried forward from the previous screening steps are all associated with noncarcinogenic effects. An MCE for noncarcinogenic effects of silver, copper lead, antimony, zinc, and dibutyl phthalate resulted in a total normalized value of 0.3. This indicates there is little potential for adverse human health effects due to exposure to PRS media.

The results of the MCE are presented in Table 5.11.8-1.

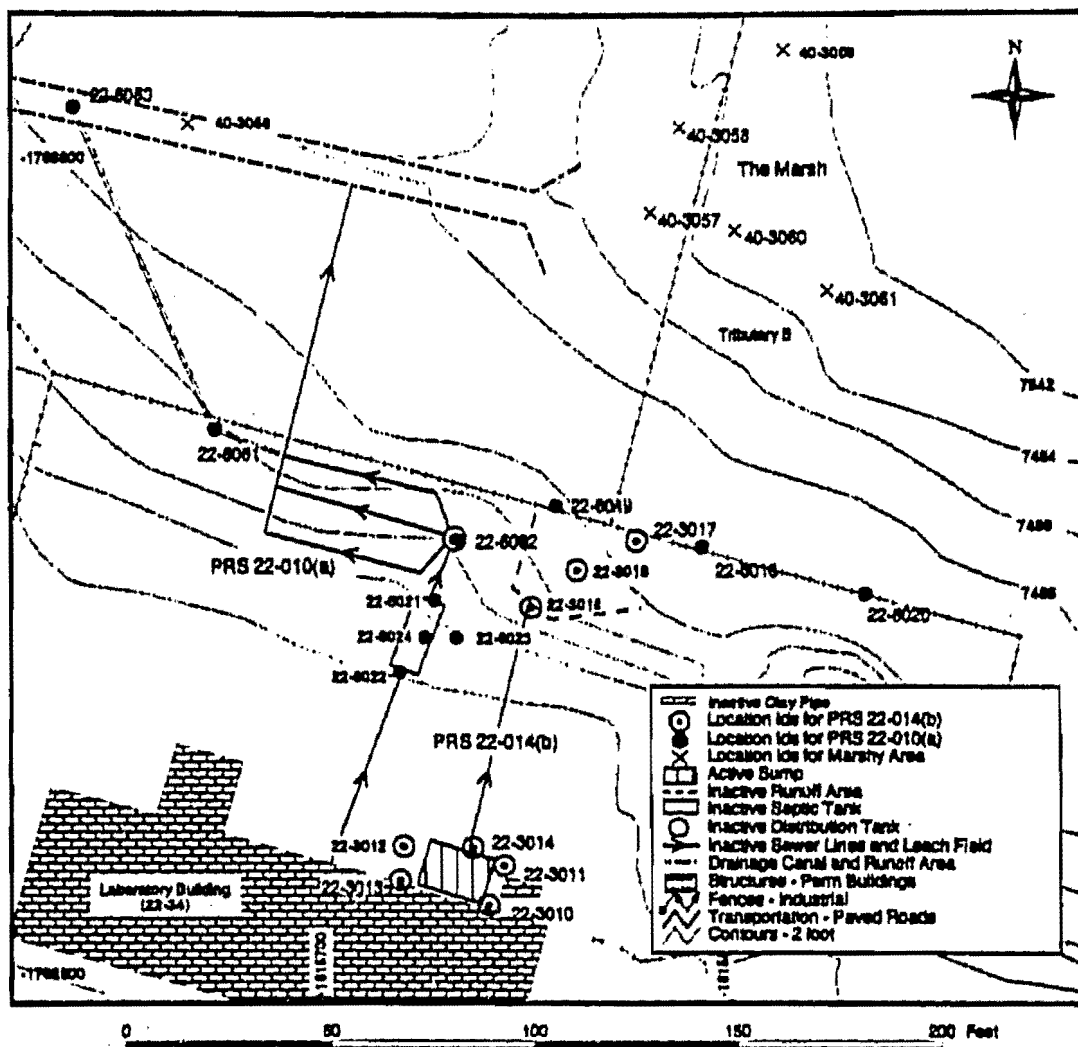


Figure 5.12-1. Locations of PRS 22-010(a), 22-014(b) and 40-005 Marsh Area samples.

5.12.1 History

This PRS is discussed in further detail in Section 5.6 of the RFI Work Plan for OU 1111 (LANL 1993, 26068).

Building TA-22-34, served by PRS 22-010(a), was constructed between 1950 and 1952 as an explosives laboratory (LANL 1993, 26068). The septic tank and associated leach field received sanitary waste from the laboratory (LANL 1990). The septic tank, drain lines, and leach field have been inactive since the septic service at TA-22-34 was routed to the Sanitary Wastewater Systems Consolidation Plant (SWISH) system in 1993. Explosives operations continue in TA-22-34, and materials associated with laboratory operations are acetone, alcohol, and explosives. HE contamination, if present, is most likely to be PETN, RDX, tetryl, and PBX (LANL 1990).

5.12.2 Description

No further site-specific information on geology, hydrology, soils, or wildlife habitat associated with this PRS is required. General area geology, hydrology, soils, or wildlife habitat information associated with this PRS is presented in Chapter 2.

5.12.3 Previous Investigation(s)

In 1972, the septic tank was checked for explosives; none were found (DOE 1987, 52975).

5.12.4 Field Investigation

The objective of the investigation at PRS 22-010(a) was to determine if COPCs are present in the inactive septic tank, in media surrounding the septic tank, or in the leach field area of the system; and, if present, do the COPCs pose an unacceptable human health risk based on the results of the screening assessment process. The septic tank, drain lines, and leach field areas are the primary sources of potential contamination. The sampling plan was designed to investigate the potential release of materials to the surrounding media during normal operations as well as through cracks or leaks in the septic system.

The conceptual model for the PRS is based on the operational design of a septic system. In this model, waste material is conveyed through a piping system to the septic tank. The tank was intended to provide an environment for the biological degradation of organic waste as well as a containment area to allow the settling and retention of inorganic material in the form of sludge. Retained sludge was expected to have been periodically removed from the tank during its operational life. The settled and relatively "clean" tank effluent was then released to a leach field where potential contaminants in the form of solutes may be retained, followed by the percolation of the bulk effluent into the surrounding soil strata. The field investigation was intended to preferentially sample locations and media associated with the septic tank and leach field most likely to have received and retained chemical contaminants. Areas of concern for sampling include septic tank inlet and outlet connections and effluent release areas (leach field). During review and assessment of Phase I field activities, it was determined that sampling points for the leach field for the PRS had been mislocated and not sampled. Therefore, a second round of sampling to address the leach field was planned and executed.

The initial field sampling activities were completed on 25 July 1994. Figure 5.12-1 shows the location of sampling points at this PRS.

The investigation involved sampling of three areas of the system: the septic tank contents, the soils surrounding the septic tank, and the leach field. The septic tank contents were sampled at one location and at three depth intervals (surface, mid-depth, and bottom). The material sampled from the septic tank was sub-sampled by the analytical laboratory with the liquid fraction decanted, analyzed, and reported as if a water matrix had been sampled.

The area surrounding the tank was sampled according to the general strategy presented in the work plan. Three locations were identified to be sampled: the tank inlet (22-6022), the tank outlet (22-6021), and one judgmental location (22-6023) determined by the field team. Each location was cored, and the core was sampled at three intervals: the depth of the tank outlet, the depth of the bottom of the tank, and 3 ft below the bottom of the tank.

The leach field, identified by personnel in the field, was sampled at three locations: at the center of the leach field (22-6018) and at each end of the leach field (22-6019 and 22-6020). Each location was planned to be sampled at two intervals, one at the depth of the drain tile and a second 3 ft below the drain tile. All leach field locations were sampled at 6-7 ft, and two locations were sampled at a deeper interval of 9-10 ft, while one location was sampled at 15 ft.

Review of the mapped leach field sample locations plotted against as built drawings of the leach field indicated that the initial investigation samples were collected outside of

the intended area. Positive location of the leach field, as indicated by the as-built drawings, was later confirmed by site personnel during a subsequent field reconnaissance.

A second sampling activity was conducted at the PRS on 9 April 1997, in order to provide characterization information and assess potential releases and impacts to the leach field area. However, prior to sampling, a ground-penetrating-radar (GPR) survey was conducted to locate the leach field starting at the distribution manhole (ER LOC 22-6062). The GPR detected only one clay pipe bearing west for about 50 ft, then turning northwest to a possible discharge area. Samples were collected at the manhole (22-6062), at an intermediate location (22-6061), and at the end of the clay pipe (22-6063). Samples were collected at the level of the clay pipe (3-5 ft) and below the line of the pipe (6-8 ft) using a hand auger.

All samples collected during the investigations at the PRS were analyzed for inorganics, HE, VOCs, and SVOCs. All sample locations were field screened for radioactivity, organic vapors, and HE prior to sample collection. All field screening results were negative or at background levels.

Table 5.12.4-1 presents a summary of samples taken during the investigation of PRS 22-010(a). Samples with the sample ID format AAAxxxx were collected during the 1994 investigation; samples with the former 0522-97-xxx were collected in 1997.

**TABLE 5.12.4-1
SUMMARY OF SAMPLES TAKEN**

Location ID	Sample ID	Depth (ft)	Media	VOCs*	SVOCs*	High Explosives*	Inorganic Chemicals*
Surrounding Area							
22-6018	AAA8909	6-7	soil	NA ^a	18242	18245	18247
22-6018	AAA8910	9-10	soil	18242	18242	18245	18247
22-6019	AAA8911	6-7	soil	NA	18242	18245	18247
22-6019	AAA8912	9-10	soil	18242	18242	18245	18247
22-6020	AAA8913	6-7	soil	NA	18242	18245	18247
22-6020	AAA8914	15-15	soil	18242	18242	18245	18247
Leach Field Area							
22-6061	0522-97-0001	4.3-5.0	soil	3049R	3049R	3051R**	3050R
22-6061	0522-97-0002	7.3-8.0	soil	3049R	3049R	3051R**	3050R
22-6062	0522-97-0003	3.0-3.6	soil	3049R	3049R	3051R**	3050R
22-6062	0522-97-0004	6.0-6.7	soil	3049R	3049R	3051R**	3050R
22-6063	0522-97-0005	4.8-5.5	soil	3049R	3049R	3051R**	3050R
22-6063	0522-97-0006	7.0-7.7	soil	3049R	3049R	3051R**	3050R
Tank Outlet							
22-6021	AAA8915	2.5-3.5	soil	18242	18242	18245	18247
22-6021	AAA8916	7.5-8.5	soil	18242	18242	18245	18247
22-6021	AAA8917	10.5-11.5	soil	18242	18242	18245	18247
Tank Inlet							
22-6022	AAA8918	5-6	soil	18242	18242	18245	18247
22-6022	AAA8919	10-11	soil	18242	18242	18245	18247
22-6022	AAA8920	13-14	soil	18242	18242	18245	18247
Side of Tank							
22-6023	AAA8921	2.5-3.6	soil	18242	18242	18245	18247
22-6023	AAA8922	2.5-3.6	soil	18242	18242	18245	18247
22-6023	AAA8923	7.5-8.5	soil	18242	18242	18245	18247
22-6023	AAA8924	10.5-11.5	soil	18242	18242	18245	18247
Tank Contents							
22-6024	AAA8925	0-0	liquid	NA	18242	18245	18247
22-6024	AAA8926	2-2	liquid	NA	18242	18245	18247
22-6024	AAA8927	4-4	liquid	NA	18242	18245	18247

* Request Numbers

** Includes PETN analysis

5.12.5 Evaluation of Inorganic Chemicals

Inorganic chemicals with concentrations at or above background at PRS 22-010(a) are presented in the Table 5.12.5-1, and the locations are plotted in Figure 5.12.5-1. The qualifiers shown in the table have been assigned during baseline validation. However, the data have undergone focused validation, and the potential data limitations identified in Section 4.1.13 will not impact site-specific decisions. Review of 1994 data indicated selenium and lead were not reported above Laboratory-background UTL in any sample, and any data limitations will not affect site decisions. Eight chemicals identified as biased high (aluminum, cobalt, copper, iron, magnesium, sodium, thallium, or vanadium) similarly did not exceed background in any sample, and the data limitations will not affect site decisions. Focused validation of the 1997 data indicates that the data are usable as

reported with the recognition that manganese results are potentially biased high (up to 200%) due to matrix interference.

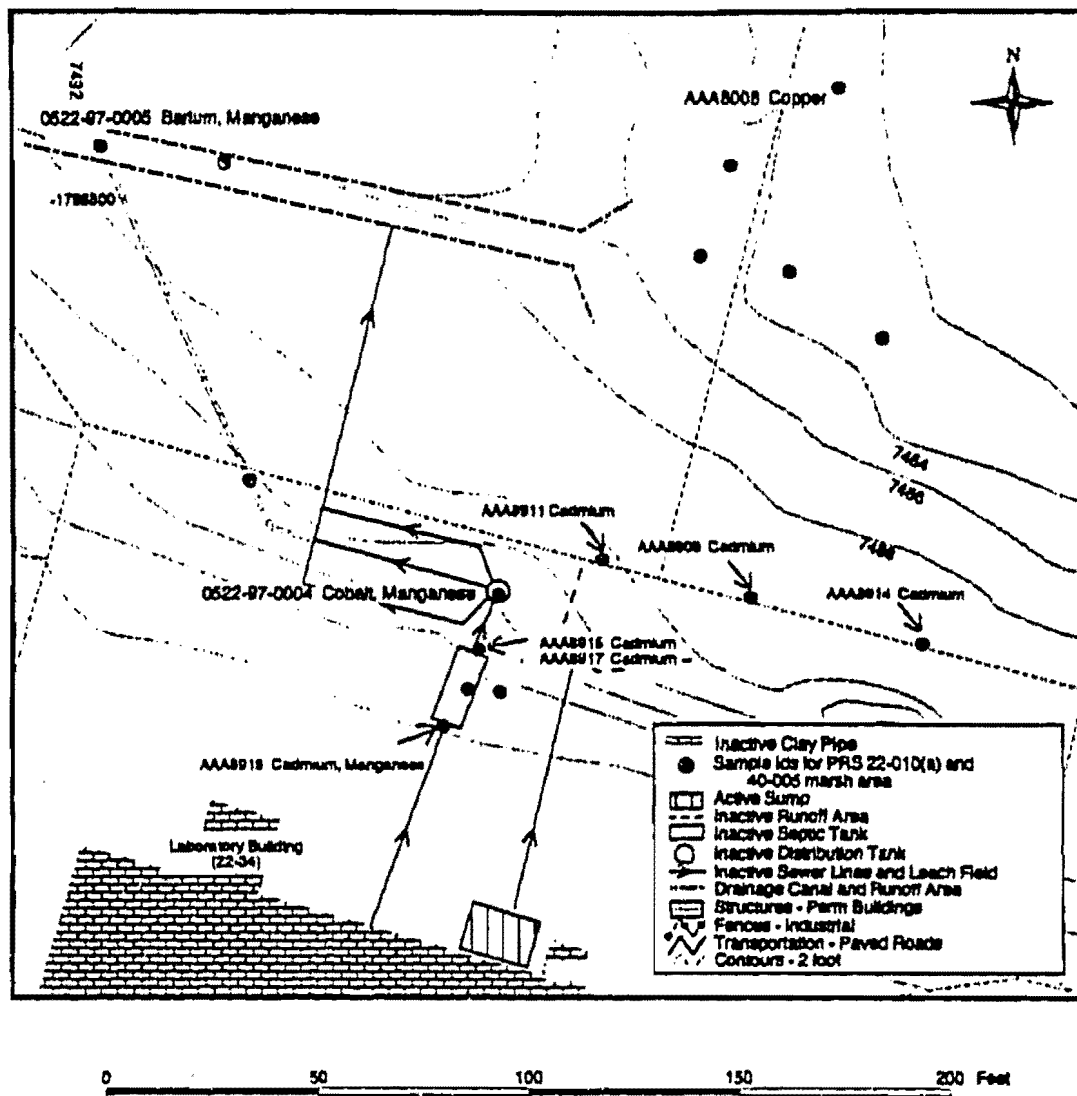


Figure 5.12.5-1. Locations of inorganic analytes that exceed background (UTLs and EOLs) and/or that exceed SALs at PRS 22-010(a) and PRS 40-005 (marsh area).

Two inorganic chemicals were reported in the 1994 soil samples at concentrations that exceed their established Laboratory-background UTL. No additional statistical analysis of the data was performed. Cadmium was reported in six soil samples at concentrations above Laboratory-background UTL. Manganese was reported in only one soil sample at a concentration of 734 mg/kg, slightly above, and probably not different from, Laboratory-background UTL. Because background UTL was only slightly exceeded and due to the low frequency of detection above background UTL, manganese was eliminated from further consideration. Cadmium was identified as a COPC for further evaluation.

Review of the 1997 leach field data found three inorganic chemicals, barium, cobalt, and manganese, at levels greater than Laboratory-background UTL. Cobalt and barium slightly exceeded UTL in single samples, while manganese was reported above UTL in

two samples. No further statistical background evaluation was performed, and the three chemicals were identified as COPCs, along with cadmium, for further evaluation in the screening assessment.

**TABLE 5.12.5-1
INORGANIC CHEMICALS WITH CONCENTRATIONS AT OR ABOVE
BACKGROUND SCREENING VALUES FOR PRS 22-010(a)**

Sample ID	Depth (ft)	Barium (mg/kg)	Cobalt (mg/kg)	Cadmium (mg/kg)	Manganese (mg/kg)
SAL	N/A ^b	5300	4600	38	3200
Soil UTL ^a	N/A ^b	315	19.2	2.7	714
Surrounding Area					
AAA8909	6-7	<47.5	<1.8	6.2	134
AAA8911	6-7	85.5	<1.8	3	193
AAA8913	6-7	62.8	<1.6	2.1	225
AAA8914	15-15	<34.4	<1.3	6.7	232
Leach Field					
0522-97-0001	4.3-5.0	219	6.06	0.58(U)	400
0522-97-0002	7.3-8.0	81	1.54	0.65(U)	61.7
0522-97-0003	3.0-3.6	44.9	1.5(B)	0.6(U)	279
0522-97-0004	6.0-6.7	136	26.9	0.56(U)	1320
0522-97-0005	4.8-5.5	374	12.4	0.69(U)	1360
0522-97-0006	7.0-7.7	46.3	1.3(U)	0.65(U)	214
Tank Area					
AAA8915	2.5-3.5	132	<6.5	3.8	366
AAA8916	7.5-8.5	77.2	<2.8	<0.49	166
AAA8916D	7.5-8.5	87	<2.9	<0.46	190
AAA8917	10.5-11.5	63.5	<0.93	3.4	95.8
AAA8918	5-6	176	<10.9	3.1	734
AAA8919	10-11	70.8	<1.5	2.4	379
AAA8920	13-14	<18.9	<0.9	1.8	95.5
AAA8921	2.5-3.6	173	<5.8	1.9	277
AAA8922FD	2.5-3.6	173	<6.6	1.9	285
AAA8923	7.5-8.5	197	<5.2	1.8	288
AAA8924	10.5-11.5	97.8	<2.6	1.5	184
Tank Contents					
AAA8925	0-0	54.2	<1.4	<1.2	181
AAA8926	2-2	<30.9	<0.9	<0.53	131

a. Upper tolerance limit of Laboratory-wide background values from A, B, and C horizons.

b. N/A = not applicable. NA = not analyzed.

Two soil samples and one tank contents (sludge) sample were analyzed and reported by the laboratory as if the samples were a liquid matrix. Apparently, the laboratory decanted and analyzed a liquid fraction from each sample, and the result would represent a leachable fraction of the solid matrix. Qualitatively, the results do not indicate unacceptable contamination in the source media; however, these results will not be used to make site decisions.

5.12.6 Evaluation of Radionuclides

No radionuclides were identified for analysis at this PRS.

5.12.7 Evaluation of Organic Chemicals

Detected organic chemicals at PRS 22-010(a) are presented in Table 5.12.7-1, and the locations are plotted in Figure 5.12.7-1. The results of the focused data validation of 1994 data, presented in Section 4.3.13, indicate that the VOC data are acceptable as reported without qualification. No SVOCs were reported in any site sample, and, although there is a potential low bias in the SVOC data, the lack of any detected SVOCs supports the elimination of this class of chemicals from further consideration.

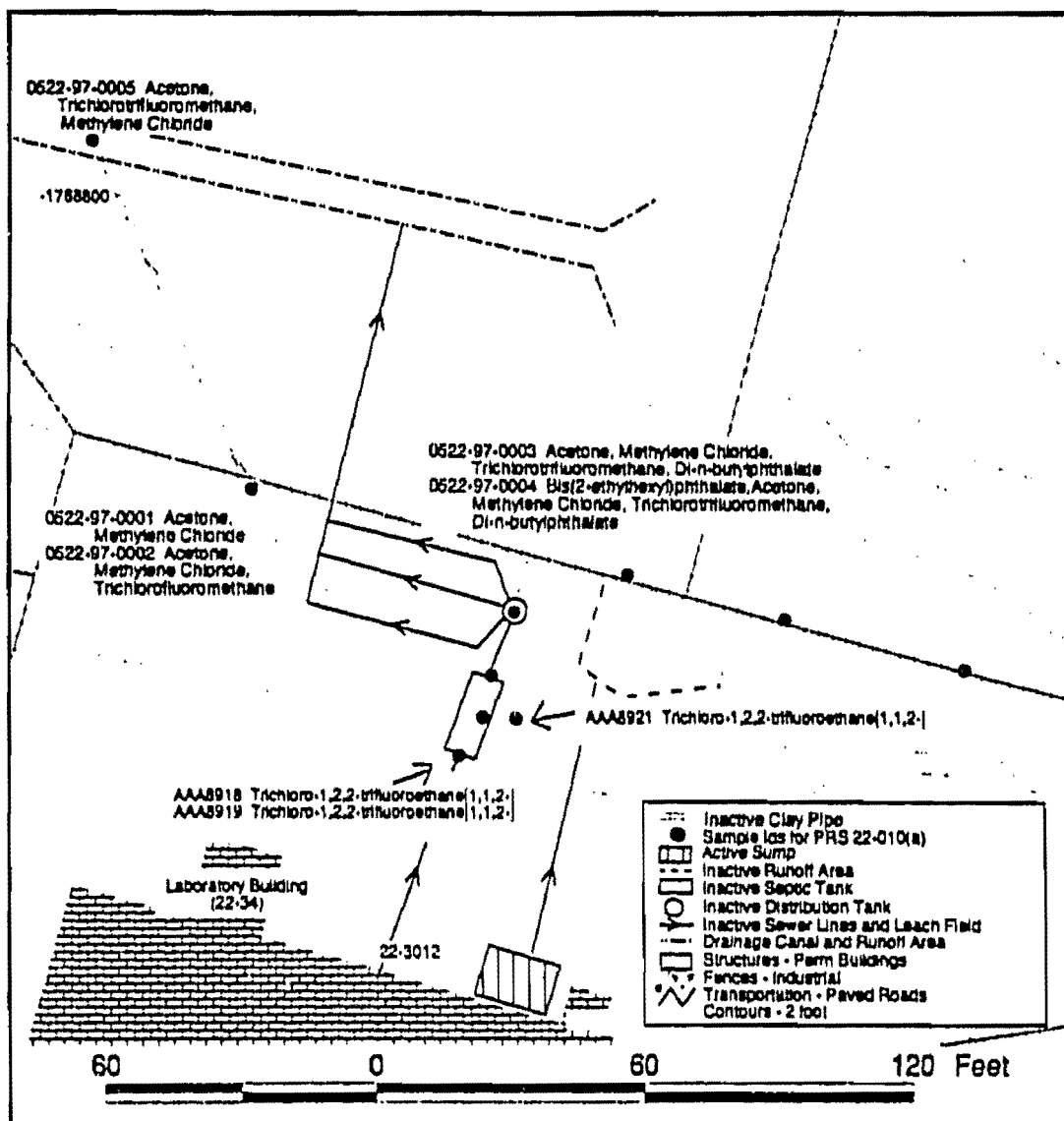


Figure 5.12.7-1 Locations of organic analytes that exceed background (UTLs and EQLs) and/or that exceed SALs at PRS 22-010(a).

All HE analyses exceeded the prescribed holding times, and the focused validation indicates that the soil HE results are biased low. The single HE result exceeding EQL was reported in a septic tank sludge sample. This result is identified in the validation

report as potentially biased high by a factor of five; no HE contamination was detected in soils. It generally appears that no substantial HE contamination is present at the site.

Trichloro-1,2,2-trifluoroethane[1,1,2-] was reported above its EQL but below its SAL in three soil samples. At the reported concentrations of 0.006 and 0.007 mg/kg, these results are just slightly above their EQL and more than 5 orders of magnitude less than SAL. This chemical at the reported levels would not affect site decisions and was eliminated from further consideration. No other organic chemicals were reported in soil samples at levels that exceed their EQL, and no organic chemicals were identified for further evaluation at the PRS.

Review of 1997 data packages during focused validation determined that VOC, SVOC, and HE data are usable as reported with the exception of the SVOC results for sample 0522-97-0006. This sample was rejected due to poor surrogate recovery. No HE was reported in any sample collected.

Three VOCs, acetone, methylene chloride, and trichlorofluoroethane (TCFE), were detected in resample data in 1997. Acetone was eliminated as a COPC when focused validation identified it as a laboratory contaminant. Methylene chloride is also a common laboratory contaminant, which was reported in 1997 samples at trace levels below EQL. TCFE was reported in 1997 samples at trace levels, consistent with 1994 data. Two samples results exceeded EQL (0.005 mg/kg) at 0.008 and 0.006 mg/kg. Because these analytes were reported at trace levels and all results were orders of magnitude less than SAL, these chemicals were eliminated from further consideration.

One SVOC, di-n-butyl phthalate, not shown in Table 5.2.7-1, was reported above EQL in two leach field samples. This compound was not detected in 1994 investigation samples. The maximum reported concentration of 0.76 mg/kg is four orders of magnitude less than its SAL of 6800, and it was eliminated from further consideration.

In summary, no HE compounds were reported in investigation samples reported outside of the septic tank. All other organic compounds were reported at trace levels and at orders of magnitude less than SALs. Therefore, all organic compounds were eliminated from further consideration at this site.

**TABLE 5.12.7-1
DETECTED ORGANIC CHEMICAL FOR PRS 22-010(a) (soils)**

Sample ID	Depth (ft)	Trichloro-1,2,2-trifluoroethane [1,1,2-] (mg/kg)
SAL ^a	NA ^a	4100
EQL	NA ^a	0.005
Tank Area		
AAA8918	5-6	0.006
AAA8919	10-11	0.007
AAA8921	2.5-3.6	0.007

a. soil SAL b. N/A = not applicable. NA = not analyzed

Two additional organic chemicals, dichlorobenzene(1,4) and HMX, were reported in septic tank contents samples at levels that exceed their EQL, and the data are summarized in Table 5.12.7-2. Although these results are presented for information only and will not be used for site decisions, they do indicate that no substantial contamination is present within the septic tank.

**TABLE 5.12.7-2
DETECTED ORGANIC CHEMICALS FOR PRS 22-010(a) (waters)**

Sample ID	Depth (ft)	Dichlorobenzene (1,4) [p-] (ug/l)	HMX (ug/l)
EQL	NA ^a	5	13
Tank Contents		(ug/l)	(ug/l)
AAA8926	2-2	12	22.35(J)
AAA8927	4-4	17	<0.21(H)

a. N/A = not applicable. NA = not analyzed

5.12.8 Risk-Based Screening Assessment

No HE or organic compounds were identified as COPCs based on background screening evaluation. Four inorganic chemicals, cadmium, barium, cobalt and manganese, were identified as COPCs based on comparison to Laboratory-soil-background UTL; no reported concentration exceeded SAL. These four chemicals were submitted for noncarcinogenic MCE analysis, and the results are presented in Table 5.12.8-1.

**TABLE 5.12.8-1
MULTIPLE CHEMICAL EVALUATION FOR SOIL SAMPLES AT PRS 22-010(a)**

Chemical	Location ID	Sample ID	Maximum Sample Value	Soil SAL	Normalized Value
Noncarcinogenic Effects (mg/kg)					
Barium	22-6063	0522-97-0005	374	5300	0.07
Cadmium	22-6020	AAA8914	6.7	38	0.18
Cobalt	22-6062	0522-97-0004	26.9	4600	0.006
Manganese	22-6063	0522-97-0005	1360	3200	0.43
				Total ^b	0.7

a. Screening action level

b. Total may not equal the sum of normalized values due to rounding

The total normalized MCE value of 0.7 for this PRS indicates that, as characterized, the site presents no unacceptable human health risk. No COPCs have been identified at this PRS.

5.12.9 Human Health Risk Assessment

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

5.12.10 Preliminary Ecological Assessment

In cooperation with the NMED and EPA Region 6, the Laboratory ER Project is developing an approach for ecological risk assessment. Further ecological risk assessment at PRS 22-010(a) will be deferred until the site can be assessed as part of the ecological exposure unit methodology currently being developed.

5.12.11 Conclusions and Recommendations

PRS 22-010(a) has been characterized and assessed based on the results of two rounds of sampling. The RFI investigation characterized surface and subsurface soils associated with the septic tank, drain line, and leach field areas. No substantial contamination was reported at the PRS, which was intended to receive only sanitary waste.

The initial RFI investigation results generally found no releases associated with the septic tank, or drain line through leaks or overflow. No HE contamination outside the tank was observed; however, no PETN analyses were performed during the initial RFI investigation, and the leach field samples were not accurately located. A second phase of investigation was carried out to characterize the leach field and investigate potential PETN contamination at the PRS. No HE contamination, including PETN, was observed, and no other substantial organic contamination was indicated.

Four inorganic chemicals were reported from PRS samples at concentrations that exceeded UTL. These constituents were submitted to MCE analysis. The total normalized value of 0.7 indicates that the site as characterized presents little potential for human health risk.

Characterization results find no evidence of the release of hazardous materials at the PRS. A potential data deficiency at this PRS is the absence of PETN analyses for the 1994 investigation. This deficiency was partly addressed with the 1997 sampling, and the total absence of HE contamination at this PRS allows one to conclude that PETN contamination is unlikely, and further analysis at the site is not required. The conservative, residential exposure based screening assessment indicates no unacceptable human health risk is presented by the PRS, and it is recommended for NFA.

This recommendation is based on the NFA criterion 4 (Los Alamos National Laboratory, Environmental Restoration Department, Project Consistency Team Policy number 015) that 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 will be requested to remove this site from the HSWA Module of the Laboratory's RCRA operating permit.

5.12.12 Sampling and Analysis Plan for PRS 22-010(a)

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

5.13 Potential Release Site - 22-010(b) and 22-016

PRS 22-010(b), shown in Figure 5.13-1, is an inactive septic tank system with several historic outfall or leach areas that served buildings TA-22-1, -4, -5, -32, -52, -90, -91, and -92. Contamination observed at the site consisted of inorganic and organic chemicals. This PRS is recommended for NFA.

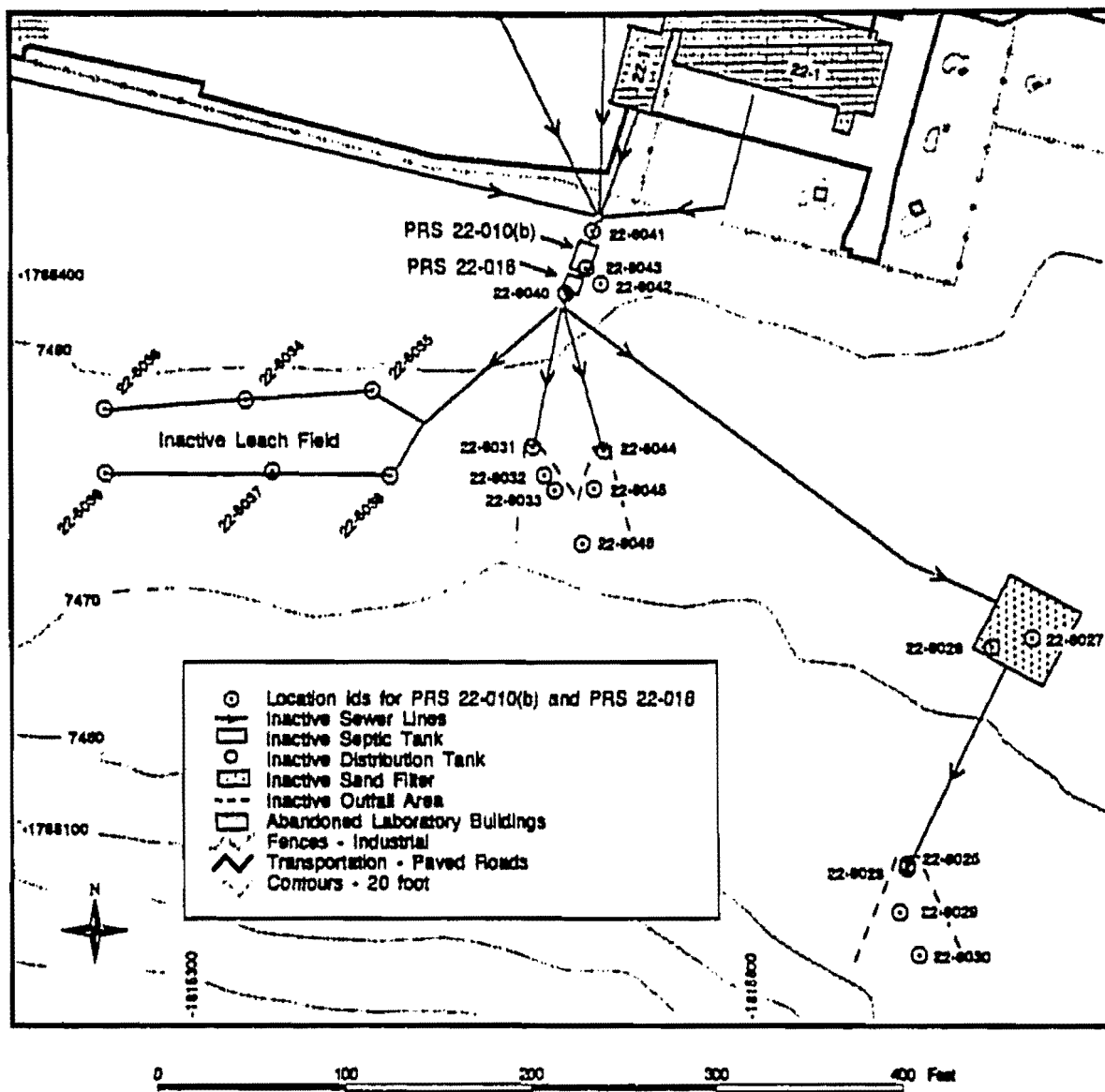


Figure 5.13-1. Locations of analytes that exceed background (UTLs and EQLs) and/or that exceed SALs at PRS 22-010(b).

5.13.1 History

PRS 22-010(b) is discussed in further detail in Section 5.6 of the RFI Work Plan for OU 1157 (LANL 1993, 20949).

PRS 22-010(b) is an inactive septic tank system, which consists of two septic tanks and three effluent release areas. The original septic tank (previous PRS 22-016), built before 1948, served buildings TA-22-1 and -4 and discharged to the inactive outfall (Figure 5.13-1). This septic tank was supplemented by the addition of a second tank [PRS 22-010(b)] in tandem with the original, on the same sewage line. The effluent from these tanks was directed to the leach field area (identified as Inactive Leach Field on the site map). During the late 70s or early 80s, the leach field was disconnected, and the sand filter outfall area was put into service. This system remained in service until it was replaced by the SWISH in the 1990s.

Processes in the facilities that would have contributed to contaminants identified for investigation include: explosives fabrication, PETN recrystallization, machine and plastics shop operations, electroplating, laundering laboratory protective clothing, and metal etching. Areas of possible contamination include the septic tanks, soil surrounding and under the tanks, and the outfall or leach-field areas. Chemicals used in these operations would have included: HE, solvents (acetone and alcohol), non-PCB oils, metals (including magnesium chips), acids, and photographic chemicals.

5.13.2 Description

No further site-specific information on geology, hydrology, soils, or wildlife habitat associated with this PRS is required. General area geology, hydrology, soils, or wildlife habitat information associated with this PRS is presented in Chapter 2.

5.13.3 Previous Investigation(s)

No previous investigations have been performed at this site.

5.13.4 Field Investigation

The objective of the investigation was to determine if COPCs are present in the inactive septic tanks, in media surrounding the septic tanks, or in the effluent release areas of the system; and, if present, do the COPCs pose an unacceptable human health risk based on the results of the screening assessment process.

The conceptual model for the PRS is based on the operational design of a septic system. In this model, waste material is conveyed through a piping system to the septic tank. The tank was intended to provide an environment for the biological degradation of organic waste as well as a containment area to allow the settling and retention of inorganic material in the form of sludge. Retained sludge was expected to have been periodically removed from the tank during its operational life. The settled and relatively "clean" tank effluent was then released to an outfall or leach field where potential contaminants in the form of solutes may be retained in organic and fine-sediment fractions, followed by the percolation of the bulk effluent into the surrounding soil strata. The field investigation was intended to specifically sample locations and media associated with the septic tank and leach field most likely to have received and retained chemical contaminants. Areas of concern for sampling include septic tank inlet and outlet connections and effluent release points.

The septic tank, drain lines connections, and outflow areas are the primary sources of potential contamination, and the sampling plan was also designed to investigate the potential release of materials to the surrounding media through normal operations as well as cracks or leaks in the septic system.

The field investigation was completed on 1 August 1994 and involved the sampling of five areas of the system: the septic tank contents, the soils surrounding the septic tanks, the inactive outfall area, the inactive leach field area, and the inactive sand filter and outfall area. Figure 5.13-1 shows the various features that comprise the PRS. The original septic tank (Facility number TA-22-42 and PRS 22-016) was never positively located during scheduled field activities. Consequently, the septic tank was never sampled (OU 1111 Work Plan Sampling Modifications, 23 February 1994). It was later determined that Septic Tank TA-22-42 was supplemented by Septic Tank TA-22-51 [PRS 22-010(b)] in 1948. Septic Tank TA-22-51 was installed directly upgradient from Septic Tank TA-22-42 and connected in-line to the same discharge system that served Septic Tank 22-42 with the addition of a new leach field. Septic Tank 22-42 was, in fact, located at a later date but never sampled. Because the two septic tanks shared the same discharge system, analytical results obtained from samples from PRS 22-010(b)

were considered to be representative of COPCs expected to be found in PRS 22-016. The outfall and runoff area associated with PRS 22-016 were identified and sampled as part of sampling activities conducted at PRS 22-010(b). The sand filter, outfall pipe, contents of Septic Tank 22-51, and area in and around the tank at PRS 22-010(b) were also sampled.

The septic tank contents were sampled at one location and at a one-depth. Apparently, the tank is empty, and a limited amount of residual material was available for sampling from the bottom of the tank. This liquid material was sampled and the results reported as a water matrix.

A location within 6 ft of the septic tank inlet (22-6041) was cored to a depth of 15 ft (3 ft below the depth of the bottom of the tank). Samples were collected from the core at 5.5 ft (the depth of the inlet), at 12 ft (the depth of the bottom of the tank), and at 15 ft (3 ft below the bottom of the tank). A location within 6 ft of the septic tank outlet (22-6040) was cored to a depth 11.5 ft (3 ft below the depth of the bottom of the tank). Samples were collected from the core at 5 ft (the depth of the outlet), at 8.5 ft (the depth of the bottom of the tank), and at 11.5 ft (3 ft below the bottom of the tank). A location within 6 ft of the side of the tank (22-6042) was cored to a depth of 11.5 ft (3 ft below the depth of the bottom of the tank). Samples were collected from the core at 5 ft (the depth of the septic tank outlet), at 8.5 ft (the depth of the bottom of the tank), and at 11.5 ft (3 ft below the bottom of the tank). These samples are believed to encompass the soils surrounding both tanks; however, it is obvious that the effluent and influent connections between tanks were not sampled as closely as intended in the work plan.

Three locations within the sand filter bed were sampled: 22-6027 was within 6 ft of the influent drain line, 22-6026 was at the center of the filter bed, and 22-6025 was at the lowest elevation within the filter bed at the discharge point and at the filter bed outflow. These locations were sampled at the surface 0- to 0.5-ft, and a hand auger was used to obtain samples from a depth of 2.5-3.5 ft. Three locations were installed in the filter bed runoff area; one location (22-6028) was within 6 ft of the outfall pipe. The other two locations (22-6029 and 22-6030) were each downgradient and at least 15 ft from the previous sample but before the bottom of the major canyon into which the outfall drained. These locations were sampled at two depth intervals, 0-0.5 and 0.5-1.5 ft in sediment accumulations or along the outfall channel if no sediment accumulations were available.

Six locations (22-6031 through 22-6033 and 22-6044 through 22-6046) were associated with two separate discharge pipes in the inactive outfall area. Each series of three locations, identified in the field, were located within 6 ft of the outfall pipe, with the two subsequent locations at least 15 ft downgradient from the previous and before the bottom of the major drainage canyon. Surface samples (0-0.5 ft) and subsurface samples (0.5-1.5 ft) were collected at sediment accumulation points within the outfall area.

Three locations in each of the two distribution arms of the inactive leach field were sampled (locations 22-6034 through 22-6039), one at the center and one at each end. Each location was sampled at two intervals, between 1.0-4.5 ft, which represented the depth of the influent pipe and the drainage tiles, and 9.0-10.0 ft, which was 7 ft below the depth of the drainage tiles.

All samples were to be analyzed for inorganics, HE, VOCs, and SVOCs. All HE analyses missed analytical holding time requirements. All locations were field screened for radioactivity, organic vapors, and HE prior to sample collection. All field screening results were negative or at background levels. Table 5.13.4-1 presents a summary of samples taken for PRS 22-010(b).

**TABLE 5.13.4-1
SUMMARY OF SAMPLES TAKEN**

Location ID	Sample ID	Depth (ft)	Media	VOCs*	SVOCs*	High Explosives*	Inorganic Chemicals*
Sand Filter and Runoff Area							
22-6025	AAA8930	0-0.5	soil	NA	18357	18439	18514
22-6025	AAA8931	0-0.5	soil	NA	18357	18439	18514
22-6025	AAA8932	2.5-3.5	soil	18357	18357	18439	18514
22-6026	AAA8933	0-0.5	soil	NA	18357	18439	18514
22-6026	AAA8934	2.5-3.5	soil	18357	18357	18439	18514
22-6027	AAA8935	0-0.5	soil	NA	18357	18439	18514
22-6027	AAA8936	2.5-3.5	soil	18357	18357	18439	18514
22-6028	AAA8937	0-0.5	soil	NA	18357	18439	18514
22-6028	AAA8938	0.5-1.5	soil	NA	18357	18439	18514
22-6029	AAA8939	0-0.5	soil	NA	18357	18439	18514
22-6029	AAA8940	0.5-1.5	soil	NA	18357	18439	18514
22-6030	AAA8941	0-0.5	soil	NA	18357	18439	18514
22-6030	AAA8942	0.5-1.5	soil	NA	18357	18439	18514
Inactive Outfall Area							
22-6031	AAA8943	0-0.5	soil	NA	18357	18439	18514
22-6031	AAA8944	0.5-1.5	soil	NA	18357	18439	18514
22-6032	AAA8945	0-0.5	soil	NA	18357	18439	18514
22-6032	AAA8946	0.5-1.5	soil	NA	18357	18439	18514
22-6033	AAA8947	0-0.5	soil	NA	18357	18439	18514
22-6033	AAA8948	0.5-1.5	soil	NA	18357	18439	18514
22-6044	AAA8975	0-0.5	soil	NA	18357	18439	18514
22-6044	AAA8976	0.5-1.5	soil	NA	18357	18439	18514
22-6045	AAA8977	0-0.5	soil	NA	18357	18439	18514
22-6045	AAA8978	0.5-1.5	soil	NA	18357	18439	18514
22-6046	AAA8979	0-0.5	soil	NA	18357	18439	18514
22-6046	AAA8980	0.5-1.5	soil	NA	18357	18439	18514
Inactive Leach Field							
22-6034	AAA8949	2-3	soil	18357	18357	18439	18514
22-6034	AAA8950	9-10	soil	18357	18357	18439	18514
22-6035	AAA8951	2-3	soil	18357	18357	18439	18514
22-6035	AAA8952	9-10	soil	18357	18357	18439	18514
22-6036	AAA8953	0.5-1.5	soil	18261	18261	18267	18260
22-6036	AAA8954	9-10	soil	18261	18261	18267	18260
22-6037	AAA8955	3-4	soil	18261	18261	18267	18260
22-6037	AAA8956	9-10	soil	18261	18261	18267	18260
22-6038	AAA8957	0.5-1.5	soil	18261	18261	18267	18260
22-6038	AAA8958	9-10	soil	18261	18261	18267	18260
22-6039	AAA8959	0.5-1.5	soil	18261	18261	18267	18260
22-6039	AAA8960	9-10	soil	18261	18261	18267	18260

**TABLE 5.13.4-1
SUMMARY OF SAMPLES TAKEN (cont.)**

Tank Area							
22-6040	AAA8961	4-5	soil	18261	18261	18267	18260
22-6040	AAA8962	7.5-8.5	soil	18261	18261	18267	18260
22-6040	AAA8963	10.5-11.5	soil	18261	18261	18267	18260
22-6041	AAA8964	4.5-5.5	soil	18261	18261	18267	18260
22-6041	AAA8965	11-12	soil	18261	18261	18267	18260
22-6041	AAA8966	14-25	soil	18261	18261	18267	18260
22-6042	AAA8967	4-5	soil	18261	18261	18267	18260
22-6042	AAA8968	7.5-8.5	soil	18261	18261	18267	18260
22-6042	AAA8969	10.5-11.5	soil	18261	18261	18267	18260
Contents of Tank							
22-6043	AAA8970	0-0	water	NA	18261	18267	18260

* Request number

5.13.5 Evaluation of Inorganic Chemicals

Inorganic chemicals with concentrations at or above background at PRS 22-010(b) are presented in Table 5.13.5-1, and plotted in Figure 5.13.5-1. The qualifiers shown in the table have been assigned during baseline validation. However, the data have undergone focused validation, and the potential data limitations identified in Section 4.1.14 will not impact site-specific decisions.

The following inorganic chemicals, arsenic, calcium, cadmium, chromium, copper, mercury, lead, antimony, vanadium, and zinc, were reported above Laboratory-background UTL levels in samples collected during this investigation. In addition, silver has no established background UTL but was reported at levels greater than laboratory EDL in the outfall drainage area. Because silver contamination may be related to past photographic-processing operations, it was included for further evaluation.

Calcium was reported in two samples at concentrations of 6170 and 6530 mg/kg relative to Laboratory-background UTL of 6120 mg/kg. Calcium is an essential human nutrient with an established Recommended Daily Allowance (RDA). Ingestion of site soil with the maximum reported calcium concentration at the default residential ingestion rate (200 mg/day) would result in a daily intake of less than 0.3% of the RDA for the most limiting human receptor (infant 0-12 months). Because calcium is an essential nutrient with low relative toxicity and the maximum reported concentration is not substantially different from background, calcium was eliminated from further consideration at the PRS.

Antimony was reported as undetected in all samples at levels that exceed Laboratory-background UTL. These elevated reporting limits are a function of the analytical method and do not indicate analytical or sample matrix interference. Because antimony was not positively detected in any sample and is not specifically linked to PRS operations, antimony was eliminated for further consideration at the site.

Arsenic, cadmium, chromium, copper, mercury, lead, silver, vanadium, and zinc exceed Laboratory-background UTL. No additional statistical evaluation of the data was performed, and these chemicals were identified as COPCs for evaluation in the screening assessment.

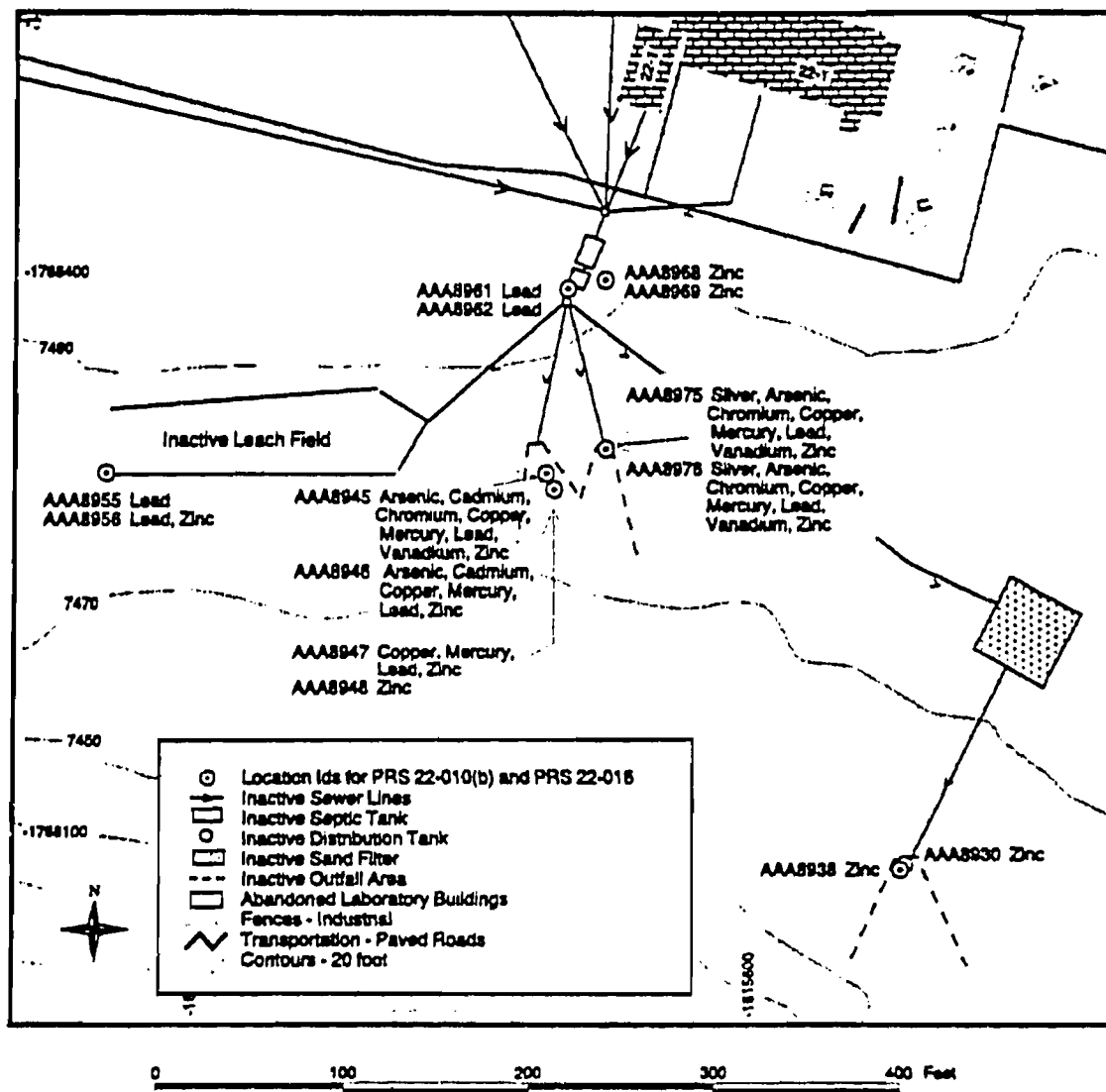


Figure 5.13.5-1. Locations of inorganic analytes that exceed background (UTLs and EQLs) and/or that exceed SALs at PRS 22-010(b).

**INORGANIC CHEMICALS WITH CONCENTRATIONS AT OR ABOVE BACKGROUND
SCREENING VALUES FOR PRS 22-010(b)**

Sample ID	Depth (ft)	Silver (mg/kg)	Arsenic (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Copper (mg/kg)
SAL		380	NA	38	210	2800
Soil UTL*		2 ^a	782	27	193	155
Sand Filter and Runoff Area						
AAA8930	0-0.5	<0.82	<0.44	12	8.7(J)	<3.1
AAA8931	0-0.5	<0.82	<0.45	<0.53	2.6(J)	<2.4
AAA8932	2.5-3.5	<0.78	<0.54	<0.74	2.1(J)	<3.3
AAA8932D	2.5-3.5	<0.78	<0.42	0.56	25	3
AAA8933	0-0.5	<0.92	<0.5	<0.74	3(J)	<4.2
AAA8933D	0-0.5	NA	NA	NA	NA	NA
AAA8934	2.5-3.5	<0.77	<0.42	18	4.7(J)	59
AAA8935	0-0.5	<0.87	<0.47	<0.68	3.3(J)	<3.4
AAA8936	2.5-3.5	<0.77	<0.42	<0.84	3.2(J)	<2.8
AAA8936D	2.5-3.5	NA	NA	NA	NA	NA
AAA8937	0-0.5	<0.86	<0.47	<0.59	<1.7(UJ)	<2.6
AAA8938	0.5-1.5	<0.78	<0.42	<0.63	<1.2(UJ)	<3.5
AAA8939	0-0.5	<0.86	<0.46	<0.81	5.8(J)	<3.1
AAA8940	0.5-1.5	<0.83	<0.72	<0.38	<1.8(UJ)	<1.3
AAA8941	0-0.5	<0.9	<0.49	<0.75	4.8(J)	<5.3
AAA8942	0.5-1.5	<0.8	<0.43	<0.74	5.3(J)	<3.4
Inactive Outfall and Runoff Area						
AAA8943	0-0.5	<1.1	<0.58	<1.1	4.7(J)	<6.1
AAA8944	0.5-1.5	<0.92	<0.51	<1.1	5.5(J)	<4.2
AAA8945	0-0.5	<1.5	186	53	52.6(J)	224
AAA8946	0.5-1.5	<0.81	102	34	9.7(J)	75
AAA8947	0-0.5	<0.86	26	19	9.8(J)	49.9
AAA8948	0.5-1.5	<0.81	<1.7	12	4(J)	9.1
AAA8975	0-0.5	13.1	43.6	1.7	40.2(J)	51.1
AAA8976	0.5-1.5	7.2	16.8	1.4	26.5(J)	34
AAA8976D	0.5-1.5	4.04		1.12	18.1	23.4
AAA8977	0-0.5	<2.2	<2.5	<1.1	10.2(J)	9.8
AAA8978	0.5-1.5	<0.92	38	1.1	6.9	6.9
AAA8979	0-0.5	<1.4	27	<0.91	7.5(J)	8.2
AAA8980	0.5-1.5	<0.8	<1.6	<0.61	2.8(J)	<3.5

TABLE 5.13.5-1 (cont.)

Sample ID	Depth (ft)	Silver (mg/kg)	Arsenic (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Copper (mg/kg)
SAL		380	NA	38	210	2800
Soil UTL*		2b	7.82	2.7	193	155
Inactive Leach Field						
AAA8949	2-3	<0.86	<1.1	<0.66	3.5(J)	<3.9
AAA8950	9-10	<0.87	<0.47	<0.42	<1.4(UJ)	<1.6
AAA8951	2-3	<0.81	<0.44	<0.37	<1.3(UJ)	<1.2
AAA8952	9-10	<0.83	<0.45	<0.42	<1.2(UJ)	<1.2
AAA8953	0.5-1.5	<0.79	2.7	<0.36	3.2(J)	<4
AAA8954	9-10	<0.83	<0.45	<0.38	2.6(J)	<2.2
AAA8955	3-4	<0.86	2.8	<0.47	2.9(J)	8(J)
AAA8956	9-10	<0.92	<2	<0.42	3.8(J)	7.8(J)
AAA8957	0.5-1.5	<0.84	<0.88	<0.39	<1.9(UJ)	<3.8
AAA8958	9-10	<0.85	<0.98	<0.39	2.6(J)	<1.3
AAA8959	0.5-1.5	<0.77	<1.5	<0.42	2.1(J)	<3.5
AAA8959D	0.5-1.5	<0.77	<1.9	<0.35	3.4	<3.8
AAA8960	9-10	<0.84	<0.89	<0.38	2.4(J)	<3.3
Tank Area						
AAA8961	4-5	<1	<1.5	<0.37	3.9(J)	<3.5
AAA8962	7.5-8.5	<0.84	<0.87	<0.39	<1.5(UJ)	<3.2
AAA8963	10.5-11.5	<0.83	<0.84	<0.38	3.1(J)	<2.4
AAA8964	4.5-5.5	<0.83	<1.9	<0.38	5(J)	<3.9
AAA8965	11-12	<0.88	<0.91	<0.41	4(J)	8.8(J)
AAA8966	14-25	<0.93	<1.3	<0.43	5.8(J)	<5.3
AAA8967	4-5	<0.83	<1.1	<0.38	6.3(J)	<4.3
AAA8968	7.5-8.5	<0.88	<0.47	<0.44	4.7(J)	<4.9
AAA8969	10.5-11.5	<0.88	<0.48	<0.41	8.4(J)	<5.9
Contents of Tank						
		(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)
WATER SAL		170	50	5	180	1300
AAA8970	0-0	<3.7	<9.8	<1.7	<7.8(UJ)	123(J)

TABLE 5.13.5-1 (cont)

Sample ID	Depth (ft)	Mercury (mg/kg)	Lead (mg/kg)	Vanadium (mg/kg)	Zinc (mg/kg)
SAL		23	400	540	23000
Soil UTL		0.1	23.3	41.9	50.8
Sand Filter and Runoff Area					
AAA8930	0-0.5	<.03(UJ)	7.2(J)	13.6(J)	67.3
AAA8931	0-0.5	<.03(UJ)	7.3(J)	<6.4(UJ)	25.8
AAA8932	2.5-3.5	<.03(UJ)	5.2(J)	<4.5(UJ)	42.1
AAA8932D	2.5-3.5	<.03(UJ)	6.7	4.5	39.8
AAA8933	0-0.5	<.03(UJ)	13.5(J)	<7.1(UJ)	34.6
AAA8933D	0-0.5	NA	NA	NA	NA
AAA8934	2.5-3.5	<.03(UJ)	11.4(J)	<7.5(UJ)	34.7
AAA8935	0-0.5	<.03(UJ)	13.6(J)	<5.8(UJ)	33
AAA8936	2.5-3.5	<.03(UJ)	14.(J)	<6.3	33.4
AAA8936D	2.5-3.5	NA	NA	NA	NA
AAA8937	0-0.5	<.03(UJ)	11.1(J)	<6.6(UJ)	24.5
AAA8938	0.5-1.5	<.03(UJ)	5.2(J)	<3.7(UJ)	51.7
AAA8939	0-0.5	<.03(UJ)	10.2(J)	<10.4(UJ)	38.1
AAA8940	0.5-1.5	<.03(UJ)	5.1(J)	<5.6(UJ)	12.7
AAA8941	0-0.5	<.03(UJ)	15.3(J)	12.6(J)	30.2
AAA8942	0.5-1.5	<.03(UJ)	11.1(J)	<8.8	18.4
Inactive Outfall and Runoff Area					
AAA8943	0-0.5	<.04(UJ)	14.5(J)	<10.3(UJ)	37.3
AAA8944	0.5-1.5	<.03(UJ)	10.5(J)	<11.2(UJ)	22.7
AAA8945	0-0.5	1.3(J)	145(J)	52(J)	1330
AAA8946	0.5-1.5	0.12(J)	24(J)	41.2(J)	994
AAA8947	0-0.5	0.25(J)	46.2(J)	14.5(J)	314
AAA8948	0.5-1.5	<.03(UJ)	9.2(J)	15(J)	149
AAA8975	0-0.5	1.1(J)	54.9(J)	152(J)	114
AAA8976	0.5-1.5	0.35(J)	35.2(J)	83.6(J)	93.1
AAA8976D	0.5-1.5	0.34	39.5	64.5	76
AAA8977	0-0.5	<.08(UJ)	22.7(J)	27.9(J)	49.6

TABLE 5.13.5-1 (cont)

Sample ID	Depth (ft)	Mercury (mg/kg)	Lead (mg/kg)	Vanadium (mg/kg)	Zinc (mg/kg)
AAA8978	0.5-1.5	<0.07(UJ)	20.3(J)	21.7(J)	38.4
AAA8979	0-0.5	<0.11(UJ)	22.7(J)	18.9(J)	49.4
AAA8980	0.5-1.5	<0.03(UJ)	11.8(J)	<10.2(UJ)	31.2
Inactive Leach Field					
AAA8949	2-3	<0.07(UJ)	11.2(J)	<6.2(UJ)	28.3
AAA8950	9-10	<0.03(UJ)	2.5(J)	<2.8(UJ)	16.7
AAA8951	2-3	<0.03(UJ)	6.8(J)	<3.2(UJ)	17
AAA8952	9-10	<0.03(UJ)	3.2(J)	<1.4(UJ)	19.7
AAA8953	0.5-1.5	<0.09	8.8(J)	11.2(J)	22
AAA8954	9-10	<0.03	0.84(J)	<2.8(J)	20.6
AAA8955	3-4	<0.03	201(J)	<8.1	42.5
AAA8956	9-10	<0.03	244(J)	<7.4	85.3
AAA8957	0.5-1.5	<0.04	14.4(J)	<6.1	22.1
AAA8958	9-10	<0.03	15.7(J)	<2.8	22.7
AAA8959	0.5-1.5	<0.03	4.2(J)	<5.9	23.4
AAA8959D	0.5-1.5	<0.03	4.5(J)	<5.9	24
AAA8960	9-10	<0.03	1.6(J)	<4.1	26.6
Tank Area					
AAA8961	4-5	<0.03	31.7(J)	<10.1	30.9
AAA8962	7.5-8.5	<0.03	42.6(J)	<4	24.7
AAA8963	10.5-11.5	<0.03	3.5(J)	<4.1	28.4
AAA8964	4.5-5.5	<0.03	11.9(J)	12.1(J)	25.4
AAA8965	11-12	<0.03	9.1(J)	<9.9	28.8
AAA8966	14-25	<0.03	19.4(J)	<8.5	32.1
AAA8967	4-5	<0.03	14.2(J)	12.6(J)	43.8
AAA8968	7.5-8.5	<0.03	22.1(J)	<9.2	105
AAA8969	10.5-11.5	<0.03	20.6(J)	<10.2	214
Contents of Tank					
		(ug/l)	(ug/l)	(ug/l)	(ug/l)
WATER SAL		2	50	260	11000
AAA8970	0-0	<0.09	6(J)	<7.5	185

a. Upper tolerance limit of Laboratory-wide background data from A, B, and C horizons;

b. Background data not available; sample-specific detection limit (DL) used as screening criteria.

5.13.6 Evaluation of Radionuclides

No radiological constituents were identified for analysis at this PRS.

5.13.7 Evaluation of Organic Chemicals

Detected organic chemicals at PRS 22-010(b) are presented in the Table 5.13.7-1 and plotted in Figure 5.13.7-1. The qualifiers shown in the table have been assigned during baseline data validation. The results of the focused data validation, presented in Section 4.3.14, indicate that the VOC data are acceptable as reported without qualification. The SVOC results for the PRS are generally expected to be biased low. No HE compounds were reported above EQL in any soil sample collected at the site. However, several problems were found with the HE data, and the focused validation indicates that HE results are probably biased low. Overall review of the organic chemical sample results find sporadic, low levels of a limited number of organic compounds at a limited number of sampling locations. There are no patterns of organic contamination consistent with a

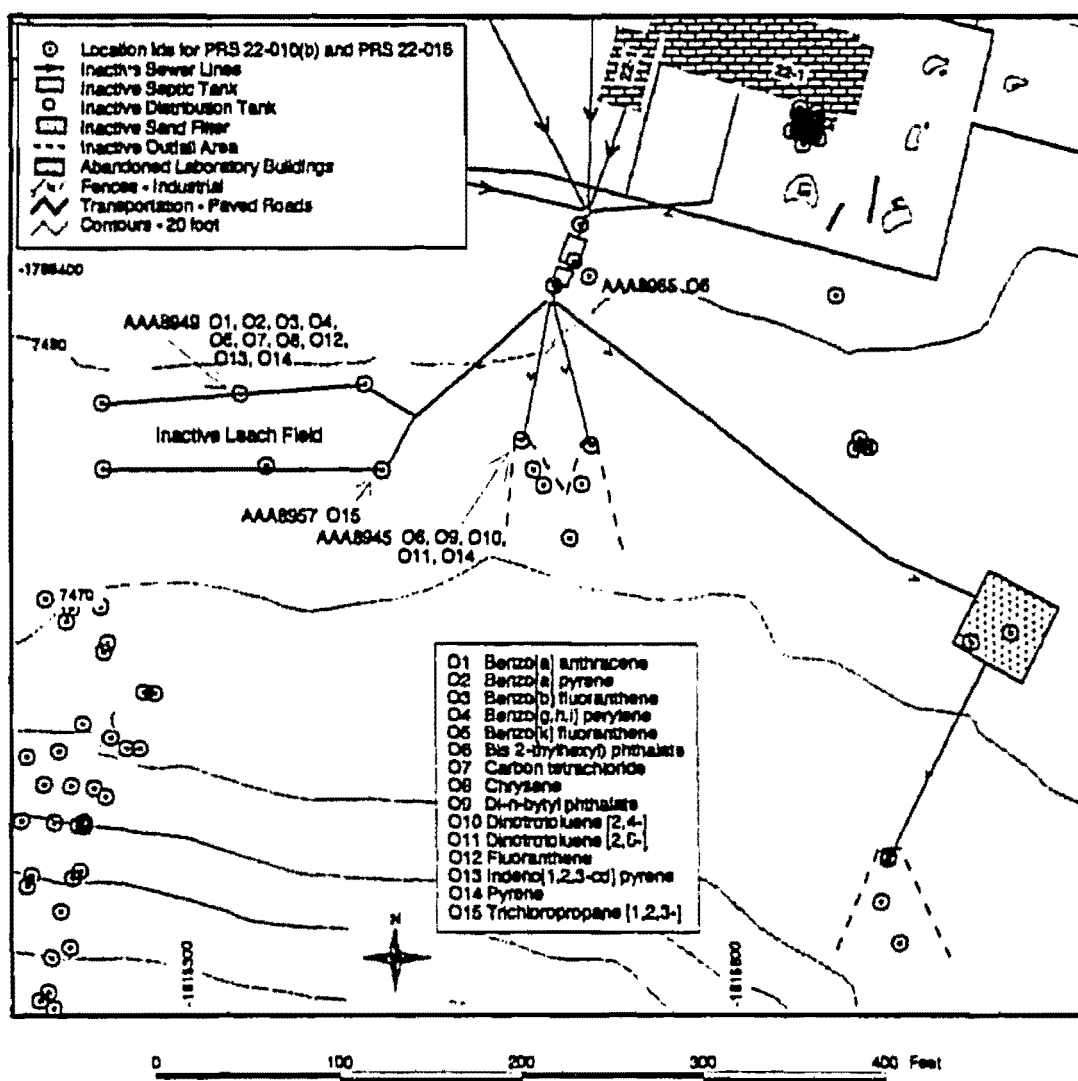


Figure 5.13.7-1. Locations of organic analytes that exceed background (UTLs and EQLs) and/or that exceed SALs at PRS 22-010 (b).

site-release scenario and no substantial organic contamination within the PRS. The analytical results will be used as reported.

Nine PAHs were reported in a single sample (AAA8949) collected at the 2- to 3-ft interval from within the inactive leach field. Pyrene was also reported in one surface sample from the outfall area (AAA8945). No PAHs were reported in any other samples taken within the leach field or in any other area of the PRS. Sample AAA8949 was collected at the upper interval sampled within the leach field. This sample was intended to be located near the distribution piping of the leach field and may have resulted in the collection of asphalt-based material, i.e., pipe or tar paper material, which contain these compounds. All PAHs were eliminated from further consideration at the site because they were infrequently and sporadically reported in two samples at the site, they are not present at substantially elevated concentrations, and they may reasonably be associated with known construction practices or other anthropogenic sources. Two HE constituents, dinitrotoluene[2,4-] and dinitrotoluene[2,6-], were reported in one inactive outfall surface sample at estimated (J qualified) concentrations, which are essentially equal to or less than EQL. These single detected values were estimated and orders of magnitude less than SAL, and the compounds were undetected in all other site samples; therefore, these constituents were eliminated from further evaluation.

Two VOCs, carbon tetrachloride and trichloropropane[1,2,3-], were reported as detected in a single subsurface sample taken from the inactive leach field. Carbon tetrachloride was reported at 0.007 mg/kg, which is not substantially greater than its EQL of 0.005 mg/kg and two orders of magnitude less than SAL. Trichloropropane[1,2,3-] was reported at 0.022 mg/kg, which is four times its EQL of 0.005 and fifteen times its recently revised (lowered) SAL of 0.0014 mg/kg. This chemical is problematic because it is one of a small group of organic chemicals whose SAL is less than its EQL. However, because these compounds were detected at a low frequency (one out of forty-six samples) and their presence is not consistent with or related to PRS activities or release scenarios, they were eliminated from further consideration.

Two SVOCs, bis(2-ethylhexyl) phthalate and di-n-butyl phthalate, were reported as detected in PRS samples, and both are common laboratory contaminants. Bis(2-ethylhexyl) phthalate was reported in one deep (11-12 ft) tank area soil sample and one surface soil outfall area sample (estimated value). Di-n-butyl phthalate was reported in the same surface soil outfall area sample at an estimated concentration. All concentrations were orders of magnitude less than SAL. Because these compounds were detected at a low frequency in site samples and do not appear to be consistent with, or related to, PRS activities or release scenarios, they were eliminated from further consideration.

All organic compounds reported in site analytical data have been eliminated from further consideration at this PRS because of the low concentration frequency of detection and the inconsistency of occurrence in site samples relative to the PRS's release model. However, as a point of reference and consistent with the approach proposed in the draft PAH policy paper, an estimation of risk resulting from the maximum observed concentrations of the eliminated organic chemicals has been performed.

Nine of the eliminated organic compounds, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, indeno(1,2,3-cd)pyrene, trichloropropane(1,2,3-), carbon tetrachloride, and bis(2-ethylhexyl)phthalate, are identified as carcinogens, and an estimated risk due to each individual compound can be calculated by the following:

where:

Site Risk Level = Calculated risk value
 PRG Risk Level = 1×10^{-6} for carcinogens or a hazard index of 1 for noncarcinogens
 Site Soil Concentration = Concentration of PAH in soil at the site (mg/kg)
 PRG = Risk-based concentration in soil for residential exposure assumptions (mg/kg)

Individual risks and total carcinogenic risk for the eight compounds are presented below.

Chemical	PRG (mg/kg)	Maximum Concentration (mg/kg)	Risk
Benzo(a)anthracene	0.61	1.6	2.6E-6
Benzo(a)pyrene	0.061	1.9	3.1E-5
Benzo(b)fluoranthene	0.61	3.7	6.1E-6
Benzo(k)fluoranthene	6.1	1.0	1.6E-7
Chrysene	61	1.6	2.6E-8
Indeno(1,2,3-cd)pyrene	0.61	1.9	3.1E-6
Trichloropropane(1,2,3-)	0.0066	0.022	1.5E-5
Carbon tetrachloride	0.47	0.007	3.0E-8
Bis(2-ethylhexyl) phthalate	32	2.4	7.5E-8
		Total risk	5.8E-5

The individual and total risk presented by the eliminated carcinogens is within the $1.0\text{E-}4$ and $1.0\text{E-}6$ risk range that is generally found to be acceptable at a site. The acceptability and elimination of these compounds at these levels would, again, be further justified by the low frequency and lack of general contamination at the site.

Six of the eliminated organic chemicals, benzo(g,h,i)perylene, fluoranthene, pyrene, di-n-butylphthalate, dinitrotoluene(2,4-) and dinitrotoluene(2,6-), are identified as noncarcinogens, and an estimated hazard quotient due to each individual compound can be calculated as for the carcinogens. Individual hazard quotients and a cumulative hazard index are presented below.

Chemical	PRG (mg/kg)	Maximum Concentration (mg/kg)	Hazard Quotient
Benzo(g,h,i)perylene	1900	1.8	0.0008
Fluoranthene	2600	1.7	0.0007
Pyrene	2000	1.9	0.001
Di-n-butylphthalate	6500	0.6	0.0001
Dinitrotoluene(2,4-)	130	0.26	0.0019
Dinitrotoluene(2,6-)	65	0.26	0.004
		Hazard Index	0.008

The individual hazard quotients and total hazard index for the eliminated noncarcinogens are substantially less than the threshold of 1, and the elimination of these minor contaminants would not alter site decisions.

**TABLE 5.13.7-1
DETECTED ORGANIC CHEMICALS FOR PRS 22-010(b)**

Sample ID	Depth (ft)	Benzo [a] anthracene (mg/kg)	Benzo[a] pyrene (mg/kg)	Benzo [b] fluoranthene (mg/kg)	Benzo[g,h,i] perylene (mg/kg)	Benzo [k] fluoranthene (mg/kg)
SAL	NA	0.61	0.061	0.61	NA	6.1
EQL	NA	0.33	0.33	0.33	0.33	0.33
Original Outfall and Runoff Area						
AAA8945	0-0.5	<0.38(UJ)	<0.38(UJ)	<0.38(UJ)	<0.38(UJ)	<0.38(UJ)
AAA8965	11-12	<0.4	<0.4	<0.4(UJ)	<0.4	<0.4
Leach Field						
AAA8949	2-3	1.6	1.9	3.7	1.8	1
AAA8957	0.5-1.5	<0.38	<0.38	<0.38(UJ)	<0.38	<0.38

Sample ID	Depth (ft)	Bis(2-ethylhexyl) phthalate (mg/kg)	Carbon tetrachloride (mg/kg)	Chrysene (mg/kg)	Di-n-butyl phthalate (mg/kg)	Dinitrotoluene [2,4-] (mg/kg)
SAL	NA	32	0.23	24	6500	130
EQL	NA	0.33	0.005	0.33	0.33	0.25
Original Outfall and Runoff Area						
AAA8945	0-0.5	2.4(J)	<0.38	<0.38(UJ)	0.6(J)	0.26(J)
AAA8965	11-12	0.52	<0.008	<0.4	<0.4	<0.13(UJ)
Leach Field						
AAA8949	2-3	<0.38	0.007	1.6	<0.38	<0.38(UJ)
AAA8957	0.5-1.5	<0.38	<0.006	<0.38	<0.38	<0.38(UJ)

Sample ID	Depth (ft)	Dinitrotoluene [2,6-] (mg/kg)	Fluoranthene (mg/kg)	Indeno[1,2,3-cd] pyrene (mg/kg)	Pyrene (mg/kg)	Trichloropropane [1,2,3-] (mg/kg)
SAL	NA	65	2600	0.61	2000	0.0014
EQL	NA	0.26	0.33	0.33	0.33	0.005
Original Outfall and Runoff Area						
AAA8945	0-0.5	0.26(J)	<0.38	<0.38(UJ)	0.46(J)	<0.38
AAA8965	11-12	<0.13(UJ)	<0.4	<0.4	<0.4(UJ)	<0.006
Leach Field						
AAA8949	2-3	<0.13(R)	1.7	1.9	1.9(J)	<0.006(UJ)
AAA8957	0.5-1.5	<0.38(UJ)	<0.38	<0.38	<0.38(UJ)	0.022

5.13.8 Risk-Based Screening Assessment.

Arsenic, cadmium, chromium, copper, mercury, lead, silver, vanadium, and zinc were found to exceed Laboratory-background UTL and require further evaluation in the screening assessment. No inorganic chemical was reported at a concentration greater than SAL. Arsenic was reported in the outfall and runoff area at levels that exceed background UTL. Arsenic has no established SAL because the Laboratory-background UTL for arsenic is greater than the risk-based concentration. However, the lifetime cancer risk resulting from the background UTL soil concentration of arsenic (7.82 mg/kg) has been calculated to be $2\text{E-}5$ (Section 3.3.1). As a point of reference and comparison, exposure to the maximum observed concentration of arsenic (43.6 mg/kg) at the PRS would result in a risk of $1.1\text{E-}4$.

Arsenic was reported above background UTL at one location and two intervals within the two outfall drainages. The site investigation appears to have defined the horizontal extent of arsenic contamination, which appears to be confined to a narrow ridge that runs diagonally across the outfall drainage (sample locations 22-6032 and 22-6044). The area of arsenic contamination is quite limited relative to a one-half acre residential exposure area, which the calculated risk is based on. Furthermore, the estimated risk presented by the maximum site contamination is within the $1.0\text{E-}4$ to $1.0\text{E-}6$ risk range, which may be acceptable when considered within the context of an extremely limited exposure area.

Chromium was the only carcinogenic chemical identified as a COPC as a result of the background screening. Its maximum site concentration is well below SAL, and no MCE was required.

The remaining seven inorganic chemicals were all present at concentrations less than SAL. These inorganic chemicals were submitted for the noncarcinogenic MCE. The results of the MCE are presented in Table 5.13.8-1.

**TABLE 5.13.8-1
MULTIPLE CHEMICAL EVALUATION FOR SOILS AT 22-010(b)**

Chemical	Location ID	Sample ID	Maximum Sample Value	Soil SAL ^a	Normalized Value
Noncarcinogenic Effects (mg/kg)					
Silver	22-6044	AAA8975	13.1	380	0.034
Cadmium	22-6032	AAA8945	5.3	38	0.14
Copper	22-6032	AAA8945	224	2800	0.08
Mercury	22-6032	AAA8945	1.3(J)	23	0.056
Lead	22-6037	AAA8956	224(J)	400	0.56
Vanadium	22-6044	AAA8975	152(J)	540	0.28
Zinc	22-6032	AAA8945	1330	23000	0.058
				Total ^b	1.2

a. SAL = screening action level

b. Total may not equal sum of normalized values due to rounding

This MCE is a conservative, residential exposure-based calculation, incorporating the maximum observed concentration of inorganic noncarcinogens regardless of location, depth, area or exposure potential of the contamination at the 3+ acre site. The MCE result of 1.2, exceeding the threshold of 1.0 by twenty percent, does not indicate that the site, as characterized, represents an unacceptable human health risk. However, the PRS is associated with an active area of TA-22, and continued Laboratory use and control of the area is reasonable now and into the future. Therefore to provide an alternative perspective of the PRS, the MCE calculation was repeated using industrial PRGs (industrial exposure-based soil screening levels) as the basis for comparison to site COPCs. The results of the industrial MCE calculation are presented in table 5.13.8-2.

**TABLE 5.13.8-2
INDUSTRIAL MULTIPLE CHEMICAL EVALUATION FOR SOILS AT 22-010(b)**

Chemical	Location ID	Sample ID	Maximum Sample Value	Industrial PRG ^a	Normalized Value
Noncarcinogenic Effects (mg/kg)					
Silver	22-6044	AAA8975	13.1	8500	0.002
Cadmium	22-6032	AAA8945	5.3	850	0.006
Copper	22-6032	AAA8945	224	63000	0.004
Mercury	22-6032	AAA8945	1.3(J)	510	0.003
Lead	22-6037	AAA8956	224(J)	1000	0.2
Vanadium	22-6044	AAA8975	152(J)	12000	0.01
Zinc	22-6032	AAA8945	1330	100000	0.01
				Total^b	0.2

a. Preliminary Remediation Goal (soil screening level)

b. Total may not equal sum of normalized values due to rounding

The total normalized value of 0.2 for the industrial MCE clearly indicates that as characterized the PRS presents no unacceptable human health risk.

5.13.9 Human Health Risk Assessment

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

5.13.10 Preliminary Ecological Assessment

In cooperation with the NMED and EPA Region 6, the Laboratory ER Project is developing an approach for ecological risk assessment. Further ecological risk assessment at PRS 22-010(b) will be deferred until the site can be assessed as part of the ecological exposure unit methodology currently being developed.

5.13.11 Conclusions and Recommendations

PRS 22-010(b) and 22-016 have been characterized through the execution of a Phase I sampling and analysis plan. No radionuclides were identified for analysis at the PRS. No general organic contamination was observed at the site, and all organic chemicals reported above EQL have been reviewed and evaluated above (Section 5.13.7). No organic COPCs have been identified for this PRS.

Seven inorganic chemicals were reported in site samples at concentrations greater than background screening values. The presence of these inorganic chemicals is consistent with previous operations, i.e., electroplating and metal etching. No inorganic chemical

was reported at a concentration greater than SAL. The seven inorganic chemicals exceeding background were evaluated for noncarcinogenic MCE, and the total MCE is 1.2.

Review of the data set indicates that the extent of contamination at the site is defined with the inorganic contaminants, limited to a short segment of the inactive outfall drainage area. Limited contamination by lead and zinc was also observed in individual subsurface soil intervals in the inactive leach field and septic tank areas.

The noncarcinogenic MCE for the site slightly exceeds the threshold of 1.0. However, due to the conservative nature of the screening assessment, the use of maximum contaminant concentrations in all calculations, and the limited exposure and exposure area offered at the site for reasonable current and future uses, the conclusion is that the site does not present an unacceptable human health risk based on the residential MCE result.

The PRS was further evaluated utilizing industrial soil screening levels (industrial PRGs) as the basis for an MCE calculation. The total normalized value of 0.2 clearly indicates that the site presents no unacceptable human health risk under reasonable, current, or future land use conditions and is proposed for NFA.

No human health COPCs 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) that 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.

5.13.12 Sampling and Analysis Plan for PRS 22-010(b)

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

5.14 Potential Release Site - 40-005

PRS 40-005, shown in Figure 5.14-1, is an active explosives sump, inactive drain line and outfall serving operations in Building TA-40-41, and a marsh located about one-quarter mile upstream and up-canyon from the building (Figure 5.12-1). Copper was observed slightly above Laboratory-background UTL but below SAL in one sample only. Acetone was observed in very low concentrations in several samples, and methylene chloride was observed in one sample at a very low concentration. No other contamination was observed at the site. This PRS is recommended for NFA.

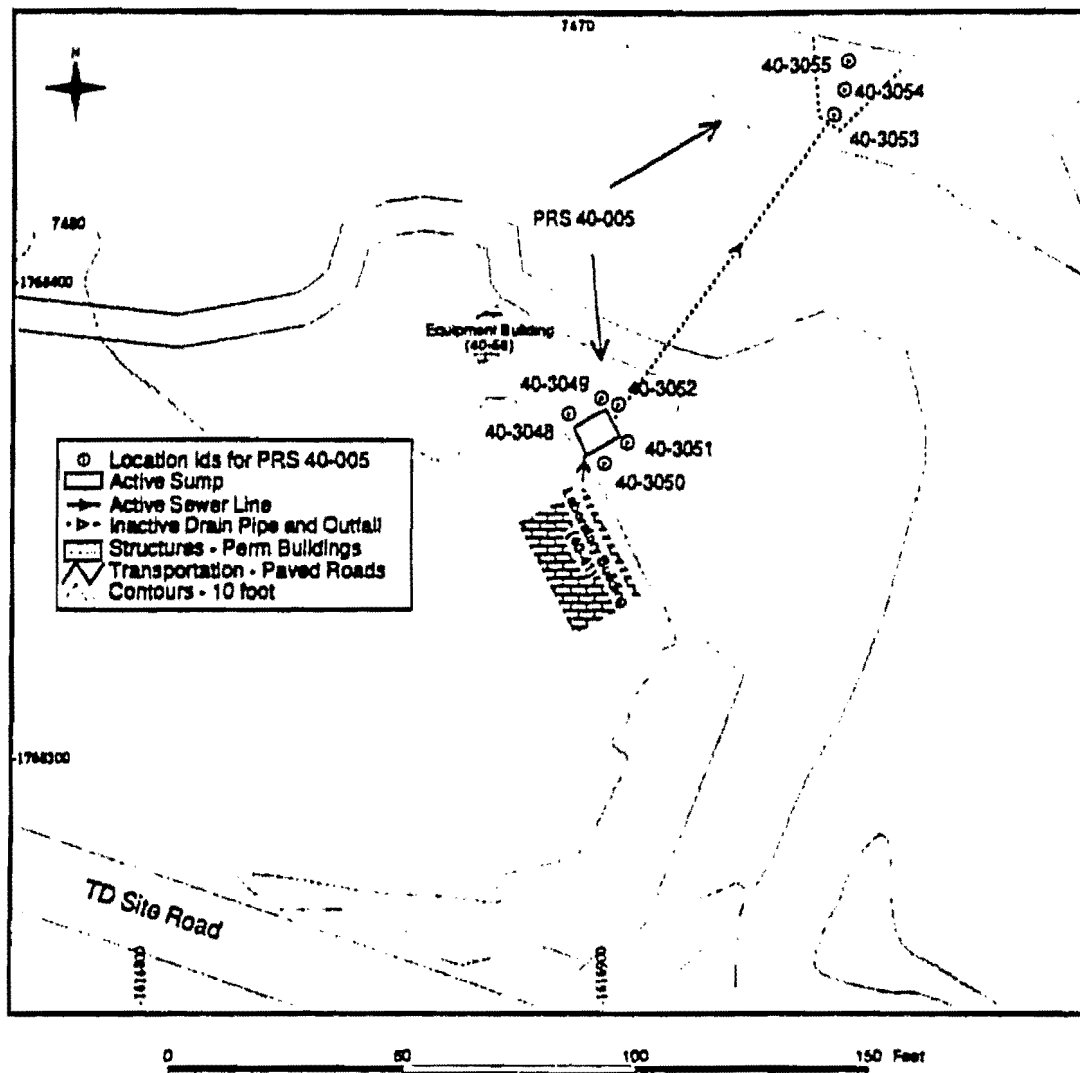


Figure 5.14-1. Locations of PRS 40-005 samples.

5.14.1 History

This PRS is discussed in further detail in Section 5.3 of the RFI Work Plan for OU 1111 (LANL 1993, 26068).

The building and sump system were part of TA-22 before being incorporated into TA-40. The system served as a settling basin for the occasional explosives grinding operations at TA-40-41. Used infrequently, only small amounts of liquid drained from the sump through a drain line to an outfall. The sump is currently in use, but, in 1994, the sump outlet port was capped, and the contents of the sump are periodically removed and disposed in approved facilities. Hazardous materials that may be present in this sump system include HE and VOCs. In addition, inorganic and radionuclide analyses were conducted on samples taken from the marsh. While the sump is currently active, the remainder of the sump system is no longer active.

5.14.2 Description

No further site-specific information on geology, hydrology, soils, or wildlife habitat associated with this PRS is required. General area geology, hydrology, soils, or wildlife habitat information associated with this PRS is presented in Chapter 2.

5.14.3 Previous Investigation(s)

No previous investigations have been performed at this site.

5.14.4 Field Investigation.

The objective of the Phase I investigation of PRS 40-005 is to determine if COPCs are present in the sump, outfall, marsh area, and related runoff areas, and, if present, do they present an unacceptable human health risk.

The conceptual model for this unit is based upon the assumption that levels of contamination are likely to be low due to the limited amount of hazardous materials used in the operation. The sump, surrounding soils, and runoff area are the primary sources of possible contaminants; the marsh may have accumulated any contamination from accidental releases from any number of PRSs, but not 40-005. The investigation was designed to assess the presence of environmental releases from leaks, spills, or operational upsets related to the system during its operational history.

Field sampling activities at PRS 40-005 were completed on 27 June 1994. Figure 5.14-1 identifies the locations of the sump, boring locations, and runoff area. Locations 40-3048 through 40-3051, at the corners of the sump, and 40-3052, at the outflow pipe, were positioned within 6 ft of the sump. Each location was cored to a depth of approximately 8.5 ft. Soil samples were collected from the cores at the surface (0-0.5 ft), at 4.5 ft (the level of the bottom of the sump), and at 7.5 ft (3 ft below the bottom of the sump). These core locations were covered with concrete or asphalt; therefore, the surface soil samples were collected directly underneath the concrete or asphalt.

Three additional surface (0-0.5 ft) soil samples were collected, one at the outfall (location 40-3053) and two at the runoff area within a distance 25-ft downslope of the outfall pipe (locations 40-3054 and 40-3055). The objective of this sampling effort was to determine if effluents released from the sump resulted in the accumulation of contaminants in the drainage sediments or soils. These soil samples were submitted for VOCs and HE analyses. Table 5.14.4-1 presents a summary of samples collected from this PRS. It was later determined that HE analyses missed holding times and that VOC samples were lost. Each location was resampled by coring immediately adjacent to the original core on 26 March 1996, and samples were analyzed for HE and VOC.

Figure 5.12-1 identifies the locations of the marsh area sampling points. All six samples were collected from the surface (0-0.5 ft), but the 1994 VOC samples were lost, and HE samples missed holding times. A point adjacent to each of these locations was resampled in 1996, and samples were analyzed for VOC, HE, inorganics, and radionuclides.

All locations were field screened for radioactivity, organic vapors, and HE prior to sample collection. All field screening results were negative or at background levels.

**TABLE 5.14.4-1
SUMMARY OF SAMPLES TAKEN**

Location ID	Sample ID	Depth (ft)	Matrix	VOCs	HE	Inorganics	Radio-nuclides
Original Investigation Samples							
Sump Area							
40-3048	AAA8780	0-0.5	SOIL	Lost	17907	NA	NA
40-3048	AAA8781	4.5-5.5	SOIL	Lost	17907	NA	NA
40-3048	AAA8782	7.5-8.5	SOIL	Lost	17907	NA	NA
40-3049	AAA8783	0-0.5	SOIL	Lost	17907	NA	NA
40-3049	AAA8784	4.5-5.5	SOIL	Lost	17907	NA	NA
40-3049	AAA8785	7.5-8.5	SOIL	Lost	17907	NA	NA
40-3050	AAA8786	0-0.5	SOIL	Lost	17907	NA	NA
40-3050	AAA8787	4.5-5.5	SOIL	Lost	17907	NA	NA
40-3050	AAA8788	7.5-8.5	SOIL	Lost	17907	NA	NA
40-3051	AAA8789	0-0.5	SOIL	Lost	17907	NA	NA
40-3051	AAA8790	4.5-5.5	SOIL	Lost	17907	NA	NA
40-3052	AAA8792	0-0.5	SOIL	Lost	17907	NA	NA
40-3052	AAA8793	4.5-5.5	SOIL	Lost	17907	NA	NA
40-3052	AAA8794	7.5-8.5	SOIL	Lost	17907	NA	NA
40-3052	AAA8795	7.5-8.5	SOIL	Lost	17907	NA	NA
Outfall Area							
40-3053	AAA8801	0-0.5	SOIL	NA	17907	NA	NA
40-3054	AAA8802	0-0.5	SOIL	NA	17907	NA	NA
40-3055	AAA8803	0-0.5	SOIL	NA	17907	NA	NA
40-3055	AAA8804	0-0.5	SOIL	NA	17907	NA	NA
Resample Activity							
Sump Area							
40-3048	0540-96-0001	0-0.5	SOIL	1915	1917	NA	NA
40-3048	0540-96-0002	4.6-5.2	SOIL	1915	1917	NA	NA
40-3048	0540-96-0003	7.5-8.2	SOIL	1915	1917	NA	NA
40-3049	0540-96-0004	0-0.5	SOIL	1915	1917	NA	NA
40-3049	0540-96-0005	4.7-5.2	SOIL	1915	1917	NA	NA
40-3049	0540-96-0006	7.5-8.0	SOIL	1915	1917	NA	NA
40-3050	0540-96-0007	0-0.5	SOIL	1915	1917	NA	NA
40-3050	0540-96-0008	4.7-5.3	SOIL	1915	1917	NA	NA
40-3050	0540-96-0009	7.0-7.5	SOIL	1915	1917	NA	NA
40-3051	0540-96-0010	0-0.5	SOIL	1915	1917	NA	NA
40-3051	0540-96-0011	4.7-5.3	SOIL	1915	1917	NA	NA

**TABLE 5.14.4-1 (con't)
SUMMARY OF SAMPLES TAKEN**

Location ID	Sample ID	Depth (ft)	Matrix	VOCs	HE	Inorganics	Radio-nuclides
40-3051	0540-96-0012	7.3-8.0	SOIL	1915	1917	NA	NA
40-3052	0540-96-0013	0-0.5	SOIL	1915	1917	NA	NA
40-3052	0540-96-0014	4.5-5.0	SOIL	1915	1917	NA	NA
40-3052	0540-96-0015	7.5-8.0	SOIL	1915	1917	NA	NA
40-3052	0540-96-0016	7.5-8.0	SOIL	1915	1917	NA	NA

Outfall Area

40-3053	0540-96-0017	0-0.5	SOIL	NA	1917	NA	NA
40-3054	0540-96-0018	0-0.5	SOIL	NA	1917	NA	NA
40-3055	0540-96-0019	0-0.5	SOIL	NA	1917	NA	NA
40-3055	0540-96-0020	0-0.5	SOIL	NA	1917	NA	NA

Marsh

40-3056	AAA8005	0-0.5	SOIL	Lost	17907	18037	18982
40-3056	0540-96-0021	0-0.5	SOIL	1915	1917	NA	NA
40-3057	AAA8006	0-0.5	SOIL	Lost	17907	18037	18982
40-3057	0540-96-0022	0-0.5	SOIL	1915	1917	NA	NA
40-3058	AAA8007	0-0.5	SOIL	Lost	17907	18037	18982
40-3058	0540-96-0023	0-0.5	SOIL	1915	1917	NA	NA
40-3059	AAA8008	0-0.5	SOIL	Lost	17907	18037	18982
40-3059	0540-96-0024	0-0.5	SOIL	1915	1917	NA	NA
40-3060	AAA8009	0-0.5	SOIL	Lost	17907	18037	18982
40-3060	0540-96-0025	0-0.5	SOIL	1915	1917	NA	NA
40-3061	AAA8010	0-0.5	SOIL	Lost	17907	18037	18982
40-3061	0540-96-0026	0-0.5	SOIL	1915	1917	NA	NA

5.14.5 Evaluation of Inorganic Chemicals

Copper was observed above UTL in a single sample in the marsh area, AAA8808, at 23.8 mg/kg. Inorganic chemicals with concentrations above background are summarized in Table 5.14.5-1 and plotted on Figure 5.12.5-1.

**TABLE 5.14.5-1
INORGANIC CHEMICALS WITH CONCENTRATIONS AT OR ABOVE
BACKGROUND SCREENING VALUES FOR PRS 40-005**

Sample ID	Depth (ft)	Media	Copper (mg/kg)
SAL	N/A ^b	N/A ^b	2800
Soil UTL ^a	N/A ^b	N/A ^b	15.5
AAA8005	0-0.5	SOIL	<1.2(U)
AAA8006	0-0.5	SOIL	<4(U)
AAA8007	0-0.5	SOIL	<2(U)
AAA8008	0-0.5	SOIL	23.8
AAA8009	0-0.5	SOIL	<1.2(U)
AAA8010	0-0.5	SOIL	<1.2(U)

a. SAL = screening action level

b. Total may not equal sum of normalized values due to rounding

5.14.6 Evaluation of Radionuclides

All radionuclide results at the marsh were below UTL. No radionuclides were identified for analysis at any other locations at this PRS.

5.14.7 Evaluation of Organic Chemicals

Detected organic chemicals at PRS 40-005 are presented in the Table 5.14.7-1 and plotted in Figure 5.14.7-1. The qualifiers shown in the table have been assigned during baseline data validation. The results of the focused data validation, presented in Section 4.3.17, indicate that the VOC data are acceptable as reported without qualification. However, the presence of low internal standard areas indicates that target analytes quantitated against the internal standards should be considered to be biased low.

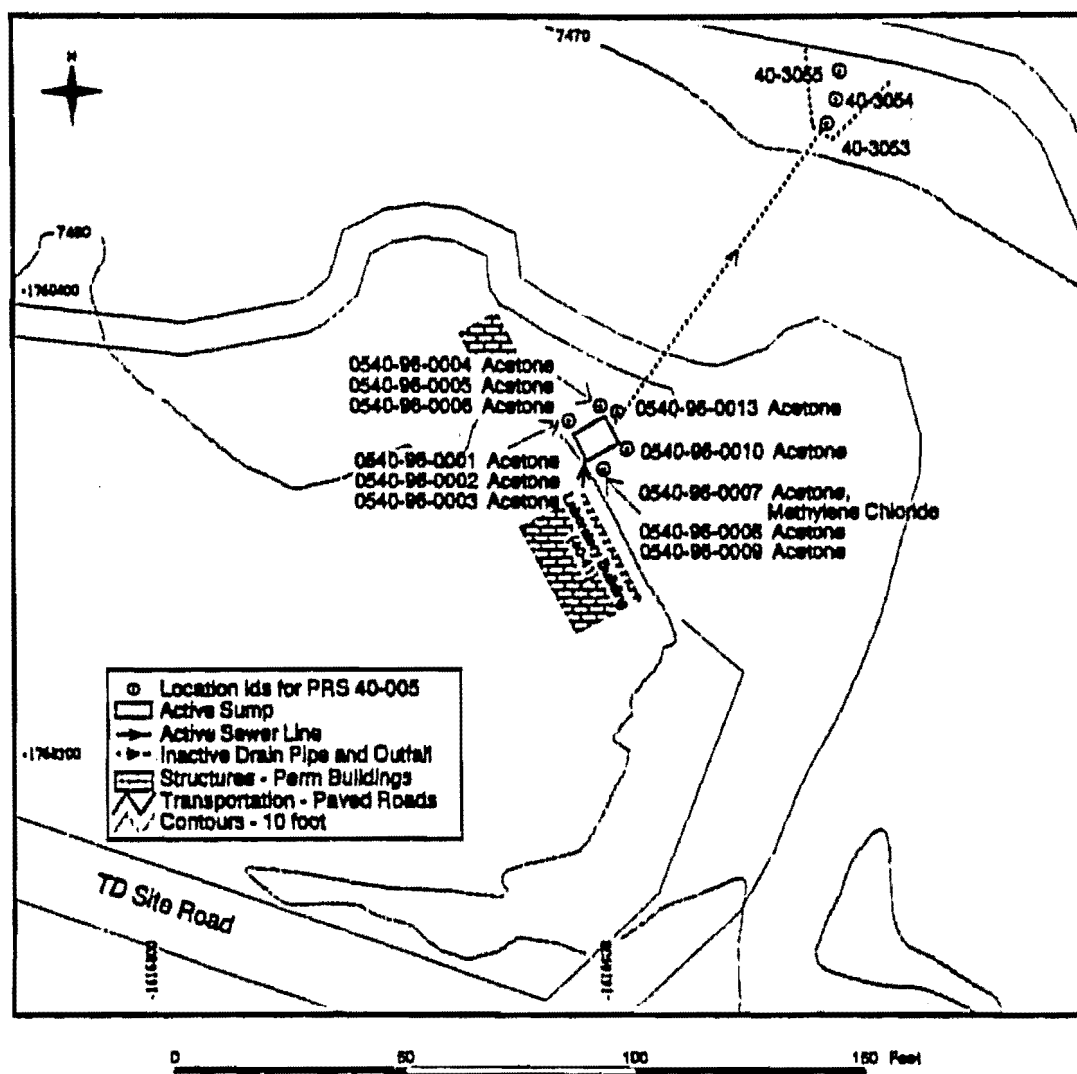


Figure 5.14.7-1. Locations of organic analytes that exceed background (UTLs and EGLs) and/or that exceed SALs at PRS 40-005 excluding the Marsh Area.

No HE compounds were reported in either set of samples analyzed for the PRS. Focused validation of the first data set determined that nitrobenzene and 1,3,5-trinitrobenzene results may be biased low, but the data are usable as reported. No HE compounds were reported in the second set of samples; all QC data are acceptable, and the data are usable as reported.

**TABLE 5.14.7-1
DETECTED ORGANIC CHEMICALS FOR PRS 40-005**

Sample ID	Depth (ft)	Acetone (mg/kg)	Methylene Chloride (mg/kg)
SAL	NA	2000	11
EQL	NA	0.02	0.005
Sump Area			
0540-96-0001	0-0.5	0.008(J)	<0.005(UJ)
0540-96-0002	4.6-5.2	0.048	<0.006
0540-96-0003	7.5-8.2	0.023	<0.005
0540-96-0004	0-0.5	0.006(J)	<0.006(UJ)
0540-96-0005	4.7-5.2	0.077(J)	<0.006(UJ)
0540-96-0006	7.5-8	0.021(J)	<0.006(UJ)
0540-96-0007	0-0.5	0.038	0.008
0540-96-0008	4.7-5.3	0.055	<0.006
0540-96-0009	7-7.5	0.07	<0.007
0540-96-0010	0-0.5	0.016(J)	<0.006(UJ)
0540-96-0013	0-0.5	0.016(J)	<0.005(UJ)

5.14.8 Risk-Based Screening Assessment

Copper, acetone, and methylene chloride were the only COPCs identified through the background screening for assessment. Acetone and copper are recognized as being noncarcinogenic, while methylene chloride is identified as a carcinogen. None of these chemicals were reported above SAL. No MCE is possible or necessary for the carcinogenic compound. The total for the MCE for the noncarcinogens is 0.009. Table 5.14.8-1 present the results for the noncarcinogenic MCE.

**Table 5.14.8-1
MULTIPLE CHEMICAL EVALUATION FOR SOIL SAMPLES AT PRS 22-014(b)**

Chemical	Location ID	Sample ID	Maximum Sample Value	Soil SAL ^a	Normalized Value
Noncarcinogenic Effects (mg/kg)					
Copper	22-3015	AAA8008	23.8	2800	0.009
Acetone	22-3014	0540-96-0005	0.077	2000	0.000
				Total ^b :	0.009

a. screening action level

b. Total may not equal the sum of normalized values due to rounding

5.14.9 Human Health Risk Assessment

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

5.14.10 Preliminary Ecological Assessment

In cooperation with the NMED and EPA Region 6, the Laboratory ER Project is developing an approach for ecological risk assessment. Further ecological risk assessment at PRS 40-005 will be deferred until the site can be assessed as part of the ecological exposure unit methodology currently being developed.

5.14.11 Conclusions and Recommendations

PRS 40-005 has been characterized and assessed based on the results of a Phase I field investigation. This investigation focused on potentially worst-case contaminated media at the PRS, and no COPCs were identified at the site. Therefore, the site is recommended for NFA.

This recommendation is based on the NFA criterion 4 (Los Alamos National Laboratory, Environmental Restoration Department, Project Consistency Team Policy number 015) that 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 will be requested to remove this site from the HSWA Module of the Laboratory's RCRA operating permit.

5.14.12 Sampling and Analysis Plan for PRS 40-005

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

5.15 Potential Release Site - 22-014(a)

PRS 22-014(a), shown in Figure 5.15-1, is an active explosives sump system with an inactive seepage pit area, which serves Building TA-22-93. No constituents were reported in any investigation sample at a concentration greater than SAL, and the PRS is recommended for NFA.

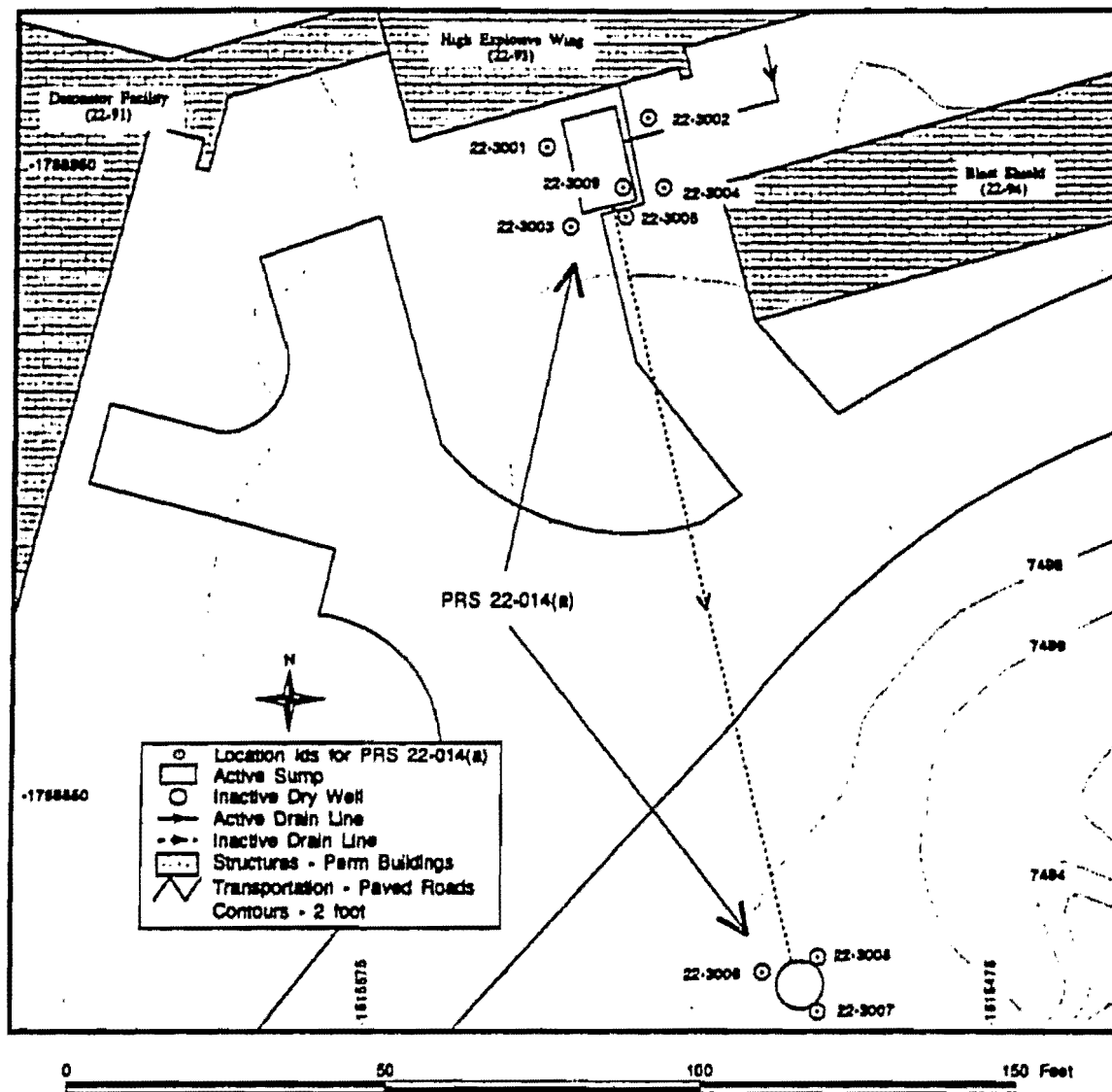


Figure 5.15-1. Locations of PRS 22-014(a) samples.

5.15.1 History

This PRS is discussed in further detail in Section 5.3 of the RFI Work Plan for OU 1111 (LANL 1993, 26068).

The active sump receives rinse water from a washing facility for parts and clothing from explosives compacting operations (LANL 1990) and, prior to 1995, discharged to a seepage pit (dry well) in the upper part of Tributary B. The sump system includes a settling basin, which allows solid materials to settle out of the water, a drain line connecting the building to the basin, an outflow drain line, and seepage pit (dry well).

The outflow from the sump was capped in 1995 leaving the drain lines and seepage pit inactive. Discharged effluent from the current operations is retained in the sump, and suspended solids are allowed to settle out as sludge. The contents of the sump are periodically removed for disposal in approved facilities.

High explosives and barium were identified in the OU 1111 Work Plan as potential contaminants associated with the PRS. However, according to a number of DX-1 employees who have been involved with operations in TA-22-93 since it opened in December 1984, barium has never been used in TA-22-93 (Creamer 1996, 56383). Therefore, barium is eliminated from further consideration in this investigation.

5.15.2 Description

No further site-specific information on geology, hydrology, soils, or wildlife habitat associated with this PRS is required. General area geology, hydrology, soils, or wildlife habitat information associated with this PRS is presented in Chapter 2.

5.15.3 Previous Investigation(s)

No previous investigations have been performed at this site.

5.15.4 Field Investigation.

The objective of the Phase 1 investigation at PRS 22-014(a) was to determine whether media associated with the sump system or seepage pit were contaminated due to past operational releases, and, if present, does the contamination represent an unacceptable human health risk based on the results of the screening assessment.

The conceptual model for this unit includes the assumption that levels of contamination are likely to be low due to the limited amount of hazardous materials used in the operation and is based on the following release scenario. Waste effluent was released to the sump where settling of most bulk and suspended contaminants occurs. Settled effluent from the sump, with a reduced waste loading, was then released via an underground drainline to the seepage pit. Waste effluent that discharged to the seepage pit percolated into the immediately surrounding soil matrix with the retention of any remaining contaminants in the seepage pit or surrounding soil matrix. The sump, seepage pit, and surrounding soils are the primary sources of possible contaminants. The investigation was designed to assess the presence of environmental releases from leaks, spills, and normal operation related to the system during its history.

Field sampling activities were completed on 15 June 1994. The sump contained only 1 ft of sludge water at the time of sample collection and, therefore, only one sample, (location 22-3009) including a duplicate, was collected.

Four locations, 22-3001 through 22-3004, were cored within 6 ft of each corner of the sump; location 22-3005 was near the outflow pipe. Because the sump is located adjacent to a concrete pad, it was necessary to cut through the concrete prior to advancing the borings at locations 22-3002 and 22-3004. Therefore, surface soils (0-0.5 ft) collected at these two locations were located under the concrete pad. Soil samples from the five cores were collected at the surface (0-0.5 ft), at 4 ft (the level of the bottom of the sump), and at 7 ft (3 ft below the bottom of the sump). Figure 5.15-1 shows the locations of the borings, active sump, inactive drain lines, and seepage pit.

The RFI Work Plan (LANL 1993, 26068) specified the collection of 3 samples from each layer of sludge or liquid present in the seepage pit. No liquid or sludge media were available in the seepage pit at the time of sampling. As an alternative, three borings were advanced at locations 22-3006 through 22-3008 within 6 ft around the seepage pit

and to a maximum depth of 27 ft. Soil samples from each core were collected at the surface (0-0.5 ft), at 14 ft, and at an interval between 17 and 27 ft.

All samples were submitted for HE analysis. Sample locations, sample numbers, and depth intervals are summarized in Table 5.15.4-1.

All locations were field screened for radioactivity, organic vapors, and HE prior to sample collection. All field screening results were negative or at background levels.

**TABLE 5.15.4-1
SUMMARY OF SAMPLES TAKEN**

Location ID	Sample ID	Depth (ft)	Media	High Explosives*
Active Sump Area				
22-3001	AAA8645	0-0.5	soil	17760
22-3001	AAA8646	3.0-4.0	soil	17760
22-3001	AAA8647	6.0-7.0	soil	17760
22-3002	AAA8648	0-0.5	soil	17760
22-3002	AAA8649	3.0-4.0	soil	17760
22-3002	AAA8650	6.0-7.0	soil	17760
22-3003	AAA8651	0-0.5	soil	17760
22-3003	AAA8652	3.0-4.0	soil	17760
22-3003	AAA8653	6.0-7.0	soil	17760
22-3004	AAA8654	0-0.5	soil	17760
22-3004	AAA8655	3.0-4.0	soil	17760
22-3004	AAA8656	6.7-7.0	soil	17760
22-3005	AAA8657	0-0.5	soil	17760
22-3005	AAA8658	3.0-4.0	soil	17760
22-3005	AAA8659	6.0-7.0	soil	17760
22-3005	AAA8660	6.0-7.0	soil	17760
Inactive Seepage Pit Area				
22-3006	AAA8661	0-0.5	soil	17908
22-3006	AAA8662	13.7-14.2	soil	17908
22-3006	AAA8663	26.8-27.2	soil	17908
22-3007	AAA8665	0-0.5	soil	17908
22-3007	AAA8666	13.7-14.2	soil	17908
22-3007	AAA8667	24.5-25.0	soil	17908
22-3008	AAA8669	0-0.5	soil	17908
22-3008	AAA8670	13.7-14.2	soil	17908
22-3008	AAA8671	17.2-17.5	soil	17908
Sump Contents				
22-3009	AAA8674	0-0.5	sludge	17760
22-3009	AAA8675	0-0.5	sludge	17760

* Request Number

5.15.5 Evaluation of Inorganic Chemicals

No inorganic chemicals were identified at this PRS as potential contaminants for investigation.

5.15.6 Evaluation of Radionuclides

No radionuclides were identified at this PRS as potential contaminants for investigation.

5.15.7 Evaluation of Organic Chemicals

Detected organic chemicals at PRS 22-014(a) are presented in the Table 5.15.7-1. The qualifiers shown in the table have been assigned during baseline data validation. The results of the focused data validation, presented in Section 4.3.16, indicate that the HE data would generally be considered to be biased low, including the results shown with the "R" qualifier, and the data have been used with that consideration.

High explosives were the only organic constituents analyzed from samples taken at this PRS. Two HE constituents, HMX and RDX, were reported to be present at levels that exceeded their associated EQL in two samples and are identified as COPCs for evaluation in the screening assessment. The results are summarized in Table 5.15.7-1. Locations of those samples are plotted in Figure 5.15.7-1.

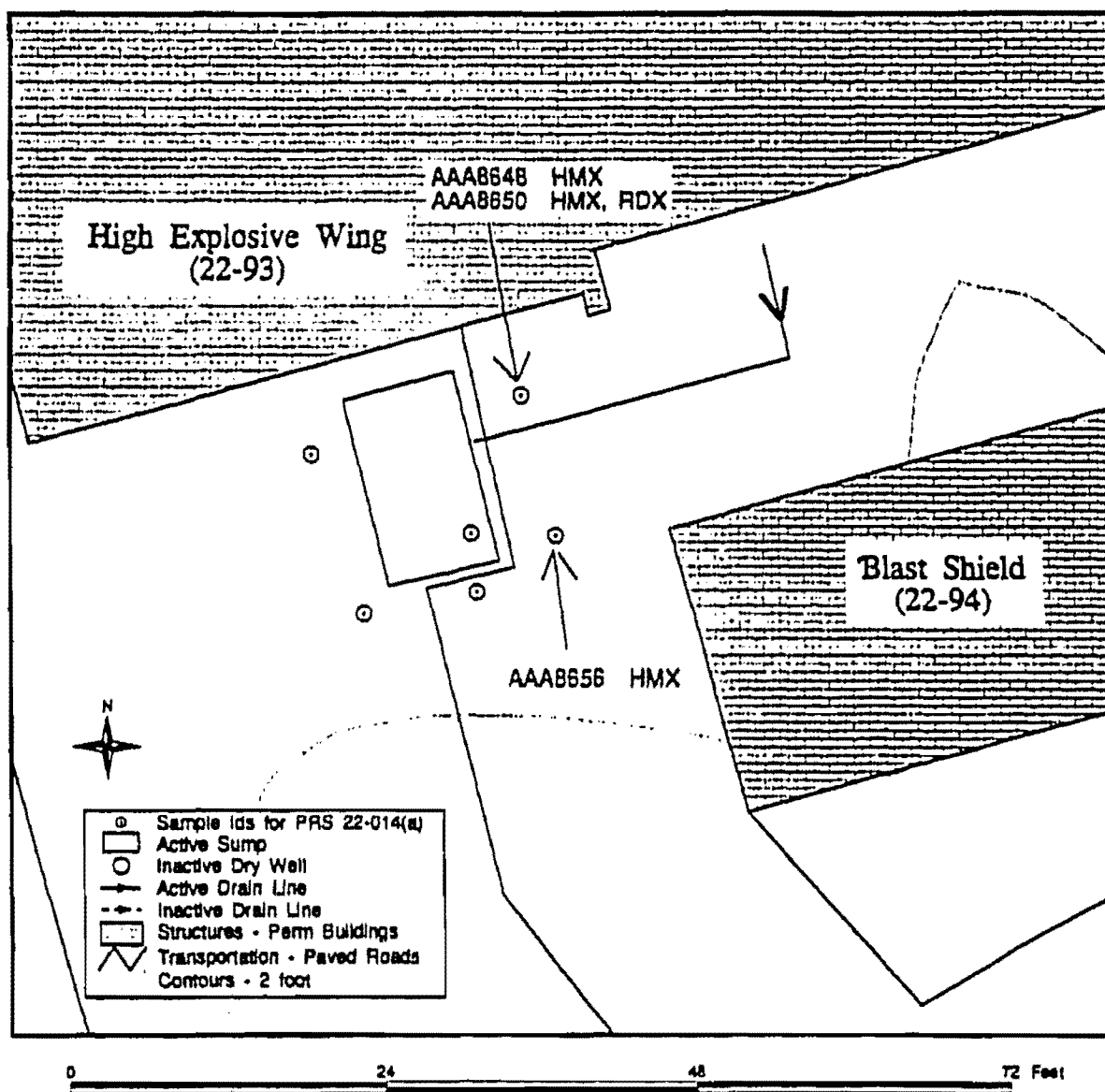


Figure 5.15.7-1. Locations of analytes that exceed background (UTLs and EQLs) and/or that exceed SALs at PRS 22-014(a).

**TABLE 5.15.7-1
DETECTED ORGANIC CHEMICALS FOR PRS 22-014(a)**

Sample ID	Depth (ft)	HMX (mg/kg)	RDY (mg/kg)
SAL	N/A	3300	4
EQL	N/A	2.2	1
Active Sump Area			
AAA8648	0-0.5	1.1(J)	<0.5(R)
AAA8650	6-7	21.1(J)	2.05(J)
AAA8656	6-7	3.06(J)	<0.5(R)

N/A = not applicable

5.15.8 Risk-Based Screening Assessment

Two HE compounds, RDX and HMX, were reported in site samples at levels that exceed EQL. HMX is identified as a noncarcinogen, while RDX is associated with carcinogenic effects. Neither compound was reported at levels exceeding SAL. Because the reported contaminants are limited to individual noncarcinogenic and carcinogenic compounds, no MCE is required, and no COPCs are identified for this PRS.

5.15.9 Human Health Risk Assessment

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

5.15.10 Preliminary Ecological Assessment

In cooperation with the NMED and EPA Region 6, the Laboratory ER Project is developing an approach for ecological risk assessment. Further ecological risk assessment at PRS 22-014(a) will be deferred until the site can be assessed as part of the ecological exposure unit methodology currently being developed.

5.15.11 Conclusions and Recommendations

This PRS has been characterized and assessed based on the results of a Phase I investigation. No HE compounds were reported in any samples associated with the seepage pit. Limited HE contamination is indicated in subsurface samples from the deepest subsurface soil intervals collected in association with the active sump. Based on this characterization, the degree and extent of potential contamination below the active sump cannot be determined or assessed.

HMX was reported above EQL in two subsurface samples at estimated concentrations due to potential low analytical bias. However, the maximum reported concentration is more than two orders of magnitude less than SAL, and the potential low bias would not alter the decision that, as characterized, HMX contamination at the PRS presents no unacceptable human health risk.

RDX was also reported above EQL in one subsurface sample at an estimated concentration due to potential low bias. RDX was not detected in any other Phase I sample, and the single maximum reported concentration is less than SAL. Due to the recognized potential for low analytical bias, this result may actually approach SAL, but no undetected analytical result would be expected to exceed SAL.

Therefore, due to the overall low frequency of HE contamination reported at the PRS, the operational history and general lack of evidence of a substantial release at the site, it is concluded that this PRS presents no unacceptable human health risk and is recommended for NFA.

This recommendation is based on the NFA criterion 4 (Los Alamos National Laboratory, Environmental Restoration Department, Project Consistency Team Policy number 015) that 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 will be requested to remove this site from the HSWA Module of the Laboratory's RCRA operating permit.

5.15.12 Sampling and Analysis Plan for PRS 22-014(a)

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

5.16 Potential Release Site - 22-014(b)

PRS 22-014(b), shown in Figure 5.12-1, is an active explosives sump and inactive outfall area serving building TA 22-34. The results of the Phase I sampling indicated the limited presence of inorganics, HE, VOCs, and SVOCs associated with the PRS. The unit is recommended for NFA.

5.16.1 History

This PRS is discussed in further detail in Section 5.3.1 of the RFI Work Plan for OU 1111 (LANL 1993, 26068).

Building TA 22-34, currently used as a laser laboratory, has previously housed a chemistry laboratory, an explosives laboratory, and a photographic laboratory that did not have a silver recovery unit. The explosives sump outlet has been capped (circa 1994), and no further discharge to the outfall drainage area is occurring. Based on the process history, hazardous wastes that may be associated with the sump and outfall system include explosives, solvents, acids, and photographic chemicals.

These processes resulted in the identification of HE, inorganics, VOCs, and SVOCs as contaminants of potential concern for the Phase I investigation.

5.16.2 Description

No further site-specific information on geology, hydrology, soils, or wildlife habitat associated with this PRS is required. General area geology, hydrology, soils, or wildlife habitat information associated with this PRS is presented in Chapter 2.

5.16.3 Previous Investigation(s)

No previous investigations have been performed at this site.

5.16.4 Field Investigation

The objective of the Phase 1 investigation was to determine whether contamination is present in media associated with the sump or outfall area; and, if present, does it pose an unacceptable human health risk based on the results of a screening assessment. The investigation focused on the inactive outfall area and soils surrounding the active sump in order to investigate potential contamination resulting from the inactive system. The sump itself was not sampled. The conceptual model for this unit includes the assumption that levels of contamination are likely to be low due to the limited amount of hazardous materials used in the operation and is based on the following release scenario. Waste effluent was released to the sump where settling of most bulk and suspended contaminants occurs. Settled effluent from the sump, with a reduced waste

loading, was then released via an underground drainline to the outfall area. Waste effluent discharged to the outfall area infiltrates into the surrounding soil matrix with the retention of particulates and less soluble constituents in the surface and near-surface soil matrix.

The sump, surrounding soils, and outfall area are the primary sources of possible contaminants. The investigation was designed to assess the presence of environmental releases due to leaks, spills, or normal operations during its operational history.

Field sampling activities were completed on 15 June 1994. Figure 5.12-1 identifies the locations of the sump, drain lines, outfall drainage, and field borings. The sump is located against the outside wall at the northeast corner of TA 22-34. The sump is raised approximately 6 in. above ground surface and abuts an asphalt parking area to the west and north and a concrete pad to the east. It was therefore necessary to remove the asphalt and concrete prior to collecting surface and subsurface soil samples.

Boring locations 22-3010 through 22-3013, placed at the corners of the sump, and 22-3014, placed at the outflow pipe, were within 6 ft of the sump. Each location was cored to a depth of approximately 6.5 ft or to the soil/tuff interface. Soil samples were collected from the cores at three intervals, the surface (0-0.5 ft), at 3.5 ft (the level of the bottom of the sump), and at 6.5 ft (3 ft below the bottom of the sump).

Three surface (0-0.5 ft) soil samples (22-3015 through 22-3017) were collected in the outfall area and included one sample at the outfall and two additional samples within 25 ft of the outfall pipe in the downgradient runoff area. Samples were submitted for metals, sulfates/copper salts, nitrates/nitrites, fluoride, and cyanide analyses, and for VOCs, SVOCs, and HE analyses. Table 5.16.4-1 presents a summary of samples collected at this PRS.

All locations were field screened for radioactivity, organic vapors, and HE prior to sample collection. All field screening results were negative or at background levels.

**TABLE 5.16.4-1
SUMMARY OF SAMPLES TAKEN**

Location ID	Sample ID	Depth (ft)	Media	VOCs*	SVOCs*	High Explosives*	Inorganic Chemicals
Active Sump Area							
22-3010	AAA8678	0-0.5	soil	17773	17773	17760	17827
22-3010	AAA8679	2.5-3.5	soil	17773	17773	17760	17827
22-3010	AAA8680	4.8-5.8	soil	17773	17773	17760	17827
22-3011	AAA8681	0-0.5	soil	17773	17773	17760	17827
22-3011	AAA8682	2.5-3.5	soil	17773	17773	17760	17827
22-3011	AAA8683	3.4-4.4	soil	17773	17773	17760	17827
22-3012	AAA8684	0-0.5	soil	17773	17773	17760	17827
22-3012	AAA8685	2.5-3.5	soil	17773	17773	17760	17827
22-3012	AAA8686	5.5-6.5	soil	17773	17773	17760	17827
22-3013	AAA8687	0-0.5	soil	17773	17773	17760	17827
22-3013	AAA8688	2.5-3.5	soil	17773	17773	17760	17827
22-3013	AAA8689	5.5-6.5	soil	17773	17773	17760	17827
22-3014	AAA8690	0-0.5	soil	17773	17773	17760	17827
22-3014	AAA8691	2.5-3.5	soil	17773	17773	17760	17827
22-3014	AAA8692	5.5-6.5	soil	17773	17773	17760	17827
22-3014	AAA8693	5.5-6.5	soil	17773	17773	17760	17827
Inactive Runoff Area							
22-3015	AAA8694	0-0.5	soil	NA	17773	17760	17827
22-3016	AAA8695	0-0.5	soil	NA	17773	17760	17827
22-3017	AAA8696	0-0.5	soil	NA	17773	17760	17827
22-3017	AAA8697	0-0.5	soil	NA	17773	17760	17827

* Request Number

NA = not analyzed

5.16.5 Evaluation of Inorganic Chemicals

Inorganic chemicals with concentrations at or above background at PRS 22-014(b) are presented in the Table 5.16.5-1, and their locations are plotted in Figure 5.16.5-1. The qualifiers shown in the table have been assigned during baseline validation. However, the data have undergone focused validation, and results are summarized in Section 4.1.16. Baseline validation resulted in the qualification of all lead data as rejected. This qualification was determined to be in error, and the lead data are usable as reported. Focused validation indicates that all data may be used as reported.

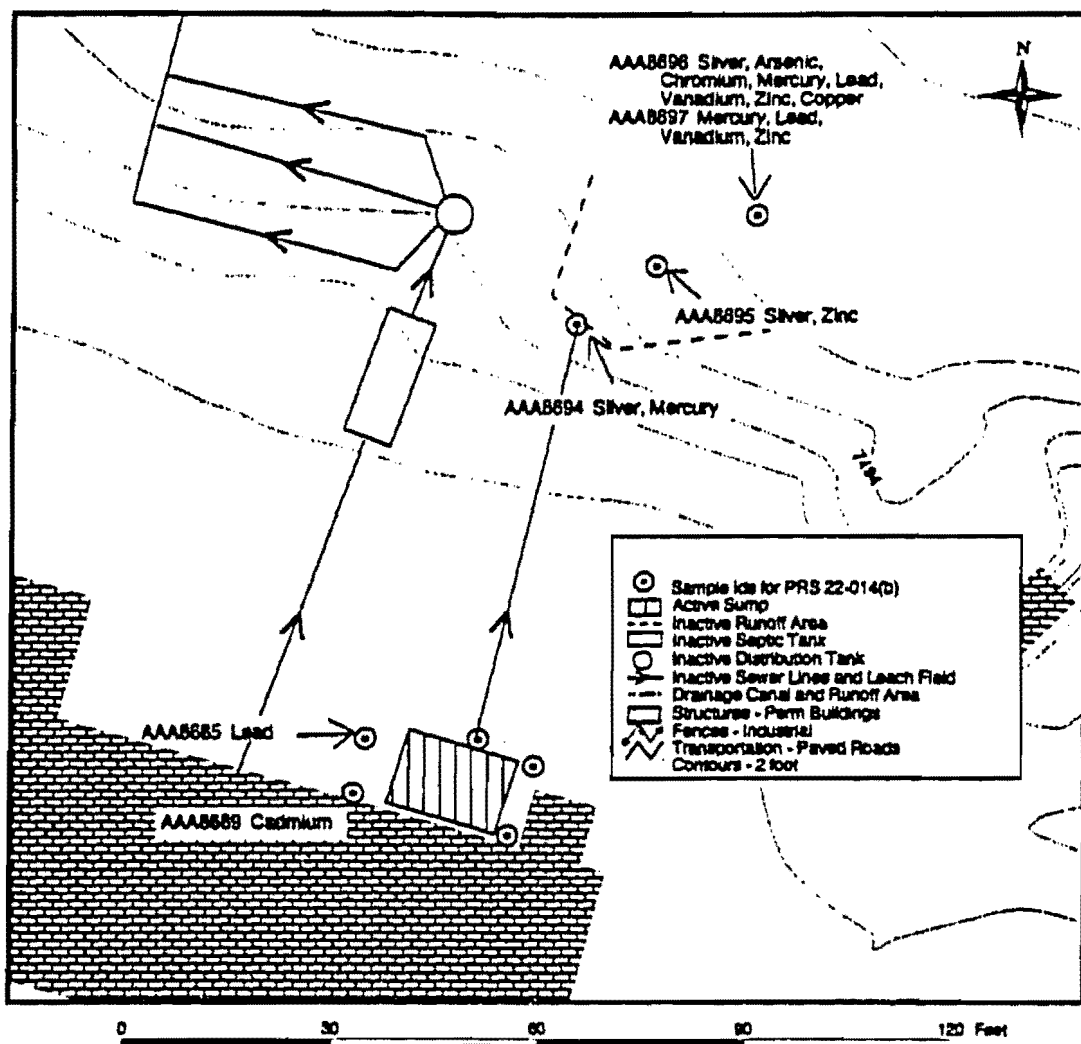


Figure 5.16.5-1 Locations of inorganic analytes that exceed background (UTLs and EQLs) and/or that exceed SALs at PRS 22-014(b).

Inorganic analyses of samples taken during this investigation indicate that arsenic, silver, calcium, cadmium, copper, chromium, mercury, lead, vanadium, and zinc were present in at least one sample at a concentration that exceeds background screening values. Calcium, which was detected in one sample above background, is an essential nutrient and has no SAL. Ingestion of the maximum observed concentration of calcium at the default residential ingestion rate for soil of 200 mg/day would result in a daily intake of less than 0.4% of the RDA of calcium. Based on this information and the absence of significant toxicity by calcium, calcium was eliminated from further consideration.

The remaining nine inorganic chemicals, arsenic, silver, cadmium, copper, chromium, mercury, lead, vanadium, and zinc, were identified as COPCs for evaluation in the screening assessment. The inorganic chemicals with concentrations at or above background screening values are summarized in Table 5.16.5-1.

**TABLE 5.16.5-1
INORGANIC CHEMICALS WITH CONCENTRATIONS AT/OR ABOVE
BACKGROUND SCREENING VALUES FOR PRS 22-014(b)**

Sample ID	Location ID	Depth (ft)	Arsenic (mg/kg)	Silver (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Copper (mg/kg)
SAL	NA	NA	NA	380	38	210	2800
Bkgmd UTL ^a	NA	NA	7.82	2.0 ^b	2.7	19.3	15.5
Active Sump Area							
AAA8678	22-3010	0-0.5	4.4	<0.89	<0.41	9.5	7.6
AAA8679	22-3010	2.5-3.5	4.3	<.92	<0.42	9.7	8
AAA8680	22-3010	4.8-5.8	<1.2	<1	<0.46	3.4	<1.5
AAA8681	22-3011	0-0.5	4.1	<0.86	<0.4	9.6	6.7
AAA8682	22-3011	2.5-3.5	3.9	<0.9	<0.42	10.1	7.4
AAA8683	22-3011	3.4-4.4	3.8	<0.91	<0.42	9.3	7.6
AAA8684	22-3012	0-0.5	<1.4	<0.77	<0.35	3.1	<4.8
AAA8684D	22-3012	0-0.5	1.7	<0.77	<0.35	3.6	4.4
AAA8685	22-3012	2.5-3.5	3.6	<0.86	<0.4	7.8	7.1
AAA8686	22-3012	5.5-6.5	3.9	<0.87	<0.4	11	8
AAA8687	22-3013	0-0.5	<1.8	<0.78	<0.36	4.2	6.4
AAA8688	22-3013	2.5-3.5	2.7	<0.85	<0.39	5.7	<4
AAA8689	22-3013	5.5-6.5	2.9	<0.86	7.9	9.1	6.3
AAA8690	22-3014	0-0.5	<1.7	<0.78	<0.36	3.7	<3.8
AAA8691	22-3014	2.5-3.5	3.3	<0.89	<0.41	9.5	7.6
AAA8692	22-3014	5.5-6.5	3.5	<0.91	<0.42	11.4	8.3
AAA8693	22-3014	5.5-6.5	4	<0.92	<0.42	9.6	6.5
Outfall Area							
AAA8694	22-3015	0-0.5	4.4	21.9	<0.38	10.8	13
AAA8694D	22-3015	0-0.5	NA	NA	NA	NA	NA
AAA8695	22-3016	0-0.5	<2.3	19	<0.45	8.3	14.3
AAA8696	22-3017	0-0.5	9	14.1	<1.1	30.7	20.1
AAA8697	22-3017	0-0.5	5.7	<2.1	1.6	11.6	10.4

a. Upper tolerance limit of Laboratory-wide background data from A, B, and C horizons

b. Background data not available; sample specific detection limit (DL) used as screening criteria

NA = not applicable

TABLE 5.16.5-1(cont)
INORGANIC CHEMICALS WITH CONCENTRATIONS AT OR ABOVE
BACKGROUND SCREENING VALUES FOR PRS 22-014(b)

Sample ID	Location ID	Depth (ft)	Mercury (mg/kg)	Lead (mg/kg)	Vanadium (mg/kg)	Zinc (mg/kg)
SAL	NA	NA	23	400	540	23000
Bkgd UTL ^a	NA	NA	0.1	23.3	41.9	50.8
Active Sump Area						
AAA8678	22-3010	0-0.5	<0.04	11.7(R)	22	28.4
AAA8679	22-3010	2.5-3.5	<0.03	11.8(R)	24.1	31.7
AAA8680	22-3010	4.8-5.8	<0.03	3.4(R)	<3.7	15.3
AAA8681	22-3011	0-0.5	<0.03	10.8(R)	22.1	26.9
AAA8682	22-3011	2.5-3.5	<0.03	9.7(R)	22	29.6
AAA8683	22-3011	3.4-4.4	<0.04	10.2(R)	21.2	29.9
AAA8684	22-3012	0-0.5	<0.03	5.7(R)	<8.5	28.1
AAA8684D	22-3012	0-0.5	<0.03	5.9	6.6	30.7
AAA8685	22-3012	2.5-3.5	<0.03	64.9(R)	16.2	25.9
AAA8686	22-3012	5.5-6.5	<0.04	17(R)	20.7	33.7
AAA8687	22-3013	0-0.5	<0.03	9.9(R)	<10.5	26.2
AAA8688	22-3013	2.5-3.5	<0.03	12.3(R)	18	25.2
AAA8689	22-3013	5.5-6.5	<0.03	12(R)	19.1	31.7
AAA8690	22-3014	0-0.5	<0.03	6.6(R)	<8.3	27
AAA8691	22-3014	2.5-3.5	<0.03	9.6(R)	22.4	28.3
AAA8692	22-3014	5.5-6.5	<0.04	9.8(R)	23.1	32.4
AAA8693	22-3014	5.5-6.5	<0.04	13.9(R)	20.9	27.6
Outfall Area						
AAA8694	22-3015	0-0.5	0.16	19(R)	18.6	32.8
AAA8694D	22-3015	0-0.5	NA	NA	NA	NA
AAA8695	22-3016	0-0.5	<0.13	12(R)	16.9	63.1
AAA8696	22-3017	0-0.5	0.71	53.3(R)	76.9	109
AAA8697	22-3017	0-0.5	1.4	37.9(R)	56.4	116

a. Upper tolerance limit of Laboratory-wide background data from A, B, and C horizons
 NA = not applicable

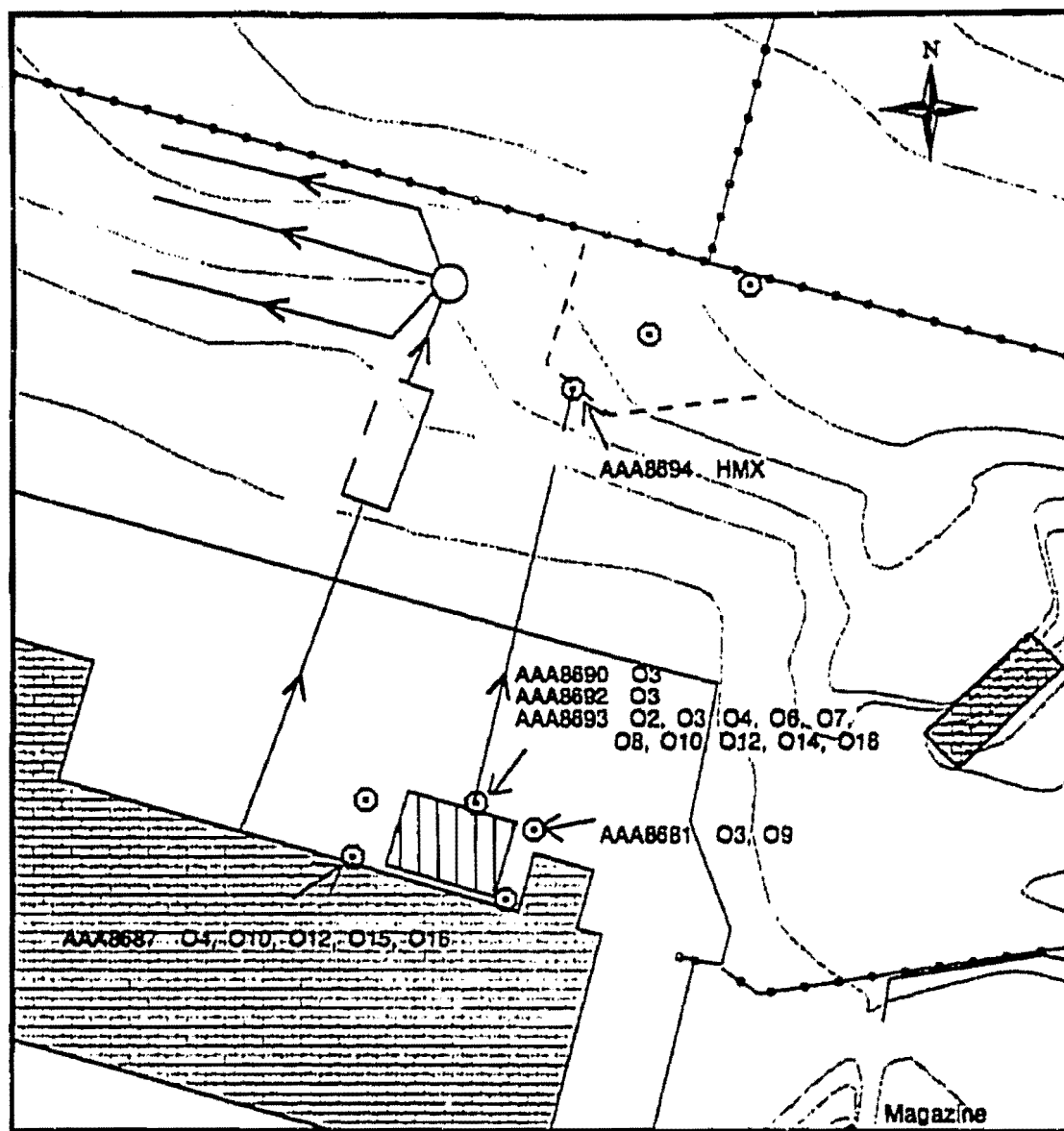
5.16.6 Evaluation of Radionuclides

No radionuclide contamination was expected at this facility based on past operations, and no specific radionuclide analyses were performed.

5.16.7 Evaluation of Organic Chemicals

Detected organic chemicals at PRS 22-014(b) are presented in the Table 5.16.7-1 and their locations plotted in Figure 5.16.7-1. The qualifiers shown in the table have been assigned during baseline data validation. The results of the focused data validation are presented in Section 4.3.16. All VOC target analytes, with the exception of acetone, were undetected, and the focused validation concluded that the data are usable as reported. SVOC results were determined to be potentially biased low, but the results were used as reported, and the potential low bias would not alter site decisions.

HE data were originally rejected due to poor surrogate and QC blind recovery. However, focused validation indicates that the data may be used as reported with the understanding that the reported values may be biased low by approximately 50%.



Sample Ids for PRS 22-014(b)
 Active Sump
 Inactive Runoff Area
 Inactive Septic Tank
 Inactive Distribution Tank
 Inactive Sewer Lines and Leach Field
 Drainage Canal and Runoff Area
 Structures - Perm Buildings
 Fences - Industrial
 Transportation - Paved Roads
 Contours - 2 foot

O2 Acenaphthalene
 O3 Acetone
 O4 Benzo[a] anthracene
 O6 Benzo[b] fluoranthene
 O7 Benzo[g,h,i] perylene
 O8 Benzo[k] fluoranthene
 O9 Bis(2-ethylhexyl) phthalate
 O10 Chrysene
 O12 Fluoranthene
 O14 Indeno[1,2,3-cd] pyrene
 O15 Phenanthrene
 O16 Pyrene

Figure 5.16.7-1. Locations of organic analytes that exceed background (UTLs and EQLs) and/or that exceed SALs at PRS 22-014(b).

**TABLE 5.16.7-1
DETECTED ORGANIC CHEMICALS FOR PRS 22-014(b)**

Sample ID	Depth (ft)	Acenaphthylene (mg/kg)	Acetone (mg/kg)	Benzo[a]anthracene (mg/kg)	Benzo[a]pyrene (mg/kg)	Benzo[b]fluoranthene (mg/kg)
SAL	NA	2200	2000	0.61	0.061	0.61
EQL	NA	0.33	0.02	0.33	0.33	0.33
Active Sump Area						
AAA8681	0-0.5	<0.38	0.074	<0.38	<0.38(UJ)	<0.38(UJ)
AAA8687	0-0.5	<3.5	<0.021	8	6.6(UJ)	11(UJ)
AAA8690	0-0.5	<0.35	0.07	<0.35	<0.35(UJ)	<0.35(UJ)
AAA8692	5.5-6.5	<0.41	0.13	<0.41	<0.41(UJ)	<0.41(UJ)
AAA8693	5.5-6.5	0.97	0.111	4.2	5.5(UJ)	10(J)
Outfall Area						
AAA8694	0-0.5	<0.36	NA	<0.36	<0.36	<0.36(UJ)
Sample ID	Depth (ft)	Benzo[g,h,i] perylene (mg/kg)	Benzo[k] fluoranthene (mg/kg)	Bis(2-ethylhexyl) phthalate (mg/kg)	Chrysene (mg/kg)	Dibenzo[a,h] anthracene (mg/kg)
SAL	NA	1900	6.1	32	61	0.061
EQL	NA	0.33	0.33	0.33	0.33	0.33
Active Sump Area						
AAA8681	0-0.5	<0.38(UJ)	<0.38(UJ)	0.43	<0.38	<0.38(UJ)
AAA8687	0-0.5	<3.5(UJ)	4.1(UJ)	<3.5	7.3	<3.5(UJ)
AAA8690	0-0.5	<0.35(UJ)	<0.35(UJ)	<0.35	<0.35	<0.35(UJ)
AAA8692	5.5-6.5	<0.41	<0.41	<0.41	<0.41	<0.41(UJ)
AAA8693	5.5-6.5	1(J)	2.2(J)	<0.4	3	0.41(UJ)
Outfall Area						
AAA8694	0-0.5	<0.36	<0.36	<0.36	<0.36	<0.36(UJ)
Sample ID	Depth (ft)	Fluoranthene (mg/kg)	HMX (mg/kg)	Indeno[1,2,3-cd] pyrene (mg/kg)	Phenanthrene (mg/kg)	Pyrene (mg/kg)
SAL	NA	2600	3300	0.61	18000	1900
EQL	NA	0.33	2.2	0.33	0.33	0.33
Active Sump Area						
AAA8681	0-0.5	<0.38	<1.1(R)	<0.38(UJ)	<0.38	<0.38
AAA8687	0-0.5	20	<1.1(R)	<3.5(UJ)	15	23
AAA8690	0-0.5	<0.35	<1.1(R)	<0.35(UJ)	<0.35	<0.35
AAA8692	5.5-6.5	<0.41	<1.1(R)	<0.41	<0.41	<0.41
AAA8693	5.5-6.5	11(J)	<1.1(R)	2(J)	<0.4	10(J)
Outfall Area						
AAA8694	0-0.5	<0.36	1.24(J)	<0.36	<0.36	<0.36

Acetone and bis(2ethylhexyl)phthalate were reported above EQL in PRS samples. None of these compounds were reported at levels greater than SAL, and all three are identified as COPCs for further evaluation.

Ten PAH compounds were reported as positively detected at two active sump area locations investigated at PRS 22-014(b). The PAHs were detected at concentrations ranging from 0.41 to 23 mg/kg and, as stated in Section 4.3.14, the results are potentially biased low.

No PAHs were reported above EQL in any outfall area samples. The two borings with elevated PAHs were both located near the active sump, which is surrounded by an asphalt parking area. Asphalt paving material is a common source of PAHs, and investigation of the sump area required boring after removal of the paved surface. Based on the location of the reported PAHs, the recognized potential source, and the lack of reported PAHs in the outfall discharge area, these constituents were eliminated from further consideration at the PRS. However, as a point of reference and consistent with the approach proposed in the draft PAH policy paper, an estimation of risk resulting from the maximum observed concentrations of the eliminated PAH chemicals has been performed.

Seven of the eliminated PAH compounds, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene, are identified as carcinogens, and an estimated risk due to each individual compound can be calculated by the following:

where:

- Site Risk Level = Calculated risk value
- PRG Risk Level = 1×10^{-6} for carcinogens or a hazard index of 1 for noncarcinogens
- Site Soil Concentration = Concentration of PAH in soil at the site (mg/kg)
- PRG = Risk-based concentration in soil for residential exposure assumptions (mg/kg)

Individual risks and total carcinogenic risk for the seven compounds are presented below.

Chemical	PRG (mg/kg)	Maximum Concentration (mg/kg)	Risk
Benzo(a)anthracene	0.61	8	1.3E-5
Benzo(a)pyrene	0.061	6.6	1.1E-4
Benzo(b)fluoranthene	0.61	11	1.8E-5
Benzo(k)fluoranthene	6.1	4.1	6.7E-7
Chrysene	61	7.3	1.2E-7
Dibenzo(a,h)anthracene	0.061	0.41	6.7E-6
Indeno(1,2,3-cd)pyrene	0.61	2	3.3E-6
		Total risk	1.5E-4

The individual and total risks presented by the eliminated carcinogens do not substantially exceed the generally acceptable risk range of $1.0E-4$ to $1.0E-6$ for carcinogens. The acceptability and elimination of these compounds at these levels is further justified by the existence of asphalt source material in the area of the investigation.

5.16.8 Risk-Based Screening Assessment

No chemicals present at PRS 22-014(b) and identified as COPCs based on background screening criteria were reported at concentrations exceeding SAL.

Eight of the COPCs are identified as eliciting noncarcinogenic effects, and two COPCs are identified as eliciting carcinogenic effects. These COPCs were submitted to MCE, and the results are presented in Table 5.16.8-1.

TABLE 5.16.8-1
MULTIPLE CHEMICAL EVALUATION FOR SOIL SAMPLES AT PRS 22-014(b)

Chemical	Location ID	Sample ID	Maximum Sample Value	Soil SAL ^a	Normalized Value
Noncarcinogenic Effects (mg/kg)					
Silver	22-3015	AAA8694	21.9	380	0.057
Cadmium	22-3013	AA8689	7.9	38	0.207
Mercury	22-3017	AAA8697	1.4	23	0.060
Lead	22-3012	AAA8685	64.9	400	0.16
Vanadium	22-3017	AAA8696	76.9	540	0.14
Zinc	22-3017	AAA8697	116	23000	0.005
Acetone	22-3014	AAA8693	0.11	2000	0.00006
HMX	22-3015	AAA8694	1.24	3300	0.0004
				Total ^b :	0.6
Carcinogenic Effects of Chemicals (mg/kg)					
Chromium	22-3017	AAA8696	30.7	210	0.0146
Bis(2ethylhexyl) phthalate	22-3011	AAA8681	0.43	32	0.013
				Total ^b :	0.03

a. screening action level

b. Total may not equal the sum of normalized values due to rounding

5.16.9 Human Health Risk Assessment

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

5.16.10 Preliminary Ecological Assessment

In cooperation with the NMED and EPA Region 6, the Laboratory ER Project is developing an approach for ecological risk assessment. Further ecological risk assessment at PRS 22-014(b) will be deferred until the site can be assessed as part of the ecological exposure unit methodology currently being developed.

5.16.11 Conclusions and Recommendations

PRS 22-014(b) has been characterized and assessed based on the results of a Phase I investigation. PAH compounds were reported at two boring locations, and the results were potentially biased low. These compounds are not associated with the activities at the site, and the potential low bias would not alter the recommendation that they be removed from consideration as COPCs at the PRS.

Limited inorganic contamination was observed in outfall area samples. While the extent of this contamination was not bounded by the current investigation, no chemical is consistently reported in the outfall area at substantially elevated levels relative to SAL. Based on the existing information, it can reasonably be concluded that the PRS presents no unacceptable human health risk and is recommended for NFA.

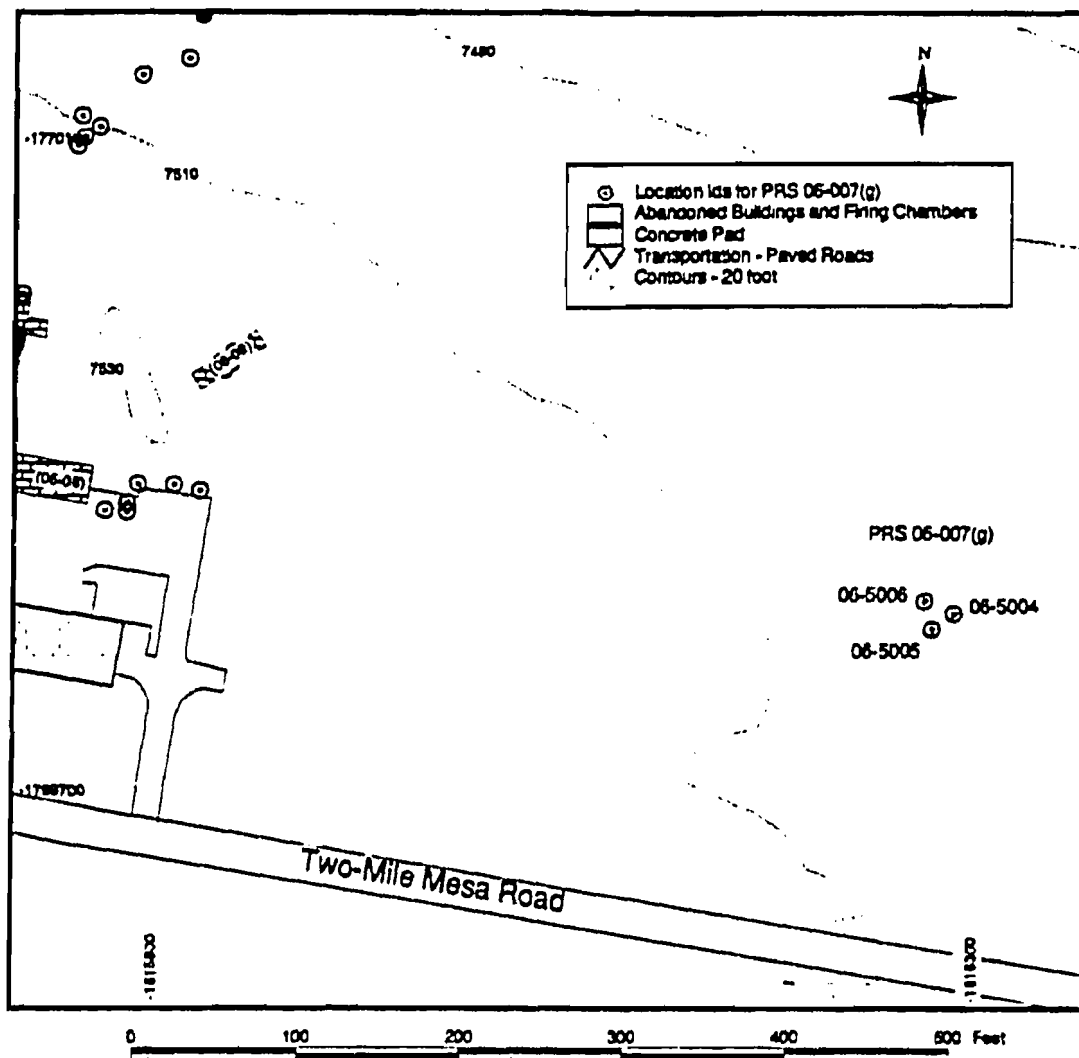
No human health COPCs were identified based on the screening of this PRS, and NFA is recommended. This recommendation is based on the NFA criterion 4 (Los Alamos National Laboratory, Environmental Restoration Department, Project Consistency Team Policy number 015) that states, "The PRS has been characterized 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 will be requested to remove this site from the HSWA Module of the Laboratory's RCRA operating permit.

5.16.12 Sampling and Analysis Plan for PRS 22-014(b)

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

5.17 Potential Release Site - 06-007(g)

PRS 06-007(g), shown in Figure 5.17-1, is former AOC C-6-004, the former site of Building TA-6-12. Limited contamination observed at the site consisted of inorganic metals. The area is proposed for NFA.



Parts that appeared likely to contain explosives were tested and found to be free of explosives. Based on field observations and indirect archival evidence, possible contaminants at this PRS include metals, HE, VOCs, SVOCs, and radionuclides.

5.17.2 Description

No further site-specific information on geology, hydrology, soils, or wildlife habitat associated with this PRS is required. General area geology, hydrology, soils, or wildlife habitat information associated with this PRS is presented in Chapter 2.

5.17.3 Previous Investigation(s)

No previous investigations have been performed at this site.

5.17.4 Field Investigation

The objective of the investigation was to determine whether contamination is present in media associated with the former facility; and, if present, does it pose an unacceptable human health risk based on the results of a screening assessment. There are no records of waste disposal activities related to this PRS. Designation of this area as a PRS was based on the observation of a small pile of discarded, exploded detonator housings near the remains of a concrete building foundation. The investigation was reconnaissance in nature and intended to characterize surface and near-surface soils in the general area of the former building.

The field sampling activities, completed on 7 July 1994, were based on a conceptual model of potential unplanned release of materials to the general area as the result of normal operations. The investigation utilized visual observation as well as radiological and metal detector field screening to identify three locations for biased sampling. The sampling locations were staked, and surface (0-0.5 ft) and subsurface samples (2.5-3.5 ft) soil samples were collected at locations 06-5004 through 06-5006, using a hand auger. One sampling location (06-5004) included the area of exploded detonator housings. Table 5.17.4-1 presents a summary of samples taken for this PRS.

All locations were field screened for radioactivity, organic vapors, and HE prior to sample collection. All field screening results were negative or at background levels.

**TABLE 5.17.4-1
SUMMARY OF SAMPLES TAKEN**

Location ID	Sample ID	Depth (ft)	Media	VOCs	SVOCs*	High Explosives	Inorganic Chemicals*	Radio-nuclides
06-5004	AAA8832	0-0.5	soil	NA	18064	18075	18039	18832
06-5004	AAA8833	2.5-3.5	soil	18064	18064	18075	18039	18832
06-5005	AAA8834	0-0.5	soil	NA	18064	18075	18039	18832
06-5005	AAA8835	2.5-3.5	soil	18064	18064	18075	18039	18832
06-5006	AAA8836	0-0.5	soil	NA	18064	18075	18039	18832
06-5006	AAA8837	2.5-3.5	soil	18064	18064	18075	18039	18832

* Request numbers
NA = not analyzed

5.17.5 Evaluation of Inorganic Chemicals

Inorganic chemicals with concentrations at or above background at PRS 06-007(g) are presented in Table 5.17.5-1 and their locations plotted in Figure 5.17.5-1. The qualifiers shown in the table have been assigned during baseline validation. However, the data have undergone focused validation, and results are summarized in Section 4.1.7. Focused validation of the data set determined that lead results for samples AAA8832 and AAA8834 were incorrectly reported and should be 1410 and 22.5 mg/kg, respectively. All other data were determined to be usable as reported.

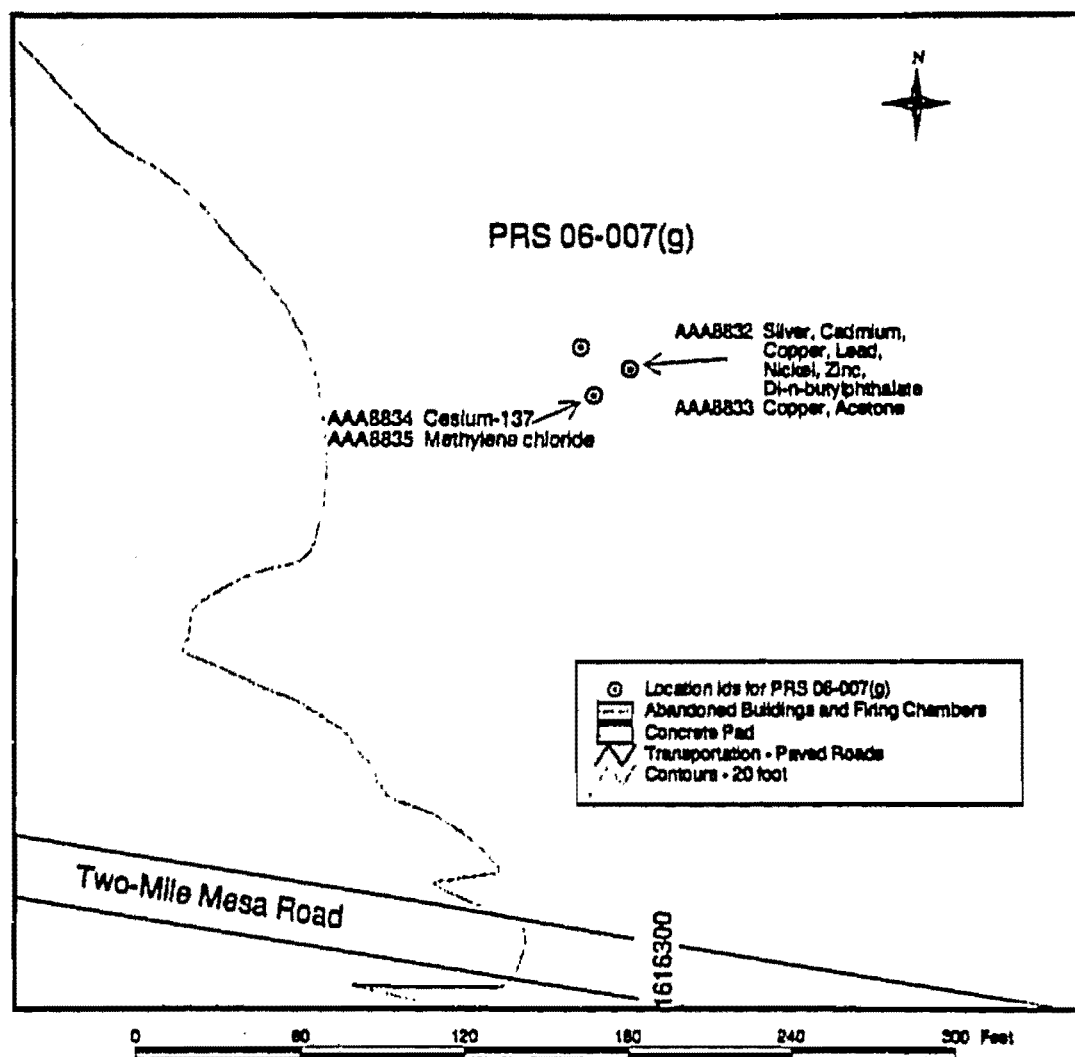


Figure 5.17.5-1. Locations of analytes that exceed background (UTLs and EGLs) and/or that exceed SALs at PRS 06-007(g).

Seven inorganic chemicals, silver, calcium, cadmium, copper, lead, nickel, and zinc, were reported in investigation samples at levels greater than background screening values. Calcium, which has no established SAL, was reported above background UTL in one soil sample. Calcium is a recognized essential human nutrient with an established RDA. Ingestion of calcium at the maximum observed concentration and default ingestion rate of 200 mg/day would result in an intake of less than 1% of the RDA. Based on this information and the limited toxicity of calcium, this chemical was eliminated from further consideration at the site.

No additional statistical background analysis was performed on the data set, and the remaining five chemicals were identified as COPCs for further evaluation.

**TABLE 5.17.5-1
INORGANIC CHEMICALS WITH CONCENTRATIONS AT OR ABOVE
BACKGROUND SCREENING VALUES FOR PRS 06-007(g)**

Sample ID	Depth (ft)	Silver (mg/kg)	Cadmium (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Nickel (mg/kg)	Zinc (mg/kg)
SAL	N/A ^b	380	38	2800	400	1500	23000
Soil UTL ^a	N/A	2 ^c	2.7	15.5	23.3	15.2	50.8
AAA8832	0-5	2.3(J)	8.8	28400	1410	15.3	14900
AAA8833	2.5-3.5	<0.82(UJ)	<0.38	18	10.1	<2.8	29.8
AAA8834	0-5	<0.75(UJ)	<0.34	5.7	22.5	<2.4	22.1
AAA8835	2.5-3.5	<0.82(UJ)	<0.38	<2.2	3.3	<1.9	21.6
AAA8836	0-5	<0.74(UJ)	<0.34	<4	3.3	<1.6	15.6
AAA8837	2.5-3.5	<0.95(UJ)	<0.39	<2.9	11.3	<1.4	17.9

a. Upper Tolerance Limit of Laboratory-wide background values from A, B, and C horizons.

b. NA = Not analyzed. N/A = not applicable.

c. Background data not available, sample-specific detection limit (DL) used as screening criteria

5.17.6 Evaluation of Radionuclides

Radionuclides with concentrations at or above background at PRS 06-007(g) are presented in the Table 5.17.6-1 and the locations plotted in Figure 5.17.5-1. The qualifiers shown in the table have been assigned during baseline data validation. Focused validation of the data set indicates the potential for a slight high bias. This potential bias would not alter the decisions made in subsequent screening processes, and the data were used as reported.

Cesium-137 was reported at two sample locations with activities that exceed background screening values, and this radionuclide was, therefore, identified as a COPC for further evaluation.

**TABLE 5.17.6-1
RADIONUCLIDES WITH CONCENTRATIONS AT OR ABOVE BACKGROUND
SCREENING VALUES FOR PRS 06-007(g)**

Sample ID	Depth (ft)	Cesium-137 (pCi/g)
SAL	N/A ^b	5.1
Soil UTL ^a	N/A ^b	1.4
AAA8832	0-5	0.136(J)
AAA8833	2.5-3.5	0.054(J)
AAA8834	0-5	2.089(J)
AAA8834D	0-5	2.035
AAA8835	2.5-3.5	0.001(J)
AAA8836	0-5	1.788(J)
AAA8837	2.4-3.5	0.001(J)

a. Upper tolerance limit of Laboratory-wide background values from A, B, and C horizons.

b. N/A = not applicable

c. Maximum detected value from Environmental Surveillance data

5.17.7 Evaluation of Organic Chemicals

Detected organic chemicals at PRS 06-007(g) are presented in the Table 5.17.7-1, and the locations are plotted in Figure 5.17.5-1. The results of the focused data validation, presented in Section 4.3.7, indicate no problems with the VOC or SVOC data. Focused validation of the HE data set found all QC requirements were acceptable. The HE data were determined to be usable as reported with the recognition of potential low bias due to extended holding times.

**TABLE 5.17.7-1
DETECTED ORGANIC CHEMICALS FOR PRS 06-007(g)**

Sample ID	Depth (ft)	Acetone (mg/kg)	Di-n-butylphthalate (mg/kg)	Methylene chloride (mg/kg)
SAL	N/A	2000	6500	11
EQL	N/A	0.01	0.33	0.01
AAA8832	0-0.5	NA	1.3	NA
AAA8833	2.5-3.5	0.054	<0.37	<0.006
AAA8835	2.5-3.6	<0.022	<0.37	0.013

N/A = not applicable NA = not analyzed

No HE compounds were detected in any site samples, and all HE components were eliminated from further consideration at the PRS.

Three organic chemicals were reported above EQL in site samples. However, focused data validation indicates that these detected organics are laboratory contaminants and, therefore, they were eliminated from further consideration. No organic COPCs have been identified for evaluation at this PRS.

5.17.8 Risk-Based Screening Assessment

Two inorganic chemicals, copper and lead, were reported in one surface soil sample at concentrations that exceed their associated SALs. Reported inorganic chemicals with concentrations that exceed SAL are presented in Table 5.17.8-1.

**TABLE 5.17.8-1
PRS 06-007(g) INORGANICS
WITH CONCENTRATIONS IN SOIL THAT EXCEED SAL**

SAMPLE ID	LOCATION ID	DEPTH (ft)	Copper (mg/kg)	Lead (mg/kg)
SAL	N/A	N/A	2800	400
AAA8832	06-5004	0-0.5	28400	1410

N/A = not applicable

No organic compounds were identified in the organic chemical evaluation, Section 5.17.6, as COPCs requiring further evaluation in the Risk-Based Screening Assessment.

One radionuclide, Cs-137, was reported in surface soils samples at activities of approximately 2.0 pCi/g relative to the maximum reported background activity from Environmental Surveillance data of 1.4 pCi/g. These reported activities were recognized through the focused validation process as being potentially biased high. In addition, the reported value is less than SAL. Because no other radionuclides were identified as COPCs through the screening process, no MCE and no further evaluation of this class of contaminants is necessary. Cesium-137 is eliminated from further consideration.

Four inorganic chemicals, silver, cadmium, lead, and nickel, were reported in site samples at levels that exceed Laboratory-background UTL. None of these constituents exceeded SAL in any sample, and the three chemicals were evaluated for noncarcinogenic MCE. The total noncarcinogenic MCE was determined to be 0.9, and the results of the MCE calculation are presented in Table 5.17.8-2.

**TABLE 5.17.8-2
MULTIPLE CHEMICAL EVALUATION FOR SOIL SAMPLES AT PRS AGGREGATE
06-007(g)**

Chemical	Location ID	Sample ID	Maximum Sample Value	Soil SAL ^a	Normalized Value
Noncarcinogenic Effects (mg/kg)					
Silver	06-5004	AAA8832	2.3	380	0.006
Cadmium	06-5004	AAA8832	8.8	38	0.23
Nickel	06-5004	AAA8832	15.3	1500	0.01
Zinc	06-5004	AAA8832	14900	23000	0.65
				Total:	0.9

a. SAL = screening action level

b. Total may not equal sum of normalized values due to rounding

5.17.9 Human Health Risk Assessment

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

5.17.10 Preliminary Ecological Assessment

In cooperation with the NMED and EPA Region 6, the Laboratory ER Project is developing an approach for ecological risk assessment. Further ecological risk

assessment at PRS 06-007(g) will be deferred until the site can be assessed as part of the ecological exposure unit methodology currently being developed.

5.17.11 Conclusions and Recommendations

PRS 06-007(g) has been characterized and assessed based on the results of a Phase I RFI. The locations sampled were selected based on the results of field screening (radiological and metal detector) techniques as well as visual inspection. One location, 06-5004 was identified for sampling based on the observation of a small amount (probably less than 500 g) of metal fragments (spent detonators cases) over an area of less than 5-sq-ft.

There is no indication of broad significant contamination at the PRS based on field observation, field screening, and analytical results. No organic or radionuclide contamination is indicated at the site. All inorganic chemical contamination at the PRS was determined to be associated with sample location 06-5004, the area of discarded detonator parts. All contamination at that location appears to be associated with the upper soil interval with no vertical migration.

Two noncarcinogenic chemicals, copper and lead, were reported at levels up to ten times SAL, and the total normalized MCE for noncarcinogens above background is 0.9. However, based on the sampling activity and results, it can be reasonably concluded that the screening assessment results are due to the sampling and analysis of particulate metal fragments from the small debris area. No viable exposure areas or pathways exist at this PRS, and there is no unacceptable human health risk under current or future conditions.

Therefore, no human health COPCs were identified based on the screening of this PRS, and NFA is recommended for this approximately 5-sq-ft area. This recommendation is based on the NFA criterion 4 (Los Alamos National Laboratory, Environmental Restoration Department, Project Consistency Team Policy number 015) that 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.

5.17.12 Sampling and Analysis Plan for PRS 06-007(g)

Due to the Conclusions and Recommendations presented for this PRS, no further investigation requiring a sampling and analysis plan is recommended 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-6, -8, -22, and -40.

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APPENDIX B DATA QUALITY EVALUATION TABLES

TABLE B-1
SUMMARY OF QUALITY ASSURANCE/QUALITY CONTROL RESULTS FOR TA-6,
PRS 06-001(a)

LOCATION ID	SAMPLE ID	MATRIX	SUITE	REQUEST NUMBER	COMMENTS*
06-0001	AAA8861	Soil	INORG	18511	Hg and CN results qualified as undetected estimated (UJ) because of missed holding time. Chromium result qualified as estimated (J) because of low (84% and 72%) QC blind recoveries. Matrix spike recoveries for As, Cr and Hg are 100% $\pm$ 20%. The CN spike recovery is 93%. Duplicate sample results are generally within 30% of the average of the duplicate concentrations.
06-0001	AAA8862	Soil	INORG	18511	Hg and CN results qualified as undetected estimated (UJ) because of missed holding time. Chromium result qualified as estimated (J) because of low (84% and 72%) QC blind recoveries. Arsenic result qualified as estimated (J) because of high (544% and 106%) QC blind recoveries. Matrix spike recoveries for As, Cr and Hg are 100% $\pm$ 20%. The CN spike recovery is 93%. Duplicate sample results are generally within 30% of the average of the duplicate concentrations.
06-0002	AAA8863	Soil	INORG	18511	Hg and CN results qualified as undetected estimated (UJ) because of missed holding time. Chromium result qualified as estimated (J) because of low (84% and 72%) QC blind recoveries. Arsenic result qualified as estimated (J) because of high (544% and 106%) QC blind recoveries.

					Matrix spike recoveries for As, Cr and Hg are 100% $\pm$ 20%;. The CN spike recovery is 93%. Duplicate sample results are generally within 30% of the average of the duplicate concentrations.
06-0002	AAA8864	Soil	INORG	18511	Hg and CN results qualified as undetected estimated (UJ) because of missed holding time. Chromium result qualified as estimated (J) because of low (84% and 72%) QC blind recoveries. Arsenic result qualified as estimated (J) because of high (544% and 106%) QC blind recoveries. Matrix spike recoveries for As, Cr and Hg are 100% $\pm$ 20%;. The CN spike recovery is 93%. Duplicate sample results are generally within 30% of the average of the duplicate concentrations.
06-0002	AAA8864	Soil	SVOCs	18265	All results except chrysene result qualified as estimated undetected (UJ). Chrysene qualified as estimated (J). Surrogate recoveries range from 30% to 45%.
06-0003	AAA8865	Soil	INORG	18511	Hg and CN results qualified as undetected estimated (UJ) because of missed holding time. Chromium result qualified as estimated (J) because of low (84% and 72%) QC blind recoveries. Arsenic result qualified as estimated (J) because of high (544% and 106%) QC blind recoveries. Matrix spike recoveries for As, Cr and Hg are 100% $\pm$ 20%;. The CN spike recovery is 93%. Duplicate sample results are generally within 30% of the average of the duplicate concentrations.
06-0003	AAA8866	Soil	INORG	18511	Hg and CN results qualified as undetected estimated (UJ) because of missed holding time. Chromium result qualified as

					(84% and 72%) QC blind recoveries. Arsenic result qualified as estimated (J) because of high (544% and 106%) QC blind recoveries. Matrix spike recoveries for As, Cr and Hg are 100% $\pm$ 20%;. The CN spike recovery is 93%. Duplicate sample results are generally within 30% of the average of the duplicate concentrations.
06-0004	AAA8867	Soil	INORG	18511	Hg and CN results qualified as undetected estimated (UJ) because of missed holding time. Chromium result qualified as estimated (J) because of low (84% and 72%) QC blind recoveries. Arsenic result qualified as estimated (J) because of high (544% and 106%) QC blind recoveries. Matrix spike recoveries for As, Cr and Hg are 100% $\pm$ 20%;. The CN spike recovery is 93%. Duplicate sample results are generally within 30% of the average of the duplicate concentrations.
06-0004	AAA8868	Soil	INORG	18511	Hg and CN results qualified as undetected estimated (UJ) because of missed holding time. Chromium result qualified as estimated (J) because of low (84% and 72%) QC blind recoveries. Arsenic result qualified as estimated (J) because of high (544% and 106%) QC blind recoveries. Matrix spike recoveries for As, Cr and Hg are 100% $\pm$ 20%;. The CN spike recovery is 93%. Duplicate sample results are generally within 30% of the average of the duplicate concentrations.
06-0004	AAA8869	Soil	INORG	18511	Hg result qualified as undetected estimated (UJ); CN results qualified as estimated (J) because of missed holding time. Chromium result qualified as estimated (J) because of low

					QC blind recoveries. Matrix spike recoveries for Cr and Hg are 100% $\pm$ 20%;. The CN spike recovery is 93%. Duplicate sample results are generally within 30% of the average of the duplicate concentrations.
06-0004	AAA8870	Soil	INORG	18511	Hg and CN results qualified as undetected estimated (UJ) because of missed holding times. Chromium result qualified as estimated (J) because of low (84% and 72%) QC blind recoveries. Matrix spike recoveries for Cr and Hg are 100% $\pm$ 20%;. The CN spike recovery is 93%. Duplicate sample results are generally within 30% of the average of the duplicate concentrations.
06-0005	AAA8871	Soil	INORG	18511	Hg and CN results qualified as undetected estimated (UJ) because of missed holding time. Chromium result qualified as estimated (J) because of low (84% and 72%) QC blind recoveries. Arsenic result qualified as estimated (J) because of high (544% and 106%) QC blind recoveries. Matrix spike recoveries for As, Cr and Hg are 100% $\pm$ 20%;. The CN spike recovery is 93%. Duplicate sample results are generally within 30% of the average of the duplicate concentrations.
06-0005	AAA8871	Soil	SVOCs	18265	Acenaphthene, o-chlorophenol, 1,2-dichlorobenzene, 2,4-dichlorophenol, fluorene, 2-methylphenol, naphthalene and 1,2,4-trichlorophenol results qualified as estimated undetected (UJ). Surrogate recoveries range from 58% to 69%.
06-0005	AAA8872	Soil	INORG	18511	Hg and CN results qualified as undetected estimated (UJ)

					because of missed holding time. Chromium result qualified as estimated (J) because of low (84% and 72%) QC blind recoveries. Arsenic result qualified as estimated (J) because of high (544% and 106%) QC blind recoveries. Matrix spike recoveries for As, Cr and Hg are 100% $\pm$ 20%;. The CN spike recovery is 93%. Duplicate sample results are generally within 30% of the average of the duplicate concentrations.
06-0005	AAA8873	Soil	INORG	18511	Hg and CN results qualified as undetected estimated (UJ) because of missed holding time. Chromium result qualified as estimated (J) because of low (84% and 72%) QC blind recoveries. Arsenic result qualified as estimated (J) because of high (544% and 106%) QC blind recoveries. Matrix spike recoveries for As, Cr and Hg are 100% $\pm$ 20%;. The CN spike recovery is 93%. Duplicate sample results are generally within 30% of the average of the duplicate concentrations.
06-0006	AAA8874	Soil	INORG	18511	Hg and CN results qualified as undetected estimated (UJ) because of missed holding time. Chromium result qualified as estimated (J) because of low (84% and 72%) QC blind recoveries. Arsenic result qualified as estimated (J) because of high (544% and 106%) QC blind recoveries. Matrix spike recoveries for As, Cr and Hg are 100% $\pm$ 20%;. The CN spike recovery is 93%. Duplicate sample results are generally within 30% of the average of the duplicate concentrations.
06-0006	AAA8875	Soil	INORG	18511	Hg and CN results qualified as undetected estimated (UJ) because of missed holding

					time. Chromium result qualified as estimated (J) because of low (84% and 72%) QC blind recoveries. Arsenic result qualified as estimated (J) because of high (544% and 106%) QC blind recoveries. Matrix spike recoveries for As, Cr and Hg are 100% $\pm$ 20%;. The CN spike recovery is 93%. Duplicate sample results are generally within 30% of the average of the duplicate concentrations.
06-0006	AAA8876	Soil	INORG	18511	Hg and CN results qualified as undetected estimated (UJ) because of missed holding times. Chromium result qualified as estimated (J) because of low (84% and 72%) QC blind recoveries. Matrix spike recoveries for Cr and Hg are 100% $\pm$ 20%;. The CN spike recovery is 93%. Duplicate sample results are generally within 30% of the average of the duplicate concentrations.
06-0006	AAA8877	Soil	INORG	18511	Hg and CN results qualified as undetected estimated (UJ) because of missed holding times. Chromium result qualified as estimated (J) because of low (84% and 72%) QC blind recoveries. Matrix spike recoveries for Cr and Hg are 100% $\pm$ 20%;. The CN spike recovery is 93%. Duplicate sample results are generally within 30% of the average of the duplicate concentrations.
06-0007	AAA8878	Soil	INORG	18511	Hg and CN results qualified as undetected estimated (UJ) because of missed holding time. Chromium result qualified as estimated (J) because of low (84% and 72%) QC blind recoveries. Arsenic result qualified as estimated (J) because of high (544% and 106%) QC blind recoveries.

					Matrix spike recoveries for As, Cr and Hg are 100% $\pm$ 20%;. The CN spike recovery is 93%. Duplicate sample results are generally within 30% of the average of the duplicate concentrations.
06-0007	AAA8879	Soil	INORG	18511	Hg and CN results qualified as undetected estimated (U) because of missed holding time. Chromium result qualified as estimated (J) because of low (84% and 72%) QC blind recoveries. Arsenic result qualified as estimated (J) because of high (544% and 106%) QC blind recoveries. Matrix spike recoveries for As, Cr and Hg are 100% $\pm$ 20%;. The CN spike recovery is 93%. Duplicate sample results are generally within 30% of the average of the duplicate concentrations.

TABLE B-2
SUMMARY OF QUALITY ASSURANCE/QUALITY CONTROL RESULTS FOR TA-6, PRS
06-001(b)

LOCATION ID	SAMPLE ID	MATRIX	SUITE	REQUEST NUMBER	COMMENTS
06-0008	AAA8882	Soil	SVOCs	18182	Anthracene, o-chlorophenol, dibenzofuran, 1,2-dichlorobenzene, 2,4-dichlorophenol, 2,4-dinitrotoluene, 2-methylphenol, naphthalene, 2-nitrophenol and 1,2,4-trichlorophenol results qualified as undetected estimated (UJ) because of low recoveries of selected compounds in selected QC blind samples. Surrogate recoveries range from 20% to 113%.
06-0009	AAA8884	Soil	SVOCs	18182	Anthracene, o-chlorophenol, dibenzofuran, 1,2-dichlorobenzene, 2,4-dichlorophenol, 2,4-dinitrotoluene, 2-methylphenol, naphthalene, 2-nitrophenol and 1,2,4-trichlorophenol results qualified as undetected estimated (UJ) because of low recoveries of selected compounds in selected QC blind samples. Surrogate recoveries range from 38% to 125%.
06-0015	AAA8897	Soil	SVOCs	18182	Anthracene, o-chlorophenol, dibenzofuran, 1,2-dichlorobenzene, 2,4-dichlorophenol, 2,4-dinitrotoluene, 2-methylphenol, naphthalene, 2-nitrophenol and 1,2,4-trichlorophenol results qualified as undetected estimated (UJ) because of low recoveries of selected compounds in selected QC blind samples. Surrogate recoveries range from 56% to 110%.

TABLE B-3
SUMMARY OF QUALITY ASSURANCE/QUALITY CONTROL RESULTS FOR TA-6, PRS
06-003(a), 6-008, and C-6-019

LOCATION ID	SAMPLE ID	MATRIX	SUITE	REQUEST NUMBER	COMMENTS
06-4001	AAB7839	Soil	INORG	18523	CN, Cr, V, and TI results qualified as estimated (J) or undetected estimated (UJ) because of low QC blind recoveries (CN: 57% and 78%; Cr: 63% and 84%; V: 64% and 90%; TI: 70%). Hg also originally qualified because of low Laboratory Control Sample (LCS) recoveries, but this was determined to be a reporting error. Hg data are not qualified; Hg LCS recoveries were 97% on two LCSs.
06-4001	AAB7839	Soil	RAD	18979	Cs-137, U-234, and U-238 results qualified as estimated (J) because of QC blind sample results outside of the 3-sigma acceptance limits.
06-4002	AAB7840	Soil	INORG	18523	CN, Cr, V, and TI results qualified as estimated (J) or undetected estimated (UJ) because of low QC blind recoveries (CN: 57% and 78%; Cr: 63% and 84%; V: 64% and 90%; TI: 70%). Hg also originally qualified because of low Laboratory Control Sample (LCS) recoveries, but this was determined to be a reporting error. Hg data are not qualified; Hg LCS recoveries were 97% on two LCSs.
06-4002	AAB7840	Soil	RAD	18979	Cs-137, U-234, and U-238 results qualified as estimated (J) because of QC blind sample results outside of the 3-sigma acceptance limits.
06-4003	AAB7841	Soil	HE	18504	HMX result qualified as estimated (J) because of high surrogate recovery and should be used with cognizance of potential high bias. Remaining

					analyte values qualified as undetected estimated (UJ) based on missed holding times but acceptable to high surrogate recoveries.
06-4003	AAB7841	Soil	INORG	18523	CN, Cr, V, and Tl results qualified as estimated (J) or undetected estimated (UJ) because of low QC blind recoveries (CN: 57% and 78%; Cr: 63% and 84%; V: 64% and 90%; Tl: 70%). Hg also originally qualified because of low Laboratory Control Sample (LCS) recoveries, but this was determined to be a reporting error. Hg data are not qualified; Hg LCS recoveries were 97% on two LCSs.
06-4003	AAB7841	Soil	RAD	18979	Cs-137, U-234, and U-238 results qualified as estimated (J) because of QC blind sample results outside of the 3-sigma acceptance limits.
06-4004	AAB7842	Soil	INORG	18523	CN, Cr, V, and Tl results qualified as estimated (J) or undetected estimated (UJ) because of low QC blind recoveries (CN: 57% and 78%; Cr: 63% and 84%; V: 64% and 90%; Tl: 70%). Hg also originally qualified because of low Laboratory Control Sample (LCS) recoveries, but this was determined to be a reporting error. Hg data are not qualified; Hg LCS recoveries were 97% on two LCSs.
06-4004	AAB7842	Soil	RAD	18979	Cs-137, U-234, and U-238 results qualified as estimated (J) because of QC blind sample results outside of the 3-sigma acceptance limits.
06-4004	AAB7843	Soil	INORG	18523	CN, Cr, V, and Tl results qualified as estimated (J) or undetected estimated (UJ) because of low QC blind recoveries (CN: 57% and 78%; Cr: 63% and 84%; V: 64% and 90%; Tl: 70%). Hg also

					originally qualified because of low Laboratory Control Sample (LCS) recoveries, but this was determined to be a reporting error. Hg data are not qualified; Hg LCS recoveries were 97% on two LCSs.
06-4004	AAB7843	Soil	RAD	18979	Cs-137, U-234, and U-238 results qualified as estimated (J) because of QC blind sample results outside of the 3-sigma acceptance limits.
06-4005	AAB7844	Soil	INORG	18523	CN, Cr, V, and Ti results qualified as estimated (J) or undetected estimated (UJ) because of low QC blind recoveries (CN: 57% and 78%; Cr: 63% and 84%; V: 64% and 90%; Ti: 70%). Hg also originally qualified because of low Laboratory Control Sample (LCS) recoveries, but this was determined to be a reporting error. Hg data are not qualified; Hg LCS recoveries were 97% on two LCSs.
06-4005	AAB7844	Soil	RAD	18979	Cs-137, U-234 and U-238 results qualified as estimated (J) because of QC blind sample results outside of the 3-sigma acceptance limits.
06-4005	AAB7845	Soil	INORG	18523	CN, Cr, V, and Ti results qualified as estimated (J) or undetected estimated (UJ) because of low QC blind recoveries (CN: 57% and 78%; Cr: 63% and 84%; V: 64% and 90%; Ti: 70%). Hg also originally qualified because of low Laboratory Control Sample (LCS) recoveries, but this was determined to be a reporting error. Hg data are not qualified; Hg LCS recoveries were 97% on two LCSs.
06-4005	AAB7845	Soil	RAD	18979	Cs-137, U-234, and U-238 results qualified as estimated (J) because of QC blind sample results outside of the 3-sigma acceptance limits.

06-4006	AAB7846	Soil	INORG	18523	CN, Cr, V, and Tl results qualified as estimated (J) or undetected estimated (UJ) because of low QC blind recoveries (CN: 57% and 78%; Cr: 63% and 84%; V: 64% and 90%; Tl: 70%). Hg also originally qualified because of low Laboratory Control Sample (LCS) recoveries, but this was determined to be a reporting error. Hg data are not qualified; Hg LCS recoveries were 97% on two LCSs.
06-4006	AAB7846	Soil	RAD	18979	Cs-137, U-234, and U-238 results qualified as estimated (J) because of QC blind sample results outside of the 3-sigma acceptance limits.
06-4006	AAB7847	Soil	INORG	18523	CN, Cr, V, and Tl results qualified as estimated (J) or undetected estimated (UJ) because of low QC blind recoveries (CN: 57% and 78%; Cr: 63% and 84%; V: 64% and 90%; Tl: 70%). Hg also originally qualified because of low Laboratory Control Sample (LCS) recoveries, but this was determined to be a reporting error. Hg data are not qualified; Hg LCS recoveries were 97% on two LCSs.
06-4006	AAB7847	Soil	RAD	18979	Cs-137, U-234, and U-238 results qualified as estimated (J) because of QC blind sample results outside of the 3-sigma acceptance limits.
06-4006	AAB7848	Soil	INORG	18523	CN, Cr, V, and Tl results qualified as estimated (J) or undetected estimated (UJ) because of low QC blind recoveries (CN: 57% and 78%; Cr: 63% and 84%; V: 64% and 90%; Tl: 70%). Hg also originally qualified because of low Laboratory Control Sample (LCS) recoveries, but this was determined to be a reporting error. Hg data are not qualified; Hg LCS recoveries were 97%

					on two LCSs.
06-4006	AAB7848	Soil	RAD	18979	Cs-137, U-234, and U-238 results qualified as estimated (J) because of QC blind sample results outside of the 3-sigma acceptance limits.
06-4035	AAB7891	Soil	INORG	18776	Al, As, Cr, and V results qualified as estimated (J), and Ti and CN results qualified as undetected estimated (UJ) because of QC blind recoveries outside of acceptance limits (see text for discussion).
06-4035	AAB7892	Soil	INORG	18776	Al, As, Cr, and V results qualified as estimated (J), and Ti and CN results qualified as undetected estimated (UJ) because of QC blind recoveries outside of acceptance limits (see text for discussion).
06-4035	AAB7893	Soil	INORG	18776	Al and Cr results qualified as estimated (J), and Ti, V and CN results qualified as undetected estimated (UJ) because of QC blind recoveries outside of acceptance limits (see text for discussion).
06-4036	AAB7894	Soil	INORG	18776	Al, As, Cr, and V results qualified as estimated (J) and Ti and CN results qualified as undetected estimated (UJ) because of QC blind recoveries outside of acceptance limits (see text for discussion).
06-4036	AAB7895	Soil	INORG	18776	Al, As, Cr, and V results qualified as estimated (J) and Ti and CN results qualified as undetected estimated (UJ) because of QC blind recoveries outside of acceptance limits (see text for discussion).
06-4036	AAB7896	Soil	INORG	18776	Al and Cr results qualified as estimated (J) and Ti, V and CN results qualified as undetected estimated (UJ) because of QC blind recoveries outside of acceptance limits (see text for discussion).

06-4037	AAB7897	Soil	INORG	18776	Al, As, Cr, and V results qualified as estimated (J), and Ti and CN results qualified as undetected estimated (UJ) because of QC blind recoveries outside of acceptance limits (see text for discussion).
06-4037	AAB7898	Soil	INORG	18776	Al, As, Cr, and V results qualified as estimated (J), and Ti and CN results qualified as undetected estimated (UJ) because of QC blind recoveries outside of acceptance limits (see text for discussion).
06-4037	AAB7899	Soil	INORG	18776	Al and Cr results qualified as estimated (J), and Ti, V and CN results qualified as undetected estimated (UJ) because of QC blind recoveries outside of acceptance limits (see text for discussion).
06-4037	AAB7900	Soil	INORG	18776	Al, As, and Cr results qualified as estimated (J), and Ti, V and CN results qualified as undetected estimated (UJ) because of QC blind recoveries outside of acceptance limits (see text for discussion).
06-4038	AAB7901	Soil	INORG	18776	Al, As, Cr, and V results qualified as estimated (J), and Ti and CN results qualified as undetected estimated (UJ) because of QC blind recoveries outside of acceptance limits (see text for discussion).
06-4038	AAB7902	Soil	INORG	18776	Al, As, Cr, and V results qualified as estimated (J), and Ti and CN results qualified as undetected estimated (UJ) because of QC blind recoveries outside of acceptance limits (see text for discussion).
06-4039	AAB7903	Soil	INORG	18776	Al, As, Cr, and V results qualified as estimated (J), and Ti and CN results qualified as undetected estimated (UJ) because of QC blind recoveries outside of acceptance limits (see text for discussion).

06-4039	AAB7904	Soil	INORG	18776	Al, As, Cr, and V results qualified as estimated (J), and TI and CN results qualified as undetected estimated (UJ) because of QC blind recoveries outside of acceptance limits (see text for discussion).
06-4040	AAB7905	Soil	INORG	18776	Al, As, Cr, and V results qualified as estimated (J), and TI and CN results qualified as undetected estimated (UJ) because of QC blind recoveries outside of acceptance limits (see text for discussion).
06-4040	AAB7906	Soil	INORG	18776	Al, As, Cr, and V results qualified as estimated (J), and TI and CN results qualified as undetected estimated (UJ) because of QC blind recoveries outside of acceptance limits (see text for discussion).
06-4038	AAB7902	Soil	SVOCs	18639	Surrogate compounds 2-fluorobiphenyl and 2-fluorophenol exhibited recoveries less than the acceptance limits of 30% and 25%, respectively, indicating a potential low bias in the reported target analyte values.
06-4038	AAB7901	Soil	VOCs	18639	Common laboratory contaminant, acetone, detected in method blank but not at levels of concern. Methylene chloride and 1,1,2-trichloro-1,2,2-trifluoroethane results qualified as estimated (J) because surrogate, 4-bromofluorobenzene recovery (125%) was greater than upper acceptable limit. Internal standard areas were low for three internal standards, requiring qualification of most results as undetected estimated (UJ).
06-4035	AAB7891	Soil	RAD	18981	Cs-137 and Sr-90 results qualified as estimated (J) because two of three QC blind samples exhibited high recoveries (126% and 127% for

					Cs-137 ;130% and 127% for Sr-90) relative to the acceptable high limits of 120% and 125%, respectively. Potential exists for slight high bias for Cs-1276 and Sr-90 results.
06-4035	AAB7892	Soil	RAD	18981	Cs-137 and Sr-90 results qualified as estimated (J) because two of three QC blind samples exhibited high recoveries (126% and 127% for Cs-137 ;130% and 127% for Sr-90) relative to the acceptable high limits of 120% and 125%, respectively. Potential exists for slight high bias for Cs-1276 and Sr-90 results.
06-4035	AAB7893	Soil	RAD	18981	Cs-137 and Sr-90 results qualified as estimated (J) because two of three QC blind samples exhibited high recoveries (126% and 127% for Cs-137 ;130% and 127% for Sr-90) relative to the acceptable high limits of 120% and 125%, respectively. Potential exists for slight high bias for Cs-1276 and Sr-90 results.
06-4036	AAB7894	Soil	RAD	18981	Cs-137 and Sr-90 results qualified as estimated (J) because two of three QC blind samples exhibited high recoveries (126% and 127% for Cs-137 ;130% and 127% for Sr-90) relative to the acceptable high limits of 120% and 125%, respectively. Potential exists for slight high bias for Cs-1276 and Sr-90 results.
06-4036	AAB7895	Soil	RAD	18981	Cs-137 and Sr-90 results qualified as estimated (J) because two of three QC blind samples exhibited high recoveries (126% and 127% for Cs-137 ;130% and 127% for Sr-90) relative to the acceptable high limits of 120% and 125%, respectively. Potential exists for slight high bias for Cs-1276 and Sr-90 results.

06-4036	AAB7896	Soil	RAD	18981	Cs-137 and Sr-90 results qualified as estimated (J) because two of three QC blind samples exhibited high recoveries (126% and 127% for Cs-137 ;130% and 127% for Sr-90) relative to the acceptable high limits of 120% and 125%, respectively. Potential exists for slight high bias for Cs-1276 and Sr-90 results.
06-4037	AAB7897	Soil	RAD	18981	Cs-137 and Sr-90 results qualified as estimated (J) because two of three QC blind samples exhibited high recoveries (126% and 127% for Cs-137 ;130% and 127% for Sr-90) relative to the acceptable high limits of 120% and 125%, respectively. Potential exists for slight high bias for Cs-1276 and Sr-90 results.
06-4037	AAB7898	Soil	RAD	18981	Cs-137 and Sr-90 results qualified as estimated (J) because two of three QC blind samples exhibited high recoveries (126% and 127% for Cs-137 ;130% and 127% for Sr-90) relative to the acceptable high limits of 120% and 125%, respectively. Potential exists for slight high bias for Cs-1276 and Sr-90 results.
06-4037	AAB7899	Soil	RAD	18981	Cs-137 and Sr-90 results qualified as estimated (J) because two of three QC blind samples exhibited high recoveries (126% and 127% for Cs-137 ;130% and 127% for Sr-90) relative to the acceptable high limits of 120% and 125%, respectively. Potential exists for slight high bias for Cs-1276 and Sr-90 results.
06-4037	AAB7900	Soil	RAD	18981	Cs-137 and Sr-90 results qualified as estimated (J) because two of three QC blind samples exhibited high recoveries (126% and 127% for Cs-137 ;130% and 127% for Sr-90) relative to the acceptable

					high limits of 120% and 125%, respectively. Potential exists for slight high bias for Cs-1276 and Sr-90 results.
06-4038	AAB7901	Soil	RAD	18981	Cs-137 and Sr-90 results qualified as estimated (J) because two of three QC blind samples exhibited high recoveries (126% and 127% for Cs-137 ;130% and 127% for Sr-90) relative to the acceptable high limits of 120% and 125%, respectively. Potential exists for slight high bias for Cs-1276 and Sr-90 results.
06-4038	AAB7902	Soil	RAD	18981	Cs-137 and Sr-90 results qualified as estimated (J) because two of three QC blind samples exhibited high recoveries (126% and 127% for Cs-137 ;130% and 127% for Sr-90) relative to the acceptable high limits of 120% and 125%, respectively. Potential exists for slight high bias for Cs-1276 and Sr-90 results.
06-4039	AAB7903	Soil	RAD	18981	Cs-137 and Sr-90 results qualified as estimated (J) because two of three QC blind samples exhibited high recoveries (126% and 127% for Cs-137 ;130% and 127% for Sr-90) relative to the acceptable high limits of 120% and 125%, respectively. Potential exists for slight high bias for Cs-1276 and Sr-90 results.
06-4039	AAB7904	Soil	RAD	18981	Cs-137 and Sr-90 results qualified as estimated (J) because two of three QC blind samples exhibited high recoveries (126% and 127% for Cs-137 ;130% and 127% for Sr-90) relative to the acceptable high limits of 120% and 125%, respectively. Potential exists for slight high bias for Cs-1276 and Sr-90 results.
06-4040	AAB7905	Soil	RAD	18981	Cs-137 and Sr-90 results qualified as estimated (J)

					because two of three QC blind samples exhibited high recoveries (126% and 127% for Cs-137 ;130% and 127% for Sr-90) relative to the acceptable high limits of 120% and 125%, respectively. Potential exists for slight high bias for Cs-1276 and Sr-90 results.
06-4040	AAB7906	Soil	RAD	18981	Cs-137 and Sr-90 results qualified as estimated (J) because two of three QC blind samples exhibited high recoveries (126% and 127% for Cs-137 ;130% and 127% for Sr-90) relative to the acceptable high limits of 120% and 125%, respectively. Potential exists for slight high bias for Cs-1276 and Sr-90 results.

PRS 06-003(a)

LOCATION ID	SAMPLE ID	MATRIX	SUITE	REQUEST NUMBER	COMMENTS
06-4001	0506-97-0001	Soil	INORG	3044R	Na results qualified as estimated with high bias (J+).

TABLE B-4
SUMMARY OF QUALITY ASSURANCE/QUALITY CONTROL RESULTS FOR TA-6, PRS
06-003(c)

LOCATION ID	SAMPLE ID	MATRIX	SUITE	REQUEST NUMBER	COMMENTS
06-4007	AAB7849	Soil	INORG	18523	CN, Cr, V, and TI results qualified as estimated (J) or undetected estimated (UJ) because of low QC blind recoveries (CN: 57% and 78%; Cr: 63% and 84%; V: 64% and 90%; TI: 70%). Hg also originally qualified because of low Laboratory Control Sample (LCS) recoveries, but this was determined to be a reporting error. Hg data are not qualified; Hg LCS recoveries were 97% on two LCSs.
06-4007	AAB7849	Soil	RAD	18979	Cs-137, U-234, and U-238 results qualified as estimated (J) because of QC blind sample results outside of the 3-sigma acceptance limits.
06-4007	AAB7850	Soil	INORG	18523	CN, Cr, V, and TI results qualified as estimated (J) or undetected estimated (UJ) because of low QC blind recoveries (CN: 57% and 78%; Cr: 63% and 84%; V: 64% and 90%; TI: 70%). Hg also originally qualified because of low Laboratory Control Sample (LCS) recoveries, but this was determined to be a reporting error. Hg data are not qualified; Hg LCS recoveries were 97% on two LCSs.
06-4007	AAB7850	Soil	RAD	18979	Cs-137, U-234, and U-238 results qualified as estimated (J) because of QC blind sample results outside of the 3-sigma acceptance limits.
06-4008	AAB7851	Soil	INORG	18523	CN, Cr, V, and TI results qualified as estimated (J) or undetected estimated (UJ) because of low QC blind recoveries (CN: 57% and 78%; Cr: 63% and 84%; V: 64% and 90%; TI: 70%). Hg also originally qualified because of low

					Laboratory Control Sample (LCS) recoveries, but this was determined to be a reporting error. Hg data are not qualified; Hg LCS recoveries were 97% on two LCSs.
06-4008	AAB7851	Soil	RAD	18979	Cs-137, U-234, and U-238 results qualified as estimated (J) because of QC blind sample results outside of the 3-sigma acceptance limits.
06-4008	AAB7852	Soil	INORG	18523	CN, Cr, V, and Ti results qualified as estimated (J) or undetected estimated (UJ) because of low QC blind recoveries (CN: 57% and 78%; Cr: 63% and 84%; V: 64% and 90%; Ti: 70%). Hg also originally qualified because of low Laboratory Control Sample (LCS) recoveries, but this was determined to be a reporting error. Hg data are not qualified; Hg LCS recoveries were 97% on two LCSs.
06-4008	AAB7852	Soil	RAD	18979	Cs-137, U-234, and U-238 results qualified as estimated (J) because of QC blind sample results outside of the 3-sigma acceptance limits.
06-4009	AAB7853	Soil	INORG	18523	Hg, CN, V, Ti, and Cr results qualified as estimated (J) or undetected estimated (UJ) because of low QC blind recoveries (15% to 90%).
06-4009	AAB7853	Soil	RAD	18979	Cs-137, U-234, and U-238 results qualified as estimated (J) because of QC blind sample results outside of the 3-sigma acceptance limits.
06-4009	AAB7854	Soil	INORG	18523	CN, Cr, V, and Ti results qualified as estimated (J) or undetected estimated (UJ) because of low QC blind recoveries (CN: 57% and 78%; Cr: 63% and 84%; V: 64% and 90%; Ti: 70%). Hg also originally qualified because of low Laboratory Control Sample (LCS) recoveries, but this was determined to be a reporting error. Hg data are not qualified;

					Hg LCS recoveries were 97% on two LCSs.
06-4009	AAB7854	Soil	RAD	18979	Cs-137, U-234, and U-238 results qualified as estimated (J) because of QC blind sample results outside of the 3-sigma acceptance limits.
06-4010	AAB7855	Soil	INORG	18523	CN, Cr, V, and Ti results qualified as estimated (J) or undetected estimated (UJ) because of low QC blind recoveries (CN: 57% and 78%; Cr: 63% and 84%; V: 64% and 90%; Ti: 70%). Hg also originally qualified because of low Laboratory Control Sample (LCS) recoveries, but this was determined to be a reporting error. Hg data are not qualified; Hg LCS recoveries were 97% on two LCSs.
06-4010	AAB7855	Soil	RAD	18979	Cs-137, U-234, and U-238 results qualified as estimated (J) because of QC blind sample results outside of the 3-sigma acceptance limits.
06-4010	AAB7856	Soil	INORG	18523	CN, Cr, V, and Ti results qualified as estimated (J) or undetected estimated (UJ) because of low QC blind recoveries (CN: 57% and 78%; Cr: 63% and 84%; V: 64% and 90%; Ti: 70%). Hg also originally qualified because of low Laboratory Control Sample (LCS) recoveries, but this was determined to be a reporting error. Hg data are not qualified; Hg LCS recoveries were 97% on two LCSs.
06-4010	AAB7856	Soil	RAD	18979	Cs-137, U-234, and U-238 results qualified as estimated (J) because of QC blind sample results outside of the 3-sigma acceptance limits.
06-4011	AAB7857	Soil	INORG	18523	CN, Cr, V, and Ti results qualified as estimated (J) or undetected estimated (UJ) because of low QC blind recoveries (CN: 57% and 78%; Cr: 63% and 84%; V: 64% and 90%; Ti: 70%). Hg also originally qualified because of low

					Laboratory Control Sample (LCS) recoveries, but this was determined to be a reporting error. Hg data are not qualified; Hg LCS recoveries were 97% on two LCSs.
06-4011	AAB7857	Soil	RAD	18979	Cs-137, U-234, and U-238 results qualified as estimated (J) because of QC blind sample results outside of the 3-sigma acceptance limits.
06-4011	AAB7858	Soil	INORG	18523	CN, Cr, V, and Ti results qualified as estimated (J) or undetected estimated (UJ) because of low QC blind recoveries (CN: 57% and 78%; Cr: 63% and 84%; V: 64% and 90%; Ti: 70%). Hg also originally qualified because of low Laboratory Control Sample (LCS) recoveries, but this was determined to be a reporting error. Hg data are not qualified; Hg LCS recoveries were 97% on two LCSs.
06-4011	AAB7858	Soil	RAD	18979	Cs-137, U-234, and U-238 results qualified as estimated (J) because of QC blind sample results outside of the 3-sigma acceptance limits.
06-4012	AAB7859	Soil	HE	18504	HMX result qualified as rejected (R) because of missed holding times and high recovery in the QC blind sample. HMX result should be used with caution. Remaining analyte values qualified as undetected estimated (UJ) based of missed holding times but acceptable to high surrogate recoveries.
06-4012	AAB7859	Soil	INORG	18523	CN, Cr, V, and Ti results qualified as estimated (J) or undetected estimated (UJ) because of low QC blind recoveries (CN: 57% and 78%; Cr: 63% and 84%; V: 64% and 90%; Ti: 70%). Hg also originally qualified because of low Laboratory Control Sample (LCS) recoveries, but this was determined to be a reporting error. Hg data are not qualified;

					Hg LCS recoveries were 97% on two LCSs.
06-4012	AAB7859	Soil	RAD	18979	Cs-137, U-234, and U-238 results qualified as estimated (J) because of QC blind sample results outside of the 3-sigma acceptance limits.
06-4012	AAB7860	Soil	INORG	18523	CN, Cr, V, and TI results qualified as estimated (J) or undetected estimated (UJ) because of low QC blind recoveries (CN: 57% and 78%; Cr: 63% and 84%; V: 64% and 90%; TI: 70%). Hg also originally qualified because of low Laboratory Control Sample (LCS) recoveries, but this was determined to be a reporting error. Hg data are not qualified; Hg LCS recoveries were 97% on two LCSs.
06-4012	AAB7860	Soil	RAD	18979	Cs-137, U-234, and U-238 results qualified as estimated (J) because of QC blind sample results outside of the 3-sigma acceptance limits.
06-4012	AAB7861	Soil	INORG	18523	CN, Cr, V, and TI results qualified as estimated (J) or undetected estimated (UJ) because of low QC blind recoveries (CN: 57% and 78%; Cr: 63% and 84%; V: 64% and 90%; TI: 70%). Hg also originally qualified because of low Laboratory Control Sample (LCS) recoveries, but this was determined to be a reporting error. Hg data are not qualified; Hg LCS recoveries were 97% on two LCSs.
06-4012	AAB7861	Soil	RAD	18979	Cs-137, U-234, and U-238 results qualified as estimated (J) because of QC blind sample results outside of the 3-sigma acceptance limits.

TABLE B-5
SUMMARY OF QUALITY ASSURANCE/QUALITY CONTROL RESULTS FOR TA-6, PRS
06-003(f)

LOCATION ID	SAMPLE ID	MATRIX	SUITE	REQUEST NUMBER	COMMENTS
06-4022	AAB7862	Soil	INORG	18755	Potential low biases on As, Cu and Cr, Sb, Se, Zn and CN (64%, 11%, 49%, 43%, 36%, 60% and 76% recoveries, respectively on the matrix spike sample). Duplicate sample data generally agree within 30% of average of duplicates.
06-4022	AAB7862	Soil	RAD	18980	Sr-90 data qualified as estimated because of two QC blind sample recoveries outside of 100% $\pm$ 20% acceptance window. Recoveries were 122% and 123%.
06-4022	AAB7863	Soil	INORG	18755	Potential low biases on As, Cu and Cr, Sb, Se, Zn and CN (64%, 11%, 49%, 43%, 36%, 60% and 76% recoveries, respectively on the matrix spike sample). Duplicate sample data generally agree within 30% of average of duplicates.
06-4022	AAB7863	Soil	RAD	18980	Sr-90 data qualified as estimated because of two QC blind sample recoveries outside of 100% $\pm$ 20% acceptance window. Recoveries were 122% and 123%.
06-4023	AAB7864	Soil	INORG	18755	Potential low biases on As, Cu and Cr, Sb, Se, Zn, and CN (64%, 11%, 49%, 43%, 36%, 60% and 76% recoveries, respectively on the matrix spike sample). Duplicate sample data generally agree within 30% of average of duplicates.
06-4023	AAB7864	Soil	RAD	18980	Sr-90 data qualified as estimated because of two QC blind sample recoveries outside of 100% $\pm$ 20% acceptance window. Recoveries were 122% and 123%.

06-4023	AAB7865	Soil	INORG	18755	Potential low biases on As, Cu and Cr, Sb, Se, Zn, and CN (64%, 11%, 49%, 43%, 36%, 60% and 76% recoveries, respectively on the matrix spike sample). Duplicate sample data generally agree within 30% of average of duplicates.
06-4023	AAB7865	Soil	RAD	18980	Sr-90 data qualified as estimated because of two QC blind sample recoveries outside of 100% $\pm$ 20% acceptance window. Recoveries were 122% and 123%.
06-4024	AAB7866	Soil	INORG	18755	Potential low biases on As, Cu and Cr, Sb, Se, Zn, and CN (64%, 11%, 49%, 43%, 36%, 60% and 76% recoveries, respectively on the matrix spike sample). Duplicate sample data generally agree within 30% of average of duplicates.
06-4024	AAB7866	Soil	RAD	18980	Sr-90 data qualified as estimated because of two QC blind sample recoveries outside of 100% $\pm$ 20% acceptance window. Recoveries were 122% and 123%.
06-4024	AAB7867	Soil	INORG	18755	Potential low biases on As, Cu and Cr, Sb, Se, Zn, and CN (64%, 11%, 49%, 43%, 36%, 60% and 76% recoveries, respectively on the matrix spike sample). Duplicate sample data generally agree within 30% of average of duplicates.
06-4024	AAB7867	Soil	RAD	18980	Sr-90 data qualified as estimated because of two QC blind sample recoveries outside of 100% $\pm$ 20% acceptance window. Recoveries were 122% and 123%.
06-4024	AAB7868	Soil	INORG	18755	Potential low biases on As, Cu and Cr, Sb, Se, Zn, and CN (64%, 11%, 49%, 43%, 36%, 60% and 76% recoveries, respectively on the matrix spike sample). Duplicate sample data generally agree within 30% of

					average of duplicates.
06-4024	AAB7868	Soil	RAD	18980	Sr-90 data qualified as estimated because of two QC blind sample recoveries outside of 100% $\pm$ 20% acceptance window. Recoveries were 122% and 123%.
06-4025	AAB7869	Soil	INORG	18755	Potential low biases on As, Cu and Cr, Sb, Se, Zn, and CN (64%, 11%, 49%, 43%, 36%, 60% and 76% recoveries, respectively on the matrix spike sample). Duplicate sample data generally agree within 30% of average of duplicates.
06-4025	AAB7869	Soil	RAD	18980	Sr-90 data qualified as estimated because of two QC blind sample recoveries outside of 100% $\pm$ 20% acceptance window. Recoveries were 122% and 123%.
06-4025	AAB7870	Soil	INORG	18755	Potential low biases on As, Cu and Cr, Sb, Se, Zn, and CN (64%, 11%, 49%, 43%, 36%, 60% and 76% recoveries, respectively on the matrix spike sample). Duplicate sample data generally agree within 30% of average of duplicates.
06-4025	AAB7870	Soil	RAD	18980	Sr-90 data qualified as estimated because of two QC blind sample recoveries outside of 100% $\pm$ 20% acceptance window. Recoveries were 122% and 123%.
06-4026	AAB7871	Soil	INORG	18755	Potential low biases on As, Cu and Cr, Sb, Se, Zn, and CN (64%, 11%, 49%, 43%, 36%, 60% and 76% recoveries, respectively on the matrix spike sample). Duplicate sample data generally agree within 30% of average of duplicates.
06-4026	AAB7871	Soil	RAD	18980	Sr-90 data qualified as estimated because of two QC blind sample recoveries outside of 100% $\pm$ 20% acceptance window. Recoveries were 122% and 123%.

06-4026	AAB7872	Soil	INORG	18755	Potential low biases on As, Cu and Cr, Sb, Se, Zn, and CN (64%, 11%, 49%, 43%, 36%, 60% and 76% recoveries, respectively on the matrix spike sample). Duplicate sample data generally agree within 30% of average of duplicates.
06-4026	AAB7872	Soil	RAD	18980	Sr-90 data qualified as estimated because of two QC blind sample recoveries outside of 100% $\pm$ 20% acceptance window. Recoveries were 122% and 123%.
06-4027	AAB7873	Soil	INORG	18755	Potential low biases on As, Cu and Cr, Sb, Se, Zn, and CN (64%, 11%, 49%, 43%, 36%, 60% and 76% recoveries, respectively on the matrix spike sample). Duplicate sample data generally agree within 30% of average of duplicates.
06-4027	AAB7873	Soil	RAD	18980	Sr-90 data qualified as estimated because of two QC blind sample recoveries outside of 100% $\pm$ 20% acceptance window. Recoveries were 122% and 123%.
06-4027	AAB7874	Soil	INORG	18755	Potential low biases on As, Cu and Cr, Sb, Se, Zn, and CN (64%, 11%, 49%, 43%, 36%, 60% and 76% recoveries, respectively on the matrix spike sample). Duplicate sample data generally agree within 30% of average of duplicates.
06-4027	AAB7874	Soil	RAD	18980	Sr-90 data qualified as estimated because of two QC blind sample recoveries outside of 100% $\pm$ 20% acceptance window. Recoveries were 122% and 123%.

LOCATION ID	SAMPLE ID	MATRIX	SUITE	REQUEST NUMBER	COMMENTS
06-4028	AAB7875	Soil	INORG	18755	Potential low biases on As, Cu and Cr, Sb, Se, Zn, and CN (64%, 11%, 49%, 43%, 36%, 60% and 76% recoveries, respectively on the matrix spike sample). Duplicate sample data generally agree within 30% of average of duplicates.
06-4028	AAB7875	Soil	RAD	18980	Cs-137 and Sr-90 qualified as estimated (J) because of two blinds samples exceeding acceptance window for each isotope.
06-4028	AAB7875	Soil	VOCs	18636	Common laboratory contaminant, methylene chloride, was detected at 18 ug/kg (3 times the detection limit). This is presumed to be laboratory contamination.
06-4028	AAB7876	Soil	INORG	18755	Potential low biases on As, Cu and Cr, Sb, Se, Zn, and CN (64%, 11%, 49%, 43%, 36%, 60% and 76% recoveries, respectively on the matrix spike sample). Duplicate sample data generally agree within 30% of average of duplicates.
06-4028	AAB7876	Soil	RAD	18980	Cs-137 and Sr-90 qualified as estimated (J) because of two blinds samples exceeding acceptance window for each isotope.
06-4028	AAB7876	Soil	VOCs	18636	Common laboratory contaminant, methylene chloride, was detected at 6 ug/kg (approximately equal to the detection limit). This is presumed to be laboratory contamination.
06-4029	AAB7877	Soil	INORG	18755	Potential low biases on As, Cu and Cr, Sb, Se, Zn, and CN (64%, 11%, 49%, 43%, 36%.

					60% and 76% recoveries, respectively on the matrix spike sample). Duplicate sample data generally agree within 30% of average of duplicates.
06-4029	AAB7877	Soil	RAD	18980	Cs-137 and Sr-90 qualified as estimated (J) because of two blinds samples exceeding acceptance window for each isotope.
06-4029	AAB7877	Soil	VOCs	18636	Common laboratory contaminant, methylene chloride, was detected at 19 ug/kg (3 times the detection limit). This is presumed to be laboratory contamination.
06-4029	AAB7878	Soil	HE	18664	All analyte values except 2,4-DNT qualified as rejected (R) because of missed holding times and failure to recover analytes from soil QC blind samples.
06-4029	AAB7878	Soil	INORG	18755	Potential low biases on As, Cu and Cr, Sb, Se, Zn, and CN (64%, 11%, 49%, 43%, 36%, 60% and 76% recoveries, respectively on the matrix spike sample). Duplicate sample data generally agree within 30% of average of duplicates.
06-4029	AAB7878	Soil	RAD	18980	Cs-137 and Sr-90 qualified as estimated (J) because of two blinds samples exceeding acceptance window for each isotope.
06-4029	AAB7878	Soil	VOCs	18636	Common laboratory contaminant, methylene chloride, was detected at 6 ug/kg (equal to the detection limit). This is presumed to be laboratory contamination.
06-4031	AAB7883	Soil	HE	18665	Nitrobenzene, m-nitrotoluene and 2,4,6-TNT results qualified as estimated (J); all other results qualified as undetected estimated (UJ) because of missed holding. Surrogate recovery is 92%.

06-4031	AAB7884	Soil	HE	18665	Nitrobenzene result qualified as estimated (J); all other results qualified as undetected estimated (UJ) because of missed holding times. Surrogate recovery is 129%.
06-4033	AAB7888	Soil	HE	18665	All results qualified as undetected estimated (UJ) because of missed holding times. Surrogate recovery is 93%.
06-4034	AAB7890	Soil	HE	18665	All results qualified as undetected estimated (UJ) because of missed holding times. Surrogate recovery is 123%.
06-4030	AAB7881	Soil	INORG	18776	Al, As, Cr, and V results qualified as estimated (J), and Ti and CN results qualified as undetected estimated (UJ) because of QC blind recoveries outside of acceptance limits (see text for discussion).
06-4030	AAB7882	Soil	INORG	18776	Al, As, Cr, and V results qualified as estimated (J), and Ti and CN results qualified as undetected estimated (UJ) because of QC blind recoveries outside of acceptance limits (see text for discussion).
06-4031	AAB7883	Soil	INORG	18776	Al, As, Cr, and V results qualified as estimated (J), and Ti and CN results qualified as undetected estimated (UJ) because of QC blind recoveries outside of acceptance limits (see text for discussion).
06-4031	AAB7884	Soil	INORG	18776	Al, As, Cr, and V results qualified as estimated (J), and Ti and CN results qualified as undetected estimated (UJ) because of QC blind recoveries outside of acceptance limits (see text for discussion).
06-4032	AAB7885	Soil	INORG	18776	Al, Cr, and V results qualified as estimated (J), and Ti and CN results qualified as undetected estimated (UJ) because of QC blind recoveries outside of

					acceptance limits (see text for discussion).
06-4032	AAB7886	Soil	INORG	18776	Al, As, Cr, and V results qualified as estimated (J), and Ti and CN results qualified as undetected estimated (UJ) because of QC blind recoveries outside of acceptance limits (see text for discussion).
06-4033	AAB7887	Soil	INORG	18776	Al, and Cr results qualified as estimated (J), and Ti, V, and CN results qualified as undetected estimated (UJ) because of QC blind recoveries outside of acceptance limits (see text for discussion).
06-4033	AAB7888	Soil	INORG	18776	Al, Cr, and V results qualified as estimated (J), and Ti and CN results qualified as undetected estimated (UJ) because of QC blind recoveries outside of acceptance limits (see text for discussion).
06-4034	AAB7889	Soil	INORG	18776	Al, As, Cr, and V results qualified as estimated (J), and Ti and CN results qualified as undetected estimated (UJ) because of QC blind recoveries outside of acceptance limits (see text for discussion).
06-4034	AAB7890	Soil	INORG	18776	Al, As, Cr, and V results qualified as estimated (J), and Ti and CN results qualified as undetected estimated (UJ) because of QC blind recoveries outside of acceptance limits (see text for discussion).
06-4030	AAB7881	Soil	RAD	18981	Cs-137 and Sr-90 results qualified as estimated (J) because two of three QC blind samples exhibited high recoveries (126% and 127% for Cs-137 ;130% and 127% for Sr-90) relative to the acceptable high limits of 120% and 125%, respectively. Potential exists for slight high bias for Cs-1276 and Sr-90 results.
06-4030	AAB7882	Soil	RAD	18981	Cs-137 and Sr-90 results

					qualified as estimated (J) because two of three QC blind samples exhibited high recoveries (126% and 127% for Cs-137 ;130% and 127% for Sr-90) relative to the acceptable high limits of 120% and 125%, respectively. Potential exists for slight high bias for Cs-1276 and Sr-90 results.
06-4031	AAB7883	Soil	RAD	18981	Cs-137 and Sr-90 results qualified as estimated (J) because two of three QC blind samples exhibited high recoveries (126% and 127% for Cs-137 ;130%, and 127% for Sr-90) relative to the acceptable high limits of 120% and 125%, respectively. Potential exists for slight high bias for Cs-1276 and Sr-90 results.
06-4031	AAB7884	Soil	RAD	18981	Cs-137 and Sr-90 results qualified as estimated (J) because two of three QC blind samples exhibited high recoveries (126% and 127% for Cs-137 ;130% and 127% for Sr-90) relative to the acceptable high limits of 120% and 125%, respectively. Potential exists for slight high bias for Cs-1276 and Sr-90 results.
06-4032	AAB7885	Soil	RAD	18981	Cs-137 and Sr-90 results qualified as estimated (J) because two of three QC blind samples exhibited high recoveries (126% and 127% for Cs-137 ;130% and 127% for Sr-90) relative to the acceptable high limits of 120% and 125%, respectively. Potential exists for slight high bias for Cs-1276 and Sr-90 results.
06-4032	AAB7886	Soil	RAD	18981	Cs-137 and Sr-90 results qualified as estimated (J) because two of three QC blind samples exhibited high recoveries (126% and 127% for Cs-137 ;130% and 127% for Sr-90) relative to the acceptable high limits of 120% and 125%, respectively. Potential exists for slight high bias for Cs-1276 and Sr-90 results.

					respectively. Potential exists for slight high bias for Cs-1276 and Sr-90 results.
06-4033	AAB7887	Soil	RAD	18981	Cs-137 and Sr-90 results qualified as estimated (J) because two of three QC blind samples exhibited high recoveries (126% and 127% for Cs-137 ;130% and 127% for Sr-90) relative to the acceptable high limits of 120% and 125%, respectively. Potential exists for slight high bias for Cs-1276 and Sr-90 results.
06-4033	AAB7888	Soil	RAD	18981	Cs-137 and Sr-90 results qualified as estimated (J) because two of three QC blind samples exhibited high recoveries (126% and 127% for Cs-137 ;130% and 127% for Sr-90) relative to the acceptable high limits of 120% and 125%, respectively. Potential exists for slight high bias for Cs-1276 and Sr-90 results.
06-4034	AAB7889	Soil	RAD	18981	Cs-137 and Sr-90 results qualified as estimated (J) because two of three QC blind samples exhibited high recoveries (126% and 127% for Cs-137 ;130% and 127% for Sr-90) relative to the acceptable high limits of 120% and 125%, respectively. Potential exists for slight high bias for Cs-1276 and Sr-90 results.
06-4034	AAB7890	Soil	RAD	18981	Cs-137 and Sr-90 results qualified as estimated (J) because two of three QC blind samples exhibited high recoveries (126% and 127% for Cs-137 ;130% and 127% for Sr-90) relative to the acceptable high limits of 120% and 125%, respectively. Potential exists for slight high bias for Cs-1276 and Sr-90 results.
06-4030	AAB7881	Soil	VOCs	18639	Common laboratory contaminant, acetone, detected in method blank but not at levels

					of concern. Methylene chloride and 1,1,2-trichloro-1,2,2-trifluoroethane results qualified as estimated (J) because surrogate, 4-bromofluorobenzene recovery (128%) was greater than upper acceptable limit.
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TABLE B-7
SUMMARY OF QUALITY ASSURANCE/QUALITY CONTROL RESULTS FOR TA-6, PRS
06-007(g)

LOCATION ID	SAMPLE ID	MATRIX	SUITE	REQUEST NUMBER	COMMENTS
06-5004	AAA8832	Soil	INORG	18039	Ag and CN results qualified as undetected estimated (UJ) because of low recoveries on QC blind samples (67% and 46%, respectively).
06-5004	AAA8832	Soil	RAD	18832	Cs-137 qualified as estimated (J) because the QC blind sample recovery was 126%, in exceedance of the acceptance window.
06-5004	AAA8832	Soil	SVOCs	18064	Bis(2-ethylhexyl)phthalate result qualified as BJ because of blank contamination. Surrogate recoveries range from 55% to 71%.
06-5004	AAA8833	Soil	INORG	18039	Ag and CN results qualified as undetected estimated (UJ) because of low recoveries on QC blind samples (67% and 46%, respectively).
06-5004	AAA8833	Soil	RAD	18832	Cs-137 qualified as estimated (J) because the QC blind sample recovery was 126%, in exceedance of the acceptance window.
06-5004	AAA8833	Soil	VOCs	18064	Methylene chloride and acetone results qualified as B because they were detected in the method blank; 4-methyl-2-pentanone result qualified as estimated (J). Surrogate recoveries range from 99% to 104%.
06-5005	AAA8834	Soil	INORG	18039	Ag and CN results qualified as undetected estimated (UJ) because of low recoveries on QC blind samples (67% and 46%, respectively).
06-5005	AAA8834	Soil	RAD	18832	Cs-137 qualified as estimated (J) because the QC blind sample recovery was 126%, in exceedance of the acceptance

					window.
06-5005	AAA8835	Soil	INORG	18039	Ag and CN results qualified as undetected estimated (UJ) because of low recoveries on QC blind samples (67% and 46%, respectively).
06-5005	AAA8835	Soil	RAD	18832	Cs-137 qualified as estimated (J) because the QC blind sample recovery was 126%, in exceedance of the acceptance window.
06-5005	AAA8835	Soil	VOCs	18064	Acetone result qualified as BJ because acetone was detected in the blank. Surrogate recoveries range from 100% to 102%.
06-5006	AAA8836	Soil	INORG	18039	Ag and CN results qualified as undetected estimated (UJ) because of low recoveries on QC blind samples (67% and 46%, respectively).
06-5006	AAA8836	Soil	RAD	18832	Cs-137 qualified as estimated (J) because the QC blind sample recovery was 126%, in exceedance of the acceptance window.
06-5006	AAA8837	Soil	INORG	18039	Ag and CN results qualified as undetected estimated (UJ) because of low recoveries on QC blind samples (67% and 46%, respectively).
06-5006	AAA8837	Soil	RAD	18832	Cs-137 qualified as estimated (J) because the QC blind sample recovery was 126%, in exceedance of the acceptance window.

TABLE B-8
SUMMARY OF QUALITY ASSURANCE/QUALITY CONTROL RESULTS FOR TA-7, PRS
07-001(a)

LOCATION ID	SAMPLE ID	MATRIX	SUITE	REQUEST NUMBER	COMMENTS
07-4041	AAB7909	Soil	INORG	18808	Al, As, CN, Cr, Ti, and V values qualified as estimated (J) or estimated undetected (UJ) values because of QC bind recoveries (Al: 70% to 82%; As: 126% to 138%; CN: 44% to 56%; Cr: 59% to 83%; Ti: 20% to 63%; V: 59% to 87%). All matrix spike data of interest generally 100% $\pm$ 20% except Sb (56% and 67%).
07-4041	AAB7910	Soil	INORG	18808	Al, As, CN, Cr, Ti, and V values qualified as estimated (J) or estimated undetected (UJ) values because of QC bind recoveries (Al: 70% to 82%; As: 126% to 138%; CN: 44% to 56%; Cr: 59% to 83%; Ti: 20% to 63%; V: 59% to 87%). All matrix spike data of interest generally 100% $\pm$ 20% except Sb (56% and 67%).
07-4042	AAB7911	Soil	INORG	18808	Al, As, CN, Cr, Ti, and V values qualified as estimated (J) or estimated undetected (UJ) values because of QC bind recoveries (Al: 70% to 82%; As: 126% to 138%; CN: 44% to 56%; Cr: 59% to 83%; Ti: 20% to 63%; V: 59% to 87%). All matrix spike data of interest generally 100% $\pm$ 20% except Sb (56% and 67%).
07-4042	AAB7912	Soil	INORG	18808	Al, As, CN, Cr, Ti, and V values qualified as estimated (J) or estimated undetected (UJ) values because of QC bind recoveries (Al: 70% to 82%; As: 126% to 138%; CN: 44% to 56%; Cr: 59% to 83%; Ti: 20% to 63%; V: 59% to 87%). All matrix spike data of interest generally 100% $\pm$ 20% except Sb (56% and 67%).

07-4043	AAB7913	Soil	INORG	18808	Al, As, CN, Cr, Tl, and V values qualified as estimated (J) or estimated undetected (UJ) values because of QC bind recoveries (Al: 70% to 82%; As: 126% to 138%; CN: 44% to 56%; Cr: 59% to 83%; Tl: 20% to 63%; V: 59% to 87%). All matrix spike data of interest generally 100% $\pm$ 20% except Sb (56% and 67%).
07-4043	AAB7914	Soil	INORG	18808	Al, As, CN, Cr, Tl, and V values qualified as estimated (J) or estimated undetected (UJ) values because of QC bind recoveries (Al: 70% to 82%; As: 126% to 138%; CN: 44% to 56%; Cr: 59% to 83%; Tl: 20% to 63%; V: 59% to 87%). All matrix spike data of interest generally 100% $\pm$ 20% except Sb (56% and 67%).
07-4044	AAB7915	Soil	INORG	18808	Al, As, CN, Cr, Tl, and V values qualified as estimated (J) or estimated undetected (UJ) values because of QC bind recoveries (Al: 70% to 82%; As: 126% to 138%; CN: 44% to 56%; Cr: 59% to 83%; Tl: 20% to 63%; V: 59% to 87%). All matrix spike data of interest generally 100% $\pm$ 20% except Sb (56% and 67%).
07-4044	AAB7916	Soil	INORG	18808	Al, As, CN, Cr, Tl, and V values qualified as estimated (J) or estimated undetected (UJ) values because of QC bind recoveries (Al: 70% to 82%; As: 126% to 138%; CN: 44% to 56%; Cr: 59% to 83%; Tl: 20% to 63%; V: 59% to 87%). All matrix spike data of interest generally 100% $\pm$ 20% except Sb (56% and 67%).
07-4045	AAB7917	Soil	INORG	18808	Al, As, CN, Cr, Tl, and V values qualified as estimated (J) or estimated undetected (UJ) values because of QC bind recoveries (Al: 70% to 82%; As: 126% to 138%; CN: 44% to 56%; Cr: 59% to 83%; Tl: 20%

					to 63%; V: 59% to 87%). All matrix spike data of interest generally 100% $\pm$ 20% except Sb (56% and 67%).
07-4045	AAB7918	Soil	INORG	18808	Al, As, CN, Cr, Ti, and V values qualified as estimated (J) or estimated undetected (UJ) values because of QC bind recoveries (Al: 70% to 82%; As: 126% to 138%; CN: 44% to 56%; Cr: 59% to 83%; Ti: 20% to 63%; V: 59% to 87%). All matrix spike data of interest generally 100% $\pm$ 20% except Sb (56% and 67%).
07-4046	AAB7919	Soil	INORG	18808	Al, As, CN, Cr, Ti, and V values qualified as estimated (J) or estimated undetected (UJ) values because of QC bind recoveries (Al: 70% to 82%; As: 126% to 138%; CN: 44% to 56%; Cr: 59% to 83%; Ti: 20% to 63%; V: 59% to 87%). All matrix spike data of interest generally 100% $\pm$ 20% except Sb (56% and 67%).
07-4046	AAB7920	Soil	INORG	18808	Al, As, CN, Cr, Ti, and V values qualified as estimated (J) or estimated undetected (UJ) values because of QC bind recoveries (Al: 70% to 82%; As: 126% to 138%; CN: 44% to 56%; Cr: 59% to 83%; Ti: 20% to 63%; V: 59% to 87%). All matrix spike data of interest generally 100% $\pm$ 20% except Sb (56% and 67%).
07-4046	AAB7921	Soil	INORG	18808	Al, As, CN, Cr, Ti, and V values qualified as estimated (J) or estimated undetected (UJ) values because of QC bind recoveries (Al: 70% to 82%; As: 126% to 138%; CN: 44% to 56%; Cr: 59% to 83%; Ti: 20% to 63%; V: 59% to 87%). All matrix spike data of interest generally 100% $\pm$ 20% except Sb (56% and 67%).

**TABLE B-
SUMMARY OF QUALITY ASSURANCE/QUALITY CONTROL RESULTS FOR TA-7, PRS
07-001(b)**

LOCATION ID	SAMPLE ID	MATRIX	SUITE	REQUEST NUMBER	COMMENTS
07-4047	AAB7922	Soil	INORG	18808	Al, As, CN, Cr, Ti, and V values qualified as estimated (J) or estimated undetected (UJ) values because of QC bind recoveries (Al: 70% to 82%; As: 126% to 138%; CN: 44% to 56%; Cr: 59% to 83%; Ti: 20% to 63%; V: 59% to 87%). All matrix spike data of interest generally 100% $\pm$ 20% except Sb (56% and 67%).
07-4047	AAB7923	Soil	INORG	18808	Al, As, CN, Cr, Ti, and V values qualified as estimated (J) or estimated undetected (UJ) values because of QC bind recoveries (Al: 70% to 82%; As: 126% to 138%; CN: 44% to 56%; Cr: 59% to 83%; Ti: 20% to 63%; V: 59% to 87%). All matrix spike data of interest generally 100% $\pm$ 20% except Sb (56% and 67%).
07-4048	AAB7924	Soil	INORG	18808	Al, As, CN, Cr, Ti, and V values qualified as estimated (J) or estimated undetected (UJ) values because of QC bind recoveries (Al: 70% to 82%; As: 126% to 138%; CN: 44% to 56%; Cr: 59% to 83%; Ti: 20% to 63%; V: 59% to 87%). All matrix spike data of interest generally 100% $\pm$ 20% except Sb (56% and 67%).
07-4048	AAB7925	Soil	HE	18693	Data qualified as rejected (R) because of missed holding times and low (42%) surrogate recovery. Data should be used with cognizance of potential low bias.
07-4048	AAB7925	Soil	INORG	18808	Al, As, CN, Cr, Ti, and V values qualified as estimated (J) or estimated undetected (UJ) values because of QC bind

					recoveries (Al: 70% to 82%; As: 126% to 138%; CN: 44% to 56%; Cr: 59% to 83%; Ti: 20% to 63%; V: 59% to 87%). All matrix spike data of interest generally 100% $\pm$ 20% except Sb (56% and 67%).
07-4049	AAB7926	Soil	INORG	18808	Al, As, CN, Cr, Ti, and V values qualified as estimated (J) or estimated undetected (UJ) values because of QC bind recoveries (Al: 70% to 82%; As: 126% to 138%; CN: 44% to 56%; Cr: 59% to 83%; Ti: 20% to 63%; V: 59% to 87%). All matrix spike data of interest generally 100% $\pm$ 20% except Sb (56% and 67%).
07-4049	AAB7927	Soil	HE	18693	All but RDX and 2,4, 6-TNT data qualified as undetected estimated (UJ) because of missed holding times and high (134%) surrogate recovery. RDX and TNT data qualified as estimated (J).
07-4049	AAB7927	Soil	INORG	18808	Al, As, CN, Cr, Ti, and V values qualified as estimated (J) or estimated undetected (UJ) values because of QC bind recoveries (Al: 70% to 82%; As: 126% to 138%; CN: 44% to 56%; Cr: 59% to 83%; Ti: 20% to 63%; V: 59% to 87%). All matrix spike data of interest generally 100% $\pm$ 20% except Sb (56% and 67%).
07-4050	AAB7928	Soil	INORG	18808	Al, As, CN, Cr, Ti, and V values qualified as estimated (J) or estimated undetected (UJ) values because of QC bind recoveries (Al: 70% to 82%; As: 126% to 138%; CN: 44% to 56%; Cr: 59% to 83%; Ti: 20% to 63%; V: 59% to 87%). All matrix spike data of interest generally 100% $\pm$ 20% except Sb (56% and 67%).
07-4050	AAB7929	Soil	INORG	18808	Al, As, CN, Cr, Ti, and V values qualified as estimated (J) or estimated undetected (UJ)

					values because of QC blind recoveries (Al: 70% to 82%; As: 126% to 138%; CN: 44% to 56%; Cr: 59% to 83%; Ti: 20% to 63%; V: 59% to 87%). All matrix spike data of interest generally 100% $\pm$ 20% except Sb (56% and 67%).
07-4051	AAB7930	Soil	INORG	18808	Al, As, CN, Cr, Ti, and V values qualified as estimated (J) or estimated undetected (UJ) values because of QC blind recoveries (Al: 70% to 82%; As: 126% to 138%; CN: 44% to 56%; Cr: 59% to 83%; Ti: 20% to 63%; V: 59% to 87%). All matrix spike data of interest generally 100% $\pm$ 20% except Sb (56% and 67%).
07-4051	AAB7931	Soil	INORG	18808	Al, As, CN, Cr, Ti, and V values qualified as estimated (J) or estimated undetected (UJ) values because of QC blind recoveries (Al: 70% to 82%; As: 126% to 138%; CN: 44% to 56%; Cr: 59% to 83%; Ti: 20% to 63%; V: 59% to 87%). All matrix spike data of interest generally 100% $\pm$ 20% except Sb (56% and 67%).
07-4052	AAB7932	Soil	INORG	18808	Al, As, CN, Cr, Ti, and V values qualified as estimated (J) or estimated undetected (UJ) values because of QC blind recoveries (Al: 70% to 82%; As: 126% to 138%; CN: 44% to 56%; Cr: 59% to 83%; Ti: 20% to 63%; V: 59% to 87%). All matrix spike data of interest generally 100% $\pm$ 20% except Sb (56% and 67%).
07-4052	AAB7933	Soil	HE	18693	All but Tetryl data qualified as undetected estimated (UJ) because of missed holding times and high (130%) surrogate recovery. Tetryl data qualified as estimated (J).
07-4052	AAB7933	Soil	INORG	18808	Al, As, CN, Cr, Ti, and V values qualified as estimated (J) or estimated undetected (UJ)

					values because of QC bind recoveries (Al: 70% to 82%; As: 126% to 138%; CN: 44% to 56%; Cr: 59% to 83%; Ti: 20% to 63%; V: 59% to 87%). All matrix spike data of interest generally 100% $\pm$ 20% except Sb (56% and 67%).
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TABLE B-10
SUMMARY OF QUALITY ASSURANCE/QUALITY CONTROL RESULTS FOR TA-7, PRS
07-001(c)

LOCATION ID	SAMPLE ID	MATRIX	SUITE	REQUEST NUMBER	COMMENTS
07-4051	0507-96-0051	Soil	SVOC	1906	Surrogates fluorophenol, 1,2-dichlorobenzene and nitrobenzene exhibit 8.7%, 10.7% and 15.1% recoveries, respectively. All data considered unusable for this sample.
07-4053	AAB7934	Soil	INORG	18983	Al, Ba, K, and Mg qualified as estimated (J) because data were greater than the upper limit of the calibration range. Cyanide and Hg results qualified as undetected estimated (UJ) because of low QC blind recoveries (47% and 73%, respectively). Cr result qualified as estimated because of low (66%) QC blind recoveries. Pb result qualified as estimated (J) because of high (129%) matrix spike recovery.
07-4054	AAB7935	Soil	INORG	18983	Al, Ba, K, and Mg qualified as estimated (J) because data were greater than the upper limit of the calibration range. Cyanide and Hg results qualified as undetected estimated (UJ) because of low QC blind recoveries (47% and 73%, respectively). Cr result qualified as estimated because of low (66%) QC blind recoveries. Pb result qualified as estimated (J) because of high (129%) matrix spike recovery.
07-4055	AAB7936	Soil	INORG	18983	Al, Ba, K, and Mg qualified as estimated (J) because data were greater than the upper limit of the calibration range. Cyanide and Hg results qualified as undetected estimated (UJ) because of low QC blind recoveries (47% and 73%, respectively). Cr result qualified as estimated because of low

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					(66%) QC blind recoveries. Pb result qualified as estimated (J) because of high (129%) matrix spike recovery.
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TABLE B-11
SUMMARY OF QUALITY ASSURANCE/QUALITY CONTROL RESULTS FOR TA-7, PRS
07-001(d)

LOCATION ID	SAMPLE ID	MATRIX	SUITE	REQUEST NUMBER	COMMENTS
07-4062	AAB7937	Soil	INORG	18983	Al, Ba, K, and Mg qualified as estimated (J) because data were greater than the upper limit of the calibration range. Cyanide and Hg results qualified as undetected estimated (UJ) because of low QC blind recoveries (47% and 73%, respectively). Cr result qualified as estimated because of low (66%) QC blind recoveries. Pb result qualified as estimated (J) because of high (129%) matrix spike recovery.
07-4062	AAB7938	Soil	INORG	18983	Al, Ba, K, and Mg qualified as estimated (J) because data were greater than the upper limit of the calibration range. Cyanide and Hg results qualified as undetected estimated (UJ) because of low QC blind recoveries (47% and 73%, respectively). Cr result qualified as estimated because of low (66%) QC blind recoveries. Pb result qualified as estimated (J) because of high (129%) matrix spike recovery.
07-4063	AAB7939	Soil	INORG	18983	Al, Ba, K, and Mg qualified as estimated (J) because data were greater than the upper limit of the calibration range. Cyanide and Hg results qualified as undetected estimated (UJ) because of low QC blind recoveries (47% and 73%, respectively). Cr result qualified as estimated because of low (66%) QC blind recoveries. Pb result qualified as estimated (J) because of high (129%) matrix spike recovery.
07-4063	AAB7940	Soil	INORG	18983	Al, Ba, K, and Mg qualified as estimated (J) because data were

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					greater than the upper limit of the calibration range. Cyanide and Hg results qualified as undetected estimated (UJ) because of low QC blind recoveries (47% and 73%, respectively). Cr result qualified as estimated because of low (66%) QC blind recoveries. Pb result qualified as estimated (J) because of high (129%) matrix spike recovery.
07-4064	AAB7941	Soil	INORG	18983	Al, Ba, K, and Mg qualified as estimated (J) because data were greater than the upper limit of the calibration range. Cyanide and Hg results qualified as undetected estimated (UJ) because of low QC blind recoveries (47% and 73%, respectively). Cr result qualified as estimated because of low (66%) QC blind recoveries. Pb result qualified as estimated (J) because of high (129%) matrix spike recovery.
07-4064	AAB7942	Soil	INORG	18983	Al, Ba, K, and Mg qualified as estimated (J) because data were greater than the upper limit of the calibration range. Cyanide and Hg results qualified as undetected estimated (UJ) because of low QC blind recoveries (47% and 73%, respectively). Cr result qualified as estimated because of low (66%) QC blind recoveries. Pb result qualified as estimated (J) because of high (129%) matrix spike recovery.
07-4064	AAB7943	Soil	INORG	18983	Al, Ba, K, and Mg qualified as estimated (J) because data were greater than the upper limit of the calibration range. Cyanide and Hg results qualified as undetected estimated (UJ) because of low QC blind recoveries (47% and 73%, respectively). Cr result qualified as estimated because of low (66%) QC blind recoveries. Pb result qualified as estimated (J) because of high (129%) matrix spike recovery.

					because of high (129%) matrix spike recovery.
07-4065	AAB7944	Soil	INORG	18983	Al, Ba, K, and Mg qualified as estimated (J) because data were greater than the upper limit of the calibration range. Cyanide and Hg results qualified as undetected estimated (UJ) because of low QC blind recoveries (47% and 73%, respectively). Cr result qualified as estimated because of low (66%) QC blind recoveries. Pb result qualified as estimated (J) because of high (129%) matrix spike recovery.
07-4065	AAB7945	Soil	INORG	18983	Al, Ba, K, and Mg qualified as estimated (J) because data were greater than the upper limit of the calibration range. Cyanide and Hg results qualified as undetected estimated (UJ) because of low QC blind recoveries (47% and 73%, respectively). Cr result qualified as estimated because of low (66%) QC blind recoveries. Pb result qualified as estimated (J) because of high (129%) matrix spike recovery.
07-4066	AAB7946	Soil	INORG	18983	Al, Ba, K, and Mg qualified as estimated (J) because data were greater than the upper limit of the calibration range. Cyanide and Hg results qualified as undetected estimated (UJ) because of low QC blind recoveries (47% and 73%, respectively). Cr result qualified as estimated because of low (66%) QC blind recoveries. Pb result qualified as estimated (J) because of high (129%) matrix spike recovery.
07-4066	AAB7947	Soil	INORG	18983	Al, Ba, K, and Mg qualified as estimated (J) because data were greater than the upper limit of the calibration range. Cyanide and Hg results qualified as undetected estimated (UJ) because of low QC blind

					recoveries (47% and 73%, respectively). Cr result qualified as estimated because of low (66%) QC blind recoveries. Pb result qualified as estimated (J) because of high (129%) matrix spike recovery.
07-4067	AAB7948	Soil	INORG	18983	Al, Ba, K, and Mg qualified as estimated (J) because data were greater than the upper limit of the calibration range. Cyanide and Hg results qualified as undetected estimated (UJ) because of low QC blind recoveries (47% and 73%, respectively). Cr result qualified as estimated because of low (66%) QC blind recoveries. Pb result qualified as estimated (J) because of high (129%) matrix spike recovery.
07-4067	AAB7949	Soil	INORG	18983	Al, Ba, K, and Mg qualified as estimated (J) because data were greater than the upper limit of the calibration range. Cyanide and Hg results qualified as undetected estimated (UJ) because of low QC blind recoveries (47% and 73%, respectively). Cr result qualified as estimated because of low (66%) QC blind recoveries. Pb result qualified as estimated (J) because of high (129%) matrix spike recovery.

TABLE B-12
SUMMARY OF QUALITY ASSURANCE/QUALITY CONTROL RESULTS FOR TA-8, PRS
08-002

No data required qualification for this PRS.

TABLE B-13
SUMMARY OF QUALITY ASSURANCE/QUALITY CONTROL RESULTS FOR TA-22, PRS
22-010(a)

LOCATION ID	SAMPLE ID	MATRIX	SUITE	REQUEST NUMBER	COMMENTS
22-6018	AAA8909	Soil	INORG	18247	Cr result qualified as estimated (J) because of low recovery (62%) on one of two QC blind recoveries, and higher-than-acceptable laboratory control standard (LCS) values. Indications of potential high bias and uncertainty for Pb. Matrix spike data are generally within 15% of acceptable values.
22-6018	AAA8910	Water	INORG	18247	Potential for low bias on Cd, Pb, and Se indicated by low spike recoveries (66%, 38% and 25%, respectively).
22-6019	AAA8911	Soil	INORG	18247	Cr result qualified as estimated (J) because of low recovery (62%) on one of two QC blind recoveries, and higher-than-acceptable laboratory control standard (LCS) values. Indications of potential high bias and uncertainty for Pb. Matrix spike data are generally within 15% of acceptable values.
22-6019	AAA8912	Water	INORG	18247	Potential for low bias on Cd, Pb, and Se indicated by low spike recoveries (66%, 38% and 25%, respectively).
22-6020	AAA8913	Soil	INORG	18247	Cr result qualified as estimated (J) because of low recovery (62%) on one of two QC blind recoveries, and higher-than-acceptable laboratory control standard (LCS) values. Indications of potential high bias and uncertainty for Pb. Matrix spike data are generally within 15% of acceptable values.
22-6020	AAA8914	Soil	INORG	18247	Cr result qualified as estimated (J) because of low recovery (62%) on one of two QC blind recoveries, and higher-than-acceptable laboratory control

					standard (LCS) values. Indications of potential high bias and uncertainty for Pb. Matrix spike data generally within 15% of acceptable values.
22-6021	AAA8915	Soil	INORG	18247	Cr result qualified as estimated (J) because of low recovery (62%) on one of two QC blind recoveries, and higher-than-acceptable laboratory control standard (LCS) values. Indications of potential high bias and uncertainty for Pb. Cu, Mg, and V also qualified as estimated (J) because of high LCS values. Matrix spike data generally within 15% of acceptable values.
22-6021	AAA8916	Soil	INORG	18247	Cr result qualified as estimated (J) because of low recovery (62%) on one of two QC blind recoveries, and higher-than-acceptable laboratory control standard (LCS) values. Indications of potential high bias and uncertainty for Pb. Matrix spike data are generally within 15% of acceptable values.
22-6021	AAA8917	Soil	INORG	18247	Cr result qualified as estimated (J) because of low recovery (62%) on one of two QC blind recoveries, and higher-than-acceptable laboratory control standard (LCS) values. Indications of potential high bias and uncertainty for Pb. Matrix spike data are generally within 15% of acceptable values.
22-6022	AAA8918	Soil	INORG	18247	Cr result qualified as estimated (J) because of low recovery (62%) on one of two QC blind recoveries, and higher-than-acceptable laboratory control standard (LCS) values. Indications of potential high bias and uncertainty for Pb. Cu, Mg, and V also qualified as estimated (J) because of high LCS values. Matrix spike data generally within 15% of acceptable values.
22-6022	AAA8919	Soil	INORG	18247	Cr result qualified as estimated (J)

					and V also qualified as estimated (J) because of high LCS values. Matrix spike data generally within 15% of acceptable values.
22-6023	AAA8924	Soil	INORG	18247	Cr result qualified as estimated (J) because of low recovery (62%) on one of two QC blind recoveries, and higher-than-acceptable laboratory control standard (LCS) values. Indications of potential high bias and uncertainty for Pb. Matrix spike data are generally within 15% of acceptable values.
22-6024	AAA8925	Soil	INORG	18247	Cr result qualified as estimated (J) because of low recovery (62%) on one of two QC blind recoveries, and higher-than-acceptable laboratory control standard (LCS) values. Indications of potential high bias and uncertainty for Pb. Matrix spike data are generally within 15% of acceptable values.
22-6024	AAA8926	Soil	HE	18245	HMX result qualified as estimated (J). All other data qualified as rejected (R). However, surrogate recovery is 105%. Potential low bias indicated by 15% to 35% recovery of QC blind analytes.
22-6024	AAA8926	Soil	INORG	18247	Cr result qualified as undetected estimated (UJ) because of low recovery (62%) on one of two QC blind recoveries, and higher-than-acceptable laboratory control standard (LCS) values. Indications of potential high bias and uncertainty for Pb. Matrix spike data generally within 15% of acceptable values.
22-6024	AAA8927	Water	INORG	18247	Potential for low bias on Cd, Pb and Se indicated by low spike recoveries (66%, 38% and 25%, respectively).

PRS 22-010(a)

LOCATION ID	SAMPLE ID	MATRIX	SUITE	REQUEST NUMBER	COMMENTS
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22-6061	0522-97-0001	Soil	INORG	3050R	Al and Pb results qualified as estimated (J); Mg results qualified as estimated with high bias (J+).
22-6061	0522-97-0002	Soil	INORG	3050R	Al and Pb results qualified as estimated (J); Mg results qualified as estimated with high bias (J+).
22-6062	0522-97-0003	Soil	INORG	3050R	Al and Pb results qualified as estimated (J); Mg results qualified as estimated with high bias (J+).
22-6062	0522-97-0004	Soil	INORG	3050R	Al and Pb results qualified as estimated (J); Mg results qualified as estimated with high bias (J+).
22-6063	0522-97-0005	Soil	INORG	3050R	Al and Pb results qualified as estimated (J); Mg results qualified as estimated with high bias (J+).
22-6063	0522-97-0006	Soil	INORG	3050R	Al and Pb results qualified as estimated (J); Mg results qualified as estimated with high bias (J+).

PRS 22-010(a)

LOCATION ID	SAMPLE ID	MATRIX	SUITE	REQUEST NUMBER	COMMENTS
22-6063	0522-97-0006	Soil	SVOCs	3049R	All results qualified as R (rejected).

TABLE B-14
SUMMARY OF QUALITY ASSURANCE/QUALITY CONTROL RESULTS FOR TA-22, PRS
22-010(b)

LOCATION ID	SAMPLE ID	MATRIX	SUITE	REQUEST NUMBER	COMMENTS
22-6025	AAA8930	Soil	INORG	18514	Hg and Tl results qualified as estimated undetected (UJ) because of low recoveries (55% and 69% for Hg; 67% and 71% for Tl) on QC blind samples. Al, Cr, and V results qualified as estimated (J) because QC blind sample recoveries were between 50% and 75% of expected values. Pb qualified as estimated (J) because of high recovery (162%) on a QC blind sample. Matrix spike recoveries generally 100% $\pm$ 20% except Sb (60% and 67%), Pb (167% and 97%), and As (104% and 139).
22-6025	AAA8931	Soil	INORG	18514	Hg and Tl results qualified as estimated undetected (UJ) because of low recoveries (55% and 69% for Hg; 67% and 71% for Tl) on QC blind samples. Al, Cr, and V results qualified as estimated (J) because QC blind sample recoveries were between 50% and 75% of expected values. Pb qualified as estimated (J) because of high recovery (162%) on a QC blind sample. Matrix spike recoveries generally 100% $\pm$ 20% except Sb (60% and 67%), Pb (167% and 97%), and As (104% and 139).
22-6025	AAA8932	Soil	INORG	18514	Hg, Tl and V results qualified as estimated undetected (UJ) because of low recoveries (between 50% and 75%) on QC blind samples. Al and Cr results qualified as estimated (J) because QC blind sample recoveries were between 50% and 75% of expected values. Pb qualified as estimated (J) because of high recovery (162%) on QC blind sample. Matrix spike recoveries generally 100% $\pm$ 20% except Sb

					(60% and 67%), Pb (167% and 97%), and As (104% and 139).
22-6026	AAA8933	Soil	INORG	18514	Hg, Tl and V results qualified as estimated undetected (UJ) because of low recoveries (between 50% and 75%) on QC blind samples. Al and Cr results qualified as estimated (J) because QC blind sample recoveries were between 50% and 75% of expected values. Pb qualified as estimated (J) because of high recovery (162%) on QC blind sample. Matrix spike recoveries generally 100% $\pm$ 20% except Sb (60% and 67%), Pb (167% and 97%), and As (104% and 139).
22-6026	AAA8934	Soil	INORG	18514	Hg, Tl, and V results qualified as estimated undetected (UJ) because of low recoveries (between 50% and 75%) on QC blind samples. Al and Cr results qualified as estimated (J) because QC blind sample recoveries were between 50% and 75% of expected values. Pb qualified as estimated (J) because of high recovery (162%) on QC blind sample. Matrix spike recoveries generally 100% $\pm$ 20% except Sb (60% and 67%), Pb (167% and 97%), and As (104% and 139).
22-6027	AAA8935	Soil	INORG	18514	Hg, Tl, and V results qualified as estimated undetected (UJ) because of low recoveries (between 50% and 75%) on QC blind samples. Al and Cr results qualified as estimated (J) because QC blind sample recoveries were between 50% and 75% of expected values. Pb qualified as estimated (J) because of high recovery (162%) on QC blind sample. Matrix spike recoveries generally 100% $\pm$ 20% except Sb (60% and 67%), Pb (167% and 97%), and As (104% and 139).
22-6027	AAA8936	Soil	INORG	18514	Hg, Tl, and V results qualified as estimated undetected (UJ) because of low recoveries (between 50% and 75%) on QC

					blind samples. Al and Cr results qualified as estimated (J) because QC blind sample recoveries were between 50% and 75% of expected values. Pb qualified as estimated (J) because of high recovery (162%) on QC blind sample. Matrix spike recoveries generally 100% $\pm$ 20% except Sb (60% and 67%), Pb (167% and 97%), and As (104% and 139).
22-6028	AAA8937	Soil	INORG	18514	Cr, Hg, Tl, and V results qualified as estimated undetected (UJ) because of low recoveries (between 50% and 75%) on QC blind samples. Al result qualified as estimated (J) because QC blind sample recovery was between 50% and 75% of expected values. Pb qualified as estimated (J) because of high recovery (162%) on QC blind sample. Matrix spike recoveries generally 100% $\pm$ 20% except Sb (60% and 67%), Pb (167% and 97%), and As (104% and 139).
22-6028	AAA8938	Soil	INORG	18514	Cr, Hg, Tl, and V results qualified as estimated undetected (UJ) because of low recoveries (between 50% and 75%) on QC blind samples. Al result qualified as estimated (J) because QC blind sample recovery was between 50% and 75% of expected values. Pb qualified as estimated (J) because of high recovery (162%) on QC blind sample. Matrix spike recoveries generally 100% $\pm$ 20% except Sb (60% and 67%), Pb (167% and 97%), and As (104% and 139).
22-6029	AAA8939	Soil	INORG	18514	Hg, Tl, and V results qualified as estimated undetected (UJ) because of low recoveries (between 50% and 75%) on QC blind samples. Al and Cr results qualified as estimated (J) because QC blind sample recoveries were between 50% and 75% of expected values. Pb qualified as estimated (J) because of high recovery (162%) on QC blind

					sample. Matrix spike recoveries generally 100% $\pm$ 20% except Sb (60% and 67%), Pb (167% and 97%), and As (104% and 139).
22-6029	AAA8940	Soil	INORG	18514	Cr, Hg, Tl, and V results qualified as estimated undetected (UJ) because of low recoveries (between 50% and 75%) on QC blind samples. Al result qualified as estimated (J) because QC blind sample recovery was between 50% and 75% of expected values. Pb qualified as estimated (J) because of high recovery (162%) on QC blind sample. Matrix spike recoveries generally 100% $\pm$ 20% except Sb (60% and 67%), Pb (167% and 97%), and As (104% and 139).
22-6030	AAA8941	Soil	INORG	18514	Hg and Tl results qualified as estimated undetected (UJ) because of low recoveries (between 50% and 75%) on QC blind samples. Al, Cr, and V results qualified as estimated (J) because QC blind sample recoveries were between 50% and 75% of expected values. Pb qualified as estimated (J) because of high recovery (162%) on QC blind sample. Matrix spike recoveries generally 100% $\pm$ 20% except Sb (60% and 67%), Pb (167% and 97%), and As (104% and 139).
22-6030	AAA8942	Soil	INORG	18514	Hg, Tl, and V results qualified as estimated undetected (UJ) because of low recoveries (between 50% and 75%) on QC blind samples. Al and Cr results qualified as estimated (J) because QC blind sample recoveries were between 50% and 75% of expected values. Pb qualified as estimated (J) because of high recovery (162%) on QC blind sample. Matrix spike recoveries generally 100% $\pm$ 20% except Sb (60% and 67%), Pb (167% and 97%), and As (104% and 139).
22-6031	AAA8943	Soil	INORG	18514	Hg, Tl, and V results qualified as

					estimated undetected (UJ) because of low recoveries (between 50% and 75%) on QC blind samples. Al and Cr results qualified as estimated (J) because QC blind sample recoveries were between 50% and 75% of expected values. Pb qualified as estimated (J) because of high recovery (162%) on QC blind sample. Matrix spike recoveries generally 100% $\pm$ 20% except Sb (60% and 67%), Pb (167% and 97%), and As (104% and 139).
22-6031	AAA8944	Soil	INORG	18514	Hg, Tl, and V results qualified as estimated undetected (UJ) because of low recoveries (between 50% and 75%) on QC blind samples. Al and Cr results qualified as estimated (J) because QC blind sample recoveries were between 50% and 75% of expected values. Pb qualified as estimated (J) because of high recovery (162%) on QC blind sample. Matrix spike recoveries generally 100% $\pm$ 20% except Sb (60% and 67%), Pb (167% and 97%), and As (104% and 139).
22-6032	AAA8945	Soil	HE	18439	Data qualified because of gross exceedance of holding times and various degrees of low analyte recoveries on surrogate compounds and QC blind samples. 4-ADNT, 2-ADNT, HMX, Tetryl and all mononitrotoluenes qualified as rejected (R). 2,4-DNT and 4,6-DNT qualified as estimated (J). All other analyte values qualified as undetected estimated (UJ).
22-6032	AAA8945	Soil	INORG	18514	Tl result qualified as estimated undetected (UJ) because of low recoveries (67% and 71%) on QC blind samples. Al, Cr, Hg, and V results qualified as estimated (J) because QC blind sample recoveries were between 50% and 75% of expected values. Pb qualified as estimated (J) because of high recovery (162%) on QC blind sample. Matrix spike

					recoveries generally 100% $\pm$ 20% except Sb (60% and 67%), Pb (167% and 97%), and As (104% and 139).
22-6032	AAA8945	Soil	SVOC	18357	Many analytes qualified as undetected (UJ) because of low surrogate recoveries and low recoveries from QC blind samples. Hexachloroethane, 1,2-dichlorobenzene, 2-methylphenol and 2-chloronaphthalene data qualified as rejected (R) because of failure to detect those analytes in the QC blind sample. Bis(2-ethylhexyl)phthalate, Di-n-butyl phthalate and pyrene results qualified as estimated (J) because of high (207%) recovery for p-terphenyl-d14 surrogate. Other surrogate recoveries range from 23% to 60%.
22-6032	AAA8946	Soil	INORG	18514	Ti result qualified as estimated undetected (UJ) because of low recoveries (67% and 71%) on QC blind samples. Al, Cr, Hg, and V results qualified as estimated (J) because QC blind sample recoveries were between 50% and 75% of expected values. Pb qualified as estimated (J) because of high recovery (162%) on QC blind sample. Matrix spike recoveries generally 100% $\pm$ 20% except Sb (60% and 67%), Pb (167% and 97%), and As (104% and 139).
22-6033	AAA8947	Soil	INORG	18514	Ti result qualified as estimated undetected (UJ) because of low recoveries (67% and 71%) on QC blind samples. Al, Cr, Hg, and V results qualified as estimated (J) because QC blind sample recoveries were between 50% and 75% of expected values. Pb qualified as estimated (J) because of high recovery (162%) on QC blind sample. Matrix spike recoveries generally 100% $\pm$ 20% except Sb (60% and 67%), Pb (167% and 97%), and As (104%

					and 139).
22-6033	AAA8948	Soil	INORG	18514	Hg and Tl results qualified as estimated undetected (UJ) because of low recoveries (between 50% and 75%) on QC blind samples. Al, Cr, and V results qualified as estimated (J) because QC blind sample recoveries were between 50% and 75% of expected values. Pb qualified as estimated (J) because of high recovery (162%) on QC blind sample. Matrix spike recoveries generally 100% $\pm$ 20% except Sb (60% and 67%), Pb (167% and 97%), and As (104% and 139).
22-6034	AAA8949	Soil	INORG	18514	Hg, Tl, and V results qualified as estimated undetected (UJ) because of low recoveries (between 50% and 75%) on QC blind samples. Al, and Cr results qualified as estimated (J) because QC blind sample recoveries were between 50% and 75% of expected values. Pb qualified as estimated (J) because of high recovery (162%) on QC blind sample. Matrix spike recoveries generally 100% $\pm$ 20% except Sb (60% and 67%), Pb (167% and 97%), and As (104% and 139).
22-6034	AAA8949	Soil	SVOC	18357	Anthracene, 2,4-dichlorophenol, and 2-methylphenol results qualified as rejected (R) because of <10% recoveries from QC blind sample. Naphthalene, o-dichlorobenzene, 2-nitrophenol, pentachlorophenol, phenol, 1,2,4-trichlorobenzene and 2,4,6-trichlorophenol results qualified as undetected estimate (UJ) because of <50% recovery on a QC blind sample. Benzo[a]pyrene and pyrene results qualified as estimated (J). Surrogate recoveries range from 21% to 48%.
22-6034	AAA8950	Soil	INORG	18514	Cr, Hg, Tl, and V results qualified as estimated undetected (UJ) because of low recoveries

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					(between 50% and 75%) on QC blind samples. Al result qualified as estimated (J) because QC blind sample recoveries were low (68% and 70% of expected values). Pb qualified as estimated (J) because of high recovery (162%) on QC blind sample. Matrix spike recoveries generally 100% $\pm$ 20% except Sb (60% and 67%), Pb (167% and 97%), and As (104% and 139).
22-6035	AAA8951	Soil	INORG	18514	Cr, Hg, Tl, and V results qualified as estimated undetected (UJ) because of low recoveries (between 50% and 75%) on QC blind samples. Al result qualified as estimated (J) because QC blind sample recoveries were low (68% and 70% of expected values). Pb qualified as estimated (J) because of high recovery (162%) on QC blind sample. Matrix spike recoveries generally 100% $\pm$ 20% except Sb (60% and 67%), Pb (167% and 97%), and As (104% and 139).
22-6035	AAA8952	Soil	INORG	18514	Cr, Hg, Tl, and V results qualified as estimated undetected (UJ) because of low recoveries (between 50% and 75%) on QC blind samples. Al result qualified as estimated (J) because QC blind sample recoveries were low (68% and 70% of expected values). Pb qualified as estimated (J) because of high recovery (162%) on QC blind sample. Matrix spike recoveries generally 100% $\pm$ 20% except Sb (60% and 67%), Pb (167% and 97%), and As (104% and 139).
22-6036	AAA8953	Soil	INORG	18260	Cr, Mn, Pb, and V results qualified as estimated (J) because of high recoveries in laboratory control sample (81%, 7%, 48% and 13% higher than upper acceptable limit, respectively). Matrix spikes generally within 100% $\pm$ 20% recovery except Al (62%).
22-6036	AAA8954	Soil	INORG	18260	Cr, Mn, Pb, and V results qualified

					as estimated (J) because of high recoveries in laboratory control sample (81%, 7%, 48% and 13% higher than upper acceptable limit, respectively). Matrix spikes generally within 100% $\pm$ 20% recovery except Al (62%).
22-6037	AAA8955	Soil	INORG	18260	Cr, Mn, Pb, and V results qualified as estimated (J) because of high recoveries in laboratory control sample (81%, 7%, 48% and 13% higher than upper acceptable limit, respectively). Matrix spikes generally within 100% $\pm$ 20% recovery except Al (62%).
22-6037	AAA8956	Soil	INORG	18260	Cr, Mn, Pb, and V results qualified as estimated (J) because of high recoveries in laboratory control sample (81%, 7%, 48% and 13% higher than upper acceptable limit, respectively). Matrix spikes generally within 100% $\pm$ 20% recovery except Al (62%).
22-6038	AAA8957	Soil	INORG	18260	Cr, Mn, Pb, and V results qualified as estimated (J) because of high recoveries in laboratory control sample (81%, 7%, 48% and 13% higher than upper acceptable limit, respectively). Matrix spikes generally within 100% $\pm$ 20% recovery except Al (62%).
22-6038	AAA8957	Soil	VOC	18261	Acetone result qualified as BJ because of contamination in the blank. Iodomethane result qualified as estimated (J). Indicates a potential for high bias for acetone. Surrogate recoveries range from 93% to 107%.
22-6038	AAA8958	Soil	INORG	18260	Cr, Mn, Pb, and V results qualified as estimated (J) because of high recoveries in laboratory control sample (81%, 7%, 48% and 13% higher than upper acceptable limit, respectively). Matrix spikes generally within 100% $\pm$ 20% recovery except Al (62%).
22-6039	AAA8959	Soil	INORG	18260	Cr, Mn, Pb, and V results qualified as estimated (J) because of high recoveries in laboratory control sample (81%, 7%, 48% and 13%

					higher than upper acceptable limit, respectively). Matrix spikes generally within 100% $\pm$ 20% recovery except Al (62%).
22-6039	AAA8960	Soil	INORG	18260	Cr, Mn, Pb, and V results qualified as estimated (J) because of high recoveries in laboratory control sample (81%, 7%, 48% and 13% higher than upper acceptable limit, respectively). Matrix spikes generally within 100% $\pm$ 20% recovery except Al (62%).
22-6040	AAA8961	Soil	INORG	18260	Cr, Mn, Pb, and V results qualified as estimated (J) because of high recoveries in laboratory control sample (81%, 7%, 48% and 13% higher than upper acceptable limit, respectively). Matrix spikes generally within 100% $\pm$ 20% recovery except Al (62%).
22-6040	AAA8962	Soil	INORG	18260	Cr, Mn, Pb, and V results qualified as estimated (J) because of high recoveries in laboratory control sample (81%, 7%, 48% and 13% higher than upper acceptable limit, respectively). Matrix spikes generally within 100% $\pm$ 20% recovery except Al (62%).
22-6040	AAA8963	Soil	INORG	18260	Cr, Mn, and Pb results qualified as estimated (J) because of high recoveries in laboratory control sample (81%, 7% and 48% higher than upper acceptable limit). Matrix spikes generally within 100% $\pm$ 20% recovery except Al (62%).
22-6041	AAA8964	Soil	INORG	18260	Cr, Mn, Pb, and V results qualified as estimated (J) because of high recoveries in laboratory control sample (81%, 7%, 48% and 13% higher than upper acceptable limit, respectively). Matrix spikes generally within 100% $\pm$ 20% recovery except Al (62%).
22-6041	AAA8965	Soil	INORG	18260	Cr, Mn, Pb, and V results qualified as estimated (J) because of high recoveries in laboratory control sample (81%, 7%, 48% and 13% higher than upper acceptable limit, respectively). Matrix spikes

					generally within 100% $\pm$ 20% recovery except Al (62%).
22-6041	AAA8965	Soil	SVOC	18261	Anthracene, 4-bromophenylphenyl ether, o-dichlorobenzene, 2-methylphenol and 2,4,6-trichlorophenol results qualified as rejected (R) because of low recoveries on QC blind samples. Benzo[b]fluoranthene, o-chlorophenol, dibenzofuran, 2,4-dichlorophenol, 2,4-dinitrotoluene, fluorene, 2-methylnaphthalene, naphthalene, 2-nitrophenol, pentachlorophenol, phenol, pyrene and 1,2,4-trichlorobenzene results qualified as undetected estimated (UJ) for same reason. Surrogate recoveries range from 33% to 43%.
22-6041	AAA8966	Soil	INORG	18260	Cr, Mn, Pb, and V results qualified as estimated (J) because of high recoveries in laboratory control sample (81%, 7%, 48% and 13% higher than upper acceptable limit, respectively). Matrix spikes generally within 100% $\pm$ 20% recovery except Al (62%).
22-6042	AAA8967	Soil	INORG	18260	Cr, Mn, Pb, and V results qualified as estimated (J) because of high recoveries in laboratory control sample (81%, 7%, 48% and 13% higher than upper acceptable limit, respectively). Matrix spikes generally within 100% $\pm$ 20% recovery except Al (62%).
22-6042	AAA8968	Soil	INORG	18260	Cr, Mn, Pb, and V results qualified as estimated (J) because of high recoveries in laboratory control sample (81%, 7%, 48% and 13% higher than upper acceptable limit, respectively). Matrix spikes generally within 100% $\pm$ 20% recovery except Al (62%).
22-6042	AAA8969	Soil	INORG	18260	Cr, Mn, Pb, and V results qualified as estimated (J) because of high recoveries in laboratory control sample (81%, 7%, 48% and 13%

					higher than upper acceptable limit, respectively). Matrix spikes generally within 100% $\pm$ 20% recovery except Al (62%).
22-6043	AAA8970	Water	HE	18267	Data qualified because of gross exceedance of holding times and various degrees of low analyte recoveries on surrogate compounds and QC blind samples. 2,4-DNT, 2,6-DNT, HMX and RDX qualified as estimated (J). All other analyte values qualified as rejected (R).
22-6043	AAA8970	Water	INORG	18260	Cr, Mn, Pb, and V results qualified as estimated (J) because of high recoveries in laboratory control sample (81%, 7%, 48% and 13% higher than upper acceptable limit, respectively). Matrix spikes generally within 100% $\pm$ 20% recovery except Al (62%).
22-6043	AAA8970	Water	SVOC	18261	All analytes except the phenols qualified as rejected (R) because of three base-neutral surrogate recoveries below acceptance criteria with p-terphenyl-d14 recovery <10%, and because of very poor blank spike and blank spike duplicate recoveries. All surrogate recoveries range from 2% to 44%, with only two >20%, indicating a potentially severe low bias on all results.
22-6044	AAA8975	Soil	INORG	18514	Tl result qualified as estimated undetected (UJ) because of low recoveries (67% and 71%) on QC blind samples. Al, Cr, Hg and V results qualified as estimated (J) because QC blind sample recoveries were low (68% and 70% of expected values). Pb qualified as estimated (J) because of high recovery (162%) on QC blind sample. Matrix spike recoveries generally 100% $\pm$ 20% except Sb (60% and 67%), Pb (167% and 97%), and As (104% and 139).
22-6044	AAA8976	Soil	INORG	18514	Tl result qualified as estimated undetected (UJ) because of low

					recoveries (67% and 71%) on QC blind samples. Al, Cr, Hg, and V results qualified as estimated (J) because QC blind sample recoveries were low (68% and 70% of expected values). Pb qualified as estimated (J) because of high recovery (162%) on QC blind sample. Matrix spike recoveries generally 100% $\pm$ 20% except Sb (60% and 67%), Pb (167% and 97%), and As (104% and 139).
22-6045	AAA8977	Soil	INORG	18514	Hg and Tl results qualified as estimated undetected (UJ) because of low recoveries (between 50% and 75%) on QC blind samples. Al, Cr, and V results qualified as estimated (J) because QC blind sample recoveries were low (68% and 70% of expected values). Pb qualified as estimated (J) because of high recovery (162%) on QC blind sample. Matrix spike recoveries generally 100% $\pm$ 20% except Sb (60% and 67%), Pb (167% and 97%), and As (104% and 139).
22-6045	AAA8978	Soil	INORG	18514	Hg and Tl results qualified as estimated undetected (UJ) because of low recoveries (between 50% and 75%) on QC blind samples. Al, Cr, and V results qualified as estimated (J) because QC blind sample recoveries were low (68% and 70% of expected values). Pb qualified as estimated (J) because of high recovery (162%) on QC blind sample. Matrix spike recoveries generally 100% $\pm$ 20% except Sb (60% and 67%), Pb (167% and 97%), and As (104% and 139).
22-6046	AAA8979	Soil	INORG	18514	Hg and Tl results qualified as estimated undetected (UJ) because of low recoveries (between 50% and 75%) on QC blind samples. Al, Cr, and V results qualified as estimated (J) because QC blind sample

					recoveries were low (68% and 70% of expected values). Pb qualified as estimated (J) because of high recovery (162%) on QC blind sample. Matrix spike recoveries generally 100% $\pm$ 20% except Sb (60% and 67%), Pb (167% and 97%), and As (104% and 139).
22-6046	AAA8980	Soil	INORG	18514	Hg, Tl, and V results qualified as estimated undetected (UJ) because of low recoveries (between 50% and 75%) on QC blind samples. Al and Cr results qualified as estimated (J) because QC blind sample recoveries were low (68% and 70% of expected values). Pb qualified as estimated (J) because of high recovery (162%) on QC blind sample. Matrix spike recoveries generally 100% $\pm$ 20% except Sb (60% and 67%), Pb (167% and 97%), and As (104% and 139).

TABLE B-15
SUMMARY OF QUALITY ASSURANCE/QUALITY CONTROL RESULTS FOR TA-22, PRS
22-014(a)

LOCATION ID	SAMPLE ID	MATRIX	SUITE	REQUEST NUMBER	COMMENTS
22-3002	AAA8648	SOIL	HE	17760	All data qualified as rejected (R) because of failure to detect analytes in QC blind samples. However, QC blind analyte concentrations were near the method detection limit. Surrogate recovery was 64%. Use data with caution. Low bias expected.
22-3002	AAA8650	SOIL	HE	17760	All data qualified as rejected (R) because of failure to detect analytes in QC blind samples. However, QC blind analyte concentrations were near the method detection limit. Surrogate recovery was 64%. Use data with caution. Low bias expected.
22-3004	AAA8656	SOIL	HE	17760	All data qualified as rejected (R) because of failure to detect analytes in QC blind samples. However, QC blind analyte concentrations were near the method detection limit. Surrogate recovery was 44%. Use data with caution. Low bias expected.

TABLE B-16
SUMMARY OF QUALITY ASSURANCE/QUALITY CONTROL RESULTS FOR TA-22, PRS
22-014(b)

LOCATION ID	SAMPLE ID	MATRIX	SUITE	REQUEST NUMBER	COMMENTS
22-3010	AAA8678	SOIL	INORG	17827	CN data qualified as undetected estimated (UJ) because of low (73% to 75%) recovery on QC blind sample; Fe data qualified as estimated (J) because of high (144%) recovery on QC blind sample.
22-3010	AAA8679	SOIL	INORG	17827	CN data qualified as undetected estimated (UJ) because of low (73% to 75%) recovery on QC blind sample; Fe data qualified as estimated (J) because of high (144%) recovery on QC blind sample.
22-3010	AAA8680	SOIL	INORG	17827	CN data qualified as undetected estimated (UJ) because of low (73% to 75%) recovery on QC blind sample; Fe data qualified as estimated (J) because of high (144%) recovery on QC blind sample.
22-3011	AAA8681	SOIL	INORG	17827	CN data qualified as undetected estimated (UJ) because of low (73% to 75%) recovery on QC blind sample; Fe data qualified as estimated (J) because of high (144%) recovery on QC blind sample.
22-3011	AAA8681	SOIL	SVOCs	17773	Anthracene and 2-methylphenol results qualified as rejected (R) because of $\leq 5\%$ recovery in QC blind sample. Acenaphthene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[g,h,i]perylene, benzo[k]fluoranthene, di-n-octyl phthalate, dibenzo[a,h]anthracene, 1,2-dichlorobenzene, 2,4-dichlorophenol, 2,4-dinitrotoluene, indeno[1,2,3-c,d]pyrene, isophorone, 2-methylnaphthalene,

					naphthalene, 2-nitrophenol, pentachlorophenol, phenol, 1,2,4-trichlorobenzene and 2,4,6-trichlorophenol results qualified as undetected estimated (UJ). Surrogate recoveries range from 40% to 89%.
22-3011	AAA8681	SOIL	VOCs	17773	Acetone and methylene chloride results qualified as estimated (J) because of internal standard area outside of acceptance window; all other results qualified as undetected estimated (UJ) for similar reason. Surrogate recoveries range from 103% to 124% with 4-bromofluorobenzene recovery exceeding upper acceptable limit of 121%.
22-3011	AAA8682	SOIL	INORG	17827	CN data qualified as undetected estimated (UJ) because of low (73% to 75%) recovery on QC blind sample; Fe data qualified as estimated (J) because of high (144%) recovery on QC blind sample.
22-3011	AAA8683	SOIL	INORG	17827	CN data qualified as undetected estimated (UJ) because of low (73% to 75%) recovery on QC blind sample; Fe data qualified as estimated (J) because of high (144%) recovery on QC blind sample.
22-3012	AAA8684	SOIL	INORG	17827	CN data qualified as undetected estimated (UJ) because of low (73% to 75%) recovery on QC blind sample; Fe data qualified as estimated (J) because of high (144%) recovery on QC blind sample.
22-3012	AAA8684D	SOIL	INORG	17827	CN data qualified as undetected estimated (UJ) because of low (73% to 75%) recovery on QC blind sample; Fe data qualified as estimated (J) because of high (144%) recovery on QC blind sample.
22-3012	AAA8685	SOIL	INORG	17827	CN data qualified as undetected estimated (UJ) because of low

					(73% to 75%) recovery on QC blind sample; Fe data qualified as estimated (J) because of high (144%) recovery on QC blind sample.
22-3012	AAA8686	SOIL	INORG	17827	CN data qualified as undetected estimated (UJ) because of low (73% to 75%) recovery on QC blind sample; Fe data qualified as estimated (J) because of high (144%) recovery on QC blind sample.
22-3013	AAA8687	SOIL	INORG	17827	CN data qualified as undetected estimated (UJ) because of low (73% to 75%) recovery on QC blind sample; Fe data qualified as estimated (J) because of high (144%) recovery on QC blind sample.
22-3013	AAA8687	SOIL	SVOCs	17773	Anthracene and 2-methylphenol results qualified as rejected (R) because of $\leq 5\%$ recovery in QC blind sample. Acenaphthene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[g,h,i]perylene, benzo[k]fluoranthene, di-n-octyl phthalate, dibenzo[a,h]anthracene, 1,2-dichlorobenzene, 2,4-dichlorophenol, 2,4-dinitrotoluene, indeno[1,2,3-c,d]pyrene, isophorone, 2-methylnaphthalene, naphthalene, 2-nitrophenol, pentachlorophenol, phenol, 1,2,4-trichlorobenzene and 2,4,6-trichlorophenol results qualified as undetected estimated (UJ). Surrogate recoveries range from 41% to 82%.
22-3013	AAA8688	SOIL	INORG	17827	CN data qualified as undetected estimated (UJ) because of low (73% to 75%) recovery on QC blind sample; Fe data qualified as estimated (J) because of high (144%) recovery on QC blind sample.
22-3013	AAA8689	SOIL	INORG	17827	CN data qualified as undetected

					estimated (UJ) because of low (73% to 75%) recovery on QC blind sample; Fe data qualified as estimated (J) because of high (144%) recovery on QC blind sample.
22-3014	AAA8690	SOIL	INORG	17827	CN data qualified as undetected estimated (UJ) because of low (73% to 75%) recovery on QC blind sample; Fe data qualified as estimated (J) because of high (144%) recovery on QC blind sample.
22-3014	AAA8690	SOIL	VOCs	17773	Acetone result qualified as estimated (J) because of internal standard area outside of quantitation range and 4-bromofluorobenzene surrogate recovery exceeding acceptable upper limit of 121%. All other data qualified as undetected estimated (UJ) because of low internal standard area. Surrogate recoveries range from 101% to 130%.
22-3014	AAA8691	SOIL	INORG	17827	CN data qualified as undetected estimated (UJ) because of low (73% to 75%) recovery on QC blind sample; Fe data qualified as estimated (J) because of high (144%) recovery on QC blind sample.
22-3014	AAA8692	SOIL	INORG	17827	CN data qualified as undetected estimated (UJ) because of low (73% to 75%) recovery on QC blind sample; Fe data qualified as estimated (J) because of high (144%) recovery on QC blind sample.
22-3014	AAA8692	SOIL	VOCs	17773	Acetone result qualified as estimated (J) because of internal standard area outside of quantitation range. All other data qualified as undetected estimated (UJ) because of low internal standard area. Surrogate recoveries range from 105% to 117%.
22-3014	AAA8693	SOIL	INORG	17827	CN data qualified as undetected estimated (UJ) because of low

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					(73% to 75%) recovery on QC blind sample; Fe data qualified as estimated (J) because of high (144%) recovery on QC blind sample.
22-3014	AAA8693	SOIL	SVOCs	17773	2-methylphenol result qualified as rejected (R) because of $\leq 10\%$ recovery in QC blind sample. Acenaphthene, anthracene, di-n-octyl phthalate, dibenzo[a,h]anthracene, 1,2-dichlorobenzene, 2,4-dichlorophenol, 2,4-dinitrotoluene, isophorone, 2-methylnaphthalene, 2-methylphenol, naphthalene, 2-nitrophenol, pentachlorophenol, phenol, 1,2,4-trichlorobenzene and 2,4,6-trichlorophenol results qualified as undetected estimated (UJ). Benzo[a]pyrene, benzo[b]fluoranthene, benzo[g,h,i]perylene, benzo[k]fluoranthene, fluoranthene, indeno[1,2,3-c,d]pyrene and pyrene results qualified as estimated (J). Surrogate recoveries range from 36% to 62%.
22-3014	AAA8693	SOIL	VOCs	17773	Acetone result qualified as estimated (J) because of internal standard area outside of quantitation range. All other data qualified as undetected estimated (UJ) because of low internal standard area. Surrogate recoveries range from 103% to 118%.
22-3015	AAA8694	SOIL	HE	17760	All data except HMX value qualified as rejected (R) because of failure to detect analytes in QC blind samples. However, QC blind analyte concentrations were near the method detection limit. Surrogate recovery was 100%. HMX value qualified as estimated (J). Use data with caution.
22-3015	AAA8694	SOIL	INORG	17827	CN data qualified as undetected estimated (UJ) because of low (73% to 75%) recovery on QC blind sample; Fe data qualified as

					estimated (J) because of high (144%) recovery on QC blind sample.
22-3015	AAA8694D	SOIL	INORG	17827	CN data qualified as undetected estimated (UJ) because of low (73% to 75%) recovery on QC blind sample; Fe data qualified as estimated (J) because of high (144%) recovery on QC blind sample.
22-3016	AAA8695	SOIL	INORG	17827	CN data qualified as undetected estimated (UJ) because of low (73% to 75%) recovery on QC blind sample; Fe data qualified as estimated (J) because of high (144%) recovery on QC blind sample.
22-3017	AAA8696	SOIL	INORG	17827	CN data qualified as undetected estimated (UJ) because of low (73% to 75%) recovery on QC blind sample; Fe data qualified as estimated (J) because of high (144%) recovery on QC blind sample.
22-3017	AAA8697	SOIL	INORG	17827	CN data qualified as undetected estimated (UJ) because of low (73% to 75%) recovery on QC blind sample; Fe data qualified as estimated (J) because of high (144%) recovery on QC blind sample.

TABLE B-17
SUMMARY OF QUALITY ASSURANCE/QUALITY CONTROL RESULTS FOR TA-40, PRS
40-005

LOCATION ID	SAMPLE ID	MATRIX	SUITE	REQUEST NUMBER	COMMENTS
40-3048	0540-96-0001:02	SOIL	VOCs	1915	Acetone result qualified as estimated with likely negative bias (J-) because surrogate recovery was between 10% and the lower acceptable limit. All other results qualified as undetected estimated (UJ) for same reason. Several analyte results also qualified as UJ because of low internal standard area for chlorobenzene-d5 and 1,4-dichlorobenzene-d4.
40-3048	0540-96-0001:02R	SOIL	VOCs	1915	Acetone result qualified as estimated with likely negative bias (J-) because surrogate recovery was between 10% and the lower acceptable limit. All other results qualified as undetected estimated (UJ) for same reason. Several analyte results also qualified as UJ because of low internal standard area for pentafluorobenzene, chlorobenzene-d5 and 1,4-dichlorobenzene-d4.
40-3048	0540-96-0001:03	SOIL	VOCs	1915	Acetone result qualified as estimated with likely positive bias (J+) because surrogate recovery was greater than the upper acceptable limit. Results for sec-butylbenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, p-isopropyltoluene, 1,2-dichlorobenzene, n-butylbenzene and 1,2-dibromo-3-chloropropane qualified as undetected estimated (UJ) because internal standard area was low.
40-3048	0540-96-0001:03R	SOIL	VOCs	1915	Acetone result qualified as estimated with likely positive bias (J+) because surrogate recovery was greater than the upper

					acceptable limit. All other results qualified as undetected estimated (UJ) because internal standard area was low.
40-3048	0540-96-0002:02	SOIL	VOCs	1915	Acetone result qualified as estimated with likely positive bias (J+) because surrogate recovery was greater than the upper acceptable limit. Analytes quantitated against internal standard pentafluorobenzene qualified as undetected estimated (UJ) because internal standard area was low. All other results unqualified.
40-3048	0540-96-0002:02R	SOIL	VOCs	1915	Acetone result qualified as estimated with likely positive bias (J+) because surrogate recovery was greater than the upper acceptable limit. All other results qualified as undetected estimated (UJ) because internal standard areas were low.
40-3048	0540-96-0003:02	SOIL	VOCs	1915	Analytes quantitated against internal standard 1,4-dichlorobenzene qualified as undetected estimated (UJ) because of low internal standard area.
40-3048	0540-96-0003:02R	SOIL	VOCs	1915	Acetone result qualified as estimated (J) because internal standard outside the acceptable limits. All other results except those analytes quantitated against internal standard 1,4-difluorobenzene qualified as undetected estimated (UJ) because internal standard areas were low.
40-3048	0540-96-0003:03	SOIL	VOCs	1915	Results quantitated against internal standard 1,4-dichlorobenzene qualified as undetected estimated (UJ) because of low internal standard area. All other results not qualified.
40-3048	0540-96-0003:03R	SOIL	VOCs	1915	Results quantitated against internal standards 1,4-dichlorobenzene and chlorobenzene-d5 qualified as

					undetected estimated (UJ) because of low internal standard area. All other results not qualified.
40-3048	AAA8780	SOIL	VOCs	17884	Lost and never analyzed.
40-3048	AAA8781	SOIL	VOCs	17884	Lost and never analyzed.
40-3048	AAA8782	SOIL	VOCs	17884	Lost and never analyzed.
40-3049	0540-96-0004:02	SOIL	VOCs	1915	Acetone result qualified as estimated with likely low bias (J-) because surrogate recovery was between 10% and lower acceptable limit. All other results qualified as undetected estimated (UJ) because surrogate recoveries were low.
40-3049	0540-96-0004:02R	SOIL	VOCs	1915	Results quantitated against internal standard 1,4-dichlorobenzene qualified as undetected estimated (UJ) because of low internal standard area. All other results not qualified.
40-3049	0540-96-0004:03	SOIL	VOCs	1915	Acetone result qualified as estimated with likely low bias (J-) because surrogate recovery was between 10% and lower acceptable limit. All other results qualified as undetected estimated (UJ) because surrogate recoveries were low.
40-3049	0540-96-0004:03R	SOIL	VOCs	1915	Results quantitated against internal standards pentafluorobenzene, chlorobenzene-d5 and 1,4-dichlorobenzene qualified as undetected estimated (UJ) because of low internal standard area. All other results not qualified.
40-3049	0540-96-0005:02	SOIL	VOCs	1915	Acetone result qualified as estimated with likely low bias (J-) because surrogate recovery was between 10% and lower acceptable limit. All other results qualified as undetected estimated (UJ) because surrogate recoveries were low.
40-3049	0540-96-	SOIL	VOCs	1915	Results quantitated against

	0005:02R				internal standards 1,4-dichlorobenzene qualified as undetected estimated (UJ) because of low internal standard area. All other results not qualified.
40-3049	0540-96-0005:03	SOIL	VOCs	1915	Acetone result qualified as estimated with likely low bias (J-) because surrogate recovery was between 10% and lower acceptable limit. All other results qualified as undetected estimated (UJ) because surrogate recoveries were low.
40-3049	0540-96-0005:03R	SOIL	VOCs	1915	Results quantitated against internal standards pentafluorobenzene, chlorobenzene-d5 and 1,4-dichlorobenzene qualified as undetected estimated (UJ) because of low internal standard area. All other results not qualified.
40-3049	0540-96-0006:02	SOIL	VOCs	1915	Acetone result qualified as estimated with likely high bias (J+) because surrogate recovery was greater than the upper acceptable limit. All other results qualified as undetected estimated (UJ) because internal standard areas were outside of acceptable limits.
40-3049	0540-96-0006:02R	SOIL	VOCs	1915	Acetone result qualified as estimated with likely low bias (J-) because surrogate recovery was between 10% and lower acceptable limit. All other results qualified as undetected estimated (UJ) because surrogate recoveries were between 10% and the lower acceptable limit.
40-3049	0540-96-0006:03	SOIL	VOCs	1915	Acetone result qualified as estimated with likely high bias (J+) because surrogate recovery was greater than the upper acceptable limit. Results quantitated against internal standard 1,4-dichlorobenzene-d4 qualified as undetected estimated because of low internal

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					standard area. All other results not qualified.
40-3049	0540-96-0006:03R	SOIL	VOCs	1915	Acetone result qualified as estimated with likely low bias (J-) because surrogate recovery was between 10% and lower acceptable limit. All other results qualified as undetected estimated (UJ) because surrogate recoveries were between 10% and the lower acceptable limit.
40-3049	AAA8783	SOIL	VOCs	17884	Lost and never analyzed.
40-3049	AAA8784	SOIL	VOCs	17884	Lost and never analyzed.
40-3049	AAA8785	SOIL	VOCs	17884	Lost and never analyzed.
40-3050	AAA8786	SOIL	VOCs	17884	Lost and never analyzed.
40-3050	AAA8787	SOIL	VOCs	17884	Lost and never analyzed.
40-3050	AAA8788	SOIL	VOCs	17884	Lost and never analyzed.
40-3051	0540-96-0010:03	SOIL	VOCs	1915	Acetone result qualified as estimated with likely low bias (J-) because surrogate recovery was between 10% and lower acceptable limit. All other results qualified as undetected estimated (UJ) because surrogate recoveries were between 10% and the lower acceptable limit.
40-3051	0540-96-0010:03R	SOIL	VOCs	1915	Acetone result qualified as estimated with likely low bias (J-) because surrogate recovery was between 10% and lower acceptable limit. All other results qualified as undetected estimated (UJ) because surrogate recoveries were between 10% and the lower acceptable limit.
40-3051	AAA8789	SOIL	VOCs	17884	Lost and never analyzed.
40-3051	AAA8790	SOIL	VOCs	17884	Lost and never analyzed.
40-3052	0540-96-0013:02	SOIL	VOCs	1915	Acetone result qualified as estimated with likely low bias (J-) because surrogate recovery was between 10% and lower acceptable limit. All other results qualified as undetected estimated (UJ) because surrogate recoveries were between 10% and the lower acceptable limit.

40-3052	0540-96-0013:02R	SOIL	VOCs	1915	All results qualified as undetected estimated (UJ) because surrogate recoveries were between 10% and the lower acceptable limit.
40-3052	0540-96-0013:03	SOIL	VOCs	1915	Results quantitated against internal standards chlorobenzene-d5 and 1,4-dichlorobenzene-d4 qualified as undetected estimated because internal standard areas are low.
40-3052	0540-96-0013:03R	SOIL	VOCs	1915	Results quantitated against internal standards 1,4-dichlorobenzene-d4 qualified as undetected estimated because internal standard areas are low.
40-3052	AAA8792	SOIL	VOCs	17884	Lost and never analyzed.
40-3052	AAA8793	SOIL	VOCs	17884	Lost and never analyzed.
40-3052	AAA8794	SOIL	VOCs	17884	Lost and never analyzed.
40-3052	AAA8795	SOIL	VOCs	17884	Lost and never analyzed.

TABLE B-18
SUMMARY OF QUALITY ASSURANCE/QUALITY CONTROL RESULTS FOR TA-40,
Marsh

LOCATION ID	SAMPLE ID	MATRIX	SUITE	REQUEST NUMBER	COMMENTS
40-3056	AAA8805	SOIL	INORG	18037	Al and Na data qualified as estimated (J) because of high recoveries (approximately 3% and 41% greater than upper acceptable limit, respectively) on laboratory control sample. No matrix spike data available for Al, As, or Na.
40-3056	AAA8805	SOIL	VOCs	17884	Lost and never analyzed.
40-3057	AAA8806	SOIL	INORG	18037	Al and Na data qualified as estimated (J) because of high recoveries (approximately 3% and 41% greater than upper acceptable limit, respectively) on laboratory control sample. No matrix spike data available for Al, As, or Na.
40-3057	AAA8806	SOIL	VOCs	17884	Lost and never analyzed.
40-3058	AAA8807	SOIL	INORG	18037	Al and Na data qualified as estimated (J) because of high recoveries (approximately 3% and 41% greater than upper acceptable limit, respectively) on laboratory control sample. No matrix spike data available for Al, As, or Na.
40-3058	AAA8807	SOIL	VOCs	17884	Lost and never analyzed.
40-3059	0540-96-0024:02	SOIL	VOCs	1915	All results qualified as undetected estimated (UJ) because of low surrogate recoveries.
40-3059	0540-96-0024:02R	SOIL	VOCs	1915	All results qualified as undetected estimated (UJ) because of low surrogate recoveries.
40-3059	0540-96-0024:03	SOIL	VOCs	1915	Results quantitated against internal standard 1,4-dichlorobenzene-d4 qualified as undetected estimated (UJ) because of low internal standard area. All other results not qualified.

40-3059	0540-96-0024:03R	SOIL	VOCs	1915	All results qualified as undetected estimated (UJ) because of low surrogate recoveries.
40-3059	AAA8808	SOIL	INORG	18037	Al and Na data qualified as estimated (J) because of high recoveries (approximately 3% and 41% greater than upper acceptable limit, respectively) on laboratory control sample. No matrix spike data available for Al, As, or Na.
40-3059	AAA8808	SOIL	VOCs	17884	Lost and never analyzed.
40-3060	AAA8809	SOIL	INORG	18037	Al and Na data qualified as estimated (J) because of high recoveries (approximately 3% and 41% greater than upper acceptable limit, respectively) on laboratory control sample.
40-3060	AAA8809	SOIL	VOCs	17884	Lost and never analyzed.
40-3061	AAA8810	SOIL	INORG	18037	Al and Na data qualified as estimated (J) because of high recoveries (approximately 3% and 41% greater than upper acceptable limit, respectively) on laboratory control sample. No matrix spike data available for Al, As, or Na.
40-3061	AAA8810	SOIL	VOCs	17884	Lost and never analyzed.

APPENDIX C RISK ASSESSMENT CALCULATIONS

No quantitative risk assessment was performed on PRSs being reported.