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Date: September 30, 1998
Refer to: EM/ER:98-397

HSWA LANL 5/1157/9
LA-UR-98-3493

Mr. Benito Garcia
NMED-HRMB
P.O. Box 26110
Santa Fe, NM 87501

SUBJECT: SUBMITTAL OF RFI REPORT FOR PRSs 9-002 AND 9-011(b) (FORMER OU 1157, FU 5) TO FULFILL THE FY98 WORK SCHEDULE COMMITMENT

Dear Mr. Garcia:

Enclosed please find the Certification and two copies of the Resource Conservation and Recovery Act Facility Investigation Report for Potential Release Sites 9-002 and 9-011(b), which are being submitted to the New Mexico Environment Department to fulfill the Fiscal Year 1998 Work Schedule commitment.

If you have any questions or comments, please contact Victoria George at (505) 665-6953.

Sincerely,

Julie A. Canepa, Program Manager
LANL/ER Project

Sincerely,

Theodore J. Taylor, Program Manager
DOE/LAAO

JC/TT/DB/rfr

Enclosures: (1) Certification
(2) Two RFI Reports for PRSs 9-002 and 9-001(b) (Former OU 1157, FU 5)

3348

TC

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EM/ER File (CT # C284), MS M992
EM/ER File, MS M992

CERTIFICATION

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

Document Title: RFI Report for PRSs 9-002 and 9-011(b) (Former OU 1157, FU 5)

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LA-UR-98-3493
August 1998

RFI Report for Potential Release Sites

09-002
09-011(b)

Environmental Restoration Project
A Department of Energy Environmental Cleanup Program

Los Alamos
NATIONAL LABORATORY
Los Alamos, NM 87545

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EXECUTIVE SUMMARY

Two potential release sites (PRSs) in technical area (TA) 9 at Los Alamos National Laboratory (the Laboratory) were investigated to assess whether contaminants are present at the sites, to evaluate the potential for release and redistribution into surrounding soils or outflow areas, and to determine if any contamination poses an unacceptable risk to human health or the environment. No further action (NFA) is recommended for both PRSs. The PRSs are evaluated as separate units. PRS 09-002, a burn pit, is a solid waste management unit (SWMU) listed in Module VIII of the Hazardous and Solid Wastes Amendments of 1984 (HWSA) permit (EPA 1990, ER ID 01585). PRS 09-011(b), a high explosives (HE) equipment storage area, is a non-HSWA site.

PRS 09-002 is a burn pit that was to dispose of film, photographs, and papers resulting from high speed photography of detonations at the nearby Far Point Firing Site. PRS 09-002 consists of an open, shallow surface depression (10 by 13 by 2-3 ft deep) located in an unused, lightly wooded, meadow area approximately 400 ft north of the active TA-9 process area. The burn pit is believed to have been used from about 1945 until 1956. Metals residues in the pit bottom are the potential contaminants from the burned photographic materials. There are no planned changes in land use or developmentsfor the site.

A Phase I investigation was conducted in 1994 to determine if a release of Resource Conservation and Recovery Act (RCRA) contaminants had occurred at the site. Two surface soil samples were collected from the bottom of the pit and were analyzed for metals. No metals above background values were detected in the samples collected. No contaminants of potential concern (COPCs) were identified at the PRS. PRS 09-002 is recommended for NFA.

PRS 09-011(b) was a small (approximately 10 ft by 10 ft), open, temporary equipment, satellite accumulation storage area on the south side of building TA-9-39, a high explosives magazine. Equipment from the TA-9 process area, suspected to be contaminated with HE residue, was stored out in the open and exposed to the weather conditions on the corner of a paved driveway until the equipment could be burned at TA-16. The storage area did not have a containment structure around it and HE residues in the equipment might have been washed out onto the surrounding soil. It is not known when the site was first used as a storage area, but it was after building TA-9-39 was constructed in 1952. Use of the parking lot corner as an HE equipment storage area ceased in 1991. The former storage area and HE magazine are located in the active part of TA-9 where research on HE development is conducted. There are no planned changes in site use or developments at the site.

A Phase I investigation was conducted at the site in 1994 and 1997. Surface soil samples were collected at two locations adjacent to the storage area and at four locations in a drainage channel east of the storage area. No HE compounds were detected in the collected samples. No COPCs were identified at the PRS. PRS 09-011(b) is recommended for NFA.

TABLE ES-1
SUMMARY OF PROPOSED ACTIONS

PRS Number	PRS Description	HSWA[a]	Radionuclide Component[b]	Proposed Action	Rationale for Recommendation	Section Number
09-002	Burn Pit	Yes	No	NFA, Criterion 3[c]	RCRA metals within background values.	2.0
09-011(b)	HE Equipment Storage Area	No	No	NFA, Criterion 3	RCRA contamination (HE) not detected at site.	3.0

[a] If the site is listed in Module VIII of the Laboratory's Hazardous Waste Facility Permit, then "yes" applies. Otherwise, "no" applies.

[b] If a release has occurred at the PRS and radionuclides are associated with the release, then "yes" applies. Otherwise, "no" applies.

[c] NFA Criteria are listed in Section II.B.4.a.(4).(b), "No Further Action (NFA) Proposals Criteria," in the ***NMED RCRA Permits Management Program Document Requirement Guide*** **(NMED 1998, ER ID 57897).**

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1.0 INTRODUCTION

Los Alamos National Laboratory (LANL or the Laboratory) is a multidisciplinary research facility owned by the Department of Energy (DOE) and managed by the University of California. The Laboratory is located in north-central New Mexico approximately 60 miles northeast of Albuquerque and 20 miles northwest of Santa Fe. The Laboratory site covers 43 square miles of the Pajarito Plateau, which consists of a series of fingerlike mesas separated by deep canyons containing ephemeral and intermittent streams that run from west to east. Mesa tops range in elevation from approximately 6200 ft to 7800 ft. The eastern portion of the plateau stands 300 to 900 ft above the Rio Grande.

The Laboratory's Environmental Restoration (ER) Project is involved in a national effort by the DOE to clean up facilities that were formerly involved in weapons production. The goal of the ER Project is to ensure that DOE's past operations do not threaten human or environmental health and safety in and around Los Alamos County, New Mexico. To achieve that goal, the ER Project is currently investigating sites potentially contaminated by past Laboratory operations.

The sites under investigation are either solid waste management units (SWMUs) or areas of concern (AOCs). In the Laboratory's ER Project, SWMUs and AOCs are collectively referred to as potential release sites (PRSs).

This investigation, including sampling and analysis, is conducted under the requirements of the Resource Conservation and Recovery Act (RCRA). The Laboratory's Installation Work Plan (IWP) describes the methodologies used in the investigation and analysis (LANL 1996, ER ID 55574).

For PRSs 09-002 and 09-011(b), the investigation is in accordance with the Hazardous and Solid Wastes Amendments of 1984 (HSWA) and follows the requirements in Module VIII of the Laboratory's Hazardous Waste Facility Permit (EPA 1990, 01585). Module VIII was issued to the Laboratory by the U.S. Environmental Protection Agency (EPA) on May 23, 1990, and modified on May 19, 1994.

Technical area (TA) 9 is located on the western border of LANL (Figure 1.0-1). An abandoned burn pit used for disposing of high speed photography film, classified papers and photographs, PRS 09-002 is discussed in Section 2. A satellite accumulation area used for temporary storage of potentially high explosives (HE) contaminated equipment, PRS 09-011(b) is discussed in Section 3. These PRSs are located in the same geographic area and setting (Figure 1.0-2).

TA-9 consists of a decommissioned northern area, sometimes referred to as Anchor Ranch East site, that was active from the early 1940s to the mid-1950s for research and development of HE and a currently active, southern area (Figure 1.0-2). A former explosives firing site (Far Point) is located east of Anchor Ranch East site. The PRS 09-002 burn pit is located northeast of the Far Point firing site. Much of Anchor Ranch East site is an open meadow area, and no new construction is planned (Dye 1998, 58484).

Construction of buildings and support structures at the newer part of TA-9 began in 1949 and continued for about five years. Thirty-eight permanent structures were erected about 700 ft south of the old TA-9 facility to house the explosive technology group. The major purpose of this group is to research and develop HE for the Laboratory's nuclear weapon systems. This is a concept-to-retirement support that has recently included dismantling explosive components from discontinued stockpiled weapons and recycling HE waste. Activities include synthesizing, characterizing, formulating, pressing, machining, performance testing, and determining the compatibility of HE with other weapon materials. Therefore, the buildings were designed for specific purposes, and their functions have not changed significantly over the 40 years of operation. PRS 09-011(b), a former HE equipment storage area, is located outside of building TA-9-39, an explosives storage magazine. Land use at the active area of TA-9 is anticipated to remain unchanged for the foreseeable future.

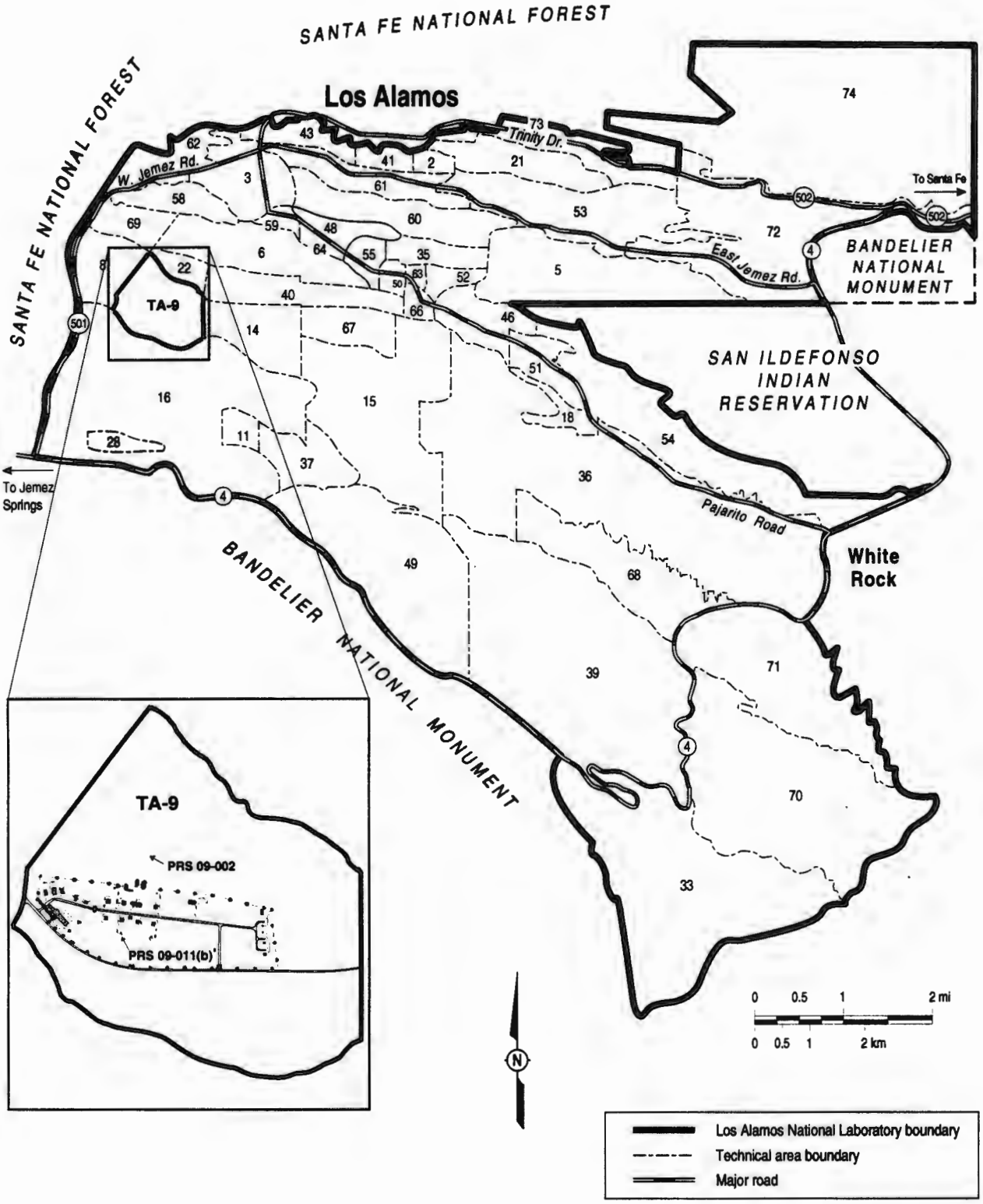


Figure 1.0-1. Location of TA-9 with respect to Laboratory technical areas and surrounding land holdings.

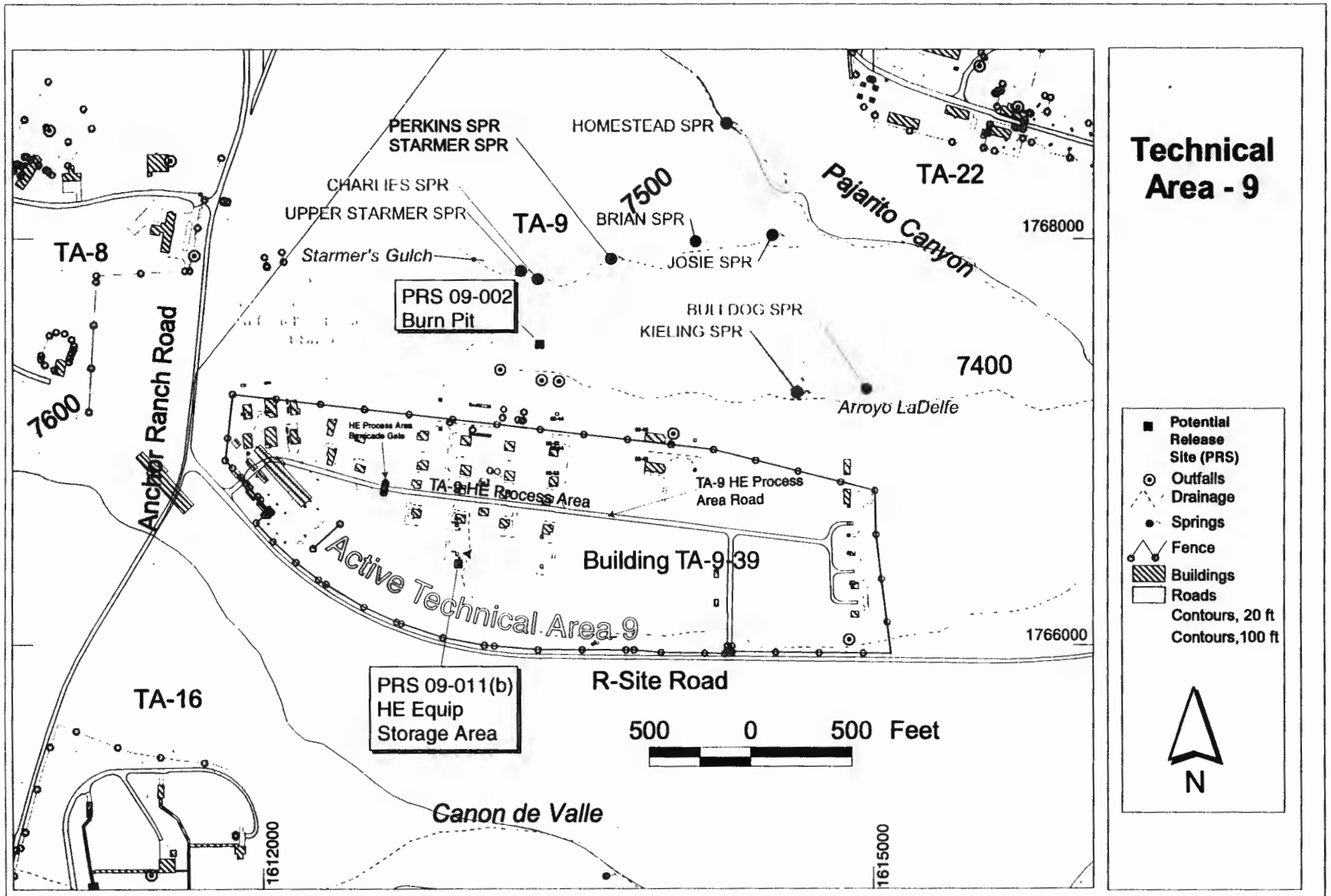


Figure 1.0-2. PRSs at TA-9.

TA-9 is situated on a mesa between two canyons: Pajarito Canyon to the north, and Canon de Valle to the south. The two PRSs are located on mesa tops. Storm water runoff from the vicinity of these two PRSs discharges to Pajarito Canyon through two tributary drainages: runoff from the area around PRS 09-002 burn pit drains into Arroyo Ladelfe, and runoff from the area around PRS 09-011(b) drains into an unnamed drainage. There are no wetlands, springs, or other surface water sites in the immediate proximity of the PRSs discussed in this report. However, there are springs in Arroyo Ladelfe beginning at approximately 1300 ft downstream and east of PRS 09-002 and also in a separate drainage (Starmer's Gulch) 300 ft north of PRS 09-002. Details on the climate, geology, hydrology, ecology, and cultural settings for this general area can be found in Appendix B, sections 3.0 through 6.0.

A list of acronyms and a glossary are included in Appendix A. Appendix B contains information on the environmental setting. Soil sampling was conducted as part of the site characterization. The resulting data met QA/QC requirements and were determined to be usable (see Appendix C for details). The complete data set is provided as Appendix D. No statistical calculations on the relatively small analytical data set were needed, and thus Appendix E is not applicable for this report. No human health or ecological risk assessments were conducted for these PRSs, but the ecological scoping checklists are included in Appendix F.

These PRSs were characterized in accordance with the methods specified in the Operable Unit (OU) 1157 RCRA Facilities Investigation (RFI) Work Plan (LANL 1993, 20949). One notice of deficency (NOD) was submitted by the EPA on the OU 1157 RFI Work Plan. The Laboratory, through the DOE, submitted two written NOD responses to the EPA. The work plan and two NOD responses were approved by the EPA in a letter dated October 7, 1994. The NOD on the OU 1157 RFI Work Plan, the Laboratory's responses to the notices, and the OU 1157 RFI Work Plan approval letter are included in Appendix G.

2.0 POTENTIAL RELEASE SITE (PRS) 9-002–BURN PIT

2.1 Summary

PRS 09-002 is a SWMU consisting of a shallow pit that was used to burn classified documents, possibly including numerous photographs, films, and other materials unfit for use. The PRS 09-002 burn pit site investigation was a Phase I activity and served as reconnaissance. The objective of the investigation was to determine if a release of RCRA contaminants had occurred at the site; to define the nature and extent of any such contaminant release; and to determine if further investigation or analysis was required based on human health and ecological screeing assessments. Section 2.3.3 provides information on the preliminary site conceptual model (SCM).

Site activities included the collecting of two surface soil samples (0 to 0.5 ft) from within the assumed boundary of the designated PRS. The samples were analyzed for metals. Section 2.3.4.2 provides details on the field investigation. No removal or stabilization activities were performed and, based on background comparison, no contamination was found at the site. The pit is a topographically-closed basin within no signs of soil erosion from storm water run-on or runoff. The bottom of the pit is stabilized with a growth of grass. Therefore, any contaminants originally deposited at the bottom of the pit would most likely have remained within the pit. The revised conceptual model is discussed in Section 2.3.5. All analytical data were usable as reported (see Appendix C). Analysis of the data indicates that no release or residual contamination is present in the pit. As discussed in Section 2.4.2, no human health or ecological screening assessments were necessary for this PRS. This PRS is recommended for NFA because concentrations of COPCs found within it were not discernibly different from Laboratory background concentrations.

2.2 Description and Operational History

PRS 09-002 is a SWMU listed in Module VIII of the Laboratory's HSWA Permit.

2.2.1 Site Description

PRS Description

PRS 09-002 is a decommissioned, inactive burn pit located near the old Far Point firing site north of the active TA-9 area (see Figure 2.2-1). It is situated on a mesa top and covers an area of approximately 130 sq ft. The only component of this PRS is the pit itself, which is a shallow, below ground level, depression, 10 ft by 13 ft by 2 to 3 ft deep. The pit has a few small rocks on the interior sidewall slope and the pit bottom is stabilized with a growth of grass. A few small trees have grown around the exterior of the pit. The pit is in an isolated area of TA-9 located approximately 450 ft north of the present day TA-9 active process area. There are no other structures or other man-made features in the immediate vicinity of the pit, and the area appears to have remained undisturbed by Laboratory activities. Photographs of the burn pit are included in Figure 2.2-2.

Land Use

TA-9 is an industrial area currently used for HE research and development. The Laboratory does not anticipate any change from this industrial use for the operational life of the Laboratory (LANL 1995, 57224, pp. 11-12). TA-9 is a high-security area with restricted access and 24-hr surveillance. A warning sign is posted at the entrance road to Far Point firing site-burn pit area and permission to access the site is controlled by the Laboratory's Dynamic Experimentation (DX) Division. These security measures effectively eliminate the possibilty of inadvertent site intrusion. No future development or decontamination and decommissioning (D&D) activities are currently proposed for this site.

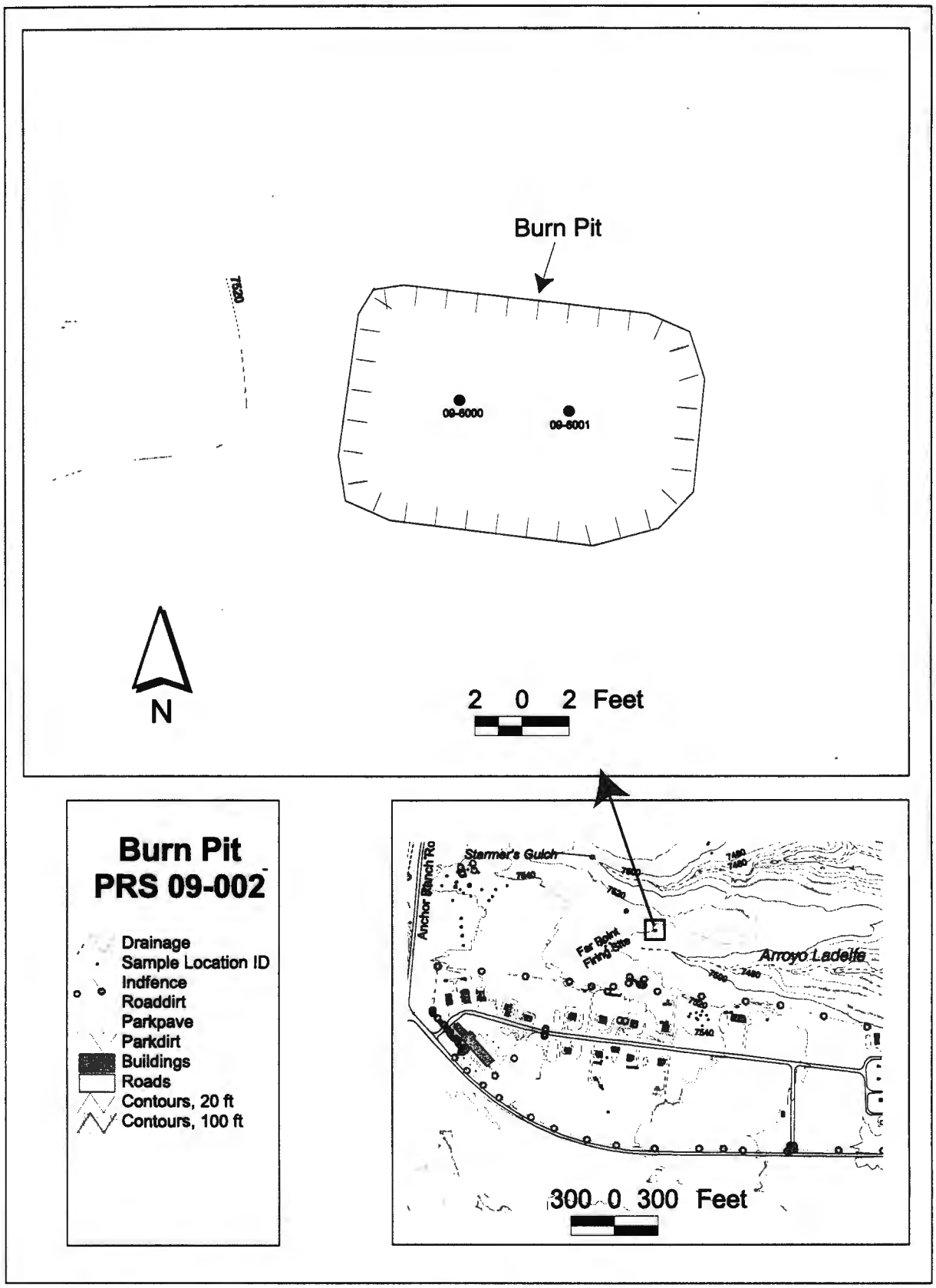
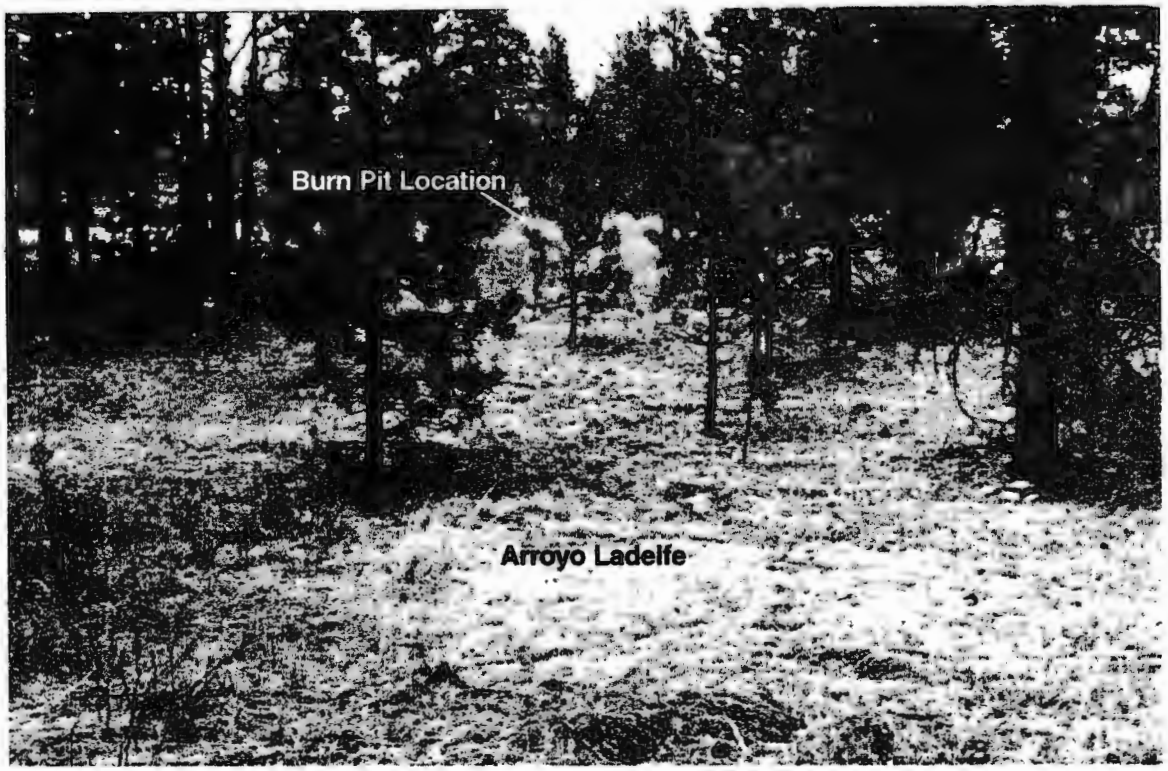


Figure 2.2-1. Sampling locations at PRS 09-002.

Burn Pit, northwest view (1998 Photo)



North Facing View of Burn Pit from Arroyo Ladelfe (1998 Photo)

Figure 2.2-2. Photographs of the PRS 9-002 burn pit

Relation to other PRSs

PRS-09-002 is an isolated unit. PRSs 09-001(b) and 09-001(c), located over 300 ft to the southeast of the burn pit, are the nearest neighboring PRSs. PRSs 09-001(b) and 09-001(c) are at the Far Point firing site, which was operated from the mid-1940s to 1956. The Far Point firing site PRSs were previously recommended for NFA (LANL 1996, 54586) and have no effect on the recommendations made in this report for PRS 09-002.

Environment

PRS 09-002 is a shallow surface depression approximately 10 ft by 13 ft, located in a lightly wooded, flat area of Pajarito Mesa (Figure 2.2-2). The general soil type is Carjo loam (Nyhan et al. 1978, 05702) and the depth to bedrock varies from 1 to 3 ft. Grass is present in and around the pit, with an approximate vegetative cover of 75 to 100 percent. The average slope at the site is less than 10 percent. There are no surface water runoff erosion drainage channels that intersect the PRS, and runoff from this general area would ultimately discharge by way of the Arroyo Ladelfe to Pajarito Canyon. Arroyo Ladelfe is an ephemeral watercourse in the area of the PRS 09-002 burn pit. There are two springs in Arroyo Ladelfe approximately 1300 ft further downstream from the burn pit.

Cultural and Biological Resources

No cultural resources or threatened and endangered species were identified for this mesa-top PRS. The nearest critical habitat (in Pajarito Canyon) is located at least 1600 ft away. Ecological and cultural resources for TA-9 are discussed in Appendixes B-5.0 and B.6.0. The ecological checklist for PRS 09-002 burn pit is found in Appendix F.

2.2.2 Operational History

The Far Point firing site was constructed in the mid-1940s and was used to test the performance of explosives until about 1956. The burn pit is located east of the Far Point firing site and is believed to have been used during the same period (1945 to 1956). This area of TA-9 was decommissioned in 1965 and has not been used since. The only written record on the burn pit is a property appraisal form (Spillman 1949, 14916) which describes a burn pit at TA-9: "An irregular shaped excavation of earth approximately 20 ft. wide by 40 ft. long and 3 ft. in depth for the burning or destruction of classified material and other materials unfit for use. This structure has no utilities."

One retired employee who worked at TA-9 said there were no burn pits at TA-9. He stated that all classified materials including film were disposed of at TA-16 (Dye 1998, 58482). However, the site investigated as the burn pit was independently located by two other retired LANL employees who worked at TA-9 (Harris 1998, 57469). A retired group leader who worked at TA-9 stated that to his knowledge, only classified documents, film from high speed cameras, and photographs were disposed of at the pit. He said that no HE or other chemicals were disposed of at the pit (Dye 1998, 58481).

The general area around the burn pit has not been used since the mid-1950s. Access to TA-9 has been restricted since it inception by a security fence. A warning sign is posted at the entrance road to Far Point firing site-burn pit area and access to the site is controlled by the Laboratory's DX Division. The burn pit can be seen, and is distinguished as a shallow depression, approximately 10 ft by 13 ft by 2 to 3 ft deep. Fragments of mirrors used in high-speed photography of experimental blasts litter the ground near the site. There is no documented evidence of liquid discharges to the pit, or contamination

associated with this facility. No other archival records were found on the existence or use of a burn pit at TA-9. There is no information available on the amount of film or other materials burned in the pit.

2.3 Investigation Activities

2.3.1 Summary

Section 2.3 describes the investigatory activities for PRS 09-002, including previous investigations (Section 2.3.2), the preliminary conceptual model that guided the RFI field work (Section 2.3.3), and the RFI field activities (Section 2.3.4.2). A review of the RFI data is also presented (Section 2.3.4.3), followed by a description of how the conceptual model for PRS 09-002 was revised based on information gained during the RFI (Section 2.3.5).

2.3.2 Previous Investigations

No previous investigations were conducted at this site.

2.3.3 Preliminary Conceptual Model

As discussed in Section 2.2.2, the PRS 09-002 burn pit was used from about 1945 until 1956 for disposing of high-speed photography film, photographs, and classified papers produced at the Far Point firing site. Even though it has smaller dimensions than described in the 1949 property appraisal form, the10-ft by 13-ft topographic depression 300 ft northeast of the Far Point firing site identified by the two retired TA-9 employees is the the most probable location of the burn pit.

The preliminary conceptual model for the site includes deposition and retention of ash and other noncombustible burn products in the bottom of the pit. The potential exists for secondary release and redistribution of site-related contaminants to the surrounding landscape through airborne smoke during burning, or subsequent wind-borne or waterborne erosion of pit contents. However, there was no physical evidence indicating the substantial presence of these secondary release pathways at the site (i.e. stained soil, erosion, deposition outside the pit), and the Phase I investigation was limited to characterizing surface soils within the pit. Surface soils at the bottom of the pit were targeted because waste constituents would have originally been deposited on the soil surface, which has remained essentially undisturbed since its active use. There has been no apparent sloughing or erosion of the pit sidewalls and the depth of the pit, at the time of sampling (i.e., 2-3 feet), was consistent with the pit description on the property appraisal form referenced in Section 2.2.2. No highly mobile, soluble, or volatile constituents were disposed of at the site. Metals from the film and photographs would be expected to persist within the surface layers of sediment deposited in the pit.

The major contaminants expected still to be present at the site are metals used in printing and photographic materials. Because the site was used to burn classified documents, the Phase I investigation was intended to determine if ash and other burn products persist in the pit and to determine if RCRA hazardous constituents are present. Based on the nature of the materials disposed and the burning process applied, a limited suite of inorganic chemicals (antimony, cadmium, chromium, lead, and silver) was identified for analysis in site samples. These metals were selected because they are, or were, commonly found in printing ink formulations over the past 50 years and could be present in photographic materials.

2.3.4 Field Investigation and Data Evaluation

2.3.4.1 Summary

Two surface soil samples were collected from the bottom of the burn pit and analyzed for metals. The immediate area around the pit location was relatively level and there was no evidence of erosion. Therefore soil samples were taken from the pit bottom where the potential for contaminant deposition and retention was the greatest. All quality control /quality assurance (QA/QC) parameters were found to be within required limits (see Appendix C) and all data were usable as reported.

2.3.4.2 Field Investigation

Two sampling sites were selected at the bottom of the surface depression identified by former TA-9 employees as the probable location of the burn pit. The bottom of the pit was selected for biased sampling because the sides of the pit were found to be intact and natural precipitation would have tended to concentrate any remaining residues from the burning down into the pit bottom. On May 10, 1994, two 0 to 0.5 ft surface soil samples (AAB0896 and AAB0897) were collected at locations 09-6000 and 09-6001 (See Figure 2.2-1 for sample locations). Soil moisture at the time of sampling was normal, that is, dry to slightly moist; the weather was cool, and the skies were overcast. No ash or burned debris were observed in the soil sampling locations. Personnel from the ESH-19 Waste Site Studies Team collected samples using the Spade and Scoop method (ER SOP 6.09 [LANL, ER ID 51575]). The samples were analyzed for metals. A summary of samples collected is shown in Table 2.3-1.

Before sample collection, the soil was screened for volatile organic vapors and HE to comply with health and safety requirements. The photoionization detector (PID) measurements for volatile organic vapors were less than 1 ppm and the HE spot test kit results were negative.

TABLE 2.3-1
SUMMARY OF SAMPLES COLLECTED AT PRS 09-002

Location ID	Sample ID	Sample Type	Depth (ft)	Media	Metals*
09-6000	AAB0896	Grab	0-0.5	Soil	17492
09-6001	AAB0897	Grab	0-0.5	Soil	17492

* request number

2.3.4.3 Data Review

An evaluation of data collected as part of the Phase I investigation of PRS 09-002 is found below.

Inorganic Chemical Comparison with Background

Five inorganic chemicals (silver, cadmium, chromium, lead, and antimony) were identified as the limited analytical suite for use in characterizing PRS 9-002. All analytical results have received focused data validation and the data were determined to be usable as reported (Appendix C).

The background data subset used to generate the background values is taken from "Inorganic and Radionuclide Background Data for Soils, Canyon Sediments, and Bandelier Tuff at LANL," (LANL 1998, 58093). The all horizons data subset was used because only surface sampling was conducted at this site. Two metals, chromium and lead, were detected in the soil samples, but were reported at concentrations below Laboratory background values (Table 2.3-a1). Antimony, cadmium, and silver were not detected in the soil samples. Therefore, inorganic chemicals were eliminated from further consideration and no inorganic COPCs were identified at PRS 09-002.

TABLE 2.3-a1
FREQUENCY OF DETECTED INORGANIC CHEMICALS AT PRS 09-002

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (mg/kg)	Background Value (mg/kg)	Frequency of Detects Above Background Value[b]
Chromium	soil/ALLH[a]	2	2	3.5 - 7.4	19.3	0/2
Lead	soil/ALLH	2	2	11 - 12	22.3	0/2

[a] All soil horizons
[b] Ratio of number of detected values exceeding the background values to the number of analyses.

Radionuclide Comparison with Background/Fallout Radionuclide Concentrations

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

Evaluation of Organic Chemicals

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

2.3.5 Revised Site Conceptual Model

No COPCs were identified as a result of the data review in Section 2.3.4.3. The original site model assumed that limited, if any, residual contamination would exist at the small burn pit. The existing data support the conclusion that no residual released material is present at the site, and no revision to the model is required.

2.3.5.1 Nature and Extent of Contamination

No COPCs were identified within the confines of the pit, the area assumed to be most impacted. Lack of evidence of contamination within the pit, as well as the previously described limited use and size of the pit, support the conclusion that further investigation of the extent of contamination at the site is unwarranted.

2.3.5.2 Environmental Fate

No COPCs were identified at the PRS; therefore, no discussion of environmental fate of contaminants is required.

2.4 Site Assessments

2.4.1 Summary

No COPCs were identified in the Data Review Section (2.3.4.3) of this report. Therefore, human health and ecological screening or risk assessments are not required for this PRS. An Ecological Scoping Checklist was completed for this site and is included as Appendix F.

2.4.2 Screening Assessments

No screening assessment is required for this PRS, as no COPCs were identified in Data Review (Section 2.3.4.3).

2.4.3 Risk Assessments

No risk assessment is required for this PRS, as no COPCs were identified in Data Review (Section 2.3.4.3).

2.4.4 Other Applicable Assessments

2.4.4.1 Surface Water

No surface water sampling was conducted in conjunction with this investigation. The LANL Assessment Process (AP) 4.5 surface water assessment erosion matrix score for this PRS was 3.6 out of a possible 100. This is the lowest possible score and indicates there is little erosion potential for this site. A copy of the AP 4.5 surface water assessment can be found in Appendix B.

2.4.4.2 Groundwater

The depth to the regional aquifer at this site is approximately 800 to 1100 ft. Any potential impacts to groundwater quality from this PRS should be minimal.

2.5 Conclusions and Recommendations

The results of the Phase I characterization of PRS 09-002 indicate that no RCRA hazardous chemicals persist in the burn pit soils. The investigation sampling was biased to characterize surface soils, the medium most likely to have been impacted within the pit. Furthermore, no substantial secondary release or impact to surrounding media was observed during field reconnaissance or investigation activities. No COPCs were identified through the background comparison process, and the PRS is recommended for NFA.

This recommendation is based on NFA criterion 3, which states, "No release to the environment has occurred or is likely to occur in the future from the SWMU/AOC" (NMED 1998, 57897). A Class III permit modification will be requested to remove this site from the HSWA Module of the Laboratory's RCRA operating permit.

3.0 POTENTIAL RELEASE SITE (PRS) 9-011(b)–HE EQUIPMENT STORAGE AREA

3.1 Summary

PRS 09-011(b) is a former satellite storage area used to temporarily hold equipment potentially contaminated with HE prior to off-site treatment (burning) and disposal. The site was on the corner of an asphalt parking lot. An RFI investigation was conducted to determine if HE from the equipment had been released to the surrounding soils. The objective of the investigation was to determine if a release of RCRA contaminants had occurred at the site; to define the nature and extent of any such contaminant release; and to determine if further investigation or analysis were required based on human health and ecological assessements. Section 3.3.3 discusses the conceptual release model. Six surface soils at the site were sampled for HE compounds as discussed in Section 3.3.4.2. No removal or stabilization activities were performed at the site. No HE compounds were found in surface soil from sampling sites upgradient of the storage area, at the storage area, and downgradient (see Section 3.3.4.3 for details). No COPCs were identified and therefore human health and ecological screening assessments were not conducted. As discussed in Section 3.5, this PRS is recommended for NFA.

3.2 Description and Operational History

PRS 9-011(b), a former HE equipment satellite storage area, is a non-HSWA PRS.

3.2.1 Site Description

PRS 9-011(b) is located on the corner of an asphalt-paved driveway and parking area south of building TA-9-39. This small building is one of eight magazine structures at TA-9 used to store small quantities of HE, and is located south of the TA-9 process area road. The TA-9 active area is located on a relatively flat, mesa-top area (Figure 3.2-1). The southeast corner of the asphalt-paved parking area was a satellite accumulation area used to store potentially HE-contaminated equipment until the equipment could be transported to TA-16 for decontamination of HE residues by flashing (burning). The former open storage area is about 10 ft by 10 ft and was once fenced and had signs posted. This is now an inactive area and the wire fence has been removed, but the location is still marked by four fence posts. Other than a fence and posts, there was no structure (e.g, a shed or storage rack) associated with this PRS. There is no curbing around the former storage area, and any storm water runoff from the storage area would have flowed off the parking lot onto soil and then into a shallow drainage channel east of the building (Figure 3.2-2).

Land Use

TA-9 is an industrial area currently used for HE research and development. The Laboratory does not anticipate any change from this industrial use for the operational life of the Laboratory (LANL 1995, 57224, pp. 11-12). TA-9 is a high security area with restricted access. It is within an enclosed security area of the Laboratory with 24-hr surveillance. TA-9 itself is further enclosed by a chain link fence around its perimeter. Within TA-9, access to PRS 09-011(b) is controlled by a barricade at the entrance to the access road leading to building TA-9-39, an HE storage magazine. These security measures effectively eliminate the possibilty of inadvertent site intrusion. No D&D activities are currently proposed for this site.

Relation to other PRSs

There are two other PRSs in the general vicinity of PRS 09-011(b) (Figure 3.2-1). Located approximately 150 ft north, at building TA-9-38 (an HE processing laboratory), are PRSs 09-004(d) (an inactive HE settling basin) and 09-011(c) (a former solvent storage rack). RFI characterization for these two PRSs will be completed and then included in a future RFI report.

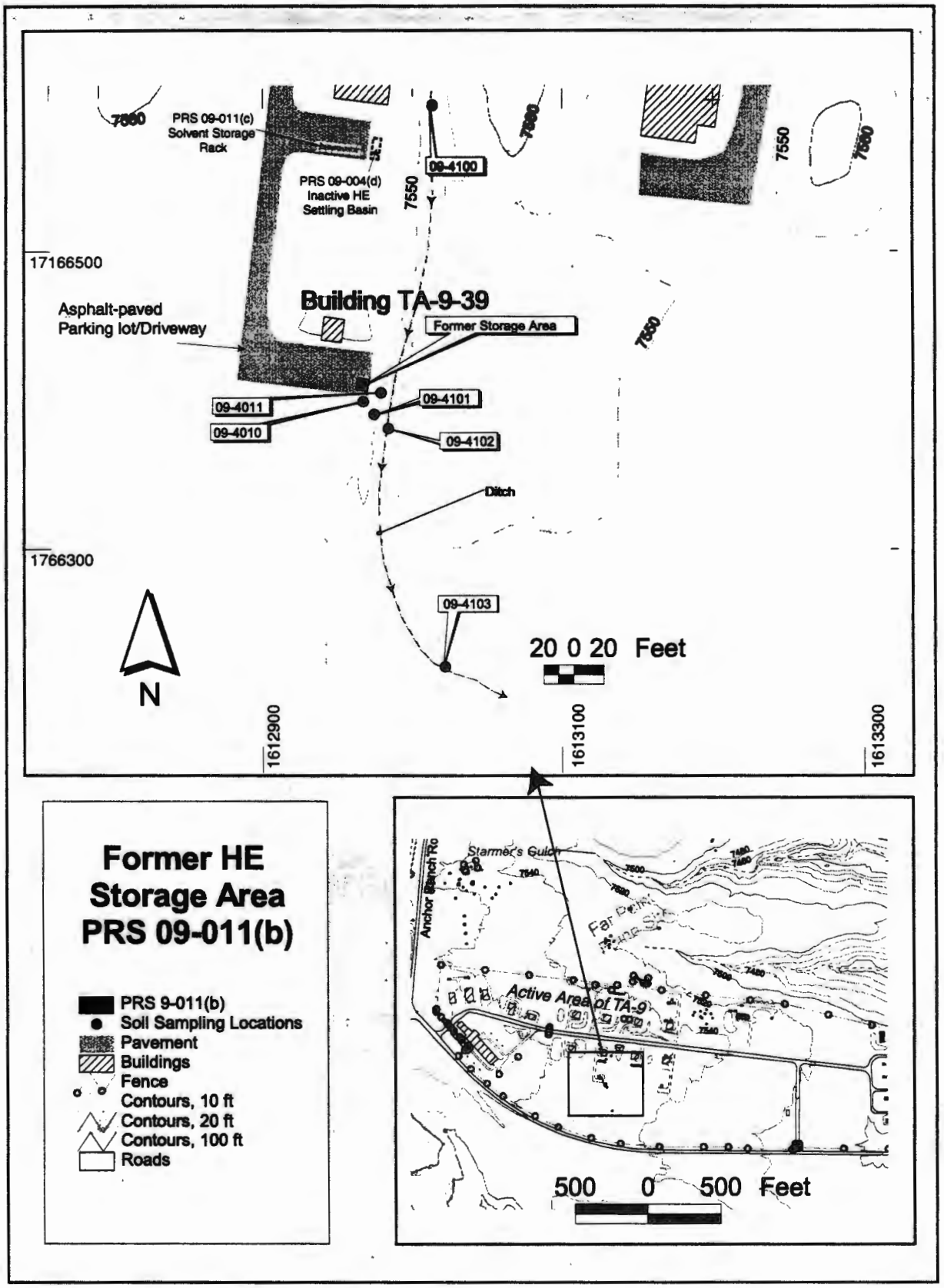
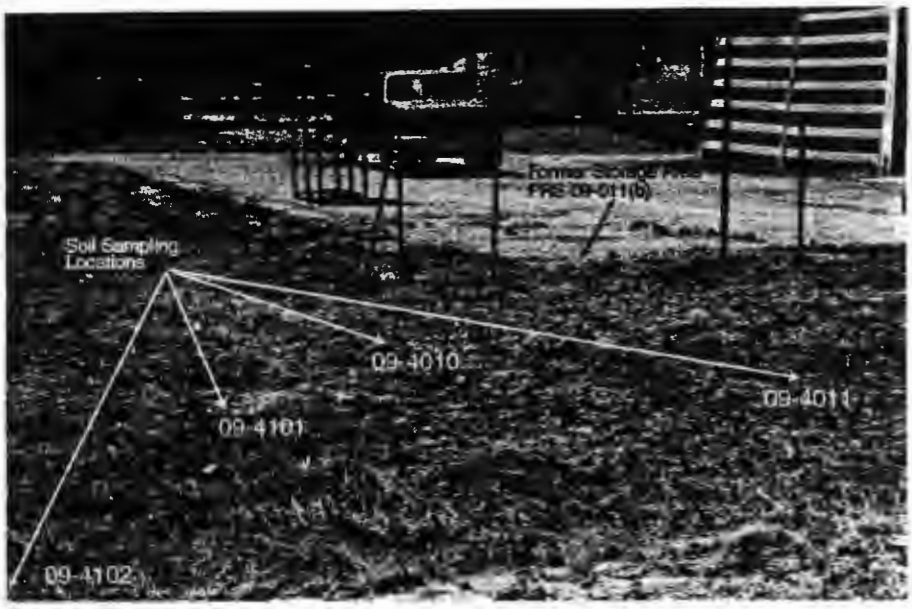
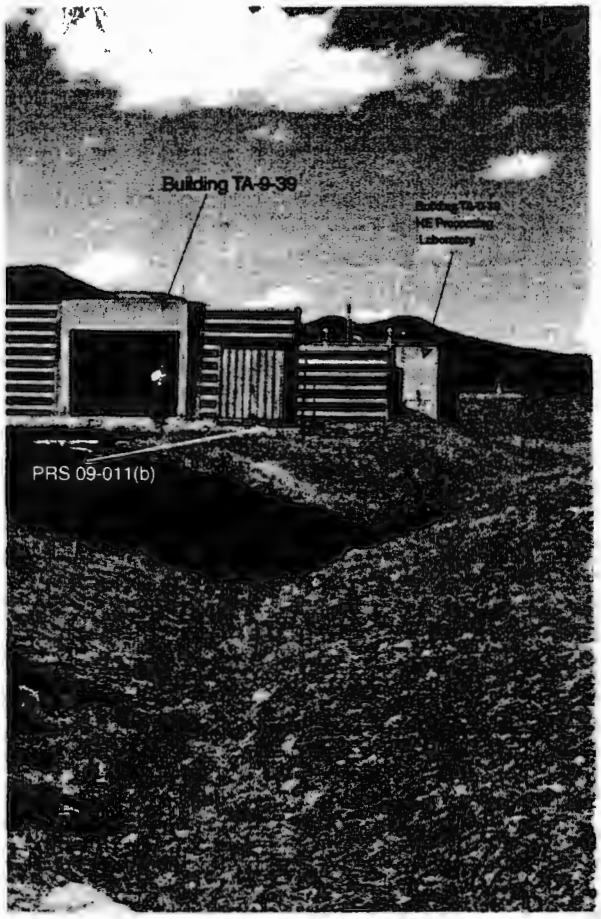


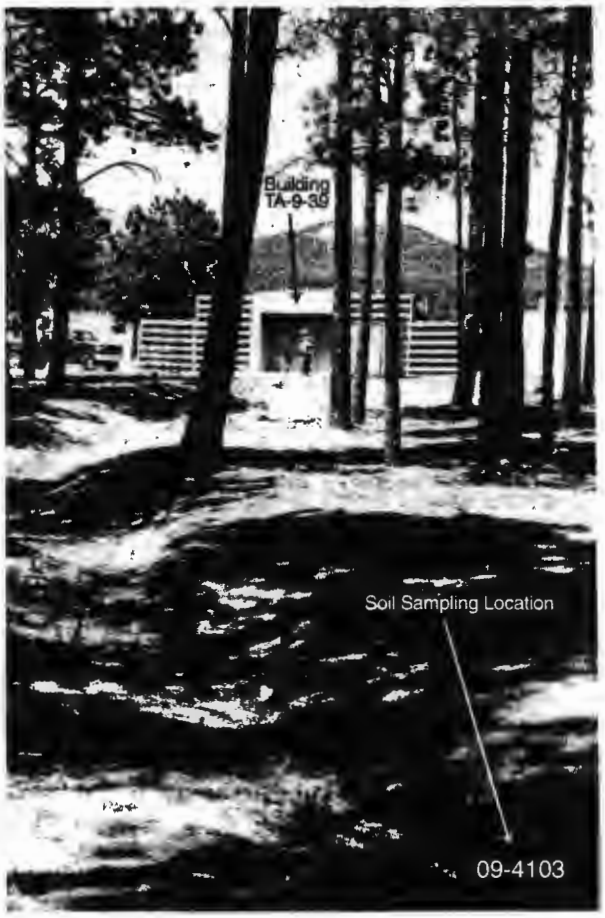
Figure 3.2-1. Sampling locations at PRS 09-011(b).



Paved area on south side of Building TA-9-39, HE Storage Magazine. View to the west (1998 Photo)



Drainage Channel Adjacent to PRS 09-011(b). View to the north (1998 Photo)



Sediment Deposition Area in Drainage Channel Below PRS-09-011(b) (1998 Photo)

Figure 3.2-2. Photographs of PRS 09-011(b).

Environment

PRS 09-011(b) is situated on a mesa top. The soil type is Carjo loam (Nyhan et al. 1978, 05702) and depth to bedrock typically varies from 1 to 2 ft. A soils map of TA-9 is shown in Appendix B. An ephemeral drainage channel is located adjacent to this PRS. The channel widens out south of the PRS, paralleling the R-Site road. The average slope of this drainage for 2400 ft downstream from PRS 09-011(b) is approximately a 2.5 percent grade. The area around this PRS is 75 to 100 percent vegetative cover. The channel continues along the mesa top before it ultimately discharges approximately 4500 ft downstream into Pajarito Canyon. Other than the drainage channel located adjacent to the PRS and the paved parking lot/driveways, there are no other man-made or natural structures or features that would affect the site hydrology. Drainage ditches around the parking lot minimize storm water run-on to the PRS. Runoff from the paved parking lot and PRS would flow 5 to 10 ft south or east of the PRS and then discharge into the drainage channel located adjacent to and east of the PRS. There is little or no debris in this drainage channel.

Cultural and Biological Resources

There are no cultural resources or threatened and endangered species identified for this mesa-top PRS site. The nearest critical habitat is located more than 1600 ft away in Pajarito Canyon. Ecological and cultural resources for all of TA-9 are discussed in Appendix B. The ecological checklist for PRS 09-011(b) is in Appendix F.

3.2.2 Operational History

Building TA-9-39 was constructed in 1952. It is not known when the corner of the parking area was first used for temporary storage of equipment, nor is the amount of equipment that was stored there known. Because no structure (such as a storage shed) was ever associated with this site and because the site is relatively small (10 ft by 10 ft) the amount of equipment stored there was probably minimal. This satellite storage area was removed from service in 1991 (ESH-19 1998, 58480). A 1991 aerial photograph of TA-9 shows no equipment on the corner of the magazine building TA-9-39 parking lot (Figure 3.2-3). Equipment stored at the site was either known to be contaminated with HE or could not be confirmed as being free of HE. If the equipment had inaccessible, interior surfaces that could not be readily tested for HE, the equipment was assumed to be contaminated and was stored temporarily for later removal to an off-site disposal area.

3.3 Investigation Activities

3.3.1 Summary

Section 3.3 describes the investigatory activities for PRS 09-011(b), including previous investigations (Section 3.3.2), the preliminary conceptual model that guided the RFI field work (Section 3.3.3), and the RFI field activities (Section 3.3.4.2). A review of the RFI data is also presented (Section 3.3.4.3), followed by a description of how the conceptual model for PRS 09-011(b) was revised based on information obtained during the RFI (Section 3.3.5).

3.3.2 Previous Investigations

No previous investigations were conducted at PRS 09-011(b).

Former HE Equipment Storage Area, PRS 09-11(b) (1991 Photo)

Figure 3.2-3. Aerial photograph of TA-9.

3.3.3 Preliminary Conceptual Model

The conceptual model for the Phase I investigation included the release of low levels of HE from contaminated equipment from exposure to wind and rain during outdoor storage. The primary release and migration mechanism investigated involves precipitation, washing, and solubilizing contamination off the stored equipment, followed by migration of storm water across the asphalt to the surrounding soil. Upon encountering the surrounding soil, the runoff would be expected to rapidly infiltrate into the soil column, with the retention of most HE material in the fine, upper soil layer due to adsorption. Due to the relatively small quantities of HE handled, very little residual contamination would be expected in soils associated with the storage area. Sampling of the surface soils located immediately adjacent to the storage area for HE compounds would determine if a release had occurred at this PRS. If the absence of HE compounds in the soil adjacent to the storage area was due to a secondary release mechanism, i.e., transport away from the site by stormwater runoff, then a supplemental sampling of the soils/ sediments in the adjacent drainage channel would determine whether HE compounds had migrated away from the PRS.

3.3.4 Field Investigation and Data Evaluation

3.3.4.1 Summary

Two samples were collected in 1994 from surface soils located adjacent to and downgradient from the HE equipment storage area. These samples were collected from the upper 6 in. of soil along the sides of the asphalt pad downgradient from the storage area and analyzed for HE compounds. The sampling depth was selected because waste constituents from the storage area would have originally been deposited on and sorbed to the upper surface of the soil. Samples were analyzed for HE compounds. QA/QC parameters were within required limits with the exception that holding times were exceeded (see Appendix C). In 1997, four additional surface soil samples were collected downgradient from the former storage area. These samples were also analyzed for HE compounds.

3.3.4.2 Field Investigation

Surface soil samples (0- to 6-in. depth interval) were collected on April 28, 1994 from two locations adjacent to the asphalt-paved storage area. These sampling locations (09-4010 and 09-4011) are shown in Figure 3.2-1. Personnel from the ESH-19 Waste Site Studies Team conducted the fieldwork. Climatic conditions at the time of sampling were clear skies, moderate temperatures, and little or no precipitation. The soil was dry to slightly moist and no atypical soil discoloration or contaminant-related odors were noted during the sampling. The Spade and Scoop Method (ER-SOP-6.09) was used to collect the samples (LANL 51575). The samples were analyzed for HE and were intended to characterize the area reasonably assumed to have been most impacted by site activities (i.e., the soils immediately surrounding the pad).

On October 23, 1997, four additional surface soil samples were collected from a storm water drainage channel located adjacent to PRS 09-011(b) and buildings TA-9-38 (an HE processing laboratory) and TA-9-39 (an HE storage magazine). The purpose of this sampling, though not required by the original sampling and analysis plan, was to determine if HE residues from the equipment storage area had migrated off the asphalt pavement and down the drainage channel. Sample location 09-4100 was upgradient of the storage area and was intended to determine if HE contamination from potential upgradient area sources could be a factor in the characterization. Sample location 09-4101 was approximately 13 feet southeast of and downgradient from PRS 9-011(b) on the west bank of the drainage channel. This location was intended to provide additional data to confirm the absence of HE at

the site, as indicated by the 1994 sampling. Location 09-4102 was in the channel bottom downgradient from the storage area and location 09-4103, the furthest point downstream, was in a natural sediment trap of the drainage channel approximately 200 ft from the storage area. These sampling locations (shown in Figure 3.2-1) were intended to serve as indicators of recent or historical release and deposition of HE contamination. A summary of samples collected is shown in Table 3.3-1.

Before sample collection, the sampling sites were field screened using an HE spot test kit. All results were negative for HE. These measurements were made for health and safety purposes.

TABLE 3.3-1
SUMMARY OF SAMPLES COLLECTED AT PRS 09-011(b)

Location ID	Sample ID	Sample Type	Depth (ft)	Media	HE*
09-4010	AAB0825	grab	0-0.5	Soil	17339
09-4011	AAB0826	grab	0-0.5	Soil	17339
09-4100	0509-97-0001	grab	0-0.5	Soil	3849R
09-4101	0509-97-0002	grab	0-0.5	Soil	3849R
09-4102	0509-97-0003	grab	0-0.5	Soil	3849R
09-4103	0509-97-0004	grab	0-0.5	Soil	3849R

* request number

3.3.4.3 Data Review

Inorganic Chemical Comparison with Background

No inorganic chemicals were identified for analysis in the investigation of this PRS.

Radionuclide Comparison with Background/Fallout Radionuclide Concentrations

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

Evaluation of Organic Chemicals

HE was the only analytical suite identified for analysis at PRS 09-011(b). The results of the initial 1994 sampling activity and the supplemental 1997 sampling activity have undergone focused validation as discussed in Appendix C and summarized in the following.

The 1994 samples were analyzed under request number 17339. No HE target analytes were detected in these samples. Recommended holding times were exceeded, and focused validation of the data indicates that these data are potentially biased low.

The 1997 samples were analyzed under request number 3849R. No HE target analytes were detected in these samples, which were prepared and analyzed within recommended holding time limits. Focused validation indicates that the data may be used as reported with the understanding that tetryl data may be biased slightly low (see comments in Appendix C). However, only small quantities of tetryl have been

used at the Laboratory, as compared to very large quantities of HMX, RDX and TNT (LANL 1993, ER ID 20948.1, p. D-6). It is reasonable to assume that environmental releases of HE residues from the stored equipment would have consisted of one or more of the three major HE compounds (i.e., HMX, RDX, or TNT) rather than tetryl. The apparent low bias for tetryl, therefore, does not significantly affect the decision process for determining the presence or absence of HE compounds in the soil at PRS 9-011(b).

No HE target analytes were reported to be detected in any investigation sample. The problem of uncertainty and low bias in the 1994 data has been eliminated by acquiring the higher quality 1997 data confirming the absence of HE at the PRS. Based on this review of the HE data, no release or persistent contamination is indicated at the site.

3.3.5 Revised Site Conceptual Model

The initial site conceptual model proposed that equipment stored on the parking lot corner might have had fine-grained HE particles either falling off or being washed off (by natural precipitation) the equipment onto the pavement surface. The contaminants would have then been transported by storm water runoff to the soils immediately adjacent to the parking lot corner. The initial characterization was broadened to include soil sampling in the storm water drainage channel. The absence of detectable HE compounds in the surrounding soils indicates that HE contamination was located within the interior surfaces of the equipment. HE contamination most likely remained with the equipment rather than being released to the parking area and surrounding soils.

3.3.5.1 Nature and Extent of Contamination

No HE contamination was detected at the site. The initial 1994 sample results, indicating no release and/ or persistence of HE contamination, were confirmed by the 1997 sampling results. These results also confirmed that no HE contamination had migrated off-site through the associated drainage channel. Potential contaminant release and transport would have resulted in 1) deposition of potential HE contaminants onto the surface soil at the edge of the pavement; 2) transport away from the edge of the parking area onto the surface of the drainage channel soil adjacent to the parking lot; or 3) transport to a sediment deposition area such as sampling location 09-4103. No release or transport of HE was observed, and both the nature and extent of proposed HE contamination at the site was demonstrated and supported by the data.

3.3.5.2 Environmental Fate

No COPCs were identified at this PRS; therefore, no discussion of environmental fate of contaminants is required.

3.4 Site Assessments

3.4.1 Summary

No COPCs were identified in Data Review (Section 3.3.4.3). Therefore, human health and ecological screening or risk assessments are not required for this PRS. An Ecological Scoping Checklist was completed for this site and is included in Appendix F-2.

3.4.2 Screening Assessments

No screening assessment is necessary, as no COPCs were identified in Data Review (Section 3.3.4.3).

3.4.3 Risk Assessments

No risk assessment is necessary, as no COPCs were identified in Data Review (Section 3.3.4.3).

3.4.4 Other Applicable Assessments

3.4.4.1 Surface Water

No surface water sampling was conducted in conjunction with this investigation. The AP 4.5 surface water assessment erosion matrix score for this PRS was 10.6 out of a possible 100. This is a low score and indicates there is little erosion potential for this site. A copy of the AP 4.5 surface water assessment can be found in Appendix B.

3.4.4.2 Groundwater

The depth to the regional aquifer at this site is approximately 800 to 1100 ft. Any potential impacts to groundwater quality from this PRS should be minimal.

3.5 Conclusions and Recommendations

Review of the Phase I data indicate no release of contaminants occurred at the site and/or no contamination persists in sampled media. The sampling included surface soils that would be expected to retain organic HE-type contaminants. Based on the results of the reported investigation, no further investigation is warranted and the site is proposed for NFA.

This recommendation is based on NFA criterion 3, which states, "No release to the environment has occurred or is likely to occur in the future from the SWMU/AOC" (NMED 1998, 57897). PRS 09-011(b) currently is not on the HSWA Module VIII of the Laboratory's RCRA operating permit and therefore it is proposed that 09-011(b) not be added to the permit and that no further action be taken on this PRS.

The following list includes all the documents cited in the body and appendixes of this report. The parenthetical information following each reference provides the author, publication date, and the ER ID number, and, if applicable, the LANL ER Project Reference Library reference set number for each document. This information is also included in the citations in the text and can be used to locate the documents in the reference list that follows.

ER ID numbers are assigned by the Laboratory's ER Project to track material associated with LANL PRSs. This number can be used to locate the actual document at the ER Project's Records Processing Facility and, where applicable, within the ER Project Reference Library. All cited documents are assigned ER ID numbers.

The reference set number is assigned to located material in the LANL Project Reference Library, which is housed at NMED, HRMB, DOE, and the ER Project Office. This library is a living document that was developed to ensure that the Administrative Authority (AA) has all the necessary material to review the decisions and actions proposed in documents submitted by the ER Project. Documents previously submitted to the AA and documents that are specific to this RFI report are not included in the Reference Library, and their citations do not include reference set numbers. Documents that are specific to this RFI report are attached in Appendix G-2.0, Referenced Documents.

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APPENDIX A LIST OF ACRONYMS AND GLOSSARY

A-1.0 LIST OF ACRONYMS AND ABBREVIATIONS

AEC	Atomic Energy Comission
AOC	area of concern
AP	assessment process
BRET	biological resource evaluations team
COPCs	contaminants of potential concern
D&D	decommissioning and decontamination
DOE	Department of Energy
DX	Dynamic Experimentation
EDL	estimated detection limit
EPA	Environmental Protection Agency
ER	Environmental Restoration
EQL	estimated quantitation limit
FIMAD	Facility for Information Management, Analysis, and Display
GIS	geographical information system
HE	high explosives
HRMB	Hazardous and Radioactive Materials Board
HSWA	Hazardous and Solid Wastes Amendments
J	estimated
LCS	laboratory control sample
NFA	no further action
NOD	notice of deficiency
PID	photoionization detector
PRS	potential release site
QAPP	Quality Assurance Project Plan
QA/QC	quality assurance/ quality control
RCRA	Resource Conservation and Recovery Act

RFI	RCRA facilities investigation
RPD	relative percent difference
SCM	site conceptual model
SWMU	solid waste management unit
UJ	undetected

A-2.0 RFI GLOSSARY

RFI Glossary

Abbreviated method A shortened form of a method. Usually refers to analytical methods that have been modified to require less rigorous sample preparation, analysis conditions, or quality control.

Accuracy The extent to which the results of a calculation or measurement approach the true values of the calculated or measured quantities, and are free from error.

Action Level. A value that, when exceeded, will trigger a specified response.

Adsorption The surface retention of solid, liquid, or gas molecules, atoms, or ions by a solid or a liquid, as opposed to absorption, the penetration of substances into the bulk of the solid or liquid.

Aliquot A representative sample of a larger quantity.

Alluvial Said of materials or features deposited by running water.

Alluvial fan A fan-shaped piedmont accumulation of sediment deposited by a stream.

Alluvium Clay, silt, sand, gravel, or other rock materials transported by water and deposited in fairly recent geologic time as sorted or semisorted sediments in riverbeds, flood plains, lake shores, and fans at the base of mountain slopes.

Alpha radiation The form of radiation composed of alpha particles emitted in the radioactive decay of certain nuclides. The least penetrating of the three common types of radiation (alpha, beta, and gamma), it can be blocked by a sheet of paper or the outer dead layer of skin.

Analysis A process used to measure one or more attributes of a sample in a clearly defined, controlled, systematic manner. Often requires treating a sample chemically or physically before measurement.

Analyte The particular chemical or radiochemical species to be identified and/or quantified.

Analytical laboratory data qualifiers Data qualifiers that are attached to sample results by the analytical laboratory that performed the sample analysis.

The following letter qualifier flags are for **inorganic analyses**:

"**U**" The compound was analyzed for but was not detected. The associated numerical value is the estimated detection limit.

"**B**" The reported value was obtained from a reading that was less than the estimated detection limit but greater than or equal to the instrument detection limit.

"E" The reported value is estimated because of the presence of interference.

"M" Duplicate injection precision was not within control limits.

"N" Spiked sample recovery was not within control limits.

"S" The reported value was determined by the Method of Standard Additions.

"W" Post-digestion spike for GFAA analysis is out of control limits, while sample absorbance is less t than 50% of spike absorbance.

"*" Duplicate sample analysis was not within control limits.

"+" Correlation coefficient for the Method of Standard Additions is less than 0.995.

The following letter qualifier flags are for **organic analyses**:

"U" The compound was analyzed for but was not detected. The reported numerical value is the estimated quantitation limit.

"J" Indicates an estimated value. The "J" flag is used if the compound is present but the result is less than the sample estimated quantitation limit and greater then the instrument detection limit.

"B" The analyte was found in the associated method blank as well as in the sample.

"E" The concentrations of the analyte exceeded the calibration range of the instrument.

"D" The analyte was identified in an analysis at a secondary dilution factor.

"C" Identification of a pesticide/PCB has been confirmed by GC/MS.

"P" The percent difference between a pesticide/PCB result obtained on the primary and secondary columns was greater than 25%.

"N" There is presumptive evidence of the presence of a tentatively identified compound based on mass spectral matching.

"A" A tentatively identified compound is a suspected aldol-condensation product.

Andesite A fine-grained volcanic rock, chiefly plagioclase and pyroxene.

Anomaly A deviation from normal variations; something that is abnormal.

Applicable, relevant, or appropriate requirement (ARARs) Those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, or that address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site.

Aquifer A permeable body of geologic material capable of yielding groundwater to wells or springs.

Aquitard A low permeability geologic material that does not readily yield groundwater to wells.

Area of concern An area at LANL known or suspected to be contaminated with radionuclides, but not contaminated by hazardous chemicals (or hazardous waste).

Assessment endpoint A quantitative or quantifiable expression of the environmental value considered to be at risk in a risk analysis (i.e. a 25% reduction in fish biomass or local extinction of an avian species).

As low as reasonably achievable (ALARA) An approach to radiation protection to control or manage exposures (both individual and collective to the work force and the general public) and releases of radioactive material to the environment as low as social, technical, economic, practical, and public policy considerations permit. Used in this sense, ALARA is not a dose limit.

Ash-flow tuff A tuff deposited by a hot dense volcanic current. Ash-flow tuff can be either welded or nonwelded.

Background level The naturally occurring concentrations of an inorganic chemical (including naturally occurring radionuclides) in soil.

Background radiation The amount of radioactivity naturally present in the environment, including cosmic rays from space.

Background value (BV) Background values exist for inorganic chemicals and radionuclides. The background values are the upper tolerance limits (UTLs) of background sample results, calculated as the upper 95% confidence limit for the 95th percentile. In cases where a UTL cannot be calculated, either the detection limit or maximum reported value is used as a BV. Background values are used as simple threshold numbers to identify potentially contaminated site sample results as greater than background levels.

Barrier Any material or structure that prevents or substantially delays movement of solid, liquid, or gaseous phase chemicals in environmental media.

Basalt A hard, dense, dark volcanic rock composed chiefly of plagioclase, augite, olivine, and magnetite.

Baseline level Anthropogenic, non-site related concentrations of a given chemical in the soil. Examples of baseline levels are nuclear fallout and organic chemicals associated with urban activities.

Baseline risk assessment (Also known as ***risk assessment***) A site-specific analysis of the potential adverse effects caused by hazardous substance releases from a site in the absence of any actions to control or mitigate these releases. There are four steps in baseline risk assessment: data collection and analysis, exposure assessment, toxicity assessment, and risk characterization.

Bentonite A clay composed of the mineral montmorillonite and variable amounts of magnesium and iron, formed over time by the alteration of volcanic ash. As bentonite can adsorb large quantities of water and expand to several times its normal volume, it is a common additive to drilling mud.

Beta radiation Radioactive transformation of a nuclide in which the nucleus emits a beta particle (electron or positron). Beta radiation can be blocked by an inch of wood or by a thin sheet of aluminum.

Bias (1) The degree to which the value obtained for a measured parameter deviates from the value accepted as the true, or reference, value. (2) A systematic deviation from the true value that remains constant over replicated measurements within the statistical precision of the measurement process.

Blank sample A sample expected to have negligible or unmeasurable amounts of analytes. Results of blank sample analyses indicate whether or not field samples might have been contaminated during one or more steps of the sample collection, transport, storage, preparation, and analysis process.

Blind sample See ***Single blind sample*** and ***Double blind sample***.

Breccia Coarse-grained rock consisting of angular fragments cemented together or embedded in a fine-grained matrix.

Caldera A more or less circular volcanic depression, generally on the order of tens of kilometers in diameter, formed during the eruption of large volumes (tens to hundreds of cubic kilometers) of dense rock equivalent, ash flow, and ash fall tuff deposits.

Calibration A process used to identify the relationship between the true, or reference, analyte concentration or other variable and the response of a measurement instrument, chemical analysis method, or other measurement system.

Calibration blank A calibration standard prepared to contain negligible or unmeasurable amounts of analytes. It is used to establish the zero concentration point for analytical measurement calibration.

Calibration standard A sample prepared to contain known amounts of the analytes of interest and of other constituents required for the analysis.

Caliche (Properly called ***pedogenic calcite***, also known as ***calcrete***) An accumulation of calcium carbonate, typically found in the near-surface.

Catchment A structure such as a basin or reservoir, for collecting or draining water; the collecting of water.

Chain of custody An unbroken, documented trail of accountability designed to ensure that the physical integrity of samples, data, and records remains uncompromised.

Chemical Any naturally occurring or man-made substance characterized by a definite molecular composition, including molecules that contain radionuclides.

Chemical of concern A chemical that is identified as a potential risk as the result of performing a site-specific human health or ecological risk assessment.

Chemical of potential concern (COPC) A chemical detected at a site that has the potential to adversely affect human and or ecological receptors due to its concentration, distribution, and mechanism of toxicity. The chemical remains a concern until exposure pathways and receptors are evaluated in a site-specific risk assessment.

Cleanup Action undertaken to physically remove or treat a hazardous substance that poses a threat or potential threat to human health and welfare and the environment. Sites are considered cleaned up when EPA removal or remedial programs have no further expectation or intention of returning to the site and threats have been mitigated or do not require further action.

Cleanup levels Media-specific target concentration levels for contaminants that must be met by a selected corrective action. Cleanup levels are established using criteria such as protection of human health and the environment; compliance with regulatory requirements; reduction of toxicity, mobility, or volume through treatment; long- and short- term effectiveness; implementability; cost; and public acceptance.

Code of Federal Regulation (CFR) A codification of all regulations developed and finalized by federal government agencies in the *Federal Register.*

Collocated sample One of two or more samples collected as close together in time and space as the sampling equipment allows so that each sample is expected to be equally representative for a given analyte within the common space and time interval.

Colluvium Rock debris accumulated at the base of a cliff or on a slope principally by the action of gravity.

Comparability A qualitative measure of the degree to which one item or data set can be compared with another.

Composite sample A sample that is formed by combining and homogenizing several grab samples.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980. Amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986. The acts created a special tax that goes into a trust fund, commonly known as Superfund, whose mandate is to investigate and clean up abandoned or uncontrolled hazardous waste sites that may endanger health or the environment. The EPA is responsible for managing Superfund.

Conceptual model See also ***Site conceptual model.***

Conceptual hydrogeologic model Perception of the occurrence, movement and quality of groundwater in an area and the relationship of groundwater to the surface water, soil water, and geologic framework there.

Confluence The place where two or more streams meet; the point where a tributary meets the main stream.

Confined Said of groundwater in an artesian aquifer.

Constituent Any compound or element present in environmental media, including both naturally occurring and anthropogenic elements.

Contaminant Any chemical (including radionuclides) present in environmental media or on structural debris at a concentration that might present a risk to human health or the environment.

Controlled area Any Laboratory area to which access is controlled to protect individuals from exposure to radiation and/or hazardous materials.

Corrective Action A measure taken to rectify conditions adverse to human health or the environment.

Corrective measures study If a RCRA facility investigation indicates that further action is required, a "corrective measures study" is performed to identify and evaluate cleanup alternatives for the release. This study assesses risks to human health and the environment, costs, and other factors such as disposal methods.

Corrective measures implementation (CMI) This third step of the corrective action process includes design, construction, maintenance, and monitoring of the chosen remedy.

Curie A unit of radioactivity defined as that quantity of any radioactive nuclide that has an activity of 3.7 x 10^{10} disintegrations per second.

Daily Calibration A combination of calibration blank and calibration standard used to determine if the instrument response to analyte concentration is within acceptable bounds relative to the initial calibration. A daily calibration establishes the 24-hour relative response factors on which quantitations are based, thus verifying the satisfactory performance of an instrument on a day-to-day basis.

Data quality assessment A statistical and scientific evaluation of the data set to assess the validity and performance of the data collection design and statistical test, and to establish whether a data set is adequate for its intended use.

Data quality objectives (DQOs) The qualitative and quantitative goals that are developed before sampling begins that clarify the investigation objectives and identify the type, quantity, and quality of data needed to support decisions.

Data validation A systematic process that applies a defined set of performance-based criteria to a body of data that might result in qualification of the data. This process is performed independently of the analytical laboratory generating the data set and occurs prior to drawing a conclusion from the data. It can comprise a standardized review (routine validation) and/or a problem-specific review (focused validation) of the data.

Data validator The person who performs data validation in accordance with LANL ER procedures.

Data verification A process of evaluating the completeness, correctness, consistency, and compliance of a laboratory data package against a specified standard or contract. Completeness means all required information is present—both hard copy and electronic. Correctness means the reported results are based on properly documented and correctly applied algorithms. Consistency means that values are the same when they are reported in different reports or are transcribed from one report to another. Compliance means that the data pass numerical QC tests based on parameters or limits specified in a contract or in an auxiliary document.

Decommissioning The permanent removal from service of surface facilities and components only, after facility closure, in accordance with regulatory requirements and environmental policies.

Decontamination The removal of unwanted material from the surface of or from within another material, or the neutralizing of it.

Deferred action Postponement of the selection and implementation of a corrective measure until a future date, usually following decommissioning of an active site.

Detection limit The minimum concentration of a substance that can be measured by an instrument with a specified statistical confidence that the analytical concentration is greater than zero.

Discharge or Hazardous Waste Discharge (As defined under RCRA, 40 CFR 260.10) The accidental or intentional spilling, leaking, pumping, pouring, emitting, emptying, or dumping of hazardous waste into or on any land or water.

Disposal The discharge, deposit, injection, dumping, spilling, leaking, or placing of any solid waste or hazardous waste into or on any land or water so that such solid waste or hazardous waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including ground waters.

U.S. Department of Energy (DOE) The federal agency that sponsors energy research and regulates nuclear materials for weapons production.

Dose The quantity of radiation absorbed, per unit of mass, by the body or by any portion of the body.

Dose equivalent An estimate of the amount of biological damage (in rems) done by the deposition in tissue of a given unit of absorbed radiation dose.

Double blind sample A sample with analyte concentration and sample identity unknown to the analyst.

Duplicate analysis An analysis performed on one of a pair of identically prepared subsamples of the same sample.

Duplicate measurement One of a pair of measurements performed on a prepared sample under identical conditions.

Ecological Screening Level (ESL) An organism's exposure-response threshold for a given chemical constituent. It is the concentration of a substance in a particular medium that corresponds to a hazard quotient (HQ) of 1.0 for a given organism and below which no risk is indicated.

Effluent A liquid discharged as a waste, such as contaminated water from a factory or the outflow from a sewage works; water discharged from a storm sewer or from land after irrigation.

Eolian Pertaining to the wind, especially said of sediment deposition by the wind, of structures such as wind-formed ripple marks, or of erosion accomplished by the wind.

Environmental Assessment (EA) A report that identifies potentially significant environmental impacts from any federally-approved or funded project that might change the physical environment. If an EA shows significant impact, an Environmental Impact Statement (EIS) is required.

Environmental Impact Statement A detailed report, required by federal law, on the significant environmental impacts that proposed major federal projects would have on the environment.

Environmental Surveillance The collection and analysis of samples of air, water, soil, foodstuffs, biota, and other media to determine environmental quality of an industry or community. It is commonly performed at sites containing nuclear facilities.

Environmental Protection Agency (EPA) The federal agency responsible for enforcing environmental laws. While state regulatory agencies may be authorized to administer some of this responsibility, EPA retains oversight authority to ensure protection of human health and the environment.

Ephemeral stream Said of a stream or spring that flows only during and immediately after periods of rainfall or snowmelt.

Equipment blank A blank sample that is used to rinse the sample collection equipment and is then transferred to a sampling container. The equipment blank is collected after equipment decontamination is completed but prior to collection of another field sample.

Error Any discrepancy between a computed, observed, or measured quantity and the expected or theoretically correct value of that quantity.

Estimated quantitation limit The lowest concentration that can be reliably achieved within specified limits of precision and accuracy during routine analytical laboratory operating conditions. Sample estimated quantitation limits are highly matrix-dependent, and the specified estimated quantitation limits might not always be achievable.

Evapotranspiration The combined discharge of water from the earth's surface to the atmosphere by evaporation from lakes, streams, and soil surfaces, and by transpiration from plants.

Exposure unit The bounded area or volume within which a person or other receptor may be exposed to contaminants that have been released to the environment.

Fault A fracture, or zone of fractures, in rock along which there has been vertical or horizontal movement; adjacent rock surfaces are displaced.

Field blank A blank sample either prepared in the field or carried to the sampling site, exposed to sampling conditions (e.g., bottle caps removed, preservatives added), and returned to a laboratory for analysis in the same manner in which environmental samples are analyzed. Used to identify the presence of contamination potentially added during the sampling and analysis process.

Field duplicate A second sample collected as near as possible to the original sample.

Field matrix spike A known amount of a field sample to which a known amount of the target analyte has been added. Used to compute the proportion of added analyte that is recovered upon analysis.

Field reagent blank Same as *field blank.*

Field sample See *sample.*

Field split A field sample that has been divided in the field into equally representative portions (See also *split sample*).

Flood plain The portion of a river valley that is built of overbank sediment deposited when the river floods.

Focused data validation A technically based analyte-, sample-, and potentially data use-specific process that extends the qualification of data beyond method or contractual compliance and provides a level of confidence that an analyte is present or absent. If the analyte is present, the quality of the quantitation may be obtained through focused validation.

Gamma radiation A form of electromagnetic, high-energy radiation emitted from a nucleus. Gamma rays are essentially the same as x-rays, and heavy shieldings, such as concrete or steel, are required to block them.

Geohydrology The science that applies hydrologic methods to the understanding of geologic phenomena.

Grab sample A specimen collected by a single application of a field sampling procedure to a target population; e.g. the surface soil from a single hole collected following the spade and scoop sampling procedure, or a single air filter left in the field for three months.

Groundwater Water in a subsurface saturated zone.

Half-life The time required for one-half of the radioactive atoms initially present in a sample to decay. Each radionuclide has a characteristic half-life ranging from a fraction of a second to thousands of years.

Hazardous and Solid Waste Amendments (HSWA) Amendments to the Resource Conservation and Recovery Act, 1984. HSWA added land disposal restrictions, minimum technology requirements, and expanded corrective action authorities to the RCRA statue.

Hazardous substance (As defined by 40 CFR 302.3) Any substance designated pursuant to 40 CFR 302. 40 CFR 302.4 – Designation of Hazardous Substances:

Listed hazardous substances. The elements, compounds, and hazardous wastes appearing in Table 302.4 are designated as hazardous substances under section 102(a) of the CERCLA.

Unlisted hazardous substances. A solid waste, defined in 40 CFR 261.2, which is not excluded from regulation as a hazardous waste under 40 CFR 261.4(b), is a hazardous substance under section 101(14) of the CERCLA if it exhibits any of the characteristics identified in 40 CFR 261.20 through 261.24. See Hazardous Waste. **Note:** This definition incorporates by reference, substances listed in CWA sections 311 and 307(a); CAA section 112; RCRA section 3001; and TSCA section 7.

Hazardous waste (As defined by RCRA 40 CFR 261.3) Any solid waste is generally a hazardous waste if it is not excluded from regulation as a hazardous waste, is listed in the regulations as a hazardous waste, exhibits any of the defined characteristics of hazardous waste (ignitability, corrosivity, reactivity, or toxicity), or is a mixture of solid waste and hazardous waste.

Holding time The maximum elapse of time that one can expect to store a sample without unacceptable changes in analyte concentrations. Holding times apply under prescribed storage conditions and deviations in storage conditions may affect the holding time. Extraction Holding Time refers to the time lapse from sample collection to sample preparation; Analytical Holding Time refers to the time lapse between sample preparation and analysis.

Hot pad An area located at an airport, or other terminal of public transportation, that is segregated from the general public for the purposes of loading and unloading hazardous, radiological, and/or biological cargo.

HSWA module A portion of the Laboratory's permit to operate under RCRA that contains requirements specific to Los Alamos National Laboratory. It is this portion of the permit that contains the list of solid waste management units that must be cleaned up in accordance with RCRA procedures.

Hydraulic conductivity The rate at which water moves through a medium in a unit of time under a unit hydraulic gradient through a unit area measured perpendicular to the direction of flow.

Hydraulic gradient The rate of change of hydraulic head per unit of distance in the direction of groundwater flow.

Hydraulic head Elevation of the water table or potentiometric surface as measured in a well.

Hydrogeology The science that applies geologic methods to the understanding of hydrologic phenomena.

Hypothesis A proposition stated as a basis for further investigation.

Industrial use scenario Industrial use is the future use scenario in which current Laboratory operations continue. Any necessary remediation involves cleanup to standards designed to ensure a safe and healthy work environment for Laboratory workers.

Infiltration Entry of water into the ground.

Interflow A runoff process that involves lateral subsurface flow in the soil zone.

Injection well A well used for adding water and/or tracers to the saturated zone during well tests of hydrologic behavior.

Initial calibration The process used to establish the relationship between instrument response and analyte concentration at several analyte concentration values to demonstrate that an instrument is capable of acceptable analytical performance.

Initiator A weapons device used as the first element of an explosion, which upon receipt of the proper mechanical or electrical impulse produces a burning or detonating action.

Interim measure The actions used to achieve the goal of stabilization at contaminated sites that present serious and immediate health hazards.

Interference A chemical or physical entity whose influence results in a decrease or increase in the response of an analytical method or other measurement system relative to the response obtained in the absence of the entity.

Intermittent stream Said of a stream that flows only in certain reaches due to losing and gaining characteristics of the channel bed.

Interrupted stream Said of a stream whose flow is discontinuous due to man-made structures.

Institutional controls Controls prohibiting or limiting access to contaminated media; may consist of deed restrictions, use restrictions, permitting requirements, etc.

Laboratory duplicate sample The portions of a sample taken from the same sample container, prepared for analysis and analyzed independently but under identical conditions. Each duplicate sample is expected to be equally representative of the original material.

Land disposal restrictions (LDR) A RCRA program that requires hazardous waste be treated (or meet specified levels for hazardous constituents) before land disposal is allowed. In addition to the disposal prohibition, there are prohibitions and limits in the LDR program regarding the dilution and storage of wastes.

LANL Data validation qualifiers Data qualifiers used in the LANL ER Project baseline validation process are as follows:

"A" Contractually required data are not available for data review and evaluation.

"U" The analyte was analyzed for but not detected.

"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 detection or quantitation limit.

"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. 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 t determine if the defect impacts data use for decision-making.

"R" The data is rejected as a result of major problems with quality assurance/qualify control (QA/QC) parameters.

Leachate A liquid that has percolated through waste, soil or rock material and mobilized chemical species in the process.

Leaching The separation or dissolving out of soluble constituents of a solid material by the natural action of percolating water or by chemicals.

Materials disposal area An area used any time between the beginning of Laboratory operations in the early 1940s and the present for disposing of chemically and/or radioactively contaminated materials.

Matrix See *sample matrix.*

Matrix Relatively fine material in which coarser fragments or crystals are embedded; also called "ground mass."

Matrix spike An aliquot of sample spiked with a known concentration of target analyte(s). The spiking typically occurs before sample preparation and analysis.

Matrix spike duplicate An intralaboratory duplicate sample spiked with a known amount of target analyte(s). Spiking occurs prior to sample preparation and analysis.

Maximum contaminant level Under the Safe Drinking Water Act, the maximum permissible level of a contaminant in water that is delivered to any user of a public water system that serves 15 or more connections and 25 or more people. The standards set take into account the feasibility and cost of attaining the standard.

Medium (environmental) Any material capable of absorbing or transporting constituents including tuffs, soils and sediments derived from these tuffs, surface water, groundwater, air, structural surfaces, and debris.

Medium (geological) The solid part of the hydrogeological system; can be unsaturated or saturated.

Method A body of procedures and techniques for systematically performing an activity.

Method blank An analyte-free matrix to which all reagents are added in the same volumes or proportions as those used in the environmental sample processing and which is prepared and analyzed in the same manner as the corresponding environmental samples. The method blank is used to assess the potential for contamination to the sample during preparation and analysis.

Method detection limit (MDL) The minimum concentration of a substance that can be measured and reported with a known statistical confidence that the analyte concentration is greater than zero. The MDL is determined from analysis of samples of a given matrix type containing the analyte after subjecting the sample to the usual preparation and analyses. The MDL is used to establish detection status.

Migration The movement of inorganic and organic species through unsaturated or saturated materials.

Migration pathway A route (e.g., a stream or subsurface flow path that controls the potential movement of contaminants to environmental receptors (plants, animals, humans).

Mitigation (1) Avoiding an impact altogether by not taking a certain action or parts of an action. (2) Minimizing impacts by limiting the degree or magnitude of the action and its implementation. (3) Rectifying the impact by repairing, rehabilitating, or restoring the affected environment. (4) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action. (5) Compensating for the impact by replacing or providing substitute resources or environments.

Mixed waste Waste that contains both hazardous waste (as defined by RCRA and its amendments) and radioactive waste (as defined by the AEA and its amendments).

Model A mathematical approximation of a physical, biological, or social system.

Monitoring well A well drilled at a specific location on or off a hazardous waste site for the purpose of sampling groundwater or measuring water levels. Typically constructed with a moderate screen interval placed so as to straddle the water table or potentiometric surface associated with the saturated zone of interest.

National Pollutant Discharge Elimination System (NPDES) A federal regulation under the Clean Water Act requiring permits for discharge into surface waterways.

National Priorities List (NPL) EPA's list of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial response using money from the Trust Fund. Updated annually.

No further action (NFA) A decision that no further investigation or remediation is warranted for a PRS, based on risk levels for residential use, recreational use, or industrial use.

Notice of Deficiency (NOD) A notice issued to DOE and the Laboratory by EPA or NMED stating that some aspect(s) of a plan or report does not meet their requirements. The ER Project must then propose a solution acceptable to the EPA/NMED before the plan or report will be approved.

Operable unit (OU) At LANL, one of 24 areas originally established for administering the ER Project. Set up as groups of potential release sites, the OUs were aggregated based on geographic proximity for the purpose of planning and conducting the cleanup effort. As the project matured, it became apparent that 24 were too many to allow efficient communication and to ensure consistency in approach. Therefore, in 1994, the 24 OUs were reduced to six administrative "field units."

Outfall The vent or end of a drain, pipe, sewer, ditch, or other conduit that carries waste water, sewage, storm runoff or other effluent into a stream.

Out of control A condition in which a measured quality control parameter does not meet specified control or acceptance criteria.

Perched groundwater Groundwater that lies above the regional water table and is separated from it by an unsaturated zone.

Percolation Gravity flow of groundwater through the pore spaces in rock or soil below the ground surface.

Perennial Stream Said of a stream or reach that flows continuously throughout the year.

Performance evaluation sample A sample of known composition with respect to selected analytes that, upon analysis, is expected to yield results that fall within a prescribed range. Performance evaluation samples are selected to mimic as closely as possible those matrices representative of environmental samples from a particular location.

Permit modification A process in which changes to requirements of the Laboratory's operating permit are requested by application to the EPA. The process includes a public hearing and a 60-day comment period on the proposed changes.

Piezometer A well drilled for the purpose of measuring hydraulic head or water level; ideally only open at the bottom but usually constructed with a very short screen interval.

Piezometric Surface Also called potentiometric surface. The level to which water will rise in a well tightly cased into an aquifer.

Pollutant Includes, but is not limited to, any element, substance, compound, or mixture, including disease-causing agents, which after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will or can reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction) or physical deformations, in such organisms or their offspring; except that the terms "pollutant or contaminant" shall not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance under Subparagraphs (A) through (F) of Paragraph (14) and shall not include natural gas, liquefied natural gas, or synthetic gas of pipeline quality (or mixtures of natural gas and such synthetic gas).

Population (statistical) A set of entities or a continuum in a physical, biological or social system of interest; e.g., the residents of Los Alamos County, the water in an alluvial aquifer, or the plants in Pajarito Canyon.

Porosity The ratio of the volume of interstices in rock or soil to its total volume expressed as a percentage or as a fraction.

Porphyritic Said of the texture of an igneous rock in which larger crystals (phenocrysts) are set in a finer ground mass.

Potential release site (PRS) A site suspected of releasing contaminants into the environment. PRS is a generic term that includes SWMUs, hazardous waste sites listed in Module VII of the Laboratory's Hazardous Waste Facility Permit, and sites that have been identified as potentially contaminated by radioactivity.

Precambrian All geologic time prior to the beginning of the Paleozoic era (the Paleozoic began about 600 million years ago), equivalent to about 90% of all geologic time.

Precision A concept used to describe dispersion of measurements with respect to a measure of location or central tendency. Precision is represented by the inverse of the standard deviation of a set of measurements.

Preliminary assessment The process of collecting and reviewing available information about a known or suspected hazardous waste site or release. The extent of release and degree of threat to human health and the environment are evaluated to determine whether further study is needed and whether the release meets the criteria for a CERCLA-funded removal.

Prepared sample A sample treated in such a manner as to render it amenable to analysis. Can include: digestate, distillate, electroplate, extract, filter retentate, filtrate, homogenate, precipitate, pulverized/ sieved portion of sample, residue, etc.

Qualifier flag A letter code indicating, on a gross scale, a verifiable or potential data deficiency. Qualifier flags are assigned to data based on the outcome of data validation checks.

Quality assessment sample A sample submitted for analysis, the data from which are used to assess the quality of performance of a sampling or analysis process. Can include performance evaluation samples, field duplicates, field blanks, etc.

Quality control (QC) sample A sample which, upon analysis, provides information useful for adjusting, controlling, or verifying continuing acceptability of sampling and/or analysis activities that are in progress.

Quaternary The second period of the Cenozoic Era, following the Tertiary, and including the last 2 – 3 million years.

Radiation Energy emitted in the form of rays or particles that are thrown off by disintegrating atoms. The rays or particles emitted may consist of alpha, beta, or gamma radiation.

Radioactive decay (1) The process whereby radioactive materials undergo a change from one nuclide, element, or state to another, releasing radiation in the process. This action ultimately results in a decrease in the number of radioactive nuclei present in the sample. (2) The spontaneous transformation of one nuclide into a different nuclide or into a different isotope of the same nuclide accompanied by either the emission of particles from the nucleus, nuclear capture or ejection of orbital electrons, or fission.

Radioactive tracer A radioactive material added to, or induced in, a sample for the purpose of monitoring chemical or physical losses of the target analytes. The tracer is assumed to behave in the same manner as that of the target analytes.

Radioactive waste Waste material containing radionuclides, or contaminated by radionuclides.

Radionuclide A nuclide (species of atom) that exhibits radioactivity.

Randomized sample A sampling design where every possible sample has an equal probability of being selected.

RCRA facility assessment (RFA) Usually the first step in the RCRA corrective action process, to identify potential and actual releases from SWMUs and make preliminary determinations about releases, the need for corrective action, and interim measures. The RFA is generally equivalent to the preliminary assessment/site investigation taken under Superfund.

RCRA facility investigation (RFI) The second step of a RCRA corrective action, to gather enough data to fully characterize the nature, extent, and rate of migration of contaminants to determine the appropriate response action. The RFI is generally equivalent to the RI portion of the Superfund process.

Reason code A code used in the ER data validation process to indicate why a qualifier flag has been assigned to a datum.

Receptor A person, plant, animal, or geographical location that is exposed to a chemical or physical agent released to the environment by human activities.

Recharge The process by which water is added to the zone of saturation, either directly from the overlying unsaturated zone or indirectly by way of another material in the saturated zone.

Recreational use scenario Recreational use refers to current and future use scenarios in which cleanup of a PRS is completed to a level that permits the public to use it safely on an intermittent basis for activities such as hiking and camping. The standards are more stringent than they are for the industrial use scenario but not as stringent as those for residential use.

Regulatory standard Media-specific contaminant concentration levels of potential concern that are mandated by federal or state legislation or regulation (e.g., the Safe Drinking Water Act, New Mexico Water Quality Control Commission regulations).

Release Any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment (including the abandonment or discarding of barrels, containers, and other closed receptacles containing any hazardous substance or pollutant or contaminant), but excludes:

(A) any release that results in exposure to persons solely within a workplace, with respect to a claim that such persons may assert against the employer of such persons;

(B) emissions from the engine exhaust of a motor vehicle, rolling, stock, aircraft, vessel, or pipeline pumping station engine;

(C) release of source, byproduct, or special nuclear material from a nuclear incident, as those terms are defined in the Atomic Energy Act, if such release is subject to requirements with respect to financial protection established by the Nuclear Regulatory Commission under Section 170 of such act, or, for the purposes of Section 104 of this title or any other response action, any release of source, byproduct, or special nuclear material from any processing site designated under Section 102(a)(1) or 302(a) of the Uranium Mill Tailings Radiation Control Act of 1978, and

(D) the normal application of fertilizer. **[CERCLA 101(22)]**

Relative precision Precision measured relative to a particular value. Relative precision expressed as the relative standard deviation (RSD) is calculated as the ratio of the standard deviation to the selected value.

Relevant and appropriate requirements Those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site. Only those state standards that are identified in a timely manner and are more stringent than federal requirements are relevant and appropriate.

Remediation The process of reducing the concentration of a contaminant (or contaminants) in air, water, or soil media to a level that poses an acceptable risk to human health; the act of restoring a contaminated area to a usable condition based on specified standards.

Remedy or remedial action Those actions consistent with permanent remedy instead of or in addition to removal actions in the event of a release or threatened release of a hazardous substance into the environment, to prevent or minimize the release of hazardous substances so that they do not migrate to cause substantial danger to present or future public health or welfare or the environment. The term includes, but is not limited to, such actions at the location of the release as storage, confinement, perimeter protection using dikes, trenches, or ditches, clay cover, neutralization, cleanup of released hazardous substances and associated contaminated materials, recycling or reuse, diversion, destruction, segregation of reactive wastes, dredging or excavations, repair or replacement of leaking containers, collection of leachate and run-off, on-site treatment or incineration, provision of alternative water supplies, and any monitoring reasonably required to assure that such actions protect the public health and welfare and the environment. **[CERCLA 101(24)]** Activities conducted at DOE facilities to reduce potential risks to people and/or harm to the environment from radioactive and/or hazardous substance contamination. **(DOE Order 5820.2A)**

Remove or removal The cleanup or removal of released hazardous substances from the environment; such actions as may be necessary taken in the event of the threat of release of hazardous substances into the environment, such actions as may be necessary to monitor, assess, and evaluate the release or threat of release of hazardous substances, the disposal of removed material, or the taking of such other actions as may be necessary to prevent, minimize, or mitigate damage to the public health or welfare or to the environment, which may otherwise result from a release or threat of release. **[CERCLA 101 (23)]**

Removal action An immediate action taken over the short term to address a release or threatened release of hazardous substances.

Replicate measurement A re-analysis (remeasurement) of a prepared sample.

Reportable quantity For any CERCLA hazardous substance, the quantity established in Table 302.4 and Appendix B of 40 CFR 302, the release of which requires notification unless federally permitted. **(DOE Order 5000.3A)**

Representativeness The degree to which data accurately and precisely represent a characteristic of a population or an environmental condition.

Residential use scenario The standards for residential use are the most stringent of the three current and future use scenarios being considered by the ER Project and is the level of cleanup EPA is currently specifying for SWMUs located off the Laboratory site and for those released for non-Laboratory use.

Resource Conservation and Recovery Act (RCRA) The RCRA regulations establish a comprehensive hazardous waste management system under the authority of RCRA Subtitle C. RCRA regulates hazardous waste from its point of generation through its point of final disposal. RCRA also regulates solid waste under Subtitle D.

Respond or response (As defined by Section 101 (25) of CERCLA) remove, removal, remedy, or remedial action, including enforcement activities related thereto. **(DOE 1991)**

Response action A CERCLA-authorized action at a Superfund site involving either a short-term removal action or a long-term remedial response that can include, but is not limited to, the following activities.

- Removing hazardous materials from a site to an EPA-approved, licensed hazardous waste facility for treatment, containment, or destruction.
- Containing the waste safely on site to eliminate further problems.
- Destroying or treating the waste on site using incineration or other technologies.
- Identifying and removing the source of groundwater contamination and halting further movement of the contaminants.

Restricted Area Any area access to which is controlled by the licensee for purposes of protection of individuals from exposure to radiation and radioactive materials. "Restricted area" shall not include areas used as residential quarters, although a separate room or rooms in a residential building may be set apart as a restricted area. **(10 CFR 60.2)**

Retardation The act or process that reduces the rate of movement of a chemical substance in water relative to the average velocity of the water. The movement of chemical substances in water can be retarded by adsorption and precipitation reactions, and by diffusion into the pore water of the rock matrix.

Risk A measure of a negative or undesirable impact associated with an event.

Risk assessment see also *Baseline Risk Assessment*

Risk assessment, preliminary A risk assessment conducted using conservative assumptions and scenarios and assuming no mitigating or corrective measures beyond those already in place.

Risk characterization The summarization and integration of the results of toxicity and exposure assessments into quantitative and qualitative expressions of risk. The major assumptions, scientific judgments, and sources of uncertainty related to the assessment are also presented.

Risk management Risk management is the integration of risk characterization with other nonscientific considerations specified in applicable statutes to make and justify regulatory decisions. ***(RCRA/ CERCLA Update*, June 1992)**

Rinsate Blank See also *Equipment blank.*

Routine analysis The analysis categories of inorganics, metals, organics, radiochemistry and high explosives as defined in the current contract laboratory statement of work.

Routine Data Validation The process of reviewing analytical data relative to quantitative routine acceptance criteria. The objective of routine data validation is two-fold: one objective is to estimate the technical quality of the data relative to minimum national standards adopted by LANL ER; the other objective is to indicate to data users the technical data quality at a gross level by assigning qualifier flags to environmental data whose quality indicators do not meet acceptance criteria.

Sample A portion of a material (e.g., rock, soil, water, air), which, alone or in combination with other samples, is expected to be representative of the material or area from which it is taken. Samples are typically sent to a laboratory for analysis or inspection or are analyzed in the field. When referring to samples of environmental media, the term *field sample* may be used.

Sample matrix In chemical analysis, that portion of a sample which is exclusive of the analytes of interest. Together, the matrix and analytes of interest form the sample.

Screening Action Level (SAL) Medium-specific concentration level for a chemical derived using conservative criteria below which it is generally assumed that there is no potential for unacceptable risk to human health. The derivation of a SAL is based on conservative exposure and land use assumptions. However, if an applicable regulatory standard exists that is less than the value derived by risk-based computations, it will be used for the SAL.

Screening Assessment A process designed to determine whether contamination detected in a particular medium at a site might present a potential unacceptable human health and /or ecological risk. The assessment uses screening levels that are either human-health or ecologically-based concentrations derived using chemical specific toxicity information and standardized exposure assumptions below which no additional actions are generally warranted.

Sensitivity An indication of the lowest analyte concentration that can be measured with a specified degree of confidence.

Single blind sample A sample submitted for analysis whose composition is known to the submitter but not to the analyst.

Site characterization The program of exploration and research, both in the laboratory and in the field, undertaken to establish the geological, hydrological, and chemical conditions at a site. Site characterization includes borings, surface excavations, excavation of exploratory shafts, limited subsurface lateral excavations and borings and geophysical testing. **(10 CFR 60.2)**

Site conceptual model A qualitative or quantitative description of sources of contamination, environmental transport pathways for contamination, and biota that could be impacted by contamination (called receptors) and whose relationships describe qualitatively or quantitatively the release of contamination from the sources, the movement of contamination along the pathways to the exposure points, and the uptake of contaminant by the receptors.

Soil gas Those gaseous elements and compounds that occur in the void spaces in rock or soil. Such gases can move through or leave the soil or rock, depending on changes in pressure.

Soil water Water in the unsaturated zone, regardless of whether it occurs in soil or rock.

Solid waste Any discarded material, including any material that is abandoned, recycled, inherently waste-like, or certain military munitions.

Solid waste management unit (SWMU) Any discernible unit at which solid wastes have been placed at any time, irrespective of whether the unit was intended for the management of solid or hazardous waste.

Split sample A sample that has been subdivided into two or more portions expected to be of the same composition. Used to characterize within-sample heterogeneity, sample handling, and measurement variability.

Stakeholder As used in this document, stakeholder refers to any party or agency, whether inside or outside the Laboratory, interested in or affected by Environmental Restoration Project issues and activities.

Standard operating procedure (SOP) A written document that details the method for an operation, analysis, or action with thoroughly prescribed techniques and steps, and is officially approved as the method for performing certain routine or repetitive tasks.

Stratification Classification of the target population into two or more non-overlapping and exhaustive categories (strata) on the basis of characteristics that are known *a priori* for the entire population.

Stratified sample A sample including one or more specimens from each of several subpopulations of the target population. (Note: If the specimens are selected from within each subpopulation using *simple random sampling*, then the sample is called a stratified random sample.)

Stratigraphy The science dealing with the succession, age, composition, and history of strata.

Surrogate compound (Surrogate) An organic compound used in analyzing organic target analytes that is similar in composition and behavior to target analytes but is not normally found in field samples. Surrogates are added to every blank and spike sample to evaluate the efficiency with which analytes are recovered during extraction and analysis.

Target analyte A chemical or parameter, the concentration, mass, or magnitude of which is designed to be quantified by use of a particular test method.

Technical area (TA) The Laboratory established technical areas as administrative units for all its operations. There are currently 49 active TAs spread over 43 square miles.

Topography The physical features of a place or region.

Toxic pollutants The 126 individual priority toxic pollutants contained in 65 toxic compounds or classes of compounds (including organic pollutants and metals) adopted by EPA pursuant to Section 307 (a) (1) of the Clean Water Act. **(DOE 1991)**

Transmission loss Reduction in surface water flow by seepage into the channel bed.

Transmissivity A measure of the amount of water that can be transmitted horizontally by the full saturated thickness of the aquifer under a hydraulic gradient of 1. **(DOE 1991)**

Transport or transportation The movement of a hazardous substance by any mode, including pipeline (as defined in the Pipeline Safety Act), and in the case of hazardous substance which has been accepted for transportation by a common or contract carrier, the term "transport" or "transportation" shall include any stoppage in transit which is temporary, incidental to the transportation movement, and at the ordinary operating convenience of a common or contract carrier, and any such stoppage shall be considered as a continuity of movement and not as the storage of a hazardous substance. **[CERCLA 101(26)]**

Treatment Any method, technique, or process, including elementary neutralization, designed to change the physical, chemical, or biological character or composition of any hazardous waste so as to neutralize such waste, or so as to recover energy or material resources from the waste, or so as to render such waste non-hazardous, or less hazardous; safer to transport, store, or dispose of; or amenable for recovery, amenable for storage, or reduced in volume.

Treatment, storage, and disposal facility (TSDF) Any building, structure, or installation where a hazardous waste is or has been treated, stored, or disposed. TSD facilities are regulated by EPA and states under RCRA.

Trip blank A sample of analyte-free media taken to the sampling site and returned to the analytical laboratory unopened along with samples taken in the field. Used to monitor cross contamination of samples during handling and storage both in the field and in the analytical laboratory.

Tuff A compacted deposit of volcanic ash and dust that contains rock and mineral fragments accumulated during an eruption.

Ultimate disposal The final disposal of hazardous substances resulting from a removal action. It does not include temporary storage or other temporary measures of managing the waste from a removal action. **(DOE 1991)**

Unconfined Said of water in a saturated zone that is open to the atmosphere; i.e., not beneath a confining bed or under artesian pressure.

Underflow Groundwater flow beneath the bed of a non-flowing stream; such water is often perched in the channel alluvium atop the bedrock surface.

Underground storage tank (As defined in Section 9001(1) of the Solid Waste Disposal Act) The term "underground storage tank" means any one or combination of tanks (including underground pipes connected thereto) used to contain an accumulation of regulated substances, and the volume of which (including the volume of the underground pipes connected thereto) is 10% or more beneath the surface of the ground. Such term does not include any:

(A) farm or residential tank of 1,100 gallons or less capacity used for storing motor fuel for noncommercial purposes;

(B) tank used for string heating oil for consumptive use on the premises where stored;

(C) septic tank;

(D) pipeline facility (including gathering lines) regulated under

i) the Natural Gas Pipeline Safety Act of 1968 (49 USC App. 1671 et seq.),

ii) the Hazardous Liquid Pipeline Safety Act of 1979 (49 USC App. 2001 et seq.), or

iii) which is an intrastate pipeline facility regulated under state laws comparable to the provisions of law referred to in Clause (i) or (ii) of this subparagraph;

(E) surface impoundment, pit, pond, or lagoon;

(F) storm water or waste water collection system;

(G) flow-through process tank;

(H) liquid trap or associated gathering lines directly related to oil or gas production and gathering operations; or

(I) storage tank situated in an underground area (such as a basement, cellar, mine working, drift, shaft, or tunnel) if the storage tank is situated upon or above the surface of the floor.

Unrestricted area Any area, access to which is not controlled by the licensee for purposes of protecting individuals from exposure to radiation and radioactive materials and any area used for residential quarters. **(10 CFR 60.2)**

Unsaturated zone The zone between the land surface and the regional water table. Generally, fluid pressure in this zone is less than atmospheric pressure, and some of the voids might contain air or other gases at atmospheric pressure. Alternatively, the unsaturated zone generally has moisture contents less than saturation.

Water balance The relationship between water input (precipitation) and output (runoff, evapotranspiration, and recharge) in a hydrological system; the portioning of precipitation into these components of the hydrological cycle.

Water content (also gravimetric moisture content) The amount of water in an unsaturated medium, expressed as the ratio of the weight of water in a sample to the weight of the oven-dried sample; often expressed as a percent.

Water table The top of the saturated zone; the water level associated with an unconfined aquifer.

Welded Tuff A volcanic deposit hardened by the action of heat, pressures from overlying material, and hot gases.

APPENDIX B OPERATIONAL AND ENVIRONMENTAL SETTING

B-1.0 OPERATIONAL HISTORY AND LAND USE

TA-9 consists of a previously used northern area (Anchor Ranch East Site), now decommissioned, active from the early 1940s to the mid-1950s for research and development of high explosives (HE). At the east end of old TA-9 is a former explosives firing site (Far Point). The PRS 09-002 burn pit is located northeast of the Far Point firing site. Much of old TA-9 is an open meadow area and no new construction is planned for the site.

The construction of buildings and support structures at the new TA-9 began in 1949 and continued for about five years. Thirty-eight permanent structures were erected about 700 ft south of the old TA-9 facility to house the explosive technology group. The major purpose of this group is to research and develop HE for the Laboratory's nuclear weapon systems. This is a concept-to-retirement support that has recently included the dismantling explosive components from discontinued stockpiled weapons and recycling HE waste. Activities include synthesizing, characterizing, formulating, pressing, machining, performance testing, and determining the compatibility of HE with other weapon materials. Therefore, the buildings were designed for specific purposes, and their functions have not changed much over the 40 years of operation. PRS 09-011(b), a former HE equipment storage area, is located outside of building TA-9-39, an explosives storage magazine. Land use at the active area of TA-9 is anticipated to remain unchanged for the foreseeable future (LANL Site Development Plan).

B-2.0 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 20 to 22 in. for TA-9, with approximately half occurring during summer thunderstorms. Stream flow in canyons can occur as a result of these storms. Spring snowmelt runoff can also produce streamflow in the area canyons.

Winds at a nearby weather station 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 can reach 50 mph.

B-3.0 GEOLOGY

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

B-3.1 Geologic Setting

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

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

B-3.2 Soils

Potential release sites (PRSs) that are located on the mesa top in TA-9 are within the Carjo soil series (Nyhan et al. 1978, 5702). 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. depth. 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 can 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 might be less for PRSs located farther from the edges of the mesa. Soils on the edges of mesas and on the canyon walls are generally poorly developed and can trap sediments and contaminants eroded from the mesa tops. The soil types at TA-9 are shown in Figure B-3.2-1.

B-4.0 HYDROLOGY

B-4.1 Hydrological Conceptual Model

The hydrology of the PRSs discussed in the report is controlled primarily by their topographic location. These are all located on the mesa top away from any major drainages. Potential contaminant pathways include surface water runoff to ephemeral/perennial stream stretches within Pajarito Canyon, surface water runoff and possible infiltration into alluvial aquifers also within Pajarito Canyon, surface water infiltration, and transport through the vadose zone into perched or regional aquifers.

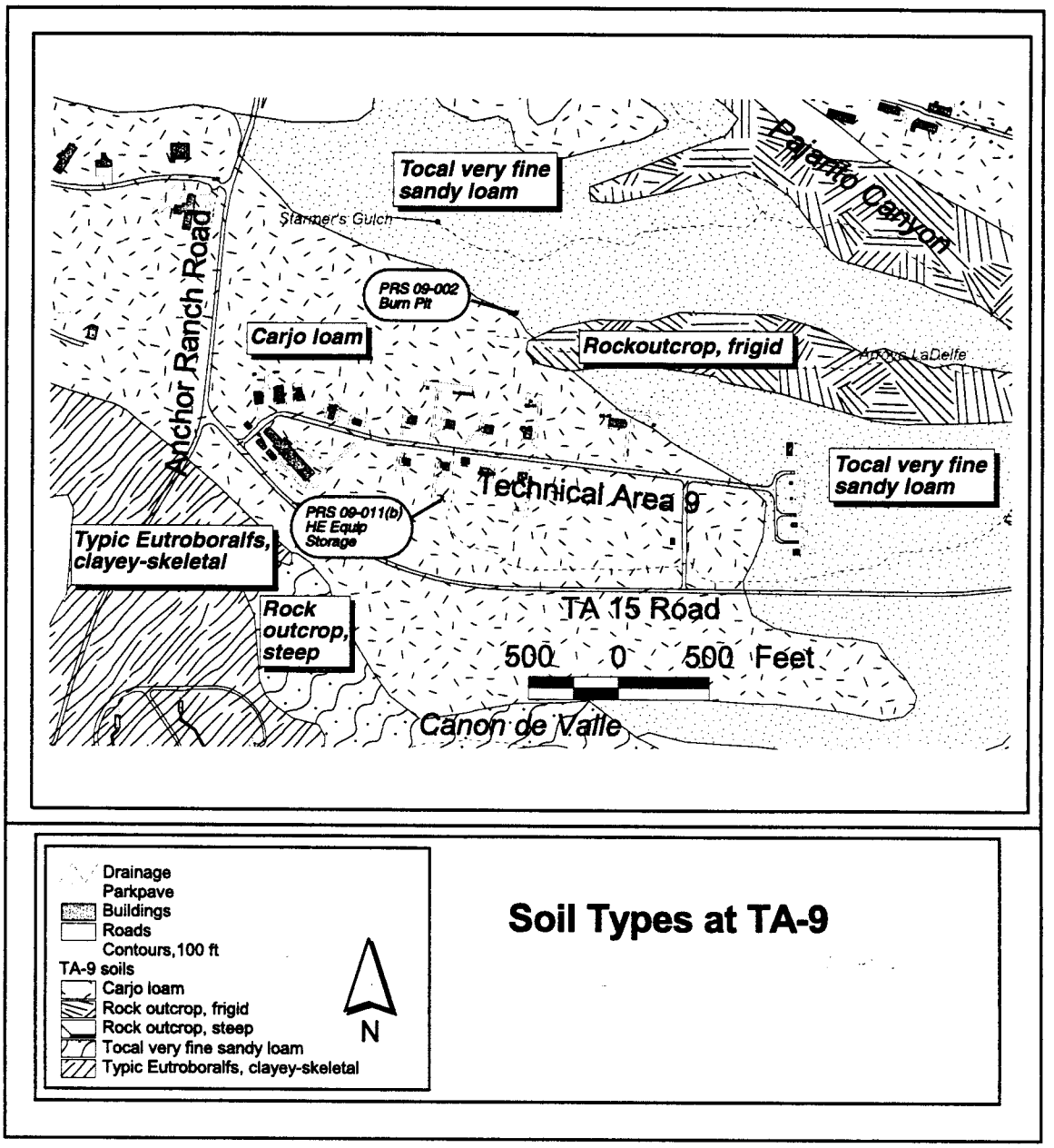

Figure B-3.2-1 Soil Types at TA-9

B-4.2 Surface Water

The PRSs discussed in this report are all located within the watershed of Pajarito Canyon, which in turn is a tributary to the Rio Grande River located approximately 9.5 miles to the southeast. PRS 09-002 is located within the watershed of Arroyo Ladelfe (Figure 1-2). LANL's FIMAD GIS database identifies two springs in Arroyo Ladelfe downgradient from this PRS: Kieling and Bulldog. PRSs 09-011(b) is located in the watershed of an unnamed tributary to Pajarito Canyon. No springs within this tributary are identified in the FIMAD database.

B-4.2.1 LANL-ER-AP-4.5 Assessment(s)

In accordance with Assessment Process 4.5, an on-site evaluation of each site was made to determine the potential for transport of contaminants off the PRS by storm water run-on and runoff. Factors evaluated included site setting, percent slope, type of groundwater, existing drainage patterns, erosion, and so forth. Summation of numerical values assigned to these factors produces matrix scores varying from 100 (highest potential for contaminant transport) to 3.6 (lowest potential for transport). Copies of the AP 4.5 evaluations are attached.

B-4.3 Groundwater

B-4.3.1 Alluvial Waters

Saturated alluvium occurs in the bottoms of Pajarito Canyon, Canon de Valle, and in the lower reaches of Arroyo Ladelfe and Starmer's Gulch. There are two springs located downstream from PRS 09-002 in Arroyo Ladelfe: Kieling and Bulldog Springs.

B-4.3.2 Perched Waters

Saturated alluvium may recharge perched zones below the canyon fill. However, on the mesa top setting at TA-9, there are no wells in the immediate vicinity of these PRSs. It is not known if there are any perched aquifers under these PRSs.

B-4.3.3 Regional Aquifer

The regional aquifer under this mesa top site is 800 to 1100 ft below ground surface (LANL 1993, 20949). There are no regional aquifer wells within a mile radius of PRSs 09-002 and 09-011(b).

B-5.0 ECOLOGICAL RESOURCES

Biological resource field surveys have been conducted in the explosives area, which includes TA-9. During 1992, field surveys were conducted by the Biological Resource Evaluations Team (BRET) of the Environmental Protection Group for 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.

Habitat Description for the Explosives Area

Vegetation within the OU 1157 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 formed in areas that were cleared before the Laboratory was established , 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 are present on the northern exposures. Ponderosa pine, one-seed juniper, and, to a lesser extent, Douglas fir, are 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, and Cliffbush, depending on location and exposure.

The common shrub types are Gambel oak and Fendler's rose. Willow appears 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, 55592) lists a large number of other plant species found at the explosives area.

Over 70 species of birds (Banar 1996, 55592) visit or are residents of the OU 1157 explosives area, including the Mountain chickadee, Three-toed Woodpecker, Pygmy nuthatch, Wren, Olive-sided flycatcher, and Chipping sparrow.

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

Because of restricted access to the OU 1157 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 at the site, are listed in Appendix B of Banar (1996, 55592) 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.

Threatened, Endangered, and Sensitive Species in the Explosives Area

Threatened, endangered, and sensitive species investigated 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). Other threatened, endangered, and sensitive species investigated 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, 55592) 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.

B-6.0 CULTURAL RESOURCES

B-6.1 Cultural Resources Survey

A cultural resource survey was conducted at all of TA-9 as required by the National Historic Preservation Act (as amended) (LANL 1993, 20949).

Ten archaeological/historical sites and Manhattan Project structures located within and around TA-9 are listed in Table 3-2 in the OU 1157 Work Plan. Three 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 based on their research potential (LANL 1993, 20949). One site is an early Atomic Energy Commission (AEC)-era structure (circa 1942 to 1948). This structure will be evaluated for National Register eligibility prior to decommissioning.

TABLE B-6.1-1
CULTURAL RESOURCES OF TA-9

Site #	Site Type	Cultural Affiliation	Time Period	Eligible
LA 21292	Lithic Scatter	Archaic	Archaic	No
LA 21293	Lithic Scatter	Archaic/Anasazi	Unknown	No
LA 21294	Lithic Scatter	Archaic/Anasazi	Unknown	No
LA 21297	Artifact Scatter	Euro-American	Homesteading	No
LA 89838 (M-55)	Small Rock Shelter	Unknown	Unknown	No
LA 89837 (M-56)	Cavates	Anasazi	Unknown	PE*
LA 89836 (M-57)	Rock shelter	Anasazi	Unknown	PE
LA 89835 (M-58)	Cavates	Anasazi	Unknown	PE
LA 89834 (M-59)	Artifact Scatter	Euro-American	Recent	No
LA 89833 (M-60)	OH-camp site	Hispanic/Euro-American	Homesteading	No

* Potentially Eligible

APPENDIX C RESULTS OF QUALITY ASSURANCE ACTIVITIES

C-1.0 SUMMARY

The sample data presented in this RFI report encompass two different sampling periods and two PRSs. Eight samples were collected and analyzed. Sampling for metals only occurred at PRS 09-002. PRS 09-011(b) was sampled for high explosives (HE) only. RFI Work plan OU 1157 (LANL 1993, 20949) governed the field sampling sampling effort. The first sampling period was during the spring and summer of 1994, when two field samples were collected. The second sampling period was the summer and autumn of 1997, when four field samples were collected. Samples from the 1994 campaign were analyzed by internal LANL fixed laboratories. The 1997 samples were analyzed by QST Environmental, Gainesville, FL.

There are differences in the 1994 and 1997 data sets that were considered during data assessment. First, the 1997 samples were collected from the same PRS, but not necessarily the same sampling locations as the 1994 samples. However, the sampling locations were judged to be as representative of the PRS as the original samples. Second, the analytical laboratory used in 1997 provided lower detection limits compared to the laboratory used for the 1994 samples. The agreement among the data from both sampling periods was generally good and the 1997 data are viewed as validating the 1994 data.

Table C-1.0-1 summarizes the analytical suites used for samples in this investigation. Target analytes and detection limits for the methods are listed in Appendix D-1.0, Target Analytes and Detection Limits.

TABLE C-1.0-1
ANALYTICAL SUITES USED FOR SAMPLES

Suite	Method ID *	Description
Inorganic Chemicals		
Trace metals (Ag, Cd, Cr, Pb)	*3050/6010*	*Inductively Coupled Plasma- Emission Spectroscopy*
Trace metals (Sb)	*3050/6020*	*Inductively Coupled Plasma- Mass Spectrometry*
Organic Chemicals		
High Explosives (HE)	*8330*	*Extraction by sonication followed by Liquid Chromatography with UV detection for nitro-aromatics and nitramines*

* Equivalent SW-846 method. Target analytes and detection limits for methods are listed in Appendix D-1.0.

Sample preservation requirements and recommended holding times are given in LANL-ER-SOP-1.02 (LANL,51575). For the first sample collection period, holding times for the samples analyzed for high explosives were exceeded by nine weeks. Because of the potential for HE analyte degradation during storage, PRS 09-011(b) was resampled for HE in 1997. The samples collected for HE analysis in the second sampling period were analyzed within the required holding times.

The analyses performed at the external fixed laboratory were conducted in accordance with the LANL ER QAPP (LANL 1996, 54609) requirements that defer to the 1995 Statement of Work (SOW) for analytical services (LANL 1995 49738). The type, frequency, and acceptance criteria for QC activities are given in the SOW. Analyses by the internal laboratory were conducted according to the requirements of the Laboratory health and environmental chemistry manual (LANL 1993, 31793).

Several types of QA/QC samples were analyzed in the laboratory to estimate the bias and precision of the analytical data delivered by the laboratories. The following laboratory QC samples and procedures were used to assess bias: laboratory blank samples, surrogate recoveries, matrix spike recoveries, and laboratory control samples (LCSs). Laboratory duplicate samples were used to assess method precision. Finally, blind QC samples were analyzed with the limited metals suite to evaluate the overall laboratory performance. Detailed descriptions of the QC sample types and associated procedures can be found in the Appendix A-2.0, Glossary.

The 1997 data received from the external analytical laboratory were subjected to the LANL ER routine data validation process, which is based on the *USEPA Contract Laboratory Program National Functional Guidelines for Data Review* (EPA 1994, 48640). The purpose of routine validation is to assign qualifier flags as required to concentration values based on QA/QC indicators. The definitions of the qualifiers used in routine validation can be found in the glossary, Appendix A. To facilitate the routine validation procedure, the validator reviews each data package against a validation worksheet. The HE data packages from 1994 were validated against the LANL Environmental Chemistry validation checklist (Rev. 0, 8/30/93). The 1994 metals and the 1997 HE data package were validated following ER Project protocol described in the QAPP (LANL 1996, 54609).

When potential technical problems are identified during routine data validation, the data can be subjected to focused validation, which is a detailed evaluation of data quality performed by an experienced chemist. The focused validation chemist may override data qualifiers assigned during the routine validation process or may qualify data that were not qualified during routine validation. Both the LANL qualifier flags and the focused validation qualifier flags, if any, appear in the data tables in Section 2.0 and Appendix D-2.0 of the RFI report. Results that indicate nondetected values have a U flag applied. Data are often qualified as estimated (J flag) to indicate that, although the analyte was positively identified, the associated numerical value is estimated to be more uncertain than would normally be expected for the analysis. Potential bias is indicated with J+ or J- flags, where the positive and negative signs indicate positive and negative bias, respectively. Qualified data are generally still usable unless they have been rejected, as indicated by a focused validation R flag.

The QC indicators for precision and bias of the main analyte suites are discussed in the following sections of this appendix. Potential limitations in the analytical data that could impact data quality or usability, such as holding time requirements, are also discussed. As a result of this evaluation of QA/QC activities the analytical data are of sufficient quality for use in this report. Details regarding the qualification of analytical results for individual samples reported are summarized in section C-5.0, Results of Data Validation. The discussion of data usability on a PRS-specific basis is also presented in Data Review, Sections 2.3.4.3 and 3.3.4.3.

C-2.1 Field Analyses

No inorganic field analyses were performed in this investigation.

C-2.2 Fixed Laboratory Analyses

Two soil samples, AAB0896 and AAB0897, were collected from PRS 09-002 and were analyzed for cadmium, chromium, lead, silver, and antimony under request number 17492. The analytical methods used are summarized in Table C-1.0-1. The contract-required estimated detection limits (EDLs) for the target analytes are listed in Appendix D-1.0. The sample-specific detection limits might be higher or lower than the contract-required EDLs depending on sample-specific interferences, dilution factors, moisture content, and instrument sensitivity. Sample-specific EDLs for all analytes in request number 17492 were below both the contract-required EDLs and the corresponding LANL soil background values.

The accuracy of the inorganic measurements was evaluated on the basis of a blind sample and a non-blind sample. The measured concentrations of the target analytes in these samples were all found to be within acceptance criteria except for silver in the blind sample. The reported silver concentration in the blind sample was 57% of the true concentration. The true concentration of silver in the sample was within a factor of two of the sample-specific detection limit. Large analytical uncertainty is expected in this low concentration regime, which in turn creates uncertainty in the percent recovery calculation. Therefore, the reported low recovery for silver in the blind sample is not a concern.

The precision of the inorganic measurements was evaluated on the basis of a duplicate analysis of a field sample run with the request number (Sample ID AAB0902). The relative percent difference (RPD) values for chromium and lead in the duplicate measurements were 9.8% and 4%, well within the 35% advisory acceptance criteria for soils. Chromium, silver, and antimony were undetected in both the sample and duplicate sample analyses. All other QC data were within acceptance criteria, and all data may be used as reported.

C-3.0 RADIOCHEMICAL ANALYSES

C-3.1 Field Analyses

No radiochemical field analyses were performed other than routine screening measurements for the purposes of health and safety and to verify compliance with shipping and handling procedures.

C-3.2 Fixed Laboratory Analyses

No fixed laboratory radiochemical analyses were performed.

C-4.0 ORGANIC ANALYSES

C-4.0 ORGANIC ANALYSES

C-4.1 Field Analyses

No organic field analyses were performed other than routine screening measurements for the purposes of health and safety and to verify compliance with shipping and handling procedures.

C-4.2 Fixed Laboratory Analyses

High Explosives (HE)

Request Number 17339

Two samples, AAB0825 and AAB0826, analyzed under Request Number 17339, pertain to PRS 09-011(b). No HE target analytes were detected in the samples.

The method blank was in control, showing no detected target analytes. The two samples were among a total of 19 HE samples analyzed under Request Number 17339. The surrogate percent recovery values for all samples in this Request Number ranged from 28% to 60%, with 5 of the 19 recovery values greater than 50%. While these surrogate recoveries fall within the laboratory's control limits of 20-150%, the consistently low HE surrogate recoveries indicate a probable low bias in the analysis process of approximately a factor of two.

At the time this request number was submitted for analysis, the HE sample load exceeded the throughput of the analytical laboratory. As a result, the samples were extracted 9 weeks after the 14-day extraction holding time had expired. The laboratory anticipated the delay and stored the samples in a freezer, rather than at the usual 4°C, in order to minimize biological degradation of HE analytes in the soil samples. After extraction, the normal cold storage conditions were used for the extract (4° C, darkness) until samples were analyzed. The chromatography analysis procedure was performed within the required 40 days following extraction.

Despite the extra precaution of freezing the samples, exceeding the sample holding times can contribute to a low target analyte bias due to sample degradation prior to extraction. This possibility, together with the observed low surrogate recovery, results in all undetected target analytes results in this request number being qualified as undetected estimated (UJ).

Request Number 3849R

Four soil samples, 0509-97-0001 through 0509-97-0004, were submitted for HE analyses. These four samples are the resampling of PRS 09-011(b). A blank sample and QC spike were analyzed with this batch of samples and all samples were prepared and analyzed within holding time limits. No target analytes were detected in these samples. The surrogate recovery in all samples ranged from 99% to 102%, indicating acceptable analyte recovery in these samples. The blank indicated no contamination. Except for Tetryl, the target analyte recoveries in the QC spike ranged from 95% to 112%, also indicating acceptable analyte recoveries. The Tetryl recovery in the matrix spike was 61% and is outside the 70% to 130% acceptance range. All data may be used as reported, with the understanding that Tetryl data could be biased slightly low. Tetryl results are qualified as undetected estimated (UJ).

C-5.0 RESULTS OF DATA VALIDATION

Table C-5.0-1 summarizes any changes to qualifier flags during focused validation.

TABLE C-5.0-1
RESULT OF DATA VALIDATION FOR PRS 09-011(B)

Request Number	Suite	SPL ID	Matrix	Comments
17339	HE	AAB0825 and AAB0826	SOIL	All results qualified as undetected estimated (UJ) because recommended holding times were exceeded.
3849R	HE	0509-97-0001 thru 0509-97-0004	SOIL	Tetryl results qualified as undetected estimated (UJ) due to low recovery from the QC spike sample.

D-1.0 TARGET ANALYTES AND DECTECTION LIMITS

Table D-1.0-1 lists the target analytes and estimated quantitation limits for the fixed laboratory analyses conducted for this RCRA facility investigation. No field laboratory analyses were conducted.

Table D-1.0-1
Target Analytes and Estimated Quantitation Limits

Analyte	Matrix	Method ID[a]	EQL	units
Amino-2,6-dinitrotoluene[4-]	Soil	8330	ND[b]	mg/kg
Amino-4,6-dinitrotoluene[2-]	Soil	8330	.26	mg/kg
Dinitrobenzene[1,3-]	Soil	8330	.25	mg/kg
Dinitrotoluene[2,4-]	Soil	8330	.25	mg/kg
Dinitrotoluene[2,6-]	Soil	8330	.26	mg/kg
HMX	Soil	8330	2.2	mg/kg
Nitrobenzene	Soil	8330	.26	mg/kg
Nitrotoluene[2-]	Soil	8330	.25	mg/kg
Nitrotoluene[3-]	Soil	8330	.25	mg/kg
Nitrotoluene[4-]	Soil	8330	.25	mg/kg
RDX	Soil	8330	1.0	mg/kg
Tetryl	Soil	8330	.65	mg/kg
Trinitrobenzene[1,3,5-]	Soil	8330	.25	mg/kg
Trinitrotoluene[2,4,6-]	Soil	8330	.25	mg/kg
Antimony	Soil	3050/6020	.25	mg/kg
Cadmium	Soil	3050/6010	1	mg/kg
Chromium, Total	Soil	3050/6010	2	mg/kg
Lead	Soil	3050/6010	0.6	mg/kg
Silver	Soil	3050/6010	1	mg/kg

[a] SW-846 Method
[b] ND = Not determined

D-2.0 RFI ANALYTICAL RESULTS

The analytical data for PRSs 09-002 and 09-011(b) are presented in Table D-2.0-1. An abridged, hard copy of the table D-2.0-1 is included as an attachment to this report. A full table is included in electronic form in the attached diskette as an Excel 4.0 spreadsheet entitled RFIdata.xls. The quality control data is included in hardcopy form in the attached Table D-2.0-2. More detailed data have been submitted in electronic format to NMED HRMB, DOE, and the LANL ER Project RPF. Copies of the report that include electronic data have the notation "Data disks included with this copy" displayed on the cover. The electronic data are also available in the LANL Facility for Information Management, Analysis, and Display (FIMAD).

Table D-2.0-1
RFI Fixed-Laboratory Analytical Data

PRS ID	Location ID	Sample ID	Collection Depth (in.)	Sample Medium	Analyte Name	Sample Result	Units	RFI Qualifier
09-002	09-6000	AAB0896	0 – 6	Soil	Antimony	0.25	mg/kg	U
09-002	09-6000	AAB0896	0 – 6	Soil	Cadmium	0.4	mg/kg	U
09-002	09-6000	AAB0896	0 – 6	Soil	Silver	1	mg/kg	U
09-002	09-6000	AAB0896	0 – 6	Soil	Chromium, Total	7.4	mg/kg	None
09-002	09-6000	AAB0896	0 – 6	Soil	Lead	11	mg/kg	None
09-002	09-6001	AAB0897	0 – 6	Soil	Antimony	0.25	mg/kg	U
09-002	09-6001	AAB0897	0 – 6	Soil	Cadmium	0.4	mg/kg	U
09-002	09-6001	AAB0897	0 – 6	Soil	Silver	1	mg/kg	U
09-002	09-6001	AAB0897	0 – 6	Soil	Chromium, Total	3.5	mg/kg	None
09-002	09-6001	AAB0897	0 – 6	Soil	Lead	12	mg/kg	None
09-011(b)	09-4010	AAB0825	0 – 6	Soil	Amino-2,6-dinitrotoluene[4-]	0.13	mg/kg	UJ
09-011(b)	09-4010	AAB0825	0 – 6	Soil	Amino-4,6-dinitrotoluene[2-]	0.13	mg/kg	UJ
09-011(b)	09-4010	AAB0825	0 – 6	Soil	Dinitrobenzene[1,3-]	0.13	mg/kg	UJ
09-011(b)	09-4010	AAB0825	0 – 6	Soil	Dinitrotoluene[2,4-]	0.13	mg/kg	UJ
09-011(b)	09-4010	AAB0825	0 – 6	Soil	Dinitrotoluene[2,6-]	0.13	mg/kg	UJ
09-011(b)	09-4010	AAB0825	0 – 6	Soil	Nitrobenzene	0.13	mg/kg	UJ
09-011(b)	09-4010	AAB0825	0 – 6	Soil	Nitrotoluene[2-]	0.13	mg/kg	UJ
09-011(b)	09-4010	AAB0825	0 – 6	Soil	Nitrotoluene[3-]	0.13	mg/kg	UJ
09-011(b)	09-4010	AAB0825	0 – 6	Soil	Nitrotoluene[4-]	0.13	mg/kg	UJ
09-011(b)	09-4010	AAB0825	0 – 6	Soil	Trinitrobenzene[1,3,5-]	0.13	mg/kg	UJ
09-011(b)	09-4010	AAB0825	0 – 6	Soil	Trinitrotoluene[2,4,6-]	0.13	mg/kg	UJ
09-011(b)	09-4010	AAB0825	0 – 6	Soil	Tetryl	0.33	mg/kg	UJ
09-011(b)	09-4010	AAB0825	0 – 6	Soil	RDX	0.5	mg/kg	UJ
09-011(b)	09-4010	AAB0825	0 – 6	Soil	HMX	1.1	mg/kg	UJ
09-011(b)	09-4011	AAB0826	0 – 6	Soil	Amino-2,6-dinitrotoluene[4-]	0.13	mg/kg	UJ
09-011(b)	09-4011	AAB0826	0 – 6	Soil	Amino-4,6-dinitrotoluene[2-]	0.13	mg/kg	UJ
09-011(b)	09-4011	AAB0826	0 – 6	Soil	Dinitrobenzene[1,3-]	0.13	mg/kg	UJ
09-011(b)	09-4011	AAB0826	0 – 6	Soil	Dinitrotoluene[2,4-]	0.13	mg/kg	UJ
09-011(b)	09-4011	AAB0826	0 – 6	Soil	Dinitrotoluene[2,6-]	0.13	mg/kg	UJ
09-011(b)	09-4011	AAB0826	0 – 6	Soil	Nitrobenzene	0.13	mg/kg	UJ
09-011(b)	09-4011	AAB0826	0 – 6	Soil	Nitrotoluene[2-]	0.13	mg/kg	UJ
09-011(b)	09-4011	AAB0826	0 – 6	Soil	Nitrotoluene[3-]	0.13	mg/kg	UJ
09-011(b)	09-4011	AAB0826	0 – 6	Soil	Nitrotoluene[4-]	0.13	mg/kg	UJ
09-011(b)	09-4011	AAB0826	0 – 6	Soil	Trinitrobenzene[1,3,5-]	0.13	mg/kg	UJ
09-011(b)	09-4011	AAB0826	0 – 6	Soil	Trinitrotoluene[2,4,6-]	0.13	mg/kg	UJ
09-011(b)	09-4011	AAB0826	0 – 6	Soil	Tetryl	0.33	mg/kg	UJ

Table D-2.0-1 Continued
RFI Fixed-Laboratory Analytical Data

PRS ID	Location ID	Sample ID	Collection Depth (in.)	Sample Medium	Analyte Name	Sample Result	Units	RFI Qualifier
09-011(b)	09-4011	AAB0826	0 – 6	Soil	RDX	0.5	mg/kg	UJ
09-011(b)	09-4011	AAB0826	0 – 6	Soil	HMX	1.1	mg/kg	UJ
09-011(b)	09-4100	0509-97-0001	0 – 6	Soil	Trinitrotoluene[2,4,6-]	0.086	mg/kg	U
09-011(b)	09-4100	0509-97-0001	0 – 6	Soil	Dinitrotoluene[2,4-]	0.062	mg/kg	U
09-011(b)	09-4100	0509-97-0001	0 – 6	Soil	RDX	0.165	mg/kg	U
09-011(b)	09-4100	0509-97-0001	0 – 6	Soil	Amino-2,6-dinitrotoluene[4-]	0.086	mg/kg	U
09-011(b)	09-4100	0509-97-0001	0 – 6	Soil	HMX	0.165	mg/kg	U
09-011(b)	09-4100	0509-97-0001	0 – 6	Soil	Amino-4,6-dinitrotoluene[2-]	0.084	mg/kg	U
09-011(b)	09-4100	0509-97-0001	0 – 6	Soil	Tetryl	0.107	mg/kg	U
09-011(b)	09-4100	0509-97-0001	0 – 6	Soil	Dinitrotoluene[2,6-]	0.082	mg/kg	U
09-011(b)	09-4100	0509-97-0001	0 – 6	Soil	Nitrotoluene[2-]	0.164	mg/kg	U
09-011(b)	09-4100	0509-97-0001	0 – 6	Soil	Nitrobenzene	0.092	mg/kg	U
09-011(b)	09-4100	0509-97-0001	0 – 6	Soil	Nitrotoluene[3-]	0.162	mg/kg	U
09-011(b)	09-4100	0509-97-0001	0 – 6	Soil	Trinitrobenzene[1,3,5-]	0.082	mg/kg	U
09-011(b)	09-4100	0509-97-0001	0 – 6	Soil	Dinitrobenzene[1,3-]	0.081	mg/kg	U
09-011(b)	09-4100	0509-97-0001	0 – 6	Soil	Nitrotoluene[4-]	0.164	mg/kg	U
09-011(b)	09-4101	0509-97-0002	0 – 6	Soil	Trinitrotoluene[2,4,6-]	0.086	mg/kg	U
09-011(b)	09-4101	0509-97-0002	0 – 6	Soil	Dinitrotoluene[2,4-]	0.062	mg/kg	U
09-011(b)	09-4101	0509-97-0002	0 – 6	Soil	RDX	0.164	mg/kg	U
09-011(b)	09-4101	0509-97-0002	0 – 6	Soil	Amino-2,6-dinitrotoluene[4-]	0.086	mg/kg	U
09-011(b)	09-4101	0509-97-0002	0 – 6	Soil	HMX	0.164	mg/kg	U
09-011(b)	09-4101	0509-97-0002	0 – 6	Soil	Amino-4,6-dinitrotoluene[2-]	0.084	mg/kg	U
09-011(b)	09-4101	0509-97-0002	0 – 6	Soil	Tetryl	0.106	mg/kg	U
09-011(b)	09-4101	0509-97-0002	0 – 6	Soil	Dinitrotoluene[2,6-]	0.082	mg/kg	U
09-011(b)	09-4101	0509-97-0002	0 – 6	Soil	Nitrotoluene[2-]	0.164	mg/kg	U
09-011(b)	09-4101	0509-97-0002	0 – 6	Soil	Nitrobenzene	0.092	mg/kg	U
09-011(b)	09-4101	0509-97-0002	0 – 6	Soil	Nitrotoluene[3-]	0.162	mg/kg	U
09-011(b)	09-4101	0509-97-0002	0 – 6	Soil	Trinitrobenzene[1,3,5-]	0.082	mg/kg	U
09-011(b)	09-4101	0509-97-0002	0 – 6	Soil	Dinitrobenzene[1,3-]	0.081	mg/kg	U
09-011(b)	09-4101	0509-97-0002	0 – 6	Soil	Nitrotoluene[4-]	0.164	mg/kg	U
09-011(b)	09-4102	0509-97-0003	0 – 6	Soil	Trinitrotoluene[2,4,6-]	0.086	mg/kg	U
09-011(b)	09-4102	0509-97-0003	0 – 6	Soil	Dinitrotoluene[2,4-]	0.062	mg/kg	U
09-011(b)	09-4102	0509-97-0003	0 – 6	Soil	RDX	0.165	mg/kg	U
09-011(b)	09-4102	0509-97-0003	0 – 6	Soil	Amino-2,6-dinitrotoluene[4-]	0.086	mg/kg	U
09-011(b)	09-4102	0509-97-0003	0 – 6	Soil	HMX	0.165	mg/kg	U
09-011(b)	09-4102	0509-97-0003	0 – 6	Soil	Amino-4,6-dinitrotoluene[2-]	0.084	mg/kg	U

Table D-2.0-1 Continued
RFI Fixed-Laboratory Analytical Data

PRS ID	Location ID	Sample ID	Collection Depth (in.)	Sample Medium	Analyte Name	Sample Result	Units	RFI Qualifier
09-011(b)	09-4102	0509-97-0003	0 – 6	Soil	Tetryl	0.107	mg/kg	U
09-011(b)	09-4102	0509-97-0003	0 – 6	Soil	Dinitrotoluene[2,6-]	0.082	mg/kg	U
09-011(b)	09-4102	0509-97-0003	0 – 6	Soil	Nitrotoluene[2-]	0.164	mg/kg	U
09-011(b)	09-4102	0509-97-0003	0 – 6	Soil	Nitrobenzene	0.092	mg/kg	U
09-011(b)	09-4102	0509-97-0003	0 – 6	Soil	Nitrotoluene[3-]	0.162	mg/kg	U
09-011(b)	09-4102	0509-97-0003	0 – 6	Soil	Trinitrobenzene[1,3,5-]	0.082	mg/kg	U
09-011(b)	09-4102	0509-97-0003	0 – 6	Soil	Dinitrobenzene[1,3-]	0.081	mg/kg	U
09-011(b)	09-4102	0509-97-0003	0 – 6	Soil	Nitrotoluene[4-]	0.164	mg/kg	U
09-011(b)	09-4103	0509-97-0004	0 – 6	Soil	Trinitrotoluene[2,4,6-]	0.086	mg/kg	U
09-011(b)	09-4103	0509-97-0004	0 – 6	Soil	Dinitrotoluene[2,4-]	0.062	mg/kg	U
09-011(b)	09-4103	0509-97-0004	0 – 6	Soil	RDX	0.165	mg/kg	U
09-011(b)	09-4103	0509-97-0004	0 – 6	Soil	Amino-2,6-dinitrotoluene[4-]	0.086	mg/kg	U
09-011(b)	09-4103	0509-97-0004	0 – 6	Soil	HMX	0.165	mg/kg	U
09-011(b)	09-4103	0509-97-0004	0 – 6	Soil	Amino-4,6-dinitrotoluene[2-]	0.084	mg/kg	U
09-011(b)	09-4103	0509-97-0004	0 – 6	Soil	Tetryl	0.107	mg/kg	U
09-011(b)	09-4103	0509-97-0004	0 – 6	Soil	Dinitrotoluene[2,6-]	0.082	mg/kg	U
09-011(b)	09-4103	0509-97-0004	0 – 6	Soil	Nitrotoluene[2-]	0.164	mg/kg	U
09-011(b)	09-4103	0509-97-0004	0 – 6	Soil	Nitrobenzene	0.092	mg/kg	U
09-011(b)	09-4103	0509-97-0004	0 – 6	Soil	Nitrotoluene[3-]	0.162	mg/kg	U
09-011(b)	09-4103	0509-97-0004	0 – 6	Soil	Trinitrobenzene[1,3,5-]	0.082	mg/kg	U
09-011(b)	09-4103	0509-97-0004	0 – 6	Soil	Dinitrobenzene[1,3-]	0.081	mg/kg	U
09-011(b)	09-4103	0509-97-0004	0 – 6	Soil	Nitrotoluene[4-]	0.164	mg/kg	U

Table D-2.0-2
QC Data

PRS ID	Sample ID	Request NUM	Analyte	Result	Reporting Units	Lab Qualifier	QC Type
09-002	00.30469	17492	Antimony	3.3	MG/KG	None	Nonblind QC
09-002	00.28280	17492	Antimony	0.25	MG/KG	U	Blind
09-002	00.30469	17492	Barium	310	MG/KG	None	Nonblind QC
09-002	00.28280	17492	Barium	200	MG/KG	None	Blind
09-002	00.30469	17492	Beryllium	92	MG/KG	None	Nonblind QC
09-002	00.30482	17492	Beryllium	1400	UG/L	None	Blind
09-002	00.30469	17492	Cadmium	97	MG/KG	None	Nonblind QC
09-002	00.28280	17492	Cadmium	37	MG/KG	None	Blind
09-002	00.30469	17492	Chromium, Total	160	MG/KG	None	Nonblind QC
09-002	00.28280	17492	Chromium, Total	18	MG/KG	None	Blind
09-002	00.30469	17492	Copper	120	MG/KG	None	Nonblind QC
09-002	00.28280	17492	Copper	100	MG/KG	None	Blind
09-002	00.30469	17492	Lead	140	MG/KG	None	Nonblind QC
09-002	00.28280	17492	Lead	1100	MG/KG	None	Blind
09-002	00.29657	17492	Mercury	27	MG/KG	None	Nonblind QC
09-002	AAB0911	17492	Mercury	2	UG/L	None	Matrix Spike
09-002	00.00549	17492	Mercury	1.4	MG/KG	None	Blind
09-002	00.30469	17492	Silver	64	MG/KG	None	Nonblind QC
09-002	00.30482	17492	Silver	170	UG/L	None	Blind
09-011(b)	00.30757	17339	Amino-2,6-dinitrotoluene[4-]	0.13	MG/KG	U	BLANK
09-011(b)	00.30757	17339	Amino-4,6-dinitrotoluene[2-]	0.13	MG/KG	U	BLANK
09-011(b)	00.30757	17339	Dinitrobenzene [1,3-]	0.13	MG/KG	U	BLANK
09-011(b)	00.30757	17339	Dinitrotoluene [2,4-]	0.13	MG/KG	U	BLANK
09-011(b)	00.30757	17339	Dinitrotoluene [2,6-]	0.13	MG/KG	U	BLANK
09-011(b)	00.30757	17339	HMX	1.1	MG/KG	U	BLANK
09-011(b)	00.30757	17339	Methyl-5-nitroaniline[2-]	32	%	None	Surrogate
09-011(b)	AAB0811	17339	Methyl-5-nitroaniline[2-]	28	%	None	Surrogate
09-011(b)	AAB0813	17339	Methyl-5-nitroaniline[2-]	36	%	None	Surrogate
09-011(b)	AAB0815	17339	Methyl-5-nitroaniline[2-]	36	%	None	Surrogate
09-011(b)	AAB0817	17339	Methyl-5-nitroaniline[2-]	36	%	None	Surrogate
09-011(b)	AAB0819	17339	Methyl-5-nitroaniline[2-]	36	%	None	Surrogate
09-011(b)	AAB0821	17339	Methyl-5-nitroaniline[2-]	44	%	None	Surrogate

Table D-2.0-2
QC Data

PRS ID	Sample ID	Request NUM	Analyte	Result	Reporting Units	Lab Qualifier	QC Type
09-002	00.30469	17492	Antimony	3.3	MG/KG	None	Nonblind QC
09-002	00.28280	17492	Antimony	0.25	MG/KG	U	Blind
09-002	00.30469	17492	Barium	310	MG/KG	None	Nonblind QC
09-002	00.28280	17492	Barium	200	MG/KG	None	Blind
09-002	00.30469	17492	Beryllium	92	MG/KG	None	Nonblind QC
09-002	00.30482	17492	Beryllium	1400	UG/L	None	Blind
09-002	00.30469	17492	Cadmium	97	MG/KG	None	Nonblind QC
09-002	00.28280	17492	Cadmium	37	MG/KG	None	Blind
09-002	00.30469	17492	Chromium, Total	160	MG/KG	None	Nonblind QC
09-002	00.28280	17492	Chromium, Total	18	MG/KG	None	Blind
09-002	00.30469	17492	Copper	120	MG/KG	None	Nonblind QC
09-002	00.28280	17492	Copper	100	MG/KG	None	Blind
09-002	00.30469	17492	Lead	140	MG/KG	None	Nonblind QC
09-002	00.28280	17492	Lead	1100	MG/KG	None	Blind
09-002	00.29657	17492	Mercury	27	MG/KG	None	Nonblind QC
09-002	AAB0911	17492	Mercury	2	UG/L	None	Matrix Spike
09-002	00.00549	17492	Mercury	1.4	MG/KG	None	Blind
09-002	00.30469	17492	Silver	64	MG/KG	None	Nonblind QC
09-002	00.30482	17492	Silver	170	UG/L	None	Blind
09-011(b)	00.30757	17339	Amino-2,6-dinitrotoluene[4-]	0.13	MG/KG	U	BLANK
09-011(b)	00.30757	17339	Amino-4,6-dinitrotoluene[2-]	0.13	MG/KG	U	BLANK
09-011(b)	00.30757	17339	Dinitrobenzene [1,3-]	0.13	MG/KG	U	BLANK
09-011(b)	00.30757	17339	Dinitrotoluene [2,4-]	0.13	MG/KG	U	BLANK
09-011(b)	00.30757	17339	Dinitrotoluene [2,6-]	0.13	MG/KG	U	BLANK
09-011(b)	00.30757	17339	HMX	1.1	MG/KG	U	BLANK
09-011(b)	00.30757	17339	Methyl-5-nitroaniline[2-]	32	%	None	Surrogate
09-011(b)	AAB0811	17339	Methyl-5-nitroaniline[2-]	28	%	None	Surrogate
09-011(b)	AAB0813	17339	Methyl-5-nitroaniline[2-]	36	%	None	Surrogate
09-011(b)	AAB0815	17339	Methyl-5-nitroaniline[2-]	36	%	None	Surrogate
09-011(b)	AAB0817	17339	Methyl-5-nitroaniline[2-]	36	%	None	Surrogate
09-011(b)	AAB0819	17339	Methyl-5-nitroaniline[2-]	36	%	None	Surrogate
09-011(b)	AAB0821	17339	Methyl-5-nitroaniline[2-]	44	%	None	Surrogate

Table D-2.0-2
QC Data

PRS ID	Sample ID	Request NUM	Analyte	Result	Reporting Units	Lab Qualifier	QC Type
09-011(b)	AAB0823	17339	Methyl-5-nitroaniline[2-]	48	%	None	Surrogate
09-011(b)	AAB0825	17339	Methyl-5-nitroaniline[2-]	40	%	None	Surrogate
09-011(b)	AAB0826	17339	Methyl-5-nitroaniline[2-]	36	%	None	Surrogate
09-011(b)	AAB0827	17339	Methyl-5-nitroaniline[2-]	44	%	None	Surrogate
09-011(b)	AAB0829	17339	Methyl-5-nitroaniline[2-]	44	%	None	Surrogate
09-011(b)	AAB0831	17339	Methyl-5-nitroaniline[2-]	56	%	None	Surrogate
09-011(b)	AAB0833	17339	Methyl-5-nitroaniline[2-]	48	%	None	Surrogate
09-011(b)	AAB0835	17339	Methyl-5-nitroaniline[2-]	56	%	None	Surrogate
09-011(b)	AAB0837	17339	Methyl-5-nitroaniline[2-]	48	%	None	Surrogate
09-011(b)	AAB0839	17339	Methyl-5-nitroaniline[2-]	60	%	None	Surrogate
09-011(b)	AAB0841	17339	Methyl-5-nitroaniline[2-]	60	%	None	Surrogate
09-011(b)	AAB0843	17339	Methyl-5-nitroaniline[2-]	56	%	None	Surrogate
09-011(b)	AAB0845	17339	Methyl-5-nitroaniline[2-]	48	%	None	Surrogate
09-011(b)	00.30757	17339	Nitrobenzene	0.13	MG/KG	U	BLANK
09-011(b)	00.30757	17339	Nitrotoluene[2-]	0.13	MG/KG	U	BLANK
09-011(b)	00.30757	17339	Nitrotoluene[3-]	0.13	MG/KG	U	BLANK
09-011(b)	00.30757	17339	Nitrotoluene[4-]	0.13	MG/KG	U	BLANK
09-011(b)	00.30757	17339	RDX	0.5	MG/KG	U	BLANK
09-011(b)	00.30757	17339	Tetryl	0.33	MG/KG	U	BLANK
09-011(b)	00.30757	17339	Trinitrobenzene [1,3,5-]	0.13	MG/KG	U	BLANK
09-011(b)	00.30757	17339	Trinitrotoluene [2,4,6-]	0.13	MG/KG	U	BLANK
09-011(b)	QC-97-21036	3849R	Amino-2,6-dinitrotoluene [4-]	0.084	MG/KG	U	BLANK
09-011(b)	QC-97-21037	3849R	Amino-2,6-dinitrotoluene[4-]	102.1	%	None	Blank spike
09-011(b)	QC-97-21036	3849R	Amino-4,6-dinitrotoluene[2-]	0.082	MG/KG	U	BLANK
09-011(b)	QC-97-21037	3849R	Amino-4,6-dinitrotoluene[2-]	101.3	%	None	Blank spike

Table D-2.0-2
QC Data

09-011(b)	QC-97-21037	3849R	Trinitrobenzene [1,3,5-]	107.7	%	None	QC spike
09-011(b)	QC-97-21036	3849R	Trinitrotoluene [2,4,6-]	0.084	MG/KG	U	BLANK
09-011(b)	QC-97-21037	3849R	Trinitrotoluene [2,4,6-]	95.5	%	None	QC spike

APPENDIX E STATISTICAL ANALYSES

No statistical analyses are required for data from PRSs 09-002 and 09-011(b).

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ECOLOGICAL SCOPING CHECKLIST OBJECTIVES AND PREPARATION INSTRUCTIONS

Objectives of checklist:

Confirm that ecological receptors can be affected by release

Determine if PRSs should be combined for screening

Evaluate data adequacy - primarily related to nature, rate and extent of contamination

Prepare for HQ/HI analysis (determine which screen is appropriate: terrestrial, aquatic screen, both?)

Provide information for prioritization / uncertainty analysis, e.g. what are the dominant/important transport pathways, exposure routes, and receptors

Scoping checklist instructions:

Obtain the following information to prepare for the scoping meeting

Most current biological information for the PRS, which is typically the Biological and Floodplain Assessment for applicable OU and/or TA

Surface runoff and erosion information from AP 4.5 Parts A,B

RFI Work Plan or Report, as applicable, that provide: contamination source, sample locations, analytical suites, results

FIMAD - Arcinfo maps that show the following features: neighboring PRSs, sample locations, vegetation types, watershed name, wetlands

Focus area manager for PRS or PRS aggregate will arrange a meeting prior to the site visit

Complete Section A of the checklist during the scoping meeting

Arrange site visit at an appropriate time of year (ideally spring or summer) to properly evaluate biological resources at the site (if the site visit is planned for another time of year make note of any uncertainties introduced in the initial biological assessment by such timing). The following resources are typically needed for the site visit:

Maps showing sample locations and results should be taken on site visit

Camera to record site conditions

If significant biological or contaminant transport features are noted, the following items will be useful:

Distance measuring device, either a measuring tape or rangefinder

GPS or markers to specify locations for surveying

Complete Section B of the checklist during the site visit

Complete Section C of the checklist after the site visit (should be completed within 1-2 days of site visit)

Ecological Scoping Checklist: Part A
Scoping Meeting Documentation

Site ID	TA-9, PRS 09-002
Nature of PRS releases (indicate all that apply)	**Solid XXX** Primary release mechanism would consist of ash deposition with retention in burn pit. Secondary release mechanisms would include release of air borne particulates during burning and wind/water borne erosion in the interim following active burning Liquid Gaseous Other, explain
List of Primary Impacted Media (indicate all that apply)	**Surface soil XXX** Primary potentially impacted media consist of surface soils within the pit and secondarily subsurface soils below the pit impacted by leaching of metals and/or burn products Surface water/sediment **Subsurface XXX** Groundwater Other, explain
FIMAD vegetation class (indicate all that apply)	Water Bare Ground Spruce/fir/aspen/mixed conifer **Ponderosa pine XXX** Piñon juniper/juniper woodland Grassland/shrubland Developed
Is T&E Habitat Present? list species if applicable	Per memo, T&E and Cultural Review of PRSs 09-002, 09-011(b), 09-011(c). PRS 09-002 is located at least 1600 feet from the nearest T & E habitat. This is based on a review of T & E habitat data located on the GIS databases maintained by the Ecology Group, ESH-20.
Provide list and description of Neighboring/ Contiguous/ Upgradient PRSs (consider need to aggregate PRS for screening)	The following PRSs are within a 400' radius of 09-002 • 09-001(a,b), control buildings for a firing area • C-09-005, location of an X-unit (CDU) chamber • 09-001(c), recovery pit for test shots, approx. 12'x12'x8' steel lined and covered used sparingly (failed). • 09-009, sewage lagoon Potential for impact to 09-002 from other PRSs is remote, aggregation not required for decision making.
AP 4.5 Part B Information Run-off score (out of 46) Terminal point of surface water transport	AP 4.5 run-off score, 0.0. Terminal point of surface water transport from the area would be Pajarito canyon via Arroyo LaDelfe.
Other Scoping Meeting Notes	There is no clearly defined burn pit observable by ash deposit or burn products in the area. Prior to sampling, a different area was identified as the PRS but this area was not sampled when field personnel found no evidence of burning in the designated area. The current PRS location is based on best information available through site personnel interviews. No better potential sites were observed in the area during reconnaissance.

Ecological Scoping Checklist: Part B Continued
Site Visit Documentation

No Receptor/ No Pathways:

If there are no receptors and no offsite transport pathways the remainder of the checklist should not be completed. Stop here and provide any additional explanation/justification for proposing an ecological No Further Action recommendation (if needed).

Data Adequacy:

Do existing data provide information on the nature, rate and extent of contamination? (yes/no/uncertain) Provide explanation (consider if the maximum value was captured by existing sample data)	Yes. PRS samples were analyzed for a limited suite of five ink and photo associated metals, i.e., Sb, Cd, Cr, Pb, and Ag. No metal was reported at a concentration exceeding its background screening value. Focused data validation determined that the data were usable for site decisions and it was concluded that no contamination persists at the sampled area. The metal oxides resulting for burning would be expected to be immobile and the surficial soil sampling should have captured maximum contaminant concentrations.
Do existing data for the PRS address potential pathways of site contamination? (yes/no/uncertain) Provide explanation (consider if other sites could be impacting this PRS)	No. No investigation of additional migration pathways occurred during the phase one sampling. Existing data and physical setting indicate that additional sampling is not required.

Additional Field Notes:

Provide additional field notes on the site setting and potential ecological receptors.
As previously stated, there was some uncertainty regarding the location of the burn pit PRS. The first area, approximate location XXX was augered and no ash or burn product deposition was observed. No samples were taken at the original location and the location sampled and reported in this RFI was specified by past employees (names). The sampled area, a depression approximately 10'x10' was sampled in the absence of physical evidence of burning. Reconnaissance of the area by A. Dye, K. Uher and L. Voss failed to identify any more reasonable candidate sites.

Ecological Scoping Checklist: Part C
Ecological Pathways Conceptual Exposure Model

Provide answers to Questions A to Q and use this information to complete the Ecological Pathways Conceptual Exposure Model

Question A:

Could soil contaminants reach receptors via vapors?

Volatility of the hazardous substance (volatile chemicals generally have Henry's Law constant $>10^{-5}$ atm-me/mol and molecular weight <200 g/mol).

Answer (yes/**no**/uncertain)

Provide explanation: No contaminants of concern were observed at the PRS.

Question B:

Could the soil contaminants identified above reach receptors through fugitive dust carried in air?

Soil contamination would have to be on the actual surface of the soil to become available for dust.

In the case of dust exposures to burrowing animals, the contamination would have to occur in the depth interval where these burrows occur.

Answer (yes/**no**/uncertain)

Provide explanation: No contaminants of concern were observed at the PRS.

Question C:

Can contaminated soil be transported to aquatic ecological communities (use AP 4.5 run-off score and terminal point of surface water runoff to help answer this question)?

If the AP 4.5 run-off score* equal to zero, this suggests that erosion at PRS is not a transport pathway. (* note that the runoff score is not the entire erosion potential score, rather it is a subtotal of this score with a maximum value of 46 points)

If erosion is a transport pathway, evaluate the terminal point to see if aquatic receptors could be affected.

Answer (yes/no/uncertain)

Provide explanation: The AP 4.5 run-off score of 0.0 indicates that erosion is not a viable transport pathway. In addition, no contaminants of concern were observed at the PRS.

Question D:

Is contaminated groundwater potentially available to biological receptors through seeps or springs?

Known or suspected presence of contaminants in groundwater.

The potential for contaminants to migrate via groundwater and discharge into habitats and/or surface waters.

Contaminants may be taken up by terrestrial and rooted aquatic plants whose roots are in contact with groundwater present within the root zone (~1 m depth).

Terrestrial wildlife receptors generally will not contact groundwater unless it is discharged to the surface.

Answer (yes/**no**/uncertain)

Provide explanation: Although no data exist regarding the presence of contaminated seeps or springs in the area, the results of the RFI indicate that no source term exists for migration to groundwater. Therefore this potential pathway is **highly** unlikely.

Question E:

Is infiltration/percolation from contaminated subsurface material a viable transport pathway?

Suspected ability of contaminants to migrate to groundwater.

The potential for contaminants to migrate via groundwater and discharge into habitats and/or surface waters.

Contaminants may be taken up by terrestrial and rooted aquatic plants whose roots are in contact with groundwater present within the root zone (~1 m depth).

Terrestrial wildlife receptors generally will not contact groundwater unless it is discharged to the surface.

Also consider the importance of mass wasting as a potential release mechanism for subsurface material.

Answer (yes/**no**/uncertain)

Provide explanation: No substantial source term was expected. No persistent, contaminated source area was found and infiltration/percolation of contaminated subsurface material is **not** a viable transport pathway

Question F:

Could airborne contaminants interact with receptors through respiration of vapors?

Contaminants must be present as volatiles in the air.

Consider the importance of inhalation of vapors for burrowing animals.

Foliar uptake of organic vapors is typically not a significant pathway.

Provide quantification of pathway (**0=no pathway**, 1=unlikely pathway, 2=minor pathway, 3=major pathway)

Provide explanation: No volatiles, no pathway.

Question G:

Could airborne contaminants interact with plants through deposition of particulates or with animals through inhalation of fugitive dust?

Contaminants must be present as particulates in the air or as dust for this pathway to be viable.

Exposure via inhalation of fugitive dust is particularly applicable to ground-dwelling species that would be exposed to dust disturbed by their foraging or burrowing activities or by wind movement.

Provide quantification of pathway (**0=no pathway**, 1=unlikely pathway, 2=minor pathway, 3=major pathway)

Provide explanation: No source area of contamination was identified and therefore no pathway exists.

Question H:

Could contaminants interact with plants through root uptake or rain splash from surficial soils?

Contaminants in bulk soil may partition into soil solution, making them available to roots.

Exposure of terrestrial plants to contaminants present in particulates deposited on leaf and stem surfaces by rain striking contaminated soils (i.e., rain splash).

Provide quantification of pathway (**0=no pathway**, 1=unlikely pathway, 2=minor pathway, 3=major pathway)

Provide explanation: No source area of contamination was identified and therefore no pathway exists.

Question I:

Could contaminants interact with receptors through food web transport from surficial soils?

The chemicals may bioaccumulate in animals (see list of bioaccumulating chemicals presented in Table 1).

Animals may ingest contaminated prey.

Provide quantification of pathway (**0=no pathway**, 1=unlikely pathway, 2=minor pathway, 3=major pathway)

Provide explanation: No source area of contamination was identified and therefore no pathway exists.

Question J:

Could contaminants interact with receptors via incidental ingestion of surficial soils?

Incidental ingestion of contaminated soil could occur while animals grub for food resident in the soil, feed on plant matter covered with contaminated soil or while grooming themselves clean of soil.

Provide quantification of pathway (**0=no pathway**, 1=unlikely pathway, 2=minor pathway, 3=major pathway)

Provide explanation: No source area of contamination was identified and therefore no pathway exists.

Question K:

Could contaminants interact with receptors through dermal contact with surficial soils?

Significant exposure via dermal contact would generally be limited to organic contaminants which are lipophilic and can cross epidermal barriers.

Provide quantification of pathway (**0=no pathway**, 1=unlikely pathway, 2=minor pathway, 3=major pathway)

Provide explanation: No source area of contamination was identified and therefore no pathway exists.

Question L:

Could contaminants interact with plants or animals through external irradiation?

External irradiation effects are most relevant for gamma emitting radionuclides.

Burial of contamination severely attenuates radiological exposure.

Provide quantification of pathway (**0=no pathway**, 1=unlikely pathway, 2=minor pathway, 3=major pathway)

Provide explanation: No source area of contamination was identified and therefore no pathway exists.

Question M:

Could contaminants interact with plants through direct uptake from water and sediment or sediment rain splash?

Contaminants may be taken-up by terrestrial plants whose roots are in contact with surface waters.

Terrestrial plants may be exposed to particulates deposited on leaf and stem surfaces by rain striking contaminated sediments (i.e., rain splash). in an area that is only periodically inundated with water.

Contaminants in sediment may partition into soil solution, making them available to roots.

Aquatic plants are in direct contact with water.

Provide quantification of pathway (**0=no pathway**, 1=unlikely pathway, 2=minor pathway, 3=major pathay)

Provide explanation: No source area of contamination was identified and therefore no pathway exists.

Question N:

Could contaminants interact with receptors through food web transport from water and sediment?

The chemicals may bioaccumulate in animals (see list of bioaccumulating chemicals presented in Table 1)

Animals may ingest contaminated prey.

Provide quantification of pathway (**0=no pathway**, 1=unlikely pathway, 2=minor pathway, 3=major pathway)

Provide explanation: No source area of contamination was identified and therefore no pathway exists.

Question O:

Could contaminants interact with receptors via incidental ingestion of water and sediment?

If sediments are present in an area that is only periodically inundated with water, terrestrial receptors may incidentally ingest sediments.

Terrestrial receptors may ingest water-borne contaminants if contaminated surface waters are used as a drinking water source.

Aquatic receptors may regularly or incidentally ingest sediment while foraging.

Provide quantification of pathway (**0=no pathway**, 1=unlikely pathway, 2=minor pathway, 3=major pathway)

Provide explanation: No source area of contamination was identified and therefore no pathway exists.

Question P:

Could contaminants interact with receptors through dermal contact with water and sediment?

If sediments are present in an area that is only periodically inundated with water, terrestrial species may be dermally exposed during dry periods.

Terrestrial organisms may be dermally exposed to water-borne contaminants as a result of wading or swimming in contaminated waters.

Aquatic receptors may be directly exposed to sediments or may be exposed through osmotic exchange, respiration, or ventilation of sediment pore waters.

Aquatic receptors may be exposed through osmotic exchange, respiration, or ventilation of surface waters.

Provide quantification of pathway (**0=no pathway**, 1=unlikely pathway, 2=minor pathway, 3=major pathway)

Provide explanation: No source area of contamination was identified and therefore no pathway exists.

Question Q:

Could contaminants interact with plants or animals through external irradiation?

External irradiation effects are most relevant for gamma emitting radionuclides.

Burial of contamination severely attenuates radiological exposure.

The water column acts to absorb radiation, thus external irradiation is typically more important for sediment dwelling organisms.

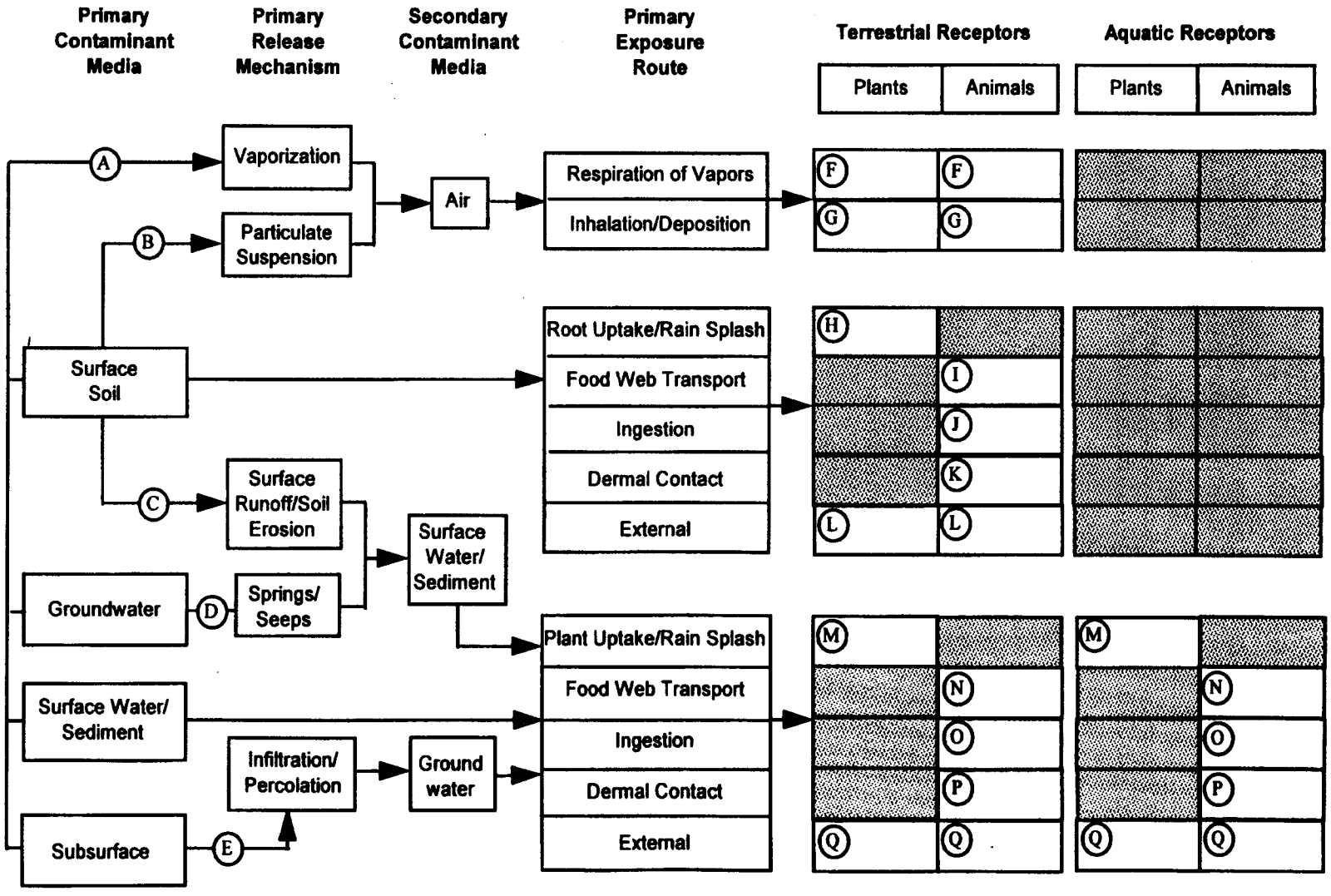
Provide quantification of pathway (**0=no pathway**, 1=unlikely pathway, 2=minor pathway, 3=major pathway)

Provide explanation: No source area of contamination was identified and therefore no pathway exists.

Table 1
List of Bioaccumulating Chemicals

Volatile Organics	**PCBs/Pesticides**
Bis(2-ethylhexyl)phthalate	All Aroclors
Butyl benzyl phthalate	beta-BHC
Dichlorobenzene[1,4-]	BHC-mixed isomers
Di-n-butyl phthalate	Chlordane
Di-n-octyl phthalate	Chlorecone (Kepone)
Trichlorobenzene[1,2,4-]	DDT and metabolites
Xylene (mixed isomers)	Dieldrin
	Endosulfan
Semivolatile Organics	Endrin
Acenaphthene	Heptaclor
Anthracene	Lindane
Benzo(a)anthracene	Methoxyclor
Benzo(a)pyrene	Toxaphene
Benzo(b)fluoranthene	
Benzo(g,h,i)perylene	**Inorganics**
Benzo(k)fluoranthene	Aluminum
Chrysene	Cadmium
Dibenzo(a,h)anthracene	Copper
Fluoranthene	Lead
Fluorene	Mercury
Indeno(1,2,3-cd)pyrene	Nickel
Phenanthrene	Selenium
Pyrene	
Pentachloronitrobenzene	**Radionuclides**
Pentachlorophenol	Americium-241
	Cesium-137
Dioxins/Furans	Radium-226,-228
Dibenzofuran	Strontium-90
2,3,7,8-tetrachloro-dibenzo(p)dioxin	Thorium-228,-230,-232
2,3,7,8-tetrachloro-dibenzo(p)furan	Uranium-234,-235,-238

Ecological Scoping Checklist: Ecological Pathways Conceptual Exposure Model



Signatures and certifications:

Checklist completed by (provide name, organization and phone number)

Name (printed): Lance Voss

Name (signature): Lance Voss

Organization: Neptune and Company

Phone number: (505) 662-0707 ext 23

Date completed: 17 July 1998

Verification by a member of ER Project Ecological Risk Task Team (provide name, organization and phone number)

Name (printed): Mark M. Hooten

Name (signature): Mark M. Hooten

Organization: Neptune & Co., Inc.

Phone number: 505-662-0707 x30

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Ecological Scoping Checklist: Part A
Scoping Meeting Documentation

Site ID	TA-9, PRS 09-011(b) HE equipment storage area
Nature of PRS releases (indicate all that apply)	**Solid XXX** Potential releases would have occurred as solid HE particles washed or otherwise released from potentially contaminated equipment. Wash water or precipitation drainage may have contained dissolved or entrained particles of HE. **Liquid XXX** Gaseous Other, explain
List of Primary Impacted Media (indicate all that apply)	**Surface soil XXX** The liquid run-off from the storage area may have primarily impacted surface soils surrounding the asphalt pad through direct contact and infiltration. **Surface water/sediment XXX** The potential exists for limited impact to surface water and sediments in the associated drainage east of the storage area. **Subsurface XXX** The potential exists for limited infiltration/percolation of relatively insoluble HE into subsurface soils. Groundwater Other, explain
FIMAD vegetation class (indicate all that apply)	**Developed XXX** The storage area was on the southeast corner of an asphalt parking lot south of Magazine TA-9-39. Any off site migration would be through a drainage ditch and into Ponderosa Pine vegetation class to the southeast. Water Bare Ground Spruce/fir/aspen/mixed conifer **Ponderosa pine** Piñon juniper/juniper woodland Grassland/shrubland
Is T&E Habitat Present? list species if applicable	Per memo, T&E and Cultural Review of PRSs 09-002, 09-011(b), 09-011(c). PRS 09-011(b) is located at least 1600 feet from the nearest T & E habitat. This is based on a review of T & E habitat data located on the GIS databases maintained by the Ecology Group, ESH-20.
Provide list and description of Neighboring/ Contiguous/ Upgradient PRSs (consider need to aggregate PRS for screening)	The following PRSs are located within a 400' radius of PRS 09-011(b). • PRSs 09-004(c,d,e,f,j,k, and m) - All are settling tanks associated with individual TA operations. All are metal lined concrete, are periodically pumped and do not release to the environment. All are deferred to D&D. • PRS 09-010(b) - Previously removed, steel framed corrugated structure. Approximately 3'x11' used as a waste can shelter outside TA 9-42, a building used for nuclear compatibility testing.

Ecological Scoping Checklist: Part A Continued
Scoping Meeting Documentation

AP 4.5 Part B Information Run-off score (out of 46) Terminal point of surface water transport	AP 4.5 run-off score, 0.0. Terminal point of surface water transport from the area would be Pajarito Canyon.
Other Scoping Meeting Notes	The original RFI sampling consisted of surface soils at two locations. This sampling was augmented in 1997 by the collection of four additional surface soil samples. One sample was collected from soil receiving run-off from the asphalt pad. Three additional samples were collected in sediment traps in the associated drainage channel. One drainage location was upgradient of the PRS and two were placed downgradient to assess migration off-site.

Ecological Scoping Checklist: Part B
Site Visit Documentation

Site ID	TA-9, PRS 09-011(b)
Date of Site Visit	5 May 1998
Site Visit Conducted by	A. Dye, K. Uher, and L. Voss

Receptor Information:

Estimate cover	75% vegetated % wetland 25% structures/asphalt, etc.	PRS is located on corner of parking area in a developed portion of the lab. Estimate includes the area potentially impacted by drainage
Field notes on the FIMAD vegetation class	Ponderosa pine vegetation class south and southeast of the PRS. Trees 12"-14" dbh, understory is clear with heavy needle cover and sparse grasses, some scrub oak inclusions.	
Field notes on T&E Habitat, if applicable	Not Applicable.	
Are ecological receptors present at the PRS? (**yes**/no/uncertain) Provide explanation	Yes in undeveloped area to the southeast. Clear evidence of elk tracks and scat. Numerous squirrel cuttings and cover makes the habitat suitable for resident small mammals and for nesting activities of bird species. Ken Uher stated that deer, raccoons, hawks and small rodents are also commonly observed in the area.	

Contaminant Transport Information:

Surface water transport Field notes on the terminal point of surface water transport (if applicable)	The distinct drainage feature from the PRS terminates ~75 yd. south/southeast of 09-011(b) in a stand of Pond. pine. The drainage resumes ~20 yd. downgradient and meanders along the TA-9 fenceline to the east.
Are there any off-site transport pathways? (**yes**/no/uncertain) Provide explanation	Yes. The primary potential exists for off-site transport via the surface drainage associated with the PRS. There is limited potential for wind borne erosion due to the extremely small area of the PRS.

Ecological Effects Information:

Physical Disturbance (provide list of major types of disturbances)	No apparent physical disturbance associated with the PRS or past operations.
Are there obvious ecological effects? (yes/**no**/uncertain) Provide explanation	No.

Ecological Scoping Checklist: Part B Continued
Site Visit Documentation

No Receptor/ No Pathways:

If there are no receptors and no offsite transport pathways the remainder of the checklist should not be completed. Stop here and provide any additional explanation/justification for proposing an ecological No Further Action recommendation (if needed).

Data Adequacy:

Do existing data provide information on the nature, rate and extent of contamination? (**yes**/no/uncertain) Provide explanation (consider if the maximum value was captured by existing sample data)	Yes. The RFI sampling was designed to investigate maximally impacted areas of the PRS. No HE target analytes were reported to be positively detected in any investigation sample. The problem of uncertainty and low bias in the 1994 data has been eliminated by the acquisition of higher quality 1997 data confirming the absence of HE at the PRS. The 1997 data also confirms the absence of contaminant transport and deposition in the downgradient drainage channel Based on this review of the HE data, no release or persistent contamination is indicated at the site and the investigation adequately addressed potential contaminant run-off
Do existing data for the PRS address potential pathways of site contamination? (**yes**/no/uncertain) Provide explanation (consider if other sites could be impacting this PRS)	Yes. The existing data address the primary pathways of contaminant transport to surface soils and further migration off-site in a local drainage. One sample was collected upgradient of the PRS to assess potential run-on into the drainage from other areas of the TA. The wind borne erosion and deposition pathway was considered to be extremely limited at this PRS and was not evaluated.

Additional Field Notes:

Provide additional field notes on the site setting and potential ecological receptors.

Ecological Scoping Checklist: Part C
Ecological Pathways Conceptual Exposure Model

Provide answers to Questions A to Q and use this information to complete the Ecological Pathways Conceptual Exposure Model

Question A:

Could soil contaminants reach receptors via vapors?

Volatility of the hazardous substance (volatile chemicals generally have Henry's Law constant $>10^{-5}$ atm-me/mol and molecular weight <200 g/mol).

Answer (yes/**no**/uncertain)

Provide explanation: No contaminants of concern were observed at the PRS.

Question B:

Could the soil contaminants identified above reach receptors through fugitive dust carried in air?

Soil contamination would have to be on the actual surface of the soil to become available for dust.

In the case of dust exposures to burrowing animals, the contamination would have to occur in the depth interval where these burrows occur.

Answer (yes/**no**/uncertain)

Provide explanation: No contaminants of concern were observed at the PRS.

Question C:

Can contaminated soil be transported to aquatic ecological communities (use AP 4.5 run-off score and terminal point of surface water runoff to help answer this question)?

If the AP 4.5 run-off score* equal to zero, this suggests that erosion at PRS is not a transport pathway. (* note that the runoff score is not the entire erosion potential score, rather it is a subtotal of this score with a maximum value of 46 points)

If erosion is a transport pathway, evaluate the terminal point to see if aquatic receptors could be affected.

Answer (yes/no/uncertain)

Provide explanation: The AP 4.5 run-off score of 0.0 indicates that erosion is not a viable transport pathway. In addition, no contaminants of concern were observed at the PRS.

Question D:

Is contaminated groundwater potentially available to biological receptors through seeps or springs?

Known or suspected presence of contaminants in groundwater.

The potential for contaminants to migrate via groundwater and discharge into habitats and/or surface waters.

Contaminants may be taken up by terrestrial and rooted aquatic plants whose roots are in contact with groundwater present within the root zone (~1 m depth).

Terrestrial wildlife receptors generally will not contact groundwater unless it is discharged to the surface.

Answer (yes/**no**/uncertain)

Provide explanation: Although no data exist regarding the presence of contaminated seeps or springs in the area, the results of the RFI indicate that no source term exists for migration to groundwater. Therefore this potential pathway is **highly** unlikely.

Question E:

Is infiltration/percolation from contaminated subsurface material a viable transport pathway?

Suspected ability of contaminants to migrate to groundwater.

The potential for contaminants to migrate via groundwater and discharge into habitats and/or surface waters.

Contaminants may be taken up by terrestrial and rooted aquatic plants whose roots are in contact with groundwater present within the root zone (~1 m depth).

Terrestrial wildlife receptors generally will not contact groundwater unless it is discharged to the surface.

Also consider the importance of mass wasting as a potential release mechanism for subsurface material.

Answer (yes/**no**/uncertain)

Provide explanation: No substantial source term was expected. No persistent, contaminated source area was found and infiltration/percolation of contaminated subsurface material is **not** a viable transport pathway

Question F:

Could airborne contaminants interact with receptors through respiration of vapors?

Contaminants must be present as volatiles in the air.

Consider the importance of inhalation of vapors for burrowing animals.

Foliar uptake of organic vapors is typically not a significant pathway.

Provide quantification of pathway (**0=no pathway**, 1=unlikely pathway, 2=minor pathway, 3=major pathway)

Provide explanation: No volatiles, no pathway.

Question G:

Could airborne contaminants interact with plants through deposition of particulates or with animals through inhalation of fugitive dust?

Contaminants must be present as particulates in the air or as dust for this pathway to be viable.

Exposure via inhalation of fugitive dust is particularly applicable to ground-dwelling species that would be exposed to dust disturbed by their foraging or burrowing activities or by wind movement.

Provide quantification of pathway (**0=no pathway**, 1=unlikely pathway, 2=minor pathway, 3=major pathway)

Provide explanation: No source area of contamination was identified and therefore no pathway exists.

Question H:

Could contaminants interact with plants through root uptake or rain splash from surficial soils?

Contaminants in bulk soil may partition into soil solution, making them available to roots.

Exposure of terrestrial plants to contaminants present in particulates deposited on leaf and stem surfaces by rain striking contaminated soils (i.e., rain splash).

Provide quantification of pathway (**0=no pathway**, 1=unlikely pathway, 2=minor pathway, 3=major pathway)

Provide explanation: No source area of contamination was identified and therefore no pathway exists.

Question I:

Could contaminants interact with receptors through food web transport from surficial soils?

The chemicals may bioaccumulate in animals (see list of bioaccumulating chemicals presented in Table 1).

Animals may ingest contaminated prey.

Provide quantification of pathway (**0=no pathway**, 1=unlikely pathway, 2=minor pathway, 3=major pathway)

Provide explanation: No source area of contamination was identified and therefore no pathway exists.

Question J:

Could contaminants interact with receptors via incidental ingestion of surficial soils?

Incidental ingestion of contaminated soil could occur while animals grub for food resident in the soil, feed on plant matter covered with contaminated soil or while grooming themselves clean of soil.

Provide quantification of pathway (**0=no pathway**, 1=unlikely pathway, 2=minor pathway, 3=major pathway)

Provide explanation: No source area of contamination was identified and therefore no pathway exists.

Question K:

Could contaminants interact with receptors through dermal contact with surficial soils?

Significant exposure via dermal contact would generally be limited to organic contaminants which are lipophilic and can cross epidermal barriers.

Provide quantification of pathway (**0=no pathway**, 1=unlikely pathway, 2=minor pathway, 3=major pathway)

Provide explanation: No source area of contamination was identified and therefore no pathway exists.

Question L:

Could contaminants interact with plants or animals through external irradiation?

External irradiation effects are most relevant for gamma emitting radionuclides.

Burial of contamination severely attenuates radiological exposure.

Provide quantification of pathway (**0=no pathway**, 1=unlikely pathway, 2=minor pathway, 3=major pathway)

Provide explanation: No source area of contamination was identified and therefore no pathway exists.

Question M:

Could contaminants interact with plants through direct uptake from water and sediment or sediment rain splash?

Contaminants may be taken-up by terrestrial plants whose roots are in contact with surface waters.

Terrestrial plants may be exposed to particulates deposited on leaf and stem surfaces by rain striking contaminated sediments (i.e., rain splash). in an area that is only periodically inundated with water.

Contaminants in sediment may partition into soil solution, making them available to roots.

Aquatic plants are in direct contact with water.

Provide quantification of pathway (**0=no pathway**, 1=unlikely pathway, 2=minor pathway, 3=major pathway)

Provide explanation: No source area of contamination was identified and therefore no pathway exists.

Question N:

Could contaminants interact with receptors through food web transport from water and sediment?

The chemicals may bioaccumulate in animals (see list of bioaccumulating chemicals presented in Table 1)

Animals may ingest contaminated prey.

Provide quantification of pathway (**0=no pathway**, 1=unlikely pathway, 2=minor pathway, 3=major pathway)

Provide explanation: No source area of contamination was identified and therefore no pathway exists.

Question O:

Could contaminants interact with receptors via incidental ingestion of water and sediment?

If sediments are present in an area that is only periodically inundated with water, terrestrial receptors may incidentally ingest sediments.

Terrestrial receptors may ingest water-borne contaminants if contaminated surface waters are used as a drinking water source.

Aquatic receptors may regularly or incidentally ingest sediment while foraging.

Provide quantification of pathway (**0=no pathway**, 1=unlikely pathway, 2=minor pathway, 3=major pathway)

Provide explanation: No source area of contamination was identified and therefore no pathway exists.

Question P:

Could contaminants interact with receptors through dermal contact with water and sediment?

If sediments are present in an area that is only periodically inundated with water, terrestrial species may be dermally exposed during dry periods.

Terrestrial organisms may be dermally exposed to water-borne contaminants as a result of wading or swimming in contaminated waters.

Aquatic receptors may be directly exposed to sediments or may be exposed through osmotic exchange, respiration, or ventilation of sediment pore waters.

Aquatic receptors may be exposed through osmotic exchange, respiration, or ventilation of surface waters.

Provide quantification of pathway (**0=no pathway**, 1=unlikely pathway, 2=minor pathway, 3=major pathway)

Provide explanation: No source area of contamination was identified and therefore no pathway exists.

Question Q:

Could contaminants interact with plants or animals through external irradiation?

External irradiation effects are most relevant for gamma emitting radionuclides.

Burial of contamination severely attenuates radiological exposure.

The water column acts to absorb radiation, thus external irradiation is typically more important for sediment dwelling organisms.

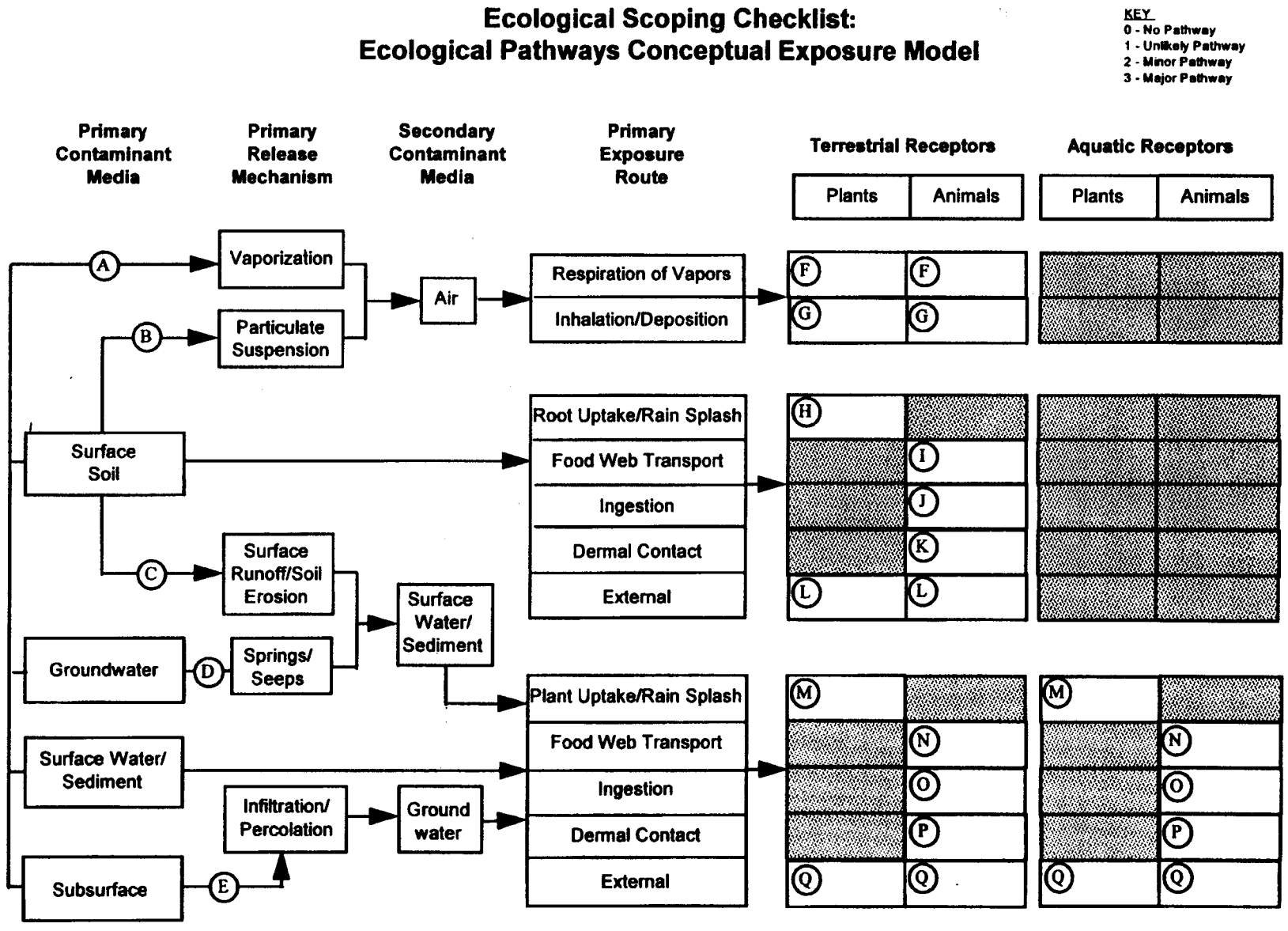
Provide quantification of pathway (**0=no pathway**, 1=unlikely pathway, 2=minor pathway, 3=major pathway)

Provide explanation: No source area of contamination was identified and therefore no pathway exists.

Table 1
List of Bioaccumulating Chemicals

Volatile Organics	**PCBs/Pesticides**
Bis(2-ethylhexyl)phthalate	All Aroclors
Butyl benzyl phthalate	beta-BHC
Dichlorobenzene[1,4-]	BHC-mixed isomers
Di-n-butyl phthalate	Chlordane
Di-n-octyl phthalate	Chlorecone (Kepone)
Trichlorobenzene[1,2,4-]	DDT and metabolites
Xylene (mixed isomers)	Dieldrin
	Endosulfan
Semivolatile Organics	Endrin
Acenaphthene	Heptaclor
Anthracene	Lindane
Benzo(a)anthracene	Methoxyclor
Benzo(a)pyrene	Toxaphene
Benzo(b)fluoranthene	
Benzo(g,h,i)perylene	**Inorganics**
Benzo(k)fluoranthene	Aluminum
Chrysene	Cadmium
Dibenzo(a,h)anthracene	Copper
Fluoranthene	Lead
Fluorene	Mercury
Indeno(1,2,3-cd)pyrene	Nickel
Phenanthrene	Selenium
Pyrene	
Pentachloronitrobenzene	**Radionuclides**
Pentachlorophenol	Americium-241
	Cesium-137
Dioxins/Furans	Radium-226,-228
Dibenzofuran	Strontium-90
2,3,7,8-tetrachloro-dibenzo(p)dioxin	Thorium-228,-230,-232
2,3,7,8-tetrachloro-dibenzo(p)furan	Uranium-234,-235,-238

Ecological Scoping Checklist:
Ecological Pathways Conceptual Exposure Model



Signatures and certifications:

Checklist completed by (provide name, organization and phone number)

Name (printed): Lance Voss

Name (signature): Lance Voss

Organization: Neptune & Company

Phone number: (505) 662-0707, ext. 23

Date completed: 17 July 1998

Verification by a member of ER Project Ecological Risk Task Team (provide name, organization and phone number)

Name (printed):

Name (signature):

Organization:

Phone number:

APPENDIX G

G-1.0 DOCUMENTATION OF REGULATORY HISTORY

G-1.1 Corrective Action History

The Laboratory, through the DOE, submitted the OU 1157 Work Plan to the Administrative Authority (USEPA) for approval on July 15, 1993. The USEPA submitted a notice of deficiency on the Work Plan on April 5, 1994. The Laboratory submitted responses to the NOD in letters dated May 24, 1994 and September 16, 1994. The USEPA approved the Work Plan on October 7, 1994.

Documents follow this page.

G-1.2 Other Regulatory Documents

No other regulatory documents apply.

G-2.0 REFERENCED DOCUMENTS

Attached.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

OCT 7 1994

Mr. Joseph C. Vozella, Chief
Environment, Safety and Health Branch
Los Alamos Area Office
Department of Energy
Los Alamos, NM 87544

Dear Mr. Vozella:

The Environmental Protection Agency (EPA) has reviewed and approves the RCRA Facility Investigation (RFI) workplan for Operable Unit 1157 with the enclosed modification. The approved workplan shall consist of the RFI workplan submitted on July 23, 1993, the NOD response dated May 24, 1994, an additional NOD response dated September 26, 1994, and the enclosed modification. LANL shall immediately implement this workplan according to the proposed schedule.

Should you have any questions, please contact Barbara Driscoll of my staff at (214) 665-7441.

Sincerely yours,

Jack Divita
for Allyn M. Davis, Director
Hazardous Waste Management Division

Enclosure (1)

cc: Kathleen Sisneros
Director, Water and Waste Management Division
New Mexico Environment Department
Jorg Jansen
Program Manager, Environmental Restoration Program
Los Alamos National Laboratory

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Modification
Operable Unit 1157

1. Final RFI Reports for each SWMU are due as indicated below:

SWMU	RFI Report Due
8-003(a)	4-30-96
9-001(c)	"
9-003(a,b,d,e)	"
9-005(a,d)	"
9-006	"
9-012	"

The RFI Report for all other OU 1157 SWMUs are due May 30, 1995.

115 /

1.28.1.2

Department of Energy
Field Office, Albuquerque
Los Alamos Area Office
Los Alamos, New Mexico 87544

SEP 26 1994

Mr. William K. Honker, Chief
RCRA Permits Branch
U. S. Environmental Protection Agency
Region 6
1445 Ross Avenue, Suite 1200
Dallas, Texas 75202-2733

Dear Mr. Honker:

Enclosed is the response to the Environmental Protection Agency's List of Modifications on the Notice of Deficiency on the RFI Work Plan for Operable Unit 1157. The revised text changes, based on the NOD response and the List of Modifications response, will follow shortly. A signed certification statement regarding this response is also enclosed.

If any questions arise, please call me at (505) 665-7203, or Mike Gilgosch, Scientech, at (505) 667-5794.

Sincerely,

for Theodore J. Taylor
Program Manager
Environmental Restoration
Program

LAAMEP:2TT-020

Enclosure

cc:
See page 2

SEP 2 6 1994

cc w/enclosure:
K. Sisneros
New Mexico Environment Department
1190 St. Francis Drive
P. O. Box 26110
Santa Fe, New Mexico 87502
E. Merrill, EM-452, HQ
T. Taylor, AAMEP, LAAO
B. Swanton, NMED-AIP, LANL,
MS-J993
J. Levings, ERPO, AL

cc w/o enclosure:
W. Spurgeon, EM-452, HQ
K. Schenck, Scientech, LAAO
M. Gilgosch, Scientech, LAAO
C. Rofer, EES-1, LANL, MS-D462
T. Baca, EM, LANL, MS-J591
J. Jansen, EM/ER, LANL, MS-M992
D. Garvey, ESH-8, LANL, MS-K490
RPF, LANL, MS M707

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 gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violation.

Document Title:

Response to the Environmental Protection Agency's (EPA) Draft List of Modifications on the Notice of Deficiency (NOD) Response for Operable Unit (OU) 1157

Name: _____ Date: 9/23/94

Dennis Erickson
Division Director
Los Alamos National Laboratory

Name: _____ Date: 9/26/94

Joseph Vozella, Chief
Environment, Safety, and Health Branch
DOE-Los Alamos Area Office

List of Modifications
Operable Unit 1157

1. *General comment #4 states EPA's position on any RFI investigation. LANL shall note that if contamination is found above background, then LANL must find the full extent of contamination and must demonstrate that there is a "clean zone" beneath the contamination. LANL shall revise their overall strategy accordingly. This comment also applies to LANL's response to Specific Comments 1(b), 5(a), 5(g), 6(e), 12(b), 13(e), 15, 15(b), 17(c), 18(d), 20(b), 21, 23(b), 24(b), 25(c), 27(c), and 28(c)*

Response:

LANL and DOE personnel have discussed this subject with EPA several times, most recently in a meeting on August 18, 1994. The consensus on this subject was that LANL would compare data analysis results against background. If contaminant levels statistically exceed background, the full nature and extent of the contamination must be defined. EPA will look at data results and LANL's proposed decisions based on those results on a case-by-case basis. This approach will be applied to investigations at Operable Unit 1157, as well as all other investigations conducted at LANL.

2. *When is the revised work plan being submitted?*

Response:

The text changes implementing the agreements made by LANL in this response, as well as the response to the Notice of Deficiency issued by EPA and responded to by LANL on May 23, 1994 will be provided no later than September 23, 1994. The text changes will indicate deletions, additions and any changes necessary. A whole new "revised work plan" will not be provided, based on previous conversations with EPA which indicated there is not a need to provide a new work plan.

3. *LANL has still not provided the information requested in these comment 5(e) and 6(a). LANL shall provide the list of all hazardous constituents that make up or are included in photoprocessing wastes.*

Response:

The original NOD comment 5(e) referenced PRS 8-009(d), and 6(a) referenced PRS 8-009(e), both process waste water outfalls that served photoprocessing laboratories. All of the known constituents that could have been a part of the discharge to the outfalls are listed below.

Chromium
Mercury
Selenium
Silver
Cyanide
4-Methyl-2-pentanone

The following constituents may have been part of the discharge, although complete records do not exist for all of the chemicals used in the photoprocessing laboratories:

Acetone	o-Cresol	Dimethylphthalate	p-Nitrophenol
2-Hexanone	m-Cresol	4,6 Dinitro-o-cresol	Pentachlorophenol
Methyl ethyl ketone	p-Cresol	2,4-Dinitrophenol	Phenol
Acetophenone	2,4-Dichlorophenol	Diphenylamine	p-Phenylenediamine
Aniline	2,6-Dichlorophenol	1-Naphthylamine	2,4,5-Trichlorophenol
p-Chloro-m-cresol	Diethylphthalate	2-Naphthylamine	2,4,6-Trichlorophenol
2-Chlorophenol	2,4-Dimethylphenol	o-Nitrophenol	

4. *No responses have been received for deficiency #7. LANL shall provide a response.*

Response:

We apologize for the oversight. We evidently skipped from specific comment 6(e) to specific comment 7(e) and therefore placed our response to 7(e) under the 6(e) response. Listed below are the deficiency comments and LANL's responses for specific comments 6(e) and 7(a-d). The response for specific comment 7(e) was in the original NOD response.

6. *PRS 8-009(e)--Process Waste Water Outfall*

(e)Page 6-18; 3rd paragraph: Please justify why the piping that goes from the building to the discharge point is not being investigated for a possible release.

Response:

Our approach to the RFI is phased. In Phase I we are determining the presence of COCs and not the nature and extent of the contamination. The nature and extent would be investigated in Phase II if needed. In the case of the pipeline sampling questioned, we are sampling under Phase I at the outfalls which would be the most likely area of contamination. If COCs are found, the pipeline sampling suggested in the comment would be performed under Phase II, or the pipeline would be removed under a VCA.

7. *PRS 8-009(f)--Process Waste Water Outfall*

(a) Page 6-20: Please justify why the piping that goes from the building to the discharge point is not being investigated for a possible release.

Response:

Our approach to the RFI is phased. In Phase I we are determining the presence of COCs and not the nature and extent of the contamination. The nature and extent would be investigated in Phase II if needed. In the case of the pipeline sampling questioned, we are sampling under Phase I at the outfalls which would be the most likely area of contamination. If COCs are found, the pipeline sampling suggested in the comment would be performed under Phase II, or the pipeline would be removed under a VCA.

(b) Page 6-19: Analysis of Results: If the bottommost sample still contains contaminants above background levels, then LANL must take deeper samples, regardless of the screening action levels.

Response:

Please see the response to Comment 1 above.

(c) Page 6-19: Sample and Analysis plan: Please include in the revised workplan all hazardous constituents in the fluorescent penetration waste stream.

Response:

The following constituents may have been part of the discharge, although complete records do not exist for all of the chemicals used in the fluorescent penetrant laboratory:

Acetone
Acetophenone
Aniline
Barium
Beryllium
p-Chloro-m-cresol
2-Chlorophenol
Chromium
Cyanide
o-Cresol
m-Cresol
p-Cresol
2,4-Dichlorophenol
2,6-Dichlorophenol
Diethylphthalate
2,4-Dimethylphenol
Dimethylphthalate
4,6-Dinitro-o-cresol
2,4-Dinitrophenol
Diphenylamine
Epichlorohydrin
Fluroanthene
2-Hexanone
Lead
Mercury
Methyl ethyl ketone
4-Methyl-2-pentanone
2-Methyl-1-propanol
Naphthalene
1-Naphthylamine
2-Naphthylamine
o-Nitrophenol
p-Nitrophenol
Pentachlorophenol
Phenol
p-Phenylenediamine
Selenium
Silver
Sulfites
Thallium
Toluene
2,4,5-Trichlorophenol
2,4,6-Trichlorophenol

(d) Page 6-20; Sampling Activity: If visual or olfactory contamination is evident in a specific section of the 6 inch sample then that zone should be sampled and not homogenized with the other soil. Also, LANL should take samples at deeper intervals (4-5 feet), to verify that vertical contamination has been delineated, and that sediments from the past have not been buried by younger deposited sediments.

Response:

If visual or olfactory contamination is evident then that zone would be sampled and not homogenized. Because water could have been a driving force at this site, we propose to sample at 1 foot intervals until the tuff surface is encountered.

1157

Department of Energy
Los Alamos Area Office
Albuquerque Operations Office
Los Alamos, New Mexico 87544

MAY 24 1994

William K. Honker, Chief
RCRA Permits Branch
U. S. Environmental Protection Agency,
Region 6
1445 Ross Ave., Suite 1200
Dallas, Texas 75202-2733

Dear Mr. Honker:

Enclosed is the response to your Notice of Deficiency for Operable Unit 1157.

If any questions arise, please call me at (505) 665-7203.

Sincerely,

Theodore J. Taylor
Program Manager
Environmental Restoration Program

LESH:1TT-007

Enclosure

cc w/enclosure:
K. Sisneros
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P. O. Box 26110
Santa Fe, NM 87502
T. Taylor, ES&H, LAAO
M. Gilgosch, Scientech, LAAO
B. Swanton, NMED/AIP, LANL,
MS-M993
RPF, LANL, MS-M707

cc w/o enclosure:
R. Harris, EM-452, HQ
W. Spurgeon, EM-452, HQ
J. Vozella, ES&H, LAAO
T. Baca, EM, LANL, MS-J591
K. Boardman, ERPO, AL

CERTIFICATION

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

Document Title:

Response to Notice of Deficiency
Concerning Operable Unit 1157
Field Investigation Work Plan

Name: _____ Date: 5/23/94

Dennis J. Erickson, Director
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LANL RFI Comments for OU 1157

General Comments:

1. The RFI Workplan for OU 1157 is very difficult to follow. It appears to EPA that Chapters 5 and 6 could be combined with portions of Chapter 4 to make the Workplan easier to follow. Combining these chapters so that the history of each unit or aggregate of units is followed by the sampling plan eases review greatly.

We apologize for the difficult time it took to review this work plan. The authors decided to organize the grouping of the potential release sites (PRSs) primarily by geographical location and past/recent history in order to ease the writing of the history and the sampling and analysis plan for each PRS or group of PRSs. Because 116 PRSs was a large number of PRSs to organize, it was determined to break the history part of each PRS away from the sampling and analysis plans, which was intended to ease the sampling events for the sampling team.

2. Several places in the Workplan LANL mentions that the sampling procedures for hand-held instruments for field screening of VOCs is in preparation. This information should have been completed when this Workplan was submitted to EPA. The revised workplan must contain this information or reference the appropriate Standard Operating Procedure.

The LANL ER Program does not have a Standard Operating Procedure for field screening of VOCs. We currently follow the manufacturer's instrument operating procedures and LANL has an internal calibration group that calibrates the instruments following the manufacturer's guidelines. We are presently evaluating the need for any additional internal procedures.

3. LANL needs to justify in the revised Workplan, in the appropriate chapter(s), why the piping that transports the waste from a particular SWMU to the outfalls are not leaking or have not leaked, and why they are not being sampled. LANL also needs to include a narrative describing various details of the piping; such as material composition, age of piping, how piping is connected, approximated volume of waste transported and any previous pipe leak tests performed.

Our approach to the RFI is phased. In Phase I we are determining the presence of COCs based on background levels and SALs, and not the nature and extent of the contamination. The nature and extent would be investigated in Phase II if needed. In the case of the pipeline sampling questioned, we are sampling under Phase I at the outfalls which would be the most likely area of contamination. If COCs are found, the pipeline sampling suggested in the comment would be performed under Phase II, or the pipeline would be removed under a VCA.

As requested in our phone conversation on May 19,1994, a listing of the SALs referenced in LANL's current Installation Work Plan is attached for your convenience and information.

4. (a) Throughout the Workplan, LANL is under the impression that if they found contamination and it is above background, but is under the screening action levels, then no further action is needed, even though the full extent of contamination has not been demonstrated. This is not correct. LANL must find the full extent of contamination and must demonstrate that there is a "clean zone" beneath the contamination. For example, if a soil sample shows PCB contamination exists from 0-2' (and is above background but below screening action levels), but was found to be "clean" from 2-5', then LANL could demonstrate that the contamination has been delineated vertically. If the contamination in the 0-2' interval is below health based numbers for a specified use (such as industrial setting), then LANL could justify a no further action remedy.

(b) In addition, at many SWMUs, LANL is not taking soil samples deep enough vertically to justify a no further action determination. For example, at outfall areas, 6 inch deep soil samples may not reach sediments from the past which have been buried by younger deposited sediments. Also, volatile organics

may not show up surface samples and may show up in deeper intervals. This concern is also appropriate at other SWMUs contained in the Workplan.

Refer to the above comment 3 for our overall strategy regarding Phase I and Phase II investigations. The sampling plans are designed to determine the presence of COCs by investigating the area(s) suspected to have the highest likelihood of contamination. The work plan is based on the guidance in the 1992 (Rev. 2) version of LANL's Installation Work Plan which states: if contamination is found below SALs for an individual constituent, but above background, no further action would be proposed. However, if two or more constituents are present, further evaluation is needed to determine their combined effects, which could be significant even though individually the constituents pose no risk. Constituents whose concentrations exceed the corresponding SALs or that are included because they are significant in combination with other constituents are designated as contaminants of concern requiring further investigation under Phase II, or a baseline risk assessment would be performed, depending on the circumstances. A VCA at this point would also be evaluated. This approach is stated in Chapter 4 of the work plan. Under this strategy the full extent of contamination would be demonstrated during Phase II for those sites where COCs were found during Phase I. We agree that if the contamination is below health risk based values, we would propose NFA.

We agree to take samples at greater depths wherever there is a driving source such as water or where sediment deposition could have occurred. At such sites, we propose to sample at 1 foot intervals until the tuff surface is encountered. However, at sites where there is no driver we do not believe that deeper samples are needed in the Phase I investigation. Again, if COCs are identified in Phase I the nature and extent of contamination would be determined in Phase II. Samples for VOCs are being taken at a 12 inch depth at every site where they may be present. Most of the sites where deeper samples would not be necessary are firing sites where we are sampling for metallic debris that would have been scattered through the air and deposited on the surface from shots that were fired on the ground surface.

5. LANL should include in the RFI Workplan a schedule that includes the starting date for the geophysical surveys and Phase I sampling for OU 1157 SWMUs and the date the Phase I Report is due to EPA. The schedule should include which SWMUs will be sampled in each year.

The schedule as requested is shown in Attachment 1 to this NOD response and will be incorporated into the final RFI work plan. It is based on the revised fiscal year 1994 baseline submitted to the Department of Energy (DOE) on April 1, 1994. Please note that we are intending to write three Phase I reports and a final RFI report.

6. Page 6-3, 2nd paragraph: LANL shall identify in the revised workplan all outfalls that discharged waste prior to receiving an NPDES-permit.

PRS outfalls 8-009(b), EPA 04A NPDES 115-076; 8-009(d), TA-8-22-OPN-5; and 8-009(e), EPA-06A075 are the permitted outfalls in TA-8 that discharged waste prior to permitting. Outfalls EPA 05A066, 05A067, 05A068 and 04A155 are in TA-9 but are not listed as PRSs. The PRSs associated with the TA-9 outfalls were investigated under this work plan and are either being sampled, deferred to D&D, or recommended for NFA. We are investigating whether the TA-9 outfalls received waste prior to NPDES permitting and will include this information in the revised work plan.

7. In reference to the proposal to integrate RCRA closure and corrective action requirements it is recommended that this specific issue be formally addressed to NMED. RCRA closure requirements may differ from corrective action requirements under the HSWA portion of the RCRA.

Question on what this is referencing.

8. Page 6-14: It is unclear whether the 2 discrete samples taken at this site will be composited or not. Text indicates that the soils will be homogenized. Only discrete samples should be collected. This

comment also applies to any other section where homogenization of samples is indicated. LANL shall clarify this language in the revised work plan.

The plan is to take 2 discrete samples within the top 6-in of soil. Each of the samples would be homogenized, the 2 samples would not be composited together. No compositing of samples is planned at any site in OU 1157. Homogenization is required to obtain a representative sample. We consider the homogenized samples to be discrete samples. This will be clarified in the revised work plan.

9. EPA does not necessarily agree with the no further action (NFA) criteria in Chapter 7, even though many of the units requested for NFA are approved because they do not need further investigation. For example if an outfall is now permitted under NPDES does not preclude examination under RCRA if the outfall operated prior to being permitted. The NPDES permit does not ensure cleanup of past activities. LANL shall establish NFA criteria which can be applied across the facility at every Operable Unit. This will ensure consistency in evaluation these sites. EPA and NMED shall approve the established NFA criteria, and this may be a separate response from this NOD response. An initial draft will be due to EPA within 45 days of receipt of this NOD.

LANL has requested an extension to submit a draft list of NFA criteria. The list will be submitted by June, 1994 if the extension is granted.

10. The following sites do not need to be added to the HSWA portion of the RCRA permit.

8-008(a)-Transformer Storage Area
8-008(c)- " " "
8-000(b)- " " " **(NOTE: Assume this to be 8-008(b))**
8-000(d)- " " " " " " " **"(d))**
8-009(b)-Outfall serving Building TA-8-70
8-010(a)-Waste Container Storage Area
8-010(b)- " " "
8-010(c)- " " "
8-001(a)-Off-Gas System
8-001(b)- " " "
8-011(a)-Decommissioned UST, TA-8-60
8-011(b)- " " TA-8-61
9-010(c)-Waste Can Shelter
9-011(a)-Waste Container Storage Area at TA-9-21
9-008(a)-Lagoon
9-015-Electrical Control Manhole
69-002(a)-Septic Tank for TA-69-9
69-002(b)-Septic Tank serving Bldg. TA-69-10
C-8-001-The Gun Bldg.
C-8-002-The Gun Bldg.
C-8-003-BLDG. TA-8-6
C-8-004-Former Ranch House
C-8-005-Guest House
C-8-006-Guest House
C-8-007-Bunk House
C-8-008-Ranch Barn
C-8-009-Ranch Barn
C-8-011-Storage Bldg., TA-8-7
C-8-012-Carpenter Shop
C-8-013-Office Bldg. TA-8-9
C-8-015-HE Magazine
C-8-016-HE Magazine
C-8-017-Storage Vault
C-8-018-Storage/Laboratory, TA-65 **(NOTE: Assume TA-8-65 is meant)**

C-8-019-Storage/Laboratory, TA-8-30
C-8-020-Mistaken Burial Site
C-9-002-Trimming Bldgs.
C-9-003-Pump House
C-9-004-Oven Bldg., TA-9-19
C-9-005-X-unit Chamber
C-9-006-Bldgs. TA-9-6, 11, and 16
C-9-007-Bldgs. AE-7 & 8
C-9-008-UST, same unit as PRS 9-016
C-9-009-oil stains

We will not add these sites to the HSWA permit, and will not investigate these sites any further.

11. LANL may request a Class III permit modification for the following sites:

8-003(b)-Inactive Septic Tank
8-003(c)-Inactive Septic Tank
8-006(b)-Material Disposal Area (duplicate of 8-006(a))
9-003(c)-Electrical Control Manhole serving TA-9-14
9-003(f)-Settling Tank serving Bldg. TA-9-51
9-005(b)-Inactive Septic Tank, Bldgs. TA-9-21, 28 & 29
9-005(c)-Inactive Septic Tank, Bldgs. TA-9-21, 33, 34, 37, and 38
9-005(e)-Inactive Septic Tank, Bldgs. TA-9-41, 42, 43, 45, & 46
9-005(f)-Inactive Septic Tank, Bldgs. TA-9-48
9-005(g)-Inactive Septic Tank, Bldgs. TA-9-109
9-005(h)-Inactive Septic Tank, Bldgs. TA-9-110
9-007-Basket Pit

We will request these sites be accepted for NFA in a future Class III permit modification.

Specific Comments:

1. 4.1.4 Decision Point 4, p. 4-10 -

a. Text refers to background levels for contaminants of concern (COC). Has LANL established background levels for COC's at OU 1157? If established, LANL shall include all information on background levels in the revised work plan.

Background levels have not been established for OU 1157. If constituents are found in Phase I that exceed SALs, site-specific background levels will be established for those constituents prior to continuing the investigation.

b. The discussion on threshold values is confusion. Text indicates that "A threshold level may be exceeded if one or more screening action level(s) are exceeded..., or if the cumulative effects of multiple contaminants exceed acceptable limits as defined in Appendix J of the IWP. Is the threshold level equivalent to the screening action level (SAL)? This term has not been used in the other work plans reviewed to date. Should sampling at a SWMU reveal contaminants at levels above background then the extent of the release needs to be defined prior to any comparison to SALs.

The discussion about threshold levels will be deleted in the revised work plan. Only background levels and SALs will be used for comparison. The sampling is designed to compare to both background and SALs. Background comparisons are only needed for constituents that exceed SALs. If a constituent does not exceed SALs it is not considered a health risk and no further investigation is needed. The extent of any release will be defined in a Phase II investigation for constituents that exceed both background and SALs.

2. 5.5.3 Data Needs and Data Quality Objectives, p.5-64 -
Under Boundaries, bullet 6, pertaining to bulk soils, the vertical boundary of 1 foot may not be sufficient to characterize COC's in disturbed soil (backfill) because the soil is probably not homogeneous. Each of these sites will be evaluated on a case-by-case basis and EPA may require additional sampling.

The intent of the bulk soils investigation is to find contamination within the first foot of soil. Other investigations are being conducted to find contamination deeper as a result of the underground units in this area. If COCs are found in the first 1 ft of soil, sampling would continue in a Phase II investigation to define the nature and extent of contamination as stated on p. 5-63. Depending on the results of the analysis, a baseline risk assessment may need to be conducted. We have confirmed that clean soil was not brought in when the site was remediated in the 1960's. When the site was remediated, the ground was leveled after the buildings were burned and removed and this disturbance would have caused any PCOCs in the soil in this area to be relatively homogeneously distributed. This will be clarified in the revised work plan.

3. PRS 8-004(d)-Drain

a. Page 6-7; 2nd paragraph: LANL states in this paragraph that there is no evidence that a release has occurred through the sewer system. Is LANL talking about the old piping or the new interceptor system? Please clarify. Also, LANL shall include in the revised workplan what testing/soil sampling they have to verify that the old piping has not leaked and please include a description of the old sewer piping.

The second paragraph begins the description of the old sewer line (vs. the interceptor system), although this "old" line is still in use. The interceptor system, mentioned in the first paragraph, did not replace any lines in the TA-8 area. We have not done any sampling to prove the system has not leaked until sampling for Phase I investigations started (at risk) earlier this spring. The intent is to sample the drain trap in the building and the downstream sewer line, where contamination would most likely be found. If contamination above levels of concern is found, the piping would be investigated (or a VCA would be performed) in a Phase II investigation. The only means of no evidence of a release is by visual inspection. Please refer to General Comment response 3 which our approach to investigating pipelines.

b. Page 6-7: second paragraph: Please include in the revised workplan a paragraph describing what LANL will do if the chip or wipe samples which are field screened unexpectedly indicate volatile contamination.

As the text in the third paragraph on p. 6-7 indicates, the samples will be screened primarily to provide worker safety. Historical information indicates that no volatile compounds were used in the building where this piping originates. However, the revised work plan will include a statement that if volatiles are found via field screening, samples will be analyzed for the Chapter 4 Extended Analyte List of VOCs.

c. 6-8; second paragraph: LANL must meet PQL detection levels for the chip or swipe samples. Detection levels equal to the screening action level is unacceptable.

Detection levels equal to or lower than the screening action levels would be acceptable to meet our decision criteria. If every sample for every analyte were analyzed at PQL detection limits, we would be analyzing at unnecessarily low detection limits.

4. PRS 8-009(c)- Floor Drain Outfall

a. Page 6-12; 1st paragraph: Please clarify in the workplan whether the 1 pint PCB spill is the only hazardous constituents that were ever transported through the floor drain in its entire time of use.

The text on page 5-8 describes the use of this drain. There is no historical information to indicate any other hazardous materials were transported through this drain. If there had been, the text would indicate as such, and sampling would be conducted as appropriate. The revised work plan will clarify this information.

b. Page 6-12: Sampling Activity: If visual or olfactory contamination is evident in a specific section of the 6 inch sample then that zone should be sampled and not homogenized with the other soil. Also, LANL should take samples at deeper intervals, to verify that vertical contamination has been delineated and that surface contamination has not migrated downward, and that sediments from the past have not been buried by younger deposited sediments.

If visual or olfactory contamination is evident then that zone would be sampled and not homogenized. Because water could have been a driving force at this site, samples will be taken at greater depths as described in the response to General Comment 4.

5. PRS 8-009(d)-Process Waste Water Outfall

a. Page 6-15; Analysis of Results: If the bottommost sample still contains PCB's above background levels, then LANL must take deeper samples, regardless of the screening action levels for PCB's.

NOTE: Assume this comment is part of the previous subset of comments for PRS 8-009(c).

Please see the response to General Comment 4. It is not necessary to continue sampling at sites where no health risk exists.

b. Page 6-15; 3rd paragraph: Please include in the revised workplan what hazardous constituent or other parameters are sampled at the outfall.

Page 6-15, 2nd paragraph indicates silver salts, chromium and pentachlorophenol will be used as indicator parameters. Also, Table 6-2, Group 1 Indicator Parameters, lists these same parameters for this outfall.

c. Page 6-15; last paragraph: Please justify why the piping that goes from the building to the discharge point is not being investigated for a possible release.

The text on page 5-9, section 5.1.1.9 indicates that this is an active drain and outfall and is not being sampled under Phase 1 investigation. Also, refer to the response to General Comment 3.

d. Page 6-15: 3rd paragraph: Please include in the revised workplan a paragraph describing what LANL will do if field screened samples unexpectedly indicate volatile contamination.

It is possible to detect volatiles at this site based on the history of the site. The samples are being analyzed for pentachlorophenol, a VOC, which we are using as an indicator of any other VOCs. If VOCs are detected in the field, we would still run the analysis for pentachlorophenol.

e. Page 6-16: Please include in the revised workplan all hazardous constituents that could have been in the photo-processing wastes for this unit. EPA may require more constituents to be analyzed in the soil samples.

The only use for this drain has been for photo-processing. Any other hazardous constituents would be similar to those we have selected as indicator parameters. However, we will analyze for the Chapter 4 Extended Analyte List VOCs and SVOCs, as requested in our telephone conversation of May 19, 1994.

f. Page 6-16: Sampling Activity: If visual or olfactory contamination is evident in a specific section of the 6 inch sample, then that zone should be sampled and not homogenized with the other soil. Mixing of soil samples are not allowed if volatile organics are present. Also, LANL should take samples at deeper intervals (4-5 feet), to verify that vertical contamination has been delineated, and that sediments from the past have not been buried by younger deposited sediments.

If visual or olfactory contamination is evident then that zone would be sampled and not homogenized. Because water could have been a driving force at this site, samples will be taken at greater depths as described in the response to General Comment 4.

g. Page 6-16: Analysis of Results: If the bottommost sample still contains contaminants above background levels, then LANL must take deeper samples, regardless of the screening action levels.

Please see the response to General Comment 4. It is not necessary to continue sampling at sites where no health risk exists.

6. PRS 8-009(e)-Process Waste Water Outfall

a. Page 6-17: Sampling and Analysis Strategy: Please include in the revised workplan all hazardous constituents in the photo-processing wastes for this unit. EPA may require more constituents to be analyzed.

The uses for this drain have been for photo-processing, discharge from a metallography laboratory and also from a radioactive fuel element polishing facility. Any other hazardous constituents related to the photo-processing wastes would be similar to those we have selected as indicator parameters. However, we will analyze for the Chapter 4 Extended Analyte List VOCs and SVOCs, as requested in our telephone conversation of May 19, 1994.

b. Page 6-18: 2nd paragraph: Please include in the revised workplan what hazardous constituents or other parameters which are sampled at the permitted outfall. Also, include some historical sampling results.

The constituents and results of the NPDES sampling from January, 1989 to April, 1994 are attached.

c. Page 6-18; 2nd paragraph: Please include in the revised workplan a paragraph describing what LANL will do if field screened samples unexpectedly indicate volatile contamination.

It is possible to detect volatiles at this site based on the history of the site. The samples are being analyzed for pentachlorophenol, a VOC, which we are using as an indicator of any other VOCs. If VOCs are detected in the field, we would still run the analysis for pentachlorophenol.

d. Page 6-18: Sampling Activity: If visual or olfactory contamination is evident in a specific section of the 6 inch sample, then that zone should be sampled and not homogenized with the other soil. Also, LANL should take samples at deeper intervals (4-5 feet), to verify that vertical contamination has been delineated, and that sediments from the past have not been buried by younger deposited sediments.

If visual or olfactory contamination is evident then that zone would be sampled and not homogenized. Because water could have been a driving force at this site, samples will be taken at greater depths as described in the response to General Comment 4.

e. Page 6-21; Analysis of results: If the bottommost sample still contains contaminants above background levels, then LANL must take deeper samples, regardless of the screening action levels.

Please see the response to General Comment 4. It is not necessary to continue sampling at sites where no health risk exists.

8. PRS 8-002-Experimental Firing Site

a. Page 6-23; Sampling Strategy: Please include in the revised workplan all hazardous constituents possible at the Gun Firing site.

The hazardous constituents that may be found at this site are those that are listed on p. 6-24, Section 6.2.3, and in Table 6-7. It is unlikely that any other hazardous constituents would be found in this area.

b. Page 6-28; 1st paragraph: LANL should take samples at deeper intervals (4-5 feet), to verify that vertical contamination has been delineated. If the most vertical sample indicates contamination above background, then deeper samples will need to be taken.

Because no driving force is present at this site, LANL does not feel it is necessary to take samples 4-5 feet deep in this area, at least not during Phase 1 characterization. The soil in this area has remained undisturbed and therefore, the top 6 inches is reasonable in finding PCOCs. If COCs are found in the top 6 in, a Phase II investigation will be initiated to delineate the vertical extent of the contamination. A baseline risk assessment or a VCA may also be appropriate. Please see the response to General Comment 4. It is not necessary to continue sampling at sites where no health risk exists.

9. PRS 8-006(a), MDA Q

a. Page 6-33; Sampling and Analysis for MDA Q: Please justify in the revised RFI workplan why sampling of the deeper waste is not occurring. If wastes are buried deeper in this unit, as the last paragraph on this page describes, then deeper sampling will be required by EPA.

Text on page 6-33, last paragraph and continuing to page 6-34 justifies why sampling is not being conducted for the deeper waste.

b. Page 6-37; Phase II sampling: If the bottommost sample still contains contaminants above background levels, then LANL must take deeper samples, regardless of the screening action levels.

Because no driving force is present at this site, LANL does not feel it is necessary to take deeper samples in this area, at least not during Phase 1 characterization. Please see the response to General Comment 4. It is not necessary to continue sampling at sites where no health risk exists.

10. PRSs 8-004(a), (b) and (c) - Building Drains

Page 6-41; 3rd paragraph: EPA disagrees with waiting to sample SWMUs 8-004(a), 8-004(b), and 8-004(c). These SWMU's need to be sampled before the D&D process. Please include sampling requirements in the revised RFI workplan.

The drainlines are beneath buildings which are abandoned and unsafe to enter. There is no mobilizing force to allow any potential contamination to migrate. LANL does not feel any contamination could be migrating from these buildings and believes that the risk of waiting until the D&D process is acceptable.

11. PRS 8-003(a)-Septic Tank

a. Page 6-46; 2nd paragraph: Where the piping connects to and from the septic tank are also points where a release might occur from this SWMU.

The sampling strategy is designed to detect contamination at the most likely area, which is inside the tank. The tank and associated piping, including the connections, are likely to be removed under a VCA. Verification sampling would be conducted to confirm that no COCs remain.

b. Page 6-47; last sentence: Please justify why the piping that goes from the building to the septic tank and from the septic tank to the discharge point is not being investigated for a possible release.

This tank is expected to have COCs. The sampling strategy is designed to confirm this. The tank and associated piping, up to the abandoned bunkers are likely to be removed under a VCA. If the sampling results do not show COCs, the tank and it's associated piping would likely be removed when the abandoned bunkers are decommissioned.

12. PRS 8-009(a)-Outfall

a. Page 6-48; Selection of Sampling Sites: Also, LANL should take samples at deeper intervals (4-5 feet), to verify that vertical contamination has been delineated, and that outfall sediments from the past have not been buried by younger deposited sediments.

Because no driving force is present at this site, LANL does not feel it is necessary to take samples 4-5 feet deep in this area, at least not during Phase 1 characterization. The soil in this area has remained undisturbed and therefore, the top 6 inches is reasonable in finding PCOCs. If COCs are found in the top 6 in, a Phase II investigation will be initiated to delineate the vertical extent of the contamination. A baseline risk assessment or a VCA may also be appropriate. Please see the response to General Comment 4. It is not necessary to continue sampling at sites where no health risk exists.

b. Page 6-51; last paragraph: If the bottommost sample taken still contains contaminants above background levels, then LANL must take deeper samples, regardless of the screening action levels.

Please see the response to General Comment 4. It is not necessary to continue sampling at sites where no health risk exists.

13. PRS 8-005-Waste Storage Vessel

a. Page 6-53; 1st paragraph: LANL states that soil samples will be taken underneath the vessel if evidence of a release is found. LANL shall clarify what constitutes evidence of a release.

When the vessel is removed, through a VCA, the soil under the vessel will be visually inspected as well as inspected using hand held instruments to detect organics. The bottom of the vessel will be inspected for holes and cracks in the metal, and the vegetation under the vessel will also be investigated for stress.

b. Page 6-53; last paragraph: If visual or olfactory contamination is evident in a specific section of the 6 inch sample, then that zone should be sampled and not homogenized with the other soil. Also, LANL should take samples at deeper intervals (4-5 feet), to verify that vertical contamination has been delineated.

The sample discussed in the text on page 6-53 is being collected from within the tank. There is not a total depth of 6 inches available. The substance in the vessel is, at most, 3 inches thick and covers an area of about 16 square inches. It is not possible to take a sample from within the vessel at a depth of 4-5 feet.

c. Page 6-54; 1st paragraph: Mixing of soil samples are not allowed if volatile organics are present.

The samples will not be homogenized if VOCs are detected using hand-held instruments.

d. Page 6-54; Selection of Sampling Sites: LANL should take samples at deeper intervals (4-5 feet), to verify that vertical contamination has been delineated.

It is unlikely that any sample will be taken from the soil underneath the vessel because the vessel appears to be intact and there appears to be no evidence of a release from around the vessel. If sampling is required, it is highly unlikely for any contamination to have migrated to a depth of 4-5 ft. because no driving force is present at this site. LANL does not feel it is necessary to take samples 4-5 feet deep in this area, at least not during Phase 1 characterization.

e. Page 6-56; 2nd paragraph: If the bottommost sample still contains contaminants above background levels, then LANL must take deeper samples, regardless of the screening action levels.

Please see the response to General Comment 4. It is not necessary to continue sampling at sites where no health risk exists.

14. PRS 9-009-Lagoon and Sand Filters

a. Page 6-59; 5th paragraph: LANL mentions that PRS 9-009 may have received hazardous materials such as Strontium-90. What are the other hazardous materials that this SWMU may have received? LANL shall clarify this statement in the revised workplan.

The text on p. 6-59 says that PRS 9-009 was used "to treat sanitary waste waters from TA-8 and TA-9 but may have received hazardous materials from a Strontium-90 spill." The sentence may be misleading in the way it is worded. The only hazardous material expected is Strontium-90 and the text will be revised in the final work plan.

b. Page 6-61; 2nd paragraph: Please justify why the piping that goes from the building to the septic tank and from the septic tank to the discharge point is not being investigated for a possible release.

The 2nd paragraph on p. 6-61 describes the sampling activity at the lagoon, not a septic tank. We assume the comment refers to the lagoon. The piping originates at Building 24 in TA-8. The drain in this building and the downstream sewer line are being sampled, as well as a septic tank and oxidation pond that were part of this piping. All of these areas, and the lagoon discussed in this comment, would be likely places to find the Strontium-90 if it is present. If Strontium-90 is detected, the drain, septic tank and associated piping is likely to be removed as part of a VCA.

c. Page 6-61: 3rd paragraph: Mixing of soil samples are not allowed if volatile organics are present. Also, the workplan doesn't mention what constituents will be analyzed from soil/waste samples if field screening and radioactive screening indicate contamination.

Volatile contamination is not expected at this site based on historical use. However, if field screening detects VOCs the samples would not be homogenized. The text indicates that only PCOC is Sr-90. If rad screening indicates contamination, Sr-90 would still be the only rad constituent to be analyzed. If field screening indicates VOCs, the sample would be analyzed for the Chapter 4 Extended Analyte List for VOCs.

d. Page 6-64; The workplan doesn't mention what constituents will be analyzed from soil/sludge samples for Phase II if Sr is found in Phase I.

Again, Sr-90 is the only PCOC expected. If a Phase II investigation is conducted, the intent would be to define the extent of the Sr-90 contamination.

15. PRSs 9-010(a), (b) and (c)-Storage Racks

Page 6-67: last paragraph: If the bottommost sample taken still contains contaminants above background levels, then LANL must take deeper samples, regardless of the screening action levels. LANL should take samples at deeper intervals (4-5 feet), to verify that vertical contamination has been delineated.

Because no driving force is present at this site, LANL does not feel it is necessary to take samples 4-5 feet deep in this area, at least not during Phase 1 characterization. The soil in this area has remained undisturbed and therefore, the top 6 inches is reasonable in finding PCOCs. If COCs are found in the top 6 in, a Phase II investigation will be initiated to delineate the vertical extent of the contamination. A baseline risk assessment or a VCA may also be appropriate. Please see the response to General Comment 4. It is not necessary to continue sampling at sites where no health risk exists.

16. PRS 9-011(b)-Storage Area

a. Page 6-69; 1st paragraph: Please clarify in the revised workplan what LANL means by the statement if HE contamination is found, then soil removal will occur. Does this mean that any detectable concentration of a HE found in the soil will initiate removal?

The final work plan text will be revised to indicate that if HE contamination is found in levels exceeding health risk based standards, then soil removal will occur.

b. Page 6-71; 2nd paragraph: If the bottommost sample taken still contains contaminants above background levels, then LANL must take deeper samples, regardless of the screening action levels.

Please see the response to General Comment 4. It is not necessary to continue sampling at sites where no health risk exists.

17. PRSs 9-003(a), (b), (d), and (e)

a. Page 6-80; 3rd paragraph: LANL should take samples at least four to five feet vertically from the original bottoms of the settling tanks.

Table 6-22 on p. 6-84 indicates the total depth of the boreholes. As indicated, each borehole will be drilled to the approximate depth of the PRS and soil gas samples will be obtained. The holes will then be drilled another 8 feet.

b. Page 6-80; 1st paragraph: LANL should have aerial photographs which may further help in locating this SWMU.

We do have aerial photos which we have used to help locate the sampling locations. However, as the text indicates, the area has been decommissioned and the nearest existing landmarks are about 100-150 ft away.

c. Page 6-86; If the bottommost sample taken still contains contaminants above background levels, then LANL must take deeper samples, regardless of the screening action levels.

Please see the response to General Comment 4. It is not necessary to continue sampling at sites where no health risk exists.

18. PRS 9-008(b)-Oxidation Pond

a. Page 6-91; 1st paragraph: EPA will require that one sample be taken in the stream bed during Phase I. Please include this in the revised workplan.

The revised work plan will include a sampling location in the stream bed. The sample will be obtained at a downstream location that looks suitable to have captured sediments. The sample will be taken of the upper 12 inches and will be analyzed for Sr-90.

b. Page 6-91; 3rd paragraph: Please explain more about the tile field. Why are samples being taken so far from the tile field? Also, it appears that at least two more borings could be taken in the tile field. One of these boreholes should be closer to the approximate location of the removed septic tank 9-005(a). Furthermore, it appears that a backhoe trench may be more successful in finding a release along the tile and the septic tank.

One more borehole will be drilled within the tile field within 10 feet of the removed septic tank. The revised work plan will include this additional sampling location. The tile field is designed to release the waste water along its entire length, therefore all the boreholes should be successful in finding a release. LANL does not feel trenching is necessary.

c. Page 6-91; 4th paragraph: It appears that a backhoe trench may be more successful in finding a release from the removed septic tank. Also, LANL doesn't mention which soil intervals will be sampled. Please include this in a revised workplan for tank and tile field.

The suggestion of the backhoe trench is valid, however we feel the number of boreholes we have designated would also be sufficient in finding any release from the septic tank. The text indicates that soil samples will be taken in each hole of the first 5 ft beneath bottom of the original structure. As stated on p. 6-92, 4th paragraph, the borehole samples will be taken from the part of the core that is likely to have the highest constituent levels, as determined from visual inspection and field-screening instruments.

d. Page 6-93; last paragraph: If the bottom sample still contains contaminants above background levels, then LANL must take deeper samples, regardless of the screening action levels.

Please see the response to General Comment 4. It is not necessary to continue sampling at sites where no health risk exists.

19. PRSs 9-003(g), (h), and (i)-Sumps and Drains

Page 6-94; 1st paragraph: EPA is still concerned about the soil remaining beneath the sumps and pipelines. It is more likely that there are areas contaminated from underneath these SWMU's. Please justify why these areas are not being sampled.

The previous section, 6.5, describes the sampling strategy for the deep sampling beneath the settling tanks that were in this area. The intent of the bulk soils investigation is to find contamination within the first foot of soil. If COCs are found in the first 1 ft of soil, sampling would continue in a Phase II investigation to define the nature and extent of contamination as stated on p. 5-63. Depending on the results of the analysis, a baseline risk assessment may need to be conducted. The sites of the sumps are not precisely known but are known to have been shallow. Any constituents released would have been disturbed during regrading and mixed in the soil, and are not likely to have remained at their original sites. We have confirmed that clean soil was not brought in when the site was remediated in the 1960's. When the site was remediated, the ground was leveled after the buildings were burned and removed.

20. PRS 9-012-Waste Pit

a. Page 6-99: last paragraph: Besides the 1 foot sample, what additional interval in the 5 foot borehole will be sampled?

As described on page 6-100, second paragraph, the borehole samples will be taken from the part of the core that is likely to have the highest constituent levels, as determined from visual inspection and field-screening instruments.

b. Page 6-100; 3rd paragraph: If the bottommost sample still contains contaminants above background levels, then LANL must take deeper samples, regardless of the screening action levels.

Please see the response to General Comment 4. It is not necessary to continue sampling at sites where no health risk exists.

21. PRSs 9-001(a) and (b)-Firing Pads

Page 6-108; 1st paragraph: If contaminants are found in the surface, then deeper samples will need to be taken.

Because no driving force is present at this site, LANL does not feel it is necessary to take samples deeper in this area, at least not during Phase 1 characterization. The soil in this area has remained undisturbed and therefore, the top 6 inches is reasonable in finding PCOCs. If COCs are found in the top 6 in, a Phase II investigation will be initiated to delineate the vertical extent of the contamination. A baseline risk assessment or a VCA may also be appropriate. Please see the response to General Comment 4. It is not necessary to continue sampling at sites where no health risk exists.

22. PRS 9-001(c)-Recovery Pit

Page 6-109; last paragraph: Which intervals of the soil will be sampled?

As the second sentence in that paragraph states, the soil selected for laboratory analysis will be taken from the most highly contaminated part of the sampler soil column (5-ft core) as determined from direct field observation and screening methods.

23. PRS 9-002-Burn Pit

a. Page 6-113: 2nd paragraph: Soil samples should be taken to at least 4-5 feet below the bottom of the unit.

Because no driving force is present at this site, LANL does not feel it is necessary to take samples 4-5 feet deep in this area, at least not during Phase 1 characterization. The soil in this area has remained undisturbed and therefore, the top 6 inches is reasonable in finding PCOCs. If COCs are found in the top 6 in, a Phase II investigation will be initiated to delineate the vertical extent of the contamination. A baseline risk assessment or a VCA may also be appropriate. Please see the response to General Comment 4. It is not necessary to continue sampling at sites where no health risk exists.

b. Page 6-113; last paragraph: If the bottommost sample still contains contaminants above background levels, then LANL must take deeper samples, regardless of the screening action levels.

Please see the response to General Comment 4. It is not necessary to continue sampling at sites where no health risk exists.

24, PRS 9-014-Firing Site

a. Page 6-115; 3rd paragraph: It appears to EPA that more samples should be located within a 10 foot radius of the slab. Please justify in the revised workplan.

A statistical sampling approach was used to determine the sample locations selected. The weighting was biased toward the firing pad and two samples are currently located within approximately 10 ft. Based on the history of the site, the greatest concentration of debris would be within a 75-foot radius which is where the other samples are located.

b. Page 6-116; third paragraph: If the bottommost sample still contains contaminants above background levels, then LANL must take deeper samples, regardless of the screening action levels.

Please see the response to General Comment 4. It is not necessary to continue sampling at sites where no health risk exists.

25. PRS 9-013-Material Disposal Area M

a. Page 6-128; last paragraph: Please justify why LANL believes that all the waste materials are only on the surface and are not buried.

All historical information, including aerial photographs, indicate this area was only used as a surface disposal site. There is no evidence indicating the site would have been excavated prior to the initiation of disposal. Aerial photographs indicate a cleared area at this site dating back at least as early as the 1940s. Because the area was already cleared is probably the reason why it was selected for disposal in the first place.

b. Page 6-133; Figure 6-16: EPA believes two soil samples should be taken in MDA M in the SW areas of the waste concentration. Please explain/justify why sampling was omitted in this area.

The sampling strategy selected for this area was based on a semi-statistical approach whereby 15 judgmental sampling locations will be selected, in addition to the 14 randomly selected locations shown on the figure. One of the 15 judgmental samples will be taken in this area. Since the material that has been disposed here is similar throughout, it is highly likely that any PCOCs would be detected based on the 29 sampling locations selected. If any COCs are detected, the whole area would be approached in the same manner throughout. If no COCs are detected, the whole site, at a minimum would be covered.

c. Page 6-135; 2nd paragraph: LANL should take samples at deeper intervals (4-5 feet), to verify that vertical contamination has been delineated.

Because no driving force is present at this site, LANL does not feel it is necessary to take samples 4-5 feet deep in this area, at least not during Phase 1 characterization. The soil in this area has remained undisturbed and therefore, the top 12 inches is reasonable in finding PCOCs. If COCs are found in the top 12 in, a Phase II investigation will be initiated to delineate the vertical extent of the contamination. A baseline risk assessment or a VCA may also be appropriate. Please see the response to General Comment 4. It is not necessary to continue sampling at sites where no health risk exists. The results of the sediment, spring, and creek samples will also help determine whether any further actions should be taken regarding waste constituents that may have migrated from the site and contaminated local surface or subsurface water resources or canyon bottom sediments.

d. Page 6-137; last paragraph: Mixing of soil samples are not allowed if volatile organics are present.

The samples will not be homogenized if field screening instruments indicate the presence of VOCs.

e. Page 6-138; fourth paragraph: If hazardous materials are found, they should be taken to a controlled area at the Lab, not left on the surface.

This whole area is over 3 acres in size. It would be more economical and feasible for LANL to cover the site and provide long-term monitoring then remove the hazardous material to a controlled area of the Laboratory. The disposition of the hazardous materials will be determined during the corrective measures study.

f. Page 6-140 Sampling and Analysis Approach for Springs and Creek: An additional surface water and surface soil sample should be taken at the confluence of Starmer Gulch and Pajarito Canyon.

It is unclear why another surface water sample is needed at the confluence of Pajarito Canyon and Starmer Gulch in the Phase I investigation. We are presently sampling water and sediments at upstream locations and additional sites within the canyons would be further characterized in Phase II if necessary. If a soil sample is required, it is unclear where EPA suggests as the location of the soil sample. Water is in this area almost year round.

26. PRS 69-001-Two Mile Incinerator Pond

Page 6-149; 2nd paragraph: LANL should take deeper samples at deeper intervals (4-5 feet), to verify that vertical contamination has been delineated. Also, EPA believes that an additional sample needs to be taken in the center of the pond.

An additional sample will be obtained from the center of the pond, as suggested. Since a driving force was present in the pond area, a 3 samples will be obtained from within the range of 0-24 inches.

27. AOC C-8-010-Drum Storage Area

a. Page 6-155; 2nd paragraph: EPA considers this site a SWMU and it should be placed into the HSWA permit.

This site, C-8-010, has been added to the permit modification, effective May 19, 1994.

b. Page 6-156; 3rd paragraph: Samples must be taken deeper than 24 inches in order to make this a legitimate investigation.

Field screening instruments will be used throughout the sampling event. Since we are not positive about the depth of the sediments in this area, if the field screening instruments continue to detect PCOCs, the sampling will continue at 1 foot intervals to the surface of the tuff. The depth of 24 inches is a reasonable estimate based on visual inspection and knowledge of this site.

c. Page 6-158; 3rd paragraph: If the bottommost sample still contains contaminants above background levels, then LANL must take deeper samples, regardless of the screening action levels.

Please see the response to General Comment 4. It is not necessary to continue sampling at sites where no health risk exists.

28. AOC C-9-001-Outfall from Chemical Storage Bldg.

a. Page 6-159: EPA considers this site a SWMU and it should be placed into the HSWA permit.

This site, C-9-001, has been added to the permit modification, effective May 19, 1994.

b. Page 6-161; 1st paragraph: Does liquids from the drainpipes come from floor drains where chemicals are stored? Please explain in the revised workplan.

Chemicals were stored in this building. The drain originates in the floor of the building where the chemicals evidently spilled. This will be clarified in the revised work plan.

c. Page 6-158; 3rd paragraph: If the bottommost sample still contains contaminants above background levels, then LANL must take deeper samples, regardless of the screening action levels.

Please see the response to General Comment 4. It is not necessary to continue sampling at sites where no health risk exists.

29. Units Requested for No Further Action:

a. Page 7-7; PRS 8-007: Please explain in the revised workplan the date the outfall first was used and the date the outfall was permitted by EPA. Also, include previous monitoring results from this outfall. Furthermore, please include a narrative describing the piping that goes from the drain to the outfall and why this piping is not a potential release site.

PRS 8-007 is the past location of a silver recovery resin bed. It was a confined unit, which is no longer in place, that was used to collect silver from the photo-processing laboratory. The outfall that is mentioned in EPAs comment and is related to PRS 8-007 is discussed in Section 6.1.6 and is being investigated.

b. Page 7-32; PRS 9-016: LANL shall provide verification that this tank has been removed.

Verification of removal of this tank has been requested and will be forwarded to EPA as soon as it is obtained.

c. Page 7-51; C-9-010 Burning Pit: LANL shall provide the archival information referenced for EPA review.

The archival information requested is attached.

d. Page 7-51; C-9-011 Burn Area: LANL shall provide the archival information referenced for EPA review.

The archival information is attached.

ATTACHMENT 1

LIST OF SCREENING ACTION LEVELS

TABLE J-1

SUMMARY OF SCREENING ACTION LEVELS FOR POTENTIAL CHEMICALS OF CONCERN IN SOIL, WATER, AND AIR FOR ENVIRONMENTAL CHARACTERIZATION OF LOS ALAMOS NATIONAL LABORATORY[a]

Chemicals[b]	Soil Screening Action Level mg/kg	Water Screening Action Level µg/l	Air Screening Action Level µg/m³	CRQL[c] mg/kg and µg/l
High Explosives				
2-amino-2,6-DNT (aminodinitrotoluene)[d]				
4-amino-2,6-DNT (aminodinitrotoluene)[d], 19406-51-0				
Ammonium nitrate[d], 6484-52-2				
Barium nitrate (soluble barium)	5,600	2,000[h]		40, 200
CEF (tri(b-chloroethyl)-phosphate)[d], 115-96-8				
1,3-DNB (dinitrobenzene), 99-65-0	8	3.5		
2,4-DNT (dinitrotoluene), 121-14-2	1	0.05		0.33, 10[e]
2,6-DNT (dinitrotoluene), 606-20-2	1	0.05		0.33, 10[e]
DPA (diphenylyamine), 122-39-4	2,000	880		
HMX (cyclotetramethylenetetranitramine), 2691-41-0	4,000	1,800		
Nitrocellulose (non-toxic)[d], 9004-70-0				
Nitromethane[d], 75-52-5				
NP (bis(2,2-dinitropropyl) acetal/formal)[d], 5917-61-3				
PETN (pentaerythritolletranitrate), 78-11-5	1,600	700		
RDX (trimethylenetrinitramine), 121-82-4	64	3.2		
TATB (triaminotrinitrobenzene)[d], 3058-38-6				
Tetryl (N-methyl-N,2,4,6-tetranitrobenzeneamine), 479-45-8	800	350		
1,3,5-TNB (trinitrobenzene), 99-35-4	4	1.8		
2,4,6-TNT (trinitrotoluene), 118-96-7	40	12		

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Chemicals[b]	Soil Screening Action Level mg/kg	Water Screening Action Level µg/l	Air Screening Action Level µg/m³	CRQL[c] mg/kg and µg/l
Organics				
Volatile Organic Compounds				
Acetone, 67-64-1	8,000	3,500		0.01, 10
Benzene, 71-43-2	0.67	5[h]	0.12	0.01, 10[e]
Benzoic Acid, 65-85-0	320,000	140,000		100, —
Bromodichloromethane, 75-27-4	11	0.56		0.01, 10[e]
Bromoform, 75-25-2	89	4.4	0.90	0.01, 10[e]
Bromomethane, 74-83-9	0.43	49	4.9	0.01, 10
2-Butanone (Methyl ethyl ketone), 78-93-3	4,000	1,700	1,000	0.01, 10
Carbon disulfide, 75-15-0	7.4	3,500	10	0.01, 10
Carbon tetrachloride, 56-23-5	0.21	5[h]	0.066	0.01, 10[e]
Chlorobenzene, 108-90-7	67	100[h]	20	0.01, 10
Chloroethane, 75-00-3	3,300		10,000	0.01, 10
Chloroform, 67-66-3	0.21	100[h]	0.043	0.01, 10[e]
Chloromethane, 74-87-3	6.4	27	5.6	0.01, 10
Dibromochloromethane, 124-48-1	83	4.2		0.01, 10[e]
1,1-Dichloroethane, 75-34-3	410	3500	500	0.01, 10
1,1-Dichloroethene, 75-35-4	0.59	7[h]	0.29	0.01, 10[e]
1,2-Dichloroethane, 107-06-2	0.20	5[h]	0.038	0.01, 10[e]
cis-1,2-Dichloroethene, 156-59-2	800	70[h]		0.01, 10
trans-1,2-Dichloroethene, 156-60-5	1600	100[h]		0.01, 10
1,2-Dichloropropane, 78-87-5	6.5	5[h]	4.0	0.01, 10
cis-1,3-Dichloropropene, 10061-01-5	0.17	0.19	0.027	0.01, 10[e]
trans-1,3-Dichloropropene, 10061-02-6	0.17	0.19	0.027	0.01, 10[e]
Ethyl benzene, 100-41-4	3,100	700[h]	1000	0.01, 10
n-Hexane, 110-54-3	4,800	2,100		
2-Hexanone[d], 591-78-6				0.01, 10
Methanol, 67-56-1	40,000	18,000		

TABLE J-1

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Chemicals[b]	Soil Screening Action Level mg/kg	Water Screening Action Level µg/l	Air Screening Action Level µg/m³	CRQL[c] mg/kg and µg/l
4-Methyl-2-pentanone (MIK), 108-10-1	510	1,700	80	0.01, 10
Methylene Chloride, 75-09-2	5.6	5[h]	2.2	0.01, 10[e]
Styrene, 100-42-5	16,000	100[h]		0.01, 10[e]
1,1,2,2-Tetrachloroethane, 79-34-5	3.9	1.8	0.18	0.01, 10[e]
Tetrachloroethene, 127-18-4	5.9	5[h]	1.8	0.01, 10[e]
Toluene, 108-88-3	890	1000[h]	380	0.01, 10
1,1,1-Trichloroethane, 71-55-6	1,000	200[h]	1,000	0.01, 10
1,1,2-Trichloroethane, 79-00-5	6.3	5[h]	0.63	0.01, 10[e]
Trichloroethene, 79-01-6	3.2	5[h]	0.58	0.01, 10[e]
Vinyl Chloride, 75-01-4	0.013	2[h]	0.012	0.01, 10[e]
Xylene (Total), 1330-20-7	160,000	10,000[h]		0.01, 10
Semi-Volatile Organic Compounds				
Acenaphthene, 83-32-9	4,800	2,100		0.33, 10
Acenaphthylene[d], 208-96-8				0.33, 10
Anthracene, 120-12-7	24,000	10,000		0.33, 10
Benzo[a]anthracene, 56-55-3	0.64	0.1[i]		0.33, 10
Benzo[b]fluoranthene,205-99-2	0.7	0.2[i]		0.33, 10
Benzo[k]fluoranthene,207-08-9	1.5	0.2[i]		0.33, 10
Benzo[ghi]perylene[d], 191-24-2	44			0.33, 10
Benzo[a]pyrene, 50-32-8	0.10	0.2[h]	0.00057	0.33, 10[e]
alpha-BHC, 319-84-6	0.1	0.0056		
beta-BHC, 319-85-7	4	0.19		
Bis-(2-chloroethoxy)methane[d], 111-91-1				0.33, 10
Bis-(2-chloroethyl)ether, 111-44-4	0.13	0.032	0.0032	0.33, 10[e]
Bis-(2-ethylhexyl)phthalate, 117-81-7	50	4[i]		0.33, 10[e]
4-Bromophenyl-phenylether[d], 101-55-3				0.33, 10
Butyl benzyl phthalate, 85-68-7	16,000	100[i]		0.33, 10

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Chemicals[b]	Soil Screening Action Level mg/kg	Water Screening Action Level µg/l	Air Screening Action Level µg/m³	CRQL[c] mg/kg and µg/l
Carbazole, 86-74-8	35	1.8		0.33, 10
Chlordane, 57-74-9	0.54	0.2[h]		0.017, 0.05
4-Chloroaniline, 106-47-8	320	140		0.33, 10
4-Chloro-3-methylphenol[g] (p-chloro-m-cresol), 59-50-7	16,000	7,000		0.33, 10
2-Chloronaphthalene, 91-58-7	6,400	2,800		0.33, 10
2-Chlorophenol, 95-57-8	400	170		0.33, 10
4-Chlorophenyl phenyl ether[d], 7005-72-3				0.33, 10
Chrysene, 218-01-9	22	0.2[i]		0.33, 10
DDD, 72-54-8	2.9	0.15		0.03, 0.1
DDT, 50-29-3	2.1	0.1		0.03, 0.1
Dibenzo[a,h]anthracene, 53-70-3	0.086	0.3[i]		0.33, 10
Dibenzofuran[d], 132-64-9				0.33, 10
Di-n-butylphthalate, 84-74-2	8,000	3,500		0.33, 10
1,2-Dichlorobenzene, 95-50-1	1,600	600[h]	200	0.33, 10
1,3-Dichlorobenzene, 541-73-1	7,200	600[h]		0.33, 10
1,4-Dichlorobenzene, 106-46-7	290	75[h]	700	0.33, 10
3,3'-Dichlorobenzidine, 91-94-1	1.6	0.078		0.33, 10[e]
2,4-Dichlorophenol, 120-83-2	240	100		0.33, 10
Diethylphthalate, 84-66-2	64,000	5,000[i]		0.33, 10
Dimethylformamide, 68-12-2	8,000	3,500		
2,4-Dimethylphenol, 105-67-9	1,600	700		0.33, 10
Dimethyl phthalate, 131-11-3	80,000	35,000		0.33, 10
4,6-Dinitro-2-methylphenol[d] (4,6-dinitro-o-cresol), 534-52-1				0.8, 25
2,4-Dinitrophenol, 51-28-5	160	70		0.8, 25
Di-n-octyl phthalate, 117-84-0	1,600	700		0.33, 10
Endosulfan, 115-29-7	4	1.8		
Ethyl acetate, 141-78-6	72,000	32,000		
Ethylene glycol, 107-21-1	160,000	70,000		

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Chemicals[b]	Soil Screening Action Level mg/kg	Water Screening Action Level µg/l	Air Screening Action Level µg/m³	CRQL[c] mg/kg and µg/l
Fluoranthene, 206-44-0	3,200	1,400		0.33, 10
Fluorene, 86-73-7	3,200	1,400		0.33, 10
Hexachlorobenzene, 118-74-1	0.44	1[h]	0.0022	0.33, 10[e]
Hexachlorobutadiene, 87-68-3	90	4.5	0.45	0.33, 10[e]
Hexachlorocyclopentadiene, 77-47-4	560	50[h]	0.07	0.33, 10
Hexachloroethane, 67-72-1	80	25	2.5	0.33, 10
Indeno[1,2,3-cd]pyrene, 193-39-5	0.41	0.4[i]		0.33, 10
Isophorone, 78-59-1	7,400	370		0.33, 10
2-Methylnaphthalene[d], 91-57-6				0.33, 10
2-Methylphenol (o-cresol), 95-48-7	4,000	1,700		0.33, 10
4-Methylphenol (p-cresol), 106-44-5	4,000	1,700		0.33, 10
Naphthalene, 91-20-3	3,200	1400		0.33, 10
2-Nitroaniline, (o-nitroaniline) 88-74-4	4.8	2.1	0.20	0.8, 25[e]
3-Nitroaniline(m-nitroaniline)[d], 99-09-2				0.8, 25
4-Nitroaniline(p-nitroaniline)[d], 100-01-6				0.8, 25
Nitrobenzene, 98-95-3	5.3	18	2.0	0.33, 10
2-Nitrophenol[d], 88-75-5				0.33, 10
4-Nitrophenol[d], 100-02-7				0.8, 25
N-Nitrosodiphenylamine, 86-30-6	140	7.1		0.33, 10[e]
N-Nitrosodi-N-propylamine, 621-64-7	0.10	0.0050		0.33, 10[e]
2,2-Oxybis(1-chloropropane) (bis[2-chloroisopropyl]ether), 108-60-1	100	0.50	1.0	0.33, 10
PCB (Aroclors), 1336-36-3	0.09	0.50[h]		0.033, 1
Pentachlorophenol, 87-86-5	5.8	1[h]		0.8, 25[e]
Phenanthrene[d], 85-01-8				0.33, 10
Phenol, 108-95-2	48,000	21,000		0.33, 10
Pyrene, 129-00-0	2,400	1,000		0.33, 10
1,2,4-Trichlorobenzene, 120-82-1	160	70[h]	9.0	0.33, 10
2,4,5-Trichlorophenol, 95-95-4	8,000	3,500		0.8, 25
2,4,6-Trichlorophenol, 88-06-2	64	3.2	0.32	0.33, 10[e]

a. SALs based on methodologies given by EPA 1990 (0432) and EPA (1991, 0302). SALs are rounded to two significant figures. Water SALs are used for both groundwater and surface water.

b. Target Analyte List (TAL), Target Compound List (TCL), High-Explosive List, with associated Chemical Abstract Services numbers, as given by EPA (1991, 0814; 1991, 0779; 1991, 1074)

c. Contract Laboratory Program (CLP) and Contract-Required Quantitation Limits (CRQLs) for soil (mg/kg) and water (µg/l), respectively. CRQLs are provided as an indicator of the analytical method detection limit, and are not to be viewed in an absolute sense as a standard of performance for a given sample representing a given matrix and a given analyte. CRQLs are not available for air.

d. Toxicity data (e.g., RfDs and/or slope factors) were not available; therefore, SALs were not calculated.

e. The SAL is less than the CRQL; therefore, special analytical services may be required.

f. Soil SAL based on EPA guidance on establishing lead cleanup levels (EPA 1989, 0987).

g. Based on subchronic RfD divided by 10; chronic RfD not available.

h. Safe drinking water regulations (EPA 1993, 1071) MCL water SALs were not calculated for compounds with MCLs in accordance with proposed EPA guidance (EPA 1990, 0432)

i. MCL is not final. Number presented is a draft or proposed MCL from EPA (1993, 1071)

j. No MCL or toxicity information appropriate for SAL derivation is available for lead. The SAL presented is based on Federal ambient water quality criteria for the protection of human health based on water and fish consumption (EPA 1993, 0830).

ATTACHMENT 2

RFI SCHEDULE

1157 RFI Field Work

ID	Name	Scheduled Start	Scheduled Finish
1	Geophysical Survey	12/7/93 8:00am	12/20/93 5:00pm
2	MDA M Grid and Inventory	5/2/94 8:00am	5/27/94 5:00pm
3	Springs Sampling	4/4/94 8:00am	10/12/94 5:00pm
4	April Sampling Event	4/4/94 8:00am	4/5/94 5:00pm
5	July Sampling Event	7/11/94 8:00am	7/12/94 5:00pm
6	October Sampling Event	10/11/94 8:00am	10/12/94 5:00pm
7	Surface/Near Surface Intrusive	4/18/94 8:00am	7/15/94 5:00pm
8	Soil Sampling	4/18/94 8:00am	5/27/94 5:00pm
9	Tank/Drain Sampling	4/18/94 8:00am	5/27/94 5:00pm
10	MDA M Springs/Surface Soil/Sediment/Containers	5/31/94 8:00am	7/15/94 5:00pm
11	Outfalls	4/18/94 8:00am	5/27/94 5:00pm
12	Sample Analysis	4/18/94 8:00am	1/18/95 5:00pm
13	MDA M Springs	6/30/94 8:00am	12/22/94 5:00pm
14	Surface/Near Surface Soil	4/18/94 8:00am	10/20/94 5:00pm
15	Tanks/Drains	6/7/94 8:00am	11/29/94 5:00pm
16	MDA M S.Soil/Sediment/Containers	7/25/94 8:00am	1/18/95 5:00pm
17	Outfalls	6/7/94 8:00am	11/29/94 5:00pm
18	Data Assessment	12/22/93 8:00am	3/3/95 5:00pm
19	Geophysics	12/22/93 8:00am	2/7/94 5:00pm
20	Surface/Near Surface Soil	4/18/94 8:00am	12/6/94 5:00pm
21	Tanks	6/7/94 8:00am	1/13/95 5:00pm
22	Outfalls	6/7/94 8:00am	1/13/95 5:00pm
23	MDA M Springs/Other sampling	7/25/94 8:00am	3/3/95 5:00pm
24	Ecological Risk Assessment	10/11/93 8:00am	9/30/94 5:00pm
25	Deep Drilling	3/28/95 8:00am	12/20/95 5:00pm
26	Deep Drilling Field Sampling	3/28/95 8:00am	5/8/95 5:00pm
27	Deep Drilling Analysis	5/16/95 8:00am	11/3/95 5:00pm
28	Deep Drilling Assessment	5/16/95 8:00am	12/20/95 5:00pm
29	Geophysics/Surface Soil/Tanks/Outfalls Phase I Report	1/13/95 8:00am	10/6/95 5:00pm
30	MDA M Springs/Other Phase I Report	3/6/95 5:00pm	12/1/95 5:00pm
31	Deep Drilling Phase I Report	12/21/95 8:00am	9/17/96 5:00pm
32	Phase II RFI	11/5/96 8:00am	10/30/97 5:00pm
33	Phase II Preparation	11/5/96 8:00am	3/14/97 5:00pm
34	Phase II Field Work	3/17/97 8:00am	5/16/97 5:00pm
35	Phase II Sample Analysis	3/31/97 8:00am	9/17/97 5:00pm
36	Phase II Data Assessment	3/31/97 8:00am	10/30/97 5:00pm
37	RFI Report	1/13/95 8:00am	9/28/98 5:00pm

PRSs

Surface/Near Surface Intrusive:

Soil: 8-002, 8-003(a), 8-006(a), 9-001(a)(b)(d), 9-002, 9-003(g)(h)(i), 9-008(b), 9-009, 9-010(a)(b), 9-011(b)(c), 9-012, 9-014, c-8-010, c-9-001

Tank/Drains/Vessels: 8-003(a), 8-004(d), 8-005, 9-005(d)

Outfalls: 8-009(a)(c)(d)(e)(f)

MDA M Springs, Surface Soil, Sediments, Contents: 9-013

Deep Drilling: 8-003(a), 9-001(c), 9-003(a)(b)(d)(e), 9-005(a)(d), 9-006, 9-012

ATTACHMENT 3

NPDES SAMPLING RESULTS
EPA OUTFALL 06A-075

TA	BLDG	DATE_SAMP	EPA	OUT	ANALYS	RESULT	RES	METHO
08	0021	17-JAN-89	075	06A	Ag	.13	MGL	272.1
08	0021	17-JAN-89	075	06A	CN	0	MGL	335.3
8	0021	17-JAN-89	075	06A	pH	7.82	SU	150.1
08	0021	19-APR-89	075	06A	Ag	.003	MGL	272.1
08	0021	19-APR-89	075	06A	CN	0	MGL	335.3
08	0021	19-APR-89	075	06A	pH	7.96	SU	150.1
08	0021	19-JUL-89	075	06A	Ag	.36	MGL	272.1
08	0021	19-JUL-89	075	06A	CN	0	MGL	335.3
08	0021	19-JUL-89	075	06A	pH	7.82	SU	150.1
08	0021	16-OCT-89	075	06A	Ag	.007	MGL	272.1
08	0021	16-OCT-89	075	06A	CN	0	MGL	335.3
08	0021	16-OCT-89	075	06A	pH	7.9	SU	150.1
08	0021	17-JAN-90	075	06A	Ag	.034	MGL	272.1
08	0021	17-JAN-90	075	06A	CN	0	MGL	335.3
08	0021	17-JAN-90	075	06A	pH	8.4	SU	150.1
08	0021	20-APR-90	075	06A	Ag	.01	MGL	272.1
08	0021	20-APR-90	075	06A	CN	0	MGL	335.3
08	0021	20-APR-90	075	06A	pH	7.9	SU	150.1
08	0021	16-JUL-90	075	06A	Ag	.01	MGL	272.1
08	0021	16-JUL-90	075	06A	CN	.018	MGL	335.3
08	0021	16-JUL-90	075	06A	pH	7.1	SU	150.1
08	0021	15-OCT-90	075	06A	Ag	.01	MGL	272.1
08	0021	15-OCT-90	075	06A	CN	0	MGL	335.3
08	0021	15-OCT-90	075	06A	pH	8.1	SU	150.1
08	0021	16-JAN-91	075	06A	Ag	.013	MGL	272.1
08	0021	16-JAN-91	075	06A	CN	0	MGL	335.3
08	0021	16-JAN-91	075	06A	pH	8.22	SU	150.1
08	0021	18-APR-91	075	06A	Ag	.15	MGL	272.1
08	0021	18-APR-91	075	06A	CN	0	MGL	335.3
08	0021	18-APR-91	075	06A	pH	7.1	SU	150.1
08	0021	16-JUL-91	075	06A	Ag	.01	MGL	272.1
08	0021	16-JUL-91	075	06A	CN	0	MGL	335.3
08	0021	16-JUL-91	075	06A	pH	7.62	SU	150.1
08	0021	16-OCT-91	075	06A	Ag	.051	MGL	272.1
08	0021	16-OCT-91	075	06A	CN	0	MGL	335.3
08	0021	16-OCT-91	075	06A	pH	7.8	SU	150.1
08	0021	06-JAN-92	075	06A	Ag	.024	MGL	272.1
08	0021	06-JAN-92	075	06A	CN	0	MGL	335.3
08	0021	06-JAN-92	075	06A	pH	8	SU	150.1
08	0021	21-FEB-92	075	06A	Ag	.195	MGL	272.1
08	0021	21-FEB-92	075	06A	CN	0	MGL	335.3
08	0021	21-FEB-92	075	06A	pH	7.4	SU	150.1
08	0021	15-APR-92	075	06A	Ag	.01	MGL	272.1
08	0021	15-APR-92	075	06A	CN	0	MGL	335.3
08	0021	15-APR-92	075	06A	pH	7.15	SU	150.1
08	0021	19-JUN-92	075	06A	Ag	.01	MGL	272.1
08	0021	19-JUN-92	075	06A	CN	0	MGL	335.3
08	0021	19-JUN-92	075	06A	pH	7.5	SU	150.1
08	0021	13-JUL-92	075	06A	Ag	.01	MGL	272.1
08	0021	13-JUL-92	075	06A	CN	.02	MGL	335.3
08	0021	13-JUL-92	075	06A	pH	7.86	SU	150.1
08	0021	04-SEP-92	075	06A	Ag	.01	MGL	272.1
08	0021	04-SEP-92	075	06A	CN	0	MGL	335.3
08	0021	04-SEP-92	075	06A	pH	7.24	SU	150.1
08	0021	15-OCT-92	075	06A	Ag	.011	MGL	272.1
08	0021	15-OCT-92	075	06A	CN	0	MGL	335.3

08	2021	15-OCT-92	075	06A	pH	7.69	SU	150.1
08	2021	13-JAN-93	075	06A	Ag	.068	MGL	272.1
08	2021	13-JAN-93	075	06A	CN	0	MGL	335.3
08	2021	13-JAN-93	075	06A	pH	6.9	SU	150.1
08	2021	15-APR-93	075	06A	Ag	.01	MGL	272.1
08	2021	15-APR-93	075	06A	CN	0	MGL	335.3
08	2021	15-APR-93	075	06A	pH	7.5	SU	150.1
08	2021	05-MAY-93	075	06A	Ag	.051	MGL	272.1
08	2021	05-MAY-93	075	06A	CN	0	MGL	335.3
08	2021	05-MAY-93	075	06A	pH	7.2	SU	150.1
08	2022	16-JUL-93	075	06A	Ag	.01	MGL	272.1
08	2022	16-JUL-93	075	06A	CN	0	MGL	335.3
08	2022	16-JUL-93	075	06A	pH	7	SU	150.1
08	2021	14-OCT-93	075	06A	Ag	.01	MGL	272.1
08	2021	14-OCT-93	075	06A	CN	0	MGL	335.3
08	2021	14-OCT-93	075	06A	pH	8.3	SU	150.1
08	2021	10-JAN-94	075	06A	Ag	.02	MGL	272.1
08	2021	10-JAN-94	075	06A	CN	0	MGL	335.3
08	2021	10-JAN-94	075	06A	pH	7.8	SU	150.1
08	2021	12-APR-94	075	06A	Ag	.01	MGL	272.1
08	2021	12-APR-94	075	06A	CN	0	MGL	335.3
08	2021	12-APR-94	075	06A	pH	8	SU	150.1

78 rows selected.

SQL>

ATTACHMENT 4

ARCHIVAL INFORMATION

(Reference: Weston, Roy J. September 19, 1989, "Environmental Restoration Program, TAsk number AL-LA-037," Los Alamos National Laboratory, Los Alamos, New Mexico)

1. Project Name : ER PROGRAM

2. Installation : LOS ALAMOS NATIONAL LABORATORY

4. Task Number : AL-LA-037

5. Phase 1 Heading : TA-9(AE)-2-CA-I-HW/RW(Burning Areas)

6. Release Site Descriptor : TA-09-17-002-0000

7. Installation Identifier : TA-9-2b

8. Alternative Identifier : Not identified

9. Site Description :
Small fire reported in pit in 1950 at Anchor Site East; location unknown(R01r).

10. Site Location:
Coordinate system and units : LANL Coordinate System / Feet
The site has not been surveyed
Coordinates : Not identified
Elevation : Not identified

11. Program Phase : NFA

12. Program Phase Rationale :
Phase 1 (R01r) and RI Scoping (R01s) activities indicate that the site should receive no further action.

13. Current Operational Status : Not Operational
Current Owner/Operating Group : Not identified

14. Site Type : Burning pit and any associated soil contamination

15. Potential Pathways : Not identified

16. Generic Waste Type : Not identified

17. EPA Waste Characteristics : Not identified

18. EPA Waste Types : Not identified

19. Contaminants of Concern: Not identified

21. Chronological Events:

Description	Date	Reference
•Small fire in burning pit	07/16/50	R02r
•ER Program Site Visit	11/21/88	R01s

22. Comments:

On July 16, 1950, it was reported that there was a small fire in the burning pit east of Anchor Ranch(R02r). Where this pit was located is not known. Activities at this pit could have led to contamination of HE and radionuclides. An attempt to locate this site was made during a November 1988 ER Program Site Visit(R01s). The attempt was unsuccessful. Due to the unlikelyhood of ever finding this site and the small chance that measurable contamination to the environment was ever released, it is suggested that this site receive no further action.

23. Information Resources

Reports

- Reference R01r
  Title : CEARP Phase 1 Report
  Author : DOE
  Date : 10/87
  Location: ER Program Document Control Files, Roy F. Weston, Albuquerque, NM

- Reference R02r
  Title : H-3 Monthly Report
  Author : LANL Division H-3
  Date : 08/24/50
  Location: ER Program Document Control Files, Roy F. Weston, Albuquerque, NM

Site Visits

- Reference R01s
  Title : ER Program Site Visit
  Author : Roy F. Weston
  Date : 11/21/88
  Location: Field Notebook Control #69, ER Program Document Control Files, Roy F. Weston, Albuq., NM

1. Project Name : ER PROGRAM

2. Installation : LOS ALAMOS NATIONAL LABORATORY

4. Task Number : AL-LA-037

5. Phase 1 Heading : TA-9(AE)-2-CA-I-HW/RW(Burning Areas)

6. Release Site Descriptor : TA-09-17-003-0000

7. Installation Identifier : TA-9-2c

8. Alternative Identifier : Not identified

9. Site Description :
Burn area associated with decommissioning of 9-1 at Anchor Site East; may be same as 9-2-1(R01r).

10. Site Location:
Coordinate system and units : TBD
The site has not been surveyed
Coordinates : Not identified
Elevation : Not identified

11. Program Phase : NFA

12. Program Phase Rationale :
Phase 1 (R01r) and RI Scoping (R01s) activities indicate that the site should receive no further action.

13. Current Operational Status : Not Operational
Current Owner/Operating Group : Not identified

14. Site Type : Burn area and any associated soil contamination

15. Potential Pathways : Not identified

16. Generic Waste Type : Not identified

17. EPA Waste Characteristics : Not identified

18. EPA Waste Types : Not identified

19. Contaminants of Concern: Not identified

21. Chronological Events:

Description	Date	Reference
•ER Program Site Visit	11/21/88	R01s

22. Comments:

As indicated in the description of the decommissioning of this site, old combustible parts of the site were piled up and burned in a region east of the site. Whether or not this was near the 1949 burning pit (TA-9-2A) is not known(R01r). An attempt to locate this site was made during a November 1988 ER Program Site Visit(R01s). The attempt was unsuccessful. Due to the unlikelyhood of ever finding this site and the small chance that measurable contamination to the environment was ever released, it is suggested that this site receive no further action.

23. Information Resources

Reports

- Reference R01r
  Title : CEARP Phase 1 Report
  Author : DOE
  Date : 10/87
  Location: ER Program Document Control Files, Roy F. Weston, Albuquerque, NM

Site Visits

- Reference R01s
  Title : ER Program Site Visit
  Author : Roy F. Weston
  Date : 11/21/88
  Location: Field Notebook Control #69, ER Program Document Control Files, Roy F. Weston, Albuq., NM

Los Alamos
NATIONAL LABORATORY

memorandum

Hazardous & Solid Waste Group (ESH-19)
Los Alamos, New Mexico 87545

To/MS: OU 1157 File
From/MS: Albert Dye, ESH-19, MS K490 AD
Phone/Fax: 7-4715/7-5224
Symbol: ESH-19:98-0129
Date: June 25, 1998

SUBJECT: MAY 28, 1998 TELEPHONE CONVERSATION WITH MANUEL URIZAR ON TA-9 PRSS 09-011(C), 09-011(B) AND 09-002

I spoke to Manuel Urizar, a now retired LANL employee who worked at TA-9 from 1947 until 1987. Mr. Urizar said that he was familiar with the solvent rack [PRS 09-011(c)] located on the south side of the HE Processing Building, TA-9-38. He indicated that one of his responsibilities at TA-9 was safety and he recalled having to conduct inspections of the solvent storage area. He thought the rack was placed into service shortly after Building TA-9-38 was constructed in the early 1950s. He said up to 5 or 6 drums of solvent at any one time were stored on the rack. He didn't recall any spills of solvents from the drum rack. He indicated that HE or HE contaminated items would not have been stored at or near the drum rack.

Mr. Urizar also recalled somewhat the temporary storage of equipment suspected to be contaminated with HE [PRS 09-011(b)] on the south side of the HE storage magazine, TA-9-39. He didn't say when that storage area was first used but he did indicate it was not used for storage of any items other than potential HE contaminated items.

Finally, Mr. Urizar said he did not recall the existence of any burn pits at TA-9, (e.g., PRS 09-002). He said most classified materials were burned at S-site. However, he did say that he was less familiar with the activities at the Far point firing site which was operated by one of the GMX groups.

AD:em

Cy: Records Processing Facility, MS M707
ESH-19 Circ. File

Los Alamos
NATIONAL LABORATORY
memorandum

Hazardous & Solid Waste Group (ESH-19)
Los Alamos, New Mexico 87545

To/MS: OU 1157 File
From/MS: Albert Dye, ESH-19, MS K490 AD
Phone/Fax: 7-4715/7-5224
Symbol: ESH-19:98-0130
Date: June 25, 1998

SUBJECT: JUNE 9, 1998 TELEPHONE CONVERSATION WITH ZENAS BOONE ON TA-9 PRS 09-002

I spoke to Zenas Boone, a retired LANL employee who worked at the TA-9 Far Point Firing Site when it was in use. Mr. Boone said that he did not remember the existence of any burn pit at TA-9. He said all classified material was sent to S-Site for disposal. He said that hundreds of HE shots were conducted at Far Point Firing Site, and during some periods, at a rate of 7 to 8 shots per day. He also said he remembered very well a burn pit at 'Lower Slobovia' in TA-36, but none at Far Point Firing Site.

AD:em

Cy: Records Processing Facility, MS M707
ESH-19 Circ. File

Los Alamos
NATIONAL LABORATORY

memorandum

Hazardous & Solid Waste Group (ESH-19)
Los Alamos, New Mexico 87545

To/MS:	Albert Dye, ESH-19, MS K490
From/MS:	Geri Rodriguez, ESH-19, MS K490
Phone/Fax:	7-6259/7-5224
Symbol:	ESH-19:98-097
Date:	May 27, 1998

SUBJECT: STORAGE AREA AT TA-9-38 & TA-9-39

Attached are the ESH-19 Hazardous and Solid Waste Group records for two former storage areas at buildings TA-9-38 and TA-9-39. These are HWTS system printouts and inspection check lists for site ID numbers 28 and 441.

GR:em

Cy: RPF, MS M707
ESH-19 Circ. File

Los Alamos
NATIONAL LABORATORY

memorandum

Hazardous & Solid Waste Group (ESH-19)
Los Alamos, New Mexico 87545

To/MS: OU 1157 File
From/MS: Albert Dye, ESH-19, MS K490
Phone/Fax: 7-4715/7-5224
Symbol: ESH-19:98-0128
Date: June 25, 1998

SUBJECT: MAY 28, 1998 TELEPHONE CONVERSATION WITH CLARENCE COURTWRIGHT ON TA-9 PRS 09-002

I spoke to Clarence Courtwright, a retired LANL employee who worked at TA-9 during the 1960s. Mr. Courtwright said that he that he did not work at TA-9 when the burn pit was in use, but he participated in the decommissioning of old TA-9 Anchor East facilities. He said he worked with the Industrial Safety Group, H-3, in the removal of high explosives contaminated buildings and other structures at TA-9. This effort involved discovering HE contamination at buildings and structures and then removal of the HE, usually through burning. He said the burn pit was used to burn high speed 16 mm camera film produced from far Point Firing site, but was not used to burn HE or other chemicals.

AD:em

Cy: Records Processing Facility, MS M707
ESH-19 Circ. File

SITE ID: 441 TA: 9 BLDG: 38 Room: N/A Loc: PROCESSING RM Facility Type: SATELLITE

Operation Type: CONTAINER Status: REMOVED Inspections: NONE Group: M-1

Contact Name: LONNIE B. CHAPMAN Phone: 667-4411 Mail Stop: C920 TA: 9 BLDG: 21 Room: 106A

Process:

Photo: no Mixed: no HE: yes

Remarks: EXPLOSIVES CONTAMINATED TOLUENE, ACETONE. SCRAP EXPLOSIVES (HMX, TNT ETC). ISOCYANATE CIPDI CONTAMINATED RAGS. POLY BUTADIENE (HYDROXY TERMINATED) CONTAMINATED, EXPL. CONT., RAGS. TNT, COMP B EXPLOSIVES MELT CASTING. CAST CURE BINDER EXPLOSIVES FORMULATION

Waste List :

EPA Code	Waste Type	Mixed	Photo	HE
	TOLUENE	n	n	y
	ACETONE	n	n	y
	HMX	n	n	y
	TNT	n	n	y
	ISOCYANATE	n	n	y
	POLY BUTADIENE	n	n	y

SATELLITE STORAGE AREA INSPECTION CHECKLIST

I. GENERAL INFORMATION

TA: 9 Bldg: 38 Room: N/A

Location Description: Processing Room

Contact Name: ~~E~~ J. Freer Phone No: 7-6361 Group: M-1

Waste Coordinator (If not the same as contact): J. Stimmel Phone No.: 7-4932

Area Status: Removed (Active/Inactive/Removed) Area Type: Satellite (Satellite, Rest House, Safety Kleen)

II. SATELLITE STORAGE AREA CRITERIA

Distance to point of generation: N/A

No. and names of generators using area: _____

Can ownership of waste be easily traced? _____

No. of processes contributing waste to area: _____

Process type(s): _____
(Machine shop, plating, R&D, etc.)

Is the area well controlled? (Provide information on control/lack of control:) _____

Who controls the area? _____

III. WASTE CHARACTERIZATION

Hazardous or Mixed Waste: _____ Acutely Hazardous: _____

If Mixed Waste, TRU or Low-level? Radionuclides known: _____

Non-RCRA Waste: _____ Solid/Gas/Liquid: _____

Further description of waste form (rags, gloves, etc.): _____

If mixed waste, what is the generation process? _____

If mixed waste, what was the date of generation? _____

IV. REGULATORY COMPLIANCE INFORMATION

Labeled "Hazardous Waste" and constituents: _____

If mixed waste, labeled "Hazardous Waste", "Radioactive Waste" and constituent: _____

N/A

IT CORPORATION
PROJECT NO 30[illegible]

If mixed waste, is the location in a radiation-controlled area and/or RMA?: _____

Estimated number of containers and approximate volume of waste: _____

Generation rate per month: _____

Container(s) condition/integrity: _____ Container(s) closed: _____

If outdoors, container(s) placed on pallet or similar structure off the ground: _____

If outdoors, containers placed in secure, preferably sheltered area, out of traffic? _____

Is waste compatible with container? _____ Is waste compatible with other wastes? _____

If volume has reached the max. allowable, is container dated? _____

When the volume has reached the max. allowable, where is it taken? (<90 day or EM-7) _____

Signs in the area identifying "Satellite Hazardous Waste Storage Area": _____

Are non-hazardous waste, radioactive waste, product, etc. clearly labelled and segregated from RCRA waste? _____

Is the general area free of obstacles, spills, ignition sources, etc.? _____

If red "fire suppression" cans are used, where are they emptied at the end of each work period: _____

V. OTHER

Have generator/waste coordinators received HS-3's Hazardous Waste Generator Training? _____

Has EM-8 been informed of any changes in the status of this area or waste types managed, including contact names (if not, provide Generator Storage of Hazardous and Mixed Waste Form):

VI. COMMENTS AND RECOMMENDATIONS:

Per discussion with J. Stimmel, sat. stor. area ~~has~~ ~~been~~ removed in 1992.

Inspector: Edward Mignault (Print) Edward R. Mignault (Sign) Date: 8-20-92

Reviewed by: [illegible] (Print) [illegible] (Sign) Date: [illegible]

EM
8/27/92

HAZARDOUS WASTE STORAGE AREA TYPE: **Satellite/<90 day**
(circle one)

DATE: 8/3/90

LOCATION: TA- 9 BLDG.- 38 ROOM- _____ (n/a if not applicable)

OTHER LOCATION INFO: _____
(i.e., outside, north dock)

NAME OF CONTACT: Lonnie B. Chapman / Sandy Hildner

GROUP: M-1 MS: C920 PHONE: 667-4411 / 667-0501

OFFICE LOCATION: TA- 9 BLDG.- 21 ROOM- 106A

TYPES OF HAZARDOUS WASTES STORED: (i.e., ACETONE, FREON TF, TCE, ETC. Be specific, indicate which are liquid and which are adsorbed on rags, etc. Also list Radioactive components and metals

Explosives Contaminated Toluene, Acetone
Scrap Explosives (HMX, TNT etc)
Toluene Soaked Explosives Contaminated Rags, Paper
Isocyanate (IPDI) contaminated Rags
Poly ~~iso~~ butadiene (hydroxy terminated) contaminated, expl. cont. rag

Process that generates hazardous waste (Be brief):

1) TNT, Comp B explosives melt casting.

2) Cast Cure binder explosives formulation.

Return to: TONY GRIEGGS, HSE-8, MS K490, 5-0451

SITE ID: 28 TA: 9 BLDG: 39 Room: N/A Loc: STORAGE MAG Facility Type: SATELLITE

Operation Type: CONTAINER Status: REMOVED Inspections: NONE Group: M-1

Contact Name: L.B. CHAPMAN Phone: 667-0501 Mail Stop: C920 TA: 9 BLDG: 21 Room: 0107

Process: HE MAGAZINE STORAGE AREA

Photo: no Mixed: no HE: yes

Remarks: OTHER M-1 CONTACTS: DIANE GRIECHEN, P940, TA-15-40-125, PH. 7-9317 MAX VIGIL, C920, TA-9-29-101, PH. 7-4323

Waste List :

EPA Code	Waste Type	Mixed	Photo	HE
	HE WASTE	n	n	y

IT CORPORATION
PROJECT NO [illegible]

SATELLITE STORAGE AREA INSPECTION CHECKLIST

I. GENERAL INFORMATION

TA: 9 Bldg: 39 Room: N/A

Location Description: ~~Service~~ Exm Storage Magazine

Contact Name: L. Chapman Phone No: 7-4411 Group: M-1

Waste Coordinator (If not the same as contact): J. Stimmel Phone No.: 7-4932

Area Status: Removed (Active/Inactive/Removed) Area Type: Satellite (Satellite, Rest House, Safety Kleen)

II. SATELLITE STORAGE AREA CRITERIA

Distance to point of generation: N/A

No. and names of generators using area: _____

Can ownership of waste be easily traced? _____

No. of processes contributing waste to area: _____

Process type(s): _____ (Machine shop, plating, R&D, etc.)

Is the area well controlled? (Provide information on control/lack of control:) _____

Who controls the area? _____

III. WASTE CHARACTERIZATION

Hazardous or Mixed Waste: _____ Acutely Hazardous: _____

If Mixed Waste, TRU or Low-level? Radionuclides known: _____

Non-RCRA Waste: _____ Solid/Gas/Liquid: _____

Further description of waste form (rags, gloves, etc.): _____

If mixed waste, what is the generation process? _____

If mixed waste, what was the date of generation? _____

IV. REGULATORY COMPLIANCE INFORMATION

Labeled "Hazardous Waste" and constituents: _____

If mixed waste, labeled "Hazardous Waste", "Radioactive Waste" and constituent: _____

N/A

IT CORPORATION
PROJECT NO. [illegible]

If mixed waste, is the location in a radiation-controlled area (CA) or RMMA?: _____

Estimated number of containers and approximate volume of waste: _____

Generation rate per month: _____

Container(s) condition/integrity: _____ Container(s) closed: _____

If outdoors, container(s) placed on pallet or similar structure off the ground: _____

If outdoors, containers placed in secure, preferably sheltered area, out of traffic? _____

Is waste compatible with container? _____ Is waste compatible with other wastes? _____

If volume has reached the max. allowable, is container dated? _____

When the volume has reached the max. allowable, where is it taken? (<90 day or EM-7) _____

Signs in the area identifying "Satellite Hazardous Waste Storage Area": _____

Are non-hazardous waste, radioactive waste, product, etc. clearly labelled and segregated from RCRA waste? _____

Is the general area free of obstacles, spills, ignition sources, etc.? _____

If red "fire suppression" cans are used, where are they emptied at the end of each work period: _____

V. OTHER

Have generator/waste coordinators received HS-3's Hazardous Waste Generator Training? _____

Has EM-8 been informed of any changes in the status of this area or waste types managed, including contact names (if not, provide Generator Storage of Hazardous and Mixed Waste Form):

VI. COMMENTS AND RECOMMENDATIONS:

Per discussion with Jay Stimmel, this sat. storage area was removed in 1991.

Inspector: Edward Mignardot (Print) Edward R. Mignardot (Sign) Date: 8-20-92

Reviewed by: [illegible] (Print) [illegible] (Sign) Date: [illegible]

km
8/27/92

Los Alamos
NATIONAL LABORATORY
memorandum

Waste Site Studies Team
ESH-19, K490

To/MS: OU 1157 file
From/MS: Albert Dye / K490
Phone/FAX: 7-4715/7-5224
Date: May 27, 1998

SUBJECT: Future Land Use at TA-9

I spoke to Franco Sisneros of the DX Division Office about future land use at TA-9. Mr. Sisneros discussed this issue with the deputy Facility Manager and reported that no changes were anticipated for TA-9. The land use will remain as industrial with continued High Explosives research. There are no changes planned for the old TA-9 and Far Point Firing Site areas which presently consist of an open meadow and lightly wooded area east of the DX Division office.

cc. RPF / M707

Los Alamos
NATIONAL LABORATORY
memorandum

Nuclear Materials Technology

NMT-1, Analytical Chemistry,
MS G740 Los Alamos, NM 87545

To/MS: Albert Dye, ESH-19, MS K490
From/MS: Betty Harris, NMT-1, MS G740 BWH
Phone/FAX: 7-4574/5-4737
Symbol: NMT-1-98-08
Date: February 2, 1998

SUBJECT: PRS 9-0002

During 1992, without success, I searched for the Burn Pit described in OU 1157, PRS 9-0002. I then talked with Zenith Boone, a retired Los Alamos National Laboratory (LANL) employee who had worked at Old Anchor Site East. More specifically, he had worked at a site then named Technical Area 23(TA-23). He came to the site and helped me locate the weapon components firing areas and what he believed to be the Burn Pit. A few weeks later, Clarence Courtright, also a LANL retiree and long time safety officer of the weapon's group, walked with me over the same area and confirmed the location of the firing area and the burn pit. This is the location we recommended to Project Leader Tracy Glatzmeier for sampling. A year or so later, I visited the site with Albert Dye who collected samples for analysis.

BH:ts

Cy: File