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JUL 1996 RECEIVED

Date: July 3, 1996
Refer to: EM/ER:96-374

Mr. Benito Garcia
NMED-HRMB
P.O. Box 26110
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SUBJECT: SUBMITTAL OF THE RESOURCE CONSERVATION AND RECOVERY ACT FACILITY INVESTIGATION (RFI) REPORT FOR POTENTIAL RELEASE SITE (PRS) IN TECHNICAL AREA (TA) 21

Dear Mr. Garcia:

Enclosed are two copies of the Los Alamos National Laboratory's RFI Report concerning PRS 21-002(b) in TA-21. One report is for your information and the second should go to your technical branch. The report documents the field work performed as detailed in the approved RFI Work Plan for Operable Unit 1106 and the results of the sampling.

Please ask your office to contact Garry Allen at (505) 667-6080 or Bonnie Koch at (505) 665-7202, if you have any questions.

Sincerely,

for Jorg Jansen, Program Manager
LANL/ER Project

Sincerely,

for Theodore J. Taylor, Program Manager
DOE/LAAO

JJ/TT/bp

Enclosures: RFI Report for PRS 21-002(b) at TA-21
Certification

LANL
1 / 1106 / 21

10239

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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: Submittal of RFI Report for PRS 21-002(b) in TA-21

Name: _____ Date: 7-3-96

for Jorg Jansen, Program Manager
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Joseph Vozella,
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Environment Restoration Program
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RFI Report for Potential Release Site in TA-21

21-002(b)

Field Unit 1

Environmental
Restoration
Project

July 1996

A Department of Energy
Environmental Cleanup Program

Los Alamos
NATIONAL LABORATORY

LA-UR-96-2260

EXECUTIVE SUMMARY

This report presents the results of the Phase I Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) for potential release site (PRS) 21-002(b). This PRS is located in Technical Area (TA) 21 and is described in detail in the TA-21 Operable Unit Work Plan (LANL 1991, 0689). Although radiological constituents are not regulated under RCRA, this investigation and report include both hazardous (as defined by RCRA) and radiological constituents. Following is a brief description of PRS 21-002(b); a more detailed description can be found in Section 5.1 of this report.

PRS 21-002(b) is an inactive container storage area (TA-21-38) that was built in 1945 to store 55-gal. drums of unknown contents. The structure was decommissioned and removed in 1966. Building TA-21-38 was located southeast of Building TA-21-31 on DP Mesa, on the northern boundary of the Laboratory and immediately east-southeast of the Los Alamos townsite (LANL 1991, 0689).

The objective of the first investigation at PRS 21-002(b) was to provide samples to confirm the absence of contamination at the container storage area. Field activities at PRS 21-002(b) were conducted in September and October 1994 and included geodetic surveying, soil sampling, and sample screening (LANL 1991, 0689). A description of these activities is provided in Section 5.1.4 of this report.

Data analysis was conducted using methodologies described in Chapter 3 of this report. A focused data quality evaluation can be found in Chapter 4 of this report. There are no significant concerns with the overall quality of data for PRS 21-002(b). No chemicals of potential concern (COPCs) were identified in the screening assessment. PRS 21-002(b) is recommended for no further action (NFA). A summary of proposed actions at this PRS is presented in Table ES-1.

TABLE ES-1

SUMMARY OF PROPOSED ACTION

		PROPOSED ACTION			
PRS	HSWA[a]	NFA CRITERIA	FURTHER ACTION[b]	RATIONALE	SUBSECTION NUMBER
21-002(b)	X	4		No COPCs were identified in the screening assessment.	5.1

[a] This column indicates whether or not the site is listed on the HSWA module (Module VIII) of the Laboratory's RCRA operating permit.
[b] For information of NFA criteria, see LANL ER Project Consistency Team Policy Number 015 (Environmental Restoration Project 1995, 1173).

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1.0 INTRODUCTION

This report presents results of the Phase I Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) potential release site (PRS) 21-002(b), an inactive container storage area at Technical Area (TA) 21 of Los Alamos National Laboratory (LANL). This report contains background information, analysis approach, data assessment, and site-specific results, conclusions, and recommendations. PRS 21-002(b) is a Hazardous and Solid Waste Amendments (HSWA) solid waste management unit (SWMU) listed in Module VIII of LANL's RCRA operating permit. Although radiological constituents are not regulated under RCRA, this investigation and report include both hazardous (as defined by RCRA) and radiological constituents.

1.1 General Site History

The Laboratory's TA-21 (Fig. 1.1-1) is located on DP Mesa, on the northern boundary of the Laboratory and immediately east-southeast of the Los Alamos townsite (Fig. 1.1-2). The areas extending to the stream channels in the canyons on either side of DP mesa, DP Canyon to the north, and Los Alamos Canyon to the south, are all included in TA-21 for RFI purposes. TA-21 measures approximately 311 acres and consists of 112 SWMUs. From 1945 to 1978, TA-21 was primarily used for plutonium research, metal production, and related activities. Since 1978, various administrative and chemical research activities have been conducted at this site.

1.2 RFI Overview

The phase I RFI sampling and analysis plan (SAP) for PRS 21-002(b) was defined in Chapter 14.6 of the TA-21 Operable Unit (OU) RFI Work Plan (LANL 1991, 0689). The conceptual model category for PRS 21-002(b) is a surface contamination area. The conceptual model is presented in Chapter 5 of the TA-21 work plan.

The objective of the RFI was to provide samples to confirm the absence of contamination at the container storage area, PRS 21-002(b) (LANL 1991, 0689). The information will then be used to support a decision on whether to take further action.

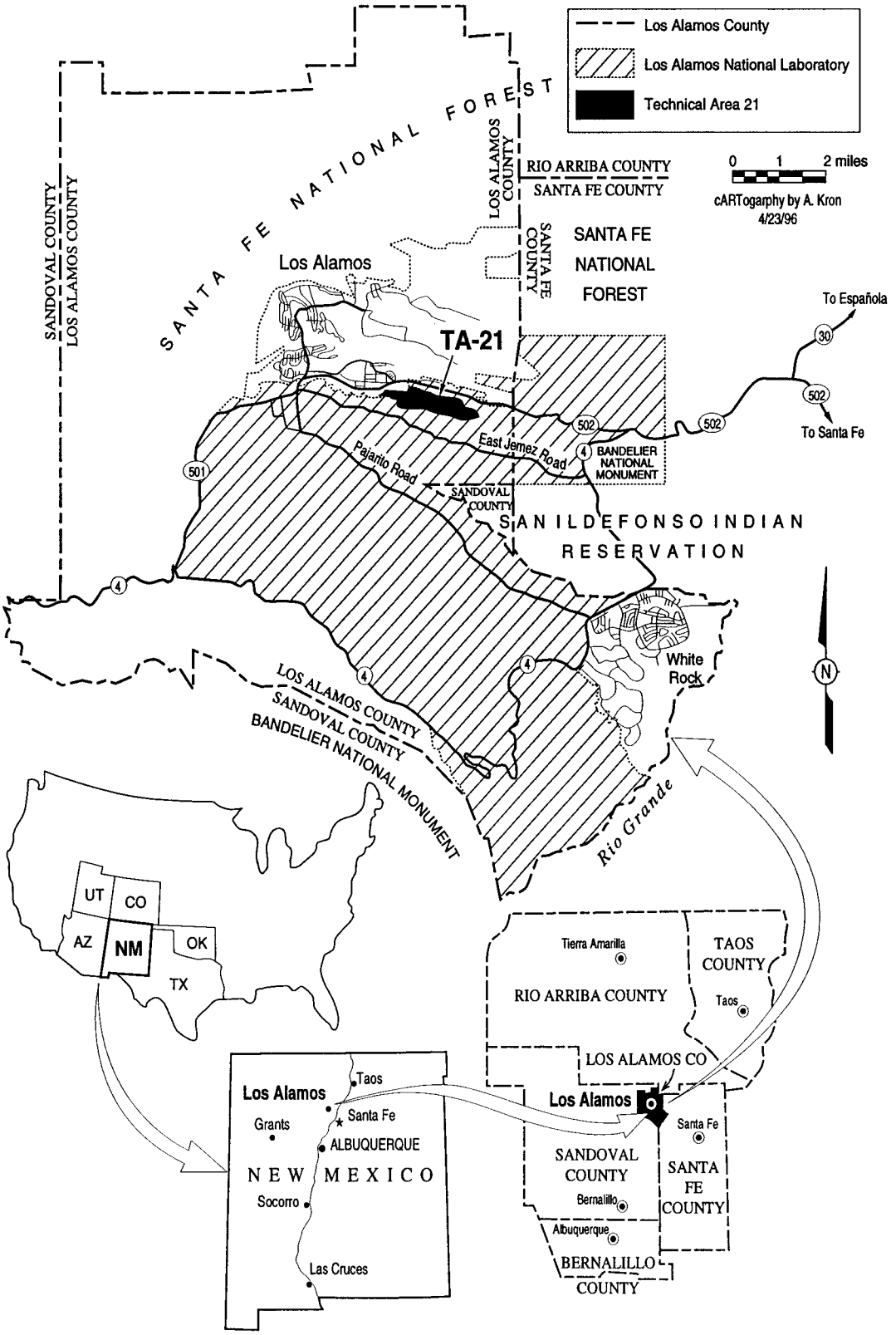

Fig. 1.1-1. Location map of TA-21 within Los Alamos National Laboratory, Los Alamos County, New Mexico.

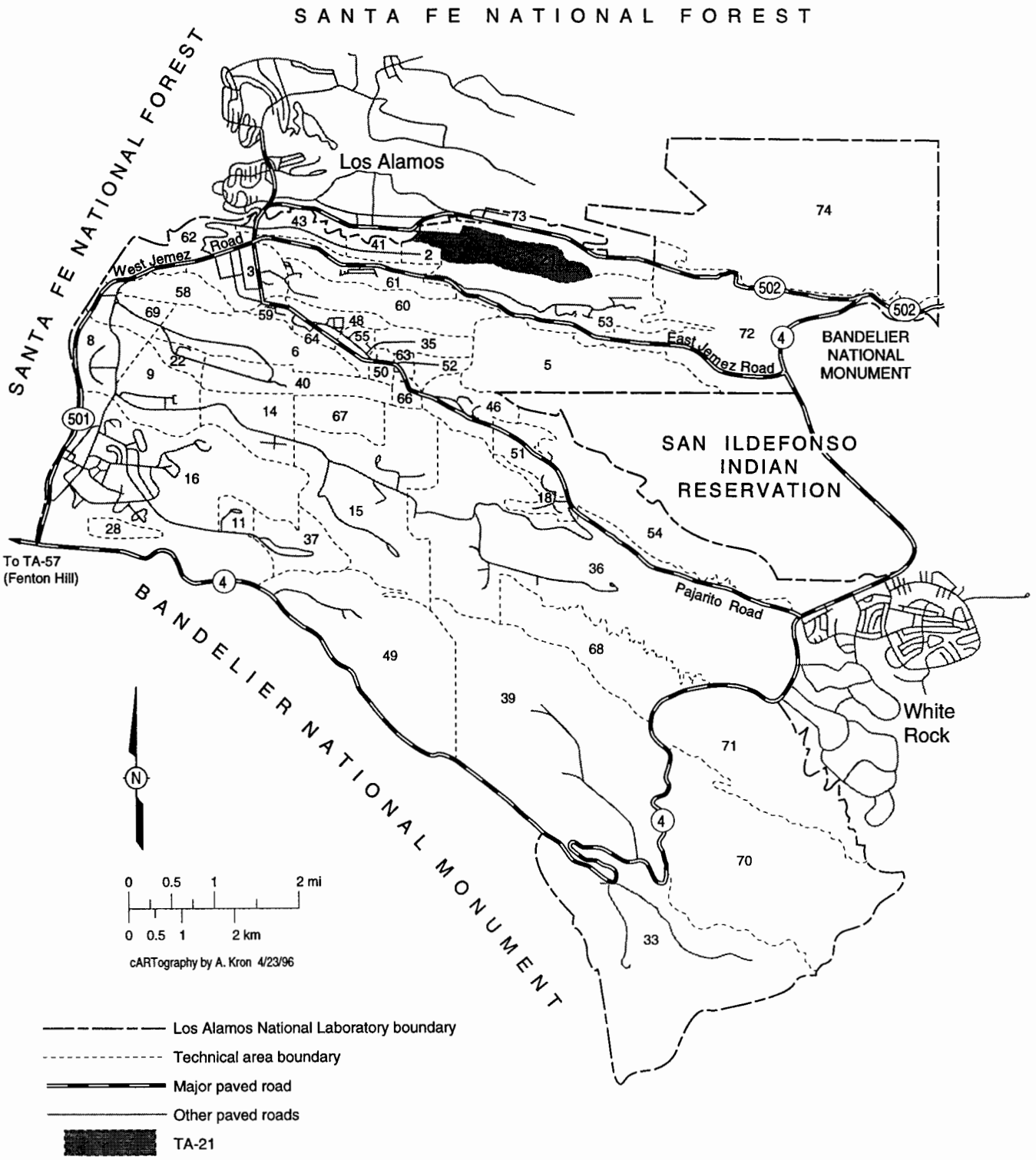

Fig. 1.1-2. Location of TA-21 with respect to Laboratory technical areas and surrounding land holdings.

1.3 Field Activities

As outlined in the work plan, field activities at PRS 21-002(b) included geodetic surveying, soil sampling, and sample screening (LANL 1991, 0689). A description of field activities, conducted in September and October 1994, is provided in Section 5.1.4 of this report.

All applicable LANL Environmental Restoration Project (ER) standard operating procedures (SOPs) were followed, unless otherwise noted in Chapter 5.

2.0 ENVIRONMENTAL SETTING

The environmental setting of the Laboratory is described in Section 2.4 of the Installation Work Plan (IWP) for Environmental Restoration (LANL 1995, 1164). A detailed discussion of the environmental setting for TA-21, including climate, geology, hydrology, and a conceptual hydrogeologic model for the area and its surroundings, is presented in the TA-21 OU RFI Work Plan (LANL 1991, 0689). A summary is presented in the following sections.

2.1 Climate

Los Alamos County has a semiarid, temperate, mountain climate. Summers are generally sunny with moderate, warm days and cool nights. High altitude, light winds, clear skies, and dry atmosphere allow summer temperatures to range from 50°F to 90°F. During the winter, temperatures typically range from 15°F to 50°F. Normal annual precipitation in Los Alamos, including rainfall and water-equivalent snowfall, is 18 in. Of this total, approximately 40% occurs as brief, intense thunderstorms during July and August. Streamflow in canyons can occur as a result of these storms. Spring snowmelt runoff may also induce streamflow in area canyons. Winter snowfall averages 51 in. annually (ESG 1989, 0308). Wind speeds are less than 2.5 m/s (5.5 mph) about 40% of the time and greater than 5 m/s (11 mph) about 20% of the time. Strong winds occur mainly in the spring. The predominant wind direction is from the south-southwest.

2.2 Geology

2.2.1 Geologic Setting

A detailed discussion of the geology of the Los Alamos area can be found in Section 2.5.1.3 of the IWP (LANL 1995, 1164). Reports of geological studies at TA-21 are presented in Earth Science Investigations for Environmental Restoration–Los Alamos National Laboratory (Broxton and Eller 1995, 1162). A summary of that information, emphasizing conditions relevant to PRS 21-002(b) is presented below.

TA-21 is located on DP Mesa at an elevation of 7 120–7 150 ft. The area is bounded on the north by DP Canyon and on the south by Los Alamos Canyon. Bedrock underlying PRS 21-002(b) is cooling unit 3 of the Upper (Tshirege) Member of the Bandelier Tuff (Fig. 2.2.1-1), comprised of fallout and ash flow deposits of silicic volcanic rock erupted 1.5–1.2 million years ago. Cooling unit 3 is a cliff-forming, nonwelded to partially welded unit. At this location, the Bandelier Tuff is approximately 710 ft thick.

Bandelier Tuff is overlain by 0–20 ft of alluvium, which consists of poorly sorted, clay-rich sand and gravel. Alluvium is generally thickest near the center of the mesa and thin to absent at mesa edges. Much of the alluvium consists of angular to subrounded lithic clasts of Tshicoma volcanic rocks, and of crystals of feldspar, quartz, and biotite and other ferromagnesian minerals derived from the Tshicoma Formation. In addition, the alluvium contains clasts of pumice and tuff probably derived from units of the Bandelier Tuff, the Cerro Toledo tuffs, and possibly from the El Cajete Tuff.

Bandelier Tuff is underlain by sedimentary rocks of the Puyé Formation, which consists of fine- to coarse-grained fanglomerates interbedded locally with axial river gravels and lacustrine siltstone and clay. The fanglomerate material is derived mainly from the Tschicoma Formation to the west.

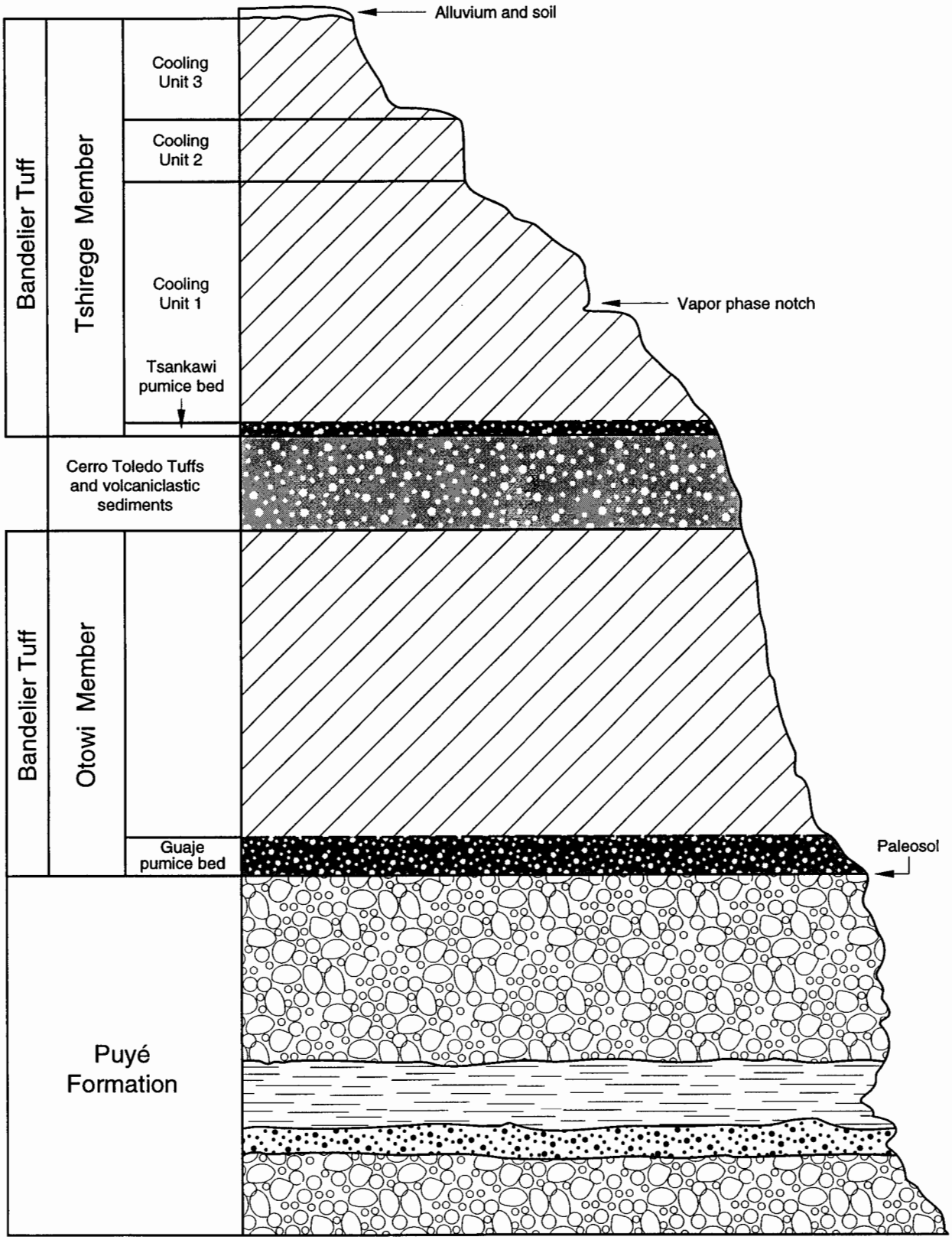

Fig. 2.2.1-1. Stratigraphy of TA-21.

2.2.2 Soils

A detailed discussion of the soils in the Los Alamos area can be found in Section 2.5.1.3 of the IWP (LANL 1995, 1164). A summary of the information specific to TA-21 is presented below. At undisturbed areas at TA-21, the soil is composed of moderately to well-developed soils developed on Bandelier Tuff and on alluvium. Soils belong to either the Hackroy or Nyjack soil series (Nyhan et al. 1978, 0161). The Hackroy series consists of very shallow to shallow, well-drained soils that have an A-Bt-R profile. Soil textures range from sandy loam to clay. The Nyjack series consists of moderately deep, well-drained soils that have an A-Bt-C-R profile. Texture ranges from gravelly sandy loam to clay loam. In the TA-21 area, the R horizon is highly fractured Bandelier Tuff that shows signs of incipient weathering, and usually has clay-rich soil matrix along bedrock fractures.

Most of TA-21 has been disturbed by construction and operation of the site for the last 40 years, with the result that natural soil profiles are, in general, not well preserved. In some cases, soil has been removed or buried by fill during construction of pads for buildings, parking lots, and waste pits.

2.3 Hydrology

2.3.1 Surface water

The hydrogeology of TA-21 is described in detail in Section 4.1.4 of the TA-21 OU RFI Work Plan (LANL 1991, 0689). Surface runoff in the area around PRS 21-002(b) occurs as sheetflow during precipitation events, mainly summer thunderstorms. Sheetflow may transport sediments from the mesa surface to adjacent canyons. At PRS 21-002(b), sheetflow runs north toward DP Canyon.

2.3.2 Groundwater

The main aquifer beneath TA-21 is at an elevation of approximately 5 900 ft (determined in Test Well 2, Pueblo Canyon, and in Otowi 4, Los Alamos Canyon), chiefly within sediments of the Puyé and Tesuque Formations (Purtymun 1995, 1293; Broxton and Eller 1995, 1162). Thus, for mesa-top sites at TA-21, more than 1 200 ft of tuff and volcaniclastic sediments separate the surface from the main aquifer. In addition to the main aquifer, two perched aquifers exist at TA-21. Shallow alluvial aquifers are present in sediments of both Los Alamos Canyon and in DP Canyon, a side canyon that merges with Los Alamos Canyon east of TA-21. These aquifers were intercepted by drill holes LADP 3, LAUZ-1, and LAUZ-2. A second perched aquifer, encountered in drill hole LADP-3, is present in the Guaje pumice bed at the base of the

Bandelier Tuff, approximately 325 ft below the floor of Los Alamos Canyon (Broxton and Eller 1995, 1162). Unpublished information from drill cores at the former TA-10 show that the top of the Puyé Formation is a weakly to moderately developed paleosol (old soil profile) containing a significant amount of clay. The clay content of the paleosol apparently reduces the permeability enough for water, if available, to perch on top of the Puyé Formation, within the overlying Guaje Pumice Bed (Fig. 2.2.1-1). That is, the paleosol at the top of the Puyé acts as an aquitard. From borehole LADP-4, the aquifer at the base of the Bandelier Tuff is known not to be present in DP Canyon, approximately 1 200 ft north of LADP-3, and therefore probably does not underlie TA-21. The perched aquifer continues upcanyon at least 0.62 mile, based on well LAOI(A)-1.1, but the lateral continuity of the aquifer in other directions beyond TA-21 is not known at present.

A perennial spring (DP Spring), located on the north side of lower DP Canyon 0.62 mile east-northeast of LADP-4, discharges at a rate of 1–4 gal. per minute (Broxton and Eller 1995, 1162; Purtymun 1995, 1293). Possibly the source of water that emerges at DP Spring is from alluvial groundwater in DP Canyon, or, alternatively, from a water body perched within the Bandelier Tuff (between units 1g and 1v) beneath DP Mesa (Broxton and Eller 1995, 1162). However, no perched zone within the Bandelier Tuff was encountered in LADP-4 to support the latter possibility. Study of DP Spring is ongoing.

2.4 Biological Surveys

Comprehensive plant and animal inventories are required by the Federal Endangered Species Act of 1973; the New Mexico Wildlife Conservation Act; Executive Order 11990, "Protection of Wetlands;" Executive Order 11988, "Floodplain Management;" 10 CFR 1022; Compliance with Floodplain/Wetlands Environmental Review Requirements (DOE 1979, 0633), and DOE Order 5400.1, General Environmental Protection Program (DOE 1988, 0075).

TA-21 is a mesa-top site in a developed, industrialized area. The preurban natural overstory for the mesa was a ponderosa pine community. The understory currently present is comprised of grasses and forbs commonly found in disturbed soils: western wheat grass, Canada bluegrass, bottlebrush squirreltail, cheat grass, sand dropseed, summer cypress, prickly lettuce, and horseweed. The mesa proper provides limited habitat for biota, does not contain sensitive habitat, and threatened or endangered species are not present on the mesa top. Although survey data indicate that potential habitat exists for several protected species, including the Jemez Mountain salamander, the spotted bat, the meadow jumping mouse, the peregrine falcon, and the goshawk, the presence of these species could not be confirmed during the biological assessment. The Cooper's hawk is known to use the area (Bennett 1992, 01-0034).

2.5 Cultural Surveys

As required by the National Historic Preservation Act of 1966 (as amended), a cultural resource survey was conducted at OU 1106 during the summer of 1991 (LANL 1992, 01-0037). The methods and techniques used for this survey conform to those specified in the Secretary of the Interior's standards and guidelines for archeology and historic preservation.

There are no archeological sites in the area of PRS 21-002(b) eligible for inclusion in the National Register of Historic Places under Criterion D.

3.0 APPROACH TO DATA ASSESSMENT AND ANALYSES

The decision approach used for PRS 21-002(b) involves a series of quantitative steps that occur after the field investigation, chemical analysis, and data reporting are complete. These steps begin with routine data validation and continue with more focused data validation, if necessary. Routine validation involves validating each data item against specific targets and adding qualifier flags to the data to signify a potential deficiency. Focused validation consists of analyzing quality assurance/quality control (QA/QC) data for potential impact on the succeeding data assessment steps, i.e., comparing site data to background concentration data, verifying the identities of detected organic chemicals, comparing site data to screening action levels (SALs) for human health impacts, and performing human health risk assessments when necessary. The following sections provide overviews of the methods used to complete these quantitative steps. Further details can be found in the guidance document, Technical Approach to RFI Reports (LANL in preparation, 1281).

3.1 Sample Analysis

All samples requiring chemical and radiological analysis and chain-of-custody documentation are submitted to the Sample Management Office (SMO), the mobile radiological analytical laboratory (MRAL), and/or the mobile chemistry analytical laboratory (MCAL) for analysis.

3.1.1 Analytical Methods

All samples were analyzed using Environmental Protection Agency (EPA) SW-846 methods or equivalent.

3.1.2 Data Validation

Data verification and validation procedures are used to determine whether data packages have been generated according to specifications and contain the information necessary to determine data sufficiency for decision-making.

Data verification is a check of data deliverables against a set of stated requirements to ensure that what has been ordered has been delivered, thus indicating that the laboratories can be paid. All analytical data generated in support of the ER Project are verified.

Data validation is the process of determining whether individual results (a datum) can be reliably used to support the decision-making process. During the process, validators determine whether data should be qualified or used with caution because of the potential impact of noted flaws or the failure to achieve analytical precision or bias constraints.

Routine validation is the comparison of quality indicators (such as surrogate recovery, measurements of method blanks, holding times, and differences between replicate measurements) with clearly defined limits to determine whether limitations may need to be placed on use of the data. Routine validation is most suitable for routine analyses and for those nonroutine analyses for which clearly defined limits have been established.

The focused data validation process addresses those characteristics of the data (e.g., precision and bias) that directly affect the decisions to be based on the data. The same data set may undergo different focused validations for different decisions.

3.2 Background Comparisons

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

- soil samples collected throughout Los Alamos County for which chemical analyses were performed for certain inorganic (metal) chemicals and naturally occurring radioactive chemicals (Longmire et al. 1995, 1142; Longmire et al. 1995, 1266);
- background concentrations of radioactive chemicals associated with global fallout from atmospheric nuclear testing (e.g., plutonium, cesium, strontium,

and tritium) reported in LANL Environmental Surveillance reports (Purtymun et al. 1987, 0211; ESG 1988, 0408; ESG 1989, 0308; Environmental Protection Group 1990, 0497; Environmental Protection Group 1992, 0740); and,

- baseline radionuclide data collected at TA-21 and discussed in Section 3.3 of this report (Ryti 1996, 01-0023).

Comparisons between site data and background data are initially performed by comparing each observed concentration datum with a chemical-specific background screening value. Chemical-specific background screening values are upper tolerance limits (UTLs), maximum reported concentrations or detection limits of non-detected chemicals. These background screening values are derived from LANL-wide soil background data and details on the calculation of these background screening values are presented in "Natural Background Geochemistry and Statistical Analysis of Selected Soil Profiles, Sediments, and Bandelier Tuff, Los Alamos, New Mexico," (Longmire et. al. 1995,1266). There is one inorganic chemical, silver, for which LANL-wide soil background data do not exist. In this chemical-specific case, PRS sample-specific detection limits for silver are used as nominal background screening values. There is one inorganic chemical, silver, for which LANL-wide soil background data do not exist. In this chemical-specific case, PRS sample-specific detection limits for silver are used as nominal background screening values.

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

3.3 Evaluation of Radiochemical Data

It is important to ensure that the radiochemical data reported are properly evaluated before use in the decision process. As indicated in Section 3.2 of this report, comparing acquired radiochemical results with background data is necessary to distinguish the activity due to the natural presence (anthropogenic, cosmogenic, and global fallout) of radionuclides from that caused by Laboratory operations.

It is also important to ensure that data used in the decision-making process be significantly different from background statistically. The LANL ER Project requires that radiochemical data reported by a laboratory, unlike data for other classes of analytes, not be censored by that laboratory on the basis of a detection test. Therefore, as part of the data validation/data assessment, reported results must be evaluated to ensure that only those results that are statistically significant be used in the decision process. This is typically done by comparing the reported value with the associated minimum detectable activity (MDA) if one is reported. When the MDA is not available or does not meet the data quality needs of the ER Project, the reported value will be tested against a confidence level based on the uncertainty of the reported measurement. Because the confidence level used will typically be 99+%, the reported result will be considered significantly different from background only if it is greater than three times the measurement uncertainty.

Where appropriate to specific radionuclides, other means of evaluating reported results may include half-life, isotopic ratios, and/or parent-daughter relationships.

Background radionuclide data for PRS 21-002(b) are defined by the TA-21 baseline data. The TA-21 baseline data reflect generally elevated activities of certain radionuclides, including americium-241, plutonium-238, plutonium-239, and uranium isotopes. The activity of other radionuclides are not distinguishable from LANL-wide background data. Table 3.3.2-1 summarizes the TA-21 radionuclide background screening values. The statistical basis for these values is presented in the Technical Position Paper on Use of TA-21 Baseline Data for RFI Reports (Ryti 1996, 1298).

TABLE 3.3.2-1

SUMMARY OF TA-21 RADIONUCLIDE SCREENING VALUES

RADIONUCLIDE	BASELINE SCREENING VALUE (pCi/g[a])
Americium-241	0.818
Cesium-137	1.4[b]
Plutonium-238	0.447
Plutonium-239	15.5
Strontium-90	0.766
Thorium-228	1.98
Thorium-230	1.60
Thorium-232	1.86
Tritium[c]	9.92
Uranium[d]	10.7
Uranium-234	3.80
Uranium-235	0.164
Uranium-238	3.57

[a] Unless otherwise noted.
[b] The LANL-wide background screening value for cesium-137 will be used for TA-21 PRS comparisons.
[c] Units = pCi/ml.
[d] Natural uranium. Units = mg/kg.

3.4 Evaluation of Organic Constituents

Background data are not available for organic chemicals. The preliminary evaluation of organic chemicals considers detected chemicals and chemicals that were analyzed for but not detected in any sample. The purpose of this decision step is to determine if organic chemicals should be retained as COPCs or eliminated from further consideration based on detection status. Detection status is determined by the analytical laboratory on a sample-by-sample, analyte-by-analyte basis. Estimated quantitation limits (EQLs) have been established for each analyte as reporting limits when the analyte is not detected. It should be noted that the EQLs reported for individual samples are dependent on a number of factors and may vary from sample to sample and from analysis to analysis. Therefore, the sample-specific EQL for a chemical must be used in this comparison.

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

3.5 Human Health Assessment

3.5.1 Risk Due to Background

Background risks can result from inorganics that are naturally occurring at a site. Calculation of background risks using the same methodology as site risk estimates provides a frame of reference for risk levels calculated at a site. This information provides a basis for determining risk-based remediation goals, which in some circumstances may be set at target risks comparable to background rather than default values, i.e., cancer risk of 1E-6 or hazard index of 1. Background risks can also affect decisions at sites that have constituents for which there

is a threshold of toxicity. For some inorganics, background intakes may be near a toxicity threshold such that incremental intakes associated with contamination may be unacceptable.

Background risks calculated here use the same exposure assumptions by which SALs are calculated. SALs are medium-specific concentrations that are calculated using chemical-specific toxicity information and conservative, default exposure assumptions and are used in the screening assessment described in Section 3.4.2 of this report. For soil exposure, the pathways include incidental soil ingestion, inhalation of resuspended dust, and dermal contact with soil. Background soil data represent several soil horizons from geographically diverse locations. Background risks are estimated for both a median concentration and the background screening value from the entire background data set to present the range of potential risk associated with different soil constituent concentrations found in and around Los Alamos (Longmire et al. 1995, 1142). The background risks based on the LANL SAL residential exposure model are provided in Table 3.5.1-1.

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

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

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

TABLE 3.5.1-1

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

SOIL INORGANIC	BACKGROUND SOIL CONCENTRATION[b] (mg/kg)		HAZARD QUOTIENT		LIFETIME CANCER RISK	
	Median	UTL	Median	UTL	Median	UTL
Aluminum	10.000	38 700	0.13	0.5	nc[c]	nc
Antimony	0.6	1.0	0.019	0.032	nc	nc
Arsenic	4.0	7.82	0.18	0.36	1.1E-5	2.1E-5
Barium	130	315	0.025	0.059	nc	nc
Beryllium	0.895	1.95	0.0027	0.0059	6.4E-6	1.4E-5
Cadmium[d]	0.20	2.7	0.0053	0.071	1.4E-10	1.9E-9
Chromium[e]	7.2	19.3	0.00009	0.0002	nc	nc
Cobalt	6.0	19.2	0.0013	0.0042	nc	nc
Copper	5.75	15.5	0.0021	0.011	nc	nc
Lead[f]	12	23.3	0.03	0.058	nc	nc
Manganese	320	714	0.84	1.9	nc	nc
Mercury	0.05	0.1	0.0022	0.0043	nc	nc
Nickel	7.0	15.2	0.0047	0.01	nc	nc
Selenium	0.3	1.7	0.00078	0.0045	nc	nc
Thallium	0.2	1.0	0.033	0.16	nc	nc
Uranium	0.9	1.87	0.0039	0.0081	nc	nc
Vanadium	21	41.9	0.039	0.078	nc	nc
Zinc	30.7	50.8	0.0013	0.0022	nc	nc

[a] Risk estimates are based on reference doses, slope factors, and EPA Region IX default exposure assumptions effective in April 1996.
[b] Background soil concentrations taken from Longmire et al. 1995, 1142.
[c] nc = not calculated.
[d] Cancer risks for cadmium are based solely on inhalation of resuspended dust.
[e] Naturally-occurring chromium is assumed to exist in a trivalent state.
[f] Hazard quotient based on uptake biokinetic model.

3.5.2 Screening Assessment

The purpose of this decision step is to determine if chemicals should be retained as chemicals of potential concern (COPCs) or eliminated from further consideration based on comparisons with SALs. This is the last step in the screening assessment process for human health concerns. If COPCs remain after this step, then further action may be proposed. If no COPCs remain after this step, then no further action (NFA) may be proposed based on human health concerns. SALs are medium-specific concentrations that are calculated using chemical-specific toxicity information and conservative, default exposure assumptions. For those chemicals for which SALs are available, each observed concentration datum is compared to the chemical's SAL. If a chemical has a reported concentration greater than its SAL, then that chemical is retained as a COPC pending further analysis. If a chemical does not have a reported concentration greater than its SAL, then that chemical is generally removed from further consideration. If more than one chemical is present at the site, this decision is deferred pending the results of a multiple chemical evaluation (described below). The decision to identify a chemical as a COPC when a SAL is not available is made on a case-by-case basis, taking into account the availability of process knowledge and toxicological information.

It is possible that COPCs should be retained because of the combined adverse health effects of several chemicals. This possibility is evaluated in a multiple chemical evaluation, in which the reported concentration for each chemical is divided by its respective SAL, and the resulting normalized values are incorporated into a simple additive model. If the sum of the normalized values (i.e., the total normalized value) is less than one, then the chemicals are removed from further consideration. If the total normalized value is greater than one, then chemicals having an individual normalized value greater than or equal to 0.1 are retained as COPCs pending further evaluation.

Only those chemicals that exceed background concentration thresholds or fail other background comparison tests (certain inorganics and radionuclides), exceed reporting limits in at least one sample (organics), and are less than the SAL are included in multiple chemical evaluations. These chemicals are divided into three classes: noncarcinogens, chemical carcinogens, and radionuclides. Additive effects are assumed within each class, but each class is evaluated separately. For further information on multiple chemical evaluations, see Technical Approach to RFI Reports (LANL in preparation, 1281).

3.5.3 Risk Assessment

Human health risk assessment follows the guidance document Risk-Based Corrective Action Process (LANL/SNL 1996, 1277). The human health risk assessment process consists of the following four steps:

- identification of chemicals of potential concern,
- exposure assessment,
- toxicity assessment, and
- risk characterization.

No human health risk assessment was performed for PRS 21-002(b) because no COPCs were identified in the screening assessment.

3.6 Ecological

All information obtained from the Phase I investigation at PRS 21-002(b) will be considered as part of a larger ecological exposure unit once the ecological exposure unit approach has been formally approved by LANL's regulators. Cumulative effects will be evaluated as part of the ecological risk assessment for the entire exposure unit.

4.0 RESULTS OF QUALITY ASSURANCE/QUALITY CONTROL ACTIVITIES

As a result of QA/QC activities, qualifiers are added to the data when necessary as part of routine data validation activities. The following is a list of the qualifiers used in this RFI report and their definitions.

J = Estimated quantity. The analyte was detected in the sample, but there were one or more QC parameters associated with this sample that were outside allowed limits.

UJ = Estimated undetected quantity. The analyte was not detected in the sample, but there were one or more QC parameters associated with this sample that were outside allowed limits.

R = Rejected quantity. The data are deemed not usable because one or more of the QC parameters for the analyte were outside allowed limits to the point that the analyte value is highly questionable.

There can be many reasons for qualifying analytical data. For example, there is a set of sample-specific QC parameters that can cause analytes from individual samples to be qualified, such as surrogate recoveries or duplicate results. There are also batch-specific parameters, such as blind QC samples and method blanks that affect all of the samples analyzed in a particular group. Often, the quantity of QA/QC data available for site-specific investigations is inadequate for estimating components of measurement error because statistics cannot be defined for sample sizes of one, or estimated well with small sample sizes. Consequently, QA/QC data for site-specific investigations will rarely be used to adjust data.

4.1 Quality Assurance/Quality Control Results for PRS 21-002(b)

4.1.1 Inorganic Analyses

Soil and water samples were analyzed for target analyte list (TAL) metals under request 20248. There were several QC problems with this request. Sodium and potassium had high recoveries in the laboratory control sample (LCS) or QC sample (>125%). Therefore, all detects for these elements are qualified J, estimated quantity, for possible high bias. Magnesium had a low recovery in the QC sample and all data for that analyte are qualified J or UJ, estimated undetected quantity.

Nickel and chromium had very low recoveries in one of two QC samples. In one QC sample, the recoveries for these two analytes were both less than 10%. For the other QC sample, however, the recoveries were both well within allowed limits (80-120%). In addition, the recoveries of nickel and chromium in the LCS and the matrix spike sample were both within allowed limits (80–120%). The values for nickel and chromium in the duplicate sample also agreed with the values in the original analysis. Therefore, because QC data from all but one QC sample were within allowed limits for nickel and chromium, the data for these analytes will not be qualified.

The recommended holding time for mercury was exceeded by about 20 days. Therefore, all of the mercury data are qualified UJ. All other data are valid and usable without qualification.

4.1.2 Organic Analyses

Soil and water samples were analyzed for volatile organic compounds (VOCs) under request 19439. The only problem with this request was that one or more of the internal standards were outside acceptance criteria in samples AAC0111, AAC0114, AAC0116, AAC0117, and AAC0118. For sample AAC0111, 36 analytes are qualified UJ. For samples AAC0114, AAC0116,

AAC0117, and AAC0118 16 analytes are qualified UJ. All other data are valid and usable without qualification.

Soil and water samples were analyzed for semivolatile organic compounds (SVOCs) under request 19439. Sample AAC0114 had a low recovery for nitrobenzene-d5 in the original analysis. The reanalysis was performed nine days beyond the holding time. Because the sample was a soil sample and the holding time was not grossly exceeded, only the two detected analytes [benzo(b)fluoranthene and benzo(g,h,i)perylene] are qualified J. Nineteen analytes had recoveries between 10% and 50% in the blind QC sample and are qualified UJ. The analytes qualified UJ are anthracene, benzo(a)pyrene, bis(2-ethylhexyl)phthalate, butylbenzylphthalate, 2-chloronaphthalene, dibenzofuran, 2,4-dinitrotoluene, 2,6-dinitrotoluene, chrysene, 1,2-dichlorobenzene, 1,4-dichlorobenzene, 2-methylphenol, 4-methylphenol, naphthalene, 4-nitrophenol, pentachlorophenol, pyrene, 2,4,6-trichlorophenol, and 1,2,4-trichlorobenzene. All other data are valid and usable without qualification.

4.1.3 Radiochemistry Analyses

Soil samples and one water sample were analyzed for isotopic plutonium by alpha spectroscopy, total uranium by kinetic phosphorescence analysis (KPA), strontium-90 by gas proportional counting, tritium by liquid scintillation, moisture content by gravimetric procedures, and gamma scan and amercium-241 by gamma spectroscopy under request number 20096. There were a number of problems with the different analyses.

There was a low recovery of plutonium-238 in the QC sample (50%), and a high recovery of plutonium-239 in the QC sample (190%). Additionally, the duplicate value for plutonium-239 differed from the original value by more than three times the measured uncertainty Therefore, the plutonium-238 and plutonium-239 data are all qualified J. Plutonium-238 was found in the method blank at a level of 0.14 pCi/L. The EQL was appropriately raised for all samples.

The data for strontium-90 are all qualified J for low recoveries in the matrix spike, LCS, and QC samples (59–74%).

The uranium data for the soil samples are all qualified J for a low recovery (59%) in the QC soil sample.

The tritium data are qualified J for a low recovery in the matrix spike sample (76%) and a high recovery in the LCS (124%, 125%).

All other data are valid and usable without qualification.

5.0 SPECIFIC RESULTS, CONCLUSIONS, AND RECOMMENDATIONS

5.1 PRS 21-002(b)

PRS 21-002(b) is an inactive container storage area. Based on the results of the Phase I investigation, PRS 21-002(b) is recommended for NFA.

5.1.1 History

PRS 21-002(b) is described in Chapter 14.6 of the TA-21 OU RFI Work Plan (LANL 1991, 0689). It was built in 1945 to store 55-gal. drums of unknown contents until the structure was decommissioned and removed in 1966. Drums were also stored on the ground immediately to the southeast of the container storage structure.

There is no information about possible contaminants at the container storage structure or the surrounding area. There is no documentation of whether there were ever any releases and whether any soil was removed or any clean backfill was brought in.

5.1.2 Description

PRS 21-002(b) is described in Chapter 14.6 of the TA-21 OU RFI Work Plan as the site of a structure (TA-21-38) that was located southeast of Building TA-21-31 (LANL 1991, 0689). The structure had three walls (it was open to the north), a roof, and probably a concrete floor.

5.1.3 Previous Investigations

No previous investigations were conducted at PRS 21-002(b).

5.1.4 Field Investigation

On October 4, 1994, the field crew collected samples from the top 6 in. of soil at 8 locations. Sample locations are shown in Fig. 5.1.4-1 and correspond to those described in the TA-21 work plan (LANL 1991, 0689). Based on measurements made from the engineering drawing (ENG-R-3421), sample location 21-2502 was in a driveway.

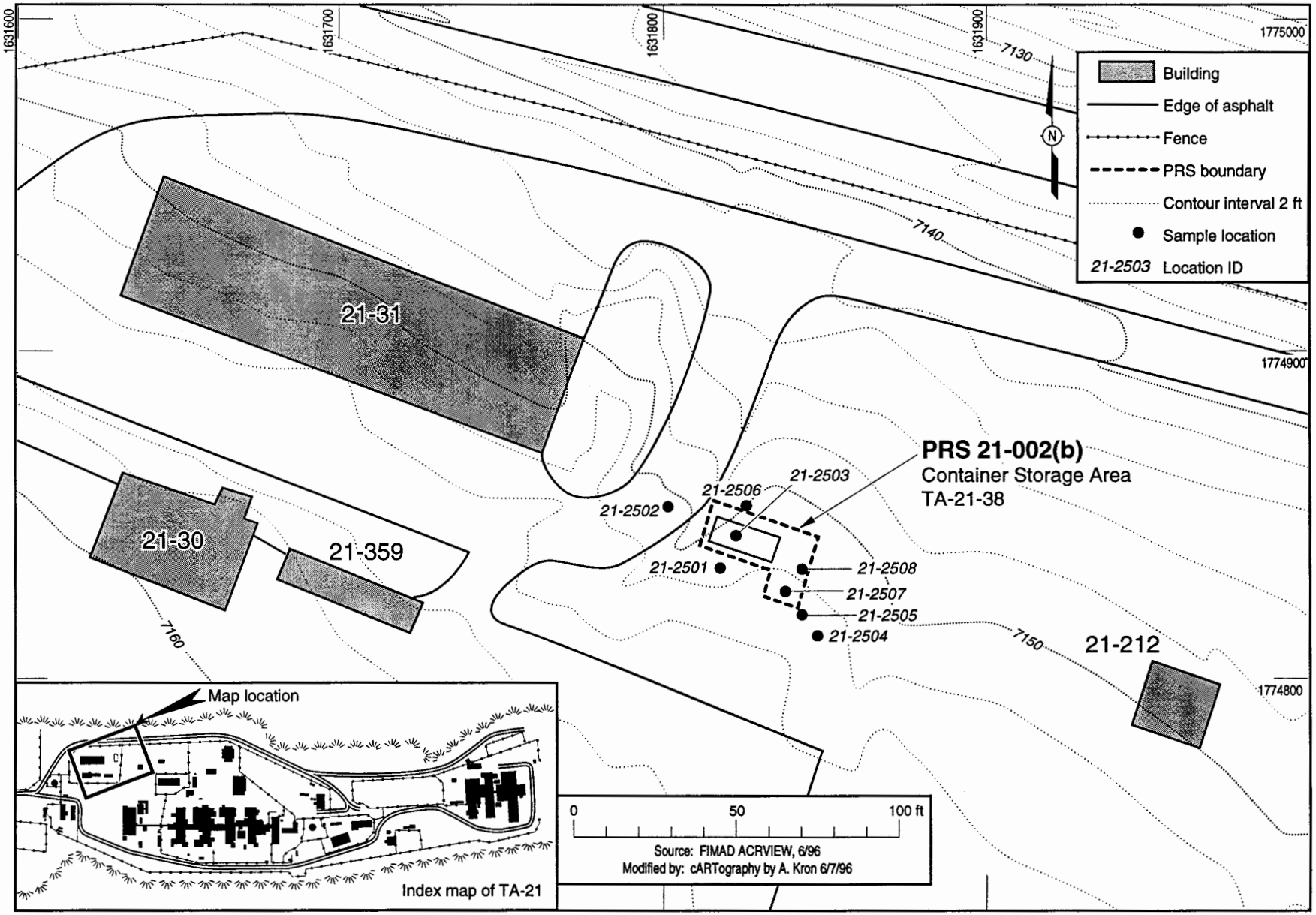

Fig. 5.1.4-1. Soil sampling locations at PRS 21-002(b).

Geodetic Survey

PRS 21-002(b), the container storage area, was surveyed in August 1994 to establish the location of the former structure and to mark sample locations. Measurements were taken from an engineering drawing (ENG-R-3421), scaled, and surveyed in. The scale of the engineering drawing was 1 in. equals 200 ft; therefore, small errors in the engineering drawing could have resulted in large errors in surveyed locations. The engineering drawing was used because it provided the best available information about the location of the container storage area.

Sample Screening

Samples were screened twice for radioactivity: once in the field to meet worker health and safety requirements and again by the MRAL to meet the requirements of analytical laboratories.

Results of soil screening for radiation by the field crew were recorded on sample collection logs. All samples had radiation levels less than the 2 nCi/g levels mandated by the Department of Transportation (49 CFR 173.403). Soil samples were also screened for gross alpha, beta, and gamma radiation by the MRAL.

Sample Analyses

After samples were screened, they were sent to fixed laboratories for analysis. Table 5.1.4-1 summarizes the analyses performed for each sample.

TABLE 5.1.4-1

SUMMARY OF SAMPLES COLLECTED AT PRS 21-002(b)

				REQUEST NUMBER			
LOCATION ID	SAMPLE ID	DEPTH (in.)	MATRIX	METALS	RADIO-NUCLIDES	SVOCs[a]	VOCs[b]
21-2501	AAC0110	0–6	Soil	20248	20096	19439	19439
21-2502	AAC0111	0–6	Soil	20248	20096	19439	19439
21-2503	AAC0112	0–6	Soil	20248	20096	19439	19439
21-2504	AAC0113	0–6	Soil	20248	20096	19439	19439
21-2505	AAC0114	0–6	Soil	20248	20096	19439	19439
21-2506	AAC0115	0–6	Soil	20248	20096	19439	19439
21-2507	AAC0116	0–6	Soil	20248	20096	19439	19439
21-2508	AAC0117	0–6	Soil	20248	20096	19439	19439
21-2508	AAC0118[c]	0–6	Soil	20248	20096	19439	19439

a SVOCs = Semivolatile organic compounds.
b VOCs = Volatile organic compounds.
c Field duplicate of sample AAC0117.

Deviations from the Work Plan

Deviations from the planned approach include the following.

- The procedure for screening samples for radioactivity was changed. According to the work plan, samples were to be screened in the field for radioactivity but not by MRAL. The additional mobile laboratory screening was performed to meet the requirements of analytical laboratories that would receive the samples.
- Sample screening in the field for organic vapor was omitted. Because samples were from the surface (0–6 in.), it was deemed unnecessary to screen for organic vapors.

These deviations from the planned approach did not significantly affect the field team's ability to meet the objective of the field activities.

5.1.5 Background Comparisons

Inorganics

Nine soil samples collected from PRS 21-002(b) were analyzed for TAL metals.

Five inorganic compounds (barium, lead, silver, sodium, and zinc) were detected above their respective background screening values. Further background comparisons were performed for barium, lead, sodium, and zinc. Silver was not subjected to further background comparisons because the background data for this metal is inadequate to support other statistical tests. Because of the lack of background information, silver is carried forward through the screening assessment process.

Because the data for the other four metals (barium, lead, sodium, and zinc) do not appear to satisfy normality assumptions, non-parametric tests were used for further background comparisons. The Gehan modification to the Wilcoxon Rank Sum test and the Quantile test were used for these evaluations. The Gehan test is best suited for assessing complete shifts in distribution, whereas the Quantile test is better suited for assessing partial shifts. These two tests can detect most types of differences between distributions. The Slippage test was also used to detect differences in the upper percentiles because of the small sample size. Observed significance levels (P-values) for these tests are presented in Table 5.1.5-1. If a P-value is less than some small probability, typically 0.05, then there is some reason to suspect that there is a difference between the background and site distributions; otherwise, no difference is indicated.

TABLE 5.1.5-1

STATISTICAL TESTS FOR BACKGROUND COMPARISONS

ANALYTE	GEHAN TEST P-VALUE	QUANTILE TEST P-VALUE	SLIPPAGE TEST P-VALUE
Barium	0.51	0.56	0.05
Lead	0	0.0002	0
Sodium	0.20	0.56	0.002
Zinc	0.0001	0.0002	0

The results for barium are indicative of site concentrations that are not statistically elevated above background. The results for lead, sodium, and zinc, however, are indicative of site concentrations that are greater than background.

Lead, silver, sodium, and zinc are carried forward to the screening assessment. Samples that have at least one value above background screening values for these analytes are presented in Table 5.1.5-2.

TABLE 5.1.5-2

INORGANICS WITH CONCENTRATIONS ABOVE BACKGROUND SCREENING VALUES AT PRS 21-002(b)

LOCATION ID	SAMPLE ID	LEAD (mg/kg)	SILVER (mg/kg)	SODIUM (mg/kg)	ZINC (mg/kg)
UTL[a]	N/A[b]	23.3	NA[c]	915	50.8
SAL[d]	N/A	400	380	na[e]	23 000
21-2503	AAC0112	35.9	<0.64	<775	52.4
21-2504	AAC0113	46.8	<0.23	20 600 (J)[e]	66.3
21-2505	AAC0114	128	<0.5	4 470 (J)	91.4
21-2506	AAC0115	163	3.1	<1010	418
21-2507	AAC0116	400	<0.52	<809	604
21-2508	AAC0117	131	<0.58	<853	217
21-2508	AAC0118	128	<0.42	<560	199

[a] UTL = Upper tolerance limit.
[b] N/A = Not applicable.
[c] NA = Because no background data are available for silver, the detection limit is used as the background screening value. See Section 3.2 for more information on background screening values.
[d] SAL = Screening action level.
[e] na = Not available.
[f] J = Estimated detected quantity.

Radionuclides

Six short-lived activation/fission products reported for PRS 21-002(b) include cerium-144, cesium-134, cobalt-57, manganese-54, ruthenium-106, and sodium-22. These radionuclides have half-lives ranging from a few days to 2.6 years. Because the site has been inactive since 1966 and there were no releases at the site in the three years preceding the 1994 sampling campaign, any radionuclide detected with a short half-life would not be attributed to Laboratory activities at these sites. The quantities measured in the samples from PRS 21-002(b) are probably a result of uncertainties in the gamma spectroscopy technique. Because these radionuclides are not related to activities at PRS 21-002(b), all are eliminated as COPCs.

Daughters of naturally occurring radionuclides (uranium and thorium) that were reported for PRS 21-002(b) include actinium-228, bismuth-211, bismuth-212, bismuth-214, lead-210, lead-211, lead-212, lead-214, protactinium-231, protactinium-234, protactinium-234m, radium-223, radium-224, radium-226, radon-219, thallium-208, thorium-227, and thorium-234. These radionuclides were found at activities expected from the reported activities of the parent radionuclide with which they are in equilibrium. All daughter products listed above are eliminated as COPCs.

At PRS 21-002(b), strontium-90 was detected at concentrations exceeding the TA-21 baseline screening value (Table 5.1.5-3). Strontium-90 is carried forward through the screening assessment process.

TABLE 5.1.5-3

RADIONUCLIDES WITH CONCENTRATIONS ABOVE BASELINE SCREENING VALUES AT PRS 21-002(b)

LOCATION ID	SAMPLE ID	STRONTIUM-90 (pCi/g)
UTL[a]	N/A[b]	0.766[c]
SAL[d]	N/A	4.4
21-2504	AAC0113	1.59[e] (J)[f]
21-2505	AAC0114	2.47[e] (J)
21-2508	AAC0118	1.33[e] (J)

[a] UTL = Upper tolerance limit.
[b] N/A = Not applicable.
[c] Baseline screening value obtained from Ryti 1996, 1298.
[d] SAL = Screening action level.
[e] Value represents the maximum value of a sample and its laboratory duplicates.
[f] J = Estimated detected quantity.

5.1.6 Evaluation of Organic Constituents

Nine samples collected at PRS 21-002(b) were analyzed for VOCs and SVOCs. Four organics [benzo[a]pyrene, benzo[b]fluoranthene, benzo[g,h,i]perylene, and toluene] were detected in these samples. Samples in which these chemicals were detected are presented in Table 5.1.6-1. These four chemicals are carried forward through the screening assessment process.

TABLE 5.1.6-1

ORGANIC COMPOUNDS DETECTED AT PRS 21-002(b)

LOCATION ID	SAMPLE ID	BENZO[a] PYRENE (mg/kg)	BENZO[b] FLUORANTHENE (mg/kg)	BENZO[g,h,i] PERYLENE (mg/kg)	TOLUENE (mg/kg)
SAL[a]	N/A[b]	0.061	0.61	NA[c]	1 900
21-2505	AAC0114	<0.35	0.61 (J)[d]	0.38 (J)	<0.005
21-2507	AAC0116	0.36	0.51 (J)	<0.34	0.005
21-2508	AAC0117	<0.34	<0.34	<0.34	0.008
21-2508	AAC0118	<0.34	<0.34	<0.34	0.006

[a] SAL = Screening action level.
[b] N/A = Not applicable.
[c] NA = not available.
[d] J = Estimated detected quantity.

5.1.7 Human Health Assessment

5.1.7.1 Screening Assessment

Nine chemicals [strontium-90, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, toluene, lead, silver, sodium, and zinc] were carried forward from the background and reporting limit comparisons as COPCs. One of these analytes, benzo(a)pyrene, was detected at a concentration exceeding its SAL in at least one sample. Lead and benzo(b)fluoranthene were detected at concentrations equal to their respective SALs in one soil sample each. Data for those soil samples where analytes were detected at or above their respective SALs are summarized in Table 5.1.7-1, and sample locations are shown on Fig. 5.1.7-1. Two chemicals, benzo(g,h,i)perylene and sodium, that were carried forward from the reporting limit comparison lack toxicity information and do not have SALs for comparison.

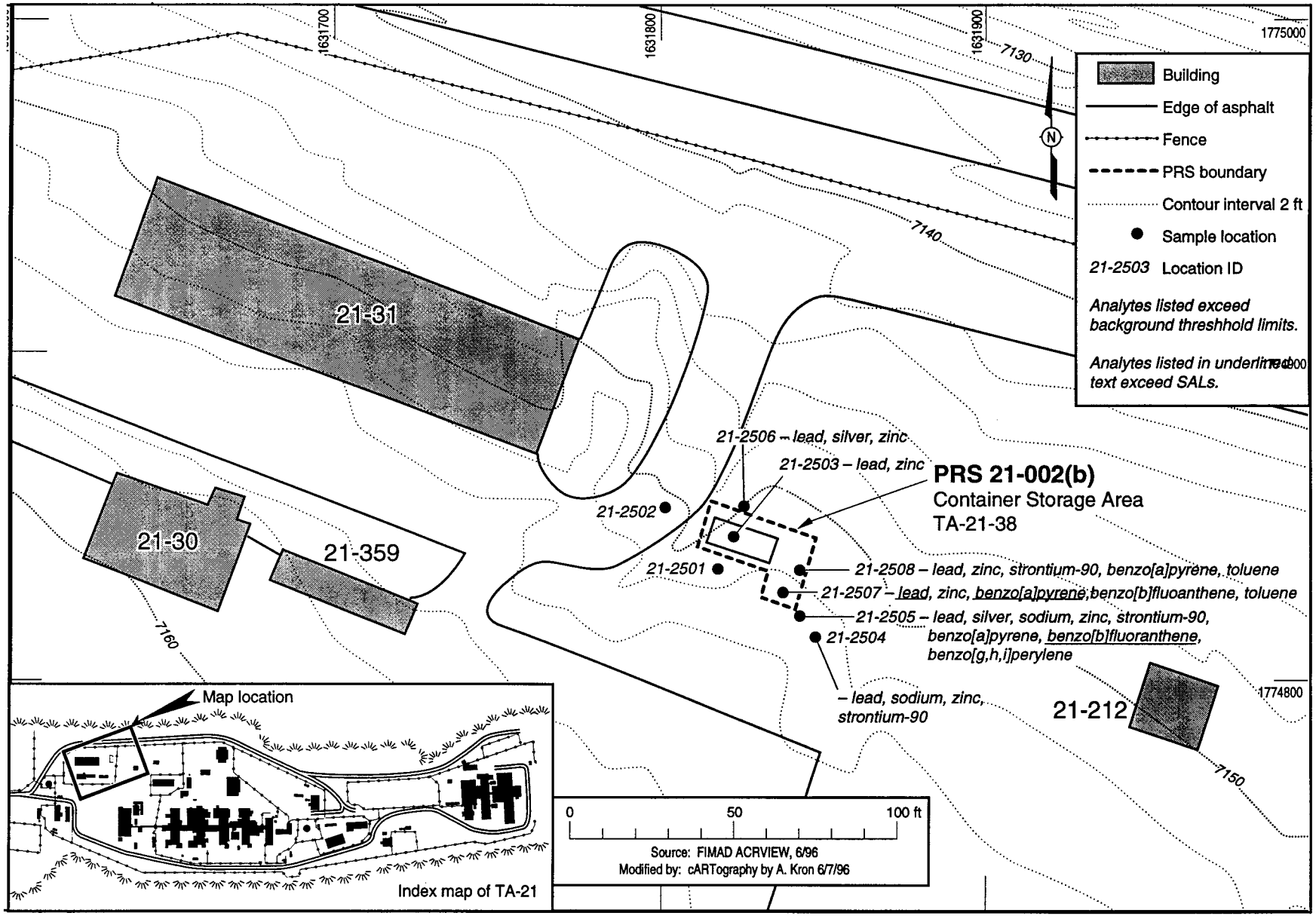

Fig. 5.1.7-1. Analytes above background and SAL at PRS 21-002(b).

TABLE 5.1.7-1

CHEMICALS WITH CONCENTRATIONS IN SOIL EQUAL TO OR EXCEEDING SALS AT PRS 21-002(b)

LOCATION ID	SAMPLE ID	BENZO[a]PYRENE (mg/kg)	BENZO[b] FLUORANTHENE (mg/kg)	LEAD (mg/kg)
SAL[a]	N/A[b]	0.061	0.61	400
21-2505	AAC0114	<0.35	0.61	128
21-2507	AAC0116	0.36	0.51	400

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

There are no known processes, past or present, at TA-21 that would have generated polycyclic aromatic hydrocarbons (PAHs) such as benzo(g,h,i)perylene, benzo(a)pyrene, and benzo(b)fluroanthene. These chemicals are typically associated with asphalt, fossil fuels, or products of combustion. A large, paved area upgradient of the sample locations is the most likely source of PAHs at this site. Therefore, these analytes are not retained as COPCs.

Sodium was detected in two samples at a concentrations greater than the UTL value of 915 mg/kg (sample AAC0113 at 20 600 mg/kg and sample AAC0114 at 4 470 mg/kg). Although the site is within an industrialized area and is likely to remain industrialized in the future, a residential exposure scenario was selected to evaluate the potential risk associated with sodium in soil as a conservative screening assessment. If a sodium concentration in soil is assumed to be 20 600 mg/kg, and a child were assumed to ingest the soil at a rate of 200 mg/day, the amount of sodium ingested per day would be approximately 4.12 mg. This amount is considerably less than the recommended daily allowance (RDA) in diet of 500 mg/day (National Research Council 1989, 1251). Therefore, sodium is not retained as a COPC.

Lead was present in one soil sample at a concentration equal to its SAL of 400 mg/kg. This SAL is calculated based on a residential exposure scenario in which children are regularly in contact with contaminated soil. Because the site is within an industrialized area that is not likely to be developed for residential use in the future, and because only one soil sample had lead concentrations equal to but not exceeding the SAL, lead is not retained as a COPC.

The remaining three chemicals [i.e., toluene, silver, and zinc] are included in the following multiple chemical evaluation.

A multiple chemical evaluation is performed separately for three classes of analytes: noncarcinogens, carcinogens (nonradioactive), and radionuclides. In this case, COPCs fall into only two classes: noncarcinogens and radionuclides. It should be noted that strontium-90 is the only radionuclide that would be considered in the multiple chemical evaluation, and no nonradionuclide carcinogens were carried forward; therefore, a multiple chemical evaluation was not performed for radionuclides or for nonradionuclide carcinogens. Strontium-90 was present in all soil samples at concentrations below its SAL; therefore it is not retained as a COPC.

Table 5.1.7-2 presents the results of the multiple chemical evaluation for PRS 21-002(b). The total normalized value is 0.038 for the noncarcinogens. Therefore, the noncarcinogens included in this multiple chemical evaluation (toluene, silver, and zinc) are not retained as COPCs.

TABLE 5.1.7-2

PRS 21-002(b) MULTIPLE CHEMICAL EVALUATION FOR SOIL

ANALYTE	LOCATION ID	SAMPLE ID	SAMPLE VALUE (mg/kg)	SOIL SAL (mg/kg)	NORMALIZED VALUE
Noncarcinogenic Effects					
Toluene	21-2508	AAC0117	0.008	1 900	0.000004
Silver	21-2506	AAC0115	3.1	380	0.008
Zinc	21-2507	AAC0116	604	23 000	0.03
				Total:	0.038

Based on the results of this evaluation of chemicals detected in soil samples collected from PRS 21-002(b), none are identified as COPCs.

5.1.7.2 Risk Assessment

No risk assessment was performed for PRS 21-002(b) because no COPCs were identified.

5.1.8 Ecological Assessment

In accordance with conversations between LANL ER Project personnel, the New Mexico Environment Department (NMED), and EPA Region 6 Officials, further ecological risk assessment at this site will be deferred until the site can be assessed as part of the new ecological exposure unit (Ecozone) methodology that is being developed by LANL in conjunction with EPA and the NMED.

5.1.9 Extent of Contamination

Although lead and benzo(b)fluoranthene were detected in one soil sample each at concentrations equal to their respective SALS, adjacent soil samples at PRS 21-002(b) were lower than these values. This indicates that the area containing concentrations of lead and benzo(b)fluoranthene equal to or greater than their respective SALs is relatively limited. Benzo(a)pyrene was also detected in one sample at concentrations above the detection limit and its SAL. All other soil samples had detection limit values above the SAL for this analyte. However, no historical use of benzo(a)pyrene is known to have occurred at PRS 21-002(b) and the source of the chemical is likely parking lot runoff.

5.1.10 Conclusions and Recommendations

No chemicals were retained as COPCs by the screening assessment process for PRS 21-002(b). Therefore, PRS 21-002(b) is recommended for NFA. Based on LANL's No Further Action Criteria Policy Criterion 4 (which states that the PRS has been characterized in accordance with current state or federal regulations, and that COPCs are not present in concentrations that would pose an unacceptable risk under the most conservative assumption of residential future land use), a Class III permit modification will be requested to remove this PRS from the HSWA Module of LANL's RCRA operating permit (Environmental Restoration Project 1995, 1173).

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APPENDIX A ANALYTICAL DATA

All analytical data are available on Facility for Information Management, Analysis, and Display (FIMAD). If FIMAD is not accessible, data will be provided upon request. A hard copy of the data is available from the Records Processing Facility under the title, "Analytical Data for the 1996 RFI Report for PRS 21-002(b)."

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APPENDIX B DATA QUALITY EVALUATION TABLES

TABLE B-1

SUMMARY OF QUALITY ASSURANCE/QUALITY CONTROL RESULTS FOR PRS 21-002(b)

REQUEST NUMBER	SAMPLE ID	SAMPLE MATRIX	ANALYTE SUITE	QUALITY CONTROL (QC) COMMENTS
19439	AAC0110	Soil	VOCs[a]	All data are valid and usable without qualification
19439	AAC0111	Soil	VOCs	35 analytes qualified UJ[b] for internal standards outside acceptance criteria.
19439	AAC0112	Soil	VOCs	All data are valid and usable without qualification
19439	AAC0113	Soil	VOCs	All data are valid and usable without qualification
19439	AAC0114	Soil	VOCs	16 analytes qualified UJ for internal standards outside acceptance criteria.
19439	AAC0115	Soil	VOCs	All data are valid and usable without qualification
19439	AAC0116	Soil	VOCs	16 analytes qualified UJ for internal standards outside acceptance criteria.
19439	AAC0117	Soil	VOCs	16 analytes qualified UJ for internal standards outside acceptance criteria.
19439	AAC0118	Soil	VOCs	16 analytes qualified UJ for internal standards outside acceptance criteria.
19439	AAC0119	Water	VOCs	All data are valid and usable without qualification
19439	AAC0120	Water	VOCs	All data are valid and usable without qualification
19439	AAC0121	Water	VOCs	All data are valid and usable without qualification
19439	AAC0110	Soil	SVOCs[c]	19 analytes are qualified UJ for low recoveries in the QC sample (10-50%).
19439	AAC0111	Soil	SVOCs	19 analytes are qualified UJ for low recoveries in the QC sample (10-50%).
19439	AAC0112	Soil	SVOCs	19 analytes are qualified UJ for low recoveries in the QC sample (10-50%).
19439	AAC0113	Soil	SVOCs	19 analytes are qualified UJ for low recoveries in the QC sample (10-50%).
19439	AAC0114	Soil	SVOCs	19 analytes are qualified UJ for low recoveries in the QC sample (10-50%). Benzo(b)fluoroanthene and benzo(g,h,i)perylene qualified J[d] for exceeding holding times.
19439	AAC0115	Soil	SVOCs	19 analytes are qualified UJ for low recoveries in the QC sample (10-50%).
19439	AAC0116	Soil	SVOCs	19 analytes are qualified UJ for low recoveries in the QC sample (10-50%).

TABLE B-1 (CONTINUED)

SUMMARY OF QUALITY ASSURANCE/QUALITY CONTROL RESULTS FOR PRS 21-002(b)

REQUEST NUMBER	SAMPLE ID	SAMPLE MATRIX	ANALYTE SUITE	QUALITY CONTROL (QC) COMMENTS
19439	AAC0117	Soil	SVOCs	19 analytes are qualified UJ for low recoveries in the QC sample (10-50%).
19439	AAC0118	Soil	SVOCs	19 analytes are qualified UJ for low recoveries in the QC sample (10-50%).
19439	AAC0119	Water	SVOCs	All data are valid and usable without qualification
19439	AAC0120	Water	SVOCs	All data are valid and usable without qualification
20096	AAC0110	Soil	Rad[e]	Plutonium-238 (50%), strontium-90 (59-74%), uranium (59%) all qualified J for low recovery in the QC sample or laboratory control sample (LCS). Plutonium-239 qualified J for high recovery (190%). Tritium qualified J for low matrix spike (76%) and high LCS (125%).
20096	AAC0111	Soil	Rad	Plutonium-238 (50%), strontium-90 (59-74%), uranium (59%) all qualified J for low recovery in the QC sample or LCS. Plutonium-239 qualified J for high recovery (190%). Tritium qualified J for low matrix spike (76%) and high LCS (125%).
20096	AAC0112	Soil	Rad	Plutonium-238 (50%), strontium-90 (59-74%), uranium (59%) all qualified J for low recovery in the QC sample or LCS. Plutonium-239 qualified J for high recovery (190%). Tritium qualified J for low matrix spike (76%) and high LCS (125%).
20096	AAC0113	Soil	Rad	Plutonium-238 (50%), strontium-90 (59-74%), uranium (59%) all qualified J for low recovery in the QC sample or LCS. Plutonium-239 qualified J for high recovery (190%). Tritium qualified J for low matrix spike (76%) and high LCS (125%).
20096	AAC0114	Soil	Rad	Plutonium-238 (50%), strontium-90 (59-74%), uranium (59%) all qualified J for low recovery in the QC sample or LCS. Plutonium-239 qualified J for high recovery (190%). Tritium qualified J for low matrix spike (76%) and high LCS (125%).

TABLE B-1 (CONTINUED)

SUMMARY OF QUALITY ASSURANCE/QUALITY CONTROL RESULTS FOR PRS 21-002(b)

REQUEST NUMBER	SAMPLE ID	SAMPLE MATRIX	ANALYTE SUITE	QUALITY CONTROL (QC) COMMENTS
20096	AAC0115	Soil	Rad	Plutonium-238 (50%), strontium-90 (59-74%), uranium (59%) all qualified J for low recovery in the QC sample or LCS. Plutonium-239 qualified J for high recovery (190%). Tritium qualified J for low matrix spike (76%) and high LCS (125%).
20096	AAC0116	Soil	Rad	Plutonium-238 (50%), strontium-90 (59-74%), uranium (59%) all qualified J for low recovery in the QC sample or LCS. Plutonium-239 qualified J for high recovery (190%). Tritium qualified J for low matrix spike (76%) and high LCS (125%).
20096	AAC0117	Soil	Rad	Plutonium-238 (50%), strontium-90 (59-74%), uranium (59%) all qualified J for low recovery in the QC sample or LCS. Plutonium-239 qualified J for high recovery (190%). Tritium qualified J for low matrix spike (76%) and high LCS (125%).
20096	AAC0118	Soil	Rad	Plutonium-238 (50%), strontium-90 (59-74%), uranium (59%) all qualified J for low recovery in the QC sample or LCS. Plutonium-239 qualified J for high recovery (190%). Tritium qualified J for low matrix spike (76%) and high LCS (125%).
20096	AAC0119	Water	Rad	Strontium-90 (59-74%), uranium (59%) all qualified J for low recovery in the QC sample or LCS. Tritium qualified J for low matrix spike (76%) and high LCS (125%).
20248	AAC0110	Soil	TAL Metals[f]	Mercury qualified UJ for exceeding holding times. Sodium and potassium detects qualified J for high recoveries (>125%). Magnesium qualified J or UJ for low recovery.
20248	AAC0111	Soil	TAL Metals	Mercury qualified UJ for exceeding holding times. Sodium and potassium detects qualified J for high recoveries (>125%). Magnesium qualified J or UJ for low recovery.
20248	AAC0112	Soil	TAL Metals	Mercury qualified UJ for exceeding holding times. Sodium and potassium detects qualified J for high recoveries (>125%). Magnesium qualified J or UJ for low recovery.
20248	AAC0113	Soil	TAL Metals	Mercury qualified UJ for exceeding holding times. Sodium and potassium detects qualified J for high recoveries (>125%). Magnesium qualified J or UJ for low recovery.

TABLE B-1 (CONTINUED)

SUMMARY OF QUALITY ASSURANCE/QUALITY CONTROL RESULTS FOR PRS 21-002(b)

REQUEST NUMBER	SAMPLE ID	SAMPLE MATRIX	ANALYTE SUITE	QUALITY CONTROL (QC) COMMENTS
20248	AAC0114	Soil	TAL Metals	Mercury qualified UJ for exceeding holding times. Sodium and potassium detects qualified J for high recoveries (>125%). Magnesium qualified J or UJ for low recovery.
20248	AAC0115	Soil	TAL Metals	Mercury qualified UJ for exceeding holding times. Sodium and potassium detects qualified J for high recoveries (>125%). Magnesium qualified J or UJ for low recovery.
20248	AAC0116	Soil	TAL Metals	Mercury qualified UJ for exceeding holding times. Sodium and potassium detects qualified J for high recoveries (>125%). Magnesium qualified J or UJ for low recovery.
20248	AAC0117	Soil	TAL Metals	Mercury qualified UJ for exceeding holding times. Sodium and potassium detects qualified J for high recoveries (>125%). Magnesium qualified J or UJ for low recovery.
20248	AAC0118	Soil	TAL Metals	Mercury qualified UJ for exceeding holding times. Sodium and potassium detects qualified J for high recoveries (>125%). Magnesium qualified J or UJ for low recovery.
20248	AAC0119	Water	TAL Metals	Mercury qualified UJ for exceeding holding times.
20248	AAC0120	Water	TAL Metals	Mercury qualified UJ for exceeding holding times.

[a] VOCs = Volatile organic compounds.
[b] UJ = Estimated undetected quantity.
[c] SVOCs = Semivolatile organic compounds.
[d] J = Estimated detected quantity.
[e] Rad = Amercium-241, gamma scan, tritium, percent moisture, plutonium-238, plutonium-239, strontium-90, and total uranium.
[f] TAL Metals = Target analyte list metals.

APPENDIX C RISK ASSESSMENT CALCULATIONS

No risk assessment was performed for PRS 21-002(b) because no COPCs were identified in the screening assessment.

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