Los Alamos National Laboratory

ENVIRONMENTAL RESTORATION

University of California
Environmental Restoration, MS M992
Los Alamos, New Mexico 87545
505-665-4557
FAX 505-665-4747

U.S. Department of Energy
Los Alamos Area Office, MS A316
Los Alamos, New Mexico 87544
505-665-7203
FAX 505-665-4504

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Date: MAY 4 1995

Refer to: EM/ER:95-J092

Mr. William Honker
Hazardous Waste Management Division
U.S. Environmental Protection Agency
Region 6
1445 Ross Ave, Suite 1200
Dallas, TX 75202-2733

Dear Mr. Honker:

SUBJECT: SUBMITTAL OF THE RESOURCE CONSERVATION AND RECOVERY ACT FACILITY INVESTIGATION (RFI) REPORT FOR POTENTIAL RELEASE SITE (PRS) 0-032

Enclosed are two copies of the Los Alamos National Laboratory's RFI Report concerning PRS 0-032 in Technical Area 0. The report documents the field work performed as detailed in the approved RFI Work Plan for Operable Unit (OU) 1071 and the results of the sampling. This RFI Report is due to your office on May 12, 1995.

Please ask your office to contact Garry Allen or Bonnie Koch of our staff at (505) 665-7202 or (505) 667-3394, respectively, if you have any questions.

Sincerely,

Jorg Jansen, Project Manager
Environmental Restoration

Sincerely,

for Theodore J. Taylor, Program Manager
Los Alamos Area Office

JJ/TT/bp

Enclosure: RFI Report

Environmental Restoration

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Cy (w/enc.):
B. Garcia, NMED/HRMB
S. Yanicak, AIP, NMED MS J993
T. Taylor, LAAO
B. Koch, LAAO
D. Griswold, ERD, MS A906
E. Merrill, EM-453, DOE-HQ
J. White, ESH-19, LANL, MS K498
RPF, MS M707

Cy (w/o enc.):
G. Allen, CST-18, MS E525
J. Jansen, EM/ER, MS M992
G. Rael, ERD, AL
T. Baca, EM-DO, LANL, MS J591
W. Spurgeon, EM-453, HQ
N. Weber, Bureau Chief, AIP, NMED
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 gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violation.

Document Title:

Submittal Of The Resource Conservation And Recovery Act Facility Investigation Report For Potential Release Site 0-032

Name: _____ Date: 3/24/95

Dennis Erickson
Director of Environment, Safety & Health Division
Los Alamos National Laboratory

Name: _____ Date: 5/4/95

Joseph C. Vozella
Acting Assistant Area Manager
Office of Environment & Projects
DOE-Los Alamos Area Office

or

Theodore J. Taylor
Program Manager
Environmental Restoration Program
DOE-Los Alamos Area Office

RFI Report for

Potential Release Site

0-032

Field Unit 1

Environmental

Restoration

Project

May 3, 1995

A Department of Energy

Environmental Cleanup Project

Los Alamos National Laboratory

LA-UR-95-932

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EXECUTIVE SUMMARY

This report presents the results of the Phase I Resource Conservation and Recovery Act Facility Investigation at the former Zia motor pool site, Operable Unit 1071, Technical Area 0, Solid Waste Management Unit (SWMU) Group 0-4, SWMU 0-032, formerly part of Los Alamos National Laboratory. The former Zia motor pool and service station were operated by Zia Company, a subcontractor to the United States Atomic Energy Commission, from the mid-1940s through the mid-1960s.

The former Zia motor pool is located west of the present Los Alamos Credit Union between Trinity Drive and Central Avenue. The one SWMU identified at this site is SWMU 0-032, which includes the former automotive maintenance hangar, Building 1 (the former vehicle maintenance shop), and Building 2 (the former heavy equipment maintenance shop).

The objectives of the Phase I investigation were: 1) to determine if there was any contamination associated with the waste oil pits of the former automotive maintenance hangar, and the vehicle greasing pits, washing pits, and drain sumps of Building 1; and 2) to investigate and remove an underground storage tank south of Building 1.

RFI samples and waste characterization samples were analyzed as part of the Phase I investigation. The two chemicals of potential concern identified at this site were total chromium in water and total lead in water, which were detected above their screening action levels in a sample from borehole MS-7. However, chromium and lead concentrations in the water sample from borehole MS-7 are not considered to be an issue because the water is limited in extent. Also, if the water is accessed through soil excavation, the primary exposure pathway of concern would be dermal contact. This contact should not present a hazard because the physiochemical properties of chromium and lead limit their adsorption through skin to negligible amounts. The presence of water in the fill surrounding the sump at borehole MS-7 has been reported to the New Mexico Environment Department Ground Water Protection Bureau. Based upon the results of the field investigation, SWMU 0-032 is recommended for no further action.

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1.0 INTRODUCTION

This report presents the results of the Phase I Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) at the former Zia motor pool site, Operable Unit (OU) 1071, Technical Area (TA) 0, Solid Waste Management Unit (SWMU) Group 0-4, SWMU 0-032, formerly part of Los Alamos National Laboratory (LANL). Included in this report are data assessment, analysis approach, and site-specific results, conclusions, and recommendations for SWMU 0-032.

1.1 Facility Background

The former Zia motor pool facility and service station were operated by Zia Company, a subcontractor to the United States Atomic Energy Commission (AEC), from the mid-1940s through the mid-1960s (LANL 1992, 0781). During its operational history, the former Zia motor pool facility included an automotive maintenance hangar and three additional buildings designated as Buildings 1, 2, and 3. Ownership of the motor pool and service station property was transferred from the AEC to the County of Los Alamos by quitclaim deed July 1, 1967. Records located in the County Clerk's Office, Deed Registry, indicate that the property was later transferred from County ownership to private ownership during the time period from 1978 to 1980. All SWMU Group 0-4 properties are currently owned by private corporations and are being used by retail establishments and small industry.

SWMU Group 0-4 encompasses approximately five acres and is located east of 15th Street between Central Avenue and Trinity Drive (Fig. 1). The site lies just west of the current location of the Los Alamos Credit Union. Two SWMUs compose SWMU Group 0-4: the former Zia motor pool facility, SWMU 0-032, and the former service station, SWMU 0-031(b). Although the SWMU Report included Building 3 in both SWMUs (LANL 1990, 0145), for the purposes of this field investigation and report, Building 3 is assumed to be the former service station, and it is included in SWMU 0-031(b) along with the underground storage tank (UST) located east of Building 3. SWMU 0-031(b) will be addressed in a separate report.

This investigation and report address SWMU 0-032, inclusive of the former automotive maintenance hangar, Building 1, and Building 2 (Fig. 2). According to the 1962 Zia engineering drawing Z-1362, Modification of Fleet Maintenance Facilities, the former automotive maintenance hangar contained administrative offices, equipment repair bays, blacksmithing equipment, and various automotive repair works including engine, radiator, battery, tire, and paint shops.

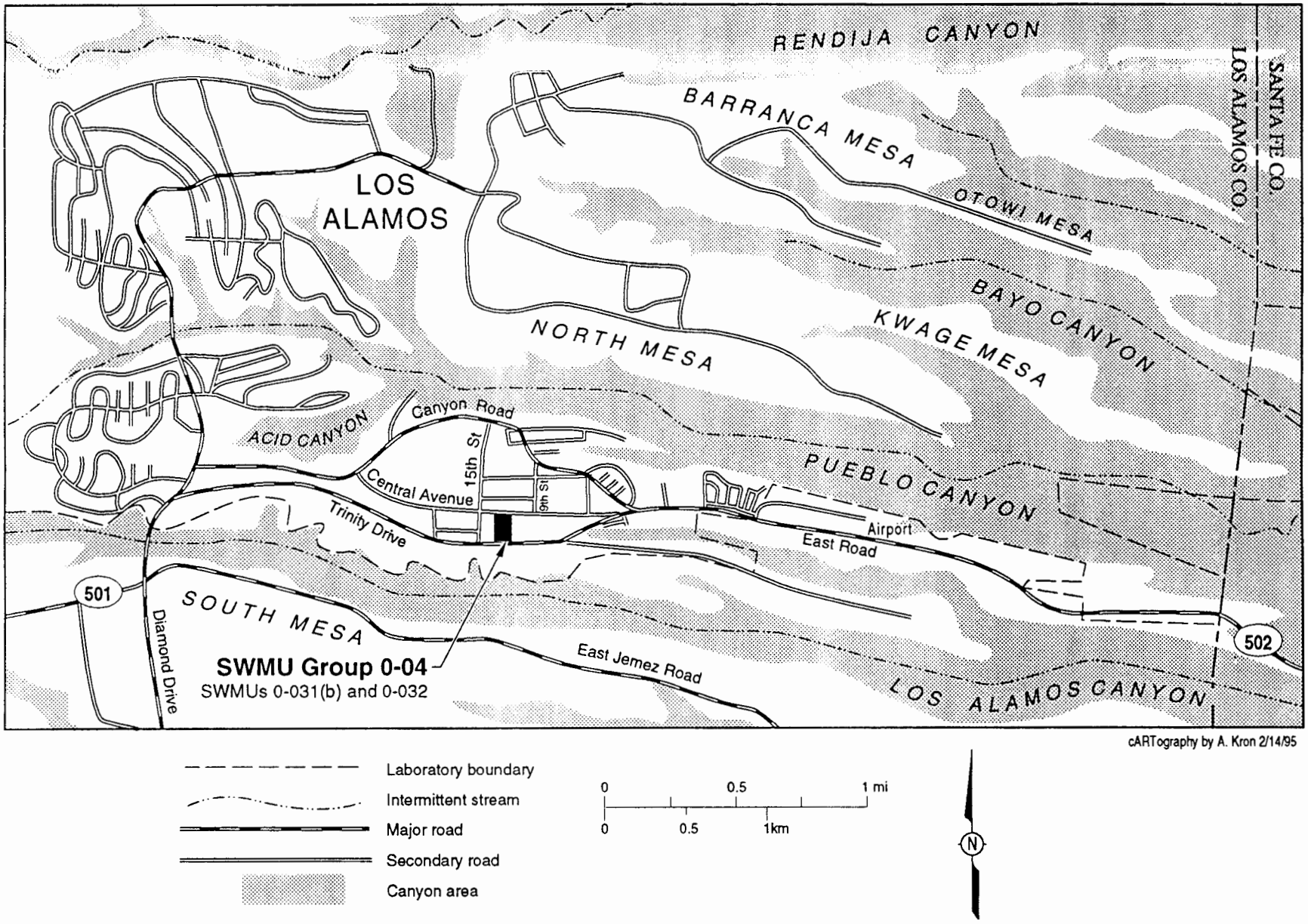

Fig. 1. General location of Former Zia Motorpool at TA-0, SWMU Group 0-04.

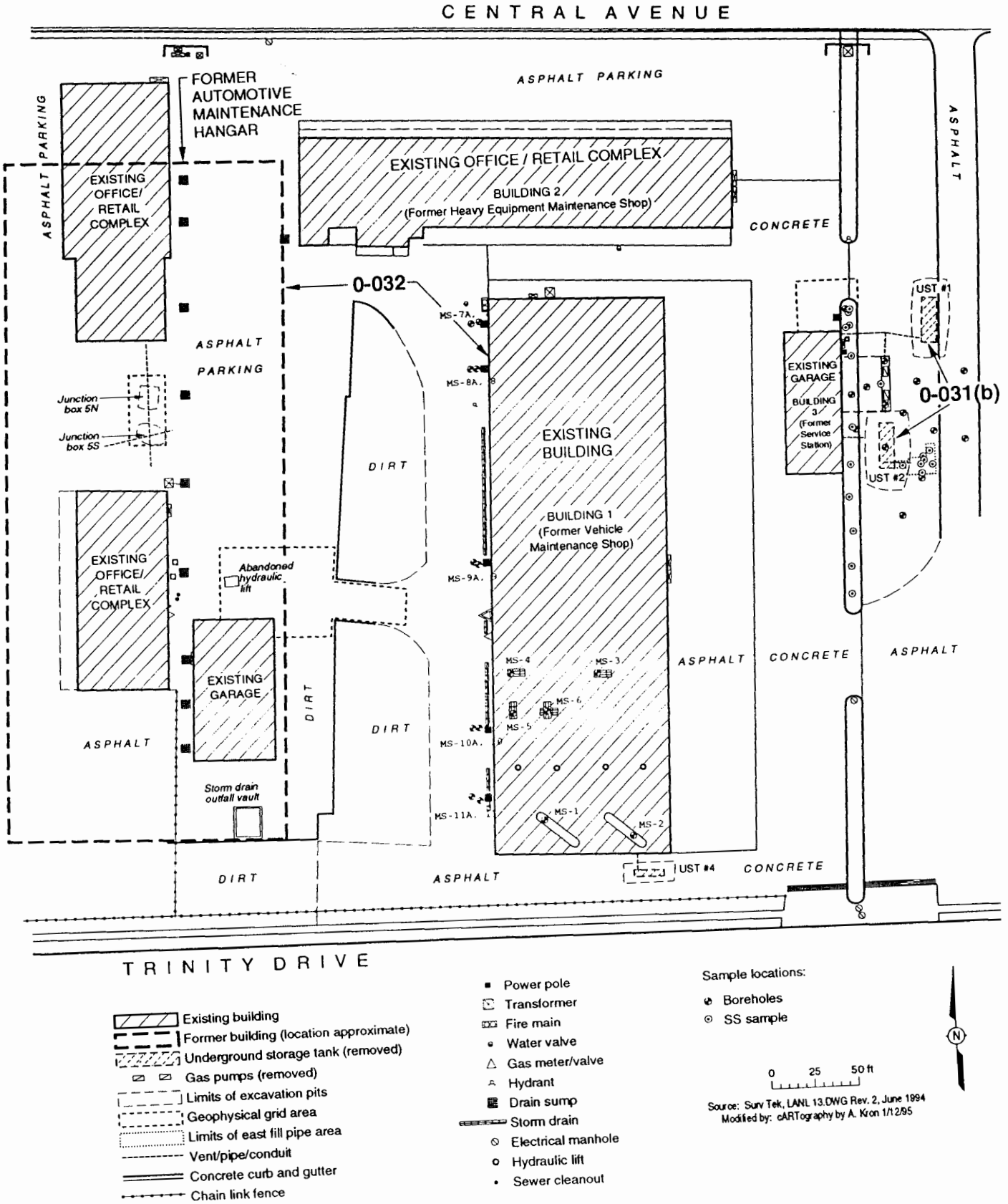

Fig. 2. Locations of structures at the former Zia motorpool site at TA-0, SWMU Group 0-4.

According to the SWMU Report, the automotive maintenance hangar was decommissioned in 1962, and its facilities were transferred to other buildings within the motor pool complex (LANL 1990, 0145).

Building 1, a former vehicle maintenance shop, received many functions of the automotive maintenance hangar, including the body repair and paint shop, engine shop, radiator shop, and carburation/ignition shop. In addition, at some point during its operation, Building 1 housed the frame, front end, and wheel shop, a lubrication and preventive maintenance shop, and vehicle wash facilities. Portions of Building 1 are now being used for storage.

Building 2 formerly served as a heavy equipment maintenance shop that housed blacksmithing facilities, heavy equipment repair bays, a machine tool and welding shop, and a brake repair shop. In addition, selected administrative offices were located in this building, and the upper floor was used for storage. Currently, Building 2 houses several retail establishments.

1.2 RFI Work Plan Overview

The primary objective of the Phase I investigation was to determine if any contaminant releases had occurred at SWMU 0-032. The investigation focused on the vehicle greasing pits, vehicle washing pits, and drain sumps associated with Building 1, and the abandoned utility junction boxes, originally believed to be waste oil pits, associated with the former automotive maintenance hangar. Data collected during this investigation were to be used to evaluate potential health risks associated with any identified releases to ensure that the property is suitable for unrestricted use. An additional objective was the investigation and removal of an underground storage tank south of Building 1.

1.3 Field Activities

The Phase I RFI investigation for SWMU 0-032 consisted of varied activities as outlined in Subsection 5.12 of the RFI Work Plan for OU 1071 (LANL 1992, 0781). These activities included the following: geodetic and geophysical surveys; excavation and removal of one UST and the associated piping south of Building 1; excavation, investigation, and/or removal of three additional subsurface structures beneath the former automotive maintenance hangar; drilling and sampling 16 boreholes inside and adjacent to Building 1; and subsurface soil sampling. Additional support activities included performing subsurface utility surveys, managing investigation-derived wastes, and performing field screening, air monitoring, and personnel oversight.

2.0 ENVIRONMENTAL SETTING

2.1 Climate

The Los Alamos area of north-central New Mexico is classified as a semiarid, temperate mountain climate. Annual precipitation in the area normally reaches about 18 in., 40% of which occurs as brief, intense thunderstorms during July and August. Winter snowfall averages about 51 in. annually (LANL 1993, 1017). In summer months, maximum daily temperatures in the Los Alamos area are usually below 90°F, dropping into the 50s at night. Winter temperatures typically range from 30°F to 50°F during the day, and from 15°F to 25°F at night, occasionally dropping to 0°F or below (LANL 1993, 1017). Winds in Los Alamos often vary greatly with the time of day and location, due in large part to the complex terrain.

2.2 Geology

The former Zia motor pool site, SWMU 0-032, is situated on the Pajarito Plateau. The morphology of the plateau is dominated by a relatively flat, eastward-sloping surface dissected by numerous steep-sided canyons. SWMU 0-032 is located on East Mesa at an elevation of 7 308 ft. The natural drainage from this site is to the south and southeast toward Trinity Drive. The site is covered with surface soil which overlays Bandelier Tuff, composed of compacted air-fall and ash-flow deposits of silicic volcanic rock.

2.3 Hydrology

The main aquifer beneath East Mesa is at an elevation of approximately 6 000 ft. At mesa-top sites such as SWMU 0-032, between 1 000 and 1 200 ft of unsaturated tuff sediments separate the surface from the main aquifer. A shallow alluvial aquifer and a perched aquifer were located at an intermediate depth (325 ft below Los Alamos Canyon) in drill hole LADP-3 at nearby TA-21. The lateral continuity of these aquifers is not known, so they may or may not be present beneath SWMU 0-032 (Broxton et al. in preparation, 1162).

2.4 Wildlife Habitats

SWMU 0-032 is characterized by heavy commercial development and urban disturbance from the Los Alamos town site. Comprehensive plant and animal inventories were not performed for this site because of the high level of disturbance. Because the wildlife habitat at SWMU 0-032 can be characterized as man-made urban plant and animal communities, the screening assessment for this SWMU will not include an ecological component.

3.0 DATA ASSESSMENT AND ANALYSIS APPROACH

3.1 Summary of Quality Assurance/Quality Control Activities

All samples collected during the Phase I investigation at SWMU 0-032 were submitted with chain-of-custody documentation to the sample coordination facility (SCF) for analysis. Selected samples were analyzed for target analyte list (TAL) metals by flame atomic absorption, electrothermal vaporization atomic absorption, cold vaporization atomic absorption, inductively coupled plasma emission spectroscopy (ICPES) (EPA Method 6010), inductively coupled plasma/mass spectrometry (ICP/MS), and colorimetry. Volatile analyses were conducted using purge and trap gas chromatography/mass spectrometry (EPA SW-846 Method 8240). Semivolatile compounds were analyzed using packed column gas chromatography/mass spectrometry (EPA SW-846 Method 8270). Polychlorinated biphenyls (PCBs) were analyzed using gas chromatography/electron capture detector (EPA SW-846 Method 8080). Total petroleum hydrocarbons (TPHs) were analyzed using infrared spectrophotometry, Method IH274, which is equivalent to EPA Method 418.1. A copy of Method IH274 is located in the Health and Environmental Chemistry: Analytical Techniques, Data Management, and Quality Assurance Manual (LANL 1992, 0520).

3.1.1 Underground Storage Tank 4

Two soil samples collected from beneath UST-4 were submitted for analysis of TPH, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), total lead, and total chromium, as shown in Appendix A, Table A1.

Both soil samples were analyzed for VOCs under request number 16972. All of the quality control (QC) results for this analysis were within allowable limits; therefore, all of the data associated with VOCs under this request are rated as valid.

Both soil samples were analyzed for SVOCs under request number 16972. There was a slight problem with the QC results for this analysis involving elevated errors for internal standards. However, since no analytes were detected in the samples, the elevated errors did not affect the sample data. Therefore, all of the data associated with SVOCs under this request are rated as valid.

Both soil samples were analyzed for total lead and total chromium under request number 16977. All of the QC results for this analysis were within allowable limits; therefore, all of the data associated with total lead and total chromium under this request are rated as valid.

Both soil samples were analyzed for TPH under request number 16972. All of the QC results for this analysis were within allowable limits; therefore, all of the data associated with TPH under this request are rated as valid.

3.1.2 Automotive Maintenance Hangar, Junction Boxes 5S and 5N

Sixteen RFI samples were given sample identification numbers at the automotive maintenance hangar, electrical junction boxes 5S and 5N, as shown in Appendix A, Table A1. Of the 16 samples, 14 were soil samples, and 2 were field trip blank samples. Selected samples were analyzed for TAL metals, VOCs, SVOCs, and TPH (Table A1).

Three samples were analyzed for total lead and total chromium under requests 16964 and 16977. All of the QC results for these analyses were within allowable limits; therefore, all of the data associated with total lead and total chromium under these requests are rated as valid.

Fourteen samples were analyzed for VOCs under request numbers 16963, 16972, and 17055. For requests 16963 and 16972, all of the QC results for this analysis were within allowable limits; therefore, all of the data associated with VOCs under these requests are rated as valid. In request 17055, there were instrument calibration problems throughout the analyses, and there were several instances of laboratory contamination in which acetone was detected in QC samples and blanks. Therefore, all of the detected acetone values for the samples in this request are qualified as estimated detected quantities. The affected samples are AAA8329, AAA8331, AAA8332, AAA8334, AAA8336, AAA8361, AAA8362, AAA8385, and AAA8395. However, all of the acetone values for these samples are quite low compared to the screening action level (SAL) of 8 000 mg/kg, and lab contamination is a possible source for all of these elevated acetone levels.

Twelve samples were analyzed for SVOCs under requests 16963, 16972, and 17055. All of the QC results for this analysis were within allowable limits; therefore, all of the data associated with SVOCs under these requests are rated as valid.

Fourteen samples were analyzed for TPH under five separate requests: 16963, 16972, 17055, 17455, and 17600. In requests 16972, 17055, 17455, and 17600, all of the QC results for this analysis were within allowable limits; therefore, all of the data associated with TPH under these requests are rated as valid. There was a QC problem in request 16963 in that TPH was found in a blank QC sample at 37 parts per million (ppm). Because of this, the detected TPH value of 40 ppm for sample AAA8575 is qualified as an estimated detected quantity. Since TPH was not seen in sample AAA8573, no data qualification for this sample is needed.

3.1.3 Former Vehicle Maintenance Shop, Building 1

Forty RFI samples and one waste characterization sample (AAA8405) were given sample identification numbers at Building 1, as shown in Appendix A, Table A1. Of the 41 samples, 26 were soil samples, 2 were water samples, and the remaining 13 were trip blanks, field blanks, and equipment rinsates. Selected samples were analyzed for TAL metals, VOCs, SVOCs, PCBs, and TPH (Table A1).

Twenty-seven samples were submitted for analysis of TAL metals, total lead, and/or total chromium. These samples were submitted under nine requests: 17020, 17023, 17024, 17034, 17074, 17085, 17095, 17145, and 17165. In eight of these requests, all of the QC results for this analysis were within allowable limits; therefore, all of the data associated with these analyses under these requests are rated as valid. However, in request 17034, the analytical results for the matrix spike samples and the blind QC samples were both low by a factor of two, due possibly to a laboratory error. However, the total lead data for the samples were very low, 2 µg/L and less than 1 µg/L, compared to a SAL of 50 µg/L; even if the values were doubled, it would not affect the usability of the data. These samples were also analyzed using a second technique (ICPES vs. ICP/MS originally) which gave values of less than 4 µg/L for both samples, within allowable QC limits. Therefore, all of the total lead data associated with this request are rated as valid.

Forty-one samples were analyzed for VOCs under eleven separate requests. The request numbers are 17018, 17019, 17022, 17032, 17055, 17073, 17077, 17097, 17144, 17164, and 17176. In requests 17018, 17019, 17022, and 17164, all of the QC results for this analysis were within allowable limits; therefore, all of the data associated with VOCs under these requests are rated as valid.

In requests 17032, 17055, 17073, 17077, and 17176, there were instrument calibration problems throughout the analyses, and there were several instances of laboratory contamination in which acetone was detected in QC samples and blanks. Therefore, all of the detected acetone values for this request are qualified as estimated detected quantities; all undetected values are unaffected. The affected samples are AAA8328, ,AAA8366, AAA8337, AAA8338, AAA8367, AAA8368, AAA8376, AAA8384, AAA8386, AAA8394, AAA8402, and AAA8405. However, all of the acetone values for these samples are quite low compared to the screening action level (SAL) of 8 000 mg/kg, and lab contamination is a possible source for all of these elevated acetone levels. 2-butanone was found in the method blanks for all these requests except 17032. The 2-butanone values ranged from 21 to 32 ug/kg. When 2-butanone was detected in a sample at similar levels, the RPL for 2-butanone was raised to the level of the detected value.

Request 17077 also had internal standard problems with 1,4-dichlorobenzene. All analytes associated with this compound were qualified as estimated quantities ("J" or UJ"). For sample AAA8522, 16 volatile analytes were qualified as estimated non-detect values ("UJ"). The qualified analytes are listed in Appendix A Table A7. Also sample AAA8513 was left unrefrigerated for 24 hours prior to analysis. Therefore, all volatile analytes in sample AAA8513 were qualified as "J" or "UJ", estimated detect or non-detect values.

Request 17097 had surrogate recovery problems associated with trip blank sample AAA8535. Therefore, all of the analytes associated with the surrogate compound 1,2 dichloroethane have been qualified as estimated non-detected values. The 25 affected analytes are shown in Appendix A, Table A2. All other data associated with VOCs in this request are rated as valid.

Request 17144 had internal calibration problems with one soil sample, AAA8347. Therefore, the dichlorodifluoromethane and trichlorofluoromethane values for this sample have been qualified as estimated non-detected values. All other data associated with VOCs in this request are rated as valid.

Thirty-two samples were analyzed for SVOCs under 10 separate requests. In eight of the requests, 17018, 17019, 17022, 17055, 17073, 17144, 17164, and 17176, all of the QC results for this analysis were within allowable limits; therefore, all of the data associated with SVOCs under these requests are rated as valid.

In request 17032 there was a recovery of less than three percent for the acid surrogates for sample AAA8401. Therefore, all of the associated analytes are qualified as rejected data for this sample. The 16 rejected semivolatile analytes are listed in Appendix A, Table A3. All other data associated with SVOCs in this request are rated as valid.

In request 17077 there was a major problem with the surrogate recovery of terphenyl in sample AAA8402. Because of extremely low recoveries, the data associated with terphenyl in this sample are qualified as rejected data. The 18 rejected analytes are listed in Appendix A, Table A4. All other data associated with SVOCs in this request are rated as valid.

Thirty-two samples were submitted for TPH analysis under 10 requests. For all 10 requests, 17018, 17019, 17022, 17032, 17055, 17073, 17077, 17144, 17164, and 17176, all of the QC results for this analysis were within allowable limits; therefore, all of the data associated with TPH under these requests are rated as valid.

One sample was submitted for PCB analysis under request 17055. The blind QC samples in this request were slightly outside normal limits. However, no analytes were found in the sample, and the data are still rated as valid.

3.2 Screening Assessment Methodology

Screening assessment of the data makes use of simple comparisons to determine which constituents require further evaluation and which do not. Constituents requiring further evaluation are retained as COPCs. Figure 3 shows the decision logic used in the data analysis and screening assessment process. Screening is conducted on all analytes that are detected at a site. Analytes that are not detected are eliminated from the screening process. A detailed discussion of the screening assessment is located in Appendix J of the LANL Installation Work Plan (LANL 1993, 1017). Subsection 4.2 of this document contains the screening assessment performed on the data from the SWMU 0-032 Phase I investigation.

3.2.1 Background Comparison

The first step in the screening assessment is a background comparison. No Los Alamos background data for water samples are currently available; therefore, analytes detected in water samples are compared to national background concentrations listed in reports from the Agency for Toxic Substances and Disease Registry, US Public Health Service. Soil samples are compared to Los Alamos background concentrations as described below.

Inorganics. Analytes that occur naturally in soils, including most inorganics, are statistically compared to background concentrations in comparable uncontaminated soils. The SWMU 0-032 results represent either surface soil or sediment samples; therefore, LANL-wide surface soil samples were used to calculate the statistical background comparison values for inorganics for this report. The LANL-wide background data include soil samples from the A, B, and C soil horizons from a variety of locations across Los Alamos County (Longmire et al. in preparation, 1142). The statistical comparisons to background in this report follow the general guidance in the LANL Environmental Restoration (ER) Project policy paper on background comparisons (LANL 1995, 06-0105). This policy paper uses methods that are described in the Environmental Protection Agency (EPA) guidance document, Statistical Analysis of Ground-Water Monitoring Data (EPA 1989, 1141).

The hot measurement test was used as the statistically-based screening tool for background comparisons of TA-31 data. This test identifies the site data that exceed the highest background concentrations. It is based on the upper tolerance limits (UTLs) calculated for naturally-occurring metal constituents (Table 1). The UTL is the 95% upper confidence level of the 99th percentile. The 99th percentile is a value, estimated from the data distribution, so that only 1% of the data will exceed this value. For more information on UTLs, see the LANL ER Project policy paper on background comparisons (LANL 1995, 06-0105). UTLs were not calculated for

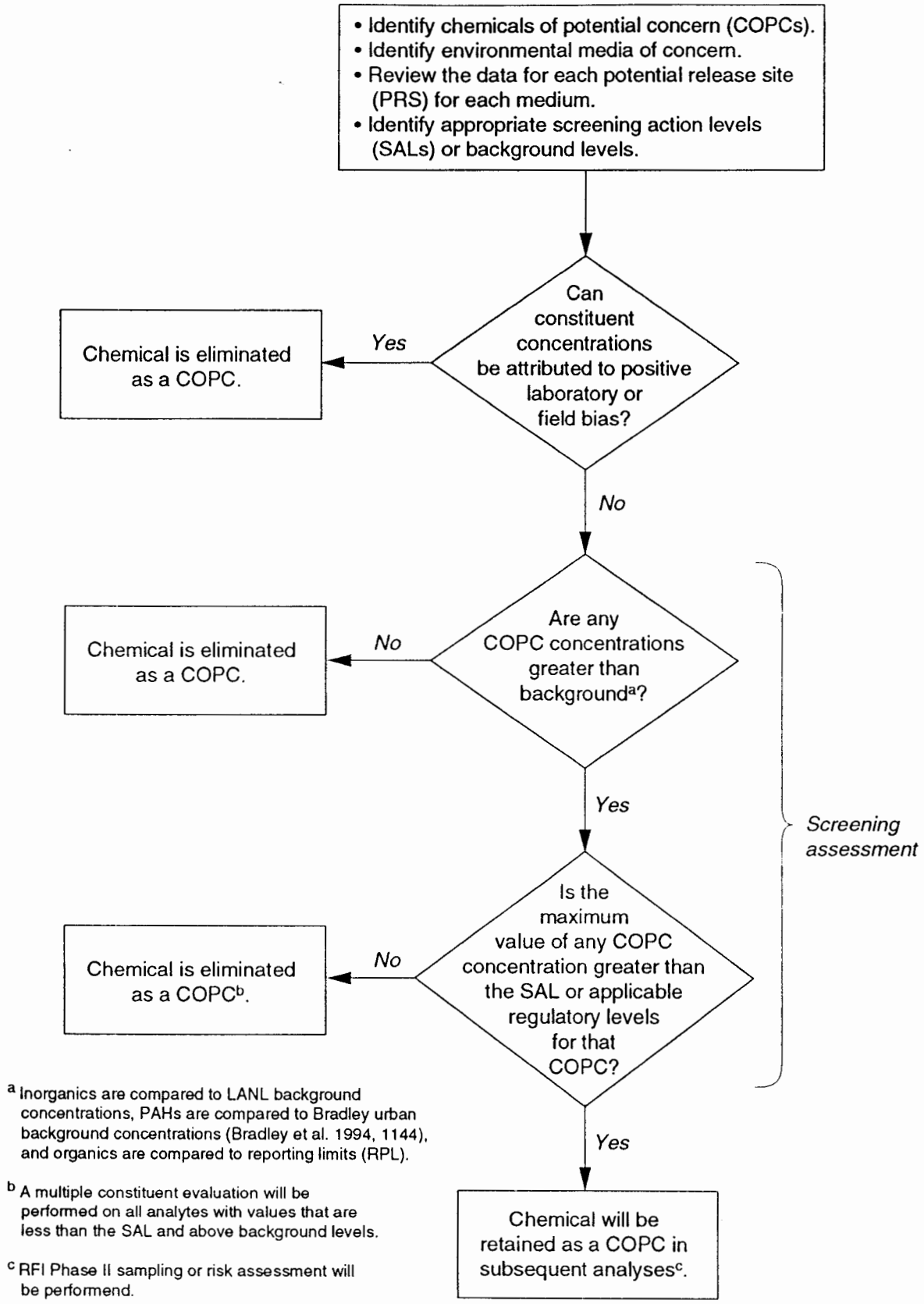

Fig. 3. Data analysis and screening assessment decision logic flow chart.

rarely detected analytes (antimony, cadmium, mercury, selenium, and thallium), and the background maximum is used as their screening value.

Inorganic analytes with values less than their background UTLs are eliminated as COPCs. Inorganic analytes with values greater than their background UTLs are advanced in the screening process to the comparison to screening action levels (SALs).

TABLE 1

LIST OF UPPER TOLERANCE LIMITS FOR LANL SOIL BACKGROUND DATA

ANALYTE	SAL[a] (mg/kg)	MEAN[b]	STANDARD DEVIATION[b]	UTL[c] 99%, 0.95	NUMBER OF SAMPLES	NUMBER OF SAMPLES > LOD[d]
Aluminum	NA[e]	19 000	13 800	123 000	47	47
Antimony	32	2.45	0.36	2.5[f]	46	2
Arsenic	NA[e]	4.4	2.5	11.6	46	46
Barium	5,600	161	129	1 140	47	47
Beryllium	NA[e]	1.15	0.75	3.31	47	47
Cadmium	80	0.39	0.54	2.7[f]	47	5
Calcium	NA[e]	5 790	12 500	54 400	47	47
Chromium (Total)	[g]	11.7	7.8	34.2	47	47
Cobalt	NA[e]	15.2	7.6	51.1	47	47
Copper	3 000	5.3	3.6	15.7	47	45
Iron	NA[e]	14 500	7 320	35 600	47	47
Lead	400[h]	15.0	8.3	39.0	47	44
Magnesium	NA[e]	2 920	2 150	16 100	47	47
Manganese	11 000	343	238	1 030	47	47
Mercury	24	0.05	0.01	0.1[f]	48	4
Nickel	1 600	9.7	5.9	26.7	47	45
Potassium	NA[e]	2 420	1 304	6 180	47	47
Selenium	400	0.43	0.41	1.7[f]	46	23
Sodium	NA[e]	577	453	3 320	47	47
Thallium	6.4	0.27	0.24	0.9[f]	45	21
Vanadium	560	25	14	66	47	47
Zinc	24 000	41	21	101	47	47

[a] SAL = Screening action level.
[b] Concentration values less than the limit of detection (LOD) were replaced by one-half the LOD.
[c] UTL = Upper tolerance limit.
[d] LOD = Limit of detection.
[e] NA = Not available.
[f] The maximum value is used as the screening value rather than the UTL.
[g] The SAL for chromium VI is 400 mg/kg; the SAL for chromium III is 80 000 mg/kg.
[h] EPA 1989, 06-0109.

PAHs. Polycyclic aromatic hydrocarbons (PAHs) are chemicals formed during the incomplete combustion of coal, oil, gas, wood, garbage, or other organic substances. PAHs are not manufactured except in small quantities for research purposes or for limited commercial applications (Clement International Corporation 1990, 0873). However, PAHs are widely distributed in urban environments such as the Los Alamos townsite due to human activities (Bradley et al. 1994, 1144). Therefore, it is appropriate to compare PAH concentrations at Los Alamos sites with urban background concentrations to determine if a release occurred. No LANL-specific background PAH concentration data are available, so background PAH data are derived from literature values reported for PAHs in other urban environments (Bradley et al. 1994, 1144). Background UTLs for these urban PAH data are discussed in Appendix C.

If the maximum concentration for a given PAH is less than the urban background UTL, that PAH is eliminated as a COPC. If the maximum concentration for a given PAH is greater than the urban background UTL, that PAH will be included in subsequent screening assessment evaluations.

Non-PAH Organics. Background values are not calculated for organic analytes other than PAHs because there is no accepted background data set for non-PAH organic analytes. Therefore, if a non-PAH organic analyte is not detected, it is eliminated as a COPC. If a non-PAH organic analyte is detected, and there are no QC problems that indicate that the detected value is unreliable, it is carried forward in the screening process to the next step, comparison to SALs.

3.2.2 Screening Action Levels Comparison

The second step in performing the screening assessment is a comparison to SALs. SALs are conservative risk-based levels, primarily based on formulas presented in the proposed RCRA Subpart S, that are intended for use as a preliminary screening tool (EPA 1990, 0432). Appendix J of the Installation Work Plan explains how the SALs used in the screening assessment are derived (LANL 1993, 1017). All inorganic analytes and PAHs detected at concentrations greater than their background UTLs, and all detected non-PAH organic analytes are compared to their respective SALs. Based on this comparison, each analyte is placed into one of three categories: greater than or equal to SAL, no SAL, or below SAL.

Greater than or equal to SAL indicates that at least one analyte value is greater than or equal to the SAL for that analyte. Any analyte that is greater than or equal to its SAL remains a COPC unless an applicable regulatory guideline takes precedent.

No SAL indicates that there is currently no SAL available for comparison and that at least one analyte value is greater than the reporting limit (RPL). Regulatory guidelines are checked to determine if there are any appropriate criteria for comparison to determine if these analytes should be maintained as COPCs (Vocke 1993, 1073).

Below SAL indicates that the analyte values are all less than their respective SALs. Analytes with concentrations below their respective SALs in all samples generally pose no risk. However, these analytes are further evaluated to determine the potential for adverse health effects due to exposure to the analyte in combination with other analytes. This is called the multiple constituent evaluation.

It is possible that chemicals in combination, while near but not exceeding their SALs, could prove harmful to human health. In evaluating the effects of multiple analytes, a simplistic screening approach that assumes additive effects is used to normalize concentration data by comparing concentration data to SALs. If the sum of proportions between each analyte that is below SAL and its SAL is less than one, then the analytes are eliminated as COPCs. If the sum of proportions is greater than one, then the effect of the multiple constituents has the potential to be adverse. It should be noted that this evaluation is used for screening purposes only, and that the normalized sums or proportions do not indicate risk levels. The equation for calculating the appropriate normalized sum is

$$M = \sum_{COPCs} \frac{C_i}{SAL_i}$$

where:

M = maximum sum of proportions;

C_i = maximum concentration of the ith chemical for a given site; and

SAL_i = chemical-specific SAL for the ith chemical.

For more information regarding this equation, refer to Appendix J of the Installation Work Plan (LANL 1993, 1017).

3.3 Development of Conclusions and Recommendations

Conclusions are based on the results of the initial screening assessment performed on the analytical results of sampling at each potential release site (PRS). Recommendations are based on the potential for human health risk and ecological risk, and on applicable regulations.

4.0 SITE-SPECIFIC RESULTS, CONCLUSIONS, AND RECOMMENDATIONS

4.1 Unit Description and Field Investigation

SWMU 0-032 includes the former automotive maintenance hangar, Building 1, and Building 2. The structures addressed in this Phase I investigation are UST-4, junction boxes 5S and 5N, and Building 1.

The Phase I RFI field activities at SWMU 0-032 were initiated in early March 1994 and continued through late April 1994. A wide variety of field activities were performed to complete the Phase I investigation as outlined in the RFI Work Plan for OU 1071 (LANL 1992, 0781), and in compliance with the New Mexico Environment Department (NMED) UST Regulations (New Mexico Environmental Improvement Board 1990, 0644). These activities are discussed in detail in Subsections 4.1.2, 4.1.3, and 4.1.4 of this report.

All activities conducted at SWMU 0-032 were performed in accordance with the Site-Specific Health and Safety Plans (LANL 1993, 05-0205; LANL 1992, 05-0206) and the Site-Specific Waste Management Plan (LANL 1993, 05-0204) except where noted in this report.

4.1.1.1 Geodetic Surveys

Initial geodetic survey work was completed on March 23 and 24, 1994, and a preliminary site map was generated. Several additional surveys were performed throughout the duration of the Phase I field activities to include additional features and sample locations. A final map, complete with all surveyed points and scaled data, was generated and provided to the Facility for Information Management, Analysis, and Display (FIMAD) for digitizing or plotting as required.

4.1.1.2 Geophysical Surveys

Geophysical surveys were conducted at the former Zia motor pool site to locate the position, orientation, and estimated depth of subsurface features, including USTs, utility lines, and waste pits. Three techniques were employed to complete the surveys: ground penetrating radar, electromagnetic induction, and radiodetection.

4.1.1.3 Sampling

Sampling activities were conducted at SWMU 0-032 beginning on March 13, 1994. Field work was performed in accordance with the RFI Work Plan for OU 1071 (LANL 1992, 0781), the Laboratory's Environmental Restoration (ER) Project procedures, and approved subcontractor procedures.

4.1.2 UST-4 Investigation and Removal

During excavation of the USTs at the former Zia service station [SWMU 0-031(b)], the former Zia motor pool site property owner indicated that additional tanks were present at the former Zia motor pool site. One of these tanks was located at the south end of Building 1, the former vehicle maintenance shop. The property owner also believed that three additional tanks were located within the footprint of the former automotive maintenance hangar, but these were later determined to be two subgrade junction boxes and an abandoned hydraulic lift. The four suspected tanks identified by the property owner were ultimately designated as UST-4, which was located south of Building 1, junction boxes 5N and 5S, which were located in the central area of the automotive maintenance hangar footprint, and the abandoned hydraulic lift, which was located at the southeastern end of the automotive maintenance hangar footprint (Fig. 2).

UST-4 was identified during the geophysical survey at the south end of Building 1 (Fig. 4). The tank was found to contain small amounts of motor oil, which, according to the property owner, may have entered the tank through gravity feed pipes from the vehicle greasing pits located inside the south end of Building 1.

The asphalt covering the tank and the small concrete pad housing the fill port were removed, and the soil was excavated around the tank to locate the identifying features, such as the fill port connection with the tank, vent line connection, drain line connection, and both ends of the tank. Excavated soil was monitored for organic vapors using a photoionization detector (PID) and for ionizing radiation using Eberline rate meters, with scintillation and GM probes, respectively. In addition, gamma exposure was measured using a Ludlum model 19 microR meter.

UST-4 was completely excavated and prepared for removal to Sigma Mesa. The drain and vent lines were cut and plugged during excavation activities. The tank appeared in good condition with some rusted areas, but no visible signs of leaks. No evidence of soil staining due to hydrocarbon releases was observed in the soils located immediately beneath the tank.

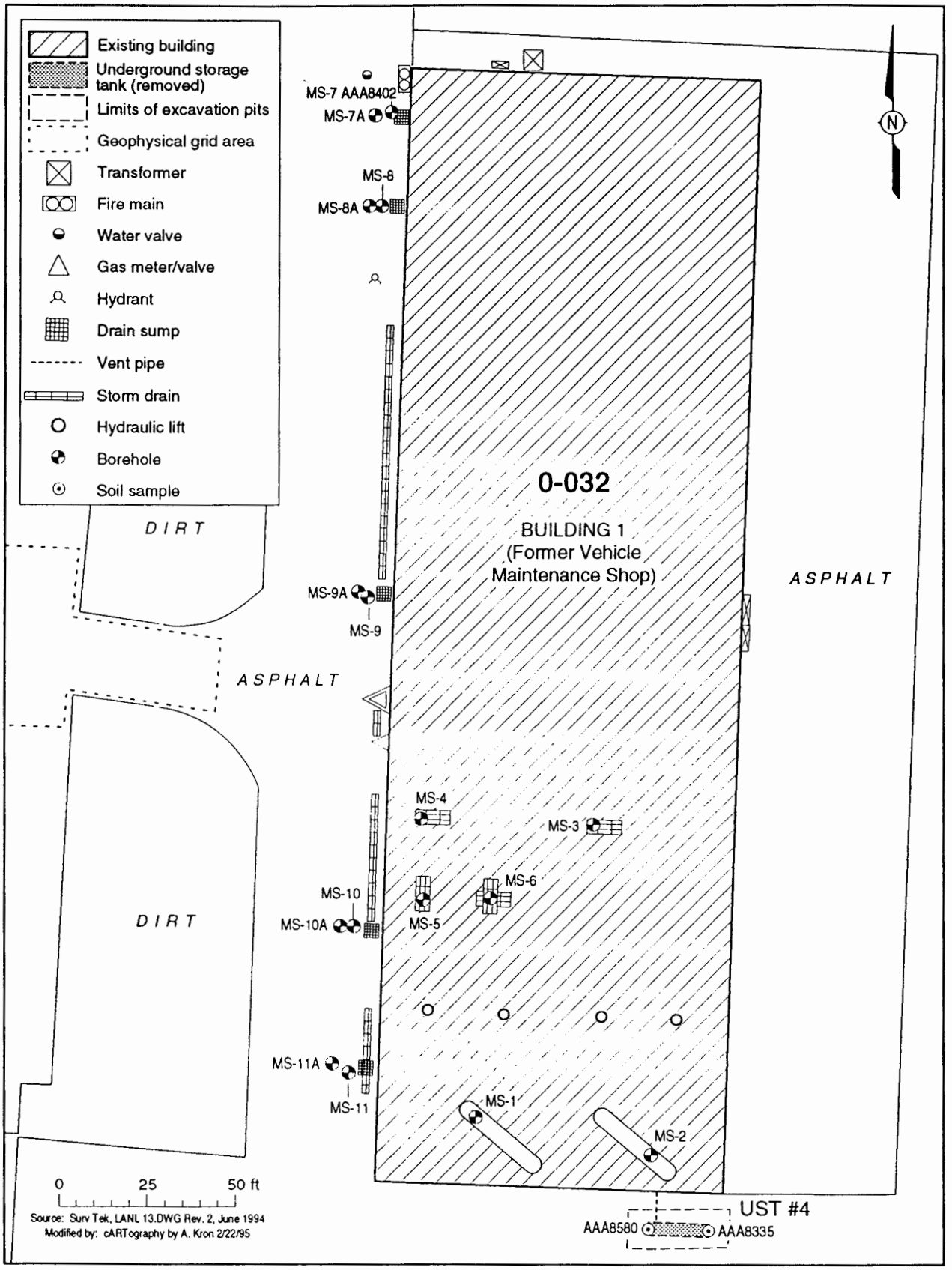

Fig. 4. Sampling locations for UST-4 and the boreholes associated with Building 1.

Because there was no noticeable soil staining, and there were no positive screening responses for organic vapors, no soil samples were collected during the excavation of UST-4. No field analyses were performed during the excavation of UST-4 due to the nature of the potential contaminants.

Two samples were collected beneath the east and west ends of the tank, samples AAA8335 and AAA8580, following procedures formerly requested by the NMED inspector during the UST-1 and UST-2 removals at SWMU 0-031(b) (Fig. 4). Soon after the sample collection, the NMED inspector arrived on-site. The sample location and the condition of the collected samples were approved by the inspector. The two samples were submitted to LANL's SCF for analysis of VOCs, SVOCs, TPH, total lead, and total chromium. In addition, two waste characterization samples, AAA8340 and AAA8333, were collected from excavated soils. The results from these analyses for those values that were detected are shown in Appendix B.

All of the analytical results for the waste characterization samples met acceptable criteria for returning the soil to the excavation. Therefore, soil excavated from the UST-4 pad was returned to the excavated area and compacted to required LANL specifications, and site restoration of the area was completed with the placement of new asphalt. A letter with analytical results indicating that a release was not detected from UST-4 was sent to the NMED UST Bureau on April 22, 1994.

4.1.3 Automotive Maintenance Hangar Investigation

Subsection 5.12 of the RFI Work Plan for OU 1071 (LANL 1992, 0781) describes three waste pits associated with the former automotive maintenance hangar at SWMU 0-032. Boreholes were planned to investigate the extent of contamination, if any, that may have existed within and surrounding the three pits. During the excavation of the USTs associated with SWMU 0-031(b), the property owner of the former Zia motor pool site indicated that the suspect SWMU 0-032 pits were actually tanks. Therefore, plans to drill into these uncertain subsurface features were canceled pending an investigation of their true nature. Geophysical surveys were conducted to investigate the size, orientation, depth, and physical nature of these subsurface features (LANL 1994, 05-0200). The northernmost pair of features were ultimately identified as two subgrade junction boxes, designated as junction boxes 5S and 5N. The third subsurface feature was found to be an abandoned hydraulic lift (Fig. 2).

Junction Boxes 5N and 5S. The investigation of the subsurface feature that was later designated as junction box 5N began with the removal of a reinforced concrete top to expose what appeared to be a 5 ft long by 5 ft wide by 4 ft deep concrete box (Fig. 5). The box was completely filled with sand and gravel. Upon excavation, soils surrounding the box were screened for organic vapors using a PID and were checked for ionizing radiation using Eberline rate meters with scintillation and GM probes. In addition, gamma exposure was measured using a Ludlum model 19 microR meter.

During excavation of the base of the south wall of this box, fluids began leaking from the base. The fluids were quickly pumped from the excavation into 55 gal. drums using a sump pump. In accordance with the Site-Specific Spill Control and Countermeasures Implementation Plan (LANL 1993, 05-0203), the LANL Emergency Management and Response Group was notified of the release. As remedial action had already been taken, no further immediate action was requested. ESH-8 requested that a sample of the drummed fluids be collected and submitted to CST-9 for analysis of VOCs, SVOCs, TAL Metals, TPH, and PCBs. A sample from the drummed water, AAB0155, was collected and submitted to CST-9 for waste characterization purposes. The results from these analyses for those values that were detected are shown in Appendix B.

Most of the sand and gravel fill contained within the box were removed to reveal abandoned conduits in the north and south walls, indicating that the box was an old subgrade junction box. Approximately two inches of oily sludge were found on the floor of junction box 5N. Because the box had already been excavated, connecting pipes were cut and the box was removed in pieces from the excavation. Soil and tuff located immediately beneath the removed junction box appeared stained and smelled like motor oil. To assess the extent of chemicals in the subsurface, an additional two feet of tuff was removed from the base of the excavation prior to sampling. Following this removal, the tuff no longer appeared stained. With the assistance of the backhoe, two soil samples were collected from the base of the excavation to investigate the extent of any chemical migration in the subsurface: one from the northwest quadrant where the dark gray soil staining had been most pronounced (sample AAA8575), and a second from the southeast quadrant where the fluid spill occurred (sample AAA8573). Both samples were submitted to CST-9 for analysis of VOCs, SVOCs, TPH, total lead, and total chromium. The northwest quadrant was sampled again and two additional soil samples were collected for analysis of TPH (samples AAB0179 and AAB5420). The results from these analyses for those values that were detected are shown in Appendix B.

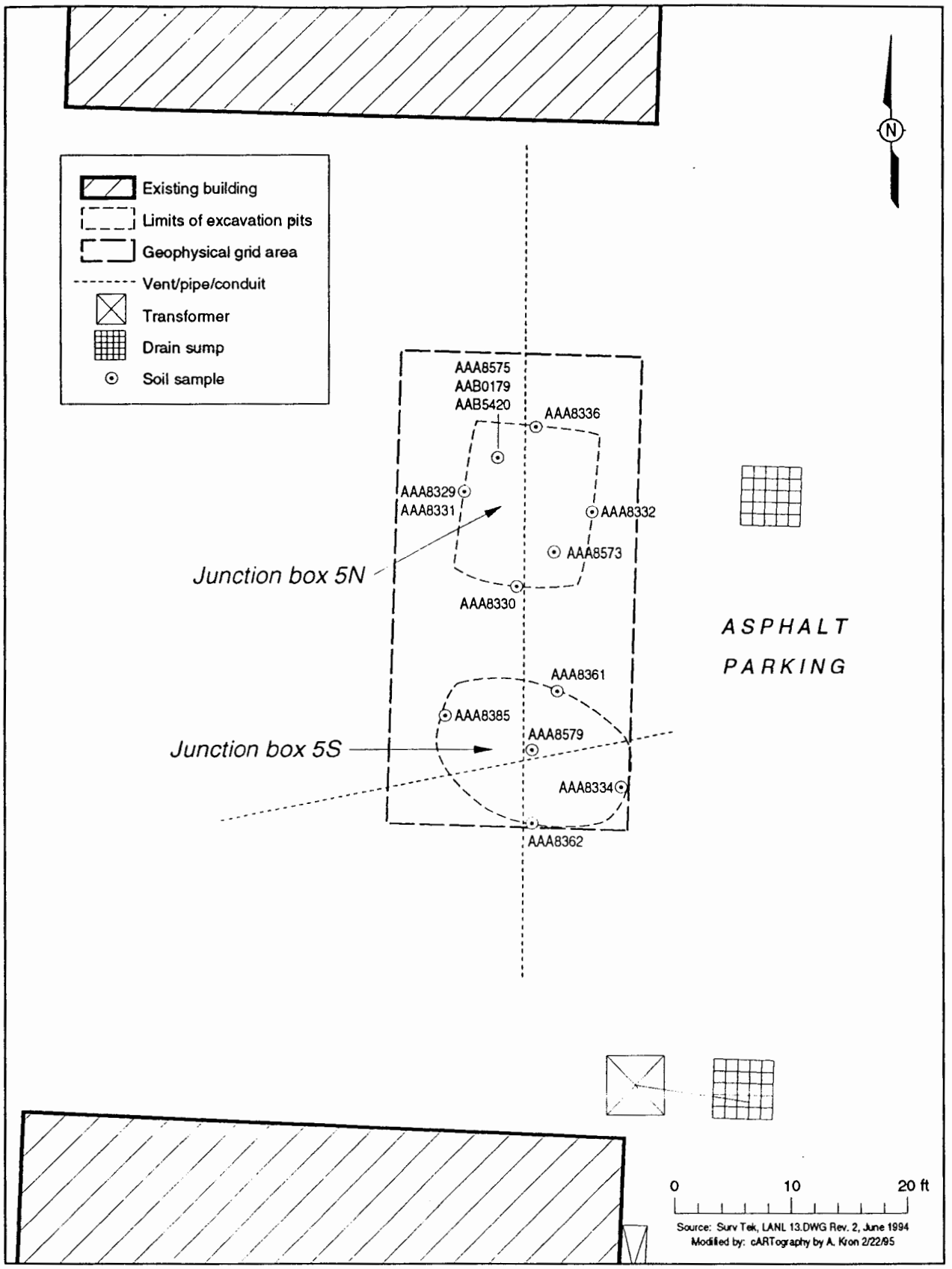

Fig. 5. Sampling locations for junction boxes 5N and 5S beneath the former automotive maintenance hangar.

The investigation of the subsurface feature that was later designated as junction box 5S began with the removal of surface asphalt, which revealed a 3.5 ft long by 4 ft wide metal lid (Fig. 5). The lid was carefully opened to uncover a second subgrade junction box. Junction box 5S was made of concrete, and it contained approximately 2.5 ft of oily water. Litter such as wrappers, oil containers, oil filters, and other wastes were noted either floating on the water or sitting in approximately two inches of oily sludge at the base of the box. Several sets of abandoned conduits were noted in all four walls of the box.

In preparation for removal of junction box 5S, all but approximately two inches of the oily water were removed from the box and pumped to a 55 gal. drum. A waste characterization water sample (AAB0154) was collected from the drummed water and submitted to CST-9 for analysis of VOCs, SVOCs, TPH, PCBs, total lead, and total chromium. Approximately two cubic feet of vermiculite (sorbent) were added to the moist sludge in the base of the box to prevent a liquid spill in the open excavation during removal of the box. Junction box 5S was removed from the excavation. An additional six inches of soil were removed from the base of the excavation in preparation for sampling. Upon excavation, soils were screened for organic vapors using a PID and were checked for ionizing radiation using Eberline rate meters, with scintillation and GM probes. In addition, gamma exposure was measured using a Ludlum model 19 microR meter. Using the backhoe, one sample (AAA8579) was collected from the floor of the excavation. This sample was submitted to CST-9 for analysis of VOCs, SVOCs, TPH, total lead, and total chromium. The results from these analyses for those values that were detected are shown in Appendix B.

In lieu of borings at the sites of junction boxes 5S and 5N, soil samples were collected from the north, south, east, and west walls and the bases of both excavations and submitted to CST-9 for analysis of VOCs, SVOCs, TPH, total lead, and total chromium (Fig. 5). The results from these analyses for those values that were detected are shown in Appendix B. Most soil samples submitted from the junction box 5S and 5N excavations were collected directly from the backhoe bucket, and the rest were collected with a stainless steel hand auger.

In addition to samples collected from the side walls and base of the junction box excavations, samples for waste characterization (samples AAA8341, AAA8574, and AAB0180) were collected from the excavated material. These samples were submitted to CST-9 for analysis of VOCs, SVOCs, TPH, total lead, and total chromium. Low levels of gasoline-related compounds and elevated TPH levels above 100 ppm (with a maximum of 580 ppm) were reported in the waste characterization samples. Because TPH levels were above 100 ppm in the excavated material, the pits from junction boxes 5S and 5N were backfilled with clean fill material and compacted

to LANL specifications. The excavation areas were regraded and new asphalt was installed. Excavated soil from both boxes was disposed of in accordance with appropriate regulations.

Abandoned Hydraulic Lift. Investigation of the subsurface feature that was later designated as the abandoned hydraulic lift began with the removal of the asphalt and concrete surrounding the feature. A steel pipe, eight inches in diameter and oriented vertically, was exposed almost immediately. Investigation of the pipe indicated that it was likely an abandoned hydraulic lift. No sampling was performed and no additional excavation was warranted. The structure was left in place. Site restoration of the abandoned hydraulic lift excavation was completed by regrading the excavation area with clean fill and repairing the asphalt.

4.1.4 Former Vehicle Maintenance Shop, Building 1, Investigation

The RFI Work Plan for OU 1071 (LANL 1992, 0781) outlines the approach used to investigate the two vehicle greasing pits and four vehicle washing pits located within the two southern bays of the former vehicle maintenance shop, Building 1. The work plan also discusses the approach used to investigate the drain sumps associated with Building 1. Contrary to the suggestion that these sumps surround Building 1, the five sumps are located only on the west side of the building, and they are part of the active storm water collection system for the former motor pool property.

Vehicle Greasing and Vehicle Washing Pits. Vertical boreholes MS-1 through MS-5 were advanced through the base of each of the two vehicle greasing pits and three of the four vehicle washing pits to a depth of 15 ft below the base of the structure (see Appendix D and Fig. 4). Boreholes were advanced using eight-inch outside-diameter (OD) hollow stem augers. Continuous 3.125-in. OD core samples were retrieved using 5 ft stainless steel split barrel samplers in conjunction with a wire-line retrieval system. Cores were screened for organic vapors using a PID and were checked for ionizing radiation using Eberline rate meters, with scintillation and GM probes. In addition, gamma exposure was measured using a Ludlum model 19 microR meter. The cores were logged and checked for visible signs of contamination.

No signs of staining were observed or elevated organic vapor readings were recorded in any of the Building 1 cores. One sample was collected from the final core interval of each borehole for fixed-laboratory analysis. Samples were also collected from the initial core interval, located immediately beneath the base of each structure, to comply with the RFI Work Plan for OU 1071 requirement that samples be collected in half of all remaining core intervals. All subsurface samples collected were submitted to CST-9 for analysis of VOCs, SVOCs, TPH, total lead, and total chromium. The results from these analyses for those values that were detected are shown in Appendix B.

Boreholes MS-1 through MS-5 were backfilled to approximately two feet below ground surface with soil cuttings originating from each respective borehole. Concrete caps were poured to the top of the boreholes to seal the structures.

When attempting to advance the final borehole, MS-6, located in the southeast vehicle washing pit of Building 1, water-saturated gravel was encountered immediately beneath the concrete floor of the pit. Activities were temporarily halted pending an investigation into the origin of the water. The water was pumped from the borehole into a 55-gal. drum; however, water continued to fill the borehole. Further investigation detected concrete about six inches below the top of the gravel, which suggests that the borehole entered some type of subgrade conduit. Since water continued to fill borehole MS-6 as the original water was pumped out, the water appeared to be contained within the conduit, unable to leak out into the surrounding materials. The property owner indicated that the saturated gravel was part of an old floor heating system. Based on this information, borehole MS-6 was terminated and a concrete cap was installed to complete the borehole.

In order to characterize the water from borehole MS-6 for disposal, waste characterization samples were collected from the unfiltered water in the drum and submitted to CST-9 for analysis of VOCs, SVOCs, TPH, PCBs, and metals. One of these waste characterization samples, AAA8405, contained elevated levels of arsenic. The water from borehole MS-6 was disposed of in accordance with appropriate regulations.

Additional drilling at the location of the fourth vehicle washing pit was halted because no building drawings were available to indicate the location or extent of the heating conduit, and the field team did not want to risk puncturing the heating duct system, thereby releasing the contained water to the subsurface soil. The risk of releasing the contained water was considered greater than the benefit of collecting an additional sample for the following reasons. First, the potential contamination sources for the vehicle washing pits were expected to be minimal (petroleum products and road dirt from various vehicles). Second, all four vehicle washing pits were of common construction, were located in the same room, and were used for common cleaning tasks. Because the field screening results for organics in soils beneath the three sampled vehicle washing pits did not indicate the presence of organics, no organic contaminants were expected in the fourth vehicle washing pit.

If analytical results from any of the sampled vehicle washing pits had indicated a release to the environment, the investigation would have been extended to the overall vehicle washing area and a Phase II sampling plan would have been prepared. However, fixed laboratory analytical results from the three sampled vehicle washing pits did not indicate a release to the environment.

Therefore, the investigation was not extended. The extent of the heating system beneath the vehicle washing pit is unknown because it does not appear on the available construction diagrams of Building 1. The vehicle washing pit and the associated heating system are expected to be removed by the property owner during upcoming construction at the site, so the water in the heating conduit should not pose a future threat to the environment.

Drain Sumps. The storm water system including the drain sumps on the west side of Building 1 is currently active; therefore, drilling through the base of the drain sumps as outlined in the RFI Work Plan for OU 1071 was not considered prudent. In order to investigate the drain sumps, an alternate drilling program was performed. Five vertical boreholes, MS-7 through MS-11, were advanced adjacent to the drain sumps to assess the vertical and lateral extent of contamination, if any (see Appendix D). Five additional boreholes were then advanced at an approximate 65° angle from horizontal to beneath the base of each sump in order to sample soils beneath the sumps. These angled boreholes were designated as MS-7A through MS-11A, and they are the westernmost boreholes adjacent to each drain sump (Fig. 4).

A CME 45 drill rig was used to complete vertical boreholes at four of the five sumps, MS-7 through MS-10. A second rig capable of drilling inclined boreholes, a Failing FT10 WT, was mobilized to the site to complete the final vertical borehole and the five angle boreholes. Boreholes were advanced by both rigs using eight inch OD hollow stem augers to an approximate depth of 12 ft to 15 ft below ground surface (BGS). Continuous 3.125 in. OD core samples were retrieved using 5 ft stainless steel split-barrel samplers in conjunction with a wire-line retrieval system. Upon core barrel retrieval, cores were screened for organic vapors using a PID and were checked for ionizing radiation using Eberline rate meters, with scintillation and GM probes. In addition, gamma exposure was measured using a Ludlum model 19 microR meter. The cores were logged and checked for visible signs of contamination.

No signs of staining were observed in any of the vertical drain sump cores. Further, no elevated organic vapor readings were recorded. One sample was collected from the final core interval in each borehole, and samples were also collected from the initial core interval, located immediately beneath the asphalt or concrete surface. One sample was collected from each angled borehole at a point beneath the sump. All subsurface samples were submitted to CST-9 for analysis of VOCs, SVOCs, TPH, total lead, and total chromium. The results from these analyses for those values that were detected are shown in Appendix B.

Two split spoon samples were collected from borehole MS-11 for analysis of microbiological constituents. The results from this analysis were to be used only in the event that a remedial action plan for the site was required. No remedial action plan was required for the site;

therefore, the results from this analysis are not addressed in this report. One split spoon sample was taken in the fill material located from 1 to 3 ft BGS. A second split-spoon sample was taken at the base of the borehole in undisturbed tuff from 15 to 17 ft BGS. Both split-spoons were screened for organic vapors and ionizing radiation by the site safety officer.

All sump boreholes, with the exception of MS-7 and MS-9A, were backfilled with cuttings originating from each respective borehole. Concrete plugs were poured from the top of the cuttings to ground surface to seal the boreholes. Asphalt patches were applied to the top of the concrete caps, where appropriate.

Groundwater was encountered in borehole MS-9A. However, approximately four to six inches of snow was on the ground when borehole MS-9A was drilled, and before completion of the drilling, the snow started to melt and run into the borehole. Therefore, the water encountered in borehole MS-9A was known to be from snow melt. Borehole MS-9A was grouted to ground surface with a cement/bentonite grout using the Tremie method. Water was not encountered in the adjacent borehole, MS-9.

In borehole MS-7, which was installed adjacent to the western edge of the northernmost drain sump, silty clay and sand backfill soils were recovered in the core sample from the surface to approximately 9.8 ft BGS. These fill materials, as well as the wooden frame of the sump, were presumed to be materials used in the construction of the drain sump and storm drain system. The silty clay and sand were wet at approximately 2.5 ft BGS, but standing water was not detected in the borehole during sampling. However, drilling was stopped at 9 ft BGS for approximately 30 minutes due to a mechanical problem with the drill rig, and water was observed to have accumulated in the borehole during that time. When drilling resumed, the core sample of 9 to 11 ft BGS and cuttings at the top of the borehole were saturated. Drilling activities were temporarily halted pending an investigation into the origin of the water. Water levels inside the augers came up to approximately 4.7 ft BGS after approximately 30 minutes. A water sample was collected from the borehole through the augers. The water in this sample was brown and dirty, with a lot of floating sediment. The water sample, AAA8402, was submitted to CST-9 for VOC, SVOC, TPH, total lead, and total chromium analyses. The results from these analyses for those values that were detected are shown in Appendix B. The next day, the depth to water in the borehole was 5.2 ft BGS. The borehole was terminated at 11 ft BGS. Borehole MS-7 was grouted to ground surface with a cement/bentonite grout using the Tremie method.

The probable source of the water encountered in borehole MS-7 is water which accumulated in the construction materials surrounding the drain sump. It is estimated that between 50 and

75 gal. of water may have accumulated in the one foot apron of sand and silty clay fill materials that surround the drain sump to an estimated depth of 10 ft BGS. Field observations suggest that water migrated into these soils horizontally beneath the asphalt and vertically down the wooden frame of the drain sump, and that the fill materials may have acted as a small catch basin.

Additional evidence that the water encountered in borehole MS-7 is of limited extent and does not extend into the tuff are the field observations and analytical results from angled borehole MS-7A. Borehole MS-7A, which was inclined 64° from the horizontal, was installed adjacent to borehole MS-7. The core samples from this borehole consisted of 3.25 ft of surface soils and 11.75 ft of tuff. Water was not encountered in the core samples or the borehole for MS-7A, which indicates that there is no water in the tuff beneath the drain sump.

The presence of water in the fill surrounding the sump was reported to the NMED Ground Water Protection Bureau. However, the sump and the surrounding materials are expected to be removed by the property owner during upcoming construction at the site, so the water in the sump should not pose a future threat to the environment.

Drain Sump Outfall Sediment Sampling. Water that collects in the storm water collection system at the former Zia motor pool site is discharged to the city storm water system at Trinity Drive. This system ultimately discharges into Los Alamos Canyon at an outfall located near Pine Glen Apartments (see 1957 Zia engineering drawing PA-500, Building and Roads, Locations of Storm Drains Map). Contributing to the storm water system are businesses located along Trinity Drive between the former Zia motor pool site and Pine Glen Apartments, including two service stations.

Subsection 5.12.6.2.1 of the RFI Work Plan for OU 1071 outlines the collection of sediment samples at outfall points associated with the former Zia motor pool site storm water system. Given the various contributors to the storm water system, including Trinity Drive itself, no information specific to the former Zia motor pool could be gained from sampling at the Pine Glen outfall. Therefore, no sediment sampling was performed during this Phase I investigation.

4.2 Screening Assessment

4.2.1 Background Comparison

As described in Subsection 3.2.1, inorganic analytes with values above LANL background UTLs, PAHs with values above urban background UTLs, and detected non-PAH organic analytes were retained as COPCs and advanced to the SALs comparison (Figs. 6 and 7).

Inorganics. All inorganic analytes detected at SWMU 0-032 were compared to Los Alamos background UTLs. Analyses for two inorganics, total chromium and total lead, were performed for soil and water. Total chromium levels in soil at the site were indistinguishable from the Los Alamos background UTL for total chromium. Total chromium in soil is, therefore, eliminated as a COPC. Total lead in soil was detected in sample AAA8579 at a concentration of 110 mg/kg, exceeding the Los Alamos background UTL, and it is advanced to the comparison to SALs. Total chromium and total lead were also detected in the one unfiltered RFI water sample, AAA8402. There are currently no Los Alamos background values for total chromium or total lead in water. Therefore, the ranges of national background concentrations found the US Department of Health and Human Services reports "Toxicological Profile for Lead" and "Toxicological Profile for Chromium," which are only applicable to filtered samples, were used for this comparison (Clement International Corporation 1993, 1055; Clement International Corporation 1992, 05-0202). Both total chromium and total lead in the unfiltered water sample (AAA8402) exceeded national background concentration ranges and are advanced to the SALs comparison (Table 2).

TABLE 2

SWMU 0-032 SOIL CONCENTRATIONS FOR INORGANICS WITH VALUES GREATER THAN BACKGROUND CONCENTRATIONS

ANALYTE	SAMPLE ID	SAMPLE VALUE	LOS ALAMOS SOIL BACKGROUND UPPER TOLERANCE LIMIT
SOIL (mg/kg)			
Total Lead	AAA8579	110	39
ANALYTE	SAMPLE ID	SAMPLE VALUE	NATIONAL WATER BACKGROUND
WATER (µg/L)			
Chromium	AAA8402	400[a]	<1–30 µg/L[b]
Total Lead	AAA8402	1 480[a]	5–30 µg/L[c]

[a] This value is measured for an unfiltered sample, but it is compared to a range of background levels applicable to filtered samples. No background level range for unfiltered samples was available.
[b] Clement International Corporation 1993, 05-0202.
[c] Clement International Corporation 1993, 1055.

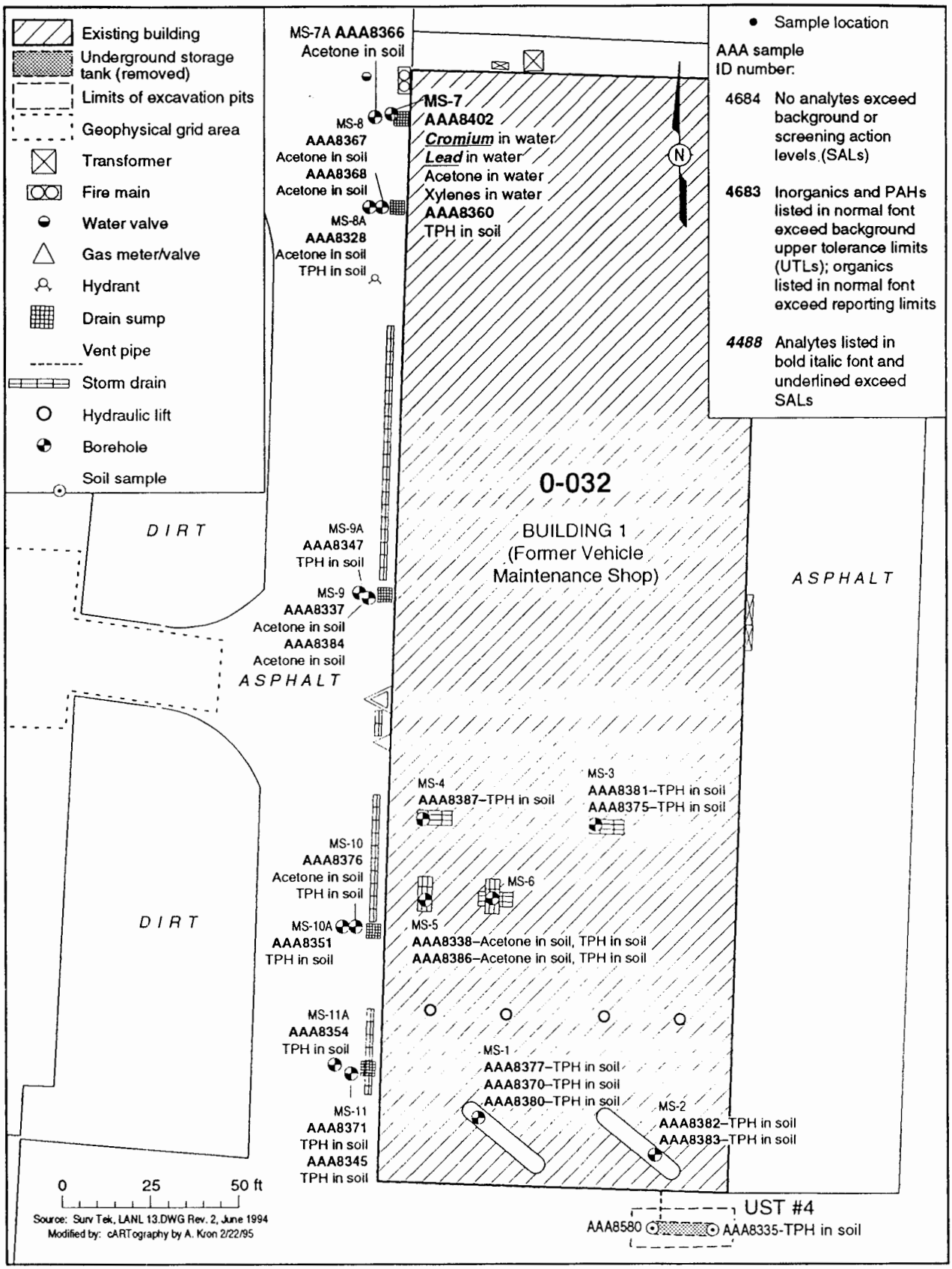

Fig. 6. Locations of inorganics and PAHs exceeding background levels or SALs and organics exceeding reporting limits at UST-4 and the boreholes with Building 1.

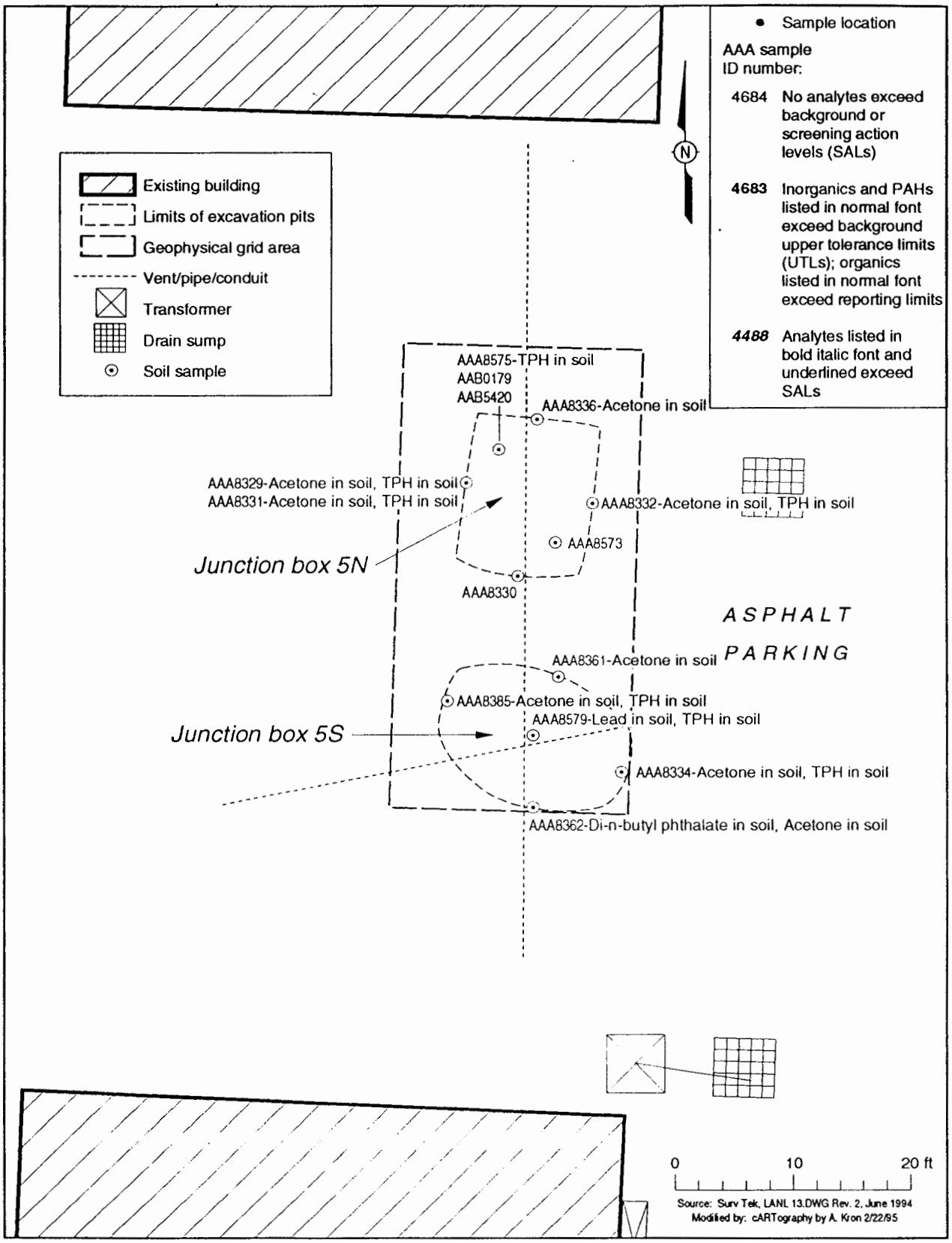

Fig. 7. Locations of inorganics and PAHs exceeding background levels or SALs and organics exceeding reporting limits at junction boxes 5N and 5S beneath the former automotive maintenance hangar.

PAHs. No PAHs were detected at SWMU 0-032.

Organics. All detected non-PAH organic analytes were retained as COPCs, as discussed in Subsection 3.2.1. Acetone, di-n-butyl phthalate, and total recoverable petroleum hydrocarbons(TPH) were detected in soil, and acetone and xylenes (o+m+p) [mixed-] were detected in water, as shown in Table 3. These analytes will be retained as COPCs and advanced to the comparison to SALs.

TABLE 3

DETECTED CONCENTRATIONS FOR ORGANICS AT SWMU 0-032

ANALYTE NAME	SAMPLE ID	SAMPLE VALUE (mg/kg)	SOIL SAL (mg/kg)
Acetone	AAA8337	0.024	8 000
	AAA8367	0.032	8 000
	AAA8376	0.033	8 000
	AAA8328	0.037	8 000
	AAA8368	0.039	8 000
	AAA8366	0.04	8 000
	AAA8384	0.041	8 000
	AAA8329	0.054	8 000
	AAA8338	0.054	8 000
	AAA8331	0.055	8 000
	AAA8386	0.058	8 000
	AAA8332	0.059	8 000
	AAA8361	0.09	8 000
	AAA8362	0.095	8 000
	AAA8385	0.13	8 000
	AAA8334	0.18	8 000
	AAA8336	0.28	8 000
Di-n-butyl phthalate	AAA8362	0.63	8 000
TPH[a]	AAA8354	1	100[b]
	AAA8371	1	100
	AAA8376	1	100
	AAA8381	1	100
	AAA8382	1	100
	AAA8328	2	100
	AAA8380	2	100
	AAA8387	2	100
	AAA8338	3	100
	AAA8347	3	100
	AAA8370	3	100
	AAA8377	3	100

TABLE 3 (CONTINUED)

DETECTED CONCENTRATIONS FOR ORGANICS AT SWMU 0-032

ANALYTE NAME	SAMPLE ID	SAMPLE VALUE (mg/kg)	SOIL SAL (mg/kg)
	AAA8386	3	100
	AAA8345	5	100
	AAA8351	5	100
	AAA8375	5	100
	AAA8332	6	100
	AAA8334	8	100
	AAA8579	8	100
	AAA8335	10	100
	AAA8329	14	100
	AAA8360	14	100
	AAA8385	14	100
	AAA8383	21	100
	AAA8331	25	100
	AAA8575	40	100
ANALYTE NAME	**SAMPLE ID**	**SAMPLE VALUE (µg/L)**	**WATER SAL (µg/L)**
Acetone	AAA8402	28[c]	3 500
Xylenes (o + m + p) [mixed-]	AAA8402	8.9[c]	10 000

[a] TPH = Total recoverable petroleum hydrocarbons.
[b] UST standard, not health-based (Wilson 1995, 05-0201).
[c] This value is measured for an unfiltered sample, but it is compared to a SAL applicable to filtered samples. No SAL for unfiltered samples was available.

4.2.2 Screening Action Levels Comparison

This subsection discusses the comparison SALs for the inorganic analytes and PAHs detected at levels greater than their background UTLs, and the detected non-PAH organic analytes in soil samples from SWMU 0-032.

Exceeds SAL. Only the chromium and lead values from the one silty water sample, sample AAA8402, fall within the exceeds SAL category (Fig. 6).

Total chromium in water was detected in one unfiltered water sample from borehole MS-7 at Building 1, sample AAA8402, at a concentration of 400 µg/L. This sample concentration is above the national background level range of less than 1 to 30 µg/L, and also above the water SAL of 100 µg/L. Both of these values are applicable to filtered samples; no background level range or SAL for unfiltered samples is available.

Total lead in water was detected in one unfiltered water sample from borehole MS-7 at Building 1, sample AAA8402, at a concentration of 1 480 µg/L. This sample concentration is above the national background level range of 5 to 30 µg/L, and also above the water SAL of 50 µg/L. Both of these values are applicable to filtered samples; no background level range or SAL for unfiltered samples is available.

Since sample AAA8402 was unfiltered, there is the possibility that the detected chromium and lead concentrations were from soil suspended in the water. Nonetheless, total chromium and lead in water are retained as COPCs and will be continued through the screening process (Table 4).

TABLE 4

SWMU 0-032 SOIL CONCENTRATIONS WITH VALUES GREATER THAN SALs

ANALYTE NAME	SAMPLE ID	SAMPLE VALUE (mg/kg)	WATER SAL (mg/kg)
WATER (µg/L)			
Chromium	AAA8402	400[a]	100
Lead	AAA8402	1 480[a]	50

[a] This value is measured for an unfiltered sample, but it is compared to a SAL applicable to filtered samples. No SAL for unfiltered samples was available.

No SAL. No analytes fall within the no SAL category.

Below SAL. Six analytes have measured concentrations above their respective background UTLs or reporting limits (RPLs) but below their respective SALs: acetone in soil, di-n-butyl phthalate in soil, total lead in soil, TPH in soil, acetone in water, and xylenes in water. All of these analytes except TPH are addressed in the multiple constituent evaluation (Table 5). The New Mexico UST standard, which is not health-based, has been used as the SAL for TPH in soil and is not appropriate to include in the health-based multiple constituent evaluation.

To evaluate multiple constituent effects for this data set, analytes below their respective SALs were grouped according to their toxicological effects (carcinogenic or noncarcinogenic). SALs for all constituents were normalized to one and summed as described in Subsection 3.2.3. The results of the analysis based on carcinogenic effects is less than one, at 0.3, indicating that resultant health effects from exposure would be unlikely. The analysis based on noncarcinogenic effects is less than one, at 0.1, indicating that resultant health effects from exposure would also be unlikely. Therefore, all analytes in the below SAL category are eliminated as COPCs.

TABLE 5

MULTIPLE CONSTITUENT EVALUATION FOR SWMU 0-032 DATA

ANALYTE AND MATRIX	MAXIMUM CONCENTRATION	SOIL SAL (mg/kg)	WATER SAL (µg/L)	MAXIMUM CONCENTRATION ÷ SAL
CARCINOGENIC				
Lead in soil	110 mg/kg	400		0.3
Total				**0.3**
NONCARCINOGENIC				
Acetone in soil	280 mg/kg	8 000		0.04
Di-n-butyl phthalate in soil	630 mg/kg	8 000		0.08
Acetone in water	28 µg/L		3 500	0.008
Xylenes in water	8.9 µg/L		10 000	0.0009
Total				**0.1**

4.2.3. Summary of Chemicals of Potential Concern

The results of the screening assessment performed thus far on the sampling data from SWMU 0-032 show that two analytes required further evaluation: total chromium in water and total lead in water. The remaining analytes occur at levels below their Los Alamos County natural background UTLs or anthropogenic urban background UTLs, or at levels below their respective SALs. Table 6 summarizes the results of the screening assessment for all chemicals detected in the soils and water.

4.2.4 Conclusions and Recommendations

All analytes, except total chromium in water and total lead in water, were eliminated as COPCs. Chromium and lead concentrations above SALs were found only in one water sample from borehole MS-7. These concentrations of chromium and lead are not considered to be an issue for the following reasons. First, the water was shown to be of limited extent by angled borehole MS-7A, adjacent to MS-7, which was dry. Second, the actual chromium and lead concentrations in the water sample may or may not have been above their respective SALs because the water sample was silty, and there are no reliable direct comparisons to the water SALs, which are for dissolved chromium and dissolved lead in a filtered sample. Third, if the water is accessed through soil excavation, the primary exposure pathway of concern would be dermal contact.

TABLE 6

RESULTS OF THE SCREENING ASSESSMENT

ANALYTE	RATIONALE FOR ELIMINATION FROM FURTHER EVALUATION	RATIONALE FOR RETENTION AS A COPC
SOIL		
Acetone	Concentrations below SAL	
Chromium	Concentrations within background	
Di-n-butyl phthalate	Concentration below SAL	
Lead	Concentrations within background	
TPH	Concentrations below SAL	
WATER		
Acetone	Concentrations below SAL	
Chromium		Concentration in sample AAA8402 exceeded SAL[a]
Lead		Concentration in sample AAA8402 exceeded SAL[a]
Xylene	Concentrations below SAL	

[a] This value is measured for an unfiltered sample, but it is compared to a SAL applicable to filtered samples. No SAL for unfiltered samples was available.

This contact should not present a hazard because the physiochemical properties of chromium and lead limit their adsorption through skin to negligible amounts.

All samples listed in Appendix B, Table B3, were collected for waste characterization purposes. The arsenic detected in the waste characterization sample from borehole MS-6 is not considered to be an issue because the water in borehole MS-6 is from a closed floor heating system in Building 1. The origin of the arsenic detected in this water is unknown; however, it is possible that the arsenic was leached from gravel in the subsurface conduits. Because the arsenic was detected only in the closed floor heating system, and the water sample was collected only for waste characterization purposes, the arsenic is not considered to be an environmental issue.

Based on the conclusions listed above and site observations during field activities, it is recommended that SWMU 0-032 be considered for no further action. Based on LANL's "No Further Action Criteria Policy," criteria 4, a class III permit modification will be requested to remove SWMU 0-032 from the Hazardous and Solid Waster Ammendments Module of the Laboratory's RCRA operating permit. (Environmental Restoration Project 1995, 1173)

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APPENDIX A. SUMMARY TABLES OF QUALITY CONTROL RESULTS

TABLE A1

QUALITY CONTROL RESULTS FOR SWMU 0-032

SAMPLE ID	LOCATION ID	SAMPLE TYPE	LOCATION	ANALYSIS	REQUEST NUMBER	QUALITY CONTROL COMMENTS
AAA8328	00-1545	Soil	Building 1, Borehole MS-8A	VOCs	17176	Instrument calibration problems; acetone only detect , therefore, acetone qualified 'J'. 2-butanone found in blank @17 µg/L (lab contamination), EQLs raised for samples where it was detected at similar levels. All other data valid.
				SVOCs	17176	QC results within allowable limits; all data valid.
				TPH	17176	QC results within allowable limits; all data valid.
AAA8329	00-1584	Soil	Junction Box 5N	VOCs	17055	Instrument calibration problems; acetone only detect , therefore, acetone qualified 'J'. 2-butanone found in blank @26 µg/L (lab contamination), EQLs raised for samples where it was detected at similar levels. All other data valid.
				SVOCs	17055	QC results within allowable limits; all data valid.
				TAL Metals	17095	QC results within allowable limits; all data valid.
				TPH	17055	QC results within allowable limits; all data valid.
AAA8330	00-1586	Soil	Junction Box 5N	VOCs	17055	Instrument calibration problems; acetone only detect , therefore, acetone qualified 'J'. 2-butanone found in blank @26 µg/L (lab contamination), EQLs raised for samples where it was detected at similar levels. All other data valid.
				SVOCs	17055	QC results within allowable limits; all data valid.
				TAL Metals	17095	QC results within allowable limits; all data valid.
				TPH	17055	QC results within allowable limits; all data valid.
AAA8331	00-1584	Field Duplicate	Junction Box 5N	VOCs	17055	Instrument calibration problems; acetone only detect , therefore, acetone qualified 'J'. 2-butanone found in blank @26 µg/L (lab contamination), EQLs raised for samples where it was detected at similar levels. All other data valid.
				SVOCs	17055	QC results within allowable limits; all data valid.
				TAL Metals	17095	QC results within allowable limits; all data valid.
				TPH	17055	QC results within allowable limits; all data valid.
AAA8332	00-1585	Soil	Junction Box 5N	VOCs	17055	Instrument calibration problems; acetone only detect , therefore, acetone qualified 'J'. 2-butanone found in blank @26 µg/L (lab contamination), EQLs raised for samples where it was detected at similar levels. All other data valid.
				SVOCs	17055	QC results within allowable limits; all data valid.
				TAL Metals	17095	QC results within allowable limits; all data valid.
				TPH	17055	QC results within allowable limits; all data valid.
AAA8334	00-1607	Soil	Junction Box 5S	VOCs	17055	Instrument calibration problems; acetone only detect , therefore, acetone qualified 'J'. 2-butanone found in blank @26 µg/L (lab contamination), EQLs raised for samples where it was detected at similar levels. All other data valid.
				SVOCs	17055	QC results within allowable limits; all data valid.
				TAL Metals	17095	QC results within allowable limits; all data valid.
				TPH	17055	QC results within allowable limits; all data valid.

TABLE A1 (CONTINUED)

QUALITY CONTROL RESULTS FOR SWMU 0-032

SAMPLE ID	LOCATION ID	SAMPLE TYPE	LOCATION	ANALYSIS	REQUEST NUMBER	QUALITY CONTROL COMMENTS
AAA8335	00-1581	Soil	UST-4	VOCs	16972	QC results within allowable limits; all data valid.
				SVOCs	16972	Elevated errors for internal standards but no analytes detected in samples. All data valid.
				Total Cr and Pb	16977	QC results within allowable limits; all data valid.
				TPH	16972	QC results within allowable limits; all data valid.
AAA8336	00-1583	Soil	Junction Box 5N	VOCs	17055	Instrument calibration problems; acetone only detect , therefore, acetone qualified 'J'. 2-butanone found in blank @26 µg/L (lab contamination), EQLs raised for samples where it was detected at similar levels. All other data valid.
				SVOCs	17055	QC results within allowable limits; all data valid.
				TAL Metals	17095	QC results within allowable limits; all data valid.
				TPH	17055	QC results within allowable limits; all data valid.
AAA8337	00-1533	Soil	Building 1, Borehole MS-9	VOCs	17073	Instrument calibration problems; acetone only detect , therefore, acetone qualified 'J'.. 2-butanone found in blanks @ 31 &32 µg/L (lab contamination), EQLs raised for samples where it was detected at similar levels. All other data valid.
				SVOCs	17073	QC results within allowable limits; all data valid.
				Total Cr and Pb	17074	QC results within allowable limits; all data valid.
				TPH	17073	QC results within allowable limits; all data valid.
AAA8338	00-1530	Soil	Building 1, Borehole MS-5	VOCs	17032	Instrument calibration problems; acetone only detect , therefore, acetone qualified 'J'.
				SVOCs	17032	Recovery of less than 3% for acid surrogates in AAA8401. All associated analytes qualified as rejected for AAA8401. All other data valid.
				Total Cr and Pb	17034	Total lead values for matrix spike and blind QC samples low by factor of two at 2 µg/L and less than 1 µg/L, possibly due to lab error. Analyzed with second technique which gave lead values of 4 µg/L. All data valid.
				TPH	17032	QC results within allowable limits; all data valid.
AAA8339	00-1529	Soil	Building 1, Borehole MS-4	VOCs	17032	Instrument calibration problems; acetone only detect , therefore, acetone qualified 'J'.
				SVOCs	17032	Recovery of less than 3% for acid surrogates in AAA8401. All associated analytes qualified as rejected for AAA8401. All other data valid.
				Total Cr and Pb	17034	Total lead values for matrix spike and blind QC samples low by factor of two at 2 µg/L and less than 1 µg/L, possibly due to lab error. Analyzed with second technique which gave lead values of 4 µg/L. All data valid.
				TPH	17032	QC results within allowable limits; all data valid.
AAA8345	00-1542	Soil	Building 1, Borehole MS-11	VOCs	17164	QC results within allowable limits; all data valid.
				SVOCs	17164	QC results within allowable limits; all data valid.
				Total Cr and Pb	17165	QC results within allowable limits; all data valid.
				TPH	17164	QC results within allowable limits; all data valid.

TABLE A1 (CONTINUED)

QUALITY CONTROL RESULTS FOR SWMU 0-032

SAMPLE ID	LOCATION ID	SAMPLE TYPE	LOCATION	ANALYSIS	REQUEST NUMBER	QUALITY CONTROL COMMENTS
AAA8347	00-1540	Soil	Building 1, Borehole MS-9A	VOCs	17144	Intermal calibration problems with AAA8347. Dichlorodifluoromethane and trichlorodfluoromethane values for AAA8347 qualified as estimated non-detected values. All other data valid.
				SVOCs	17144	QC results within allowable limits; all data valid.
				Total Cr and Pb	17145	QC results within allowable limits; all data valid.
				TPH	17144	QC results within allowable limits; all data valid.
AAA8348	00-1544	Soil	Building 1, Borehole MS-7A	VOCs	17176	Instrument calibration problems; acetone only detect , therefore, acetone qualified 'J'. 2-butanone found in blank @17 µg/L (lab contamination), EQLs raised for samples where it was detected at similar levels. All other data valid.
				SVOCs	17176	QC results within allowable limits; all data valid.
				TPH	17176	QC results within allowable limits; all data valid.
AAA8351	00-1541	Soil	Building 1, Borehole MS-10A	VOCs	17164	QC results within allowable limits; all data valid.
				SVOCs	17164	QC results within allowable limits; all data valid.
				Total Cr and Pb	17165	QC results within allowable limits; all data valid.
				TPH	17164	QC results within allowable limits; all data valid.
AAA8354	00-1543	Soil	Building 1, Borehole MS-11A	VOCs	17176	Instrument calibration problems; acetone only detect , therefore, acetone qualified 'J'. 2-butanone found in blank @17 µg/L (lab contamination), EQLs raised for samples where it was detected at similar levels. All other data valid.
				SVOCs	17176	QC results within allowable limits; all data valid.
				TPH	17176	QC results within allowable limits; all data valid.
AAA8360	00-1535	Soil	Building 1, Borehole MS-7	VOCs	17077	Acetone (28 ug/l) and 2-butanone (24, 23, 26, 27 µg/L) found in method blanks. EQLs raised for samples where it was detected at similar levels. All other data valid.
				SVOCs	17077	Low surrogate recoveries for terphenyl in AAA8402 at 9% . All data associated with terphenyl for AAA8402 are rejected. All other data valid
				Total Cr and Pb	17085	QC results within allowable limits; all data valid.
				TPH	17077	QC results within allowable limits; all data valid.
AAA8361	00-1532	Soil	Junction Box 5S	VOCs	17055	Instrument calibration problems; acetone only detect , therefore, acetone qualified 'J'. 2-butanone found in blank @26 µg/L (lab contamination), EQLs raised for samples where it was detected at similar levels. All other data valid.
				SVOCs	17055	QC results within allowable limits; all data valid.
				TAL Metals	17095	QC results within allowable limits; all data valid.
				TPH	17055	QC results within allowable limits; all data valid.

TABLE A1 (CONTINUED)

QUALITY CONTROL RESULTS FOR SWMU 0-032

SAMPLE ID	LOCATION ID	SAMPLE TYPE	LOCATION	ANALYSIS	REQUEST NUMBER	QUALITY CONTROL COMMENTS
AAA8362	00-1606	Soil	Junction Box 5S	VOCs	17055	Instrument calibration problems; acetone only detect , therefore, acetone qualified 'J'. 2-butanone found in blank @26 µg/L (lab contamination), EQLs raised for samples where it was detected at similar levels. All other data valid.
				SVOCs	17055	QC results within allowable limits; all data valid.
				TAL Metals	17095	QC results within allowable limits; all data valid.
				TPH	17055	QC results within allowable limits; all data valid.
AAA8366	00-1535	Soil	Building 1, Borehole MS-7	VOCs	17077	Instrument calibration problems; acetone only detect , therefore, acetone qualified 'J'. 2-butanone found in blank @26 µg/L (lab contamination), EQLs raised for samples where it was detected at similar levels. All other data valid.
				SVOCs	17077	Low surrogate recoveries for terphenyl in AAA8402 at 9% . All data associated with terphenyl for AAA8402 are rejected. All other data valid
				Total Cr and Pb	17085	QC results within allowable limits; all data valid.
				TPH	17077	QC results within allowable limits; all data valid.
AAA8367	00-1534	Soil	Building 1, Borehole MS-8	VOCs	17073	Instrument calibration problems; acetone only detect , therefore, acetone qualified 'J'.. 2-butanone found in blanks @ 31 &32 µg/L (lab contamination), EQLs raised for samples where it was detected at similar levels. All other data valid.
				SVOCs	17073	QC results within allowable limits; all data valid.
				Total Cr and Pb	17074	QC results within allowable limits; all data valid.
				TPH	17073	QC results within allowable limits; all data valid.
AAA8368	00-1534	Soil	Building 1, Borehole MS-8	VOCs	17073	Instrument calibration problems; acetone only detect , therefore, acetone qualified 'J'.. 2-butanone found in blanks @ 31 &32 µg/L (lab contamination), EQLs raised for samples where it was detected at similar levels. All other data valid.
				SVOCs	17073	QC results within allowable limits; all data valid.
				Total Cr and Pb	17074	QC results within allowable limits; all data valid.
				TPH	17073	QC results within allowable limits; all data valid.
AAA8370	00-1526	Field Duplicate	Building 1, Borehole MS-1	VOCs	17018	QC results within allowable limits; all data valid.
				SVOCs	17018	QC results within allowable limits; all data valid.
				Total Cr and Pb	17020	QC results within allowable limits; all data valid.
				TPH	17018	QC results within allowable limits; all data valid.
AAA8371	00-1542	Soil	Building 1, Borehole MS-11	VOCs	17164	QC results within allowable limits; all data valid.
				SVOCs	17164	QC results within allowable limits; all data valid.
				Total Cr and Pb	17165	QC results within allowable limits; all data valid.
				TPH	17164	QC results within allowable limits; all data valid.

TABLE A1 (CONTINUED)

QUALITY CONTROL RESULTS FOR SWMU 0-032

SAMPLE ID	LOCATION ID	SAMPLE TYPE	LOCATION	ANALYSIS	REQUEST NUMBER	QUALITY CONTROL COMMENTS
AAA8374	00-1536	Soil	Building 1, Borehole MS-10	VOCs	17077	Instrument calibration problems; no detects , therefore no qualifications. 2-butanone found in blank @24,26 µg/L (lab contamination), EQLs raised for samples where it was detected at similar levels. All other data valid.
				SVOCs	17077	Low surrogate recoveries for terphenyl in AAA8402 at 9% . All data associated with terphenyl for AAA8402 are rejected. All other data valid
				Total Cr and Pb	17085	QC results within allowable limits; all data valid.
				TPH	17077	QC results within allowable limits; all data valid.
AAA8375	00-1528	Soil	Building 1, Borehole MS-3	VOCs	17022	QC results within allowable limits; all data valid.
				SVOCs	17022	QC results within allowable limits; all data valid.
				Total Cr and Pb	17023	QC results within allowable limits; all data valid.
				TPH	17022	QC results within allowable limits; all data valid.
AAA8376	00-1536	Soil	Building 1, Borehole MS-10	VOCs	17077	Instrument calibration problems; acetone detected, therefore qualified 'J'. 2-butanone found in blank @24,26 µg/L (lab contamination), EQLs raised for samples where it was detected at similar levels. All other data valid.
				SVOCs	17077	Low surrogate recoveries for terphenyl in AAA8402 at 9% . All data associated with terphenyl for AAA8402 are rejected. All other data valid
				Total Cr and Pb	17085	QC results within allowable limits; all data valid.
				TPH	17077	QC results within allowable limits; all data valid.
AAA8377	00-1526	Soil	Building 1, Borehole MS-1	VOCs	17018	QC results within allowable limits; all data valid.
				SVOCs	17018	QC results within allowable limits; all data valid.
				Total Cr and Pb	17020	QC results within allowable limits; all data valid.
				TPH	17018	QC results within allowable limits; all data valid.
AAA8380	00-1526	Soil	Building 1, Borehole MS-1	VOCs	17018	QC results within allowable limits; all data valid.
				SVOCs	17018	QC results within allowable limits; all data valid.
				Total Cr and Pb	17020	QC results within allowable limits; all data valid.
				TPH	17018	QC results within allowable limits; all data valid.
AAA8381	00-1528	Soil	Building 1, Borehole MS-3	VOCs	17022	QC results within allowable limits; all data valid.
				SVOCs	17022	QC results within allowable limits; all data valid.
				Total Cr and Pb	17023	QC results within allowable limits; all data valid.
				TPH	17022	QC results within allowable limits; all data valid.

TABLE A1 (CONTINUED)

QUALITY CONTROL RESULTS FOR SWMU 0-032

SAMPLE ID	LOCATION ID	SAMPLE TYPE	LOCATION	ANALYSIS	REQUEST NUMBER	QUALITY CONTROL COMMENTS
AAA8382	00-1527	Soil	Building 1, Borehole MS-2	VOCs	17019	QC results within allowable limits; all data valid.
				SVOCs	17019	QC results within allowable limits; all data valid.
				Total Cr and Pb	17024	QC results within allowable limits; all data valid.
				TPH	17019	QC results within allowable limits; all data valid.
AAA8383	00-1527	Soil	Building 1, Borehole MS-2	VOCs	17019	QC results within allowable limits; all data valid.
				SVOCs	17019	QC results within allowable limits; all data valid.
				Total Cr and Pb	17024	QC results within allowable limits; all data valid.
				TPH	17019	QC results within allowable limits; all data valid.
AAA8384	00-1533	Soil	Building 1, Borehole MS-9	VOCs	17073	Instrument calibration problems; acetone only detect , therefore, acetone qualified 'J'.. 2-butanone found in blanks @ 31 &32 µg/L (lab contamination), EQLs raised for samples where it was detected at similar levels. All other data valid.
				SVOCs	17073	QC results within allowable limits; all data valid.
				Total Cr and Pb	17074	QC results within allowable limits; all data valid.
				TPH	17073	QC results within allowable limits; all data valid.
AAA8385	00-1605	Soil	Junction Box 5S	VOCs	17055	Instrument calibration problems; acetone only detect , therefore, acetone qualified 'J'. 2-butanone found in blank @26 µg/L (lab contamination), EQLs raised for samples where it was detected at similar levels. All other data valid.
				SVOCs	17055	QC results within allowable limits; all data valid.
				TAL Metals	17095	QC results within allowable limits; all data valid.
				TPH	17055	QC results within allowable limits; all data valid.
AAA8386	00-1530	Soil	Building 1, Borehole MS-5	VOCs	17032	Instrument calibration problems; acetone only detect , therefore, acetone qualified 'J'.
				SVOCs	17032	Recovery of less than 3% for acid surrogates in AAA8401. All associated analytes qualified as rejected for AAA8401. All other data valid.
				Total Cr and Pb	17034	QC results within allowable limits; all data valid.
				TPH	17032	QC results within allowable limits; all data valid.
AAA8387	00-1529	Soil	Building 1, Borehole MS-4	VOCs	17032	Instrument calibration problems; no detects, therefore no qualifications.
				SVOCs	17032	Recovery of less than 3% for acid surrogates in AAA8401. All associated analytes qualified as rejected for AAA8401. All other data valid.
				Total Cr and Pb	17034	QC results within allowable limits; all data valid.
				TPH	17032	QC results within allowable limits; all data valid.

TABLE A1 (CONTINUED)

QUALITY CONTROL RESULTS FOR SWMU 0-032

SAMPLE ID	LOCATION ID	SAMPLE TYPE	LOCATION	ANALYSIS	REQUEST NUMBER	QUALITY CONTROL COMMENTS
AAA8389		Field Trip Blank	Building 1	VOCs	17018	QC results within allowable limits; all data valid.
AAA8391		Field Trip Blank	Building 1	VOCs	17032	Instrument calibration problems; acetone only detect , therefore, acetone qualified 'J'.
AAA8393		Field Trip Blank	Building 1	VOCs	17073	Instrument calibration problems; acetone only detect , therefore, acetone qualified 'J'.. 2-butanone found in blanks @ 31 &32 µg/L (lab contamination), EQLs raised for samples where it was detected at similar levels. All other data valid.
AAA8394	00-1531	Field Trip Blank	Building 1, Borehole MS-6	VOCs	17055	Instrument calibration problems; acetone only detect , therefore, acetone qualified 'J'. 2-butanone found in blank @26 µg/L (lab contamination), EQLs raised for samples where it was detected at similar levels. All other data valid.
AAA8395	00-1532	Field Trip Blank	Junction Box 5S	VOCs	17055	Instrument calibration problems; acetone only detect , therefore, acetone qualified 'J'. 2-butanone found in blank @26 µg/L (lab contamination), EQLs raised for samples where it was detected at similar levels. All other data valid.
AAA8396		Field Trip Blank	Building 1	VOCs	17144	Intermal calibration problems with AAA8347. Dichlorodifluoromethane and trichlorodfluoromethane values for AAA8347 qualified as estimated non-detected values. All other data valid.
AAA8398		Field Blank	Building 1	VOCs	17176	Instrument calibration problems; acetone only detect , therefore, acetone qualified 'J'. 2-butanone found in blank @26 µg/L (lab contamination), EQLs raised for samples where it was detected at similar levels. All other data valid.
				SVOCs	17176	QC results within allowable limits; all data valid.
				TPH	17176	QC results within allowable limits; all data valid.
AAA8401	00-1529	Equipment Blank	Building 1, Borehole MS-4	VOCs	17032	Instrument calibration problems; acetone only detect , therefore, acetone qualified 'J'.
				SVOCs	17032	Recovery of less than 3% for acid surrogates in AAA8401. All associated analytes qualified as rejected for AAA8401. All other data valid.
				Total Cr and Pb	17034	QC results within allowable limits; all data valid.
				Lead	17034	QC results within allowable limits; all data valid.
				TPH	17032	QC results within allowable limits; all data valid.
AAA8402	00-1535	Water	Building 1, Borehole MS-7	VOCs	17077	Instrument calibration problems; no detects therefore no qulaifications. 2-butanone found in blank @24,26 µg/L (lab contamination), EQLs raised for samples where it was detected at similar levels. All other data valid.
				SVOCs	17077	Low surrogate recoveries for terphenyl in AAA8402 at 9% . All data associated with terphenyl for AAA8402 are rejected. All other data valid
				Total lead	17085	QC results within allowable limits; all data valid.
				Total chromium	17085	QC results within allowable limits; all data valid.
				TPH	17077	QC results within allowable limits; all data valid.

TABLE A1 (CONTINUED)

QUALITY CONTROL RESULTS FOR SWMU 0-032

SAMPLE ID	LOCATION ID	SAMPLE TYPE	LOCATION	ANALYSIS	REQUEST NUMBER	QUALITY CONTROL COMMENTS
AAA8404	00-1529	Field Reagent	Building 1, Borehole MS-4	VOCs	17032	Instrument calibration problems; acetone only detect , therefore, acetone qualified 'J'.
				SVOCs	17032	Recovery of less than 3% for acid surrogates in AAA8401. All associated analytes qualified as rejected for AAA8401. All other data valid.
				Total Cr and Pb	17034	QC results within allowable limits; all data valid.
				Lead	17034	QC results within allowable limits; all data valid.
				TPH	17032	QC results within allowable limits; all data valid.
AAA8405	00-1531	Water (Waste'. Characterization Sample)	Building 1, Borehole MS-6	VOCs	17055	Instrument calibration problems; acetone only detect , therefore, acetone qualified 'J'. 2-butanone found in blank @26 µg/L (lab contamination), EQLs raised for samples where it was detected at similar levels. All other data valid.
				SVOCs	17055	QC results within allowable limits; all data valid.
				PCB	17055	Blind QC samples outside normal limits (60%) but no analytes found in the sample. All data valid.
				TPH	17055	QC results within allowable limits; all data valid.
				Metals	17095	QC results within allowable limits; all data valid.
AAA8406		Equipment Blank	Building 1	VOCs	17176	Instrument calibration problems; acetone only detect , therefore, acetone qualified 'J'. 2-butanone found in blank @26 µg/l (lab contamination), EQLs raised for samples where it was detected at similar levels. All other data valid.
				SVOCs	17176	QC results within allowable limits; all data valid.
				TPH	17176	QC results within allowable limits; all data valid.
AAA8514	00-1523	Equipment Blank	00-032, 00-031(b)	Pb	16883	QC results within allowable limits; all data valid.
				TPH/BTEX	16885	QC results within allowable limits; all data valid.
AAA8534		Field Trip Blank	Building 1	VOCs	17077	Instrument calibration problems; No detects therefore no qualification. EQLs raised for samples where it was detected at similar levels. All other data valid.
AAA8535		Field Trip Blank	Building 1	VOCs	17097	Low surrogate recovery problem in AAA8535 (61%); analytes associated with surrogate compound 1,2 dichloroethane qualified as non-detected values for AAA8535.
AAA8573	00-1525	Soil	Junction Box 5N	VOCs	15963	QC results within allowable limits; all data valid.
				SVOCs	15963	QC results within allowable limits; all data valid.
				Total Cr and Pb	16964	QC results within allowable limits; all data valid.
				TPH	15963	TPH found in QC sample at 37 ppm. TPH value of 40 ppm in AAA8575 is qualified as an estimated detected quantity. All other data valid.

TABLE A1 (CONTINUED)

QUALITY CONTROL RESULTS FOR SWMU 0-032

SAMPLE ID	LOCATION ID	SAMPLE TYPE	LOCATION	ANALYSIS	REQUEST NUMBER	QUALITY CONTROL COMMENTS
AAA8575	00-1582	Soil	Junction Box 5N	VOCs	15963	QC results within allowable limits; all data valid.
				SVOCs	15963	QC results within allowable limits; all data valid.
				Total Cr and Pb	16964	QC results within allowable limits; all data valid.
				TPH	15963	TPH found in QC sample at 37 ppm. TPH value of 40 ppm in AAA8575 is qualified as an estimated detected quantity. All other data valid.
AAA8576		Field Trip Blank	Building 1	VOCs	17176	Instrument calibration problems; acetone only detect , therefore, acetone qualified 'J'. 2-butanone found in blank @26 µg/L (lab contamination), EQLs raised for samples where it was detected at similar levels. All other data valid.
AAA8579	00-1532	Soil	Junction Box 5S	VOCs	16972	QC results within allowable limits; all data valid.
				SVOCs	16972	QC results within allowable limits; all data valid.
				Total Cr and Pb	16977	QC results within allowable limits; all data valid.
				TPH	16972	QC results within allowable limits; all data valid.
AAA8580	00-1580	Soil	UST-4	VOCs	16972	QC results within allowable limits; all data valid.
				SVOCs	16972	Had elevated errors for internal standards, but no analytes detected in samples. All data valid.
				Total Cr and Pb	16977	QC results within allowable limits; all data valid.
				TPH	16972	QC results within allowable limits; all data valid.
AAB0157		Field Trip Blank	Building 1	VOCs	17164	QC results within allowable limits; all data valid.
AAB0160		Field Trip Blank	Junction Box 5N	VOCs	16972	QC results within allowable limits; all data valid.
AAB0179		Soil	Junction Box 5N	TPH	17455	QC results within allowable limits; all data valid.
AAB5420		Soil	Junction Box 5N	TPH	17600	QC results within allowable limits; all data valid.

TABLE A2

VOLATILE ANALYTES QUALIFIED AS ESTIMATED NON-DETECTED VALUES FOR SAMPLE AAA8535

ANALYTE NAME	CAS[a] NUMBER
Acetone	67641
Benzene	71432
Bromochloromethane	74975
Bromomethane	74839
2-Butanone	78933
Carbon disulfide	75150
Carbon tetrachloride	56235
Chloroethane	75003
Chloroform	67663
Chloromethane	74873
Dichlorodifluoromethane	75718
1,1-Dichloroethylane	75343
1,2-Dichloroethylene	107062
1,1-Dichloroethene	75354
trans-1,2-Dichloroethylene	156605
cis-1,2-Dichloroethylene	156592
1,2-Dichloropropane	78875
2,2-Dichloropropane	594207
1,1-Dichloropropene	563586
Methyl iodide	74884
Methylene chloride	75092
1,1,2-Trichloro-1,2,2-trifluoroethane	76131
1,1,1-Trichloroethane	71556
Trichlorofluoromethane	75694
Vinyl chloride	75014

[a] CAS = Chemical Abstracts Service

TABLE A3

SEMIVOLATILE ANALYTES QUALIFIED AS REJECTED FOR SAMPLE AAA8401

ANALYTE NAME	CAS[a] NUMBER
Benzoic Acid	65850
Benzyl Alcohol	100516
4-Chloro-3-methylphenol	59507
o-Chlorophenol	95578
2,4-Dichlorophenol	120832
2,4-Dimethylphenol	105679
2,4-Dinitrophenol	51285
2-Methyl-4,6-dinitrophenol	534521
2-Methylphenol	95487
4-Methylphenol	106445
2-Nitrophenol	88755
4-Nitrophenol	100027
Pentachlorophenol	87865
Phenol	108952
1,2,4-Trichlorobenzene	95954
2,4,6-Trichlorophenol	88062

[a] CAS = Chemical Abstracts Service

TABLE A4

SEMIVOLATILE ANALYTES QUALIFIED AS REJECTED FOR SAMPLE AAA8402

ANALYTE NAME	CAS[a] NUMBER
Anthracene	120127
m-Benzidine	92875
Benzo-a-anthracene	56553
Benzo-a-pyrene	50328
Benzo-b-fluoranthene	205992
Benzo[g,h,i]perylene	191242
Benzo-k-fluoranthene	207089
Bis(2-ethylhexly)phthalate	117817
Butyl benzylphthalate	85687
Chrysene	218019
Di-n-butylphthalate	84742
Di-n-octylphthalate	117840
Dibenzo[a,h]anthracene	53703
3,3'-Dichlorobenzidine	91941
Fluoranthene	206440
Indeno[1,2,3-cd]pyrene	193395
Phenanthrene	85018
Pyrene	129000

[a] CAS = Chemical Abstracts Service

TABLE B1

ANALYTICAL RESULTS FOR DETECTED ANALYTES IN WATER SAMPLES AT SWMU 0-032

		Acetone	Chromium[a]	Lead	TPH[b]	Di-n-butyl phthalate	Xylenes[c]
COMPARISON LEVELS FOR WATER SAMPLES (µg/L)	SAL[d]	3 500	100	50	NA[e]	NA[e]	10 000
	NATIONAL BACKGROUND[f]	None[g]	<1–30[h]	5–30[i]	NA[e]	NA[e]	None[g]
	RPL[j]	20–32	0	0.03	NA[e]	NA[e]	5

LOCATION	LOCATION ID	SAMPLE ID	SAMPLE TYPE	SAMPLE MATRIX	DEPTH (ft.)	ANALYSIS RESULTS (µg/L) Acetone	Chromium	Lead	TPH	Di-n-butyl phthalate	Xylenes
Building 1, Borehole MS-6	00-1531	AAA8394	Field Trip Blank	Water	NA[e]	32	-	-	-	-	-
Junction Box 5S	00-1532	AAA8395	Field Trip Blank	Water	NA[e]	46	-	-	-	-	-
Building 1, Borehole MS-4	00-1529	AAA8401	Equipment Blank	Water	NA[e]	-	-	2	52 000	57	-
Building 1, Borehole MS-7	00-1535	AAA8402	RFI	Water	4.6–5	28	400	1 480	-	-	8.9
Building 1, Borehole MS-4	00-1529	AAA8404	Field Reagent	Water	NA[e]	-	-	-	-	63	-
00-032, 00-031(b)	00-1523	AAA8514	Equipment Blank	Water	NA[e]	-	-	2	-	-	-
						-	-	3	-	-	-

[a] The SAL value for chromium is for chromium VI.
[b] TPH = Total recoverable petroleum hydrocarbons. The SAL value for TPH is the New Mexico UST standard. It is not health based.
[c] Xylenes = Xylenes(o+m+p)[mixed-].
[d] SAL = Screening action level.
[e] NA = Not applicable.
[f] There are currently no Los Alamos background data for water samples. Therefore, the national background ranges listed in reports by the US Department of Health and Human Services are used for water samples.
[g] There is currently no applicable SAL available for this analyte.
[h] Clement International Corporation 1993, 05-0202.
[i] Clement International Corporation 1993, 1055.
[j] RPL = Reporting limit.

TABLE

ANALYTICAL RESULTS FOR DETECTED ANALYTES IN SOIL SAMPLES AT SWMU 0-032

						Acetone	Chromium[a]	Lead	TPH[b]	Di-n-butyl phthalate
COMPARISON LEVELS FOR SOIL SAMPLES (mg/kg)					SAL[c]	8 000	400	400	100	8 000
					UTL[d]	None[e]	34.2	39	None[e]	None[e]
					RPL[f]	20–44	0.7–1	4–5.0	1–25.2	330–510
						ANALYSIS RESULTS (µg/L)				
LOCATION	LOCATION ID	SAMPLE ID	SAMPLE TYPE	SAMPLE MATRIX	DEPTH (ft.)	Acetone	Chromium	Lead	TPH	Di-n-butyl phthalate
Building 1, Borehole MS-8A	00-1545	AAA8328	RFI	Soil	10–14	0.037	1.5	8.2	2	-
Junction Box 5N	00-1584	AAA8329	RFI	Soil	2	0.054	10	20	14	-
Junction Box 5N	00-1586	AAA8330	RFI	Soil	3	-	12	32	-	-
Junction Box 5N	00-1584	AAA8331	Field Duplicate	Soil	2–3	0.055	9.2	15	25	-
Junction Box 5N	00-1585	AAA8332	RFI	Soil	2–3	0.059	8.2	17	6	-
Junction Box 5S	00-1607	AAA8334	RFI	Soil	3	0.18	11	19	8	-
UST-4	00-1581	AAA8335	RFI	Soil	9	-	14	12	10	-
						-	14	15	-	-
Junction Box 5N	00-1583	AAA8336	RFI	Soil	2	0.28	5.7	21	-	-
Building 1, Borehole MS-9	00-1533	AAA8337	RFI	Soil	2.5–5	0.024	12	18	-	-
Building 1, Borehole MS-5	00-1530	AAA8338	RFI	Soil	10–15	0.054	1.8	5.4	3	-
Building 1, Borehole MS-4	00-1529	AAA8339	RFI	Soil	0–2.5	-	19	23	-	-
Building 1, Borehole MS-11	00-1542	AAA8345	RFI	Soil	3–5	-	13	25	5	-
Building 1, Borehole MS-9A	00-1540	AAA8347	RFI	Soil	10–11	-	2	-	3	-
Building 1, Borehole MS-7A	00-1544	AAA8348	RFI	Soil	12.5–15	-	5	-	-	-
Building 1, Borehole MS-10A	00-1541	AAA8351	RFI	Soil	10–11	-	1.2	-	5	-
Building 1, Borehole MS-11A	00-1543	AAA8354	RFI	Soil	11.5–13.5	-	-	-	1	-
Building 1, Borehole MS-7	00-1535	AAA8360	RFI	Soil	9–11	-	0.92	5	14	-
Junction Box 5S	00-1532	AAA8361	RFI	Soil	2.5	0.09	12	20	-	-
Junction Box 5S	00-1606	AAA8362	RFI	Soil	3	0.095	10	15	-	0.63
Building 1, Borehole MS-7	00-1535	AAA8366	RFI	Soil	0–9	0.04	1.7	11	-	-
Building 1, Borehole MS-8	00-1534	AAA8367	RFI	Soil	10–15	0.032	1.4	7.6	-	-
Building 1, Borehole MS-8	00-1534	AAA8368	RFI	Soil	0–2.5	0.039	2.3	-	-	-
Building 1, Borehole MS-1	00-1526	AAA8370	Field Duplicate	Soil	0–5	-	9.9	-	3	-
Building 1, Borehole MS-11	00-1542	AAA8371	RFI	Soil	12.5–15	-	6.7	11	1	-

TABLE B2 (CONTINUED)

ANALYTICAL RESULTS FOR DETECTED ANALYTES IN SOIL SAMPLES AT SWMU 0-032

LOCATION	LOCATION ID	SAMPLE ID	SAMPLE TYPE	SAMPLE MATRIX	DEPTH (ft.)	ANALYSIS RESULTS (µg/L)				
						Acetone	Chromium	Lead	TPH	Di-n-butyl phthalate
Building 1, Borehole MS-10	00-1536	AAA8374	RFI	Soil	10–15	-	4.9	-	-	-
Building 1, Borehole MS-3	00-1528	AAA8375	RFI	Soil	0–2	-	10	13	5	-
Building 1, Borehole MS-10	00-1536	AAA8376	RFI	Soil	0–5	0.033	9.4	16	1	-
Building 1, Borehole MS-1	00-1526	AAA8377	RFI	Soil	10–15	-	-	8.6	3	-
Building 1, Borehole MS-1	00-1526	AAA8380	RFI	Soil	0–5	-	10	9.1	2	-
Building 1, Borehole MS-3	00-1528	AAA8381	RFI	Soil	11–15	-	1.8	5.1	1	-
Building 1, Borehole MS-2	00-1527	AAA8382	RFI	Soil	13.5–15	-	5.1	11	1	-
Building 1, Borehole MS-2	00-1527	AAA8383	RFI	Soil	0–5	-	12	18	21	-
Building 1, Borehole MS-9	00-1533	AAA8384	RFI	Soil	12.5–15	0.041	3.8	8.8	-	-
Junction Box 5S	00-1605	AAA8385	RFI	Soil	4	0.13	10	20	14	-
Building 1, Borehole MS-5	00-1530	AAA8386	RFI	Soil	0–2.5	0.058	5.7	-	3	-
Building 1, Borehole MS-4	00-1529	AAA8387	RFI	Soil	12–15	-	1.2	-	2	-
Junction Box 5N	00-1525	AAA8573	RFI	Soil	6	-	-	9	-	-
Junction Box 5N	00-1582	AAA8575	RFI	Soil	6	-	6.5	12	40	-
						-	11	18	-	-
Junction Box 5S	00-1532	AAA8579	RFI	Soil	5	-	14	110	8	-
UST-4	00-1580	AAA8580	RFI	Soil	9	-	13	14	-	-

[a] The SAL value for chromium is for chromium VI.
[b] TPH = Total recoverable petroleum hydrocarbons. The SAL value for TPH is the New Mexico UST standard. It is not health based.
[c] SAL = Screening action level.
[d] UTL = Upper tolerance limit.
[e] There is no background UTL for this analyte.
[f] RPL = Reporting limit.

TABLE B3

ANALYTICAL RESULTS FOR WASTE CHARACTERIZATION SAMPLES WITH RESULTS GREATER THAN THE REPORTING LIMIT

WASTE CHARACTERIZATION SOIL SAMPLES (mg/kg)									
LOCATION	SAMPLE ID	Chromium	Lead	TPH	Bis(2-ethylhexyl) phthalate	Ethylbenzene	Trimethyl- benzene [1,2,4-]	Trimethyl- benzene [1,3,5-]	Xylenes (o+m+p) [mixed-]
00-032 UST-4	AAA8333	12	13	25	-	-	-	-	-
00-032 UST-4	AAA8340	11	7	16	-	-	-	-	-
Junction Boxes 5N and 5S	AAA8341	11	15	530	-	-	-	-	-
Junction Boxes 5N and 5S	AAA8574	2.4	-	260	0.66	0.016	0.032	0.012	0.022

WASTE CHARACTERIZATION WATER SAMPLES (µg/L)																						
LOCATION	SAMPLE ID	Acetone	Aluminium	Antimony	Arsenic	Barium	Beryllium	Butyl benzyl phthalate	Calcium	Chromium	Copper	Di-n-butyl phthalate	Iron	Lead	Magnesium	Manganese	Nickel	Potassium	Selenium	Sodium	Vanadium	Zinc
Bldg. 1 Borehole MS-6	AAA8405	61	6 200	2	350	130	2	38	42 000	48	29	93	4 400	28	2 600	160	-	89 000	5	410 000	810	120
Junction Box 5S	AAB0154	-	460	1.4	4	66	-	-	22 000	21	-	-	3 400	416	910	110	-	5 800	-	13 000	9.2	550
Junction Box 5N	AAB0155	-	580	-	-	120	-	-	24 000	-	12	-	1 200	21	2 100	47	39	5 300	-	13 000	7.5	52
		-	640	-	-	130	580	-	25 000	-	120	-	1 200	-	2 100	47	-	5 600	-	13 000	7.9	60

APPENDIX C. ANTHROPOMORPHIC BACKGROUND LEVELS OF PAHs

Polycyclic aromatic hydrocarbons (PAHs) are the product of incomplete combustion of organic material such as coal, wood, oil, gas, garbage, and tobacco. PAHs occur naturally due to forest fires and volcanoes, but they are also a byproduct of asphalt paving, vehicle exhaust, coal tarring activities, and municipal trash incineration.

The US Department of Health and Human Services Agency for Toxic Substances and Disease Registry (ATSDR) has published the background soil concentrations of PAHs in a document titled *Toxicological Profile for Polycyclic Aromatic Hydrocarbons* (Clement International Corporation 1990, 0873). This information is a compilation of seven different studies. Data from the article "Background Levels of Polycyclic Aromatic Hydrocarbons (PAHs) and Selected Metals in New England Urban Soils" (Bradley et al. 1994, 1144) were added to the ATSDR data in order to provide background ranges for a more complete list of PAHs.

However, prior to stating that PAHs are of no concern because their concentrations fall within the normal urban levels described in the ATSDR and Bradley reports, we need to determine if the data used in these reports are applicable to Los Alamos and are comparable to SWMU 0-032 data. The studies which compose the ATSDR and Bradley background levels are currently being appraised for applicability to the SWMU 0-032 data. If the levels in these studies are not applicable to the data, then the feasibility of determining PAH background data for the Los Alamos area will be evaluated. Once a reliable background level for PAHs in Los Alamos is ascertained, we will be more able to determine whether levels of PAHs at SWMU 0-032 warrant concern or no further investigation.

APPENDIX D. BOREHOLE SUMMARY

TABLE D1
BOREHOLE SUMMARY

BOREHOLE	DATE INSTALLED	TOTAL DEPTH (ft BGS[a])	INCLINATION (DEGREE FROM HORIZONTAL)	GROUND SURFACE ELEVATION (ft MSL[b])	NORTHING EASTING (NM PLANE COORDINATES, CENTRAL ZONE NAD 83)	BOREHOLE STATUS	LOCATION
MS-1	25-Mar-94	15	90	7287.96	N-1775591.75 E-1626419.15	cuttings backfill; concrete plug	Inside Building 1, Southern bay
MS-2	28-Mar-94	15	90	7288.04	N-1775580.95 E-1626468.21	cuttings backfill; concrete plug	Inside Building 1, Southern bay
MS-3	28-Mar-94	15	90	7289.52	N-1775673.89 E-1626451.98	cuttings backfill; concrete plug	Inside Building 1, Northern bay
MS-4	29-Mar-94	15	90	7289.52	N-1775675.84 E-1626403.46	cuttings backfill; concrete plug	Inside Building 1, Northern bay
MS-5	29-Mar-94	15	90	7289.21	N-1775652.46 E-1626404.25	cuttings backfill; concrete plug	Inside Building 1, Northern bay
MS-6	29-Mar-94	0.5	90	7288.52	N-1775653.02 E-1626422.96	gravel; concrete plug	Inside Building 1, Northern bay
MS-7	31-Mar-94	11	90	7292.90	N-1775874.86 E-1626394.44	cement/ bentonite grout to surface	West of Building 1
MS-7A	13-Apr-94	15	64	7293.32	N-1775873.82 E-1626389.85	cuttings backfill; concrete plug; asphalt patch	West of Building 1
MS-8	31-Mar-94	15	90	7292.62	N-1775848.05 E-1626391.57	cuttings backfill; concrete plug	West of Building 1
MS-8A	13-Apr-94	14	62	7292.90	N-1775848.12 E-1626388.02	cuttings backfill; concrete plug; asphalt patch	West of Building 1
MS-9	31-Mar-94	15	90	7292.40	N-1775737.97 E-1626388.05	cuttings backfill; concrete plug; asphalt patch	West of Building 1
MS-9A	11-Apr-94	12	57	7292.60	N-1775739.15 E-1626385.08	cement/ bentonite grout to surface	West of Building 1
MS-10	01-Apr-94	15	90	7292.54	N-1775645.57 E-1626384.19	cuttings backfill; concrete plug; asphalt patch	West of Building 1
MS-10A	11-Apr-94	12.17	60	7292.70	N-1775645.28 E-1626380.38	cuttings backfill; concrete plug; asphalt patch	West of Building 1
MS-11	12-Apr-94	17	90	7292.48	N-1775603.83 E-1626382.77	cuttings backfill; concrete plug; asphalt patch	West of Building 1
MS-11A	12-Apr-94	13.5	63	7292.64	N-1775606.44 E-1626378.20	cuttings backfill; concrete plug; asphalt patch	West of Building 1

[a] BGS = Below ground surface
[b] MSL = Mean sea level