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Mr. William Honker
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Date: June 27, 1995
Refer to: EM/ER:95-289

SUBJECT: SUBMITTAL OF THE RESOURCE CONSERVATION AND RECOVERY ACT FACILITY INVESTIGATION (RFI) REPORT FOR POTENTIAL RELEASE SITEs (PRSs) IN TECHNICAL AREA (TA) 0

Dear Mr. Honker:

Enclosed are two copies of the Los Alamos National Laboratory's RFI Report concerning PRSs 0-030(c, q) in TA-0. The report documents the field work performed as detailed in the approved RFI Work Plan for Operable Unit 1071 and the sampling results. This RFI Report was due to your office on May 25, 1995.

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

Sincerely,

Jorg Jansen, Project Manager
Environmental Restoration

Sincerely,

Theodore J. Taylor, Program Manager
Los Alamos Area Office

JUN 28 1995

Environmental Restoration

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JJ/TT/bp

Enclosures: RFI Report for PRSs in TA-0 (2 copies)

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

Document Title:

Submittal of RFI Report for PRSs 0-030(c, g) in TA-0

Name: _____ Date: 6-23-95

for Tom Baca, Program Director
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or

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DOE-Los Alamos Area Office

RFI Report for

Potential Release Sites

0-030(c)

0-030(q)

Field Unit 1

Environmental Restoration Project

Los Alamos National Laboratory

June 12, 1995

A Department of Energy

Environmental Cleanup Program

LA-UR-95-XXXX

EXECUTIVE SUMMARY

This report presents the results of the Phase I Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) at Technical Area (TA) 0, solid waste management units (SWMUs) 0-030(c,q). These SWMUs are former Atomic Energy Commission facilities located outside the current boundaries of Los Alamos National Laboratory (LANL). The SWMU 0-030(c,q) septic tanks handled sanitary waste from residences in the original townsite. As described in the RFI Work Plan for Operable Unit (OU) 1071, SWMU 0-030(c) was a septic tank on private property north of the intersection of Canyon Road and Manhattan Loop that is suspected to have served residences, and SWMU 0-030(q) was a septic tank on private property east of 22nd Street and north of the Mesa Public Library that is known to have served residences and buildings from the Los Alamos Ranch School (LANL 1992, 0781). Both tanks were removed during the Phase I investigation.

The constituents of potential concern (COPCs) at SWMUs 0-030(c,q) before the RFI Phase I sampling were volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), target analyte list (TAL) metals, polychlorinated biphenyls (PCBs), pesticides, total uranium, isotopic plutonium, cesium and americium (LANL 1992, 0781).

The objectives of the Phase I investigation at SWMUs 0-030(c,q) were as follows: 1) to determine if there was residual soil contamination associated with these septic tank systems and, in the case of SWMU 0-030(c), the related outfall area; and, 2) to remove any remaining structures related to these SWMUs from the site.

At the conclusion of the RFI Phase I activities, no COPCs were retained through the human health screening assessment. Seven constituents of potential ecological concern (COPECs) were retained through the ecotoxicological screening assessments, including mercury, bis (2-ethylhexylphthalate), (p,p') dichlorodiphenyltrichloroethane [DDT(p,p')], Aldrin™, beta-BHC, Endrin™, and heptachlor. None of these constituents are present at concentrations that pose an ecological threat.

Based on the human health and ecological screening assessments, SWMUs 0-030(c,q) are proposed for no further action.

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CONTENTS

EXECUTIVE SUMMARY v

1.0 INTRODUCTION 1

1.1 Facility Background 1

1.2 Phase I Work Plan Overview 3

1.3 Field Activities 3

2.0 ENVIRONMENTAL SETTING 4

2.1 Climate 4

2.2 Geology 4

2.3 Hydrogeology 5

2.4 Wildlife Habitats 5

3.0 DATA ASSESSMENT AND ANALYSIS APPROACH 5

3.1 Introduction 5

3.2 Data Validation Methods 6

3.3 Methods for Comparisons between Site and Background Data. 8

3.4 Comparison With Human Health Screening Action Levels 9

3.5 Comparison With Ecotoxicological Screening Action Levels 10

4.0 SITE-SPECIFIC RESULTS, CONCLUSIONS, AND RECOMMENDATIONS 12

4.1. SWMU 0-030(c) 12

4.1.1 Field Investigation and Sampling Activities 12

4.1.2 SWMU 0-030(c) Quality Assurance / Quality Control Results 19

4.1.3 Background Comparisons for SWMU 0-030(c) 23

4.1.4 SAL Comparisons at SWMU 0-030(c) 26

4.1.5 Ecotoxicological Screening Assessment for SWMU 0-030(c) 26

4.2. SWMU 0-030(q) 29

4.2.1 Field Investigation and Sampling Activities 29

4.2.2 SWMU 0-030(q) Quality Assurance/Quality Control Results 33

4.2.3 Background Comparisons for SWMU 0-030(q) 36

4.2.4 SAL Comparisons at SWMU 0-030(q) 38

4.2.5 Ecotoxicological Screening Assessment for SWMU 0-030(q) 40

4.3 Conclusions, Actions, and Recommendations 40

5.0 REFERENCES 41

APPENDIX A BACKGROUND DATA SUMMARY TABLES WITH UPPER TOLERANCE LIMITS 45

APPENDIX B ANALYTICAL RESULTS 47

LIST OF FIGURES

Fig. 1-1. Locations of septic tanks in SWMU Group 0-3. 2

Fig. 3-1. Data analysis and screening assessment decision logic flow chart. 7

Fig. 3-2. Data analysis and ecotoxicological screening assessment decision logic flow chart. 11

Fig. 4-1. Sampling locations for SWMU 0-030(c), septic tank. 13

Fig. 4-2. Locations of sample IDs at SWMU 0-030(c), septic tank. 15

Fig. 4-3. Sampling locations for the outfall at SWMU 0-030(c). 17

Fig. 4-4. Locations of sample IDs for the outfall at SWMU 0-030(c). 18

Fig. 4-5. Sampling locations for SWMU 0-030(q), septic tank. 30

Fig. 4-6. Locations of sample IDs for SWMU 0-030(q), septic tank. 31

Fig. 4-7. Distributions of background and site lead concentrations. 37

LIST OF TABLES

Table 4-1 Summary of Quality Control Results for SWMU 0-030(c) 20

Table 4-2 SWMU 0-030(c) Inorganics with Concentrations that Exceed UTLs 24

Table 4-3 SWMU 0-030(c) Radionuclides with Concentrations that Exceed UTLs 24

Table 4-4 SWMU 0-030(c) Detected Concentrations for Organics 25

Table 4-5 Multiple Constituent Evaluation for SWMU 0-030(c) Data 27

Table 4-6 Analyte Comparison to ESALs 28

Table 4-7 Summary of Quality Control Results for SWMU 0-030(q) 34

Table 4-8 SWMU 0-030(q) Inorganics with Concentrations that Exceed UTLs 36

Table 4-9 SWMU 0-030(q) Detected Concentrations for Organics 38

Table 4-10 Multiple Constituent Evaluation for SWMU 0-030(q) Data 39

Table A-1 Summary of LANL Soil Background Data 45

Table A-2 Summary of PAH Soil Background Data 46

Table B-1 Summary Table of Samples Collected at SWMU 0-030(c) 47

Table B-2 Analytical Results for Inorganic Analytes Detected at SWMU 0-030(c) 48

Table B-3 Analytical Results for Organic Analytes Detected at SWMU 0-030(c) 50

Table B-4 Fixed Laboratory Radionuclide Results for Samples Collected at SWMU 0-030(c) 51

Table B-5 Mobile Radiological Analysis Laboratory Results for Samples Collected at SWMU 0-030(c) 53

Table B-6 Summary Table of Samples Collected at SWMU 0-030(q) 54

Table B-7 Analytical Results for Inorganic Analytes Detected at SWMU 0-030(q) 55

Table B-8 Analytical Results for Organic Analytes Detected at SWMU 0-030(q) 59

Table B-9 Fixed Laboratory Radionuclide Results for Samples Collected at SWMU 0-030(q) 60

Table B-10 Mobile Radiological Analysis Laboratory Results for Samples Collected at SWMU 0-030(q) 61

1.0 INTRODUCTION

This report presents the results of the Phase I Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) at Technical Area (TA) 0, solid waste management unit (SWMU) Group 0-3, SWMUs 0-030(c,q). These SWMUs are former Atomic Energy Commission septic systems located outside the current boundaries of Los Alamos National Laboratory (LANL). Included in this report are the data assessment and analysis approach used in the Phase I investigation and the site-specific results, conclusions, and recommendations for SWMUs 0-030(c,q). Both septic tanks were removed during the Phase I investigation.

1.1 Facility Background

The 13 abandoned septic systems that compose SWMU Group 0-3 are located within the Los Alamos townsite (Fig. 1-1). These septic systems were installed during the early 1940s, and most remained in use until the Central Wastewater Treatment Plant was completed in late 1947 (LANL 1990, 0145). The septic tanks in this SWMU group handled sanitary waste from the original townsite and, in a few cases, from early laboratory operations. However, because engineering drawings of these tanks are incomplete, it is not possible to document all of the buildings served by each tank (Francis and Sullivan 1995, 05-0207).

SWMU 0-030(c) was a septic tank on private property north of the intersection of Canyon Road and Manhattan Loop (The Zia Company 1947, 05-0132; LANL 1990, 0145). The location of the tank suggests that it served residences. There is no available archival documentation about the dimensions of this septic tank, the buildings it served, or the outfall pipes.

SWMU 0-030(q) was a septic tank on private property north of the new Mesa Public Library and just east of the intersection of Ponderosa and Spruce streets. A 1943 engineering drawing indicates that the tank served a residence and discharged to a sanitary waste line connected to SWMU 0-030(e), a septic system north of SWMU 0-030(q) at Canyon Road (US Engineer Area Office 1943, 05-0161). Before the Manhattan Project, the tank was used by the Ranch School and may have had no overflow pipe, and therefore, no outfall.

Low levels of plutonium are not precluded in some of the septic systems, and any plutonium in the effluent from the septic systems could have been carried through Pueblo and Los Alamos Canyons to the Rio Grande. The constituents of potential concern (COPCs) at SWMUs 0-030(c,q) are volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), target analyte list (TAL) metals, polychlorinated biphenyls (PCBs), pesticides, total uranium, isotopic plutonium, cesium, and americium (LANL 1992, 0781). These COPCs include all chemicals associated with laboratories operating in the townsite before 1966.

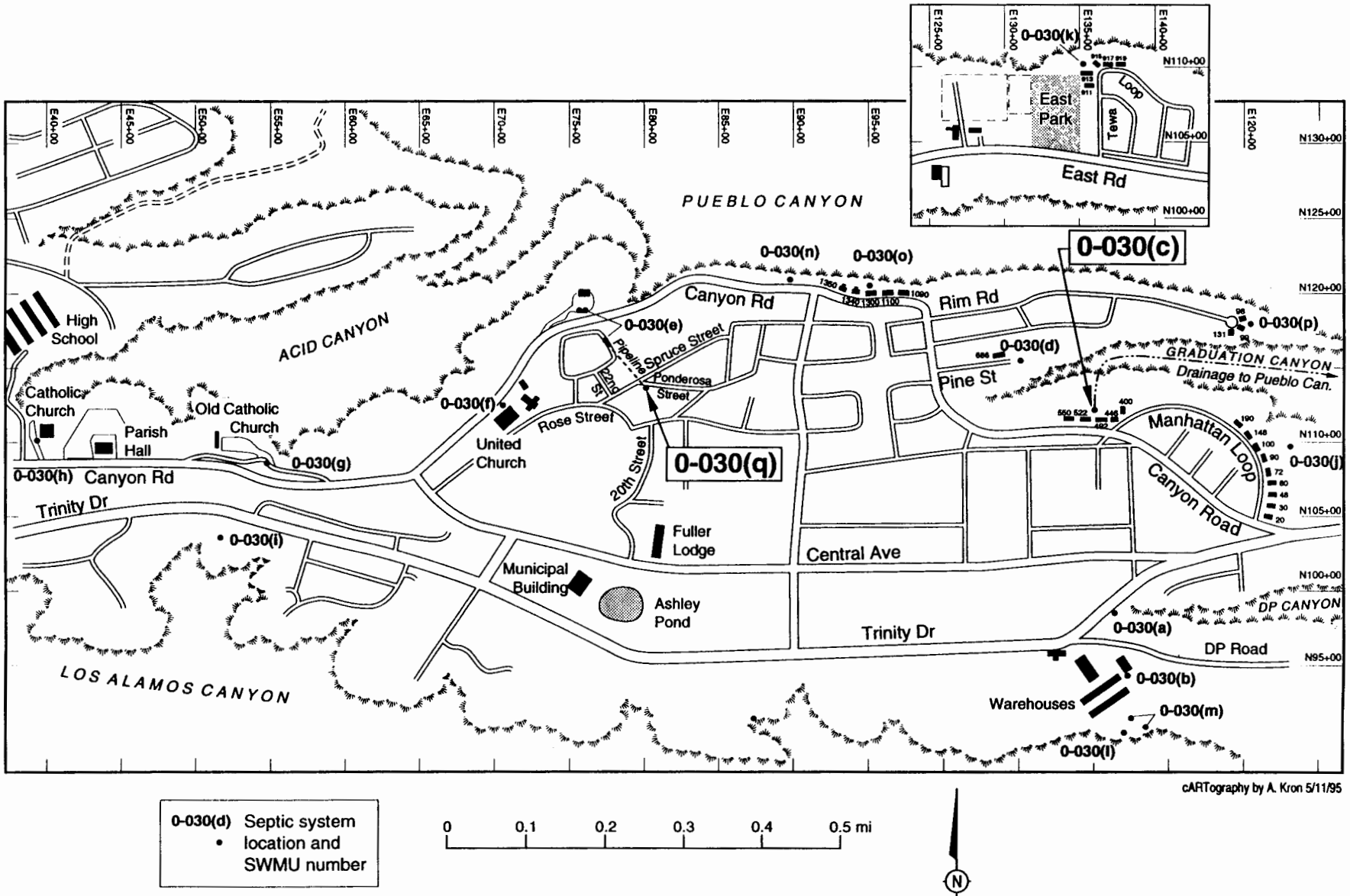


Fig. 1-1. Locations of septic tanks in SWMU Group 0-3.

1.2 Phase I Work Plan Overview

The Phase I investigation at SWMU 0-030(c,q) had two objectives. The first objective was to determine the locations, boundaries, and geometries of each septic tank system, including associated drain lines and the outfall for SWMU 0-030(c), and to remove any remaining structures at either location. The second objective was to determine the nature and extent of any contaminants that might be present in site media or potential release areas, including subsurface soils beneath the septic tanks and associated drain lines, and in channel sediments from surface drainage that originated at the outfall for SWMU 0-030(c).

In accordance with the work plan, site and geophysical surveys were used to locate and define the boundaries of the septic tank system structures and to locate outfalls. Mapping surveys were used to locate sediment catchments adjacent to outfalls and to determine locations for channel sediment samples. Because the sludge in a septic tank is likely to reflect only its most recent waste stream, sampling was performed in sediment catchments and in soil beneath the tanks. All surface and subsurface samples were screened for organic vapors and gross alpha, beta, and gamma radiation.

1.3 Field Activities

SWMU 0-030(c) Septic Tank. Field activities at SWMU 0-030(c) consisted of borehole drilling and subsurface sample collection to precharacterize the septic tank materials, followed by septic tank removal and then characterization sampling from beneath the tank, drain line, and related outfall. Drilling and sampling operations were conducted following appropriate LANL Environmental Restoration (ER) Project Standard Operating Procedures (SOPs).

Precharacterization drilling was done to determine the likelihood that COPCs were present and to minimize the potential for generating mixed waste during excavation of the septic tank. Three boreholes were drilled inside the tank to the tank floor at a depth of about eight to nine feet below ground surface (bgs) using a hand auger. Samples were collected from within the boreholes for laboratory analysis of the tank contents. Analytical results from precharacterization samples indicated that mixed waste would not be generated, so tank characterization and subsequent excavation activities were initiated. The septic tank and drain line were excavated and removed in accordance with Subsection 2.3.4.1 of the RFI Work Plan for OU 1071 (LANL 1992, 0781). Characterization samples were collected within the tank and beneath the tank and drain line during excavation and removal.

SWMU 0-030(q) Septic Tank. Field activities at SWMU 0-030(q) consisted of borehole drilling and subsurface sample collection to precharacterize the septic tank materials, followed by septic tank removal, and then characterization sampling from beneath the tank and drain line. Drilling and sampling operations were conducted following appropriate LANL ER Project SOPs.

Precharacterization drilling was done before septic tank excavation to minimize the potential generation of mixed waste. Three boreholes were drilled inside the tank to collect laboratory analysis samples to precharacterize the tank contents. Two of the three boreholes were later determined to be outside the tank walls. The borehole drilled within the tank was advanced to a depth of approximately 12 ft bgs. The septic tank was excavated and removed in accordance with the RFI Work Plan for OU 1071 (LANL 1992, 0781). Characterization samples were collected within the tank and beneath the tank and drain line during excavation and removal.

2.0 ENVIRONMENTAL SETTING

2.1 Climate

The Los Alamos area of north-central New Mexico has a semiarid, temperate mountain climate. Annual precipitation normally reaches about 18 in., 40% of which occurs as brief, intense thunderstorms during July and August. Winter snowfall averages about 51 in. annually. In summer months, maximum daily temperatures 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 vary greatly with the time of day and location, largely because of the complex terrain.

2.2 Geology

SWMUs 0-030(c,q) are located on East Mesa. This mesa is underlain by the Bandelier Tuff which is capped by thin soil developed in alluvial materials that overlie the tuff on the mesa surface. Both septic tanks are located near the north edge of the mesa. Surface drainage on this part of the mesa is north into Pueblo Canyon or one of its tributaries. The north-facing canyon wall descends rather steeply from Townsite Mesa into the adjacent canyons. The SWMU 0-030(c) septic tank has an outfall which drains onto the steep slope from the mesa surface into a shallow channel that flows into Graduation Canyon, a tributary to Pueblo Canyon. The SWMU 0-030(q) septic tank was connected by a drain line to another tank, SWMU 0-030(e), and did not have a surface outfall or produce any surface drainage.

2.3 Hydrogeology

SWMU 0-030(c) had an outfall that produced surface runoff onto the north slope of East Mesa. The runoff was concentrated along a shallow channel that descends from the outfall into the drainage channel of Graduation Canyon. A number of small sediment catchment areas along this channel were selected for sampling. Because the outfall drainage was entirely surface runoff and was concentrated along the drainage channel, it is likely that most of the runoff reached the axial drainage in the canyon and did not pond along the slope long enough to infiltrate the underlying tuff. Thus, there is no likelihood of any outfall discharge reaching the main aquifer, over 1 000 ft below the mesa surface. SWMU 0-030(q) is not associated with an outfall because it was connected by a drain line to the septic tank that is now designated SWMU 0-030(e).

2.4 Wildlife Habitats

SWMUs 0-030(c,q) consist primarily of mesa-top habitats characterized by urban disturbance from the Los Alamos townsite. Comprehensive plant and animal inventories were not performed for the mesa-top portions of SWMUs 0-030(c,q) because of the high level of disturbance. SWMU 0-030(c) is associated with an outfall into Graduation Canyon, a tributary of Pueblo Canyon. Any impact to threatened and endangered species would occur downgradient of SWMU 0-030(c) in Pueblo Canyon, which is a potential habitat for the peregrine falcon. SWMU 0-030(q) is not directly associated with an outfall because it was connected by a drain line to SWMU 0-030(e).

3.0 DATA ASSESSMENT AND ANALYSIS APPROACH

3.1 Introduction

The decision approach used for SWMUs 0-030(c,q) involves a series of quantitative steps, which occur after the field investigation, chemical analysis, and data reporting. These steps begin with routine data validation, in which each data item is validated against EPA-specific targets, and continue with more focused data validation if necessary, in which quality assurance/ quality control (QA/QC) data are analyzed for their potential impacts on succeeding data assessment steps. The data assessment steps for SWMUs 0-030(c,q) involve comparing site data with background concentration data and performing a human health screening assessment in which site data are compared with screening action levels (SALs). A simplified decision logic

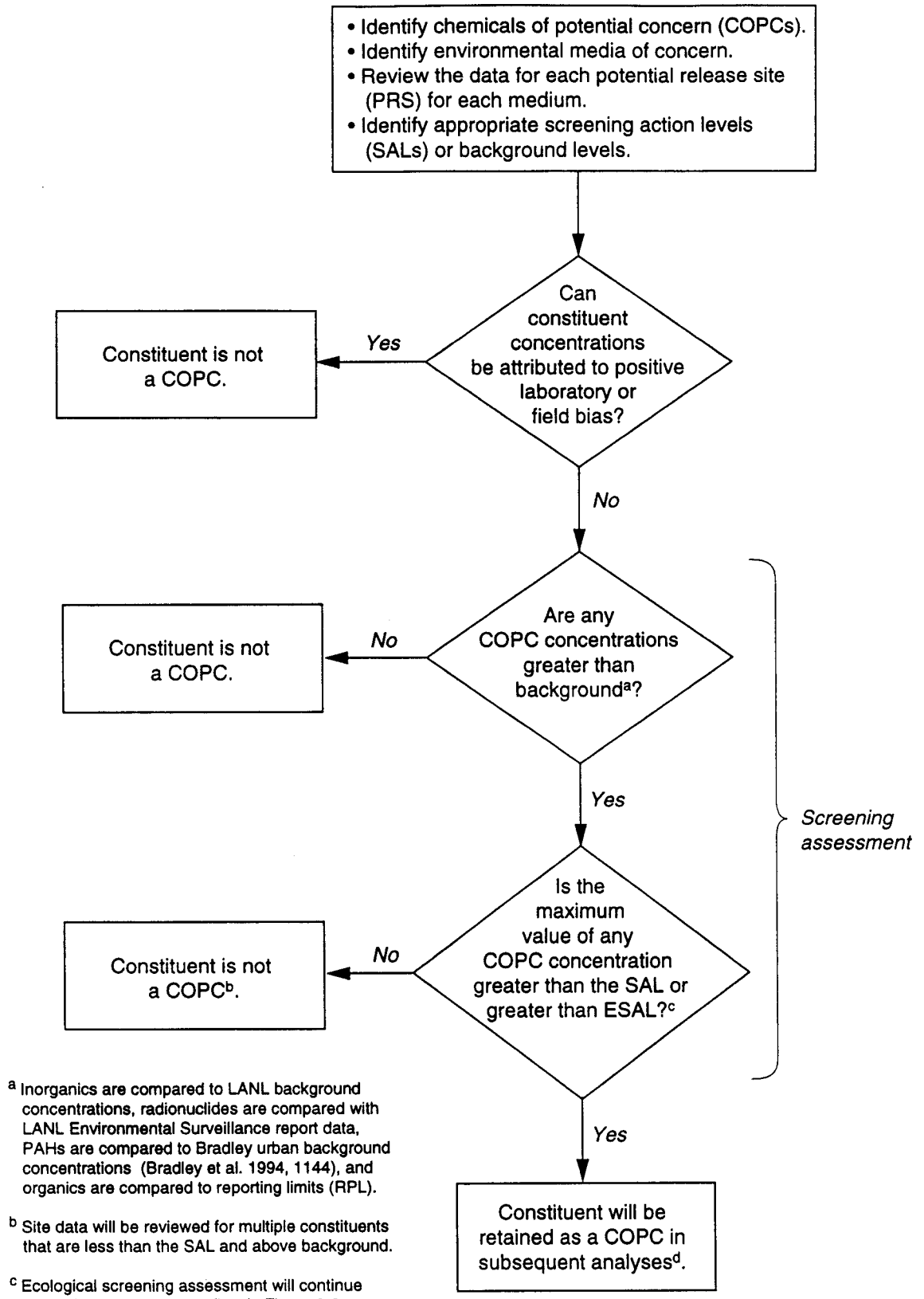
is provided in Fig. 3-1. The following subsections provide overviews of the methods used to complete these quantitative steps.

It should be noted that SALs do not exist for all constituents that may be included in the data collection process, and that background data are available only for certain inorganic constituents, certain radioactive constituents, and polycyclic aromatic hydrocarbons (PAHs). The need for both background comparisons and comparisons with SALs arises because of the incomplete coverage of one or the other. Also, there are a few constituents (e.g., arsenic, beryllium, and several PAHs) for which SALs are within the range of available background data. In these cases, background comparisons are preferred.

3.2 Data Validation Methods

All data from analytical laboratories are validated by LANL. Validation is performed using the guidelines from the LANL ER Project "Generic Quality Assurance Project Plan for RCRA Facility Investigations" (LANL 1991, 0412).

All samples were submitted with chain-of-custody documentation to the sample management office (SMO). Selected samples were analyzed for TAL metals by flame atomic absorption (EPA SW-846 Method 7420), electrothermal vaporization atomic absorption (EPA SW-846 Method 7060 or 7760), cold vaporization atomic absorption (EPA SW-846 Method 7471), inductively coupled plasma emission spectroscopy (EPA SW-846 Method 6010) and inductively coupled plasma/mass spectrometry (EPA SW-846 Method 6020). The TAL metals include aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc. Analyses for VOCs were conducted using gas chromatography/ mass spectrometry (GC/MS), EPA SW-846 Method 8240 (Purge and Trap Method) or Method 8260 (Capillary Column Method). Analyses for SVOCs were conducted using packed column GC/MS, EPA SW-846 Method 8250 (Packed Column Method) or 8270 (Capillary Column Method). Analyses for PCBs were conducted using gas chromatography/electron capture detector, EPA SW-846 Method 8080. Analyses for pesticides were also conducted using gas chromatography/electron capture detector with EPA contract laboratory program method OLM01.8. For the radiological analyses, samples were analyzed for plutonium isotopes using alpha spectroscopy, for total uranium using kinetic phosphorescence analysis or inductively coupled plasma/mass spectrometry, and for cesium-137 and americium using gamma spectroscopy.



[a] Inorganics are compared to LANL background concentrations, radionuclides are compared with LANL Environmental Surveillance report data, PAHs are compared to Bradley urban background concentrations (Bradley et al. 1994, 1144), and organics are compared to reporting limits (RPL).

[b] Site data will be reviewed for multiple constituents that are less than the SAL and above background.

[c] Ecological screening assessment will continue according to the decision flow in Figure 3-2.

[d] RFI risk assessment.

Fig. 3-1. Data analysis and screening assessment decision logic flow chart.

3.3 Methods for Comparisons between Site and Background Data

Once the data validation process is complete and the site data are finalized, the next step in the process is to compare site data to available background data. Background data are available from several sources, including: 1) soil samples collected throughout Los Alamos County for which chemical analyses were performed for certain inorganic (metal) constituents and naturally occurring radioactive constituents (Longmire et al. in preparation, 1142); 2) background concentration data for radionuclides associated with global fallout from atmospheric nuclear testing (for example, plutonium, cesium, strontium, and tritium) reported in LANL Environmental Surveillance reports (Purtymun et al. 1987, 0211; ESG 1988, 0408; ESG 1989, 0308; Environmental Protection Group 1990, 0497; Environmental Protection Group 1992, 0740); and, 3) a New England study for which soil samples were collected on a broad scale to assess background levels, both natural and man-made, of PAHs (Bradley et al. 1994, 1144).

Comparisons between site data and background data are initially performed by comparing each observed concentration datum to its upper tolerance limit (UTL). UTLs are used to represent reasonable values for high background concentrations. The UTL used in the LANL ER Project for each constituent is the 95% upper confidence bound on the estimated 99th percentile of the constituent's background concentration distribution. Exceptions are made when there is a large proportion of nondetects in the background data for a given constituent, in which case the maximum reported background concentration is used in lieu of the UTL. Comparative plots of the site and background data and statistical tests for the difference between site and background concentration distributions are also performed. Details of statistical methods used to generate UTLs from the sets of background data, and suggestions for statistical methods for comparing site and background concentration distributions are presented in LANL ER Project Assessments Council guidance documents (LANL 1995, 05-0215; LANL in preparation, 05-0211).

If a constituent has a reported concentration that exceeds its UTL or fails other statistical background comparison tests (i.e., the site data are statistically greater than the background data), then that constituent is retained as a COPC pending comparison with its SAL (provided

a SAL exists and exceeds the threshold for background concentrations). If a constituent does not have a reported concentration that exceeds the UTL, then that constituent is proposed for removal from further consideration. Tables in Appendix A provide UTLs for inorganics, radionuclides, and PAHs for which background data are available.

3.4 Comparison With Human Health Screening Action Levels

The next steps in the decision process are screening assessment decisions. This subsection focuses on the methods used for human health-based screening assessment. Screening assessment decisions are made by comparing site data to SALs that have been developed at LANL, and which take into account several exposure pathways. Appendix J of the 1993 Installation Work Plan (IWP) provides a complete description of methods used to generate SALs (LANL 1993, 1017). For constituents with available SALs, screening assessment decisions are made by comparing each observed concentration datum to the constituent's SAL. If a constituent has a reported concentration that exceeds its SAL, then that constituent is retained as a COPC. If a constituent does not have a reported concentration that exceeds its SAL, then that constituent is proposed for removal from further consideration.

When comparing site data to SALs, the impact of detection limits on the screening assessment decision must be considered. For example, when the limit of detection (LOD) is greater than a constituent's SAL and its background concentration threshold or UTL, and no other exceedances are reported, then the LOD may be used as an action level and the constituent removed from further consideration. However, if the concentration of a constituent is less than the LOD and that constituent is expected to be present, then further analysis may be required.

The preceding discussion addresses comparisons for single constituents. It is possible that none of the constituents are retained as COPCs based on these comparisons, but that unacceptable risk to human health may be present because of the combined effect of several constituents. The potential for an adverse combined effect is evaluated by normalizing reported concentrations from a single sample against the respective SALs, and applying the normalized concentrations in an additive model. Constituents that are included in such a calculation include only those that exceed background concentration thresholds.

If the sum of the normalized concentrations is less than one, then the constituents are removed from further consideration. This process must be performed separately for distinct classes of constituents such as carcinogens, systemic toxicants, and radioactive constituents, where the distinctions relate to different types of health risks. The equation for calculating the normalized concentration sum for a given sample is as follows:

$$M = \max_{samples}\left\{ \sum_{constituents} C_i / SAL_i \right\}$$

where:

M	=	maximum sum of normalized concentrations;
C_i	=	concentration of the ith constituent for a given sample; and
SAL_i	=	constituent-specific SAL for the ith constituent.

3.5 Comparison With Ecotoxicological Screening Action Levels

A discussion of the requirements and generic approach for ecotoxicological screening and risk assessment is presented in Appendix L of the LANL IWP (LANL 1993,1017). A detailed method for determining ecotoxicological screening action levels (ESALs) was developed to determine if further action at hazardous waste sites is warranted based on toxicological effects to birds, mammals, and reptiles inhabiting the site (Ebinger et al. 1994, 05-0210; Ferenbaugh 1995, 05-0213). Surface and subsurface soils were sampled during the RFI Phase I investigation for COPCs from SWMUs 0-030(c,q) and screened for values above LODs for organics, and above background (UTLs) for inorganics and organics (see Subsection 3.3 of this RFI report).

If contaminants of potential ecological concern (COPECs) are found from comparison of the above-background values with ecotoxicological screening action levels (ESALs), then a number of decisions are possible depending on the size and accessibility of the contaminated area (as compared to the ranges of the animals inhabiting the area), whether threatened or endangered plants and animals inhabit or use the area, and whether the site or adjacent sites contain sensitive habitats. An initial biological evaluation that identifies possible threatened and endangered species, major plant communities, sensitive habitats, wetlands, and floodplains has been done for the areas related to SWMUs 0-030(c,q) (Biggs 1992, 05-0208; Biggs 1993, 05-0209). Figure 3-2 shows the ecological decision tree used for the ecotoxicological screening assessment performed for SWMUs 0-030(c,q) and presented in Subsections 4.1.5 and 4.2.5 of this RFI report.

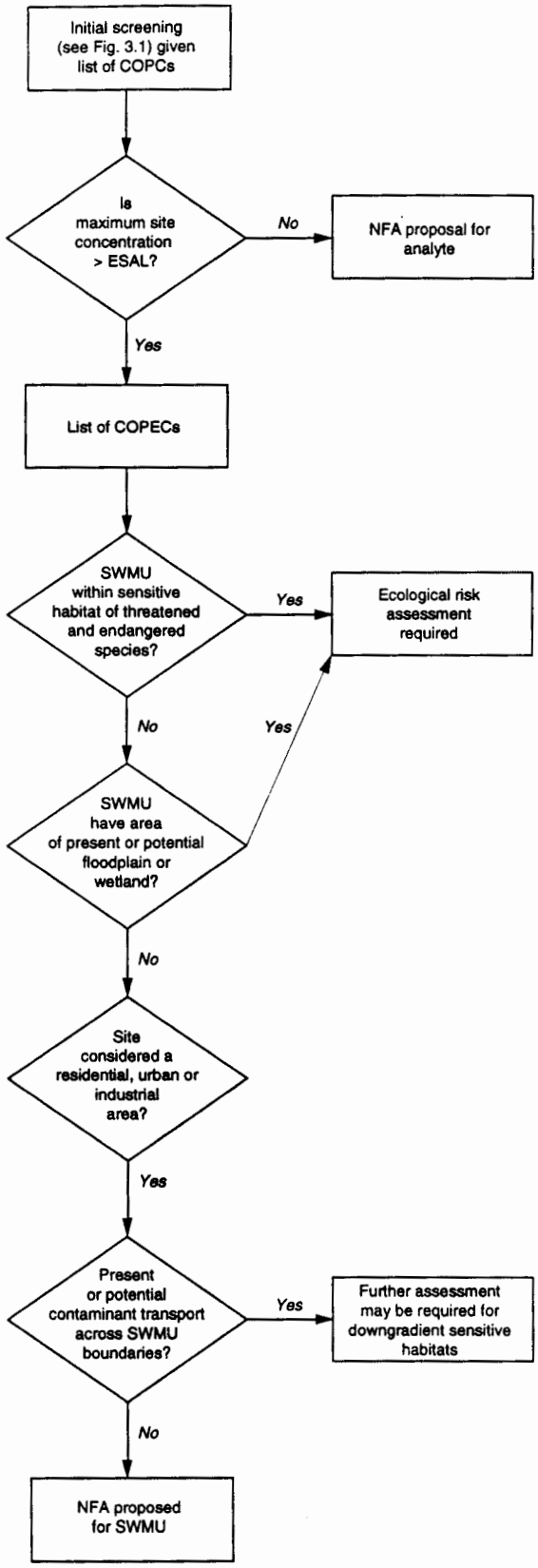


Fig. 3-2. Data analysis and ecotoxicological screening assessment decision logic flow chart.

Note that the ecotoxicological screening assessment was performed for the SWMU site itself and for a larger set of adjacent sites (called the ecological exposure unit) which could be impacted by past or future transport of COPECs from the SWMU. This ecological exposure unit approach assures that identification of the source terms, contaminant concentrations in soil and water, and their potential impacts to the biota are screened in overall context with the topography, hydrology, and sensitive habitats within the ecological exposure unit which may be impacted. The ecotoxicological screening process does not identify risks to the organisms in sensitive habitats; ecological risk assessment may be required if the screening indicates the possibility of a potential impact to organisms within a sensitive habitat. If no potential impacts are found, such as no COPECs at an outfall and within the drainage, then the screening process will indicate that no further actions are necessary at the SWMU or on adjacent sites within the ecological unit. If COPECs remain at the outfall or remain within the drainage, then a judgment will be made as to whether further ecological exposure unit characterization, including measuring impacts on the biota and performing an ecological risk assessment, is necessary.

4.0 SITE-SPECIFIC RESULTS, CONCLUSIONS, AND RECOMMENDATIONS

4.1. SWMU 0-030(c)

4.1.1 Field Investigation and Sampling Activities

Field activities conducted at SWMU 0-030(c) consisted of borehole drilling and subsurface sample collection to precharacterize the septic tank materials, followed by septic tank removal, and then characterization sampling from beneath the tank, drain line, and related outfall. Table B-1 in Appendix B describes how each sample was used (i.e., precharacterization, local background, septic tank characterization, or RFI characterization). Screening, drilling, sampling, and excavation activities were conducted between March 21 and June 8, 1994, in accordance with appropriate LANL ER Project SOPs.

The tank and drain line locations were determined by examination of historic aerial photographs, an archival review of maps and engineering plans, and through visual inspection of the site. The location of the tank and drain line, as indicated by maps and plans, was marked in the field by professional surveyors. Surface geophysical surveys using magnetometry and/or ground penetrating radar were conducted to more precisely locate the septic tank and drain line.

Local Background Samples. Four boreholes at location IDs 00-1479, 00-1482, 00-1483, and 00-1484, were drilled with hollow-stem augers in the expected location of the tank and drain line to precharacterize the tank contents. Location IDs are shown on Fig. 4-1. Native,

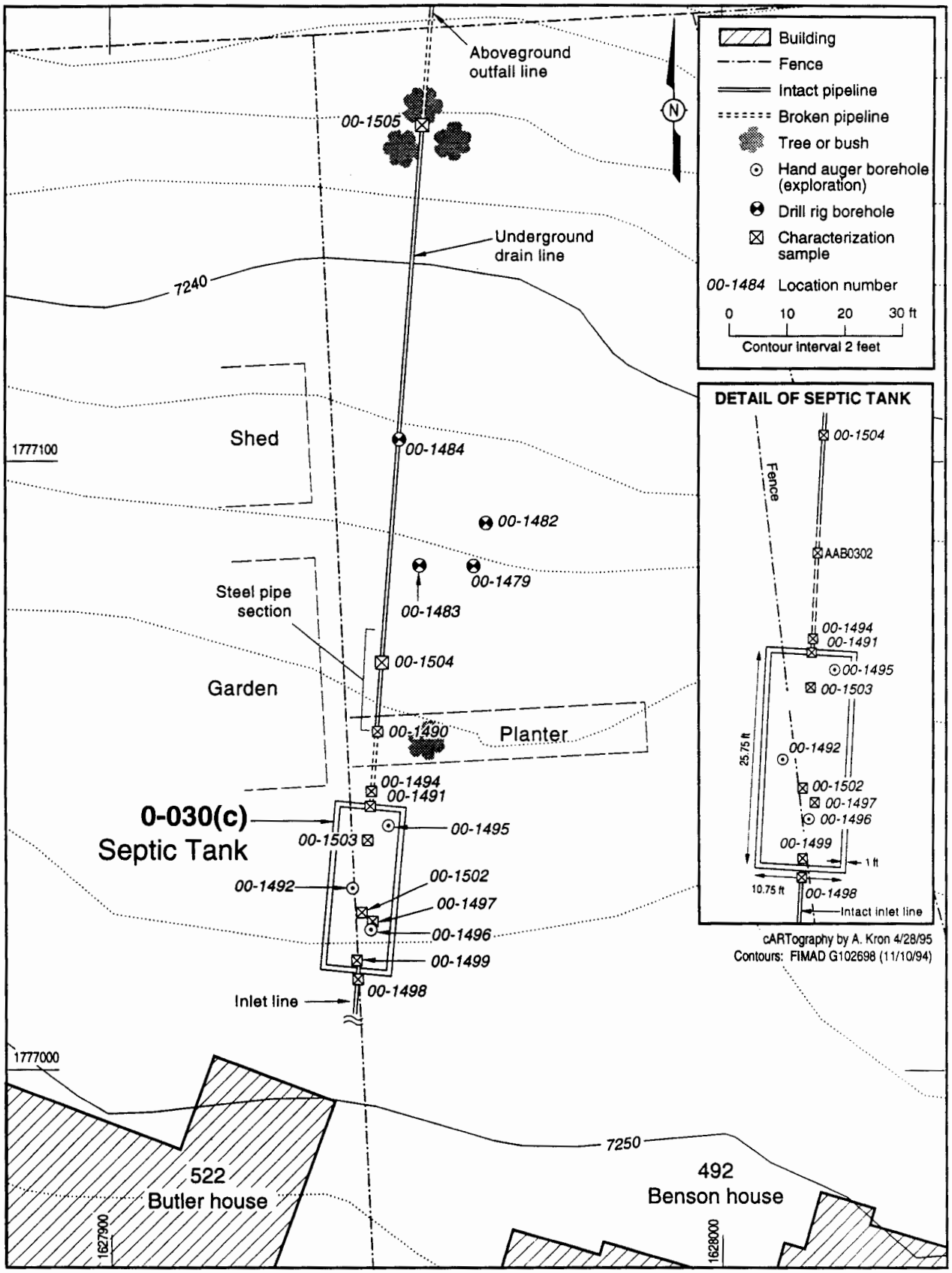


Fig. 4-1. Sampling locations for SWMU 0-030(c), septic tank.

undisturbed tuff was encountered in all four of these boreholes at depths ranging from 1 to 3.5 ft bgs, indicating that the tank and drain line were not present at the expected location. Samples were collected from borehole 00-1479 at depths of 1 to 3.5 ft bgs (AAB0283) and 7 to 8 ft bgs (AAB 0261) for fixed laboratory analysis. Samples were collected from borehole 00-1482 at depths of 3 to 3.5 ft for screening by the mobile radiological analytical laboratory (MRAL) (AAB0303) and 7.5 to 10 ft for fixed laboratory analysis (AAB0269). One sample was collected from borehole 00-1483 at a depth of 5 to 6 ft for laboratory analysis (AAB0267). Locations of sample IDs are shown on Fig. 4-2. Borehole 00-1484 was not sampled, but observations made during drilling resulted in the conclusion that the septic tank was not in the suspected location and that additional investigation would be necessary to locate the tank. Samples collected in these locations were used to determine local background values for COPCs.

Precharacterization Samples. Following confirmation of the tank location through exploratory hand augering, additional precharacterization drilling activities were conducted before the septic tank was excavated. Upon encountering the north wall of the septic tank, one soil sample (AAB0300) was collected adjacent to the wall at a depth of zero to two feet below ground surface for MRAL screening. Three boreholes, at locations 00-1492, 00-1495, and 00-1496, were completed to the bottom of the tank interior (tank floor), using a hand auger to collect samples from within the tank. Borehole locations are shown on Fig. 4-1. Because of frequent hand-auger refusal caused by concrete rubble in the tank backfill, completing boreholes 00-1495 and 00-1496 required several attempts. Samples were collected in borehole 00-1492 at a depth of 4.25 ft bgs (AAB0282), 6.5 ft bgs (AAB0286), and at the tank floor at 9.25 ft bgs (AAB0289). Borehole 00-1495 was sampled at a depth of approximately 4.5 ft bgs (AAB0288), and at the tank floor at a depth of approximately 8 ft bgs (AAB0280). Samples were collected in borehole 00-1496 at depths of approximately 4.5 ft bgs (AAB0277 and AAB0276-duplicate), and at the tank floor at 9.75 ft bgs (AAB0284). Boreholes were located to ensure that representative samples were collected to precharacterize the materials within the tank. Samples AAB0276, AAB0277, AAB0280, AAB0282, AAB0284, AAB0286, AAB0288, and AAB0289 were later classified as waste samples.

The outside dimensions of the tank were determined to be 25.75 ft long (north to south) and 10.25 ft wide (east to west). The depth of the tank floor (interior) was approximately eight to nine feet below ground surface. The walls and floor of the tank were constructed of 12-in.-thick concrete reinforced with 0.5-in. rebar. Figure 4-1 shows details of the tank dimensions and associated piping. The tank cover (lid) and rim appeared to have been demolished and buried within the tank.

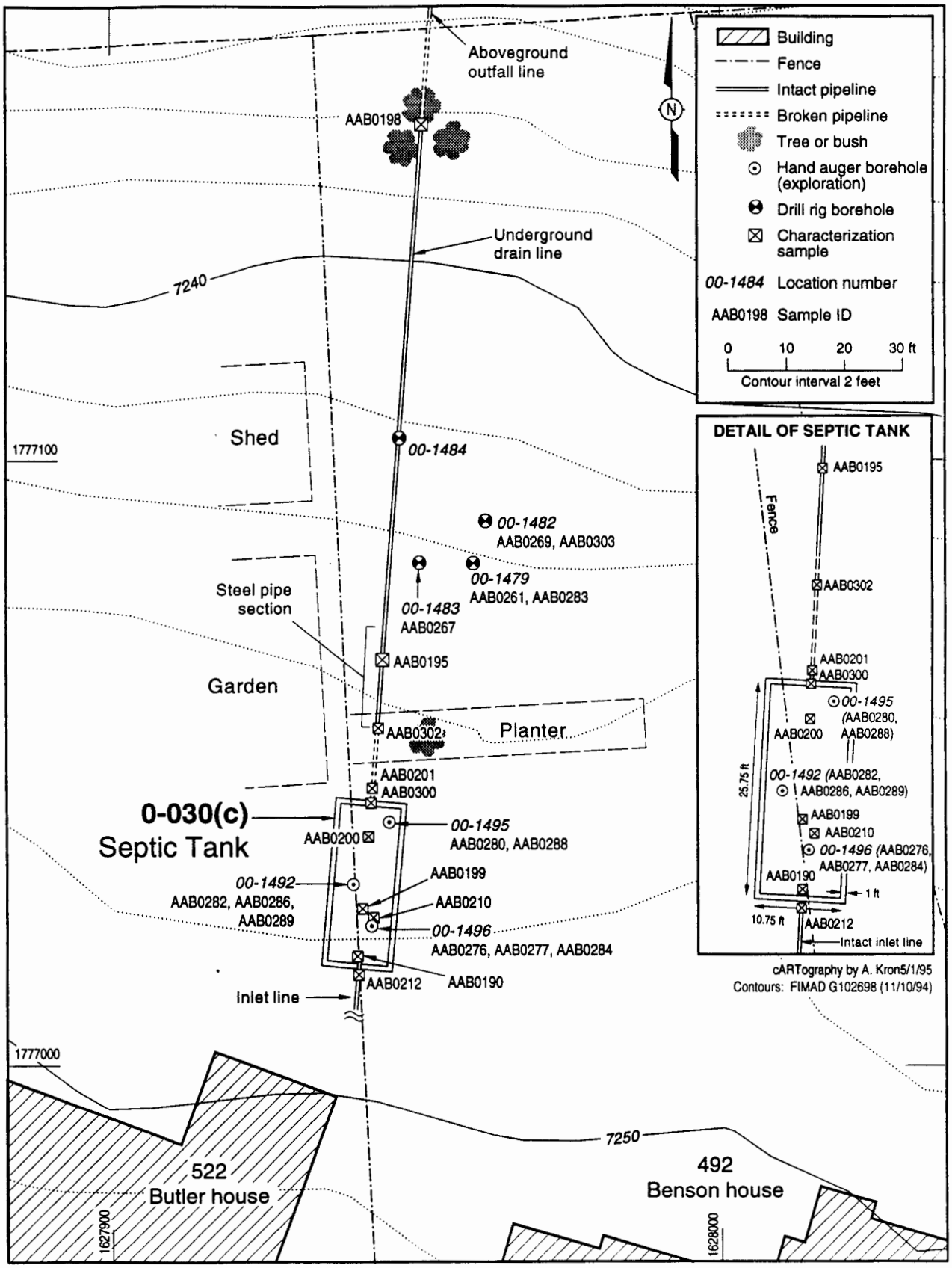


Fig. 4-2. Locations of sample IDs at SWMU 0-030(c), septic tank.

Septic Tank Characterization Samples. Samples were collected during tank excavation for septic tank characterization. Elevated levels of organic vapors, at 1 600 parts per million (ppm), were detected with a photoionization detector (PID) near the center of the north end of the tank, approximately 1 ft north of the tank wall, at a depth of 6.5 bgs, near the root system of a spruce tree (location ID 00-1494). Although the tree roots were the suspected source of the PID readings, a soil sample was collected for confirmatory analysis of the full analytical suite (AAB0201) (Fig. 4-2).

Waste Characterization Samples. Samples were collected from the tank interior for waste characterization. A soil sample (AAB0210) was collected from the southeast quadrant of the tank at a depth of six feet for screening in the MRAL. The sample exhibited slightly elevated alpha activity (10 counts per minute) on the hand-held meter. The results of MRAL screening did not indicate the presence of radiological contamination. A soil sample (AAB0212) was also collected from inside the tank inlet line (Fig. 4-2) at a depth of 2.75 ft for screening at the MRAL (Fig. 4-2). No elevated levels of activity were detected. One sample, AAB0190, was collected from inside the tank floor on the south wall directly below the inlet line (Figs. 4-1 and 4-2).

RFI Samples. Samples collected from beneath and adjacent to the tank for RFI site characterization are the basis for the human health and ecological screening assessments. Following removal of the tank floor, two samples were collected from beneath the tank at points directly below the centers of the north and south halves of the tank (AAB0200 and AAB0199, respectively, as shown on Fig. 4-2). The contents of the tank consisted mostly of fill material (crushed tuff/soil) and tank rubble. Large pieces of concrete and some wood fragments, determined to be remnants of the tank lid and the top rim of the walls, were observed in the materials removed from the tank. The interior surfaces of the tank walls were inspected for cracks and staining. The floor of the tank was scraped clean with a specialized backhoe-bucket attachment and inspected for cracks and staining. No cracking or staining was observed on the interior walls or floor of the tank. Each backhoe bucket of material removed from the tank was field screened for organic vapors and radioactivity before being dumped onto the soil stockpiles. Soils were also screened periodically for mercury vapor and explosive atmospheres.

The subsurface portion of the drain line consisted of 8-in.-diameter vitrified clay pipe, with the exception of a 13-ft section of steel pipe located approximately 13 ft north of the north wall of the septic tank (Fig. 4-3). Upon encountering the broken section of the drain line between the north wall of the tank and the steel section of pipe, a soil sample was collected for MRAL screening (Figs. 4-3 and 4-4). RFI Phase I site characterization samples were collected from two points along the drain line during drain line excavation and removal. One sample was

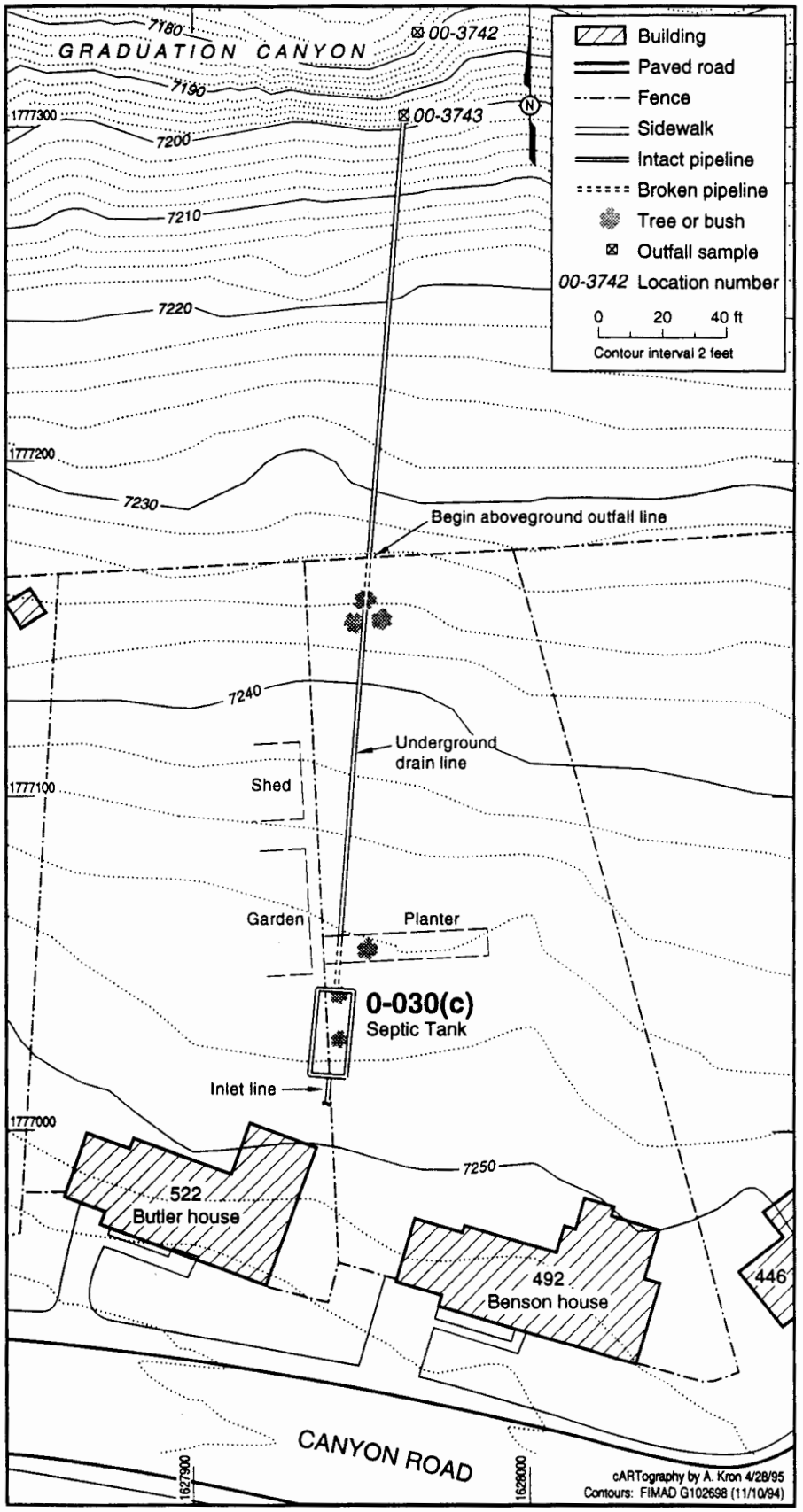


Fig. 4-3. Sampling locations for the outfall at SWMU 0-030(c).

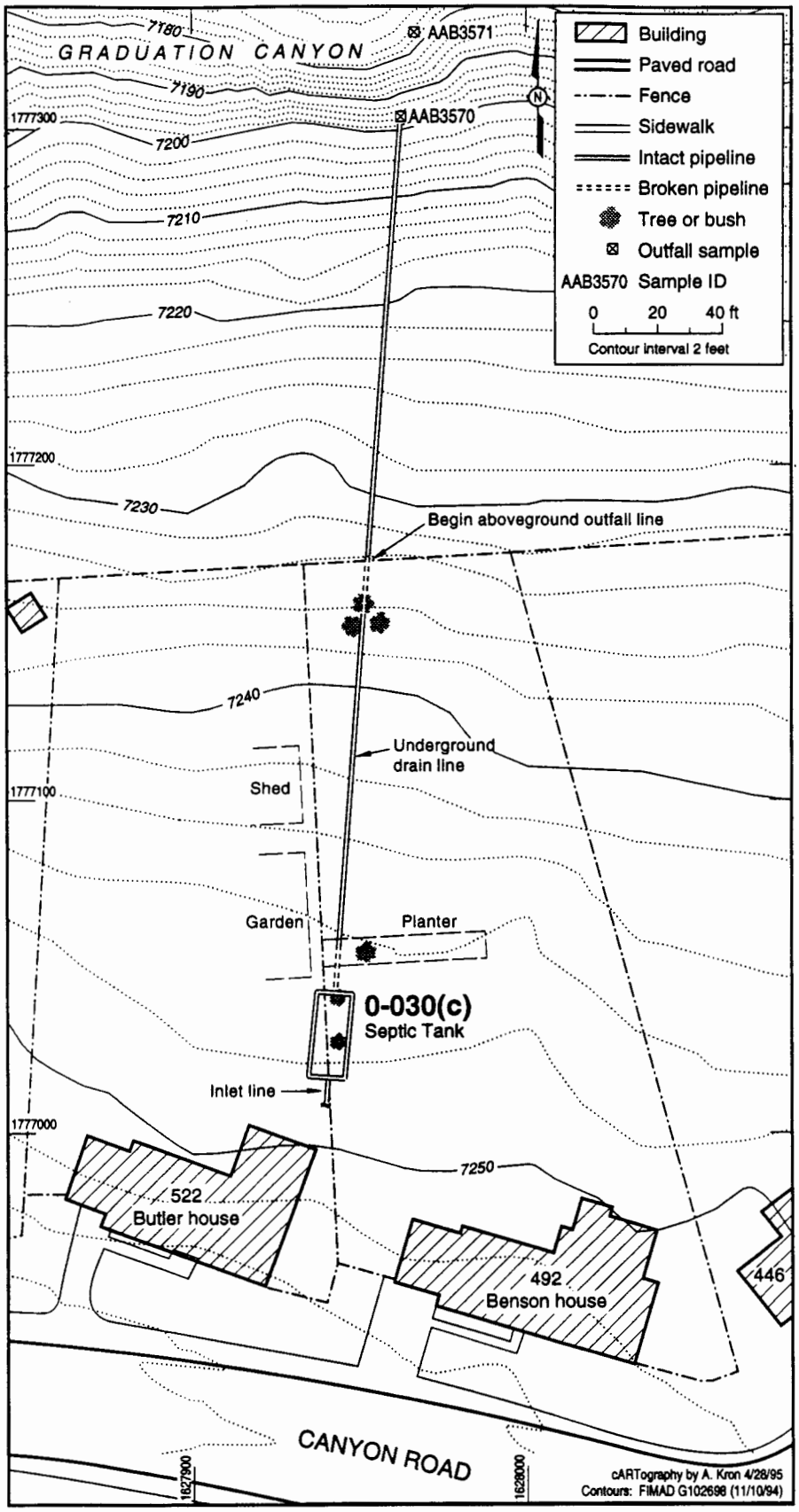


Fig. 4-4. Locations of sample IDs for the outfall at SWMU 0-030(c).

collected from beneath a steel section of the drain line approximately 25 ft north of the northern edge of the septic tank (AAB0195) at a depth of 2 ft bgs (approximately 6 in. below the base of the drain line). Elevated organic vapors (700 ppm) were detected with the PID in the soil beneath the pipe. However, as shown in Subsections 4.1.3 and 4.1.4, analytical results did not indicate the presence of chemical or radiological contamination above normal background levels or SALs at this location. The second sample (AAB0198) was collected from beneath the north end of the drain line at a depth of two feet below ground surface, where the buried portion of the drain line terminated. An aboveground portion of the drain line, which extended approximately 132 ft north of the northern property line to the outfall point in Graduation Canyon, was also removed. This portion of the line consisted of 8-in.-diameter steel pipe that was supported by 18-in.-high concrete stanchions that supported the pipe above the ground surface. At the time of the fieldwork, some of the stanchions had fallen over and the pipe no longer rested on them. The aboveground portion of the drain line and the stanchions were field screened for radioactivity and removed. No elevated readings were observed.

Samples were collected from the outfall area in Graduation Canyon to determine if potential contaminants had accumulated in the drainage beneath the outfall pipe. Two samples (AAB3570 and AAB3571) were collected from sediment traps within the drainage channel, where contaminants were most likely to have accumulated. Samples were collected using scoopulas to obtain sediments from a depth of approximately one to four inches below the surface of the drainage. Sample materials were field screened for radioactivity before sample collection.

4.1.2 SWMU 0-030(c) Quality Assurance / Quality Control Results

A summary of all the QA/QC results for each sample collected during investigation of SWMU 0-030(c) can be found in Table 4-1.

TAL Metals. Eight samples were submitted for TAL metals analysis under five separate requests. For three of the requests, 17121, 17711, and 20454, all of the QC parameters were within allowable limits and all of the data are usable without qualification.

For request 17664, there was a problem with post-digestion spikes (atomic absorption) for arsenic and thallium in one of the samples. This is an indicator of possible interferences in the spectra for particular elements. Therefore, for sample AAB3570 arsenic and thallium are qualified "UJ," estimated undetected quantities.

For request 17712, there were problems with the blind QC samples. All of the open QC samples and the sample duplicates were within allowable limits. However, the blind QC samples were out of allowable limits for many elements (arsenic, mercury, selenium, antimony, thallium, and

TABLE 4-1

SUMMARY OF QUALITY CONTROL RESULTS FOR SWMU 0-030(c)

LOCATION ID	SAMPLE ID	MATRIX CODE	ANALYTE SUITE	REQUEST NUMBER	QUALITY CONTROL (QC) COMMENTS
00-1494	AAB0201	Soil	VOCs[a]	17509	QC results within allowable limits; all data valid.
00-1494	AAB0201	Soil	SVOCs[b]	17513	QC sample had low recoveries, but no analytes were detected. Data not qualified; all data valid.
00-1494	AAB0201	Soil	Pesticides	17513	QC sample had low recoveries, but no analytes were detected. Data not qualified; all data valid.
00-1494	AAB0201	Soil	Radionuclides[c]	18067	QC results within allowable limits; all data valid.
00-1494	AAB0201	Soil	TAL Metals[d]	20454	QC results within allowable limits; all data valid.
00-1496	AAB0293	Water	PCBs[e]	17116	QC sample had low recoveries, but no analytes were detected. Data not qualified; all data valid.
00-1496	AAB0293	Water	SVOCs	17116	QC sample had low recoveries, but no analytes were detected. Data not qualified; all data valid.
00-1496	AAB0293	Water	VOCs	17116	2-Butanone detected in blank (27ug/kg). RPL raised for 2-butanone in samples. All data valid.
00-1496	AAB0293	Water	Pesticides	17118	QC results within allowable limits; all data valid.
00-1496	AAB0293	Water	TAL Metals	17121	QC results within allowable limits; all data valid.
00-1496	AAB0293	Water	Radionuclides	17123	QC results within allowable limits; all data valid.
00-1502	AAB0199	Soil	SVOCs	17709	QC results within allowable limits; all data valid.
00-1502	AAB0199	Soil	Pesticides	17709	QC results within allowable limits; all data valid.
00-1502	AAB0199	Soil	VOCs	17709	QC results within allowable limits; all data valid.
00-1502	AAB0199	Soil	TAL Metals	17712	Blind QC sample had low recoveries, possibly because of error in preparation or dilution of the QC sample. No other QC problems. Data not qualified; all data valid.
00-1502	AAB0199	Soil	Radionuclides	17922	QC results within allowable limits; all data valid.
00-1503	AAB0200	Soil	SVOCs	17709	QC results within allowable limits; all data valid.
00-1503	AAB0200	Soil	Pesticides	17709	QC results within allowable limits; all data valid.
00-1503	AAB0200	Soil	VOCs	17709	QC results within allowable limits; all data valid.
00-1503	AAB0200	Soil	TAL Metals	17712	Blind QC sample had low recoveries, possibly because of error in preparation or dilution of the QC sample. No other QC problems. Data not qualified; all data valid.
00-1503	AAB0200	Soil	Radionuclides	17922	QC results within allowable limits; all data valid.
00-1503	AAB0354	Water	VOCs	17709	QC results within allowable limits; all data valid.

TABLE 4-1 (CONTINUED)

SUMMARY OF QUALITY CONTROL RESULTS FOR SWMU 0-030(c)

LOCATION ID	SAMPLE ID	MATRIX CODE	ANALYTE SUITE	REQUEST NUMBER	QUALITY CONTROL (QC) COMMENTS
00-1504	AAB0195	Soil	SVOCs	17706	QC results within allowable limits; all data valid.
00-1504	AAB0195	Soil	VOCs	17706	QC results within allowable limits; all data valid.
00-1504	AAB0195	Soil	Pesticides	17706	Low surrogate recoveries. All detected values qualified as "J," estimated detected quantities.
00-1504	AAB0195	Soil	TAL Metals	17711	QC results within allowable limits; all data valid.
00-1504	AAB0195	Soil	Radionuclides	17921	QC results within allowable limits; all data valid.
00-1505	AAB0198	Soil	SVOCs	17706	QC results within allowable limits; all data valid.
00-1505	AAB0198	Soil	VOCs	17706	QC results within allowable limits; all data valid.
00-1505	AAB0198	Soil	Pesticides	17706	Low surrogate recoveries. All detected values qualified as "J," estimated detected quantities.
00-1505	AAB0198	Soil	TAL Metals	17711	QC results within allowable limits; all data valid.
00-1505	AAB0198	Soil	Radionuclides	17921	QC results within allowable limits; all data valid.
00-3742	AAB3571	Soil	Pesticides	17661	Low surrogate recovery for QC sample; does not affect the useablity of the data. All data valid.
00-3742	AAB3571	Soil	SVOCs	17661	QC sample had low recoveries, but within recoveries were within surrogate limits. Data not qualified; all data valid.
00-3742	AAB3571	Soil	TAL Metals	17664	QC results within allowable limits; all data valid.
00-3742	AAB3571	Soil	Radionuclides	18065	Low uranium recovery (10%), All uranium data qualified as "J," estimated detected quantities.
00-3743	AAB3570	Soil	Pesticides	17661	Low surrogate recovery for 2-4-5-6 tetrachlorometaxylene. All detected values qualified as "J," estimated detected quantities.
00-3743	AAB3570	Soil	SVOCs	17661	QC sample had low recoveries, but within recoveries were within surrogate limits. Data not qualified; all data valid.
00-3743	AAB3570	Soil	TAL Metals	17664	Post digestion spike problem. Thallium and arsenic values qualified as "J," estimated detected quantities.
00-3743	AAB3570	Soil	Radionuclides	18065	Low uranium recovery (10%), All uranium data qualified as "J," estimated detected quantities.
NONE	AAB0211	Water	VOCs	17509	QC results within allowable limits; all data valid.
NONE	AAB0355	Water	VOCs	17706	QC results within allowable limits; all data valid.

[a] VOCs = Volatile organic compounds.
[b] SVOCs = Semivolatiles organic compounds.
[c] Radionuclides = Analysis for cesium-137, plutonium-238, plutonium-239, americium-241 and total uranium .
[d] TAL Metals = Target analyte list metals.
[e] PCBs = Polychlorinated biphenyls.

barium) by factors of 30% to 1 000. Because all sample values were within background ranges and all other QC parameters were within allowable limits, it is assumed that the blind QC samples are incorrect and all of the data are usable without qualification.

Radionuclides. Eight samples were submitted for radiological analyses under five separate requests. All samples were analyzed for cesium-137, total uranium, plutonium-238, plutonium-239, and americium-241. For four of the requests, 17123, 17921, 17922, and 18067, all QC parameters were within allowable limits and the data are usable without qualification.

For request 18065, there was a low recovery (10%) of uranium in the blind QC sample. Therefore, all of the uranium data are qualified "J," estimated quantities.

Volatile Organic Compounds. Nine samples were submitted for volatile analyses under four separate requests. Three of the requests, 17509, 17706, and 17709, had no QC problems and the data are usable without qualification.

For request 17116, 2-butanone was found in the method blank at a level of 27 µg/kg. Sample AAB0293 contained 2-butanone at the same value, obviously from lab contamination; therefore the reporting limit was raised to 27 µg/kg.

Semivolatile Organic Compounds. Eight samples were analyzed for semivolatile analytes under five separate requests. For request 17709, all of the QC parameters were within allowable limits and all of the data are usable without qualification.

For requests 17116, 17513, and 17706, all QC data were within allowable limits except the blind QC sample data. In all of these requests, 4-chloroaniline and aniline were not detected in the QC sample. Several other analytes were outside the LANL Analytical Group (CST-3) acceptance criteria (30%) but were within the surrogate recovery limits. Because no compounds were detected in any of these requests, all other QC data are acceptable, and no compounds were found in any samples associated with these requests, the data are deemed usable without qualification.

For request 17661, there were a number of the analytes in the blind QC sample (which did not contain aniline and 4-chloroaniline) that were outside the CST-3 acceptance criteria (30%), but were within the surrogate recovery limits. No data qualification was needed.

Pesticides. Eight samples were analyzed for pesticides under five requests. For two of the requests, 17118 and 17709, all of the QC parameters were within allowable limits and all of the data are usable without qualification.

For request 17513, there was a slight problem with a low recovery of Aroclors™ (40%) in the blind QC sample. Because no Aroclors™ were found in the sample and all other QC parameters were within allowable limits, the data are usable without qualification.

For request 17661, there were problems with surrogate recoveries and blind QC recoveries for samples AAB3570 and AAB3571. For both samples, the surrogate recovery for 2-4-5-6 tetrachlorometaxylene (TCMX) was below the allowable limit. A second extraction was done and only the surrogate for AAB3570 was still below the allowed limits. Therefore, only the detected compounds for AAB3570 are qualified "J." The values for the blind QC sample were also low. This is probably due to the low recoveries of the surrogates associated with the blind QC sample. The laboratory did not do a second extraction of the QC sample.

Request 17706 had problems similar to those found in request 17661. Several of the surrogate recoveries for samples AAB0195 and AAB0198 were low, as well as the QC sample recoveries. The samples were not extracted again; therefore, all of the detected values are qualified "J."

Polychlorinated Biphenyls. One sample was analyzed for PCBs.

For request 17116, the blind QC samples had low recoveries. However, a thorough examination of the chromatogram for sample AAB0293 showed that it was totally absent of any possible Aroclor™ patterns that would have yielded a result above the estimated quantitation limit (EQL). Therefore, the data for this sample are usable without qualification.

4.1.3 Background Comparisons for SWMU 0-030(c)

This subsection describes the background comparisons performed using the analytical results from samples collected at SWMU 0-030(c). Appendix B presents the analytical data, showing a summary of the samples collected and the analyses performed, the detected values for inorganics and organics, and the background UTLs and SALs used for comparisons. Results of further statistical comparisons with background are presented in the following subsections.

Table 4-2 shows the inorganic analytes that were detected in soil at concentrations in excess of their respective UTLs. Inorganic analysis was requested for seven RFI soil samples collected at this site. One of the samples was analyzed twice (laboratory duplicate of sample AAB0198). Only the two outfall samples were analyzed for manganese. Reported manganese concentrations were 1 930 mg/kg and 352 mg/kg, compared with its UTL of 1 030 mg/kg. Of the seven samples that were analyzed for mercury, all but two (AAB3570 and AAB3571) were analyzed three times. Only the samples from the outfall had observed concentrations in excess of the reported maximum background value of 0.1 mg/kg.

TABLE 4-2

SWMU 0-030(c) INORGANICS WITH CONCENTRATIONS[a] THAT EXCEED UTLs[b]

ANALYTE	SAMPLE ID	SAMPLE VALUE (mg/kg)	UTL (mg/kg)	DEPTH (ft)	LOCATION DESCRIPTION
Manganese	AAB3571	1930	1030	0.50	outfall
Mercury	AAB3570	0.22	0.1[c]	0.08–0.33	outfall
	AAB3571	0.34		0.50	outfall

[a] PRS 0-030(c) analytical data were extracted from the Facility for Information Management, Analysis, and Display on April 19, 1995.
[b] UTL = Upper tolerance limit - 95th upper confidence bound of the 99th percentile.
[c] There was an insufficient number of samples to calculate the UTL for this analyte; the maximum value in the background range was used (Longmire et al. in preparation, 1142).

Table 4-3 shows the radionuclide analytes that were detected in soil at concentrations in excess of their respective UTLs or the background maximums when UTLs do not exist. Radionuclide analyses were requested for seven RFI soil samples collected at this site. Two of the samples were analyzed twice for some radionuclides (laboratory duplicates of samples AAB0200 and AAB0201). Cesium-137 and plutonium-239 were detected in the outfall samples. One detected value of cesium-137, at 2.22 pCi/g, exceeds the maximum reported background value of 1.4 pCi/g, and both detections of plutonium-239 exceeded its maximum reported background value of 0.052 pCi/g.

TABLE 4-3

SWMU 0-030(c) RADIONUCLIDES WITH CONCENTRATIONS[a] THAT EXCEED UTLs[b]

ANALYTE	SAMPLE ID	SAMPLE VALUE (pCi/g)	MAXIMUM BACKGROUND (pCi/g)	DEPTH (ft)	LOCATION DESCRIPTION
Cesium-137	AAB3571	2.22	1.4[c]	0.50	outfall
Plutonium-239	AAB3570	0.15	0.052[c]	0.08–0.33	outfall
	AAB3571	0.17		0.50	outfall

[a] PRS 0-030c analytical data were extracted from the Facility for Information Management, Analysis, and Display (FIMAD) on April 19, 1995.
[b] UTL = Upper tolerance limit.
[c] Maximum background concentration from the LANL Environmental Surveillance reports.

PAHs, the only organic compounds for which background data are available, were not detected in any of the seven soil samples submitted for organics analysis. Detected organic compounds are listed in Table 4-4. Most of the detected organic compounds are pesticides or pesticide degradates most likely originating from domestic use, although bis(2-ethylhexyl)phthalate was detected in one of the outfall samples, and 1,1,1-trichloroethane was detected in another sample.

In summary, the analytes detected above the UTL or background at SWMU 0-030(c) include the following: manganese, mercury, cesium-137, plutonium-239, Aldrin™, BHC(-beta), bis(2-ethylhexyl)phthalate, (p,p'-)dichlorodiphenyltrichloroethane [DDT (p,p')], Endrin™, heptachlor, and 1,1,1-trichloroethane (1,1,1-TCA).

TABLE 4-4

SWMU 0-030(c) DETECTED CONCENTRATIONS[a,b] FOR ORGANICS

ANALYTE	SAMPLE ID	SAMPLE VALUE (mg/kg)	MAX. LOD[c] (mg/kg)	DEPTH (ft)	LOCATION DESCRIPTION
Aldrin	AAB3570	0.0132	0.00231	0.08–0.33	outfall
BHC (beta-)	AAB3570	0.00658	0.00231	0.08–0.33	outfall
Bis(2-ethylhexyl) phthalate	AAB3571	9.5	0.39	0.50	outfall
DDT [p,p'-] dichlorodiphenyl-trichloroethane[d]	AAB0195	0.019	0.0035[e]	2.00	pipe
	AAB0198	0.11		2.00	pipe
	AAB0199	0.0136		2.00	tank
	AAB0200	0.145		2.00	tank
	AAB0201	0.126		6.00	tank
	AAB3570	0.306		0.08–0.33	outfall
	AAB3571	0.156		0.50	outfall
Endrin	AAB3570	0.023	0.00448	0.08–0.33	outfall
Heptachlor	AAB3570	0.0161	0.00231	0.08–0.33	outfall
Trichloroethane [1,1,1]	AAB0199	0.011	0.022	2.00	tank

[a] PRS 0-030(c) analytical data were extracted from the Facility for Information Management, Analysis, and Display (FIMAD) on April 19, 1995.
[b] Detected acetone concentrations are not reported here because their presence is thought to be due to laboratory contamination.
[c] LOD = Limit of Detection is the maximum LOD reported for non-detects for each analyte.
[d] Degradates DDD[p,p'] and DDE[p,p'] were detected in the same samples.
[e] DDT[p,p'] was detected in all samples. The maximum LOD presented was reported for non-detects of DDT[p,p'] in waste samples taken from this PRS.

4.1.4 SAL Comparisons at SWMU 0-030(c)

This subsection presents results of the human health-based SAL comparison for the constituents detected in samples collected at SWMU 0-030(c).

No analytes were detected at concentration levels greater than SALs at this SWMU. The analytes that were detected above background levels are included in the following multiple-constituent SAL comparisons. Note that the multiple-constituent comparisons are performed separately for the three classes of analytes: noncarcinogens, carcinogens (nonradioactive), and radionuclides.

Inorganics detected at concentrations greater than background, Endrin™, and 1,1,1-TCA are the systemic constituents to be considered in a multiple-constituent SAL comparison. The total normalized concentration in the worst-case sample (AAB3571) is approximately 0.19, indicating that these constituents should not pose a noncarcinogenic health risk. No unacceptable adverse human health effects are indicated.

The list of carcinogenic chemicals to be considered in a multiple-constituent comparison includes several pesticides and pesticide degradates. The total normalized concentration in the worst-case sample (AAB3571) is approximately 0.51, a value that is largely dominated by the contribution from the pesticide Aldrin™. These results suggest that these constituents should not pose an unacceptable carcinogenic health risk.

The SAL for plutonium-239 is 18 pCi/g, and for cesium-137 is 4 pCi/g. Considering the detected concentrations of these radionuclides, presented in Table 4-5, it is apparent that these constituents should not pose an unacceptable carcinogenic health risk based on a multiple-constituent SAL comparison. The detected concentration of cesium-137 dominates the multiple-constituent comparison in the worst-case sample (AAB3571), contributing a normalized value of 0.555. Results for the plutonium isotope do not add significantly to this value.

4.1.5 Ecotoxicological Screening Assessment for SWMU 0-030(c)

Septic tank 0-030(c) was located north of Canyon Road and had a 300 ft drain line running directly north to an outfall in Graduation Canyon. Graduation Canyon is a narrow, one-half-mile-long side canyon to the much larger mid Pueblo Canyon which is about 1 500 ft wide in this area. Pueblo Canyon stretches from Pajarito Mountain all the way to the Rio Grande and contains sensitive habitats and threatened and endangered species (Biggs 1993, 05-0209; Johnson 1992, 1097).

TABLE 4-5

MULTIPLE CONSTITUENT EVALUATION FOR SWMU 0-030(c) DATA

ANALYTE	SAMPLE ID	SAMPLE VALUE (mg/kg)	SOIL SAL[a] (mg/kg)	NORMALIZED VALUE
NONCARCINOGENIC EFFECTS				
Manganese	AAB3571	1 930	11 000	0.175
Mercury		0.34	24	0.014
Endrin		ND[b]	24	NA[c]
Trichloroethane [1,1,1]		0.011	1 000	0.000011
Total				**0.19**
CARCINOGENIC EFFECTS (NONRADIOACTIVE)				
Aldrin	AAB3570	0.0132	0.04	0.33
BHC [beta-]		0.00658	4	.0016
Bis-(2-ethylhexyl)phthalate		ND	50	NA
[p,p'-] dichlorodiphenyl-dichloroethane		.0522	2.9	0.018
[p,p'-] dichlorodiphenyl-dichloroethylene		.129	2.1	0.061
[p,p'-] dichlorodiphenyl-trichloroethane		.306	2.1	0.15
Heptachlor		.0161	0.16	0.10
Total				**0.51**
RADIONUCLIDE EFFECTS				
Cesium-137 (pCi/g)	AAB3571	2.22	4	0.556
Plutonium-239 (pCi/g)		0.169	18	0.0094
Total				**0.56**

[a] For constituents that exhibit both systemic and carcinogenic effects, the most conservative is used in screening assessment.
[b] ND = Not detected.
[c] NA = Not applicable.

Because the site on the mesa top is part of a suburban area and not a natural habitat, samples from the tank area were not addressed as part of this ecotoxicological screening assessment. Table 4-6 presents the values for the analytes greater than UTL and LOD for the sample locations at the outfall (AAB3570) and further down into Graduation Canyon (AAB3571). ESALs are given for each analyte and the results of the screening of these values against the ESALs are given in the last column as COPECs. The COPECs are then screened using the decision tree shown in Fig. 3-2, which completes the ecotoxicological screening assessment.

TABLE 4-6

ANALYTE COMPARISON TO ESALs[a]

SAMPLE ID	ANALYTE	VALUE (mg/kg)	UTL[b]/LOD[c] (mg/kg)	DEPTH (ft)	LOCATION	ESAL (mg/kg)	COPEC[d]
AAB3571	Manganese	1 930	1 030[b]	0.5	Outfall	0.002[e,f]	no[g]
	Mercury	0.34	0.1[b]			0.26[e,f]	yes
	Cesium-137	2.22	1.4[b]			4[e,h,i]	no
	Plutonium-239	0.17	0.052[b]			18[e,h,i]	no
	Bis(2-ethylhexyl)-phthalate	9.5	0.39[b]			0.095[e,h]	yes
	DDT[p,p']	0.156	0.0035[c]			0.0039[e,h]	yes
AAB3570	Mercury	0.22	0.1[b]	0.08–0.33	Outfall	0.26[e,f]	no
	Plutonium-239	0.15	0.052[b]			18[e,h,i]	no
	Aldrin	0.013	0.0023[c]			0.000078[e,h]	yes
	beta-BHC	0.0066	0.0023[c]			0.00074[e,h]	yes
	DDT[p,p']	0.31	0.0035[c]			0.0039[e,h]	yes
	Endrin	0.023	0.0045[c]			0.011[e,f]	yes
	Heptachlor	0.016	0.0023[c]			0.00075[e,h]	yes

[a] ESAL = Ecotoxicological screening action level.
[b] UTL = Upper tolerance limit.
[c] LOD = Limit of detection.
[d] COPEC = Chemical of potential ecological concern.
[e] Soil ingestion pathway.
[f] Systemic toxicant.
[g] Manganese is a common soil micronutrient in the range of 700-1000 ppm (Brady 1990, 05-0214)
[h] Carcinogenic toxicant.
[i] SAL is used for radionuclide because radiation-induced carcinogenisis for these organisms is unknown.

The ESALs used for the comparison represent the most conservative value developed for large and small birds, mammals, and reptiles in these ecosystems (Ebinger et al. 1994, 05-0210). The most sensitive organism in all cases was a small omnivorous or granivorous bird which occupied the site continuously and ingested the contaminant with food or incidental soil. Because the drain line samples (AAB0195 and AAB0198) were collected at a depth of two feet, an environment for burrowing animals, and the only

COPEC identified in the screening assessment was (p,p'-)DDT, which was at levels below those found in the outfall samples, the drain line samples warrant no further consideration. Thus, the seven COPECs listed in the table represent contaminants at the outfall which could be transported into the canyon habitats. SWMU 0-030(c) is not within the sensitive habitat of a threatened and endangered species, floodplain, or wetland, and the site has been remediated by removing the tank, its contents, and surrounding soil.

The final ecotoxicological screening decision (Fig. 3-2) is a determination of whether the site has past, present, or potential contaminant transport across SWMU boundaries into adjacent areas that may contain sensitive habitats. Removal of the tank, its contents, and associated soil eliminated residual levels of (p,p'-) DDT and 1,1,1-TCA (see Table 4-4 in section 4.1.3), which were found during site characterization. Sources for the other contaminants are not known; but pesticides and mercury (possibly from early fungicide use) are common lawn and garden contaminants that could have contributed to the downgradient location at the outfall.

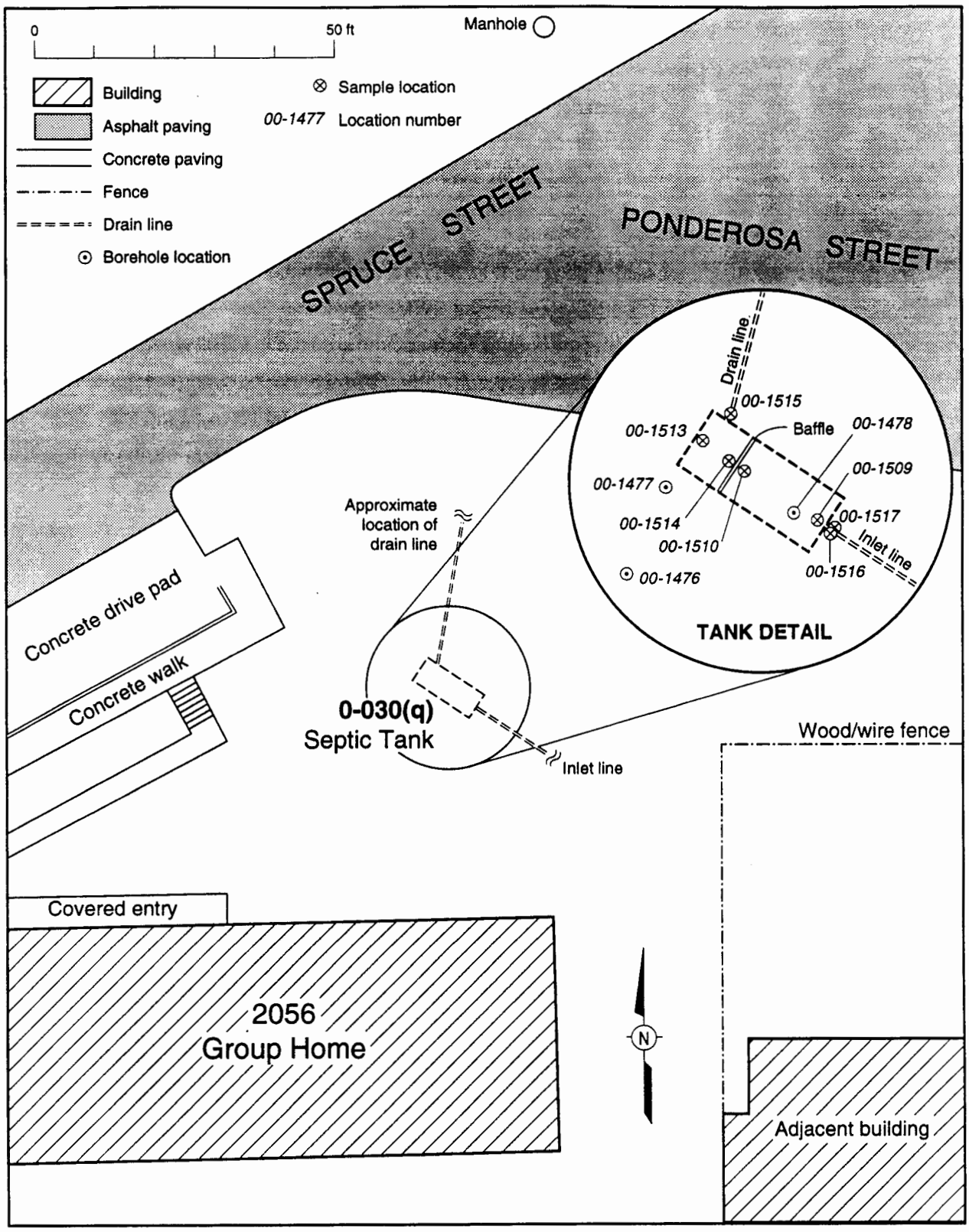
4.2 SWMU 0-030(q)

4.2.1 Field Investigation and Sampling Activities at SWMU 0-030(q)

Field activities at SWMU 0-030(q) consisted of borehole drilling and subsurface sample collection to precharacterize the septic tank materials, followed by septic tank removal and characterization sampling from beneath the tank and drain line. Table B-5 in Appendix B describes how each sample was used (e.g., precharacterization, local background, septic tank characterization, or RFI characterization). The drain line from SWMU 0-030(q) connects to the septic tank at SWMU 0-030(e)-south. No outfall area is directly associated with SWMU 0-030(q). Screening, drilling, sampling, and excavation activities were conducted between February and June 1994, in accordance with appropriate LANL ER Project SOPs.

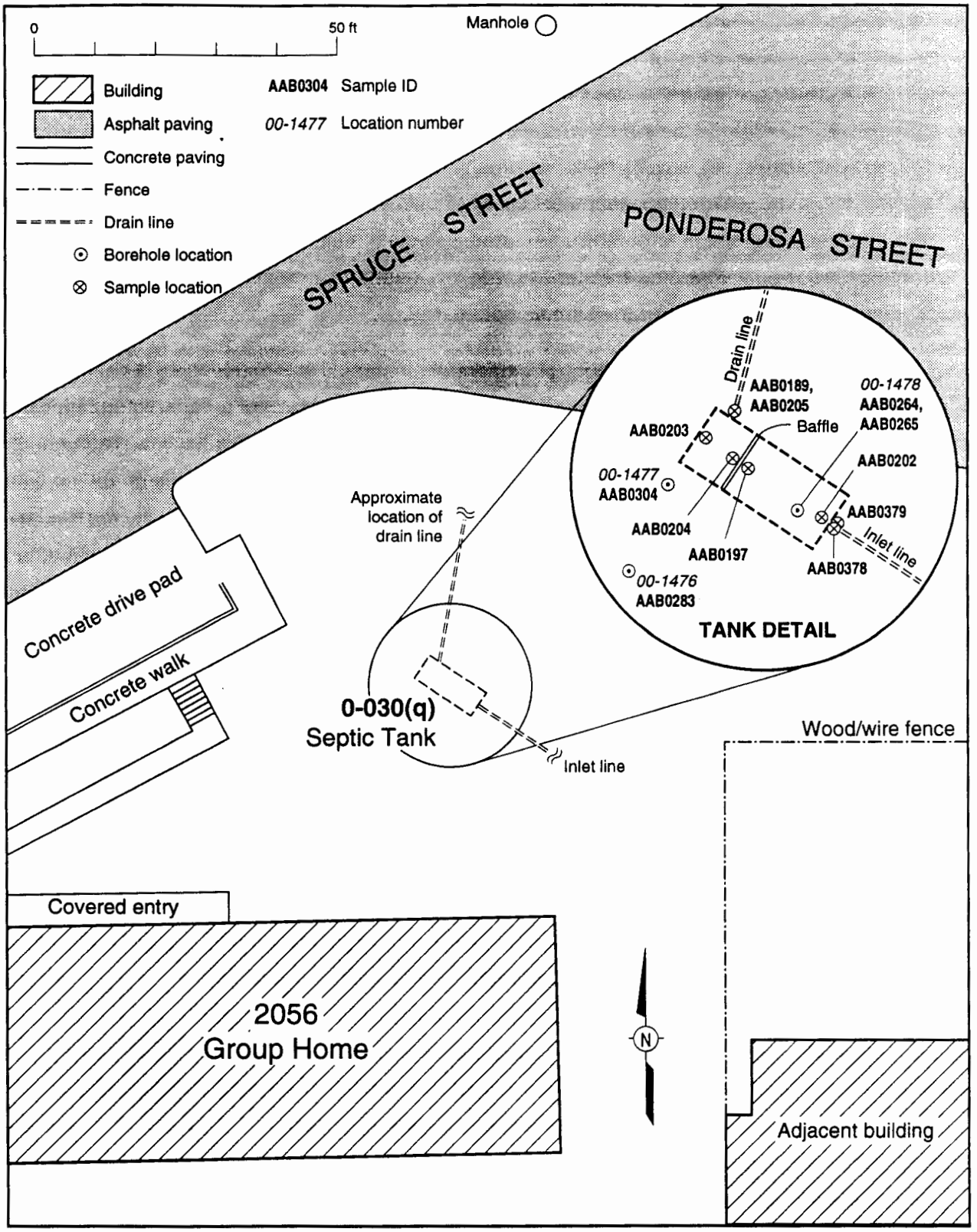
The tank and drain line locations were determined by examination of historic aerial photographs, archival review of maps and engineering plans, and thorough visual inspection of the site. The location of the tank and drain line, indicated by maps and plans, was marked in the field by professional surveyors. Surface geophysical surveys using magnetometry and/or ground-penetrating radar were conducted to more precisely locate the septic tank and drain line.

Precharacterization samples. Three boreholes at locations 00-1476, 00-1477, and 00-1478, were drilled and sampled to precharacterize the tank contents. Location IDs are shown in Fig. 4-5 and sample IDs are shown in Fig. 4-6. Two samples (AAB0265 and AAB0264) were collected from location ID 00-1478, at depths of 0 to 1.5 ft and 5 to 7.5 ft (the fill/tuff interface),



Source: Surv-Tek, Feb. 1994, LANL-11.DWG
Modifed by: cARTography by A. Kron 4/28/95

Fig. 4-5. Sampling locations for SWMU 0-030(q), septic tank.



Source: Surv-Tek, Feb. 1994, LANL-11.DWG
Modifed by: cARTography by A. Kron 4/28/95

Fig. 4-6. Locations of sample IDs for SWMU 0-030(q), septic tank.

respectively, to precharacterize the contents of the septic tank. Asphalt and concrete fragments were encountered within this borehole to a depth of 6.5 ft bgs (the fill/tuff interface), which indicated that the borehole was potentially within the septic tank or a backfilled excavation that formerly contained the septic tank. The other two boreholes, 00-1476 and 00-1477, were not sampled because there was no evidence of the septic tank or fill material in the boreholes. A sample was collected from borehole 00-1477 (AAB0304) from a depth of 2 to 5 ft bgs to confirm that elevated readings of VOCs detected at a maximum level of 300 ppm resulted from the aromatic roots of a pine tree adjacent to the borehole. The roots were encountered in the borehole and collected within the sample barrel.

The tank was finally located through exploratory trenching at the suspected tank location based on historical information, engineering drawings, and the results of precharacterization drilling. The outside dimensions of the tank were 12 ft long (east to west) by 5 ft wide (north to south). The tank was constructed of 3- to 6-in.-thick concrete with no reinforcement and no concrete floor. The bottom of the tank consisted of hard, consolidated tuff and the walls were set directly on the tuff. The tank contained two separate chambers. The larger chamber, measuring 7.5 ft long (east to west) by 4.5 ft wide by 7.5 ft deep, was located on the east side of the tank and contained a partial concrete baffle. The smaller chamber, measuring 3.5 ft long (east to west) by 4.5 ft wide by 4.5 ft deep, was located on the west side of the tank and separated from the east chamber by a concrete baffle with a horizontal slot. The baffle extended from the tank floor to the top of the walls. The contents of the tank consisted mostly of fill material (crushed tuff/soil) and some tank rubble. No cracking or staining was observed on the interior walls or the tuff floor of the tank.

RFI Samples. Three RFI characterization samples were collected from inside the tank at the fill/tuff interface during excavation. One of these samples (AAB0202) was collected at a depth of 8 ft bgs from inside the east chamber of the tank at the base of the east wall, directly below the inlet line. The second sample (AAB0203) was collected from the base of the west wall of the west chamber at a depth of 4.5 ft bgs. The third sample (AAB0204) was collected from the base of the east wall (baffle) of the west chamber at a depth of 4.5 ft bgs. Sample AAB0197 was collected for confirmatory MRAL screening from the base of the west wall (baffle) of the east chamber at a depth of 7.5 ft bgs. One soil sample (AAB0378) was collected for MRAL screening from inside the tank inlet line at a depth of 2.75 ft bgs, and another soil sample (AAB0379) was collected from beneath the inlet line at a depth of 3 ft bgs. Each backhoe bucket of material removed from the tank was screened for organic vapors and radioactivity before being dumped onto the soil stockpiles. Soils were also screened periodically for mercury vapor and explosive atmospheres.

During septic tank excavation and removal activities, the drain line leading to the north from the west chamber of the tank, was sampled for RFI characterization. Samples AAB0189 and duplicate AAB0205 were collected from beneath the drain line at a point one foot north of the outside of the tank wall, near the midpoint of the north wall of the west chamber. The sample depth was 2.5 ft bgs. The drain line leading from the tank was not removed. The exact orientation and location of the drain line was difficult to determine because it had been disturbed by the installation of an active sewer line which crosses the site and was broken and infilled with soil/fill material. In addition, the pipe at the point where the drain line entered the tank was not intact. The drain line appeared to be located at a depth of approximately 2 to 2.5 ft bgs and trended toward the north.

4.2.2 SWMU 0-030(q) Quality Assurance/Quality Control Results

A summary of all the QA/QC results for each sample collected for SWMU 0-030(q) can be found in Table 4-7.

TAL Metals. Seven samples were analyzed for TAL metals under three requests. All QC parameters for requests 17860 and 17999 were within allowable limits and all data are usable without qualification.

For request 17093, cadmium had a low value at 37%. However, cadmium values were also low in the sample, so all data are usable without qualification.

Radionuclides. Six samples were submitted for radiological analyses under three separate requests. All samples were analyzed for cesium-137, total uranium, plutonium-238, plutonium-239, and americium-241. For request 18074, all QC parameters were within allowable limits and the data are usable without qualification.

For request 18065, there was a low recovery of uranium in the blind QC sample. There was only a 10% recovery; therefore, all of the uranium data are qualified "J," estimated quantities.

For request 18073, the only QC problem was that the LANL-required EQL of 0.01 pCi/g for plutonium was not met. Instead, an EQL of 0.2 pCi/g was delivered. Because all data for this sample were low, and the SAL is 18 pCi/g, the elevated EQL does not affect the usability of the data.

Volatile Organic Compounds. Seven samples were analyzed for volatile organic analytes under two separate requests. For request 17730, all of the QC parameters were within allowable limits and all data are usable without qualification.

TABLE 4-7

SUMMARY OF QUALITY CONTROL RESULTS FOR SWMU 0-030(q)

LOCATION ID	SAMPLE ID	MATRIX CODE	ANALYTE SUITE	REQUEST NUMBER	QUALITY CONTROL (QC) COMMENTS
00-1477	AAB0304	Soil	TAL Metals[a]	17093	Cadmium value 37% low in QC sample, but cadmium values also low in sample. Data not qualified; all data valid.
00-1509	AAB0202	Soil	Pesticides	17787	High surrogate recovery for decachlorobiphenyl. All detected values qualified as "J," estimated detected quantities.
00-1509	AAB0202	Soil	SVOCs[b]	17787	QC results within allowable limits; all data valid.
00-1509	AAB0202	Soil	VOCs[c]	17787	Internal standard low, all analytes related to 1,4-dichlorobenzene qualified as "UJ," estimated undetected quantities (no detects).
00-1509	AAB0202	Soil	TAL Metals[a]	17860	QC results within allowable limits; all data valid.
00-1509	AAB0202	Soil	Radionuclides[d]	18073	Estimated quantitation limits for plutonium were not met, but data not qualified. All data valid.
00-1513	AAB0203	Soil	Pesticides	17730	Low surrogate recovery for 2-4-5-6 tetrachlorometaxylene. All detected values qualified as "J," estimated detected quantities.
00-1513	AAB0203	Soil	SVOCs[b]	17730	QC results within allowable limits; all data valid.
00-1513	AAB0203	Soil	VOCs[c]	17730	QC results within allowable limits; all data valid.
00-1513	AAB0203	Soil	TAL Metals[a]	17999	QC results within allowable limits; all data valid.
00-1513	AAB0203	Soil	Radionuclides[d]	18074	QC results within allowable limits; all data valid.
00-1513	AAB0377	Water	VOCs[c]	17730	QC results within allowable limits; all data valid.
00-1514	AAB0204	Soil	Pesticides	17730	Low surrogate recovery for 2-4-5-6 tetrachlorometaxylene. All detected values qualified as "J," estimated detected quantities.
00-1514	AAB0204	Soil	SVOCs[b]	17730	QC results within allowable limits; all data valid.
00-1514	AAB0204	Soil	VOCs[c]	17730	QC results within allowable limits; all data valid.
00-1514	AAB0204	Soil	TAL Metals[a]	17999	QC results within allowable limits; all data valid.
00-1514	AAB0204	Soil	Radionuclides[d]	18074	QC results within allowable limits; all data valid.
00-1515	AAB0189	Soil	Pesticides	17730	Low surrogate recovery for 2-4-5-6 tetrachlorometaxylene. All detected values qualified as "J," estimated detected quantities.
00-1515	AAB0189	Soil	SVOCs[b]	17730	QC results within allowable limits; all data valid.
00-1515	AAB0189	Soil	VOCs[c]	17730	QC results within allowable limits; all data valid.
00-1515	AAB0189	Soil	TAL Metals[a]	17999	QC results within allowable limits; all data valid.
00-1515	AAB0189	Soil	Radionuclides[d]	18074	QC results within allowable limits; all data valid.
00-1515	AAB0205	Soil	Pesticides	17730	Low surrogate recovery for 2-4-5-6 tetrachlorometaxylene. All detected values qualified as "J," estimated detected quantities.
00-1515	AAB0205	Soil	SVOCs[b]	17730	QC results within allowable limits; all data valid.
00-1515	AAB0205	Soil	VOCs[c]	17730	QC results within allowable limits; all data valid.

TABLE 4-7 (CONTINUED)

SUMMARY OF QUALITY CONTROL RESULTS FOR SWMU 0-030(q)

LOCATION ID	SAMPLE ID	MATRIX CODE	ANALYTE SUITE	REQUEST NUMBER	QUALITY CONTROL (QC) COMMENTS
00-1515	AAB0205	Soil	TAL Metals[a]	17999	QC results within allowable limits; all data valid.
00-1515	AAB0205	Soil	Radionuclides[d]	18074	QC results within allowable limits; all data valid.
00-3740	AAB3572	Soil	Pesticides	17661	Low surrogate recovery for 2-4-5-6 tetrachlorometaxylene. All detected values qualified as "J," estimated detected quantities.
00-3740	AAB3572	Soil	SVOCs[b]	17661	QC sample had low recoveries, but the recoveries were within surrogate limits. Data not qualified; all data valid.
00-3740	AAB3572	Soil	TAL Metals[a]	17664	Post-digestion spike problem. All detected values qualified as "J," estimated detected quantities.
00-3740	AAB3572	Soil	Radionuclides[d]	18065	Low uranium recovery (10%). All uranium data qualified "J," estimated detected quantities.
Not applicable	AAB0373	Water	VOCs[c]	17787	QC results within allowable limits; all data valid.

[a] TAL Metals = Target analyte list metals.
[b] SVOCs = Semivolatile organic compounds.
[c] VOCs = Volatile organic compounds.
[d] Radionuclides = Analysis for cesium-137, plutonium-238, plutonium-239, americium-241 and total uranium .

For request 17787, the last internal standard for sample AAB0202 (1,4 dichlorobenzene-d4) was below the acceptance limits. Because of this, all of the analytes associated with 1,4 dichlorobenzene-d4 are qualified "UJ," estimated undetected quantities. No associated analytes were detected.

Semivolatile Organic Compounds. Six samples were analyzed for semivolatile organic analytes under three requests. Two requests, 17730 and 17787, had all QC parameters within allowable limits and all data are usable without qualification.

For request 17661, the QC sample had low recoveries. However, because all recoveries were within surrogate limits, all of the data are usable without qualification.

Pesticides. Six samples were analyzed for pesticides under three requests. All of the requests had QC problems.

For request 17730, sample AAB0204 had a low recovery for the TCMX surrogate. Because of this, all of the detected analytes in AAB0204 are qualified "J."

For request 17787, sample AAB0202 had surrogate recovery problems. The recovery of decachlorobiphenyl was above the upper control limit. Because of this, the detected compounds for AAB0202 are qualified "J."

For request 17661, the QC sample had low recoveries. However, because all recoveries were within surrogate limits, all of the data are usable without qualification.

4.2.3 Background Comparisons for SWMU 0-030(q)

This subsection describes the background comparisons performed using analytical results from samples collected at SWMU 0-030(q). Appendix A presents the analytical data, showing a summary of the samples collected and the analyses performed, the detected values for inorganics and organics, and the background UTLs and SALs used for comparisons. Results of further statistical comparisons with background are presented in the following subsections.

Table 4-8 shows the inorganic analytes that were detected in soil at concentrations in excess of their respective UTLs. A full suite of inorganic analyses was requested for six soil samples that were collected at this site, one of which was a field duplicate (AAB0189 and AAB0205), and two of which were analyzed twice (laboratory duplicates of samples AAB0202 and AAB0205). Results for copper were reported for five samples only. Copper was detected in each of these samples, but only once at a concentration (160 mg/kg) that exceeds its UTL of 15.7 mg/kg. Lead was detected in one sample at a concentration in excess of its UTL. The range of detected lead concentration values indicates that lead may be present at levels marginally greater than background. Figure 4-4 provides a comparison of background and site lead concentration data.

TABLE 4-8

SWMU 0-030(q) INORGANICS WITH CONCENTRATIONS[a] THAT EXCEED UTLs[b]

ANALYTE	SAMPLE ID	SAMPLE VALUE (mg/kg)	UTL (mg/kg)	DEPTH (ft)	LOCATION DESCRIPTION
Copper	AAB0202	160	15.7	8.00	tank
Lead	AAB0202	58	39	8.00	tank
Mercury	AAB0202	1.9[c]	0.1[d]	8.00	tank
	AAB0204	0.17[c]		4.50	tank
Silver	AAB0202	2.4	1.61[d]	8.00	tank
Zinc	AAB0202	250	101	8.00	tank
	AAB0204	140		4.50	tank

[a] PRS 0-030(q) analytical data were extracted from the Facility for Information Management, Analysis, and Display on April 19, 1995.
[b] UTL = Upper tolerance limit - 95th upper confidence bound of the 99th percentile.
[c] Average concentration from three analyses of the same prepared sample.
[d] There was an insufficient number of samples to calculate the UTL for this analyte; the maximum value in the background range was used (Longmire et al. in preparation, 1142).

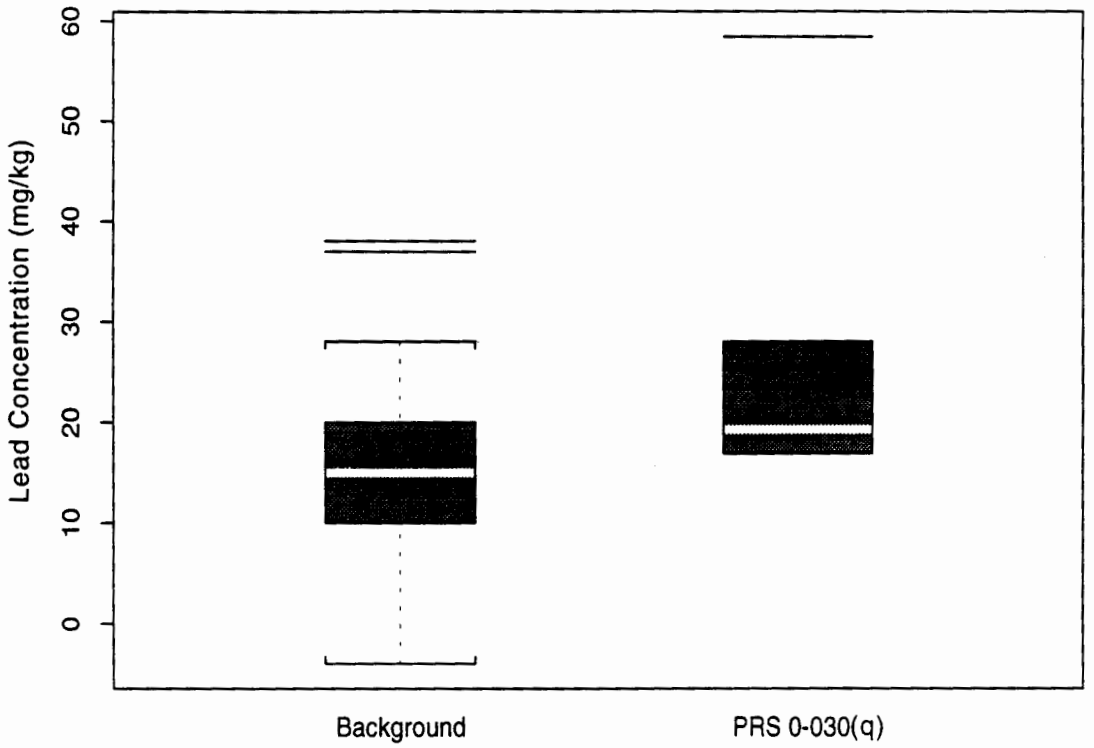


Fig. 4-7. Distributions of background and site lead concentrations. Statistical tests for the difference between these two distributions indicate that the distributions are different (t-test and Wilcoxon test significant at the 0.01 level).

More formal statistical tests indicate a difference between the two distributions. For example, the t-test and Wilcoxon rank sum tests resulted in differences at observed significance levels respectively of 0.004 and 0.013 (LANL1995, 05-0215).

The six samples that were analyzed for mercury were analyzed three times each. Mercury was detected in five of these samples, but only two of these detections were at concentrations in excess of the maximum background value of 0.1 mg/kg. Mercury results reported in Table 4-8 reflect average concentrations for repeated analyses. Silver was detected in only one sample, and zinc was detected in two samples at concentrations greater than its UTL.

No radionuclides were detected in the RFI soil samples for this SWMU. PAHs were not detected in any of the five soil samples submitted for organics analysis. Other detected organics are listed in Table 4-9. The detected organics are pesticides or pesticide degradates most likely originating from domestic use.

TABLE 4-9

SWMU 0-030(q) DETECTED CONCENTRATIONS[a,b] FOR ORGANICS

ANALYTE	SAMPLE ID	SAMPLE VALUE (mg/kg)	MAX. LOD[c] (mg/kg)	DEPTH (ft)	LOCATION DESCRIPTION
[p,p'-] dichlorodiphenyl trichloroethane[d]	AAB0189 AAB0205	0.106[e]	0.00362[f]	2.50	tank
	AAB0202	0.0486		8.00	tank
	AAB0203	0.00911		4.50	tank
	AAB0204	0.00629		4.50	tank
Methoxychlor	AAB0189 AAB0205	0.098[e]	0.0183	2.50	tank

[a] PRS 0-030(q) analytical data were extracted from the Facility for Information Management, Analysis, and Display (FIMAD) on April 19, 1995.
[b] Acetone was detected in two samples. The results are not reported here because its presence is thought to be due to laboratory contamination.
[c] LOD = Limit of Detection - is the maximum LOD reported for nondetects for each analyte.
[d] Degradates DDD[p,p'] and DDE[p,p'] were detected in the same samples.
[e] Average of sample concentrations from first sample (AAB0189) and field duplicate (AAB0205).
[f] DDT[p,p'] was detected in all samples. The maximum LOD presented was reported for nondetects of DDT[p,p'] in waste samples taken from this PRS.

In summary, the analytes detected above the UTL or background at SWMU 0-030(q) include copper, lead, mercury, silver, zinc, (p,p'-)DDT, and methoxychlor.

4.2.4 SAL Comparisons at SWMU 0-030(q)

This subsection presents results of the human health-based SAL comparison for the constituents detected in samples collected at SWMU 0-030(q).

No analytes were detected at levels greater than SALs at this SWMU. However, several analytes were detected at levels greater than background. These analytes are presented in the following multiple constituent SAL comparisons. Summary information is presented in Table 4-10.

The inorganics detected at concentrations greater than background (as shown in Table 4-9) and methoxychlor are the systemic toxicants to be considered in a multiple-constituent SAL comparison. Lead dominates this multiple-constituent analysis in the worst-case sample (AAB0202), contributing one-half of the total normalized concentration of approximately 0.3. These results indicate that these constituents should not pose a noncarcinogenic health risk.

The only carcinogens detected were (p,p'-) dichlorodiphenyltrichloroethane [DDT(p,p')] and its degradates (p,p'-) dichlorodiphenyldichloroethane [DDD(p,p')] and (p,p'-) dichlorodiphenyldichloroethylene [DDE(p,p')]. Considering the detected concentrations of these pesticides, as presented in Table 4-10, it is apparent that these constituents should not pose an unacceptable carcinogenic health risk based on a multiple-constituent SAL comparison. The sum of normalized concentrations is approximately 0.125 for the worst-case sample (AAB0189/AAB0205).

TABLE 4-10

MULTIPLE CONSTITUENT EVALUATION FOR SWMU 0-030(q) DATA

ANALYTE	SAMPLE ID	SAMPLE VALUE (mg/kg)	SOIL SAL[a] (mg/kg)	NORMALIZED VALUE
NONCARCINOGENIC EFFECTS				
Copper	AAB0202	160	3 000	0.053
Lead		58	400	0.15
Mercury		1.9	24	0.081
Silver		2.4	400	0.006
Zinc		250	24 000	0.010
Methoxychlor		ND[b]	400	NA[c]
Total				**0.30**
CARCINOGENIC EFFECTS (NONRADIOACTIVE)				
[p,p'-] dichlorodiphenyl-trichloroethane	AAB0189	0.106	2.1	0.050
[p,p'-] dichlorodiphenyl-dichloroethane	AAB0205[d]	0.0048	2.9	0.0016
[p,p'-] dichlorodiphenyl-dichloroethylene		0.151	2.1	0.073
Total				**0.125**

[a] For constituents that exhibit both systemic and carcinogenic effects, the most conservative is used in screening assessment.
[b] ND = Not detected.
[c] NA = Not applicable.
[d] Average of sample concentrations from first sample (AAB0189) and field duplicate (AAB0205).

4.2.5 Ecotoxicological Screening Assessment for SWMU 0-030(q)

Septic tank 0-030(q) is located in a suburban area south of Spruce Street. The tank and associated soil was removed, leaving no contaminants at the site. Because the SWMU 0-030(q) septic tank was connected by a drain line to the SWMU 0-030(e) septic tank, no ecotoxicological screening assessment will be performed for SWMU 0-030(q). The ecotoxicological screening assessment for SWMU 0-030(e) and its outfall will be addressed in a future RFI report.

4.3 Conclusions, Actions, and Recommendations

The results of the human health screening assessment performed on the sampling data from SWMUs 0-030(c,q) clearly show that there are no COPCs present. Based on potential impacts to human health, SWMUs 0-030(c,q) are proposed for no further action.

The ecotoxicological screening assessment for the outfall associated with SWMU 0-030(c) identified COPECs with the potential to migrate down the outfall channel. However, the concentrations of COPECs in the outfall samples are not high enough to be considered a source to sensitive habitats in the canyons because further migration will result in significant dilution by surface runoff. In addition, removal of the septic tank and its contents eliminated any potential source of increased concentrations of COPECs at the outfall. The location of SWMU 0-030(q) entirely on a disturbed mesa top precludes the need for an ecotoxicological screening assessment. Therefore, based on potential ecological impacts, SWMUs 0-030(c,q) are recommended for no further action.

In addition, the SWMUs 0-030(c,q) septic tanks handled only domestic sewage, which is not a RCRA solid waste. Because domestic sewage often contains common household chemicals (e.g., pesticides, fungicides, cleaning solvents), the presence of these constituents in samples collected during characterization of the septic tank and its outfall is not unexpected. Further, pesticides and fungicides are most likely present as a result of domestic lawn and garden use rather than LANL operations. In conclusion, results of the human health and ecotoxicological screening assessment and evaluation of the analytes from a regulatory perspective indicate that no further action is necessary for SWMUs 0-030(c,q).

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APPENDIX A BACKGROUND DATA SUMMARY TABLES WITH UPPER TOLERANCE LIMITS

TABLE A-1

SUMMARY OF LANL SOIL BACKGROUND DATA

ANALYTE	SAL[a] (mg/kg)	MEAN[b] (mg/kg)	STANDARD DEVIATION (mg/kg)	UTL[c] (99%,0.95) (mg/kg)	NUMBER OF SAMPLES	NUMBER OF SAMPLES > LOD[d]
Aluminum		19 000	13 800	123 000	47	47
Antimony	32	2.45	0.36	2.5 (MAX[e])	46	2
Arsenic		4.4	2.5	11.6	46	46
Barium	5 600	161	129	1140	47	47
Beryllium		1.15	0.75	3.31	47	47
Cadmium	80	0.39	0.54	2.7 (MAX)	47	5
Calcium		5 790	12 500	54 400	47	47
Cesium-137[f]	4	0.42	0.31	1.4 (MAX)	79	79
Chromium (Total)[g]		11.7	7.8	34.2	47	47
Cobalt		15.2	7.6	51.1	47	47
Copper	3 000	5.3	3.6	15.7	47	45
Iron		14 500	7320	35 600	47	47
Lead	400	15.0	8.3	39.0	47	44
Magnesium		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 (MAX)	48	4
Nickel	1 600	9.7	5.9	26.7	47	45
Plutonium-238[f]	20	0.0013	0.0024	0.014 (MAX)	76	62
Plutonium-239[f]	18	0.0083	0.0079	0.052 (MAX)	88	85
Potassium		2 420	1 304	6 180	47	47
Selenium	400	0.43	0.41	1.7 (MAX)	46	23
Silver	400	NA[h]	NA	NA	NA	NA
Sodium		577	453	1 880	47	47
Strontium-90[f]	5.9	0.34	0.27	1 (MAX)	29	29
Thallium	6.4	0.27	0.24	0.9 (MAX)	45	21
Thorium-232[i]	5	1.71	0.34	2.68	50	50
Tritium[j]	810	0.88	0.82	4.08(MAX)	50	50
Uranium[k]	160	3.41	0.80	5.71	50	50
Vanadium	560	25	14	66	47	47
Zinc	24 000	41	21	101	47	47

[a] Screening action level.
[b] Concentration values < limit of detection (LOD) were replaced by 0.5 of the LOD.
[c] Upper tolerance limit.
[d] Limit of detection.
[e] MAX = Maximum value is reported, rather than the UTL.
[f] Data converted from elemental concentrations reported in the LANL background report, units are pCi/g.
[g] SAL for Chromium-III is 80 000 mg/kg and for Chromium-VI is 400 mg/kg.
[h] NA = Not available.
[i] Data are from the Environmental Surveillance Reports (1974 - 1990), units are pCi/g.
[j] Based on Environmental Surveillance Reports (1974 - 1990) that are reported in pCi/ml, and these data were converted units into pCi/g by assuming 23.9% soil moisture.
[k] Analyzed by Delayed Neutron Activation Analysis (DNAA).

TABLE A-2

SUMMARY OF PAH SOIL BACKGROUND DATA

ANALYTE	SAL[a] (mg/kg)	MEAN[b] (mg/kg)	STANDARD DEVIATION (mg/kg)	UTL[c] 99%,0.95 (mg/kg)	NUMBER OF SAMPLES	NUMBER OF SAMPLES > LOD[d]
2-Methylnapthalene		0.15	0.088	0.64[e]	62	19
Acenapthene	4 800	0.20	0.42	3.40[e]	62	30
Acenapthylene		0.17	0.14	1.10[e]	62	24
Anthracene	24 000	0.35	0.74	4.29	62	54
Benzo(a)anthracene	1	1.32	2.20	12.40	62	58
Benzo(a)pyrene	0.1	1.32	2.00	12.10	62	57
Benzo(b)fluoranthene	1	1.44	2.20	12.20	62	55
Benzo(g,h,i)perylene		0.89	1.20	5.90[e]	62	36
Benzo(k)fluoranthene	1	1.68	3.40	19.40	62	59
Chrysene	96	1.84	3.40	19.50	62	60
Dibenzo(a,h)anthracene	0.1	0.39	0.53	2.90[e]	62	32
Fluoranthene	3 200	3.05	5.60	32.50	62	60
Fluorene	3 200	0.21	0.41	3.30[e]	62	35
Indeno(1,2,3-cd)pyrene	1	0.99	1.23	6.00[e]	62	43
Napthalene	3 200	0.13	0.096	0.66[e]	62	35
Phenanthrene		1.84	4.60	24.20	62	61
Pyrene	2 400	2.40	2.20	12.80	62	61

[a] Screening action level.
[b] Concentration values less than the limit of detection (LOD) were replaced by 1/2 of the LOD.
[c] Upper tolerance limit.
[d] Limit of detection.
[e] The maxiumun background concentration value is reported rather than the UTL.

APPENDIX B ANALYTICAL RESULTS

TABLE B-1

SUMMARY TABLE OF SAMPLES COLLECTED AT SWMU 0-030(c)

Location ID	Sample ID	Sample Type	Sample Matrix	Depth	Units	ANALYSES PERFORMED					
						TAL Metals[a]	VOCs[b]	SVOCs[c]	PCBs[d]	Radio-nuclides	Pesti-cides
00-1504	AAB0195	RFI[e]	Soil	2	ft	X	X	X		X	X
00-1505	AAB0198	RFI	Soil	2	ft	X	X	X		X	X
00-1502	AAB0199	RFI	Soil	2	ft	X	X	X		X	X
00-1503	AAB0200	RFI	Soil	2	ft	X	X	X		X	X
00-1494	AAB0201	RFI	Soil	6	ft	X	X	X		X	X
NONE	AAB0211	RFI	Soil				X				
00-1498	AAB0212	RFI	Soil	2.7	ft						
00-1479	AAB0261	Local Background	Soil	7–8	ft						
00-1483	AAB0267	Local Background	Soil	5–6	ft						
00-1482	AAB0269	Local Background	Soil	7.5–10	ft						
00-1492	AAB0282	RFI	Soil	3.9–4.3	ft						
00-1479	AAB0283	Local Background	Soil	3–3.5	ft						
00-1496	AAB0293	Rinsate Blank	Water			X	X	X	X	X	X
00-1491	AAB0300	RFI	Soil	0–2	ft						
00-1490	AAB0302	RFI	Soil	0–1	ft						
00-1482	AAB0303	Local Background	Soil	3–3.5	ft						
00-1479	AAB0306	Trip Blank	Water								
00-1492	AAB0308	Trip Blank	Water								
NONE	AAB0354	Trip Blank	Water				X				
00-1504	AAB0355	Trip Blank	Water				X				
00-3743	AAB3570	RFI	Soil	1–4	in.	X		X		X	X
00-3742	AAB3571	RFI	Soil	6	in.	X		X		X	X

[a] TAL METALS = Target analyte list metals.
[b] VOCs = Volatile organic compounds.
[c] SVOCs = Semivolatile organic compounds.
[d] PCBs = Polychlorinated biphenyls.
[e] RFI = Resource Conservation and Recovery Act facility investigation sample.

TABLE B-2

ANALYTICAL RESULTS FOR INORGANIC ANALYTES DETECTED AT SWMU 0-030(c)

LOCATION ID	SAMPLE ID	ANALYTE	ANALYSIS RESULTS (mg/kg)	UTL[a]	SAL[b]
00-3743	AAB3570	Aluminium	4 080	123 000	NA[c]
00-3742	AAB3571	Aluminium	5 490	123 000	NA
00-3742	AAB3571	Antimony	34.8	2.5	32
00-1504	AAB0195	Arsenic	3.3	11.6	NA
00-1505	AAB0198	Arsenic	2	11.6	NA
00-1502	AAB0199	Arsenic	2.7	11.6	NA
00-1503	AAB0200	Arsenic	3	11.6	NA
00-1504	AAB0195	Barium	57	1 143	5 600
00-1505	AAB0198	Barium	43	1 143	5 600
00-1502	AAB0199	Barium	63	1 143	5 600
00-1503	AAB0200	Barium	69	1 143	5 600
00-3743	AAB3570	Barium	74.5	1 143	5 600
00-3742	AAB3571	Barium	149	1 143	5 600
00-1504	AAB0195	Beryllium	0.54	3.31	NA
00-1505	AAB0198	Beryllium	0.66	3.31	NA
00-1502	AAB0199	Beryllium	0.86	3.31	NA
00-1503	AAB0200	Beryllium	0.63	3.31	NA
00-3743	AAB3570	Calcium	1 900	54 362	NA
00-3742	AAB3571	Calcium	8 550	54 362	NA
00-1504	AAB0195	Chromium	6.1	34.2	NA
00-1505	AAB0198	Chromium	3.4	34.2	NA
00-1502	AAB0199	Chromium	5.5	34.2	NA
00-1503	AAB0200	Chromium	5.7	34.2	NA
00-3743	AAB3570	Chromium	4.1	34.2	NA
00-3742	AAB3571	Chromium	4.4	34.2	NA
00-3743	AAB3570	Copper	6.9	15.7	3 000
00-3742	AAB3571	Copper	11.3	15.7	3 000
00-3743	AAB3570	Iron	7 250	35 586	NA
00-3742	AAB3571	Iron	7 430	35 586	NA
00-1504	AAB0195	Lead	19	39	400
00-1505	AAB0198	Lead	13.1	39	400
00-1502	AAB0199	Lead	12.5	39	400
00-1503	AAB0200	Lead	10.5	39	400
00-3743	AAB3570	Lead	37.9	39	400
00-3742	AAB3571	Magnesium	1 760	16 147	NA
00-3743	AAB3570	Manganese	352	1 030	11 000
00-3742	AAB3571	Manganese	1 930	1 030	11 000
00-1504	AAB0195	Mercury	0.03	0.1	24
00-1504	AAB0195	Mercury	0.03	0.1	24

TABLE B-2 (CONTINUED)

ANALYTICAL RESULTS FOR INORGANIC ANALYTES DETECTED AT SWMU 0-030(c)

LOCATION ID	SAMPLE ID	ANALYTE	ANALYSIS RESULTS (mg/kg)	UTL[a]	SAL[b]
00-1504	AAB0195	Mercury	0.02	0.1	24
00-1505	AAB0198	Mercury	0.02	0.1	24
00-1505	AAB0198	Mercury	0.02	0.1	24
00-1505	AAB0198	Mercury	0.03	0.1	24
00-1502	AAB0199	Mercury	0.02	0.1	24
00-1502	AAB0199	Mercury	0.02	0.1	24
00-1502	AAB0199	Mercury	0.02	0.1	24
00-1503	AAB0200	Mercury	0.03	0.1	24
00-1503	AAB0200	Mercury	0.02	0.1	24
00-1503	AAB0200	Mercury	0.02	0.1	24
00-3743	AAB3570	Mercury	0.22	0.1	24
00-3742	AAB3571	Mercury	0.34	0.1	24
00-1504	AAB0195	Nickel	6	26.7	1 600
00-1505	AAB0198	Nickel	3	26.7	1 600
00-1502	AAB0199	Nickel	3	26.7	1 600
00-1503	AAB0200	Nickel	3	26.7	1 600
00-1504	AAB0195	Selenium	0.7	1.7	400
00-1505	AAB0198	Selenium	0.6	1.7	400
00-3743	AAB3570	Zinc	47.4	101	24 000
00-3742	AAB3571	Zinc	74.6	101	24 000

[a] UTL = Upper tolerance limit.
[b] SAL = Screening action level.
[c] Not available.

TABLE B-3

ANALYTICAL RESULTS FOR ORGANIC ANALYTES DETECTED AT SWMU 0-030(c)

LOCATION ID	SAMPLE ID	ANALYTE	ANALYSIS RESULTS (mg/kg)	UTL[a]	SAL[b]
00-3743	AAB3570	Aldrin	0.0132	NA[c]	0.04
00-3743	AAB3570	BHC [beta-]	0.00658	NA	4
00-3742	AAB3571	Bis(2-ethylhexyl)phthalate	9.5	NA	50
00-1503	AAB0200	DDD [p,p'-]	0.00532	NA	2.9
00-3743	AAB3570	DDD [p,p'-]	0.0522	NA	2.9
00-3742	AAB3571	DDD [p,p'-]	0.0231	NA	2.9
00-1504	AAB0195	DDE [p,p'-]	0.0592	NA	2.1
00-1505	AAB0198	DDE [p,p'-]	0.105	NA	2.1
00-1502	AAB0199	DDE [p,p'-]	0.03	NA	2.1
00-1503	AAB0200	DDE [p,p'-]	0.133	NA	2.1
00-1494	AAB0201	DDE [p,p'-]	0.188	NA	2.1
00-3743	AAB3570	DDE [p,p'-]	0.129	NA	2.1
00-3742	AAB3571	DDE [p,p'-]	0.0574	NA	2.1
00-1504	AAB0195	DDT [p,p'-]	0.0192	NA	2.1
00-1505	AAB0198	DDT [p,p'-]	0.11	NA	2.1
00-1502	AAB0199	DDT [p,p'-]	0.0136	NA	2.1
00-1503	AAB0200	DDT [p,p'-]	0.145	NA	2.1
00-1494	AAB0201	DDT [p,p'-]	0.126	NA	2.1
00-3743	AAB3570	DDT [p,p'-]	0.306	NA	2.1
00-3742	AAB3571	DDT [p,p'-]	0.156	NA	2.1
00-3743	AAB3570	Endrin	0.023	NA	24
00-3743	AAB3570	Heptachlor	0.0161	NA	0.16
00-1502	AAB0199	Trichloroethane [1,1,1-]	0.011	NA	1 000

[a] UTL = Upper tolerance limit.
[b] SAL = Screening action level.
[c] Not available.

TABLE B-4

FIXED LABORATORY RADIONUCLIDE RESULTS FOR SAMPLES COLLECTED AT SWMU 0-030(c)

LOCATION ID	SAMPLE ID	ANALYTE	ANALYSIS RESULTS (pCi/g)	UTL[a]	SAL[b]
00-3743	AAB3570	Cesium-137	1.19	1.4	4
00-3742	AAB3571	Cesium-137	2.22	1.4	4
00-3743	AAB3570	Lead-210	4.06	NA[c]	NA
00-3742	AAB3571	Lead-210	5.98	NA	NA
00-1504	AAB0195	Lead-212	1.24	NA	NA
00-1505	AAB0198	Lead-212	1.87	NA	NA
00-1502	AAB0199	Lead-212	1.07	NA	NA
00-1503	AAB0200	Lead-212	1.92	NA	NA
00-1494	AAB0201	Lead-212	1.9	NA	NA
00-3743	AAB3570	Lead-212	1.16	NA	NA
00-3742	AAB3571	Lead-212	1.14	NA	NA
00-1504	AAB0195	Plutonium-238	0.0409	0.014	20
00-1505	AAB0198	Plutonium-238	0.0353	0.014	20
00-1502	AAB0199	Plutonium-238	0.0565	0.014	20
00-1503	AAB0200	Plutonium-238	0.0104	0.014	20
00-1503	AAB0200	Plutonium-238	0.0015	0.014	20
00-1494	AAB0201	Plutonium-238	0.0031	0.014	20
00-3743	AAB3570	Plutonium-238	0.0004	0.014	20
00-3742	AAB3571	Plutonium-238	0.0067	0.014	20
00-1504	AAB0195	Plutonium-239	0.0153	0.052	18
00-1505	AAB0198	Plutonium-239	0.0101	0.052	18
00-1502	AAB0199	Plutonium-239	0.0034	0.052	18
00-1503	AAB0200	Plutonium-239	0.0302	0.052	18
00-1503	AAB0200	Plutonium-239	0.0169	0.052	18
00-1494	AAB0201	Plutonium-239	0.0089	0.052	18
00-3743	AAB3570	Plutonium-239	0.148	0.052	18
00-3742	AAB3571	Plutonium-239	0.169	0.052	18
00-1504	AAB0195	Potassium-40	26.6	36.1	NA
00-1505	AAB0198	Potassium-40	33	36.1	NA
00-1502	AAB0199	Potassium-40	25.1	36.1	NA
00-1503	AAB0200	Potassium-40	23.5	36.1	NA
00-1494	AAB0201	Potassium-40	28.1	36.1	NA
00-3743	AAB3570	Potassium-40	26.9	36.1	NA
00-3742	AAB3571	Potassium-40	23.8	36.1	NA
00-1504	AAB0195	Radium-226	1.14	NA	5
00-1505	AAB0198	Radium-226	1.12	NA	5
00-1503	AAB0200	Radium-226	1.3	NA	5
00-1494	AAB0201	Radium-226	1.01	NA	5
00-3743	AAB3570	Radium-226	0.884	NA	5

TABLE B-4 (CONTINUED)

FIXED LABORATORY RADIONUCLIDE RESULTS FOR SAMPLES COLLECTED AT SWMU 0-030(c)

LOCATION ID	SAMPLE ID	ANALYTE	ANALYSIS RESULTS (pCi/g)	UTL[a]	SAL[b]
00-3742	AAB3571	Radium-226	0.933	NA	5
00-1504	AAB0195	Thallium-208	0.471	NA	NA
00-1505	AAB0198	Thallium-208	0.499	NA	NA
00-1502	AAB0199	Thallium-208	0.521	NA	NA
00-1503	AAB0200	Thallium-208	0.553	NA	NA
00-1494	AAB0201	Thallium-208	0.447	NA	NA
00-3742	AAB3571	Thallium-208	0.481	NA	NA
00-1503	AAB0200	Thorium-234	2.09	NA	NA
00-3743	AAB3570	Thorium-234	1.91	NA	NA
00-1504	AAB0195	Uranium	1.15	5.71	160
00-1504	AAB0195	Uranium	1.09	5.71	160
00-1505	AAB0198	Uranium	2.29	5.71	160
00-1502	AAB0199	Uranium	1.54	5.71	160
00-1503	AAB0200	Uranium	1.88	5.71	160
00-1494	AAB0201	Uranium	1.56	5.71	160
00-3743	AAB3570	Uranium	3.77	5.71	160
00-3742	AAB3571	Uranium	4.06	5.71	160

[a] UTL = Upper tolerance limit.
[b] SAL = Screening action level.
[c] Not available.

TABLE B-5

MOBILE RADIOLOGICAL ANALYTICAL LABORATORY RESULTS FOR SAMPLES COLLECTED AT SWMU 0-030(c)

LOCATION ID	SAMPLE ID	ANALYTE	ANALYSIS RESULTS (pCi/g)
00-1491	AAB0300	Rad van americium-241	0
00-1490	AAB0302	Rad van americium-241	0.21
00-1491	AAB0300	Rad van cesium-137	-1.54
00-1490	AAB0302	Rad van cesium-137	-0.78
00-1491	AAB0300	Rad van cobalt-60	-0.15
00-1490	AAB0302	Rad van cobalt-60	0.52
00-1504	AAB0195	Rad van gross alpha screening	44.28
00-1505	AAB0198	Rad van gross alpha screening	7.38
00-1502	AAB0199	Rad van gross alpha screening	-11.1
00-1503	AAB0200	Rad van gross alpha screening	3.7
00-1494	AAB0201	Rad van gross alpha screening	0
00-1498	AAB0212	Rad van gross alpha screening	-7.4
00-1491	AAB0300	Rad van gross alpha screening	3.69
00-1490	AAB0302	Rad van gross alpha screening	11.07
00-3743	AAB3570	Rad van gross alpha screening	11.07
00-3742	AAB3571	Rad van gross alpha screening	3.69
00-1504	AAB0195	Rad van gross beta screening	17.08
00-1505	AAB0198	Rad van gross beta screening	6.41
00-1502	AAB0199	Rad van gross beta screening	-22.42
00-1503	AAB0200	Rad van gross beta screening	-7.47
00-1494	AAB0201	Rad van gross beta screening	-23.49
00-1498	AAB0212	Rad van gross beta screening	-12.81
00-1491	AAB0300	Rad van gross beta screening	22.42
00-1490	AAB0302	Rad van gross beta screening	18.15
00-3743	AAB3570	Rad van gross beta screening	23.49
00-3742	AAB3571	Rad van gross beta screening	6.41
00-1504	AAB0195	Rad van gross gamma screening	-1
00-1505	AAB0198	Rad van gross gamma screening	0.45
00-1502	AAB0199	Rad van gross gamma screening	-0.8
00-1503	AAB0200	Rad van gross gamma screening	-1.13
00-1494	AAB0201	Rad van gross gamma screening	0.7
00-1498	AAB0212	Rad van gross gamma screening	-4.15
00-1491	AAB0300	Rad van gross gamma screening	-0.18
00-1490	AAB0302	Rad van gross gamma screening	1.01
00-3743	AAB3570	Rad van gross gamma screening	1.24
00-3742	AAB3571	Rad van gross gamma screening	-4.02

TABLE B-6

SUMMARY TABLE OF SAMPLES COLLECTED AT SWMU 0-030(q)

Location ID	Sample ID	Sample Type	Sample Matrix	Depth	Units	ANALYSES PERFORMED					
						TAL Metals[a]	VOCs[b]	SVOCs[c]	PCBs[d]	Radio-nuclides	Pesti-cides
00-1515	AAB0189	RFI[e]	Soil	2.5	ft						
001510	AAB0197	RFI	Soil	10	ft						
00-1509	AAB0202	RFI	Soil	8	ft	X	X	X		X	X
00-1513	AAB0203	RFI	Soil	4.5	ft	X	X	X		X	X
00-1514	AAB0204	RFI	Soil	4.5	ft	X	X	X		X	X
00-1515	AAB0205	RFI	Soil	2.5	ft	X	X	X		X	X
00-1477	AAB0304	RFI	Soil	2–5	ft	X					
00-1476	AAB0305	Trip Blank	Water								
NONE	AAB0373	Trip Blank	Water								
00-1513	AAB0377	Trip Blank	Water				X				
00-1516	AAB0378	RFI	Soil	2.75	ft						
00-1517	AAB0379	RFI	Soil	3	ft						

[a] TAL METALS = Target analyte list metals.
[b] VOCs = Volatile organic compounds.
[c] SVOCs = Semivolatile organic compounds.
[d] PCBs = Polychlorinated biphenyls.
[e] RFI = Resource Conservation and Recovery Act facility investigation sample.

TABLE B-7

ANALYTICAL RESULTS FOR INORGANIC ANALYTES DETECTED AT SWMU 0-030(q)

LOCATION ID	SAMPLE ID	ANALYTE	ANALYSIS RESULTS (mg/kg)	UTL[a]	SAL[b]
00-1515	AAB0189	Aluminium	11 000	123 000	NA[c]
00-1509	AAB0202	Aluminium	4 600	123 000	NA
00-1513	AAB0203	Aluminium	7 100	123 000	NA
00-1514	AAB0204	Aluminium	3 300	123 000	NA
00-1515	AAB0205	Aluminium	12 000	123 000	NA
00-1515	AAB0205	Aluminium	8 000	123 000	NA
00-1515	AAB0189	Arsenic	4	11.6	NA
00-1509	AAB0202	Arsenic	2.7	11.6	NA
00-1509	AAB0202	Arsenic	2.9	11.6	NA
00-1513	AAB0203	Arsenic	3	11.6	NA
00-1514	AAB0204	Arsenic	2	11.6	NA
00-1515	AAB0205	Arsenic	5	11.6	NA
00-1515	AAB0205	Arsenic	3	11.6	NA
00-1477	AAB0304	Arsenic	3.2	11.6	NA
00-1515	AAB0189	Barium	120	1 143	5 600
00-1509	AAB0202	Barium	190	1 143	5 600
00-1513	AAB0203	Barium	110	1 143	5 600
00-1514	AAB0204	Barium	130	1 143	5 600
00-1515	AAB0205	Barium	110	1 143	5 600
00-1515	AAB0205	Barium	100	1 143	5 600
00-1477	AAB0304	Barium	110	1 143	5 600
00-1515	AAB0189	Beryllium	0.6	3.31	NA
00-1509	AAB0202	Beryllium	0.23	3.31	NA
00-1513	AAB0203	Beryllium	0.2	3.31	NA
00-1514	AAB0204	Beryllium	0.38	3.31	NA
00-1515	AAB0205	Beryllium	0.6	3.31	NA
00-1515	AAB0205	Beryllium	0.5	3.31	NA
00-1477	AAB0304	Beryllium	0.76	3.31	NA
00-1509	AAB0202	Cadmium	1.7	2.7	80
00-1514	AAB0204	Cadmium	0.7	2.7	80
00-1515	AAB0189	Calcium	3 000	54 362	NA
00-1509	AAB0202	Calcium	2 600	54 362	NA
00-1513	AAB0203	Calcium	2 600	54 362	NA
00-1514	AAB0204	Calcium	3 100	54 362	NA
00-1515	AAB0205	Calcium	2 100	54 362	NA
00-1515	AAB0205	Calcium	2 400	54 362	NA
00-1515	AAB0189	Chromium	7.7	34.2	NA
00-1509	AAB0202	Chromium	8	34.2	NA
00-1513	AAB0203	Chromium	6.6	34.2	NA

TABLE B-7 (CONTINUED)

ANALYTICAL RESULTS FOR INORGANIC ANALYTES DETECTED AT SWMU 0-030(q)

LOCATION ID	SAMPLE ID	ANALYTE	ANALYSIS RESULTS (mg/kg)	UTL[a]	SAL[b]
00-1514	AAB0204	Chromium	4.6	34.2	NA
00-1515	AAB0205	Chromium	8.7	34.2	NA
00-1515	AAB0205	Chromium	6.5	34.2	NA
00-1477	AAB0304	Chromium	7.5	34.2	NA
00-1515	AAB0189	Cobalt	3.9	51.1	NA
00-1509	AAB0202	Cobalt	2.4	51.1	NA
00-1513	AAB0203	Cobalt	3.2	51.1	NA
00-1514	AAB0204	Cobalt	12	51.1	NA
00-1515	AAB0205	Cobalt	3.9	51.1	NA
00-1515	AAB0205	Cobalt	3.6	51.1	NA
00-1515	AAB0189	Copper	5.5	15.7	3 000
00-1509	AAB0202	Copper	160	15.7	3 000
00-1513	AAB0203	Copper	8.1	15.7	3 000
00-1514	AAB0204	Copper	13	15.7	3 000
00-1515	AAB0205	Copper	4.5	15.7	3 000
00-1515	AAB0205	Copper	6	15.7	3 000
00-1515	AAB0189	Iron	11 000	35 586	NA
00-1509	AAB0202	Iron	6 100	35 586	NA
00-1513	AAB0203	Iron	8 500	35 586	NA
00-1514	AAB0204	Iron	5 700	35 586	NA
00-1515	AAB0205	Iron	9 200	35 586	NA
00-1515	AAB0205	Iron	12 000	35 586	NA
00-1515	AAB0189	Lead	17	39	400
00-1509	AAB0202	Lead	53.9	39	400
00-1509	AAB0202	Lead	63	39	400
00-1513	AAB0203	Lead	21	39	400
00-1514	AAB0204	Lead	28	39	400
00-1515	AAB0205	Lead	18	39	400
00-1515	AAB0205	Lead	17	39	400
00-1477	AAB0304	Lead	16.9	39	400
00-1515	AAB0189	Magnesium	1 700	16 147	NA
00-1509	AAB0202	Magnesium	980	16 147	NA
00-1513	AAB0203	Magnesium	1 300	16 147	NA
00-1514	AAB0204	Magnesium	930	16 147	NA
00-1515	AAB0205	Magnesium	1 400	16 147	NA
00-1515	AAB0205	Magnesium	1 800	16 147	NA
00-1515	AAB0189	Manganese	290	1 030	11 000
00-1509	AAB0202	Manganese	160	1 030	11 000
00-1513	AAB0203	Manganese	220	1 030	11 000
00-1514	AAB0204	Manganese	610	1 030	11 000