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Date: **November 13, 1995**
Refer to: EM/ER:95-522

SUBJECT: SUBMITTAL OF THE RESOURCE CONSERVATION AND RECOVERY ACT FACILITY INVESTIGATION (RFI) REPORT FOR SOLID WASTE MANAGEMENT UNIT (SWMU) 0-030(g)

Dear Mr. Neleigh:

Enclosed are two copies of the Los Alamos National Laboratory's RFI Report concerning SWMU 0-030(g). The report documents the field work performed as detailed in the approved RFI Work Plan for Operable Unit 1071 and the results of the sampling.

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

Sincerely,

Jorg Jansen, Program Manager
Environmental Restoration

Sincerely,

Theodore J. Taylor, Program Manager
Los Alamos Area Office

JJ/TT/bp

Enclosure: RFI Report for SWMU 0-030(g) (2 copies)

Environmental Restoration

1089

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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 The Resource Conservation And Recovery Act Facility Investigation (RFI) Report For Solid Waste Management Unit (SWMU) 0-030(g)

Name: _____ Date: 10-5-95

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DOE-Los Alamos Area Office

RFI Report for Solid Waste Management Units

0-030(g)

Field Unit 1

Environmental Restoration Project

September 1995

A Department of Energy
Environmental Cleanup Program

Los Alamos
NATIONAL LABORATORY

LA-UR-95-3263

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EXECUTIVE SUMMARY

Phase I investigation at solid waste management unit (SWMU) 0-030(g) had the following main objectives: (1) to determine whether a septic tank existed at the site; (2) once the septic tank and associated drain lines were located, to establish whether the site had been contaminated and, if so, to determine the degree of contamination; and (3) to take a corrective action approach, according to which the tank was to be removed and the residual contamination cleaned up.

In the process of sample collection at SWMU 0-030(g), the approach taken was the one summarized in the Resource Conservation and Recovery Act (RCRA) Facility Investigation Work Plan for Operable Unit 1071. In addition to the two channel-sediment samples collected according to the work plan, several other samples were collected upstream and downstream from the junction of the outfall drainage and the drainage channel. The objective for taking these additional samples was to further characterize the contaminants present in the drainage channel.

After the septic tank had been located, it was excavated and removed. Extensive data collected during 1993 indicated that several radionuclides and inorganic chemicals were present at elevated concentrations in soil and/or sludge samples collected from within the septic tank and from the tank's immediate vicinity. The contaminated material was removed as part of the excavation of the septic tank and associated drain line.

The human health screening assessment conducted with data derived from the outfall sampling suggested that plutonium-239/240 and polychlorinated biphenyls (PCBs), which were found at concentrations slightly greater than their respective screening action levels (SALS) and in a very limited area should not result in adverse effects on human health. At the same time, the results of the multiple-constituent evaluation suggested that the presence of other chemicals in soil at concentrations below the SALs should not result in adverse effects on human health.

The ecotoxicological screening assessment identified 9 chemicals as contaminants of potential ecological concern (COPECS) because they are present in soil at one or more outfall sampling locations, at concentrations greater than their respective ecotoxicological SALs (ESALs). Although these chemicals have the potential to migrate down the outfall channel, they are not present at high enough concentrations to become a source of contamination to sensitive habitats in the canyons. In addition, removal of the septic tank, its contents, and surrounding soil eliminates any potential source of increased concentrations of COPECs at the outfall. Therefore, those chemicals identified at the outfall should not have any adverse ecological impact. On the basis of results from the human health and ecotoxicological screening assessments, SWMU 0-030(g) is proposed for no further action.

1.0 INTRODUCTION

This report presents results of the Phase I Resource Conservation and Recovery Act (RCRA) Facility Investigation at Technical Area 0 (TA-0), solid waste management unit (SWMU) group 0-3, SWMU 0-030(g). This SWMU is a former Atomic Energy Commission septic tank located outside the current boundaries of the Los Alamos National Laboratory (LANL). During the investigation, the tank was removed from the site. Included in the report are the data assessment and analysis approach used in the investigation, as well as the site-specific results, conclusions, and recommendations for SWMU 0-030(g).

1.1 Facility Background

SWMU group 0-3 consists of 13 septic tank systems, which were installed during the 1940s (Fig. 1-1). Most of these septic tanks remained in use until the central wastewater treatment plant (SWMU 0-019) was completed in late 1947 (LANL 1990, 0145). Because engineering drawings of these tanks are incomplete, it is impossible to document all the buildings served by each septic tank.

SWMU 0-030(g), referred to as septic tank #6, is located on private and Los Alamos County property north of Canyon Road and west of the intersection with Central Avenue (The Zia Company 1947, 05-0132; 05-0170; and 05-0172). One document states that "most of the Tech Area sanitary sewage leaves the area by way of the 8-inch sanitary sewer, which passes just south of C-Shop and eventually discharges into Septic Tank #6" (Williams 1964, 05-0129).

The only source of information on the period of time that the septic tank was in use is provided by engineering drawings, according to which the tank was installed in the mid-1940s and has not been in use for nearly 40 years. No specific dates are given, but they can be deduced from the drawings. On a 1943 engineering drawing (US Engineer Office 1943, 05-0173), SWMU 0-030(g) is depicted as having possibly been connected to TA-1, an area where some of the buildings of the original Laboratory site were located. Some of the typical contaminants for this area were plutonium, uranium, polonium, and mercury. Because SWMU 0-030(g) may have serviced this area, the potential for contamination existed. As a result, the site was evaluated for possible contamination and then thoroughly cleaned up.

A drain line from SWMU 0-030(g) extends north to an outfall on the rim of a small drainage channel that is a tributary of upper Acid Canyon—a small, narrow, one-half-mile-long side canyon to the much larger Pueblo Canyon. Stretching from Pajarito Mountain all the way to the Rio Grande, Pueblo Canyon contains sensitive habitats and threatened and endangered

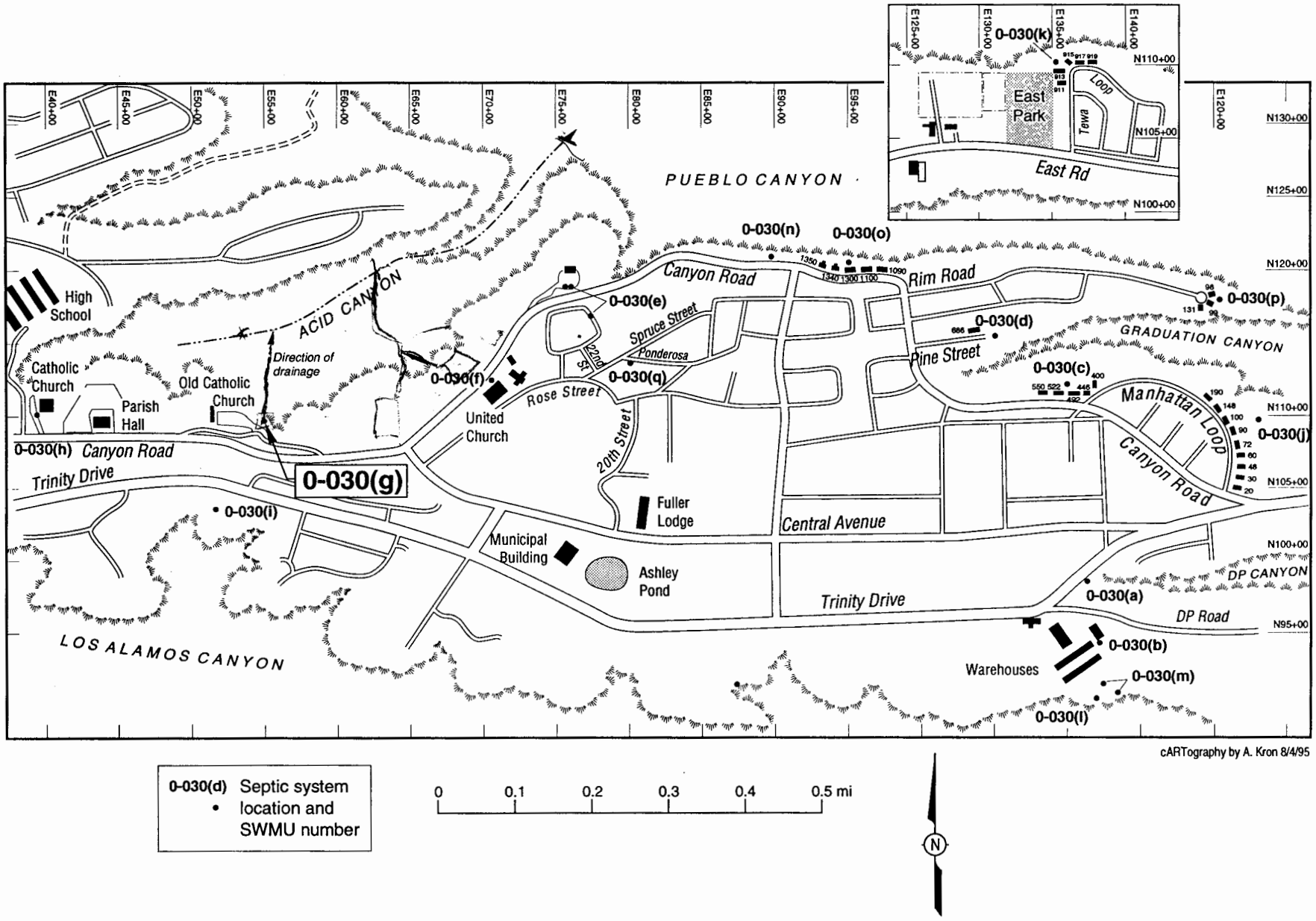

Fig. 1-1. Locations of septic tanks in SWMU group 0-3.

species (Biggs 1993, 05-0209). An evaluation of the possible contamination caused by the septic tank in the immediate area and an assessment of the possibility for a wider impact have thus become mandatory.

1.2 Phase I Work Plan Overview

The primary objective of the Phase I investigation was to determine whether a septic tank actually existed at SWMU 0-030(g). Once the septic tank and associated drain lines were located, the next objective was to establish whether the site had been contaminated and, if so, to determine the degree of contamination. The next step was to take a corrective action approach, according to which the tank was to be removed and the residual contamination cleaned up.

Section 5.10.6.2.1 of the RCRA Facility Investigation (RFI) Work Plan for Operable Unit (OU) 1071 summarizes the approach to be taken for collecting outfall samples for septic tanks. It states that "samples of channel sediments will be collected from sediment catchments adjacent to or immediately downslope of septic drain outfall points. Two sediment samples will be collected as close as possible to the outfall points from sediment catchments in first- or higher-order drainage channels that have developed downslope of the septic drain outfalls." These requirements were observed in the process of sample collection at SWMU 0-030(g). Moreover, in addition to the two channel-sediment samples collected according to the work plan, several other samples were collected upstream and downstream from the junction of the outfall drainage and the drainage channel. The objective for taking these additional samples was to further characterize the contaminants present in the drainage channel.

1.3 Field Activities

The septic tank and associated drain lines at SWMU 0-030(g) were located as a result of a series of geophysical and geodetic surveys. For the geodetic survey, preconstruction engineering drawings were used. After the septic tank and clay-pipe drain line were located, they were excavated, sampled, and eventually removed. In this work, all the requirements listed in the RFI Work Plan for OU 1071 were observed.

The extent of the contamination was defined by analyses of samples taken from within the tank, beneath the tank and drain line, as well as from the outfall. Additional soil samples were taken at a depth of 18 in. below the excavated tank and drain line, and they confirmed that all contaminated material had been excavated. After these field activities had been completed, all

contaminated materials (as defined by RCRA), tank structures, and drainpipe were removed from the site, and the excavation was filled with clean fill material.

2.0 ENVIRONMENTAL SETTING

2.1 Climate

The Los Alamos area of north-central New Mexico has a semiarid, temperate mountain climate. Annual precipitation in the area normally reaches about 18 in., 40% of which occurs as brief, intense thunderstorms during July and August. Winter snowfall averages about 51 in. annually. In the summer months, maximum daily temperatures are usually below 90°F, dropping into the 50°F range 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

SWMU 0-030(g) lies at the northern edge of Town Site Mesa, adjacent to the upper end of Acid Canyon. The septic tank was located in an excavation in the bedrock, and the outfall drain line extended northeast to the mesa edge. This mesa is capped by Bandelier Tuff, which is locally overlain by thin deposits of alluvial material and soil. The site, including the small drainage channel into which the runoff from the septic tank outfall drained, is underlain by Bandelier Tuff; the drainage channel is cut into the tuff on the canyon wall north from the mesa surface. There is little soil or other unconsolidated material that caps the tuff along the mesa at this site, and large tracts of bedrock are exposed along the mesa edge.

In the small drainage channel that heads just east of the site, runs along the base of the north mesa slope along the site, and ultimately feeds into Acid Canyon (Fig. 2-1), two ages of alluvial fill were identified: 1) an older fill, about 1 ft thick, which dates from the 1940s and 1950s as evidenced by automobile tires that date from that period and were found in the fill and 2) modern material in the currently active stream channel.

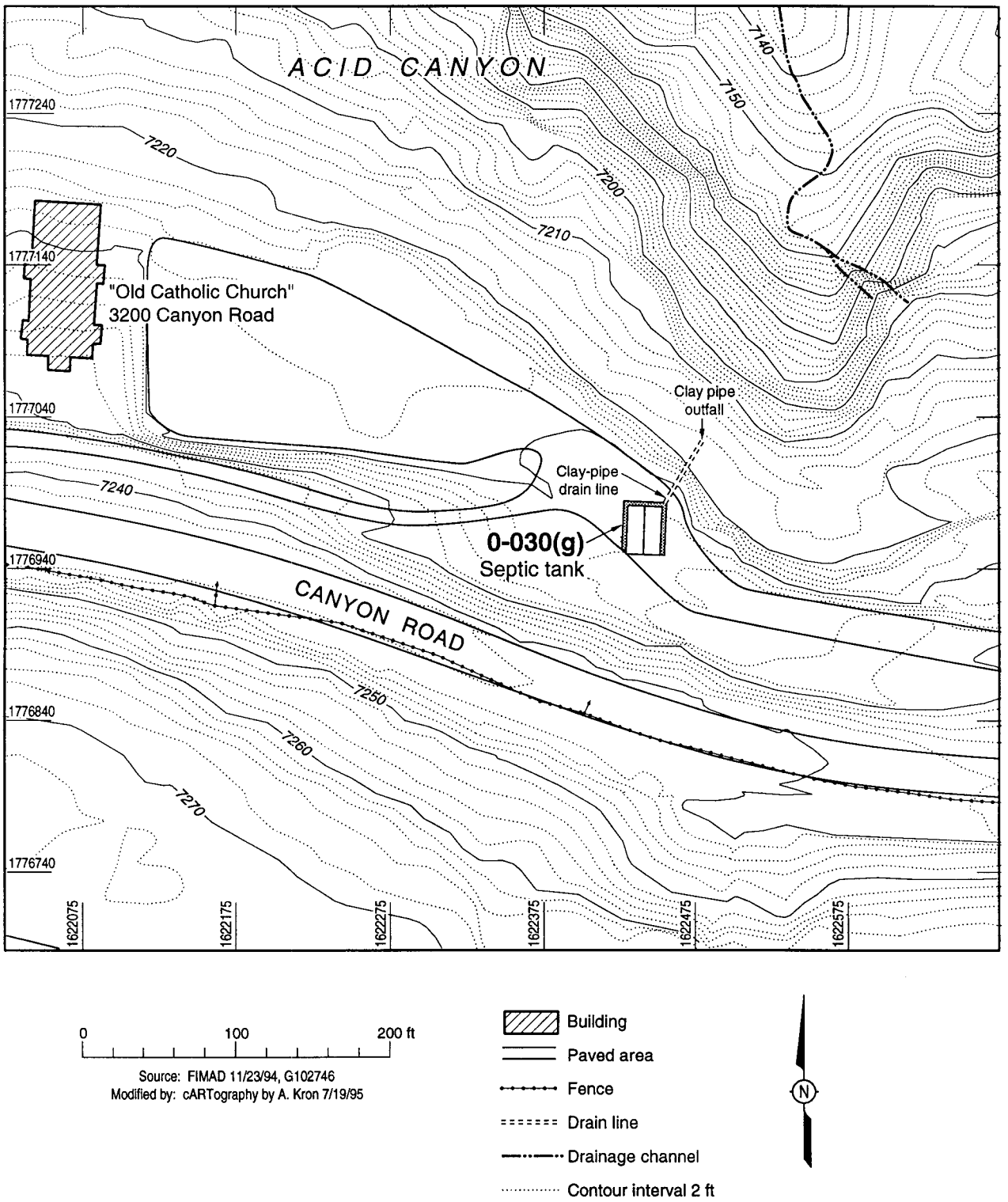

Fig. 2-1. Site map for SWMU 0-030(g).

2.3 Hydrology

SWMU 0-030(g) drains north through a drain line outfall off the north mesa edge and into a small drainage channel at the base of a steep 40- to 50-ft-high slope. As the small drainage channel runs at the base of this slope, along the site, all surface runoff from the mesa edge flows into the drainage. Numerous sediment catchment areas along the drainage channel allow local ponding to occur behind the rocks that lie in the channel. Contaminants that may have been present would have been caught in these sediment catchment areas and would have essentially been buried there. The drainage channel flows into Acid Canyon, a small distance downstream from the canyon head. Thus, drainage from the site that did not infiltrate into the older fill sediment along the channel would have ultimately been added to the drainage of Acid Canyon. Because of the age of the older fill and its presence in the sediment catchment areas along the drainage channel, it is likely that any contaminants still remaining would be contained in this fill. Sample analyses indicate that contaminants are not present in the downstream area of the small drainage channel and are thus not likely to be present in Acid Canyon. Because there are no large areas of ponding along the drainage channel, deep infiltration of the surface waters is not probable, and any outfall runoff that did not infiltrate quickly into the alluvial fill would have continued to flow down the channel and into Acid Canyon. Therefore, at this site, contamination cannot affect groundwater.

2.4 Wildlife Habitats

Southwestern mountainous ecosystems on the Pajarito Plateau typically support a large number of plant and animal species because of the number of plant communities convergent in this region (Biggs 1993, 05-0209; and Ebinger et al. 1994, 05-0210). The SWMU 0-030(g) site is located in a church parking lot, which does not contain natural plant and animal communities. Biological surveys were not conducted for the mesa top in this area because of the potential for commercial disturbance. The areas near the outfall and downgradient into Acid Canyon are not disturbed; hence, the approach was to determine possible ecological effects of the septic system on the soil at the outfall and below the outfall. Near the SWMU 0-030(g) outfall and below, three major plant communities are evident, and each has a number of habitats supporting characteristic fauna.

Undisturbed areas on mesa tops at this elevation support a ponderosa pine forest typified by ponderosa pine, Gambel oak, and Rocky Mountain juniper overstory. Bearberry, barberry, and wild rose are typical shrubs; mountain muhly and pine dropseed are typical grasses. This community supports characteristic fauna such as mule deer, Albert's squirrel, Steller's jay,

montane vole, deer mouse, and pipistrelle bat. Threatened and endangered animals that regionally nest or forage in the ponderosa pine forest habitats include the meadow jumping mouse, peregrine falcon, northern goshawk, and spotted bat.

The north-facing slope below the outfall supports a mixed conifer forest community. Douglas fir, ponderosa pine, white fir, and limber pine are the predominant trees. Bearberry and Gambel oak are the major shrubs; junegrass and pine dropseed are the major grasses. Characteristic fauna include the elk, mule deer, red squirrel, and mountain cottontail. Some of the threatened and endangered species that regionally nest or forage in the mixed conifer forest are the meadow jumping mouse, Jemez Mountains salamander, northern goshawk, and Mexican spotted owl.

There is a narrow, riparian plant community at the bottom of Acid Canyon. At the confluence with Pueblo Canyon, the bottom of Acid Canyon has a perennial stream and a well-defined wetlands community. Since the availability of water is a limiting factor for plant and animal distribution in the Southwest, the presence of a year-round stream creates a complex and diverse habitat that combines plant and animal species from the ponderosa and mixed conifer communities with the distinct deciduous plants and water-loving animals found along streams. The riparian areas here are characterized by dense stands of Rocky Mountain maple and willow; ponderosa pine, Russian olive, mountain ash, and aspen contribute to the overstory. The meadow jumping mouse, meadow vole, and vagrant shrew inhabit grassy riparian areas. The Jemez Mountains salamander is also attracted to the deep, cool canyon riparian areas at this elevation. The black bear can be frequently found foraging in the riparian areas because of the excellent cover and food availability.

3.0 DATA ASSESSMENT AND ANALYSIS APPROACH

Introduction. The data assessment and analysis approach used for SWMU 0-030(g) involves a series of quantitative steps, which occur after field investigation, chemical analysis, and data reporting have been completed. The first step is routine data validation, according to which each data item is validated against EPA-specific targets; then, whenever it is necessary, more focused data validation is performed, in which quality assurance/quality control (QA/QC) data are analyzed for their potential impact on succeeding data assessment steps. The data assessment steps for SWMU 0-030(g) 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.

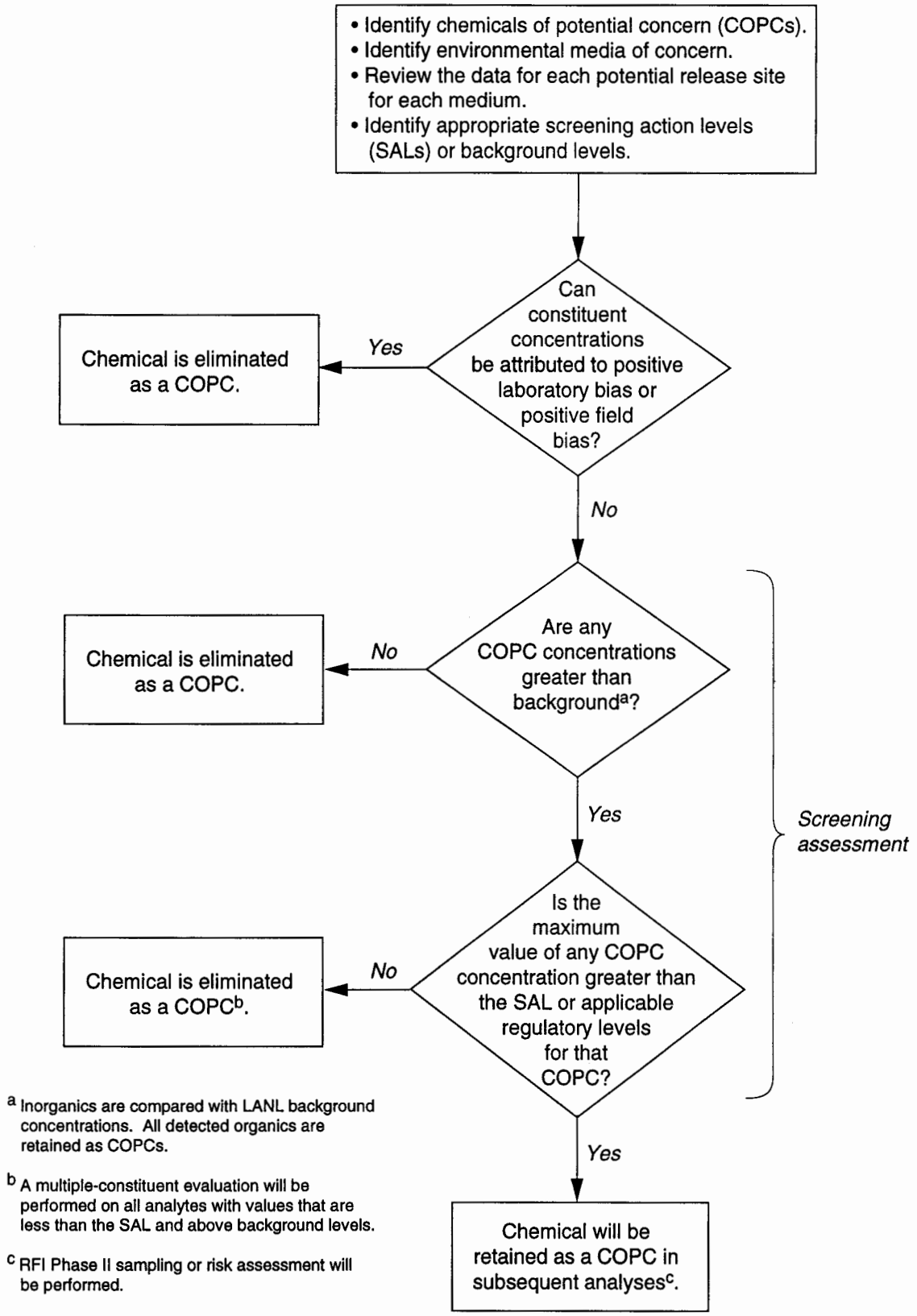

Fig. 3-1. Data analysis and screening assessment decision logic flow chart.

3.1 Quality Assurance/Quality Control Activities

3.1.1 Analytical Methodology

All soil samples had been routinely screened for gross alpha and beta activity with a low-level counter and for gamma activity with a deep well counter before they were submitted for analysis, with chain-of-custody documentation, to the sample coordination facility (SCF). Soil samples were analyzed for target analyte list (TAL) metals by

- flame atomic absorption, performed according to SW-846 method 7420,
- electrothermal vaporization atomic absorption, performed according to SW-846 method 7060 or 7760,
- cold vaporization atomic absorption, performed according to SW-846 method 7471,
- inductively coupled plasma emission spectroscopy, performed according to SW-846 method 6010,
- inductively coupled plasma/mass spectrometry, performed according to SW-846 method 6020, and
- colorimetry.

For volatile organic compound (VOC) analyses, the method chosen was gas chromatography/ mass spectrometry (GC/MS), performed according to SW-846 method 8240 (also referred to as the Purge and Trap Method) or SW-846 method 8260 (also referred to as the Capillary Column Method).

Semivolatile organic compounds (SVOCs) were analyzed with GC/MS, performed according to SW-846 method 8250 (also referred to as the Packed Column Method) or according to SW-846 method 8270 (also referred to as the Capillary Column Method).

Polychlorinated biphenyls (PCBs) were analyzed with gas chromatography/electron capture detector (GC/ECD), according to SW-846 method 8080. Pesticides were also analyzed with GC/ECD and contract lab procedure (CLP) method OLM01.8.

Soil samples were analyzed for the following radionuclides:

1. tritium—the analytical method was liquid scintillation,
2. cesium-137, uranium-235, and uranium-238—the analytical method was gamma spectroscopy,

3. uranium-234, uranium-235, uranium-238, plutonium-238, and plutonium-239—the analytical method was alpha spectrometry

4. total uranium—the analytical method was kinetic phosphorescence analysis, and

5. americium-241—the analytical method was alpha spectrometry.

3.1.2 Quality Assurance/Quality Control Data for Samples From SWMU 0-030(g)

Selected samples were analyzed for TAL metals, VOCs, SVOCs, pesticides, PCBs, tritium, cesium-137, uranium-234, uranium-235, uranium-238, plutonium-238, plutonium-239, and americium-241 (see Table 3-1).

TABLE 3-1

QUALITY ASSURANCE/QUALITY CONTROL DATA FOR SAMPLES FROM SWMU 0-030(g)

LOCATION ID	SAMPLE ID	MATRIX	ANALSIS	REQUEST	QA/QC COMMENTS
00-3662	AAA1909	Soil	PCBs[a]	15276	QC results are within control limits; all data are valid.
00-3662	AAA1909	Soil	Pesticides	15276	QC results are within control limits; all data are valid.
00-3662	AAA1909	Soil	SVOCs[b]	15276	QC results are within control limits; all data are valid.
00-3662	AAA1909	Soil	VOCs[c]	15276	Last surrogate is 8% over limit. No analytes are detected. Data are not qualified; all data are valid.
00-3662	AAA4387	Soil	Lead, mercury	15303	One lead QC value is high (50%); other QC values are in control. All data are in background range. Data are not qualified; all data are valid.
00-3662	AAA4388	Soil	Lead, mercury	15303	One lead QC value is high (50%); other QC values are in control. All data are in background range. Data are not qualified; all data are valid.
00-3662	AAA4389	Soil	Lead, mercury	15303	One lead QC value is high (50%); other QC values are in control. All data are in background range. Data are not qualified; all data are valid.
00-3662	AAA4390	Soil	Lead, mercury	15303	One lead QC value is high (50%); other QC values are in control. All data are in background range. Data are not qualified; all data are valid.
00-3662	AAA4391	Soil	Lead, mercury	15303	One lead QC value is high (50%); other QC values are in control. All data are in background range. Data are not qualified; all data are valid.
00-3662	AAA4392	Soil	Lead, mercury	15303	One lead QC value is high (50%); other QC values are in control. All data are in background range. Data are not qualified; all data are valid.
00-3663	AAA4375	Soil	TAL metals[d]	15305	QC results are within control limits; all data are valid.
00-3663	AAA4376	Soil	TAL metals	15305	QC results are within control limits; all data are valid.
00-3663	AAA4377	Soil	TAL metals	15305	QC results are within control limits; all data are valid.
00-3663	AAA4393	Soil	Lead, mercury	15303	One lead QC value is high (50%); other QC values are in control. All data are in background range. Data are not qualified; all data are valid.
00-3664	AAA4406	Soil	Lead, mercury	15356	QC results are within control limits; all data are valid.
00-3665	AAA4407	Soil	Lead, mercury	15356	QC results are within control limits; all data are valid.
00-3666	AAA4408	Soil	Lead, mercury	15356	QC results are within control limits; all data are valid.
00-3668	AAA1909	Soil	TAL metals	15266	Iron, sodium, and zinc are high in QC sample, probably because of lab contamination (low levels). All data are in background range. Data are not qualified; all data are valid.
00-3668	AAA1909	Soil	Rad[e] + tritium	15268	Low americium recovery does not affect usability of data. Data are not qualified; all data are valid.

TABLE 3-1 (CONTINUED)

QUALITY ASSURANCE/QUALITY CONTROL DATA FOR SAMPLES FROM SWMU 0-030(g)

LOCATION ID	SAMPLE ID	MATRIX	ANALSIS	REQUEST	QA/QC COMMENTS
00-3668	AAA4371	Soil	TAL metals	15266	Iron, sodium, and zinc are high in QC sample, probably because of lab contamination (low levels). All data are in background range. Data are not qualified; all data are valid.
00-3669	AAA1910	Soil	Rad + gamma	15364	QC results are within control limits; all data are valid.
00-3669	AAA3563	Soil	Rad + gamma	15364	QC results are within control limits; all data are valid.
00-3670	AAA1910	Soil	TAL metals	15356	Chromium, magnesium, and nickel are high in QC sample, probably because of lab contamination (low levels). All data are in background range. Data are not qualified; all data are valid.
00-3670	AAA3563	Soil	TAL metals	15356	Chromium, magnesium, and nickel are high in QC sample, probably because of lab contamination (low levels). All data are in background range. Data are not qualified; all data are valid.
00-3671	AAA1910	Soil	Pesticides	15365	Dichlorodiphenyl-dichloroethane (DDD) is out of control limits on columns. All DDD values are qualified as J.
00-3671	AAA3563	Soil	Pesticides	15365	DDD is out of control limits on columns. All DDD values are qualified as J.
00-3674	AAA1910	Soil	PCBs	15367	QC results are within control limits; all data are valid.
00-3674	AAA1910	Soil	SVOCs	15367	QC results are within control limits; all data are valid.
00-3675	AAA3563	Soil	PCBs	15367	QC results are within control limits; all data are valid.
00-3675	AAA3563	Soil	SVOCs	15367	QC results are within control limits; all data are valid.
00-3676	AAA1910	Soil	VOCs	15367	QC results are within control limits; all data are valid.
00-3676	AAA3563	Soil	VOCs	15367	QC results are within control limits; all data are valid.
00-3724	AAB0275	Soil	Pesticides	17135	Percent relative standard difference (%RSD) for 2 columns is >25% for some analytes. Analytes are qualified as J.
00-3724	AAB0275	Soil	PCBs	17138	QC results are within control limits; all data are valid.
00-3724	AAB0275	Soil	SVOCs	17138	QC results are within control limits; all data are valid.
00-3724	AAB0275	Soil	VOCs	17138	Surrogate dichlorobenzene is below control limits. All associated analytes are qualified as UJ. Carbon disulfide and 2-butanone are detected in blanks (5.3 µg/kg and 32 µg/kg); the estimated quantitation limits (EQLs) are raised. Initial calibration for acetone is 33%; therefore, acetone is qualified as J.
00-3724	AAB0278	Soil	Pesticides	17135	%RSD for 2 columns is >25% for some analytes. Analytes are qualified as J.
00-3724	AAB0278	Soil	PCBs	17138	QC results are within control limits; all data are valid.
00-3724	AAB0278	Soil	SVOCs	17138	QC results are within control limits; all data are valid.
00-3724	AAB0278	Soil	VOCs	17138	Surrogate dichlorobenzene is below control limits. All associated analytes are qualified as UJ. Carbon disulfide and 2-butanone are detected in blanks (5.3 µg/kg and 32 µg/kg); the EQLs are raised. Initial calibration for acetone is 33%; therefore, acetone is qualified as J.
00-3725	AAB0275	Soil	TAL metals	17139	One selenium QC value is high because of problem with the QC sample, not the analysis. Data are not qualified; all data are valid.
00-3725	AAB0275	Soil	Rad	17141	Blind QC sample is biased. All other QC results are within control limits. Data are not qualified; all data arevalid.
00-3725	AAB0278	Soil	TAL metals	17139	One selenium QC value is high because of problem with the QC sample, not the analysis. Data are not qualified; all data are valid.
00-3725	AAB0278	Soil	Rad	17141	Blind QC sample is biased. All other QC results are within control limits. Data are not qualified; all data arevalid.
00-3733	AAB3573	Soil	Rad	18065	Uranium recovery is 40% low in blind QC sample. Uranium is qualified as J.
00-3733	AAB3574	Soil	Rad	18065	Uranium recovery is 40% low in blind QC sample. Uranium is qualified as J.
00-3735	AAB3575	Soil	Rad	18065	Uranium recovery is 40% low in blind QC sample. Uranium is qualified as J.

TABLE 3-1 (CONTINUED)

QUALITY ASSURANCE/QUALITY CONTROL DATA FOR SAMPLES FROM SWMU 0-030(g)

LOCATION ID	SAMPLE ID	MATRIX	ANALSIS	REQUEST	QA/QC COMMENTS
00-3736	AAB3579	Soil	Rad	18065	Uranium recovery is 40% low in blind QC sample. Uranium is qualified as J.
00-3737	AAB3580	Soil	Rad	18065	Uranium recovery is 40% low in blind QC sample. Uranium is qualified as J.
00-3737	AAB3581	Soil	Rad	18065	Uranium recovery is 40% low in blind QC sample. Uranium is qualified as J.
00-3738	AAB3576	Soil	Rad	18065	Uranium recovery is 40% low in blind QC sample. Uranium is qualified as J.
00-3738	AAB3577	Soil	Rad	18065	Uranium recovery is 40% low in blind QC sample. Uranium is qualified as J.
00-3739	AAB3578	Soil	Rad	18065	Uranium recovery is 40% low in blind QC sample. Uranium is qualified as J.

[a] PCBs = Polychlorinated biphenyls.
[b] SVOCs = Semivolatile organic compounds.
[c] VOCs = Volatile organic compounds.
[d] TAL metals = Target analyte list metals.
[e] Rad = Uranium-234, uranium-235, uranium-238, plutonium-238, plutonium-239, and americium-241.

TAL Metals Analyses

Nineteen soil samples were submitted for TAL metals analyses under five request numbers: 15266, 15303, 15305, 15356, and 17139. Nine samples were analyzed for all the TAL metals, and 10 samples were analyzed for mercury and lead only. All holding times were met for these analyses. Data were obtained for all elements of interest and, in general, the QC data for the samples were within control limits. Detected QC values considered within control limits are defined as those equal to the actual QC value ± 20% of the actual QC value. Requests 15305 and 15356 had all the QC values within control limits. Analyses of several QC samples indicated that a few elements were "out of control," that is, the detected QC value deviated from the actual QC value by more than 20%. The following paragraphs present a detailed discussion of the validation results obtained from TAL metals analyses.

Requests 15266 and 15356 had minor problems: QC values were high for iron, sodium, and zinc in the samples under request 15266, and they were high for chromium, magnesium, and nickel in the samples under request 15356. These high values may have been caused by a slight contamination of the samples. However, since the detected QC values were higher than the actual QC values, the data from the samples would be overestimated and thus conservative. Because all these data are within background ranges for local soil, they are not qualified and are valid.

The detected QC value for lead in one sample under request 15303 was higher by 50% than the actual QC value for lead. The other QC values under the same request were under control. All the data for this request were below the SAL by a factor of 20 or more, and they were within background ranges for local soil. As a result, the data are not qualified and are valid.

In the two samples under request 17139, the detected QC value for selenium was high, namely, 0.8 mg/kg, as opposed to 0.009 mg/kg, which is the actual QC value. Considering that the actual QC value is well below the detection limit of the analytical instrument, the detected QC value may be viewed as a false positive. However, all selenium values for soil samples were within background ranges for local soils (0.4 mg/kg or less) and well below the SAL, which is 400 mg/kg. Therefore, the data are not qualified and are considered valid.

VOCs, SVOCs, Pesticides, and PCBs Analyses

Five soil samples were analyzed for VOCs, SVOCs, pesticides, and PCBs. They were submitted under requests 15276, 15365, 15367, 17135, and 17138 (Table 3-1). The only aberration that occurred was that the requests for pesticides analysis were submitted under numbers 15365 instead of 15367 and 17135 instead of 17138. Following is a more detailed discussion of these analyses.

VOCs Analyses. All the QC values for VOCs in the samples included under request 15367 were within control limits. For request 15276, the last surrogate was 8% above the control limit. However, since all the other QC values were within control limits and no analytes were detected in the sample, the data are not qualified and are valid.

For request 17138, the last internal standard (1,4-dichlorobenzene-d4) was below the control limit. As a result, each analyte associated with this surrogate is qualified as an estimated undetected quantity, or UJ. For sample AAB0278, the initial calibration for acetone had a relative standard difference (RSD) of 33%, which caused the acetone value—22 µg/kg—to be qualified as estimated quantity, or J. At the same time, carbon disulfide and 2-butanone were found in the method blank at 5.3 µg/kg and 32 µg/kg, respectively. That is why, the estimated quantitation limits (EQLs) for both analytes were raised in the samples to the detected level.

SVOCs Analyses. All the detected QC values for SVOCs in requests 15276, 15367, and 17138 were within control limits. The data are not qualified and are valid.

Pesticides Analyses. All detected QC values for pesticides in the sample included under request 15276 were within control limits.

In all samples under request 15365, the pesticide dichlorodiphenyl dichloroethane (DDD) was detected as being outside the control limits on both columns used in the gas chromatography technique. Because no other QC was done for this particular pesticide, all the QC values for DDD associated with this request must be qualified as UJ if DDD is not detected and as J if DDD is detected.

For request 17135, there was a greater than 25% difference between the QC values detected with the two columns used in the analyses. As a result, the following analytes were qualified as J: gamma-chlordane, DDD, dichlorodiphenyl dichloroethylene (DDE), dichlorodiphenyl trichloroethane (DDT), dieldrin, endosulfan II, and endrin aldehyde for sample AAB0275 and dieldrin and endosulfan II for sample AAB0278.

PCBs Analyses. All the detected QC values in requests 15276, 15367, and 17138 were within control limits. Therefore, all data are valid.

Radiochemistry Analyses

Fourteen samples were submitted for radiochemistry analyses. All the samples were analyzed for plutonium-238, plutonium-239, uranium-234, uranium-235, uranium-238, and americium-238 under requests 15268, 15364, 17141, and 18065. One of these samples, included under request 15268, was analyzed for tritium and water. Two of these samples, included under request 15364, underwent a gamma scan.

For request 15268, americium-241 was spiked with americium-243. There was a 57% recovery for americium-241, which would change the americium-241 value from 0.105 pCi/g to 0.184 pCi/g, an insignificant difference compared with the SAL of 17 pCi/g. Because there were no other problems with the QC values, all the americium-241 data are not qualified and are valid.

All the detected QC values for request 15364 were within control limits, and the data are valid.

For request 17141, there were slight problems with the blind QC samples. A consistently low bias (approximately 25%) characterized the QC samples for plutonium-238, plutonium-239, and americium-241 across a number of laboratories. Because all other internal laboratory QC

values were within control limits and given the history of these values, the data are not qualified and are valid.

For request 18065, the detected QC value for total uranium was 40% below the actual QC value. This problem occurred consistently whenever kinetic phosphorescence analysis was used. As a result, all the uranium data for this request are qualified as J.

3.2 Methods for Comparing Site Data With Background Data

Once the data validation process is complete and the site data are finalized, the next step in the data assessment involves comparing site data with background data. Background data are available from several sources, including the following:

- soil samples collected throughout Los Alamos County, which underwent chemical analyses for certain inorganic (metal) constituents and naturally occurring radioactive constituents (Longmire et al. 1995, 1142); and
- 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; and Environmental Protection Group 1992, 0740).

In a comparison of site data with background data, each observed concentration datum must first be compared with its upper tolerance limit (UTL). UTLs are used to represent reasonable values for high background concentrations. The UTL used in the LANL Environmental Restoration (ER) Project for each constituent is the estimated 95% upper confidence bound of the 99th percentile of the constituent's background concentration distribution. However, if there is a large proportion of nondetects in the background data for a given constituent, the maximum reported background concentration is used instead 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 statistical methods for comparing site and

background concentration distributions are presented in LANL ER Project Assessments Council guidance documents (ER Project Assessments Council 1995, 1218; and Glatzmaier 1995, 1213).

If a constituent has a reported concentration that exceeds its UTL or fails other statistical background comparison tests (that is, the site data are statistically greater than the background data), then that constituent is retained as a chemical of potential concern (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.

3.3 Comparison With Human Health Screening Action Levels

The next step in the decision process is the screening assessment. Decisions based on human health screening assessments are made by comparing site data with SALs that have been developed at LANL and that 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). A SAL comparison is made for every medium of concern for which an exposure pathway is complete. At SWMU 0-030(g), soil is the only medium of interest.

For constituents with available SALs, screening assessment decisions are made by comparing each observed concentration datum with 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.

The impact of detection limits on the screening assessment decision must be considered in a comparison of site data with SALs. For example, when the limit of detection (LOD) is greater than a constituent's SAL and its background concentration threshold or UTL and when no other exceedances are reported, the LOD may be used as an action level, and the constituent may

be removed from further consideration. However, further chemical analyses may be required if the concentration of a constituent is less than the LOD and if that constituent is expected to be present at the site based on process knowledge of historical Laboratory operations.

The preceding paragraphs address comparisons for single constituents. Although, on the basis of these comparisons, some individual constituents are not retained as COPCs, the combined effect of several constituents may pose an unacceptable risk to human health. The potential for an adverse combined effect is evaluated by normalizing reported concentrations from a single sample against the respective SALs and then applying the normalized concentrations in an additive model. Only those constituents that exceed background concentration thresholds are included in the calculation.

If the sum of the normalized concentrations is <1, the constituents are removed from further consideration. This process must be performed separately for distinct classes of constituents such as carcinogens, systemic toxicants (noncarcinogens), and radioactive constituents; the distinctions among these constituents refer to different types of health risks. The equation for calculating the normalized concentration sum for a given sample is as follows:

$$M = \max_j \left\{ \sum_i C_{i,j} / SAL_i \right\},$$

where

M = maximum sum of normalized concentrations,

i = COPC index,

j = sample index,

$C_{i,j}$ = concentration of COPC i in sample j, and

SAL_i = chemical-specific SAL for the ith COPC.

3.4 Comparison With Ecotoxicological Screening Action Levels

Appendix L of the LANL IWP (LANL 1993, 1017) discusses the requirements and generic approach for ecotoxicological screening assessments (ESAs) and risk assessments. A detailed method for determining ecotoxicological screening action levels (ESALs) allows us to decide whether further action at hazardous waste sites is warranted on the basis of toxicological effects on birds, mammals, and reptiles inhabiting the site (Ebinger et al. 1994, 05-0210; and Ferenbaugh 1995, 05-0213).

If contaminants of potential ecological concern (COPECs) are revealed by a comparison of the above background values with ESALs, a number of decisions are possible, all of which will depend on the size and accessibility of the contaminated area (as compared with the ranges of the animals inhabiting the area), the presence of threatened or endangered plants and animals in the area, and the presence of sensitive habitats in the area. So far, an initial biological evaluation has been competed; it identifies possible threatened and endangered species, major plant communities, sensitive habitats, wetlands, and floodplains for the areas related to SWMU 0-030(g) (Biggs 1992, 05-0208; and Biggs 1993, 05-0209). Figure 3-2 shows the ecological decision flow chart used for the ESA performed for SWMU 0-030(g) and presented here in Subsection 4.4.

In fact, the ESA was performed not only for the SWMU site itself but also for a larger set of adjacent sites, called the ecological exposure unit, that could be affected by past or future transport of COPECs from the SWMU. This approach ensures that identification of potential source terms, contaminant concentrations in soil and water, and potential impact on the biota are screened in overall context with the topography, hydrology, and sensitive habitats within the ecological exposure unit that may be affected. The ecotoxicological screening process does not identify risks to the organisms in sensitive habitats; however, should it indicate the potential for an impact on organisms within a sensitive habitat, an ESA may be required. If the screening indicates that no impact is likely, the screening process will indicate that no further action (NFA) is necessary at the SWMU or on adjacent sites within the ecological unit. If COPECs are identified at the outfall or within the drainage, a decision must be made whether to further characterize the ecological exposure unit; such further work would include measuring the impact on the biota and performing an ESA.

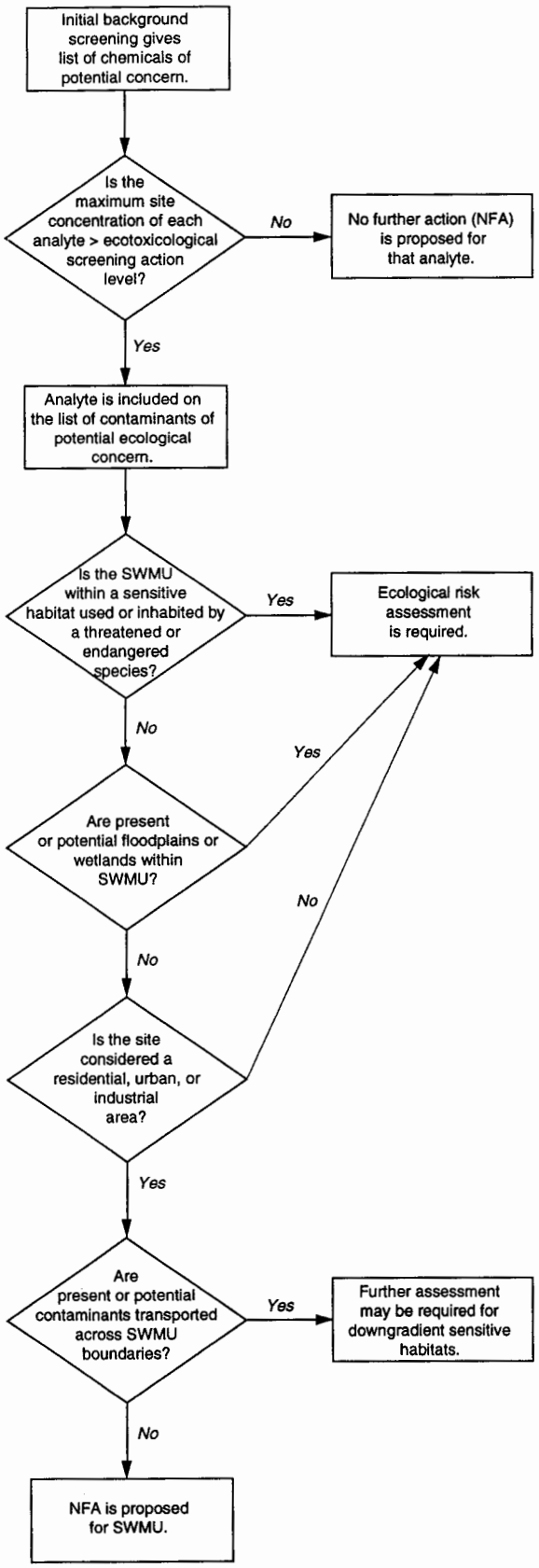

Fig. 3-2. Data analysis and ecotoxicological screening assessment decision logic flow chart.

4.0 SITE-SPECIFIC RESULTS, CONCLUSIONS, AND RECOMMENDATIONS

4.1 Field Investigation and Sampling Activities

Investigation and removal of the septic tank and piping materials associated with SWMU 0-030(g), in accordance with the RFI Work Plan for OU 1071, called for a series of surveys, sampling and field screening methodologies, and intrusive field operations, which started on June 18, 1993. Details of all these activities are presented in the following subsections.

4.1.1 Geophysical and Geodetic Surveys

Following geophysical and geodetic surveys, the septic tank and associated structures were located. Among the geophysical instruments used in the surveys were a ground-penetrating radar (GPR) and a magnetometer.

Geodetic Survey. A geodetic survey was conducted in early June 1993. The objective of this survey was to mark the location of the septic tank and associated structures. Preconstruction engineering drawings, aerial photographs, and visual inspection of the site were used to locate the septic tank and associated structures at SWMU 0-030(g). Several structures associated with the septic tank could be seen on the preconstruction engineering drawing, and it was not known whether these structures were buried at the site.

The geodetic survey revealed the presence of the following structures:

- a septic tank, which was 30 ft long x 20 ft wide x 7 ft deep;
- a valve box, which was approximately 5 ft long x 3 ft wide and was located approximately 5 ft due north from the tank; and
- a steel outfall pipe that ran due north, out of the tank and valve box and into the edge of the canyon that was approximately 250 ft away.

Visual inspection of the site revealed a clay pipe running for approximately 50 ft northeast of the septic tank's suspected location and into the edge of the canyon. At the time of the survey, it was unknown whether the clay pipe was the actual outfall pipe of the septic system or one of the components of an unknown structure at the site.

Geophysical Surveys. In April 1993, a clay-pipe drain line was successfully located with the GPR. However, with this instrument, the tank itself and other associated structures could not be located. This task was accomplished with the geodetic survey conducted in early June 1993.

The locations determined with the geodetic survey served in late June 1993 as a guide in a second geophysical survey of the tank area—the magnetic survey. Because it was assumed that the concrete tank had been built with steel rebar reinforcement, a magnetic survey seemed a suitable method at that point in the investigations. The following three magnetic anomalies were found:

1. One magnetic anomaly was in the septic tank, and it was attributed to the steel rebar used in building the tank.

2. A small magnetic anomaly was found approximately 5 ft due north from the septic tank anomaly and was attributed to the possible presence of the valve box and associated steel piping.

3. Finally, a third anomaly extended due north from the valve box anomaly, in a linear fashion, and was suspected to have been caused by the steel outfall pipe.

4.1.2 Sampling Methodology

A total of 89 soil samples and four concrete samples collected from within the septic tank chambers, immediately below the septic tank, and beneath the tank drain line were used in assessing the presence and extent of radionuclides, metals, and organic constituents associated with SWMU 0-030(g). Figure 4-1 illustrates the locations of all the samples collected during the investigation of SWMU 0-030(g).

Soil samples were generally collected in accordance with LANL-ER-SOP-06.09,R0, "Spade and Scoop Method for Collection of Soil Samples." When material was being excavated from confined spaces, soil samples were collected directly from the backhoe bucket to ensure worker safety. Several samples were collected with a hand auger, according to LANL-ER-SOP-6.10, R0, "Hand Auger and Thin-Walled Tube Sampler." Disposable scoops and aluminum pans were used for collecting samples. Hand augers were decontaminated with Fantastik™ cleaner and paper towels before and after each sample collection.

Three drum water samples were collected for waste characterization purposes. The guidelines in LANL-ER-SOP-6.15,R0, "Coliwasa Sampler for Liquids and Slurries," were observed in collecting representative water samples from the drums. Table 4-1 summarizes the types of containers and preservatives used for these samples.

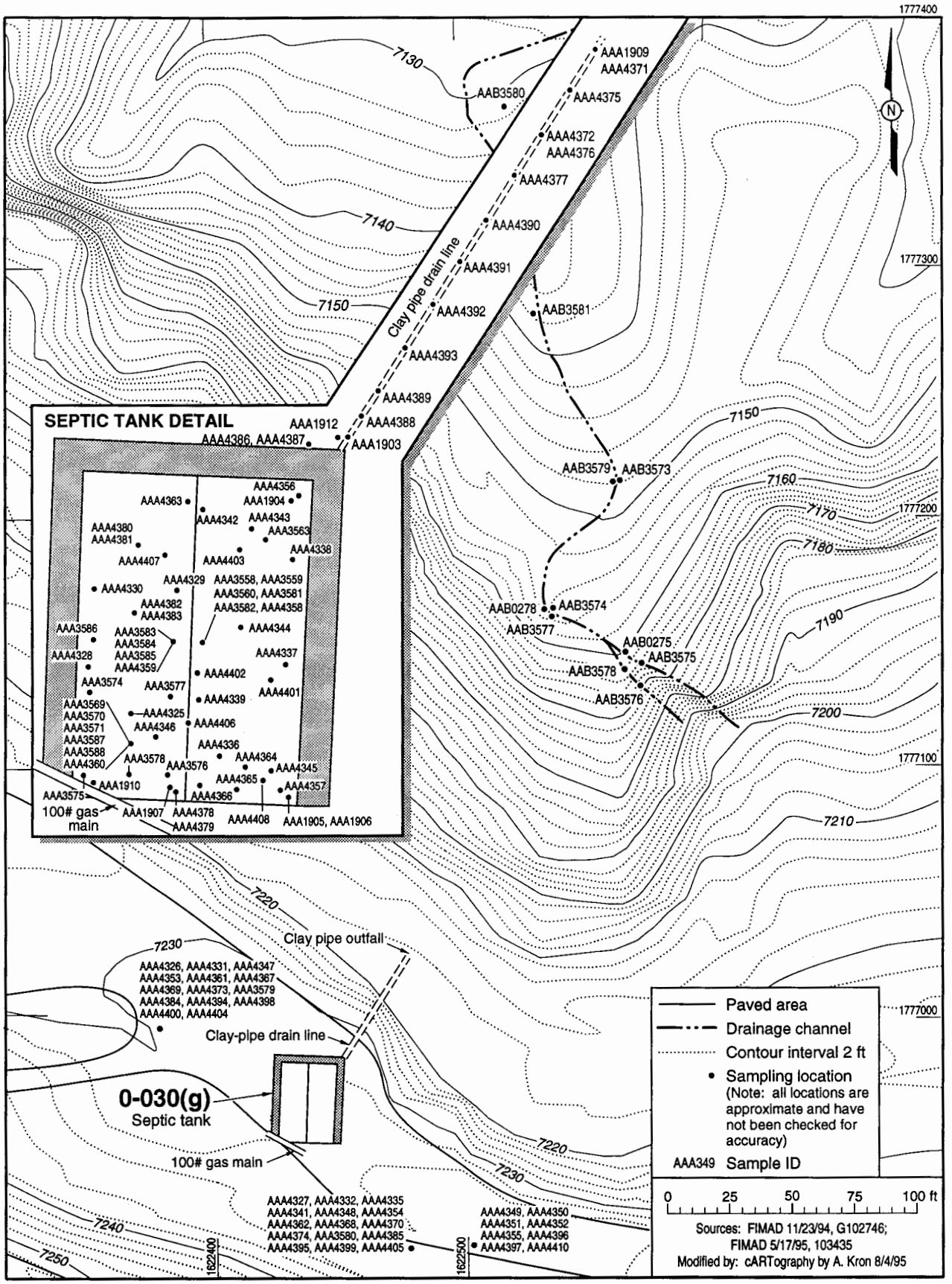

Fig. 4-1. Locations of samples collected at SWMU 0-030(g).

All soil samples were submitted under chain of custody to the LANL mobile radiological analytical laboratory (MRAL) for radiological counting. For gross alpha and beta counting, a low-level counter was used, whereas for gamma counting, a deep well counter was used. Following field counting in the MRAL, samples were shipped under chain of custody to the SCF at LANL for transmittal to analytical laboratories. Table 4-1 summarizes the types of containers and preservatives used for collecting these samples and the methods for analyzing the samples.

Eight soil samples, as well as one QA field duplicate sample, were submitted for analyses of radiochemistry (plutonium-238, plutonium-239, strontium-90, uranium-234, uranium-235, and gamma spectrometry), VOCs, SVOCs, organochlorine pesticides/PCBs, and TAL metals in accordance with the RFI Work Plan for OU 1071. The remaining 80 samples support waste characterization and further define the extent of contamination in the tank and associated piping; they were submitted for MRAL counting. Several of these samples were also submitted for TAL metals analysis. Samples whose total metal results exceeded 20 times the RCRA toxicity characteristic leaching procedure (TCLP) threshold were resubmitted for TCLP analyses.

TABLE 4-1

SAMPLE CONTAINERS, PRESERVATIVES, AND ANALYTICAL METHODS FOR SWMU 0-030(g)

ANALYTE	MATRIX	METHOD	SAMPLE CONTAINER	PRESERVATIVE
TAL[a] and TCLP[b] metals	Soil	6010	125 mL, made of polyethylene	Ice
TAL metals	Water	6010	500 mL, made of polyethylene	Nitric acid to pH<2, Ice
Radiochemistry	Soil	Gamma spectrometry	250 mL, made of polyethylene	Ice
VOCs[c]	Soil	8240	2-mL x 40-mL amber glass	Ice
SVOCs[d]	Soil	8270	250 mL, made of glass	Ice
Pesticides/PCBs[e]	Soil	8080	250 mL, made of glass	Ice
MRAL[f] screening	Soil	MRAL	1-quart plastic bag	Ice
MRAL screening	Water	MRAL	500 mL, made of polyethylene	Ice

[a] TAL = Target analyte list.
[b] TCLP = Toxicity characteristic leaching procedure.
[c] VOCs = Volatile organic compounds.
[d] SVOCs = Semivolatile organic compounds.
[e] PCBs = Polychlorinated biphenyls.
[f] MRAL = Mobile radiological analytical laboratory.

4.1.3 Field Screening Methodology

All excavated and sample materials were screened in the field for radioactivity and organic vapors. A direct-reading Eberline ESP-1™ with an air-proportional probe was used to screen for alpha activity, and a direct-reading Eberline ESP-1™ with a HP 260 detector was used to screen for beta/gamma activity. Screening for alpha activity was not reliable because of probe inefficiencies and shielding, which was caused by soil moisture. A flame ionization detector screened organic constituents within the tank and in worker breathing zones. A combustible-gas indicator monitored oxygen levels and combustible gases. As the septic tank was being excavated, a Jerome mercury-vapor probe screened mercury vapors.

4.1.4 Valve Box Investigation

Intrusive activities began in the suspected valve box area, located by the geodetic and magnetic surveys, approximately 5 ft due north of the septic tank's surveyed location. Excavation of the suspected area did not locate the valve box. Instead, a broken, vitrified-clay pipe was found approximately 2 ft below ground surface (bgs). This broken pipe was oriented parallel to the clay pipe outfall located northeast of the tank's suspected location.

Excavated material was placed on plastic tarpaulins, in accordance with the approved site-specific waste management plan, and was screened in the field for radioactivity and organic vapors. No radioactivity or organic vapors were detected above background levels. Therefore, the excavated material was placed back into the excavation.

Six soil samples were collected from the valve box excavation. Two of the samples, AAA1903 and AAA1912 (Table A-1, Appendix A), were submitted in accordance with the RFI Work Plan for OU 1071 for MRAL screening and for laboratory analyses of radiochemistry, TAL metals, VOCs, SVOCs, pesticides, and PCBs. The remaining four soil samples, which were collected for screening purposes, were submitted only for MRAL counting.

4.1.5 Septic Tank Investigation

Following excavation of the valve box area, excavation continued in the suspected direction of the septic tank. The north end of the tank was located two days after the start of intrusive operations. Assessment of the tank's integrity and dimensions required continued exposure of the outside of the tank's walls. During excavation, a 100-pound per square inch gas main was discovered running across the southwest corner of the tank, and it prevented excavation along the outer south wall of the tank. Three screening samples were collected from excavated material outside the tank walls, and they were submitted for MRAL counting.

The tank was 32 ft long x 22 ft wide x 6.5 ft deep. A center baffle separated the tank into the east and west chambers. Although the top of the tank was not intact, its sides were intact and made of reinforced concrete. Fill, rebar, and concrete debris were found within the tank. Several large pieces of concrete from within both chambers were suspected to be the remains of the top of the tank.

First, the fill material found inside the tank was removed with a backhoe so that the tank could later be excavated. Each backhoe bucket was screened in the field for radioactivity, as material was being removed from the tank. The excavated material was stockpiled on plastic tarpaulins on site pending characterization in accordance with the site-specific waste management plan.

Eight soil samples were collected from fill material during this first stage of the excavation. They were collected directly from the backhoe bucket, as material was being excavated from the tank. Three of the eight samples were collected for screening purposes and were submitted for MRAL counting. Four of the eight samples—AAA1904, AAA1905, AAA1906, and AAA1907—were collected in accordance with the RFI Work Plan for OU 1071 and were submitted for MRAL counting and fixed laboratory analyses of radiochemistry, TAL metals, VOCs, SVOCs, pesticides, and PCBs. Sample AAA1906 is a duplicate of AAA1905. The last of the eight samples, designated "Aliquot," was collected at the same location as AAA1907. Samples Aliquot and AAA1907 were collected from discolored material found at the southeast corner of the tank's west chamber (see Table A-1 for a listing of all these samples). Field screening was performed right away so as to ensure that the samples collected contained truly contaminated material, which, in turn, would later allow a determination of actual levels of radioactivity and an identification of the specific constituents. Beta/ gamma radioactivity levels as high as 2 000 counts per minute (cpm) were recorded during the field screening of the discolored material. The Aliquot sample, which was not assigned a laboratory identification ("AAA") number at the time of collection, was submitted for MRAL counting and analysis of TAL metals. The discolored material was returned to the tank to minimize worker exposure as well as airborne transport of material from the excavation. The excavation and excavated material were covered at the end of each day with a plastic tarpaulin.

In samples AAA1907 and Aliquot, which were collected from the west chamber of the tank, americium-241, plutonium-239, and uranium-234 were found, and their activity levels were above SALs. In addition, total uranium, lead, and mercury concentrations were also reported

to be above SALs. Because reported lead and mercury concentrations exceeded the 20 times TCLP limits set by RCRA, the fill material from the tank's west chamber was classified as a hazardous (by toxicity characteristics) as well as radioactive waste. Therefore, samples AAA1907 and Aliquot were resubmitted for TCLP analyses. TCLP results indicated that the leachable concentrations of lead and mercury did not exceed the regulated toxicity characteristic thresholds.

The discovery of elevated radiological activity within the fill material posed both waste management and occupational safety concerns. A sampling survey had been performed in the tank chambers before additional fill material was removed. Fifteen samples—AAA3558, AAA3559, AAA3560, AAA3569, AAA3570, AAA3571, AAA3581, AAA3582, AAA3583, AAA3584, AAA3585, AAA3586, AAA3587, AAA3588, and AAA4325—were collected from six boreholes drilled in both chambers of the tank. Hand augers made of stainless steel were used in drilling boreholes through the fill material to depths ranging from 1 ft to 6 ft. Then the samples were collected at 1-ft intervals. The fill material was field-screened as it was being recovered; no radioactivity above background was reported during field screening. All 15 samples were submitted for MRAL counting, which indicated no above background radioactivity levels. Selected samples were also submitted for TAL metals analyses (Table A-1); no metals were found present in concentrations that exceeded SALs or 20 times TCLP thresholds.

Following completion of sampling by hand auger, excavation activities resumed in the west chamber of the tank. Because radiologically contaminated fill material was believed to be present in parts of the tank, a strategy for minimizing waste was developed. Material was removed from the tank in 1-ft lifts. After each lift was screened in the field, clean material was separated from potentially contaminated material. Excavated materials were stockpiled next to the excavation, with clean plastic sheeting separating each lift. The following samples were collected from backhoe lifts taken from the west chamber: AAA3574, AAA3575, AAA3576, AAA3577, AAA3578, AAA4328, AAA4329, and AAA4330. Field screening did not indicate the presence of elevated activity in the first two lifts. A composite sample from the first lift (AAA4328) and two discrete samples (AAA4329 and AAA4330) from the second lift were submitted for MRAL counting and TAL metals analysis to confirm this finding.

Elevated beta/gamma activity was detected in the third lift from the west chamber. The material in the third lift was not discolored. Four samples were collected from the top of the third lift, one from each corner of the lift (AAA3574, AAA3575, AAA3576, and AAA3577), and they were submitted for MRAL counting. One additional sample (AAA3578) was collected from 4 ft bgs at the south central end of the west chamber for characterization purposes, and it was

submitted for MRAL screening. On the basis of screening results and observation, it was concluded that the contamination within the fill material was distributed heterogeneously. Continued separation of "clean" and "contaminated" material was therefore no longer feasible or practical.

The owner of the property on which SWMU 0-030(g) is located expressed a strong desire to have contaminated materials removed from his property as quickly as possible. Therefore, field operations could not be slowed or stopped for a reassessment of the tank's contents. A conservative approach to the nature of materials from the tank was implemented in removing the materials: they were assumed to be mixed waste. Excavated material was placed directly into double-lined 55-gal. drums. A total of 276 drums were filled.

The fill material in the east chamber of the tank was precharacterized because of the results obtained from earlier analyses, and only afterwards was it excavated. One sample collected from the bottom northeast corner of the east chamber of the tank during the initial excavation of material along the walls of the tank (sample AAA1904) was reported to contain plutonium-239 above the SAL. Therefore, eight additional samples (AAA4336, AAA4337, AAA4338, AAA4339, AAA4342, AAA4343, AAA4344, and AAA4345) were collected from the bottom of eight boreholes that had been drilled with a hand auger into the fill material of the east chamber; it was believed that these samples would provide additional information regarding the fill material's chemical nature. The east chamber was divided into eight equal sections from which a random point was chosen as representing the borehole location. All eight samples were submitted for MRAL counting and TAL metals analysis.

Excavation of the fill material then resumed in the east chamber. Early results from hand auger and fill samples indicated that the waste from the east chamber would be classified as low-level radioactive and non-RCRA regulated. Excavated materials were placed into bulk containers (lined dump trucks) and shipped off-site to Area G, a material disposal area (MDA) at TA-54. All debris found within the tank (concrete and rebar) was also shipped to Area G for disposal.

Following the excavation of all fill and debris materials, an inspection of the bottom of the tank—a 6- to 12-in.-thick unreinforced concrete slab—revealed that area to be stained and spongy in places. Four concrete samples (AAA4346, AAA4379, AAA4381, and AAA4383) were collected by jackhammering through the concrete from the bottom of the west chamber in areas that were particularly stained and/or spongy. Three soil samples (AAA4378, AAA4380, and AAA4382) were collected from immediately beneath the west chamber, at depths of 6 to 12 in. Another three soil samples (AAA4401, AAA4402, and AAA4403) were collected from beneath the east chamber floor. All soil and concrete samples were submitted for MRAL counting and TAL metals analyses. A summary of all concrete and soil samples is presented in Table A-1.

4.1.6 Drain Line Investigation

After all material had been excavated from the septic tank, the investigation turned to the suspected location of the tank's drain line, which, according to geodetic and geophysical surveys, extended due north from the septic tank. When material from the outside part of the north wall of the tank was excavated, no evidence was found of a drain line extending due north from the tank. Two trenches were excavated perpendicular to the suspected location at 10 and 15 ft north of the septic tank and to depths of 3 and 5 ft bgs, respectively. Both trenches failed to reveal any evidence of a drain line running north from the septic tank. However, a vitrified-clay drain line was found running northeast of the tank and is suspected to be the outfall from the septic tank. It is also suspected that this is the same clay pipe that was encountered in the valve box excavation north of the septic tank. Four samples (AAA1903, AAA1912, AAA4372, and AAA4386) were collected from within and around the clay pipe in order to assess the presence of metals and of radiological or organic contamination within and immediately below the clay pipe.

4.1.7 Excavation and Confirmatory Sampling Activities

The septic tank and drain line, fill and debris materials from within the septic tank, and soil from a depth of 18 in. beneath the tank and from a depth of 12 in. beneath the clay pipe were removed and transported to Area G. Five samples (AAA1910, AAA3563, AAA4406, AAA4407, and AAA4408) were collected from below the bottom of the septic tank at an 18-in. depth, and 12 samples (AAA1909, AAA4371, AAA4375, AAA4376, AAA4377, AAA4387, AAA4388, AAA4389, AAA4390, AAA4391, AAA4392, and AAA4393) were collected from below the clay drain line at 12-in. depth in order to confirm that all contaminated material had been removed from the site (Table A-1). Figure 4-2 shows the locations of all confirmatory samples. Two of the five confirmatory samples for the septic tank were submitted for MRAL screening and laboratory analyses of TAL metals, radiochemistry, VOCs, SVOCs, pesticides, and PCBs. The remainder of the septic tank and all the clay pipe confirmatory samples were submitted for MRAL screening and laboratory analyses of total mercury and lead.

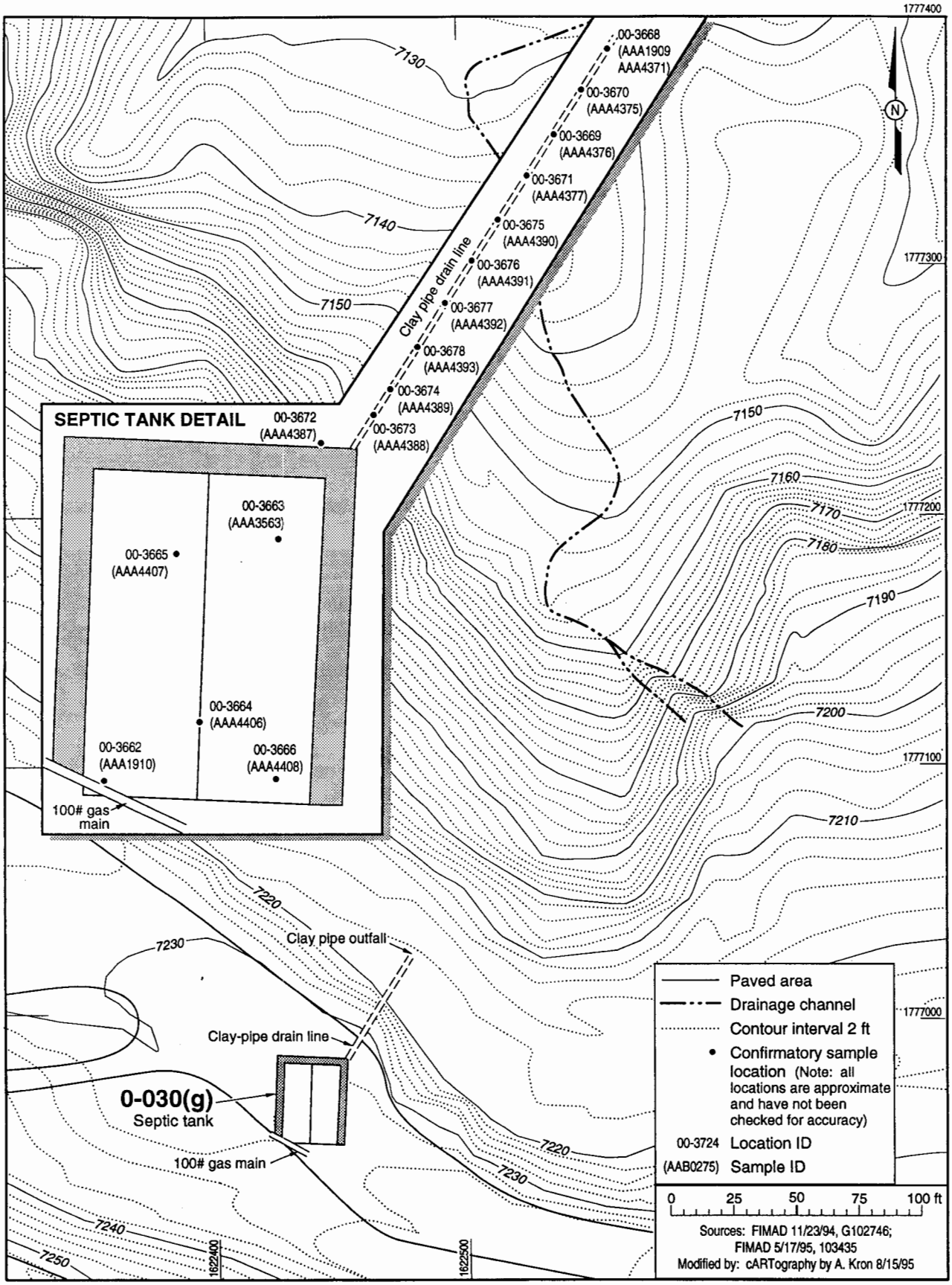

Fig. 4-2. Locations of confirmatory samples collected at SWMU 0-030(g).

4.1.8 Outfall Sampling Activities

In June 1994, 11 soil samples (AAB0275, AAB0278, AAB3573, AAB3574, AAB3575, AAB3576, AAB3577, AAB3578, AAB3579, AAB3580, AAB3581) were collected from the drainage channel impacted by the drain line outfall; the purpose was to assess the possible presence of metals, organics, and radionuclide contamination resulting from runoff from the clay pipe outfall. Table A-1 lists these soil samples, which were collected from the older alluvial fill along the channel. The samples were collected from three basic locations:

- the area at the base of the hill slope, where the septic tank outfall drains into the small drainage channel (sample AAB3578),
- areas in the drainage channel above the entry point of the outfall drainage (sample AAB3576), and
- several catchment areas in the drainage channel below the entry point of the outfall drainage (samples AAB0275, AAB0278, AAB3574, AAB3573, and AAB3580).

Sample AAB3577 was collected from material that underlies the older fill; the goal was to assess whether contaminants had leached downward from the older alluvial fill. (See Subsection 2.2 of this report for a discussion of the older and present alluvial fill.)

Three additional samples—AAB3575, AAB3579, and AAB3581—were collected from material in the presently active drainage channel.

4.1.9 Waste Characterization Sampling

Samples of Rainwater and Decontamination Water. Several drumfuls of rainwater and decontamination water were collected during the investigation and excavation activities at SWMU 0-030(g).

- One set of drums contained rainwater that was collected from the bottom of the septic tank's west chamber after a heavy rainstorm.
- Another set of drums contained rainwater that was collected from the bermed part of the drum storage area.
- The last set of drums contained decontamination water for personnel (water used to wash hands and respirators after personnel exit from the exclusion zone).

For waste characterization purposes, one water sample was collected with a clean glass coliwasa sampler from a representative drum chosen from each of the three groups listed before.

Samples of Fill Material From the West Chamber. At the request of LANL waste management personnel, five additional soil samples were collected from the material contained in the west chamber of the tank; this material had previously been excavated and drummed. The purpose of the analysis was to further characterize the distribution of mercury and lead contaminants within the fill. Five drums were selected that, based on field screening, contained fill material with above background radioactivity. One sample was collected from the top of each drum and submitted for MRAL counting and TAL metals analyses; TCLP analyses were to be performed if necessary.

4.2 Background Comparisons for SWMU 0-030(g)

This subsection describes the background comparisons performed with analytical results obtained from samples collected at SWMU 0-030(g). Appendix A (Tables A-1 through A-5) presents the analytical data; it lists the samples collected and the analyses performed, as well as the detected values for inorganics, radionuclides, and organics, the background UTLs and SALs used for comparisons, and the nondetected analytes.

Table 4-2 shows the inorganic analytes that were detected in soil at concentrations greater than their respective UTLs. Inorganic analysis was requested for 19 verification soil samples that were collected at this site. Nine samples were analyzed for TAL metals, and the remaining 10 were analyzed for lead and mercury only. The 19 prepared samples that were analyzed for mercury were run three times. These are not field duplicates or laboratory duplicates; they are reanalyses of the same prepared sample, in which case it is appropriate to average the three results for data analysis purposes. Two of the samples were analyzed twice for some inorganics (laboratory duplicates of samples AAA4377 and AAB0275).

Chromium was detected in all 9 verification soil samples collected at this SWMU. In 4 of these samples, chromium was detected at concentrations in excess of its UTL that is 34.2 mg/kg; the maximum detected concentration was reported as 360 mg/kg. Mercury was detected in approximately 40% of the 57 analyses. The average of the 3 analyses of the same sample is presented in Table 4-2; one-half of the detection limit was used for nondetects that are included in the averages presented. Overall, mercury was detected in 7 of the

TABLE 4-2

INORGANIC CONCENTRATIONS[a] THAT EXCEED UTLs[b]

ANALYTE	SAMPLE ID	SAMPLE VALUE (mg/kg)	UTL (mg/kg)	DEPTH (ft)	LOCATION DESCRIPTION
Chromium	AAA1909	60	34.2	3.0–8.0	Septic tank
	AAA4375	360		2.0–2.5	Clay pipe
	AAA4376	38		3.5–4.0	Clay pipe
	AAA4377	39[c]		5.0–5.5	Clay pipe
Mercury	AAA4377	0.15[d]	0.1[e]	5.0–5.5	Clay pipe
	AAA4390	0.6[d]		5.5–6.0	Clay pipe
	AAA4391	0.8[d]		6.5–7.0	Clay pipe
	AAA4392	0.37[d]		7.5–8.0	Clay pipe
	AAA4393	0.63[d]		8.5–9.0	Clay pipe
	AAA4406	0.1[d]		9.0–9.5	Septic tank
	AAB0275	0.13[d]		NA[f]	Outfall
Nickel	AAA4375	118	26.7	2.0–2.5	Clay pipe
Thallium	AAA4377	1.15	0.9[e]	5.0–5.5	Clay pipe

[a] Analytical data were obtained from the Facility for Information Management, Analysis, and Display on May 5, 1995.
[b] UTL = Upper tolerance limit.
[c] Average of concentrations from sample AAA4377 and a laboratory duplicate of that sample.
[d] Average concentration from three analyses of the same prepared sample.
[e] The UTL for this analyte could not be calculated because samples were too few; the maximum value from the background range was used (Longmire et al. 1995, 1142).
[f] NA = Not available.

19 samples at concentrations greater than its maximum reported background concentration that is 0.1 mg/kg. Nickel and thallium were also detected in one sample, each at concentrations above the respective background threshold levels.

Table 4-3 shows the radionuclide analytes that were detected in soil at concentrations in excess of the respective UTLs. Radionuclide analyses were requested for 14 RFI verification soil samples that were collected at this site. Three of the samples were analyzed twice for some radionuclides (laboratory duplicates of samples AAA1910, AAA3563, and AAB0275). In all samples analyzed, plutonium-239/240 was detected at concentrations in excess of the maximum reported background concentration. Plutonium-238 was also detected in several of

these samples at concentrations greater than its maximum reported background value. Isotopic analysis of uranium was requested for samples taken from near the septic tank and clay pipe; total uranium analysis was requested for the outfall samples. Uranium isotopes were detected at concentrations in excess of their respective UTLs in both soil samples taken from near the septic tank. Only one of the outfall samples exhibited total uranium concentration in excess of its UTL of 5.71 mg/kg. The range of concentrations for total uranium in the outfall samples was 1.42 mg/kg to 6.82 mg/kg.

TABLE 4-3

RADIONUCLIDE CONCENTRATIONS[a] THAT EXCEED UTLs[b]

ANALYTE	SAMPLE ID	SAMPLE VALUE (pCi/g)	UTL (pCi/g)	DEPTH (ft)	LOCATION DESCRIPTION
Plutonium-238	AAA1909	0.022	0.014[c]	3.0–8.0	Clay pipe
	AAB0278	0.208		NA[d]	Outfall
	AAB0275	0.621[e]		NA	Outfall
	AAB3573	0.1465[e]		0.17–0.50	Outfall
	AAB3574	0.161[e]		0.33	Outfall
	AAB3575	0.1156[e]		0.33	Outfall
	AAB3576	0.0713[e]		0.0–0.04	Outfall
	AAB3578	0.2435[e]		0.25	Outfall
	AAB3579	0.1787[e]		0.0–0.17	Outfall
	AAB3580	0.2017[e]		0.42	Outfall
	AAB3581	0.05[e]		0.5	Outfall
Plutonium-239/ plutonium-240	AAA1910	0.812	0.052[c]	9.0–9.5	Septic tank
	AAA3563	2.469		9.0–9.5	Septic tank
	AAA1909	4.56		3.0–8.0	Clay pipe
	AAB0278	11.48		NA	Outfall
	AAB0275	33.70[e]		NA	Outfall
	AAB3573	10.18[e]		0.17–0.5	Outfall
	AAB3574	11.1[e]		0.33	Outfall
	AAB3575	4.885[e]		0.33	Outfall

TABLE 4-3 (CONTINUED)

RADIONUCLIDE CONCENTRATIONS[a] THAT EXCEED UTLs[b]

ANALYTE	SAMPLE ID	SAMPLE VALUE (pCi/g)	UTL (pCi/g)	DEPTH (ft)	LOCATION DESCRIPTION
Plutonium-239/ plutonium-240 (continued)	AAB3576	5.675 [e]	0.052[c]	0.0–0.04	Outfall
	AAB3577	2.96 [e]		0.33	Outfall
	AAB3578	14.22[e]		0.25	Outfall
	AAB3579	5.92[e]		0.0–0.17	Outfall
	AAB3580	9.025[e]		0.42	Outfall
	AAB3581	10.525[e]		0.5	Outfall
Uranium-234	AAA3563	3.005	2.03	9.0–9.5	Septic tank
Uranium-235	AAA1910	0.109	0.088	9.0–9.5	Septic tank
	AAA3563	0.194		9.0–9.5	Septic tank
Uranium-238	AAA3563	2.111	1.9	9.0–9.5	Septic tank
Uranium (Total)	AAA3581	6.82	5.71	0.5	Outfall

[a] Analytical data were obtained from the Facility for Information Management, Analysis, and Display on May 5, 1995.
[b] UTL = Upper tolerance limit.
[c] Maximum background concentration from LANL Environmental Surveillance reports.
[d] NA = Not available.
[e] Average of concentrations from sample and laboratory duplicate of that sample.

Organic constituents that were detected are reflected in Table 4-4. Most of the detected organics are pesticides or pesticide degradates, although PCBs were also detected in the two outfall samples that were analyzed for organics.

TABLE 4-4

DETECTED CONCENTRATIONS[a,b] FOR ORGANICS

ANALYTE	SAMPLE ID	SAMPLE VALUE (mg/kg)	MAX. LOD[c] (mg/kg)	DEPTH (ft)	LOCATION DESCRIPTION
PCBs[d]	AAB0275	1.78	0.036	NA[e]	Outfall
	AAB0278	0.297		NA	Outfall
Chlordane	AAB0275	0.0396	0.0053	NA	Outfall
	AAB0278	0.011		NA	Outfall
Dichlorodiphenyl dichloroethane	AAB0275	0.0108	0.0042	NA	Outfall
	AAB0278	0.00448		NA	Outfall
Dichlorodiphenyl dichloroethylene	AAB0278	0.00626	0.00389	NA	Outfall
Dichlorodiphenyl trichloroethane	AAA1910	0.044	0.0044	9.0–9.5	Septic tank
	AAA3563	0.017		9.0–9.5	Septic tank
	AAB0275	0.0387		NA	Outfall
	AAB0278	0.0196		NA	Outfall
Dieldrin	AAB0275	0.0439	0.0055	NA	Outfall
	AAB0278	0.00784		NA	Outfall
Endosulfan II	AAB0275	0.0211	0.028	NA	Outfall
	AAB0278	0.00552		NA	Outfall
Endrin aldehyde	AAB0275	0.00866	0.058	NA	Outfall

[a] Analytical data were obtained from the Facility for Information Management, Analysis, and Display on May 5, 1995.
[b] Detected acetone concentrations are not reported here because the presence of acetone is thought to be caused by laboratory contamination.
[c] These are the maximum limits of detection (LODs) reported for nondetects for each analyte.
[d] Detected polychlorinated biphenyls (PCBs) were Aroclor 1254™ and Aroclor 1260™.
[e] NA = Not available.

4.3 Human Health Screening Assessment

This subsection presents results from the human health screening assessment for those COPCs that have been retained in the decision process to this point. Figure 4-3 shows the locations of the RFI samples and indicates constituents that were detected at concentrations greater than their respective SALs.

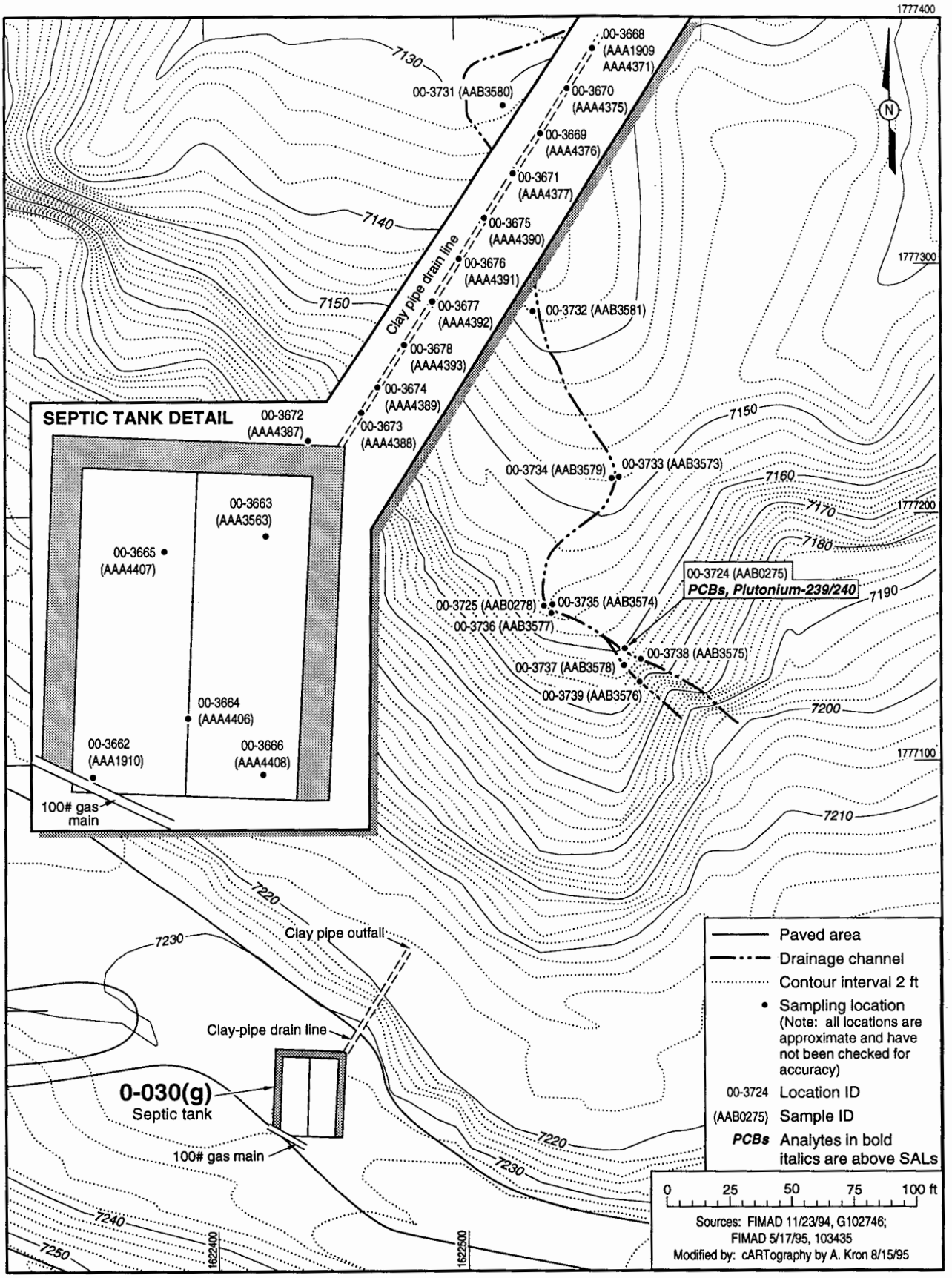

Fig. 4-3. Locations of RFI samples collected at SWMU 0-030(g).

Two types of analytes, plutonium-239/240 and PCBs (Aroclor 1254™ and Aroclor 1260™), were detected at concentration levels greater than the analytes' SALs. These exceedances of SALs occurred only in sample AAB0275. The concentrations of plutonium-239/240 and PCBs in this sample were 33.7 pCi/g and 1.78 mg/kg, compared with the respective SALs of 18 pCi/g and 1 mg/kg. Therefore, plutonium-239/240 and PCBs were retained as COPCs pending further analysis. The remaining 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.

The inorganics that were detected at concentrations greater than background—chromium, mercury, nickel, and thallium, together with pesticide constituents endosulfan II and endrin aldehyde—make up the list of noncarcinogenic constituents to be considered in a multiple-constituent SAL comparison. The highest total normalized concentration, approximately 0.19, in sample AAA4377 suggests that these constituents do not pose an unacceptable, noncarcinogenic human health risk. Note, however, that chromium is not included in the multiple-constituent SAL comparison presented in Table 4-5 because total chromium has no associated SAL. If chromium is considered to be in its trivalent state, the most prevalent state in soil, then chromium does not add significantly to the normalized concentration in any sample (the SAL for chromium III is 80 000 mg/kg).

The list of carcinogenic constituents to be considered in a multiple-constituent comparison includes several pesticides and pesticide degradates. The highest total normalized concentration for carcinogens was approximately 1.04 in sample AAB0275. The reported concentration of dieldrin dominates the multiple-constituent comparison, contributing a normalized value of 0.998. Laboratory operations are unlikely to be the reason for the presence of these constituents at SWMU 0-030(g); furthermore, these constituents should not pose an unacceptable carcinogenic human health risk at this site even when considered in combination.

Plutonium-238 and uranium (isotopic or natural) are included in the multiple-constituent SAL comparison for radionuclides. The highest total normalized concentration, approximately 0.08, in sample AAA3563 suggests that these constituents do not pose an unacceptable human health risk at this site.

In summary, the multiple-constituent analyses indicate that, at SWMU 0-030(g), no additional constituents need to be considered as COPCs.

TABLE 4-5

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

ANALYTE	SAMPLE ID	CONCENTRATION (mg/kg)	SOIL SAL[a] (mg/kg)	NORMALIZED VALUE
Noncarcinogenic Effects				
Mercury	AAA4377	0.15	24	0.00625
Nickel		0.0025	1 600	0.000002
Thallium		1.15	6.4	0.18
Endosulfan II		0.0211[b]	4	0.0053
Endrin aldehyde		0.00866[b]	24	0.00036
Total				**0.19**
Carcinogenic Effects (Nonradioactive)				
Chlordane	AAB0275	0.0396	0.54	0.02
Dichlorodiphenyl dichloroethane		0.0108	2.9	0.0015
Dichlorodiphenyl trichloroethane		0.0387	2.1	0.0184
Dieldrin		0.0439	0.044	0.998
Total				**1.04**
Radionuclide Effects				
Plutonium-238	AAA3563	0.01 pCi/g	20 pCi/g	0.0005
Uranium-234		3.005	86	0.035
Uranium-235		0.194	18	0.011
Uranium-238		2.111	59	0.036
Total				**0.082**

[a] For constituents that exhibit both systemic and carcinogenic effects, the most conservative screening action level (SAL) is used in the screening assessment.
[b] No organics analysis was requested for this sample. Values presented are the maximum concentration reported from samples submitted for organics analyses.

On the basis of this human health screening assessment, plutonium-239/240 and PCBs were identified as COPCs because the maximum detected concentrations of these two analytes exceeded their respective SALs. However, as shown previously, the maximum detected concentrations were less than twice the respective SALs and were measured in a single sample collected from a sediment catchment in the drainage channel. Ten other outfall samples were

analyzed for plutonium-239/240, including samples collected farther upstream and downstream in the drainage channel. Plutonium-239/240 was detected in all 10 outfall samples at reported concentrations ranging from 2.96 pCi/g to 14.22 pCi/g; the SAL for plutonium-239/240 is 18 pCi/g. One of these 10 samples, taken directly downstream from the sample containing the maximum detected concentrations, was also analyzed for organics. PCBs were detected in this sample at a concentration of 0.297 mg/kg, as compared with a SAL of 1 mg/kg for PCBs. These results suggest that plutonium-239/240 and PCBs are found at concentrations greater than their respective SALs in a limited or very small portion of the drainage channel. Because the contamination is very limited and because these SALs are based on a residential land use scenario that is not feasible in this area, these SAL exceedances should not pose an unacceptable risk to human health. Therefore, NFA is recommended at SWMU 0-030(g) for protection of human health.

4.4 Ecotoxicological Screening Assessment for SWMU 0-030(g)

Results. Tables 4-2, 4-3, and 4-4 present the values for those analytes whose concentrations are greater than their UTLs and LODs. Table 4-6 gives the maximum values only for the outfall samples that exceeded the LOD and UTL and compares those values with the ESALs, which are given for each analyte. The last column of the table lists the COPECs that have been determined by the screening process. The COPECs are then screened against the decisions given in Fig. 3-2.

The ESALs were developed on the basis of risk factors connected with certain birds, mammals, and reptiles (Ebinger et al. 1994, 05-0210). The most sensitive organism in all cases was a small omnivorous or granivorous bird that occupied the site continuously and ingested the contaminant with food or incidental soil. The nine COPECs listed in the table are contaminants near the outfall, and they could be transported into the canyon habitats. The next step in the screening assessment is to take the COPECs through the decision tree in Fig. 3-2. SWMU 0-030(g) is not within the sensitive habitat of a threatened and endangered species, and it is not a floodplain or wetland. Moreover, removal of the septic tank, together with its contents and surrounding soil, has remedied the site. Because the site on the mesa top, in the parking lot, is part of a suburban area, the habitat was not natural anyway; therefore, samples from the tank area were not addressed as part of this ESA. The last screening decision is a determination of whether the site is likely to cause present or potential contaminant transport across the boundaries of the SWMU. It appears that removal of the tank, its contents, and associated soil eliminated a source for chromium, mercury, nickel, thallium, plutonium-238,

TABLE 4-6

INITIAL ECOTOXICOLOGICAL SCREENING ASSESSMENT FOR SWMU 0-030(g)—MAXIMUM VALUES COMPARED WITH ECOTOXICOLOGICAL SCREENING ACTION LEVELS

ANALYTE	MAXIMUM VALUE[a]	UTL[a,b] OR MAX. LOD[a,c]	ESAL[a,d]	COPEC[e]
Aroclor 1254™/1260™	1.78	0.036	0.00017[f]	yes
Chlordane	0.040	0.0053	0.001[f]	yes
Dichlorodiphenyl dichloroethane	0.011	0.0042	0.0055[f]	yes
Dichlorodiphenyl dichloroethylene	0.0063	0.0039	0.0039[f]	yes
Dichlorodiphenyl trichloroethane	0.039	0.0035	0.0039[f]	yes
Dieldrin	0.044	0.0055	0.000083[f]	yes
Endosulfan II	0.021	0.028	0.0065[g]	yes
Endrin aldehyde	0.0087	0.058	0.011[g,h]	yes
Mercury	0.1	0.1	0.26[g]	yes
Plutonium-238	0.62	0.014	20[i]	no
Plutonium-239/240	33.7	0.052	18[i]	no
Total uranium	6.82	5.71	NA[j]	no

[a] Values for analytes, UTLs, and ESALs are given in mg/kg for inorganics and organics and in pCi/g for radionuclides.
[b] UTL = Upper tolerance limit.
[c] LOD = Limit of detection.
[d] ESAL = Ecotoxicological screening action level.
[e] COPEC = Contaminant of potential ecotoxicological concern.
[f] Carcinogenic toxicant.
[g] Systemic toxicant.
[h] ESAL for endrin is used as a surrogate; there is no ESAL available for endrin aldehyde.
[i] SAL is used for radionuclide because radiation-induced carcinogenesis for these organisms is unknown.
[j] NA = Not available.

plutonium-239/ 240, uranium nuclides, and DDT (see Tables 4-2, 4-3, and 4-4 in Subsection 4.2.1), which were found during characterization within the tank. Sources for the other contaminants are not known. However, pesticides are common contaminants of gardens and lawns in the vicinity of sites; it is possible that neighboring gardens and lawns are the cause for the presence of pesticides in this downgradient location at the outfall. The COPECs at the

outfall may migrate farther into the canyons; however, they are not present at high enough concentrations to be considered a source of contamination to sensitive habitats in the canyons. Therefore, on the basis of potential ecological impact, SWMU 0-030(g) is recommended for NFA.

4.5 Conclusions, Actions, and Recommendations

The objective of the Phase I investigation at SWMU 0-030(g) was to locate, excavate, and remove the septic tank and determine the presence or absence of radiological and/or hazardous contaminants. Extensive data collected during 1993 indicated that several radionuclides and inorganic chemicals were present at elevated concentrations in soil and/or sludge samples collected from within the septic tank and from the tank's immediate vicinity. The contaminated material was removed as part of the excavation of the septic tank and associated drain line.

A human health screening assessment was conducted on data collected from the outfall. According to the results of this assessment, two chemicals were identified in soil - plutonium-239/240 and PCBs - at concentrations slightly greater than their respective SALS. However, further evaluation of the entire data set suggests that the presence of these chemicals at those particular concentrations and in a very limited area should not result in adverse effects on human health. At the same time, the results of the multiple-constituent evaluation suggest that the presence of other chemicals in soil at concentrations below the SALs should not result in adverse effects on human health.

An ecotoxicological screening assessment was conducted on data collected from the outfall. Nine chemicals were identified as COPECs because they are present in soil, at one or more outfall sampling locations, at concentrations greater than their respective ESALS. These chemicals have the potential to migrate down the outfall channel; however, they are not present at high enough concentrations to become a source of contamination to sensitive habitats in the canyons. In addition, removal of the septic tank, its contents, and surrounding soil eliminates any potential source of increased concentrations of COPECs at the outfall. Therefore, those chemicals identified at the outfall should not have any adverse ecological impact. On the basis of results from the human health and ecotoxicological screening assessments, SWMU 0-030(g) is proposed for NFA.

outfall may migrate farther into the canyons; however, they are not present at high enough concentrations to be considered a source of contamination to sensitive habitats in the canyons because further migration will result in significant dilution by surface runoff. Therefore, on the basis of potential ecological impact, SWMU 0-030(g) is recommended for NFA.

4.5 Conclusions, Actions, and Recommendations

The objective of the Phase I investigation at SWMU 0-030(g) was to locate, excavate, and remove the septic tank and determine the presence or absence of radiological and/or hazardous contaminants. Extensive data collected during 1993 indicated that several radionuclides and inorganic chemicals were present at elevated concentrations in soil and/or sludge samples collected from within the septic tank and from the tank's immediate vicinity. The contaminated material was removed as part of the excavation of the septic tank and associated drain line.

A human health screening assessment was conducted on data collected from the outfall. According to the results of this assessment, two chemicals were identified in soil—plutonium-239/240 and PCBs—at concentrations slightly greater than their respective SALs. However, further evaluation of the entire data set suggests that the presence of these chemicals at those particular concentrations and in a very limited area should not result in adverse effects on human health. At the same time, the results of the multiple-constituent evaluation suggest that the presence of other chemicals in soil at concentrations below the SALs should not result in adverse effects on human health.

An ecotoxicological screening assessment was conducted on data collected from the outfall. Nine chemicals were identified as COPECs because they are present in soil, at one or more outfall sampling locations, at concentrations greater than their respective ESALs. These chemicals have the potential to migrate down the outfall channel; however, they are not present at high enough concentrations to become a source of contamination to sensitive habitats in the canyons. Moreover, should further migration occur, the chemicals' concentrations will decrease even more because of surface runoff dilution. In addition, removal of the septic tank, its contents, and surrounding soil eliminates any potential source of increased concentrations of COPECs at the outfall. Therefore, those chemicals identified at the outfall should not have any adverse ecological impact. On the basis of results from the human health and ecotoxicological screening assessments, SWMU 0-030(g) is proposed for NFA.

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APPENDIX A ANALYTICAL DATA

TABLE A-1

SUMMARY OF SAMPLES COLLECTED AT SWMU 0-030(g)

LOCATION	LOCATION ID	SAMPLE ID	SAMPLE TYPE	SAMPLE MATRIX	DEPTH (ft bgs[a])	ANALYSES PERFORMED						
						MRAL[b]	RADCHEM[c]	TAL[d]	P[e]	SVPCs[f]	VOCs[g]	PCBs[h]
Valve box	00-3622	AAA1903	Pre-characterization	Soil (near-surface)	1.5-1.8	X	X	X	X	X	X	X
Tank's inner wall—bottom of septic tank, east chamber, northeast corner	00-3623	AAA1904	Pre-characterization	Soil (sub-surface)	6.5-7.0	X	X	X	X	X	X	X
Tank's inner wall—bottom of septic tank, east chamber, southeast corner	00-3624	AAA1905	Pre-characterization	Soil (sub-surface)	6.5-7.0	X	X	X	X	X	X	X
Tank's inner wall—duplicate of sample aaa 1905	00-3624	AAA1906	Pre-characterization	Soil (sub-surface)	6.5-7.0	X	X	X	X	X	X	X
Tank's inner wall—southeast corner of west chamber	00-3625	AAA1907	Pre-characterization	Soil (sub-surface)	5.0-5.5	X	X	X	X	X	X	X
Drain line—beneath clay pipe outfall, surface	00-3668	AAA1909	RFI	Soil (sub-surface)	3.0-8.0	X	X	X	X	X	X	X
Septic tank—southwest corner of tank, west chamber	00-3662	AAA1910	RFI	Soil (sub-surface)	9-9.5	X	X	X	X	X	X	X
Valve box	00-3667	AAA1912	Pre-characterization	Soil (near-surface)	1.5-1.8	X	X	X	X	X	X	X
East and west chambers—east chamber, west central hole	00-3626	AAA3558	Pre-characterization	Soil (near-surface)	0.67-0.83	X						
East and west chambers—east chamber, west central hole	00-3626	AAA3559	Pre-characterization	Soil (near-surface)	2.0-2.5	X						
East and west chambers—east chamber, west central hole	00-3626	AAA3560	Pre-characterization	Soil (sub-surface)	3.0-3.5	X						
Septic tank—northeast corner of east chamber	00-3663	AAA3563	RFI	Soil (sub-surface)	9-9.5	X	X	X	X	X	X	X
East and west chambers—east chamber, south central hole	00-3627	AAA3569	Pre-characterization	Soil (sub-surface)	4.0-4.5	X						
East and west chambers—east chamber, south central hole	00-3627	AAA3570	Pre-characterization	Soil (sub-surface)	5.0-5.5	X						
East and west chambers—west chamber, south central hole	00-3627	AAA3571	Pre-characterization	Soil (sub-surface)	5.5-6.0	X						
West chamber—west chamber, northwest corner of south end	00-3629	AAA3574	Pre-characterization	Soil (sub-surface)	3.0-3.5	X						
West chamber—west chamber, southwest corner of south end	00-3630	AAA3575	Pre-characterization	Soil (sub-surface)	3.0-3.5	X						
West chamber—west chamber, southeast corner of south end	00-3631	AAA3576	Pre-characterization	Soil (sub-surface)	3.0-3.5	X						
West chamber—west chamber, northeast corner of south end	00-3632	AAA3577	Pre-characterization	Soil (sub-surface)	3.0-3.5	X						
West chamber—west chamber, south central end	00-3633	AAA3578	Pre-characterization	Soil (sub-surface)	4.0-4.5	X						
East and west chambers—east chamber, west central hole	00-3626	AAA3581	Pre-characterization	Soil (sub-surface)	4.0-4.5	X						
East and west chambers—east chamber, west central hole	00-3626	AAA3582	Pre-characterization	Soil (sub-surface)	5.0-5.5	X						
East and west chambers—west chamber, east central hole	00-3634	AAA3583	Pre-characterization	Soil (sub-surface)	6.0-6.5	X						
East and west chambers—west chamber, east central hole	00-3634	AAA3584	Pre-characterization	Soil (near-surface)	2.0-2.5	X						
East and west chambers—west chamber, east central hole	00-3634	AAA3585	Pre-characterization	Soil (sub-surface)	3.0-3.5	X						
East and west chambers—west chamber, west central hole	00-3635	AAA3586	Pre-characterization	Soil (near-surface)	1.0-1.5	X						
East and west chambers—west chamber, south central hole	00-3627	AAA3587	Pre-characterization	Soil (sub-surface)	2.0-2.5	X						
East and west chambers—west chamber, south central hole	00-3627	AAA3588	Pre-characterization	Soil (sub-surface)	3.0-3.5	X						
East and west chambers—west chamber, south central hole	00-3636	AAA4325	Pre-characterization	Soil (sub-surface)	5.0-5.5	X						
West chamber—lift 1, composite, central third of tank	00-3637	AAA4328	Pre-characterization	Soil (near-surface)	1.0-1.5	X		X				
West chamber—lift 2, central third of tank, northeast corner of lift	00-3638	AAA4329	Pre-characterization	Soil (near-surface)	2.0-2.5	X		X				
West chamber—lift 2, central third of tank, northwest corner of lift	00-3639	AAA4330	Pre-characterization	Soil (near-surface)	2.0-2.5	X		X				

TABLE A-1 (CONTINUED)

SUMMARY OF SAMPLES COLLECTED AT SWMU 0-030(g)

LOCATION	LOCATION ID	SAMPLE ID	SAMPLE TYPE	SAMPLE MATRIX	DEPTH (ft bgs[a])	ANALYSES PERFORMED						
						MRAL[b]	RADCHEM[c]	TAL[d]	P[e]	SVPCs[f]	VOCs[g]	PCBs[h]
East chamber	00-3640	AAA4336	Pre-characterization	Soil (near-surface)	1.0-1.5	X		X (mercury and lead only)				
East chamber	00-3641	AAA4337	Pre-characterization	Soil (near-surface)	2.0-2.5	X		X (mercury and lead only)				
East chamber	00-3642	AAA4338	Pre-characterization	Soil (near-surface)	2.0-2.5	X		X (mercury and lead only)				
East chamber	00-3643	AAA4339	Pre-characterization	Soil (near-surface)	2.0-2.5	X		X (mercury and lead only)				
East chamber	00-3644	AAA4342	Pre-characterization	Soil (sub-surface)	6.0-6.5	X		X (mercury and lead only)				
East chamber	00-3645	AAA4343	Pre-characterization	Soil (sub-surface)	6.0-6.5	X		X (mercury and lead only)				
East chamber	00-3646	AAA4344	Pre-characterization	Soil (near-surface)	2.0-2.5	X		X (mercury and lead only)				
East chamber	00-3647	AAA4345	Pre-characterization	Soil (sub-surface)	5.0-5.5	X		X (mercury and lead only)				
Tank floor—bottom of west chamber, south side	00-3648	AAA4346	Pre-characterization	Concrete	6.5-6.8	X		X				
Drain line—end of pipe outfall	00-3668	AAA4371	RFI	Soil (near-surface)	1.0-1.5	X		X				
Drain line—10 ft from outfall, within pipe	00-3669	AAA4372	Pre-characterization	Soil (near-surface)	1.5-1.8	X		X				
Drain line—5 ft away from outfall, 1 ft below pipe	00-3670	AAA4375	RFI	Soil (near-surface)	2.0-2.5	X		X				
Drain line—10 ft away from outfall, 1 ft below pipe	00-3669	AAA4376	RFI	Soil (sub-surface)	3.5-4.0	X		X				
Drain line—15 ft away from outfall, 1 ft below pipe	00-3671	AAA4377	RFI	Soil (sub-surface)	5.0-5.5	X		X				
Below tank floor—west chamber, southeast corner of tank	00-3656	AAA4378	Pre-characterization	Soil (sub-surface)	5.5-6.0	X		X				
Tank floor—west chamber, southeast corner of tank, 0–3 in. of concrete floor	00-3656	AAA4379	Pre-characterization	Concrete	8.0-8.5	X		X				
Below tank floor—west chamber, north center	00-3657	AAA4380	Pre-characterization	Soil (sub-surface)	6.5-6.8	X		X				
Tank floor—north-central part of west chamber, 0–6 in. Of concrete floor	00-3657	AAA4381	Pre-characterization	Concrete	8.2-8.4	X		X				
Below tank floor—west chamber, center	00-3658	AAA4382	Pre-characterization	Soil (sub-surface)	6.5-7.0	X		X				
Tank floor—west chamber, center, 0–6 in. Of concrete floor	00-3658	AAA4383	Pre-characterization	Concrete	6.5-7.0	X		X				
Drain line—4 ft north of tank center	00-3672	AAA4386	RFI	Soil (near-surface)	0.67-1.8	X		X (mercury and lead only)				
Drain line—1 ft below the area where sample aaa 4386 was collected, 50 ft away from outfall	00-3672	AAA4387	RFI	Soil (near-surface)	2.0-2.5	X		X (mercury and lead only)				
Drain line—45 ft away from outfall, 5 ft from northeast edge of tank, 1 ft below clay pieces	00-3673	AAA4388	RFI	Soil (near-surface)	2.5-3.0	X		X (mercury and lead only)				
Drain line—40 ft away from outfall, 8 ft northeast of northeast corner of tank, 1 ft below pipe	00-3674	AAA4389	RFI	Soil (near-surface)	2.5-3.0	X		X (mercury and lead only)				
Drain line—20 ft away from outfall, 1 ft below pipe	00-3675	AAA4390	RFI	Soil (sub-surface)	5.5-6.0	X		X (mercury and lead only)				

TABLE A-1 (CONTINUED)

SUMMARY OF SAMPLES COLLECTED AT SWMU 0-030(g)

LOCATION	LOCATION ID	SAMPLE ID	SAMPLE TYPE	SAMPLE MATRIX	DEPTH (ft bgs[a])	ANALYSES PERFORMED						
						MRAL[b]	RADCHEM[c]	TAL[d]	P[e]	SVPCs[f]	VOCs[g]	PCBs[h]
Drain line—25 ft away from outfall, 1 ft below pipe	00-3676	AAA4391	RFI	Soil (sub-surface)	6.5-7.0	X		X (mercury and lead only)				
Drain line—30 ft away from outfall, 1 ft below pipe	00-3677	AAA4392	RFI	Soil (sub-surface)	7.5-8.0	X		X (mercury and lead only)				
Drain line—35 ft away from outfall, 1 ft below pipe	00-3678	AAA4393	RFI	Soil (sub-surface)	8.5-9.0	X		X (mercury and lead only)				
Below tank floor—east chamber, southeast quadrant of central third of tank	00-3659	AAA4401	Pre-characterization	Soil (sub-surface)	7.6-7.8	X		X (mercury and lead only)				
Below tank floor—east chamber, southwest quadrant of central third of tank	00-3660	AAA4402	Pre-characterization	Soil (sub-surface)	7.6-7.8	X		X (mercury and lead only)				
Below tank floor—east chamber, north central section	00-3661	AAA4403	Pre-characterization	Soil (sub-surface)	7.6-7.8	X		X (mercury and lead only)				
Septic tank—center of tank	00-3664	AAA4406	RFI	Soil (sub-surface)	9-9.5	X		X (mercury and lead only)				
Septic tank—east chamber, southern third of tank	00-3665	AAA4407	RFI	Soil (sub-surface)	9-9.5	X		X (mercury and lead only)				
Septic tank—east chamber, southern third of tank	00-3666	AAA4408	RFI	Soil (sub-surface)	9-9.5	X		X (mercury and lead only)				
Outfall	00-3724	AAB0275	RFI	Soil (surface)	-	X	X	X	X	X	X	X
Outfall	00-3725	AAB0278	RFI	Soil (surface)	-	X	X	X	X	X	X	X
Outfall	00-3733	AAB3573	RFI	Soil (near-surface)	0.17-0.5	X	X	X	X	X	X	X
Outfall	00-3735	AAB3574	RFI	Soil (near-surface)	0.33	X	X	X	X	X	X	X
Outfall	00-3738	AAB3575	RFI	Soil (near-surface)	0.33	X	X	X	X	X	X	X
Outfall	00-3739	AAB3576	RFI	Soil (surface)	0-0.04	X	X	X	X	X	X	X
Outfall	00-3736	AAB3577	RFI	Soil (near-surface)	0.33	X	X	X	X	X	X	X
Outfall	00-3737	AAB3578	RFI	Soil (near-surface)	0.25	X	X	X	X	X	X	X
Outfall	00-3734	AAB3579	RFI	Soil (surface)	0.016	X	X	X	X	X	X	X
Outfall	00-3731	AAB3580	RFI	Soil (near-surface)	0.42	X	X	X	X	X	X	X
Outfall	00-3732	AAB3581	RFI	Soil (near-surface)	0.5	X	X	X	X	X	X	X
Tank's inner wall—center of west chamber, sludge showing 2000 cpm beta/gamma	00-3625	Aliquot	Pre-characterization	Soil (sub-surface)	5.0-5.5	X		X				

[a] bgs = Below ground surface.
[b] MRAL = Mobile radiological analysis laboratory.
[c] RADCHEM = Radiochemistry.
[d] TAL metals = Target analyte list metals.
[e] P = Organochlorine pesticides.
[f] SVPCs = Semivolatile organic compounds.
[g] VOCs = Volatile organic compounds.
[h] PCBs = Polychlorinated biphenyls.
[i] NA = Not applicable.

TABLE A-2

ANALYTICAL RESULTS FOR INORGANIC ANALYTES DETECTED IN SOIL AT SWMU 0-030(g)

COMPARISON LEVELS FOR SOIL SAMPLES (mg/kg)		Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Cyanide	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
	UTL[a]	123 000	2.5	11.6	1 140	3.31	2.7	54 400	34.2	51.1	15.7	NA[c]	35 600	39	16 100	1 030	0.1	26.7	6 180	1.7	1.61	3 320	0.9	66.2	101
	SAL[b]	NA	32	NA	5 600	NA	80	NA	400	NA	3 000	1 600	NA	400	NA	11 000	24	1 600	NA	400	400	NA	6.4	560	24 000
LOCATION ID	SAMPLE ID	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Cyanide	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
00-3662	AAA1910	3 400	<0.08	1.2	28	0.65	<0.4	3 700	2	1.1	4.7	0.141	4 700	7	490	290	<0.1	<2	320	<0.2	<1	91	<0.04	5.3	38
00-3662	AAA1910R	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-
00-3662	AAA1910R1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-
00-3663	AAA3563	4 600	<0.08	1.3	33	0.67	<0.4	7 000	3.4	0.88	6.4	0.144	5 600	5	700	360	<0.1	3	490	0.9	<1	93	<0.04	6.4	55
00-3663	AAA3563R	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-
00-3663	AAA3563R1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-
00-3664	AAA4406	-	-	-	-	-	-	-	-	-	-	-	-	<4	-	-	<0.1	-	-	-	-	-	-	-	-
00-3664	AAA4406R	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-
00-3664	AAA4406R1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2	-	-	-	-	-	-	-	-
00-3665	AAA4407	-	-	-	-	-	-	-	-	-	-	-	-	12	-	-	<0.1	-	-	-	-	-	-	-	-
00-3665	AAA4407R	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-
00-3665	AAA4407R1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-
00-3666	AAA4408	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	<0.1	-	-	-	-	-	-	-	-
00-3666	AAA4408R	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-
00-3666	AAA4408R1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-
00-3668	AAA1909	4 200	<0.08	1.3	33	0.59	<0.4	980	60	1.2	5.4	0.325	4 800	15	540	240	<0.1	24	390	<0.2	<1	63	<0.04	5.5	24
00-3668	AAA1909R	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-
00-3668	AAA1909R1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-	-
00-3668	AAA4371	2 800	<0.08	1	26	0.83	<0.4	740	13	<0.5	0.6	0.2	4 200	16	350	210	<0.1	5.8	290	<0.2	<1	69	<0.04	1.7	30
00-3668	AAA4371R	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-
00-3668	AAA4371R1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-
00-3669	AAA4376	4 500	<0.08	1	31	0.64	<0.4	750	38	0.9	3.1	0.189	4 500	5	480	230	<0.1	<2	380	<0.2	<1	100	0.06	3.5	29
00-3669	AAA4376R	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-
00-3669	AAA4376R1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-
00-3670	AAA4375	3 200	<0.08	1.9	19	0.43	<0.4	670	360	1.8	8.8	0.267	3 400	5	410	130	<0.1	118	300	0.4	<1	72	0.07	4.5	18
00-3670	AAA4375R	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-
00-3670	AAA4375R1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-
00-3671	AAA4377	3 900	<0.08	0.9	33	0.54	<0.4	1 000	36	1.3	5.7	0.266	4 200	8	540	230	<0.1	2	400	<0.2	<1	120	0.115	4.4	32
00-3671	AAA4377R	4 200	-	-	24	0.59	<0.4	990	42	0.9	4.7	-	4 300	5	530	190	0.2	3	360	-	<1	120	-	4	30
00-3671	AAA4377R1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2	-	-	-	-	-	-	-	-
00-3672	AAA4387	-	-	-	-	-	-	-	-	-	-	-	-	19	-	-	<0.1	-	-	-	-	-	-	-	-
00-3672	AAA4387R	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-
00-3672	AAA4387R1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-
00-3673	AAA4388	-	-	-	-	-	-	-	-	-	-	-	-	16	-	-	<0.1	-	-	-	-	-	-	-	-
00-3673	AAA4388R	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-

TABLE A-2 (CONTINUED)

ANALYTICAL RESULTS FOR INORGANIC ANALYTES DETECTED IN SOIL AT SWMU 0-030(g)

COMPARISON LEVELS FOR SOIL SAMPLES (mg/kg)		Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Cyanide	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
	UTL[a]	123 000	2.5	11.6	1 140	3.31	2.7	54 400	34.2	51.1	15.7	NA[c]	35 600	39	16 100	1 030	0.1	26.7	6 180	1.7	1.61	3 320	0.9	66.2	101
	SAL[b]	NA	32	NA	5 600	NA	80	NA	400	NA	3 000	1 600	NA	400	NA	11 000	24	1 600	NA	400	400	NA	6.4	560	24 000
LOCATION ID	SAMPLE ID	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Cyanide	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
00-3673	AAA4388R1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-	-
00-3674	AAA4389	-	-	-	-	-	-	-	-	-	-	-	-	17	-	-	<0.1	-	-	-	-	-	-	-	-
00-3674	AAA4389R	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-
00-3674	AAA4389R1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	-	-
00-3675	AAA4390	-	-	-	-	-	-	-	-	-	-	-	-	16	-	-	0.6	-	-	-	-	-	-	-	-
00-3675	AAA4390R	-	-	-	-	-	-	-	-	-	-	-	-	25	-	-	1	-	-	-	-	-	-	-	-
00-3675	AAA4390R1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2	-	-	-	-	-	-	-	-
00-3676	AAA4391	-	-	-	-	-	-	-	-	-	-	-	-	29	-	-	0.7	-	-	-	-	-	-	-	-
00-3676	AAA4391R	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.8	-	-	-	-	-	-	-	-
00-3676	AAA4391R1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.9	-	-	-	-	-	-	-	-
00-3677	AAA4392	-	-	-	-	-	-	-	-	-	-	-	-	18	-	-	0.4	-	-	-	-	-	-	-	-
00-3677	AAA4392R	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-
00-3677	AAA4392R1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.4	-	-	-	-	-	-	-	-
00-3678	AAA4393	-	-	-	-	-	-	-	-	-	-	-	-	26	-	-	1	-	-	-	-	-	-	-	-
00-3678	AAA4393R	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.4	-	-	-	-	-	-	-	-
00-3678	AAA4393R1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5	-	-	-	-	-	-	-	-
00-3724	AAB0275	-	<0.1	1.8	61	0.4	<0.4	-	5.5	-	-	-	-	15	-	-	0.1	5.8	-	0.4	<1	-	<0.1	-	-
00-3724	AAB0275R	-	<0.1	2	-	-	-	-	-	-	-	-	-	22	-	-	0.1	-	-	0.4	-	-	0.3	-	-
00-3724	AAB0275R1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2	-	-	-	-	-	-	-	-
00-3725	AAB0278	-	<0.1	1.4	63	0.58	<0.4	-	2.9	-	-	-	-	11	-	-	0.1	4.8	-	0.3	<1	-	<0.1	-	-
00-3725	AAB0278R	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-	-
00-3725	AAB0278R1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-	-

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

— = Not analyzed

TABLE A-3

ANALYTICAL RESULTS FOR RADIONUCLIDES DETECTED IN SOIL AT SWMU 0-030(g)

COMPARISON LEVELS FOR SOIL SAMPLES (pCi/g)		Americium-241	Cesium-137	Cobalt-60	Plutonium-238	Plutonium-239	Potassium-40	Radium-226	Thorium-232	Tritium	Uranium[d]	Uranium-234	Uranium-235	Uranium-238
	UTL[a]	NA[c]	1.4	NA	0.014	0.052	36.1	NA	2.68	NA	5.71	2.03	0.088	1.9
	SAL[b]	17	4	0.9	20	18	NA	5	5	810	160	86	18	59
LOCATION ID	**SAMPLE ID**	**Americium-241**	**Cesium-137**	**Cobalt-60**	**Plutonium-238**	**Plutonium-239**	**Potassium-40**	**Radium-226**	**Thorium-232**	**Tritium**	**Uranium[d]**	**Uranium-234**	**Uranium-235**	**Uranium-238**
00-3662	AAA1910	<2.8	<0.331	<0.239	0.003	0.839	35.2	1.931	2.552	-	-	1.432	<3.55	<38
00-3662	AAA1910R	0.016	-	-	0.005	0.784	-	-	-	-	-	-	0.109	1.412
00-3662	AAA1910R	0.015	-	-	-	-	-	-	-	-	-	-	-	-
00-3663	AAA3563	<3.89	<0.431	<0.435	0.01	2.469	35.356	<1.8	<2.67	-	-	3.005	<2.88	<40.5
00-3663	AAA3563R	0.073	-	-	-	-	-	-	-	-	-	-	0.194	2.111
00-3663	AAA3563R	0.039	-	-	-	-	-	-	-	-	-	-	-	-
00-3668	AAA1909	0.105	-	-	0.022	4.56	-	-	-	0.032	-	-	-	-
00-3724	AAB0275	7.577	-	-	0.644	35.116	-	-	-	-	4.4	-	-	-
00-3724	AAB0275R	7.668	-	-	0.598	32.28	-	-	-	-	4.4	-	-	-
00-3725	AAB0278	2.108	-	-	0.208	11.48	-	-	-	-	4.1	-	-	-
00-3731	AAB3580	1.1	-	-	0.326	13.5	-	-	-	-	2.22	-	-	-
00-3732	AAB3581	<0.315	-	-	0.0623	11.9	-	-	-	-	6.82	-	-	-
00-3733	AAB3573	1.85	-	-	0.192	13.6	-	-	-	-	2.31	-	-	-
00-3734	AAB3579	<1.58	-	-	0.312	9.87	-	-	-	-	1.92	-	-	-
00-3735	AAB3574	2.99	-	-	0.173	14.6	-	-	-	-	1.91	-	-	-
00-3736	AAB3577	<1.64	-	-	0.0319	4.02	-	-	-	-	2.11	-	-	-
00-3736	AAB3577R	-	-	-	-0.116	1.9	-	-	-	-	-	-	-	-
00-3737	AAB3578	3.95	-	-	0.344	19.5	-	-	-	-	3.02	-	-	-
00-3738	AAB3575	<1.67	-	-	0.191	8.42	-	-	-	-	1.42	-	-	-
00-3739	AAB3576	1.66	-	-	0.0976	7.27	-	-	-	-	2.19	-	-	-

[a] UTL = Upper tolerance limit.
[b] SAL = Screening action level.
[c] NA = Not available.
[d] Units in mg/kg.

TABLE A-4

ANALYTICAL RESULTS FOR ORGANIC ANALYTES DETECTED IN SOIL AT SWMU 0-030(g)

COMPARISON LEVELS FOR SOIL SAMPLES (mg/kg)		Acetone	Aroclor 1254™	Aroclor [mixed-]	Chlordane [alpha-]	Chlordane [gamma-]	DDD	DDE	DDT	Dieldrin	Endosulfan II	Endrin aldehyde
	SAL[a]	8 000	1	1	NA[b]	NA	2.9	2.1	2.1	0.044	NA	NA
LOCATION ID	SAMPLE ID	Acetone	Aroclor 1254™	Aroclor [mixed-]	Chlordane [alpha-]	Chlordane [gamma-]	DDD	DDE	DDT	Dieldrin	Endosulfan II	Endrin aldehyde
00-3662	AAA1910	<0.02	<1	<1	-	-	<0.0042	<0.0015	0.044	<0.00076	<0.0015	<0.0087
00-3663	AAA3563	<0.02	<1	<1	-	-	<0.0042	<0.0015	0.017	<0.00076	<0.0015	<0.0088
00-3668	AAA1909	<0.02	<0.0032	<0.5	-	-	<0.00032	<0.00032	<0.00032	<0.00032	<0.00032	<0.00032
00-3724	AAB0275	<0.02	1.07	0.71	0.0274	0.0122	0.0108	<0.00389	0.0387	0.0439	0.0211	0.00866
00-3725	AAB0278	0.022	0.297	<0.2757	0.0087	0.0023	0.00448	0.00626	0.0196	0.00784	0.00552	<0.00383

[a] SAL = Screening action level.
[b] NA = Not available.

TABLE A-5

NONDETECTED ANALYTES IN SOIL AT SWMU 0-030(g)

ANALYTE	TOTAL NUMBER OF ANALYSES	NUMBER OF NONDETECTS	RANGE OF NONDETECTS		NUMBER OF DETECTS	RANGE OF DETECTS		COMPARISON LEVELS	
			MIN	MAX		MIN	MAX	UTL[a]	SAL[b]
INORGANICS (mg/kg)									
Aluminum	8	0	NA[c]	NA	8	2 800	4 600	123 000	NA
Antimony	10	10	0.08	0.1	0	NA	NA	2.5	32
Arsenic	10	0	NA	NA	10	0.9	2	11.6	NA
Barium	10	0	NA	NA	10	19	63	1 140	5 600
Beryllium	10	0	NA	NA	10	0.4	0.83	3.31	NA
Cadmium	10	10	0.4	0.4	0	NA	NA	2.7	80
Calcium	8	0	NA	NA	8	670	7 000	54 400	NA
Chromium	10	0	NA	NA	10	2	360	34.2	400
Cobalt	8	1	0.5	0.5	7	0.88	1.8	51.1	NA
Copper	8	0	NA	NA	8	0.6	8.8	15.7	3 000
Cyanide	7	0	NA	NA	7	0.141	0.325	NA	1 600
Iron	8	0	NA	NA	8	3 400	5 600	35 600	NA
Lead	22	1	4	4	21	5	29	39	400
Magnesium	8	0	NA	NA	8	350	700	16 100	NA
Manganese	8	0	NA	NA	8	130	360	1 030	11 000
Mercury	57	34	0.1	0.1	23	0.1	1	0.1	24
Nickel	10	2	2	2	8	2	118	26.7	1 600
Potassium	8	0	NA	NA	8	290	490	6 180	NA
Selenium	10	5	0.2	0.2	5	0.3	0.9	1.7	400
Silver	10	10	1	1	0	NA	NA	1.61	400
Sodium	8	0	NA	NA	8	63	120	3320	NA
Thallium	10	6	0.04	0.1	4	0.06	0.3	0.9	6.4
Vanadium	8	0	NA	NA	8	1.7	6.4	66.2	560
Zinc	8	0	NA	NA	8	18	55	101	24 000
ORGANICS (mg/kg)									
Acenaphthene	5	5	0.33	0.33	0	NA	NA	NA	4 800
Acenaphthylene	5	5	0.33	0.33	0	NA	NA	NA	NA
Acetone	5	4	0.02	0.02	1	0.022	0.022	NA	8 000
Aldrin	6	6	0.00032	0.002	0	NA	NA	NA	0.04
Aniline	5	5	0.33	0.33	0	NA	NA	NA	120
Anthracene	5	5	0.33	0.33	0	NA	NA	NA	24 000
Aroclor 1016™	2	2	0.0383	0.0389	0	NA	NA	NA	1
Aroclor 1221™	2	2	0.0777	0.079	0	NA	NA	NA	1
Aroclor 1232™	2	2	0.038	0.0383	0	NA	NA	NA	1
Aroclor 1242™	6	6	0.0032	1	0	NA	NA	NA	1
Aroclor 1248™	2	2	0.038	0.0383	0	NA	NA	NA	1
Aroclor 1254™	5	3	0.0032	1	2	0.297	1.07	NA	1
Aroclor 1260™	5	5	0.0032	1	0	NA	NA	NA	1
Aroclor [mixed-]	5	4	0.2757	1	1	0.71	0.71	NA	1
Azobenzene	5	5	0.33	0.33	0	NA	NA	NA	6.4
Benzene	5	5	0.005	0.005	0	NA	NA	NA	0.67
Benzidine [m-]	5	5	0.33	0.33	0	NA	NA	NA	0.003
Benzoic acid	5	5	0.33	0.33	0	NA	NA	NA	320 000
Benzo[a]anthracene	5	5	0.33	0.33	0	NA	NA	NA	1
Benzo[a]pyrene	5	5	0.33	0.33	0	NA	NA	NA	0.1
Benzo[b]fluoranthene	5	5	0.33	0.33	0	NA	NA	NA	1
Benzo[g,h,i]perylene	5	5	0.33	0.33	0	NA	NA	NA	NA
Benzo[k]fluoranthene	5	5	0.33	0.33	0	NA	NA	NA	1
Benzyl alcohol	5	5	0.33	0.33	0	NA	NA	NA	24 000
BHC [alpha-]	6	6	0.00032	0.002	0	NA	NA	NA	0.1
BHC [beta-]	6	6	0.00032	0.0023	0	NA	NA	NA	4
BHC [delta-]	6	6	0.00032	0.0034	0	NA	NA	NA	NA
Bis(2-chloroethoxy)methane	5	5	0.33	0.33	0	NA	NA	NA	NA
Bis(2-chloroethyl)ether	5	5	0.33	0.33	0	NA	NA	NA	0.12
Bis(2-chloroisopropyl)ether	5	5	0.33	0.33	0	NA	NA	NA	100
Bis(2-ethylhexyl)phthalate	5	5	0.33	0.33	0	NA	NA	NA	50

TABLE A-5 (CONTINUED)

NONDETECTED ANALYTES IN SOIL AT SWMU 0-030(g)

ANALYTE	TOTAL NUMBER OF ANALYSES	NUMBER OF NONDETECTS	RANGE OF NONDETECTS		NUMBER OF DETECTS	RANGE OF DETECTS		COMPARISON LEVELS	
			MIN	MAX		MIN	MAX	UTL[a]	SAL[b]
ORGANICS (mg/kg) (CONTINUED)									
Bromobenzene	5	5	0.005	0.005	0	NA	NA	NA	NA
Bromochloromethane	5	5	0.005	0.005	0	NA	NA	NA	NA
Bromodichloromethane	5	5	0.005	0.005	0	NA	NA	NA	11
Bromoform	5	5	0.005	0.005	0	NA	NA	NA	89
Bromomethane	5	5	0.01	0.01	0	NA	NA	NA	0.43
Bromophenylphenyl ether [4-]	5	5	0.33	0.33	0	NA	NA	NA	NA
Butanone [2-]	5	5	0.02	0.038	0	NA	NA	NA	4 000
Butyl benzyl phthalate	5	5	0.33	0.33	0	NA	NA	NA	16 000
Butylbenzene [n-]	5	5	0.005	0.005	0	NA	NA	NA	NA
Butylbenzene [sec-]	5	5	0.005	0.005	0	NA	NA	NA	NA
Butylbenzene [tert-]	5	5	0.005	0.005	0	NA	NA	NA	NA
Carbon disulfide	5	5	0.005	0.0099	0	NA	NA	NA	7.4
Carbon tetrachloride	5	5	0.005	0.005	0	NA	NA	NA	0.21
Chlordane	3	3	0.0053	0.0053	0	NA	NA	NA	0.54
Chlordane [alpha-]	2	0	NA	NA	2	0.0087	0.0274	NA	NA
Chlordane [gamma-]	2	0	NA	NA	2	0.0023	0.0122	NA	NA
Chloro-3-methylphenol [4-]	5	5	0.33	0.33	0	NA	NA	NA	16 000
Chloroaniline [4-]	5	5	0.33	0.33	0	NA	NA	NA	320
Chlorobenzene	5	5	0.005	0.005	0	NA	NA	NA	67
Chlorodibromomethane	5	5	0.005	0.005	0	NA	NA	NA	83
Chloroethane	5	5	0.01	0.01	0	NA	NA	NA	2 900
Chloroform	5	5	0.005	0.005	0	NA	NA	NA	0.21
Chloromethane	5	5	0.01	0.01	0	NA	NA	NA	6.4
Chloronaphthalene [2-]	5	5	0.33	0.33	0	NA	NA	NA	6 400
Chlorophenol [o-]	5	5	0.33	0.33	0	NA	NA	NA	400
Chlorophenylphenyl ether [4-]	5	5	0.33	0.33	0	NA	NA	NA	NA
Chlorotoluene [o-]	5	5	0.005	0.005	0	NA	NA	NA	1 600
Chlorotoluene [p-]	5	5	0.005	0.005	0	NA	NA	NA	NA
Chrysene	5	5	0.33	0.33	0	NA	NA	NA	96
DDD	5	3	0.00032	0.0042	2	0.00448	0.0108	NA	2.9
DDE	5	4	0.00032	0.00389	1	0.00626	0.00626	NA	2.1
DDT	5	1	0.00032	0.00032	4	0.017	0.044	NA	2.1
Di-n-butyl phthalate	5	5	0.33	0.33	0	NA	NA	NA	8 000
Di-n-octyl phthalate	5	5	0.33	0.33	0	NA	NA	NA	1 600
Dibenzofuran	5	5	0.33	0.33	0	NA	NA	NA	NA
Dibenzo[a,h]anthracene	5	5	0.33	0.33	0	NA	NA	NA	0.1
Dibromo-3-chloropropane [1,2-]	5	5	0.01	0.01	0	NA	NA	NA	0.5
Dibromoethane [1,2-]	5	5	0.005	0.005	0	NA	NA	NA	NA
Dibromomethane	5	5	0.005	0.005	0	NA	NA	NA	0.0082
Dichlorobenzene (1,2) [o-]	5	5	0.005	0.33	0	NA	NA	NA	1 600
Dichlorobenzene (1,3) [m-]	5	5	0.005	0.33	0	NA	NA	NA	7 200
Dichlorobenzene (1,4) [p-]	5	5	0.005	0.33	0	NA	NA	NA	29
Dichlorobenzidine [3,3'-]	5	5	0.33	0.33	0	NA	NA	NA	1.6
Dichlorodifluoromethane	5	5	0.01	0.01	0	NA	NA	NA	16 000
Dichloroethane [1,1-]	5	5	0.005	0.005	0	NA	NA	NA	410
Dichloroethane [1,2-]	5	5	0.005	0.005	0	NA	NA	NA	0.2
Dichloroethene [1,1-]	5	5	0.005	0.005	0	NA	NA	NA	0.4
Dichloroethene [trans-1,2-]	5	5	0.005	0.005	0	NA	NA	NA	1 600
Dichloroethylene [cis-1,2-]	5	5	0.005	0.005	0	NA	NA	NA	800
Dichlorophenol [2,4-]	5	5	0.33	0.33	0	NA	NA	NA	240
Dichloropropane [1,2-]	5	5	0.005	0.005	0	NA	NA	NA	6.5
Dichloropropane [1,3-]	5	5	0.005	0.005	0	NA	NA	NA	NA
Dichloropropane [2,2-]	5	5	0.005	0.005	0	NA	NA	NA	NA
Dichloropropene [1,1-]	5	5	0.005	0.005	0	NA	NA	NA	NA
Dichloropropene [cis-1,3-]	5	5	0.005	0.005	0	NA	NA	NA	0.17
Dichloropropene [trans-1,3-]	5	5	0.005	0.005	0	NA	NA	NA	0.17
Dieldrin	5	3	0.00032	0.00076	2	0.00784	0.0439	NA	0.044

TABLE A-5 (CONTINUED)

NONDETECTED ANALYTES IN SOIL AT SWMU 0-030(g)

ANALYTE	TOTAL NUMBER OF ANALYSES	NUMBER OF NONDETECTS	RANGE OF NONDETECTS		NUMBER OF DETECTS	RANGE OF DETECTS		COMPARISON LEVELS	
			MIN	MAX		MIN	MAX	UTL[a]	SAL[b]
ORGANICS (mg/kg) (CONTINUED)									
Diethyl phthalate	5	5	0.33	0.33	0	NA	NA	NA	64 000
Dimethyl phthalate	5	5	0.33	0.33	0	NA	NA	NA	800 000
Dimethylphenol [2,4-]	5	5	0.33	0.33	0	NA	NA	NA	1 600
Dinitrophenol [2,4-]	5	5	0.33	0.33	0	NA	NA	NA	160
Dinitrotoluene [2,4-]	5	5	0.33	0.33	0	NA	NA	NA	1
Dinitrotoluene [2,6-]	5	5	0.33	0.33	0	NA	NA	NA	1
Endosulfan I	5	5	0.00032	0.0053	0	NA	NA	NA	NA
Endosulfan II	5	3	0.00032	0.0015	2	0.00552	0.0211	NA	NA
Endosulfan sulfate	5	5	0.00032	0.025	0	NA	NA	NA	4
Endrin	5	5	0.00032	0.00389	0	NA	NA	NA	24
Endrin aldehyde	5	4	0.00032	0.0088	1	0.00866	0.00866	NA	NA
Endrin ketone	2	2	0.00383	0.00389	0	NA	NA	NA	NA
Ethylbenzene	5	5	0.005	0.005	0	NA	NA	NA	3 100
Fluoranthene	5	5	0.33	0.33	0	NA	NA	NA	3 200
Fluorene	5	5	0.33	0.33	0	NA	NA	NA	3 200
Heptachlor	5	5	0.00032	0.002	0	NA	NA	NA	0.16
Heptachlor epoxide	5	5	0.00032	0.032	0	NA	NA	NA	0.077
Hexachlorobenzene	5	5	0.33	0.33	0	NA	NA	NA	0.44
Hexachlorobutadiene	5	5	0.33	0.33	0	NA	NA	NA	90
Hexachlorocyclopentadiene	5	5	0.33	0.33	0	NA	NA	NA	560
Hexachloroethane	5	5	0.33	0.33	0	NA	NA	NA	80
Hexanone [2-]	5	5	0.02	0.02	0	NA	NA	NA	NA
Indeno[1,2,3-cd]pyrene	5	5	0.33	0.33	0	NA	NA	NA	1
Isophorone	5	5	0.33	0.33	0	NA	NA	NA	7 400
Isopropylbenzene	5	5	0.005	0.005	0	NA	NA	NA	3 200
Isopropyltoluene [4-]	5	5	0.005	0.005	0	NA	NA	NA	NA
Lindane	7	7	0.00032	0.002	0	NA	NA	NA	0.54
Methoxychlor	4	4	0.0197	0.067	0	NA	NA	NA	400
Methyl iodide	5	5	0.005	0.005	0	NA	NA	NA	NA
Methyl-2-pentanone [4-]	5	5	0.02	0.02	0	NA	NA	NA	510
Methyl-4,6-dinitrophenol [2-]	5	5	0.33	0.33	0	NA	NA	NA	NA
Methylene chloride	5	5	0.005	0.005	0	NA	NA	NA	5.6
Methylnaphthalene [2-]	5	5	0.33	0.33	0	NA	NA	NA	NA
Methylphenol [2-]	5	5	0.33	0.33	0	NA	NA	NA	4 000
Methylphenol [4-]	5	5	0.33	0.33	0	NA	NA	NA	400
Naphthalene	5	5	0.33	0.33	0	NA	NA	NA	3 200
Nitroaniline [2-]	5	5	0.33	0.33	0	NA	NA	NA	NA
Nitroaniline [3-]	5	5	0.33	0.33	0	NA	NA	NA	240
Nitroaniline [4-]	5	5	0.33	0.33	0	NA	NA	NA	240
Nitrobenzene	5	5	0.33	0.33	0	NA	NA	NA	5.3
Nitrophenol [2-]	5	5	0.33	0.33	0	NA	NA	NA	NA
Nitrophenol [4-]	5	5	0.33	0.33	0	NA	NA	NA	5 000
Nitrosodi-n-propylamine [N-]	5	5	0.33	0.33	0	NA	NA	NA	0.1
Nitrosodimethylamine [N-]	5	5	0.33	0.33	0	NA	NA	NA	0.014
Nitrosodiphenylamine [N-]	5	5	0.33	0.33	0	NA	NA	NA	140
Pentachlorophenol	5	5	0.33	0.33	0	NA	NA	NA	5.8
Phenanthrene	5	5	0.33	0.33	0	NA	NA	NA	NA
Phenol	5	5	0.33	0.33	0	NA	NA	NA	48 000
Propylbenzene	5	5	0.005	0.005	0	NA	NA	NA	NA
Pyrene	5	5	0.33	0.33	0	NA	NA	NA	2 400
Styrene	5	5	0.005	0.005	0	NA	NA	NA	3 300
Tetrachloroethane [1,1,1,2-]	5	5	0.005	0.005	0	NA	NA	NA	270
Tetrachloroethane [1,1,2,2-]	5	5	0.005	0.005	0	NA	NA	NA	3.9
Tetrachloroethylene	5	5	0.005	0.005	0	NA	NA	NA	5.9
Toluene	5	5	0.005	0.005	0	NA	NA	NA	910
Toxaphene	4	4	0.091	0.2	0	NA	NA	NA	0.64
Trichloro-1,2,2-trifluoroethane [1,1,2-]	5	5	0.005	0.005	0	NA	NA	NA	NA

TABLE A-5 (CONTINUED)

NONDETECTED ANALYTES IN SOIL AT SWMU 0-030(g)

ANALYTE	TOTAL NUMBER OF ANALYSES	NUMBER OF NONDETECTS	RANGE OF NONDETECTS		NUMBER OF DETECTS	RANGE OF DETECTS		COMPARISON LEVELS	
			MIN	MAX		MIN	MAX	UTL[a]	SAL[b]
ORGANICS (mg/kg) (CONTINUED)									
Trichlorobenzene [1,2,4-]	5	5	0.33	0.33	0	NA	NA	NA	160
Trichloroethane [1,1,1-]	5	5	0.005	0.005	0	NA	NA	NA	1 000
Trichloroethane [1,1,2-]	5	5	0.005	0.005	0	NA	NA	NA	6.3
Trichloroethene	5	5	0.005	0.005	0	NA	NA	NA	3.2
Trichlorofluoromethane	5	5	0.005	0.005	0	NA	NA	NA	24 000
Trichlorophenol [2,4,5-]	5	5	0.33	0.33	0	NA	NA	NA	8 000
Trichlorophenol [2,4,6-]	5	5	0.33	0.33	0	NA	NA	NA	64
Trichloropropane [1,2,3-]	5	5	0.005	0.005	0	NA	NA	NA	480
Trimethylbenzene [1,2,4-]	5	5	0.005	0.005	0	NA	NA	NA	40
Trimethylbenzene [1,3,5-]	5	5	0.005	0.005	0	NA	NA	NA	32
Vinyl chloride	5	5	0.01	0.01	0	NA	NA	NA	0.013
Xylenes (o + m + p) [mixed-]	5	5	0.005	0.005	0	NA	NA	NA	160 000
RADIONUCLIDES (pCi/g)									
Americium-241	19	6	0.315	3.89	13	0.015	7.668	NA	17
Cesium-137	2	2	0.331	0.431	0	NA	NA	1.4	4
Cobalt-60	2	2	0.239	0.435	0	NA	NA	NA	0.9
Plutonium-238	25	0	NA	NA	25	-0.116	0.644	0.014	20
Plutonium-239	25	0	NA	NA	25	0.784	35.116	0.052	18
Potassium-40	2	0	NA	NA	2	35.2	35.356	36.1	NA
Radium-226	2	1	1.8	1.8	1	1.931	1.931	NA	5
Thorium-232	2	1	2.67	2.67	1	2.552	2.552	2.68	5
Tritium	1	0	NA	NA	1	0.032	0.032	NA	810
Uranium	12	0	NA	NA	12	1.42	6.82	5.71	160
Uranium-234	2	0	NA	NA	2	1.432	3.005	2.03	86
Uranium-235	4	2	2.88	3.55	2	0.109	0.194	0.088	18
Uranium-238	4	2	38	40.5	2	1.412	2.111	1.9	59
MRAL[d] (pCi/g)									
MRAL gross alpha screening	26	0	NA	NA	26	-16.86	18.45	NA	NA
MRAL gross beta screening	26	0	NA	NA	26	-34.16	44.84	NA	NA
MRAL gross gamma screening	26	0	NA	NA	26	-17.3	1.04	NA	NA

[a] UTL = Upper tolerance limit.
[b] SAL = Screening action level.
[c] NA = Not available.
[d] MRAL = Mobile radiological analytical laboratory.