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*Date:* February 22, 1999
*Refer to:* EM/ER:99-040

Mr. Benito Garcia
NMED-HRMB
P.O. Box 26110
Santa Fe, NM 87502

**SUBJECT: SAMPLING AND ANALYSIS PLAN – SOLID WASTE MANAGEMENT UNIT 0-030(g), OUTFALL DRAINAGE AREA**

Dear Mr. Garcia:

Enclosed is the Sampling and Analysis Plan (SAP) for Solid Waste Management Unit (SWMU) 0-030(g), Outfall Drainage Area. This Plan represents the second stage of confirmation sampling at the site and addresses sampling downgradient of the former location of 0-030(g) septic tank. This additional sampling was coordinated with New Mexico Environment Department, Department of Energy-Oversight Bureau and Hazardous and Radioactive Management Bureau (HRMB) personnel. The first stage of sampling was completed in September 1998 and a status report of these findings submitted to HRMB on November 19, 1998. The results and findings from both stages of sampling will be summarized in a Resource Conservation and Recovery Act Facility Investigation Supplemental Report.

If you have any questions, please call Dave McInroy at (505) 667-0819 or Joe Mose at (505) 667-5808.

Sincerely,

Julie A. Canepa, Program Manager
LANL/ER Project

Sincerely,

Theodore J. Taylor, Program Manager
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Enclosure: SAP for SWMU 0-030(g), Outfall Drainage Area

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February 1999

# Sampling and Analysis Plan

## Solid Waste Management Unit 0-030(g), Outfall Drainage Area

Environmental Restoration Project
A Department of Energy Environmental Cleanup Program

**Los Alamos**
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Los Alamos, NM 87545

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## 1.0 INTRODUCTION

Solid Waste Management Unit (SWMU) 0-030(g) is located in former Technical Area 0 (TA-0) at Los Alamos National Laboratory (LANL), along the northern perimeter of Town Site Mesa and near the south rim of Acid Canyon, a tributary of Pueblo Canyon (Figure 1.0-1). The SWMU includes septic tank #6, which was characterized and removed in 1993 as part of the initial Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI). A drainline, which was also removed during RFI field activities, extended north to the outfall on the rim of a small drainage channel that is a tributary of upper Acid Canyon (Figure 1.0-2).

A previous sampling and analysis plan (SAP) and re-confirmation sampling summary were prepared for the mesa-top portion of the SWMU, including the area beneath the septic tank and the inlet and outlet lines (LANL 1998a, 59637; LANL 1998b, 62412). This SAP addresses only the SWMU 0-030(g) outfall drainage area, and is designed to further define the extent of contamination within that area.

### 1.1 Objectives and Scope

SWMU 0-030(g) was recommended for no further action (NFA) based on the results of the 1993 RFI; these results were documented in the RFI Report for SWMU 0-030(g) (LANL 1995, 51983). In a Notice of Deficiency/Request for Supplemental Information related to that RFI report, New Mexico Environment Department's (NMED) Hazardous and Radioactive Material Bureau (HRMB) expressed the following concerns:

- The extent of contamination within the outfall drainage area had not been adequately defined.
- Human health and ecological screening assessments using approved methodologies had not been conducted for the outfall drainage area.

The sampling activities proposed in this plan address these concerns. Specifically, the three principal objectives of this SAP are

1. to collect data that will define the extent of contamination identified during the 1993 and subsequent RFI activities by following the predominant drainage pathway down the hillslope to the bottom of Acid Canyon (Figure 1.1-1);
2. to collect data to support a human health screening assessment; and
3. to collect data to support an ecological screening assessment for the SWMU.

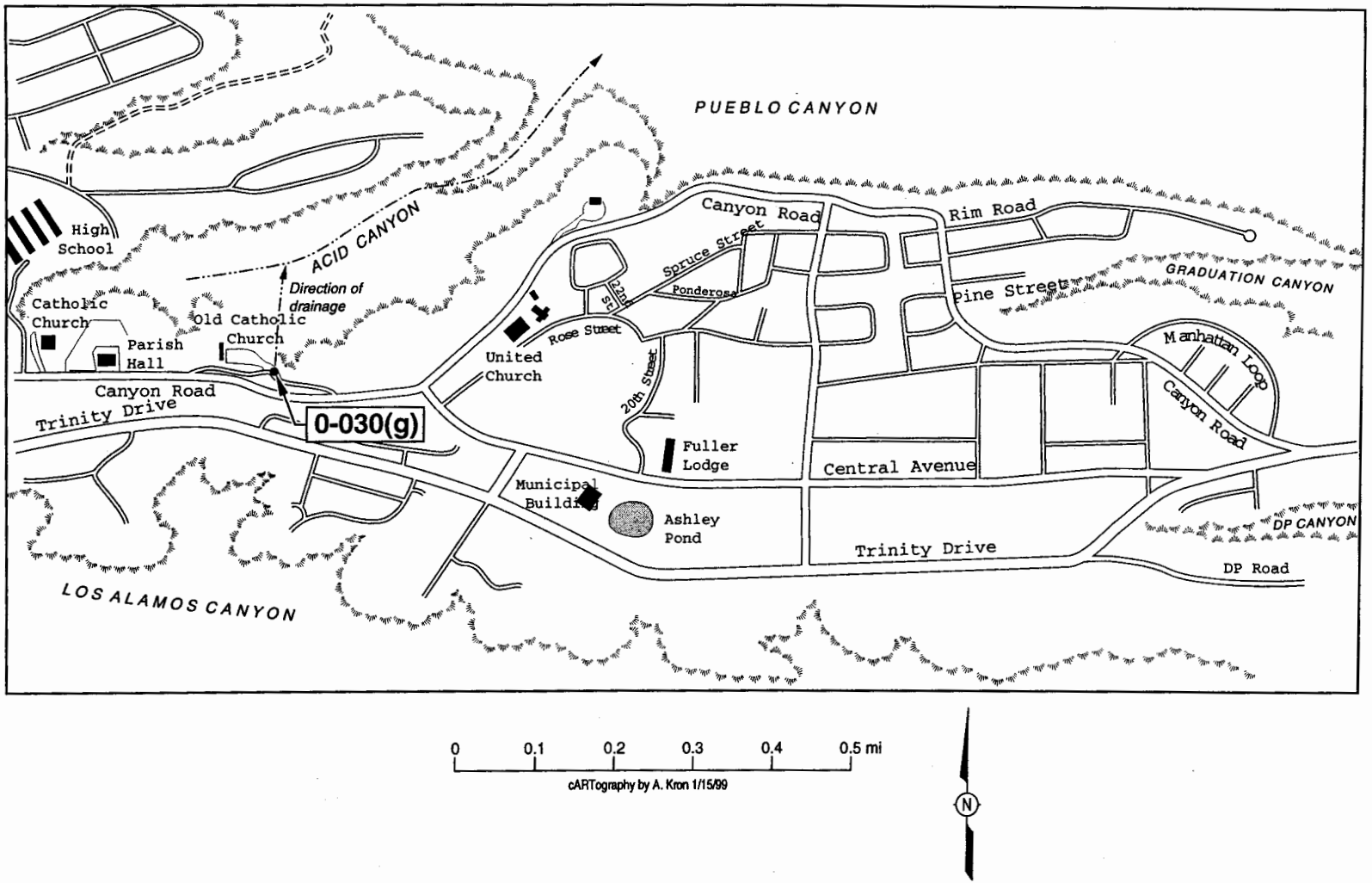


**Figure 1.0-1. Location of SWMU 0-030(g).**

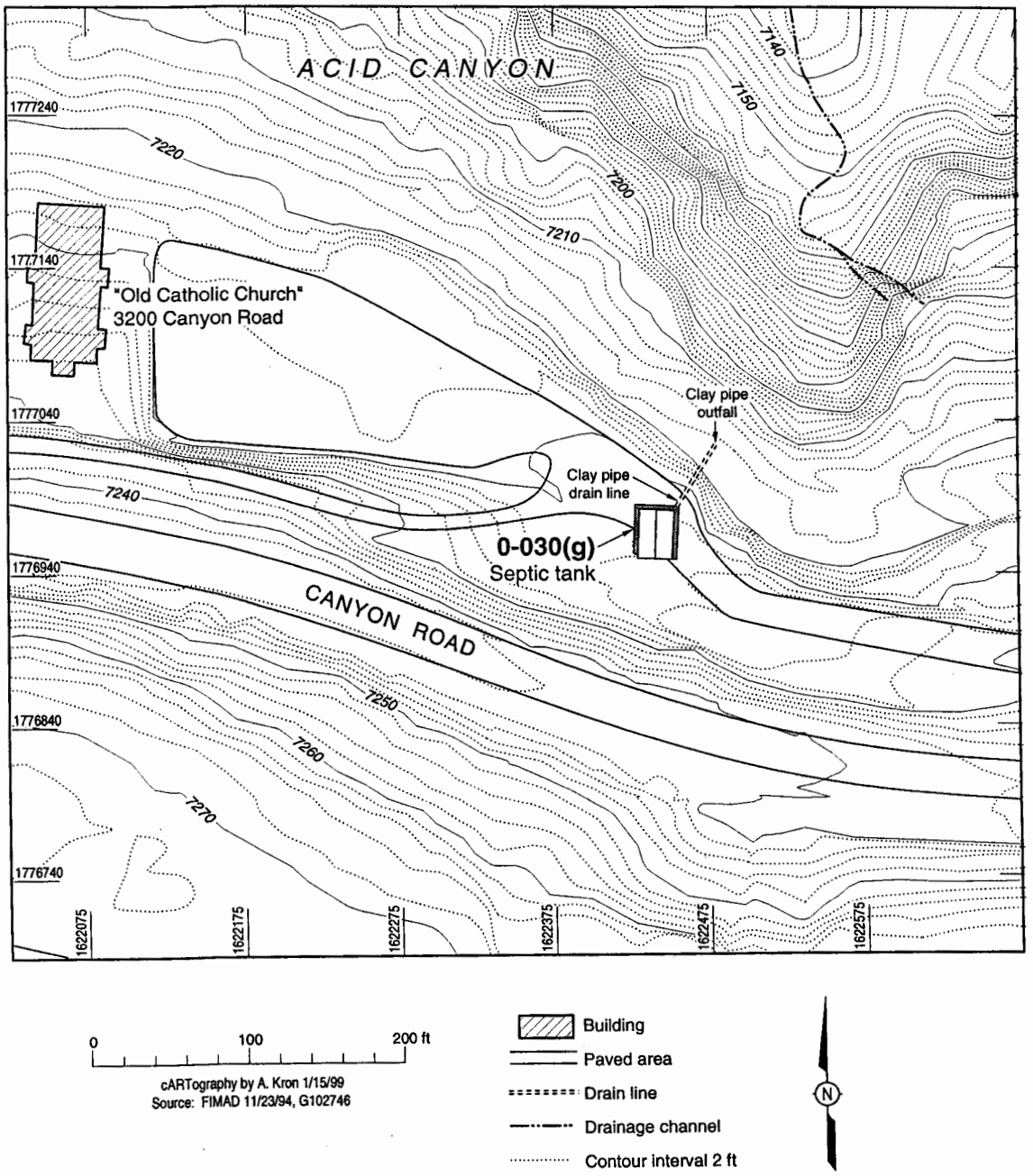


**Figure 1.0-2. Site map for SWMU 0-030(g).**

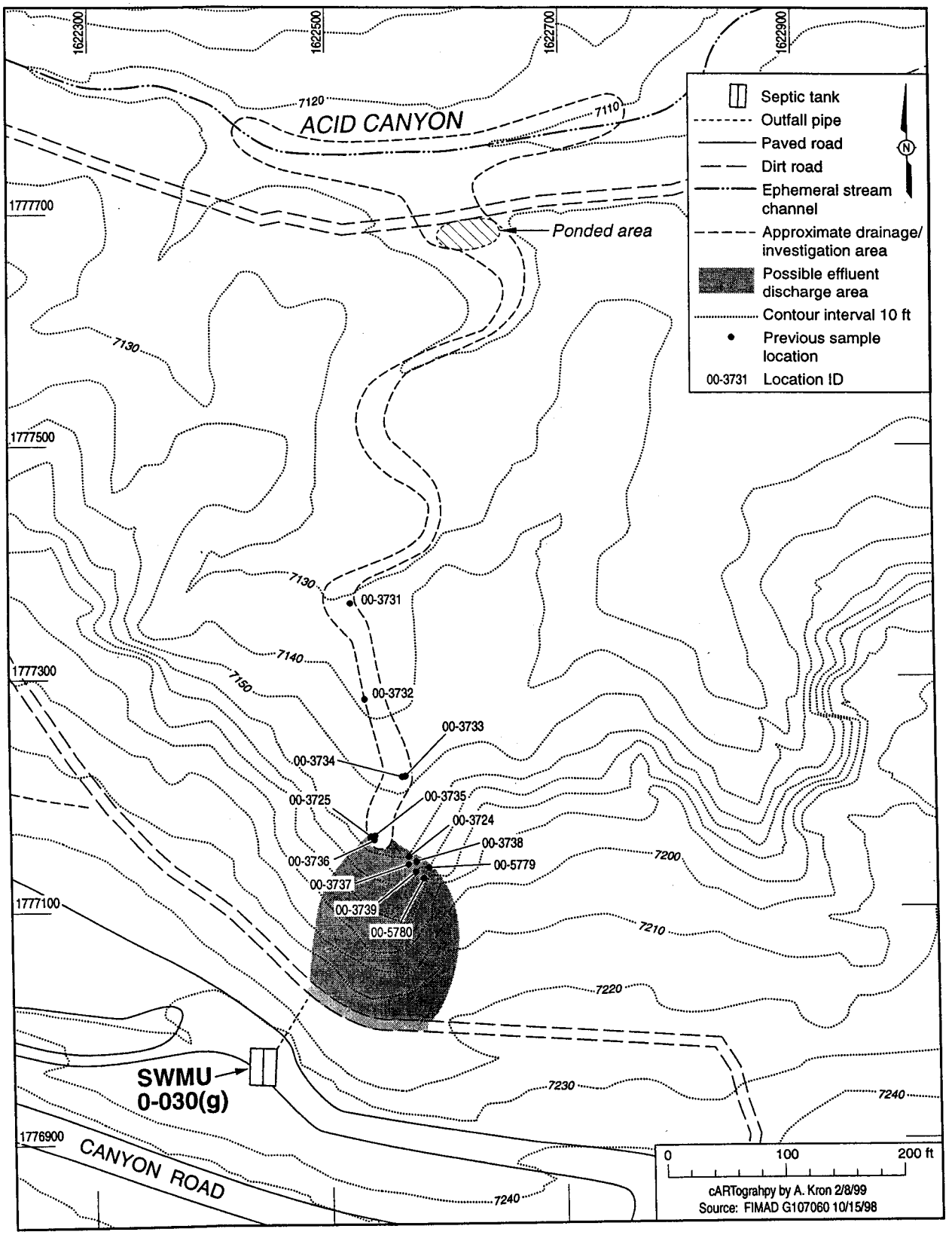


**Figure 1.1-1. SWMU 0-030(g) drainage showing previous sampling locations.**

## 1.2 Approach and Implementation

This SAP is presented in an abbreviated form in order to expedite this focused sampling program for the final characterization of the SWMU. This SAP is intended to augment the three previous RFI sampling events associated with the former septic tank and outfall drainage area. The three sampling efforts were conducted in 1993 (RFI investigation), 1996 [re-confirmation sampling for polychlorinated biphenyls (PCBs)], and 1998 (re-confirmation sampling in the areas of the former septic tank, the inlet line, and the outlet line). The combined data sets from all sampling events will establish the nature and extent of contamination in the vicinity of the outfall and its associated drainage area. The approach that is proposed for sampling the drainage of SWMU 0-030(g) is discussed in detail in Section 2.2.

## 1.3 Background Issues

### 1.3.1 Regulatory Requirements

Regulatory requirements governing this investigation are discussed in Section 1.4 of the Canyons Core Document (LANL 1997, 55622). In particular, the requirements of Module VIII of LANL's Hazardous Waste Facility Permit under the Resource Conservation and Recovery Act are addressed by this investigation (EPA 1990, 01585). In addition to federal and state regulations, DOE Order 5400.5, "Radiation Protection of the Public and Environment," provides guidance on residual radioactivity at DOE facilities.

Table 1.3-1 summarizes the correspondence between LANL and the NMED and provides a list of the documents produced to date related to SWMU 0-030(g).

**Table 1.3-1**
**Chronological Summary of Regulatory Reporting for SWMU 030(g)**

| Document | Date | Summary |
|---|---|---|
| RFI Report for SWMU 0-030(g) | September 1995 | LANL recommends SWMU 0-030(g) for NFA. |
| Notice of Deficiency (NOD) for RFI Report | July 1, 1996 | HRMB outlines deficiencies, including conducting an ecological risk assessment at SWMU 0-030(g) and the associated outfall drainage using NMED guidance within 90 days of issuance of final ecological risk assessment guidance. |
| NOD Response for RFI Report | March 6, 1997 | LANL responds to deficiencies and agrees to conduct and submit the ecological risk assessment within 90 days of receiving final NMED guidance. |
| Request for Supplemental Information (RSI) for RFI Report | May 12, 1998 | HRMB outlines supplemental information required for the site, including the preparation of a SAP to conduct (1) additional confirmation sampling at SWMU 0-030(g) and extent sampling in the outfall drainage, and (2) both human health and ecological assessments using NMED's Risk-Based Decision Tree, and RFI and supplemental data. |

| Document | Date | Summary |
|---|---|---|
| Response to RSI for RFI Report | June 10, 1998 | LANL responds to deficiencies and agrees to prepare a SAP, conduct field work, and submit a report that includes the human health and ecological assessments using NMED's Risk-Based Decision Tree. |
| RFI Report - Approval upon Modification and Response to RSI | June 29, 1998 | HRMB outlines modifications required to finalize approval of the RFI report, including providing several replacement pages to the original RFI report and addressing other modifications in the SAP. |
| RSI for SAP | August 7, 1998 | NMED requests supplemental information for the SAP prepared for the mesa-top portion of the SWMU. |
| Response to RSI for SAP | August 14, 1998 | LANL responds to NMED request for supplemental information for the SAP prepared for the mesa-top portion of the SWMU. Revised SAP included as attachment. |
| Revised Status Report for SWMU 0-030(g) - Former Septic Tank and Vitrified Clay Pipe | December 1998 | LANL report documents the results of final confirmatory sampling under former septic tank and inlet and outlet drainlines. |

### 1.3.2 Other Issues

The only significant issue associated with the development of this SAP involves the expedited private party development of the site. The pending sale of this property is the main driver for the focused development and subsequent implementation of this SAP.

## 1.4 Data Quality Objectives Process

NMED has determined that additional data collection is warranted to better define the extent of contamination in the outfall drainage, and to determine the potential for human health and ecological risk posed by contamination within the outfall drainage.

The decision statement for the investigation is to determine the extent of contamination in the sediments in the 0-030(g) drainage in order to evaluate the need for potential remediation or to conclude that no further action is necessary. If the data results exceed their appropriate action levels, and if there is sufficient justification (e.g., potential human health or ecological risk), the decision will be made to conduct additional analyses or conduct some type of remedial action.

Geomorphologic and analytical data will be collected to meet these data quality objectives. The data will also be used to determine the potential contributions from the SWMU 0-030(g) outfall drainage to the ephemeral stream channel at the base of Acid Canyon.

The data collection process is identical to the approach used most recently for the evaluation of sediment contamination in Upper and Lower Los Alamos Canyon and Pueblo Canyon (Reneau et al., 1998). This process follows the Canyons Core Document (LANL 1997, 55622). The sampling process hinges on the geomorphic mapping of the sediment deposition areas in the drainage channel below the outfall and in the ephemeral stream channel in Acid Canyon. The results of the geomorphic investigation will direct the

location and number of samples collected from the drainage area, including locations within and adjacent to the current drainage channel. The samples will be collected from locations along the full length of the drainage beginning at the base of the hillslope, the full thickness of the post-1942 sediments, and the complete range in particle size present in post-1942 sediments. The results of the mapping and sampling exercises will meet these data objectives.

## 2.0 SAMPLING AND ANALYSIS PLAN FOR SWMU 0-030(g)—OUTFALL AND DRAINAGE CHANNEL

### 2.1 Characterization and Setting

SWMU 0-030(g), also referred to as "the site," was a septic tank system that was active in the mid-1940s (LANL 1992). The site is located on private and Los Alamos County property north of Canyon Road and west of the intersection of Canyon Road and Central Avenue (Figures 1.0-1 and 1.0-2). The division between private and County property is approximately 10 ft off the northeast corner of the tank (following the drainline) shown on Figure 1.0-2.

The septic tank portion of the site was formerly used as a parking lot for the "old" Catholic Church, and is currently used as a residential driveway. The outfall portion has been, and is currently, County open space. The anticipated future land use at the mesa-top portion of the site is commercial or high-density residential. The future land use of the drainage area portion of the site is expected to remain as County open space.

#### 2.1.1 Site Description

The SWMU is comprised of a mesa-top segment (currently a parking area) including an outfall and canyon slope segment, including a drainage channel. The drainage channel collected runoff from the septic tank outfall, current and former parking area, city streets and other paved areas. The channel discharged into Acid Canyon. The mesa-top segment of the SWMU was addressed in a previous SAP and supplemental investigation report, as well as in the original RFI report and subsequent correspondence (see Table 1.3-1). As discussed previously, this SAP addresses only the drainage channel.

The possible effluent discharge area leading to the drainage is noted on Figure 1.1-1. The exact effluent drainage path could not be identified at the time of the investigation since information concerning the precise location of the outfall during the operation of the septic tank was not available. Currently, the outfall is located on the south side of the dirt road shown in Figure 1.1-1. The possible effluent discharge area shown in the figure assumes that current conditions (i.e., outfall location, grading of the road, drainage pathways, etc.) existed during the time of septic tank operation. The effluent discharge area would have been substantially narrower relative to the area shown on the Figure 1.1-1 if the outfall had run beneath the road and discharged on the north side, or if the road had a swale to constrict the flow across it. In addition, it is also not known if the dirt road was in its current location during the operation of the septic tank.

The septic tank was formerly located in an excavation within the tuff on the mesa-top, approximately 9 ft below grade. Backfill, composed primarily of crushed tuff and large chunks of uncrushed tuff, was used to

fill in the areas excavated during removal of the septic tank and drainline leading to outfall below the mesa edge.

The depth to tuff on the mesa-top averages between 3 and 5 ft below grade in unexcavated areas, and averages greater than 5 ft in excavated areas, depending on the depth of the fill material. The SWMU 0-030(g) hillslope consists primarily of tuff outcrops that are covered in some areas with a very thin layer of sediment/fill material. The base of the hillslope leading toward the bottom of the canyon consists of sediment deposits ranging from approximately 1 to 3 ft in depth. The main geologic and hydrogeologic aspects of the conceptual model are provided in the RFI report (LANL 1995, 51983).

### 2.1.2 Operational History

The documented history of the tank provides limited information as to its building connections, associated processes, and duration of use. Information from one document suggested that most of the sanitary waste was removed from the area via an 8-in. sanitary sewer that discharged into 0-030(g), then known as septic tank #6. Engineering drawings indicate that the tank was installed in the mid-1940s and that it has not been used since 1947, when a new wastewater treatment facility became operational. Additional information about SWMU 0-030(g) related to the site description, background, and operational history was provided in the RFI report (LANL 1995, 51983).

Information about specific processes that contributed wastewater to the septic tank is not available at this time. Continuing efforts will be made to uncover such information prior to the preparation of the revised RFI report for SWMU 0-030(g).

### 2.1.3 Waste Characteristics

Waste materials including personal protective equipment, dry decontamination waste and/or disposable sampling equipment will be collected for disposal as uncontaminated solid waste or contaminated material depending on the analytical results. The waste will be handled in accordance with LANL-ER-SOP-1.06 (LANL 1997, 57367). Sampling activities are expected to generate less than one cubic foot of solid waste material. Based on previous data collected from the site, potential contaminants that may be encountered include polychlorinated biphenyls (PCBs), pesticides, TAL metals, and radionuclides.

## 2.2 Investigatory Approach

### 2.2.1 Existing Data

#### 2.2.1.1 Non-sampling

In 1993, the septic tank and associated drainlines at SWMU 0-030(g) were located through the use of a series of geophysical and geodetic surveys. Pre-construction engineering drawings were used for the geodetic survey (LANL 1995, 51983). Additional non-sampling activities included:

- excavation and removal of the septic tank, septic tank contents, and the drainline; and
- excavation and removal of soil underlying the septic tank and drainline.

#### 2.2.1.2 Sampling

In 1993, an RFI was conducted at SWMU 0-030(g) and the associated outfall. This field investigation included:

- collecting waste characterization samples of septic tank contents;
- collecting confirmation samples from the soil/tuff underlying the excavated locations of the removed septic tank, drainline, and associated soil; and
- collecting samples from sediments located within the outfall drainage.

The information gathered from these field activities, together with subsequent data evaluation and a human health screening assessment, resulted in a recommendation for no further action. These activities were documented in the RFI report for SWMU 0-030(g) (LANL 1995, 51983).

The 1993 analytical results from the samples collected in the outfall drainage showed concentrations in surface sediment (0–6 in.) above background for isotopic plutonium and americium. PCBs and trace levels of pesticides were also detected in these samples. One or more of these constituents were detected in the 11 surface samples taken from an area extending approximately 300 ft north of the base of the hillslope toward Acid Canyon (Figure 1.1-1). Additional sampling for PCBs in the drainage was conducted in 1996 at the same locations. The analytical results from this sampling event confirmed the presence of low levels (approximately 0.5–1.0 parts per million) of PCBs. Radiochemicals were not analyzed for during the 1996 sampling event.

### 2.2.2 Conceptual Model

One potential source of contamination at this SWMU is the former 0-030(g) septic tank outfall. The potential pathways for contaminant migration include:

- sediment transport from the outfall down the slope and into the drainage areas at the base of the hillside,
- transport into the stream channel in Acid Canyon,
- and air entrainment of contaminants from the surficial sediments in the particulate phase.

The potential pathways to human receptors include ingestion and inhalation of airborne contaminants associated with entrained particulates, as well as direct dermal absorption. Potential pathways to biotic receptors include uptake by vegetation and by terrestrial animals in the drainage areas.

#### 2.2.2.1 Nature and Extent of Contamination

The 1995 RFI report for SWMU 0-030(g) included the 1993 sampling results and described the nature of the contamination in the outfall drainage. The radionuclide contaminants detected above LANL background levels included isotopic plutonium and americium. Organic contaminants detected included pesticides and PCBs. One of three replicate analyses (i.e., three analyses run on the same sample) of mercury reported a detection of 0.2 mg/kg in one sample. The other two replicate analyses were reported as not detected. Lead was not detected in the two samples for which the analysis was conducted.

However, both of these inorganics were retained as COPCs due to mesa-top results above background levels.

This contamination may have originated from 0-030(g) (septic tank #6). The SAP presented here for the SWMU 0-030(g) drainage is designed to determine the extent of contamination within the drainage area that may be associated with the outfall.

#### 2.2.2.2 Fate and Transport

The radionuclide, inorganic, pesticide, and PCB contaminants currently associated with the SWMU 0-030(g) outfall may have accumulated in the sediments along the drainage channel below the outfall. The geomorphic investigation is designed to identify those sediment deposition areas that would be most likely to contain concentrations of these contaminants present in the sediments. The results of the investigation will also be used to determine the potential for migration of materials down the drainage and into Acid Canyon.

#### 2.2.2.3 Data Gaps

The sediment deposits along the drainage channels downslope from the SWMU 0-030(g) septic tank outfall have not been adequately investigated to define the extent of contamination. In order to address this, the age, physical characteristics, and potential distribution of contaminant concentrations need to be characterized in the drainage area. The determination of the extent of contamination and the potential for migration of contaminants into Acid Canyon will be conducted by completing the geomorphic characterization (mapping, sediment description, etc.) discussed in Section 2.2.3.2.

### 2.2.3 Sampling Activities

#### 2.2.3.1 Contaminant Source

The protocol discussed in the following section follows the technical approach for sediment sampling in canyon environments as presented in the Core Document for Canyons Investigations (LANL 1997, 55622). This methodology has been reviewed and approved by NMED as a logical approach to develop a successful sediment, or depositional environment, sampling program in the Laboratory's canyon systems. A more detailed description of the geomorphic mapping is provided in the Canyons Core Document (LANL 1997, 55622).

#### 2.2.3.2 Media Characterization

The media characterization effort will be conducted on the sediments along the 030(g) drainage channel and the Acid Canyon stream channel. The characterization effort will include physical descriptions of the sediments, including particle size analysis, and will be conducted with the purpose of bounding the lateral and vertical extent of contamination in the sediments. A discussion of the geomorphic mapping and analysis, and its use in the selection of the sediment sampling locations, is provided below.

##### (a) Discussion of Geomorphic Mapping and Analysis

The geomorphic mapping and associated characterization is being used to define the horizontal and vertical extent of post-1942 sediments, all of which are assumed to be potentially contaminated based on previous sediment analyses along the 0-030(g) drainage. It is also assumed that all chemicals of potential concern

(COPCs) along this drainage were identified during previous sampling events, and that the purpose of this sampling event is to collect additional data for

1. determining variations in COPC concentrations for the purposes of defining extent,
2. conducting both human health and ecological risk assessments, and
3. focusing potential remedial actions, if necessary.

It is expected that contaminant concentrations may vary with sediment age and with particle size of specific sediment samples. Sediment that is of similar age to the original effluent releases may have higher concentrations than younger sediment, and relatively fine-grained sediment is expected to have higher concentrations than coarse-grained sediment. Concentrations may also vary laterally along the 0-030(g) drainage, potentially being highest near the upper part of the drainage and lowest near the confluence with Acid Canyon due to dilution, although such dilution may not be significant because of the short length of this drainage. Because of these potential influences on COPC concentration, the proposed sample locations were chosen to include both relatively young and relatively old sediment, both fine-grained and coarse-grained sediment, and sites in both the upstream and downstream parts of the drainage. These data are intended to be adequate for providing reasonable estimates of both maximum and average COPC concentrations in sediments along the drainage. These data can also be used to examine time trends in sediment contamination within the 0-030(g) drainage by comparing younger and older sediments.

Prior sediment sampling was largely concentrated in the upper drainage basin where the drainage channel is steep and rocky and where there are relatively small volumes of post-1942 sediment. Only two samples (location IDs 00-3731 and 00-3732 on Figure 2.2-1) were collected in the downgradient part of the basin where the width, depth, and volume of post-1942 sediment is much greater. Both of these samples were taken from the 0- to 6-in. interval, and from relatively young sediment (probably post-1980 sediment). No particle size data or detailed field descriptions are available for these two samples, but examination of the approximate sample locations during the preparation of this SAP suggested that the samples included a combination of coarse-grained and fine-grained sediment layers. The sampling proposed in this SAP, as discussed below, will complement the previous analyses by sampling deeper sediment layers in this same part of the basin, including both coarse-grained and fine-grained layers. One sample in this area will also be collected from the surface sediments but will be restricted to fine-grained sediments. All samples in the lowest part of the basin, which has not been previously sampled, will be of fine-grained sediment because there is relatively little coarse-grained sediment in this area.

### (b) Geomorphic Mapping and Selection of Sampling Locations

The selection of potential sampling locations was initiated by preparing a preliminary geomorphic map to identify post-1942 (i.e., potentially contaminated) deposits within an area of the drainage that begins at the base of the hillslope and extends into Acid Canyon (Figure 2.2-1). The deposits were subdivided into geomorphic units representing different ages, physical characteristics, and/or potential contaminant concentrations. The characterization of the sediments included thickness measurements and field descriptions of particle size. Estimates of post-1942 sediment thickness were based on the presence of anthropogenic (man-made) or other exotic materials (e.g., quartzite clasts), buried soil horizons (correlated to the base of buried trees), and previous radionuclide and organic contaminant measurements. The mapping and thickness measurements define the horizontal and vertical extent of potentially contaminated post-1942 sediments. A summary of the geomorphic mapping units is presented in Table 2.2-1.

The results of the geomorphic mapping and characterization were used to select representative locations and corresponding depths of post-1942 sediment (Figure 2.2-1 and Table 2.2-1). Sampling locations are presented in Table 2.2-2 and include multiple geomorphic units representing different ages, physical characteristics, and/or potential contaminant concentrations. This process allows the variability of contamination to be defined. Characteristics of the proposed sample locations (Table 2.2-2) are summarized in Table 2.2-1. Dendrochronology (tree-ring dating) was used to help determine ages of different sediment layers (see Figure 2.2-1).

As shown in Figure 2.2-1, the mapping and sampling activities cover a short reach in Acid Canyon that extends upstream and downstream from the confluence with the SWMU 0-030(g) drainage. This is designed to obtain information about the impact of the 030(g) drainage on Acid Canyon relative to the potential contributions of contaminants from other sites located farther west in the Acid Canyon drainage basin.

**Table 2.2-1**

**Geomorphic Mapping Units in 0-030(g) Drainage and Acid Canyon**

| Drainage | Geomorphic Mapping Unit | Unit Area ($m^2$) | Estimated Average Thickness, Fine Sediment (m) | Estimated Average Thickness, Coarse Sediment (m) | Estimated Volume, Fine Sediment ($m^3$) | Estimated Volume, Coarse Sediment ($m^3$) | Notes |
|---|---|---|---|---|---|---|---|
| **0-030(g)** | c1 | 502 | 0.13 | 0.29 | 65 | 146 | active channels, shallowly incised below c1b and c2 surfaces |
| **0-030(g)** | c1b | 187 | 0.07 | 0.43 | 13 | 80 | recent sand and gravel lobe; similar to c2a unit |
| **0-030(g)** | c1w | 191 | 0.45 | 0 | 86 | 0 | ponded area above road; fine sediment overlying tuff; high water table |
| **0-030(g)** | c2a | 1750 | 0.22 | 0.32 | 385 | 560 | relatively thick, coarse c2 deposits in upper basin; about 25 cm post-1980 sediment overlying pre-1964, post-1942 sediment (correlated to c2c sediments?) |
| **0-030(g)** | c2b | 731 | 0.19 | 0.19 | 139 | 139 | intermediate between c2a and c2c |

| Drainage | Geomorphic Mapping Unit | Unit Area ($m^2$) | Estimated Average Thickness, Fine Sediment (m) | Estimated Average Thickness, Coarse Sediment (m) | Estimated Volume, Fine Sediment ($m^3$) | Estimated Volume, Coarse Sediment ($m^3$) | Notes |
|---|---|---|---|---|---|---|---|
| **0-030(g)** | c2c | 2541 | 0.16 | 0.06 | 407 | 152 | relatively thin, fine c2 deposits in lower basin; presumed correlative sediments underlie c2a in upper basin, and most of the sediment may be pre-1964 |
| **0-030(g)** | c2? c3? | 4 | 0.15 | 0.15 | 1 | 1 | correlated with c2a or c3? |
| **0-030(g)** | c3? | 208 | 0.15 | 0.15 | 31 | 31 | slightly higher surface than c2a; sediments may be correlative to older, buried c2a sediments |
| ***Total*** | — | ***6114*** | — | — | ***1127*** | ***1109*** | — |
| **Acid Canyon** | c1 | 369 | 0 | 0.3 | 0 | 111 | active channel |
| **Acid Canyon** | c1b | 21 | 0 | 0.3 | 0 | 6 | sand and gravel bars adjacent to channel |
| **Acid Canyon** | c2 | 116 | 0.65 | 0.3 | 75 | 35 | younger abandoned channel surfaces inset below c3 and f1; average about 0.8 m above channel upstream and about 0.6 m above channel downstream of 0-030(g) drainage |
| **Acid Canyon** | c3 | 609 | 0.68 | 0.3 | 414 | 183 | older abandoned channel surface downstream of 0-030(g) drainage; average about 0.7 m above channel |
| **Acid Canyon** | f1+c3 | 918 | 0.63 | 0.15 | 578 | 138 | undifferentiated abandoned channel and floodplain surface upstream of 0-030(g) drainage; average about 0.95 m above channel |
| ***Total*** | — | ***2033*** | — | — | ***1068*** | ***472*** | — |

**Notes**

Coarse sediment: median particle size of medium sand to gravel

Fine sediment: median particle size of silt to medium sand

Thicknesses refer to post-1942 sediment

**Table 2.2-2**

**Proposed Sampling Locations for 0-030(g) Drainage and Acid Canyon**

| Sample No. | Subreach | Unit | Depth (cm) | Stratigraphic Description/Comments |
|---|---|---|---|---|
| 1 | 030(g) drainage | c2a | 0–12 | dark very fine sand to fine sand; post-1980 sediments |
| 2 | 030(g) drainage | c2a | 45–58 | very fine sand; pre-1964, post-1935 sediments |
| 3 | 030(g) drainage | c2a | 58–79 | medium to coarse sand; pre-1964, post-1935 sediments |
| 4 | 030(g) drainage (west tributary) | c2 (fan) | 0–9 | fine sand to very fine sand |
| 5 | 030(g) drainage | c2a | 29–41 | clean medium to coarse sand, stratified; pre-1964, post-1947 sediments |
| 6 | 030(g) drainage | c2c | 0–12 | fine sand to very fine sand; post-1940 sediments |
| 7 | 030(g) drainage | c1w | Approx. 0–20 | Stratigraphic and exact sample interval for samples #7 and #8 will be determined in the field during sampling |
| 8 | 030(g) drainage | c1w | Approx. 20–40 | Stratigraphic and exact sample interval for samples #7 and #8 will be determined in the field during sampling |
| 9 | Acid Canyon | c2 | 0–47 | fine sand; unstratified |
| 10 | Acid Canyon | f1+c3 | 1–14 | dark fine sand to very fine sand |
| 11 | Acid Canyon | c1 | 0–10 | coarse sand and gravel |
| 12 | Acid Canyon | c3 | 0–40 | dark fine sand to very fine sand |
| 13 | Acid Canyon | c1 | 0–10 | coarse sand and gravel |
| 14 | Acid Canyon | c2 | 0–49 | fine sand to very fine sand |

### Sampling Design

The sampling design is based on the previous RFI results (documented in LANL 1995, 51983) and the results of the geomorphic mapping presented in Figure 2.2-1. COPCs previously detected in the drainage include PCBs, pesticides, mercury, and isotopic plutonium and americium (see Section 2.2.2.1). Previous sampling locations and results were also used to assist in selecting the sample locations presented in Figure 2.2-1.

Figure 1.1-1 shows the previous RFI sediment sampling locations in the drainage area. The proposed sampling locations and corresponding number of samples to be collected at each location are shown on Figure 2.2-1. The locations and depth for each sample were selected based on the results of the geomorphic mapping task and the physical characterization of the sediments as discussed in the previous section. Sediment samples to be collected downgradient from the 0-030(g) outfall include locations along the full length of the drainage, the full thickness of the post-1942 sediments, and the complete range in particle size present in post-1942 sediments.

Fourteen samples will be collected and analyzed for pesticides, PCBs, TAL metals, and isotopic plutonium and americium. In addition, particle size data will also be collected to provide a more complete analysis and discussion of contamination. The selection of these analyses was based on the results of the existing data, and the analyses include all the COPCs detected in previous samples.

## 3.0 DATA COLLECTION DESIGN AND PROCEDURES

### 3.1 Data Quality Objectives

The data quality objectives are discussed above in Section 1.4. As described in Section 2.2.3.1, the results of the geomorphic investigation performed in the drainage channel will be used to guide the collection of samples required to determine the extent and variability of contamination. It is believed that this additional data, combined with existing data, will also be sufficient to meet the human health and ecological screening assessment objectives.

### 3.2 Quality Assurance/Quality Control

The analytical data obtained from the sediment samples will be subject to the same requirements for data analysis described in the ER Project's Quality Assurance Project Plan (LANL 1996, 55298) and the analytical services statement of work (LANL 1995, 49738).

The analytical data generated from the sampling will undergo routine validation as described in the Installation Work Plan (IWP) (LANL 1996, 57368). The validation process is based on EPA's national functional guidelines for data review (EPA 1994, 48639; EPA 1994, 58690). Based on the results, the qualifiers will be assigned to the sample data and a determination of the adequacy of the data for decision-making purposes will be made.

### 3.3 Field Activities

#### 3.3.1 Sample Collection and Field Screening Methodology

Sediment samples will be collected in accordance with LANL-ER-SOP-06.09, "Spade and Scoop Method for Collection of Soil Samples" (LANL 1997, 57367). Samples will be collected at the locations and depths discussed above.

Once collected, each sample will be field-screened for gross alpha and beta/gamma radiation for health and safety purposes. Radiological field-screening methods for samples will consist of using a Ludlum 139 with a 43-4 air proportional probe and a Ludlum 2221 with a 43-1 zinc sulfide scintillation probe to detect gross alpha radiation, and a Ludlum 2221 with a 44-40 GM probe to detect gross beta/gamma radiation. Equivalent detectors and instruments may be substituted, as appropriate. After field screening, samples will be submitted to the TA-21 radiological screening laboratory to satisfy transportation requirements.

#### 3.3.2 Analytical Methods

All samples will be analyzed at off-site fixed analytical laboratories using EPA SW-846 methods (EPA 1993, 40070). Based on the COPCs generated from the 1993 and 1996 sampling events, each sample will be analyzed for pesticides (EPA Method 8081), PCBs (EPA Method 8082), TAL metals (EPA Method 6010B), mercury (EPA Method 7471A), and isotopic plutonium and americium via alpha spectroscopy.

## 4.0 PROJECT MANAGEMENT PLAN

### 4.1 Project Scheduling and Reporting Requirements

These sampling activities at SWMU 0-030(g) are scheduled to begin either upon receipt of HRMB concurrence with this plan or 45 days following this submittal, if no response is received. Additionally, LANL ER personnel will notify HRMB prior to the initiation of sampling activities to accommodate the collection of split samples, if desired. Sampling activities are expected to require one or two days to complete.

The results of these outfall drainage sampling activities will be combined with the results from the mesa-top re-confirmation sampling and will be presented in a final RFI report addendum that will provide a detailed presentation and evaluation of all sampling data collected to date.

### 4.2 Health and Safety Plan

The site-specific health and safety plan developed for SWMU 0-030(g) will be reviewed and updated as necessary for the activities discussed above. The HASP and any associated updates will be conducted in accordance with the Environmental Management/Environmental Restoration Project Site/Specific Health and Safety Plan (SSHASP).

### 4.3 Investigation-Derived Waste Plan

Investigation-derived waste (IDW) may include personal protective equipment (gloves), dry decontamination waste (paper towels), and/or disposable sampling equipment (scoops). IDW will be collected for disposal as uncontaminated solid waste or contaminated material depending on the analytical results, and will be handled in accordance with LANL-ER-SOP-1.06 (LANL 1997, 57367). Sampling activities are expected to generate less than one $ft^3$ of IDW.

### 4.4 Community Relations Plan

Community relations are governed by the Public Involvement Plan in Chapter 7 of the 1996 IWP (LANL 1996, 57368).

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