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Date: November 13, 1997
Refer to: EM/ER:97-462

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

SUBJECT: VCA COMPLETION REPORT FOR TA-49, PRS 49-008(d) ACTIVITIES

Dear Mr. Garcia:

Enclosed please find two copies of the Voluntary Corrective Action Completion Report for Technical Area 49, Potential Release Site (PRS) 49-008(d) cleanup activities completed in Fiscal Year 1998. The other appropriate entities within the Department have been included on distribution. The Environmental Restoration Project believes that this completion report justifies no further action (NFA) at this PRS. This PRS is listed in the Hazardous and Solid Waste Amendments (HSWA) Module of the Los Alamos National Laboratory's Resource Conservation and Recovery Act operating permit; therefore, we are asking for your concurrence in our recommendation to remove this site from the HSWA Module via a Class III Permit Modification.

The Department of Energy has reviewed and approved this report and agrees with the recommendation for NFA. The approval form is attached to the report. The Certification of Completion has been signed and is included in the enclosed report.

If you have any questions, please call Don Krier at (505) 665-7834 or Mike Gilgosch at (505) 667-5794.

Sincerely,

Julie A. Canepa, Program Manager
LANL/ER Project

Sincerely,

for Joseph H. Moore

Theodore J. Taylor, Program Manager
DOE/LAAO

JC/TT/ss

3984

Enclosures: (1) Final VCA Completion Report for TA-49, PRS 49-008(d)
(2) Certification of Completion
(3) DOE Approval Form

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VOLUNTARY CORRECTIVE ACTION (VCA) COMPLETION REPORT APPROVAL/DISAPPROVAL FORM

PRS(s) 49-008(d)

The undersigned have reviewed the VCA Completion Report and believe that the intent and goals of the VCA plan have been met.

FPL Donathon Kriev Date Oct 30, 1997

FPC _____ Date _____

.....

I, Theodore J. Taylor, DOE-LAAO, **APPROVE** _____, **DISAPPROVE** _____ the accompanying Voluntary Correction Action Report for PRS(s) _____, TA-____.

The following reasons reflect the decision for disapproval:

_____

_____

_____

_____

_____

_____

_____

Signed: _____ Date: _____

VOLUNTARY CORRECTIVE ACTION (VCA) COMPLETION REPORT APPROVAL/DISAPPROVAL FORM

PRS(s) 49-008(d)

The undersigned have reviewed the VCA Completion Report and believe that the intent and goals of the VCA plan have been met.

FPL _____ Date _____

FPC [signature] Date 10/30/97

.....

I, Theodore J. Taylor, DOE-LAAO, **APPROVE** ✓, **DISAPPROVE** _____ the accompanying Voluntary Correction Action Report for PRS(s) 49-008(d) TA-____.

The following reasons reflect the decision for disapproval:

Signed: [signature] Date: 10/30/97

VCA Completion Report for Potential Release Site at TA-49

49-008(d) Bottle House Soils

Field Unit 5

Environmental Restoration Project

October 1997

A Department of Energy
Environmental Cleanup Program

Los Alamos
NATIONAL LABORATORY

LA-UR-97-3809

CONTENTS

FIGURES

TABLES

ACRONYMS AND ABBREVIATIONS

COPC	chemicals of potential concern
DOE	Department of Energy
EPA	Environmental Protection Agency
ER	Environmental Restoration
ESG	Environmental Surveillance Group
ESH	Environmental, Safety, and Health (Division)
FIMAD	Facility for Information Management, Analysis and Display
HE	high explosive
HSWA	Hazardous and Solid Waste Amendments of 1984
IWP	Installation Work Plan
MCE	multiple chemical evaluation
MDA	Material Disposal Area
NFA	No Further Action
NMED	New Mexico Environment Department
OU	Operable Unit
PCB	polychlorinated biphenyls
PRS	Potential Release Site
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	quality control
RFI	RCRA Facility Investigation
SAL	screening action level
SMO	Sample Management Office
SOP	standard operating procedure
SVOC	semivolatile organic compounds
TAL	Target Analyte List
TA	Technical Area
the Laboratory	Los Alamos National Laboratory
U	Uranium
UTL	upper tolerance limit
VCA	volumtary corrective action
VOC	volatile organic compounds

1.0 INTRODUCTION

Soil with elevated levels of uranium was removed from Potenital Release Site (PRS) 49-008(d) in Technical Area 49 as a Voluntary Corrective Action (VCA) undertaken as part of the Los Alamos National Laboratory's (the Laboratory) Environmental Restoration (ER) Project. This report discusses the Phase I characterization of PRS 49-008(d) and the actions taken to allow this non-HSWA (Hazardous and Solid Waste Amendments) permit PRS to be recommended for no further action (NFA) status.

The Area 12 Bottle House PRS 49-008(d) is located in Technical Area 49, which is on the southern boundary of Los Alamos National Laboratory on Frijoles Mesa (Figure 1.0-1) Area 12 is located immediately east of Material Disposal Area (MDA) AB (Figure 1.0-2). Area 12 is on a relatively flat, open area on the mesa top. The depth to the main aquifer is about 1200 ft, and there are no perched aquifers known or expected in the area. A 700-ft borehole was drilled in Area 12 in 1993 as part of the RFI (RCRA Facility Investigation) characterization of the adjacently located Area 2. The borehole, located approximately 100 ft south of the Bottle House, encountered no saturated water zones. PRS 49-008(d) consists of the surface soils around two structures and a stained soil area (Figure 1.0-3). Structure 49-23, referred to as the Bottle House, is a small building (17 ft by 17 ft) located over a 10-ft-diameter by 30-ft-deep backfilled shaft where confinement experiments were conducted. The shaft used for the confinement experiments was backfilled in the early 1960s, and no surface evidence of the shaft exists. Structure 49-121, referred to as the Cable Pull Test Facility, consists of a cement slab with a structure built on top designed to test the integrity of cables to be used in experiments. The stained soil area is a 10-ft-diameter surface depression located south of structure 49-121.

The main historic activities in Area 12 were confinement experiments in 1960 and 1961. These experiments consisted of HE detonations in metal containment bottles placed in the shaft at the Bottle House. The containment bottles were filled with road salt for energy absorption purposes. The containment bottles were lowered to the bottom of the shaft, detonated, removed from the shaft, and then examined (Figure 1.0-4). Approximately 26 experiments were carried out in this shaft. Several of the experiments involved the use of Uranium-(U) 238 and Uranium-235. All containment experiments at the Bottle House facility were concluded in 1961. The Cable Pull Test Facility was constructed in the early 1960s, at the conclusion of the containment experiments. This was a simple above-ground facility used to test the integrity of large-diameter cables used in experiments. The Bottle House building was used to support operations at the Cable Pull Test Facility. The Bottle House containment shaft was backfilled with crushed tuff, and a hydraulic system, including a fluid reservoir, compressor, and hydraulic lines, was installed in the building. The hydraulic system, possibly with buried lines connecting the Bottle House with the Cable Pull Facility, is still present. Because hydraulics were used in this facility, there is potential for hydraulic fluid contamination. The soil depression area consists of a 10-ft-diameter depression with an area of discolored soil. As stated in the OU 1144 Work Plan, Frijoles Mesa had a very active archeological past, and field observation of the stained area indicates that it might actually represent an ancient fire pit.

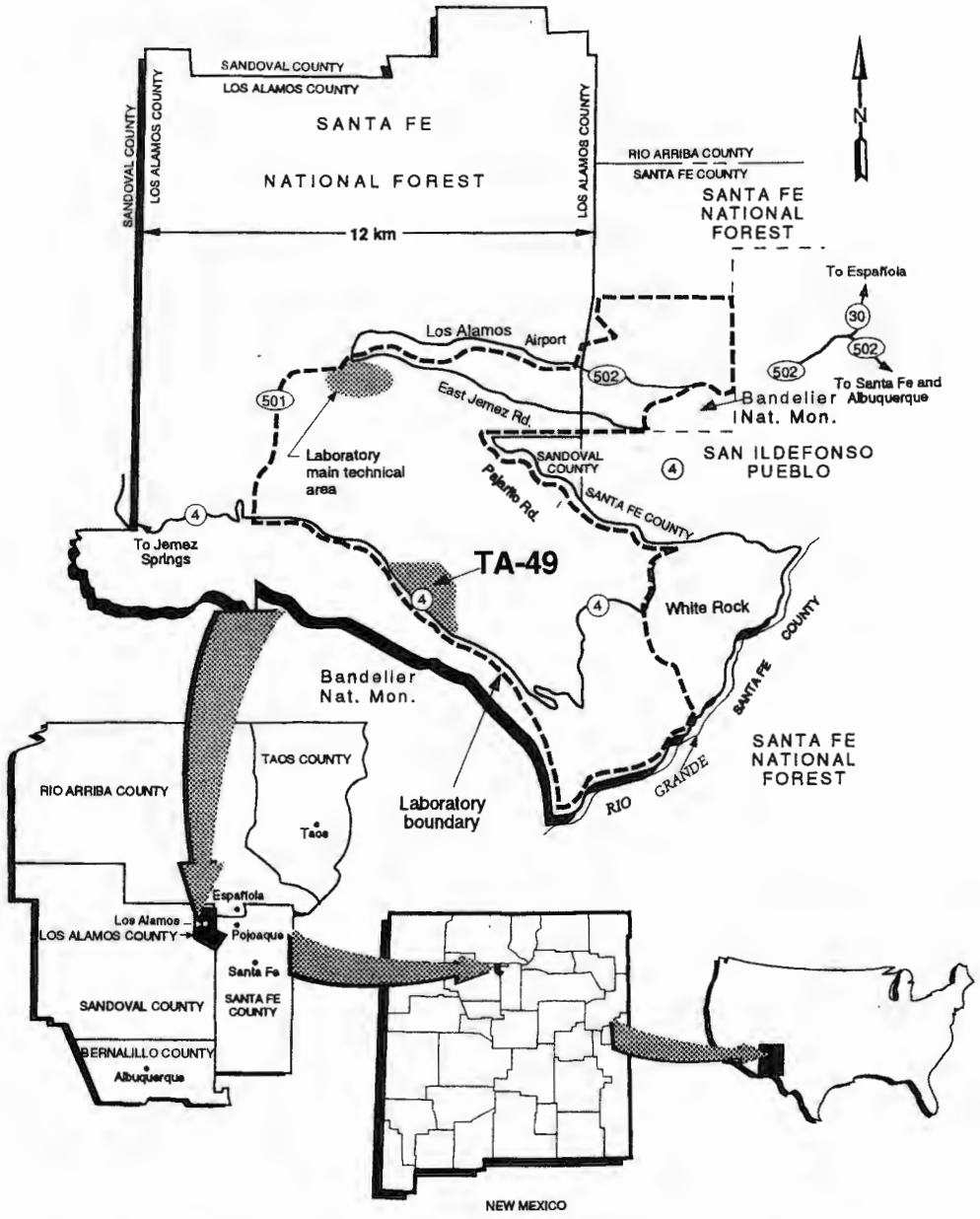

Figure 1.0-1. Location of Los Alamos National Laboratory and TA-49.

Description, site history, and potential source terms of PRS-49-008(d)/Area 12 are discussed in detail in Section 6.6.2, page 6.6 - 3 to 8 of the RFI Work Plan for OU 1144 (LANL 1992, 7670).

1.1.1 Operational History

The main historic activities in Area 12 were confinement experiments in 1960 and 1961 that were related to the TA-49 hydronuclear program. These experiments consisted of HE detonations in sealed metal "bottles" (up to 5 ft in diameter by 16 ft in length) placed in a 10-ft-diameter by 30-ft-deep shaft. The Bottle House structure still remains at Area 12.

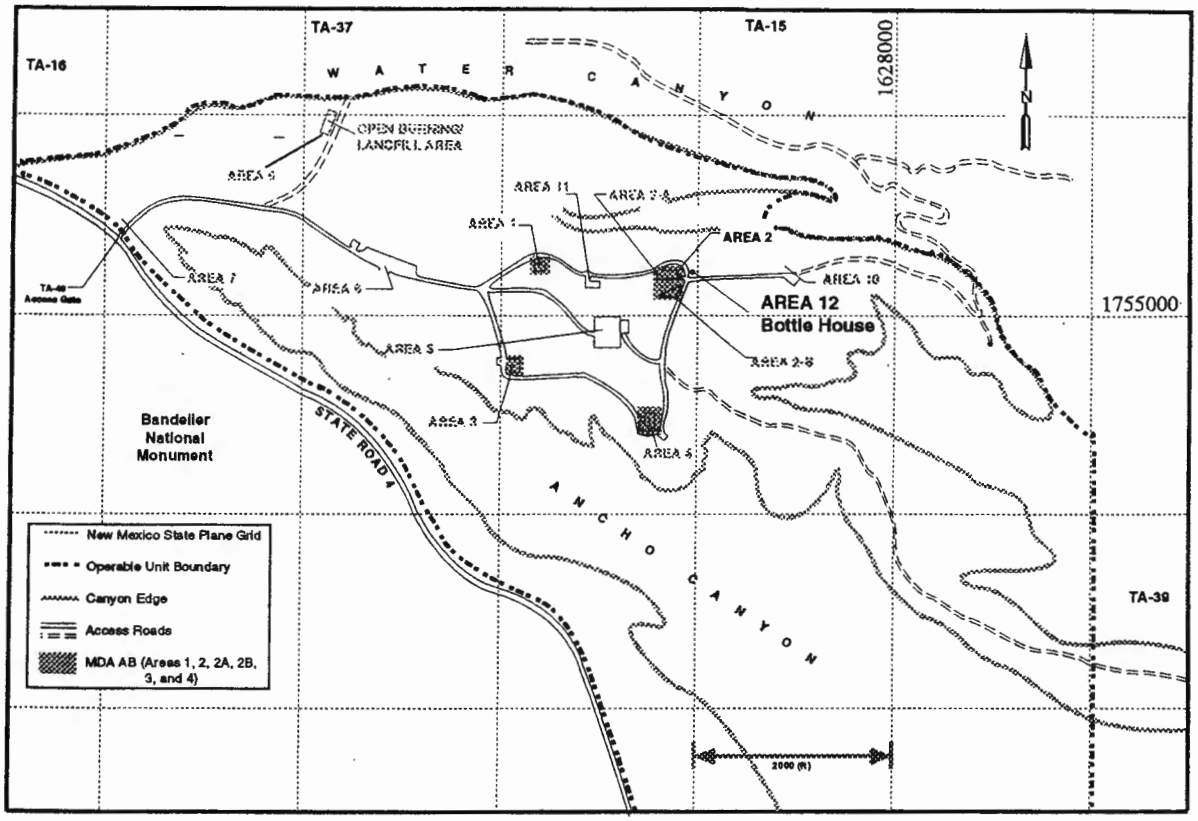

Figure 1.0-2. Location of Area 12 Bottle House within TA-49.

Approximately 26 confinement experiments involving HE detonations were carried out in the Area 12 shaft. Several experiments involved a few kilograms of U-238. Six experiments involved a few microcuries of irradiated uranium tracer (typically 3.5 g of U-238 and, in one case, 10.6 g of U-235). Up to 7 tons of road salt were used as an energy absorbent for each of the major experiments. In each experiment, after the HE was detonated, the containment vessel was unsealed and the salt was removed, sometimes with the help of jackhammers. According to several site employees, the salt was disposed of at the TA-54 waste disposal site. Following the final experiment, the containment bottle also was disposed of off-site, probably at TA-54.

During the containment experiments, the area was monitored routinely for the release of radiation. Field notes indicate that after several experiments in May 1961, low levels of gross alpha contamination were noted on the interior surfaces of the containment vessel and the compressed salt. According to the OU 1144 RFI Work Plan, there was no indication from any records or interviews that contamination was released to the site environment from the confinement experiments or from any other Area 12 activities (LANL 1992, 7670). As discussed below, however, in the Phase I RFI soil sampling investigation, the presence of radioactive contaminants originating from an unknown source was discovered.

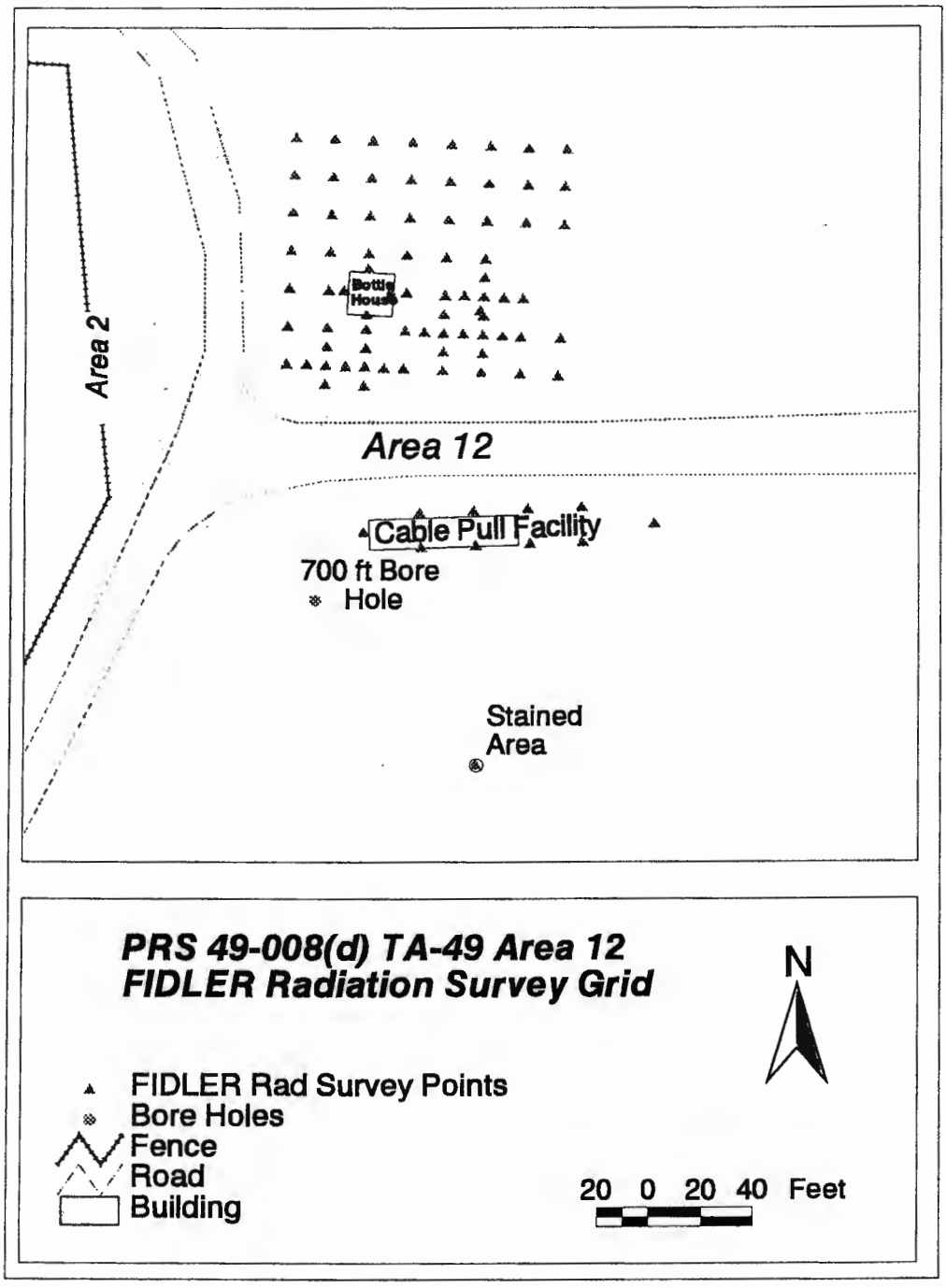

Figure 1.0-3. Area 12 FIDLER Radiation Survey Grid.

2.0 SITE CHARACTERIZATION PRIOR TO REMOVAL

2.1 RFI Field Investigation

The objective of the field investigation was to determine if chemicals of potential concern (COPCs) were present at concentrations above Laboratory site-wide background levels and /or above screening action levels (SALs) and present an unacceptable human health

risk, and whether or not Area 12 is suitable for unrestricted Laboratory use, subject to general restrictions imposed by the continuing use of TA-49 as a firing-site buffer zone.

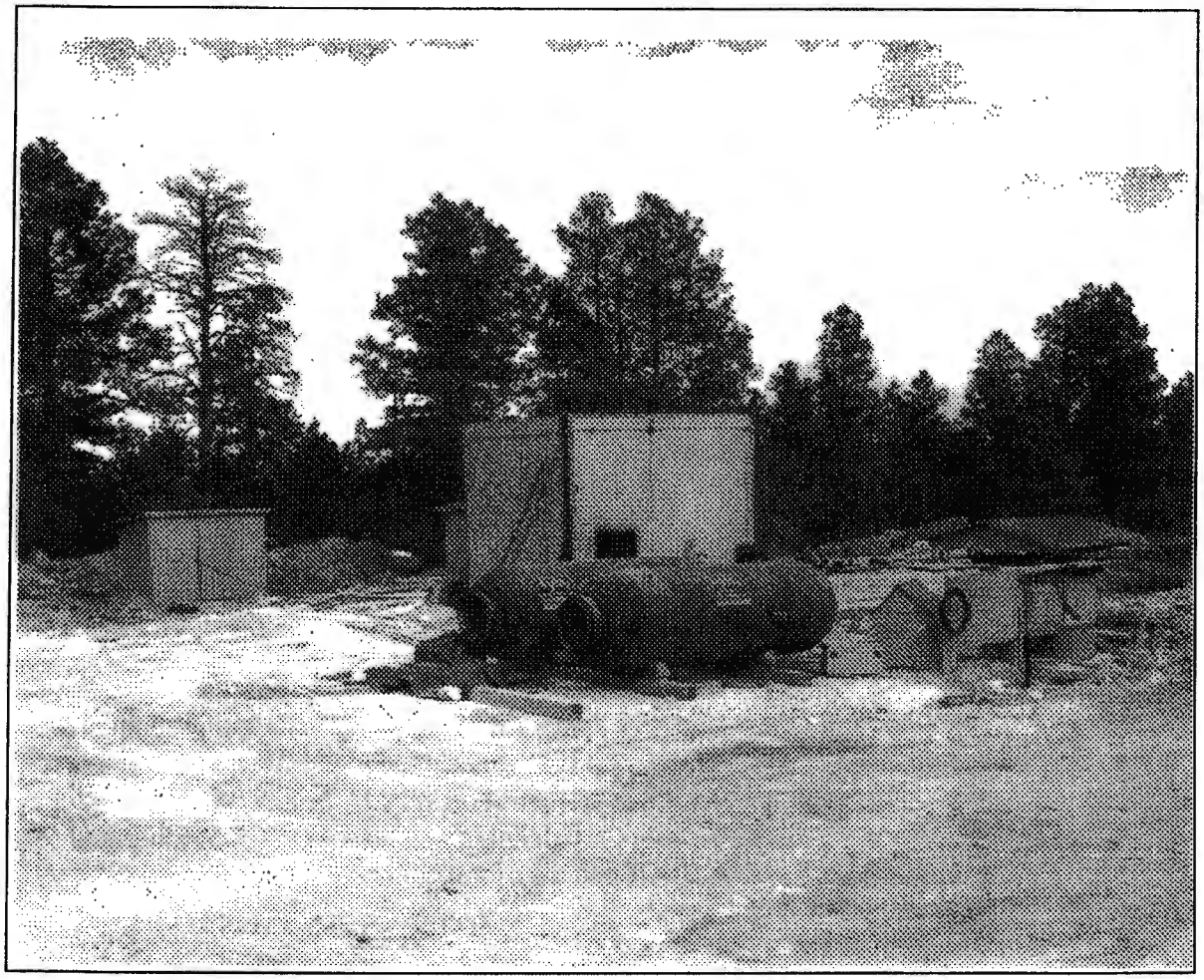

Figure 1.0-4. Early 1960s Photograph of Bottle House and Containment Bottles.

Within the Laboratory risk-based corrective action process (Dorries 1996, 55575), the results of the screening assessment can be used to support decisions of:

- NFA, if the results clearly indicate no human health risk;
- further assessment, if site-specific exposure parameters may impact the assessment or be required to support the development of remedial action objectives;
- accelerated cleanup, such as a VCA, if the remedy is obvious, can provide a final solution, and meet the additional criteria defined in the risk-based corrective action process.

The conceptual model and investigation design for the site are based on the operational activities carried out during the Bottle House experiments, as well as subsequent activities during cable-pull testing. During the Bottle House tests, all explosive shots were contained

within the test vessel, and no releases occurred within the shaft. Due to this history and because the shaft was backfilled with clean compacted tuff, there is little potential for contamination and no credible exposure pathway to shaft media. Therefore, no deep soil sampling of the area surrounding the shaft was proposed or executed during the RFI.

Surface soils (0–0.5 ft) and near-surface soils (0.5–1.0 ft) in the area surrounding the bottle house were identified as the primary media and intervals of concern for investigation. This is based on the test-related activity in which the containment bottles were unsealed and the test components (including energy-absorbing salt) were removed from the vessels in the area surrounding the Bottle House. That material removal often required the use of jackhammers. Although monitoring records indicate that no contamination was released to the site environment, the RFI activity was designed to determine if any residual contamination from accidental releases remains at the site.

The conceptual release model for the Cable Pull Test Facility includes the potential spill or leakage of hydraulic fluid to surface soils during the operation of hydraulic equipment at the site. Surface soils at the 0- to 0.5-ft interval were identified for sampling to support this investigation. Three areas were targeted for the investigation and included soil sampling around the concrete pad of the Cable Pull Test Facility, sampling inside the Bottle House due to the presence of hydraulic equipment housed there, and sampling of an area of discolored soil south of the Cable Pull Facility, which may have been the site of a staging support area.

The chemicals potentially present for the RFI investigation are TAL (Target Analyte List) metals, radionuclides, semivolatile organic compounds (SVOCs), and polychlorinated biphenyls (PCBs). PCBs were identified as potentially present due to the presence of hydraulic equipment on the site; however, no documented use of PCBs at the site is known, and existing equipment at the site is labeled "PCB free." The field investigation included the following elements:

- A radiological survey using FIDLER portable gamma spectrometry instruments.
- Collection of discrete surface soil samples (0-6 in.) around the Bottle House and Cable Pull Test Facility areas, and surface soil samples (0- to 6- and 6- to 12-in.) at areas identified as "hot spots" by the radiological survey, for fixed analytical laboratory analysis for radionuclides and metals.
- Collection of discrete soil samples (0-6 in.) from the Bottle House floor and the discolored soil depression area for analysis for radionuclides, TAL metals, PCBs, and SVOCs.

2.1.1 FIDLER Radiological Survey

The radiological survey at Area 12 was performed at locations shown in Figure 1.0-3. The radiological survey of the Cable Pull Test Facility and of the discolored soil area did not show any hot spots or areas that exceeded three standard deviations of the average background.

The radiological survey around the Bottle House area identified locations that exceeded three standard deviations of average background. Hot spots were identified at survey locations: 49-9019, 49-9036, 49-9080, and 49-9082.

See "TA-49 FIDLER Survey Report," (Art 1996, 55332) for detailed information on the radiological survey conducted at Area 12.

2.1.2 Soil Sampling

As prescribed by the OU 1144 work plan, sample locations were established at PRS 49-008(d) at the Bottle House area, Cable Pull Test Facility area, and the discolored soil area. On 10 August 1995, twenty-nine surface soil samples were collected from twenty-three locations at Area 12 (see Figure 2.1.2-1). To investigate potential surface contamination resulting from Bottle House testing, eleven of the twenty-nine samples (locations 49-9013, 49-9026, 49-9040, 49-9049, 49-9052, and 49-9054 to 49-9058) were collected (0-6 in.) around the Bottle House area based on a grid-sampling design; twelve additional samples (locations 49-9007, 49-9019, 49-9032, 49-9035, 49-9036, and 49-9096) were collected (0-6 and 6-12 in.) from hot spots identified by the radiological survey. To investigate potential hydraulic fluid releases, one sample was collected at location 49-9095 from the Bottle House floor; four (from locations 49-9060, 49-9062, 49-9064, and 49-9066) were collected around the Cable Pull Test facility; and one sample (location 49-9069) was collected from the discolored soil area. All surface soil samples were collected according to LANL-ER-SOP-06.09, R0,Spade and Scoop Method for Collection of Soil Samples.

All the samples collected were analyzed for gross alpha/beta and gamma spectrometry; one-half of the samples plus all the hot spot samples were analyzed for isotopic plutonium, total uranium, and TAL metals. The samples associated with the Cable Pull Test Facility, Bottle House floor, and discolored soil area were sampled for SVOCs. Four samples from around the Cable Pull test Facility (49-9060, 49-9062, 49-9064, 49-9066), one from the stained area (49-9069), and one from the Bottle House floor were also analyzed for PCBs. Table 2.1.2-1 summarizes the samples collected and analyses performed.

At each of the twenty-seven sample locations in Area 12, beta/gamma screening was conducted subsequent to sample removal using an ESP-1 portable radiation meter. The range of beta/gamma measurements was 174 to 17,500 cpm, with the average being 1,161.7 cpm. The elevated measurements came from the hot spot sample locations; the normal Laboratory background is from 150-250 cpm.

All the samples collected were also screened for gross alpha/beta before shipment to the analytical laboratory. Minimum, average, and maximum radioactivities of the samples from Area 12, PRS 49-008(d), were 0.4, 89, and 2308 pCi/g gross beta, and 0.0, 9.0, and 160 pCi/g gross alpha. No Laboratory-background upper tolerance limit (UTL) has been established for gross alpha or beta activity; however, these data can be compared to TA-49 on-site background data. At nine on-site monitoring locations, the minimum, average, and maximum gross alpha activities were 0, 2.9, and 5.9 pCi/g, and gross beta activities were 2.6, 12.1, and 19.8 pCi/g.

Deviations from OU 1144 Work Plan for Area 12

Only one sample was collected from the Bottle House floor instead of the four recommended by the work plan. The work plan recommended taking four samples from the Bottle House floor where stained soil areas were located; however, only one stained area was visible, so the one sample was taken from that area.

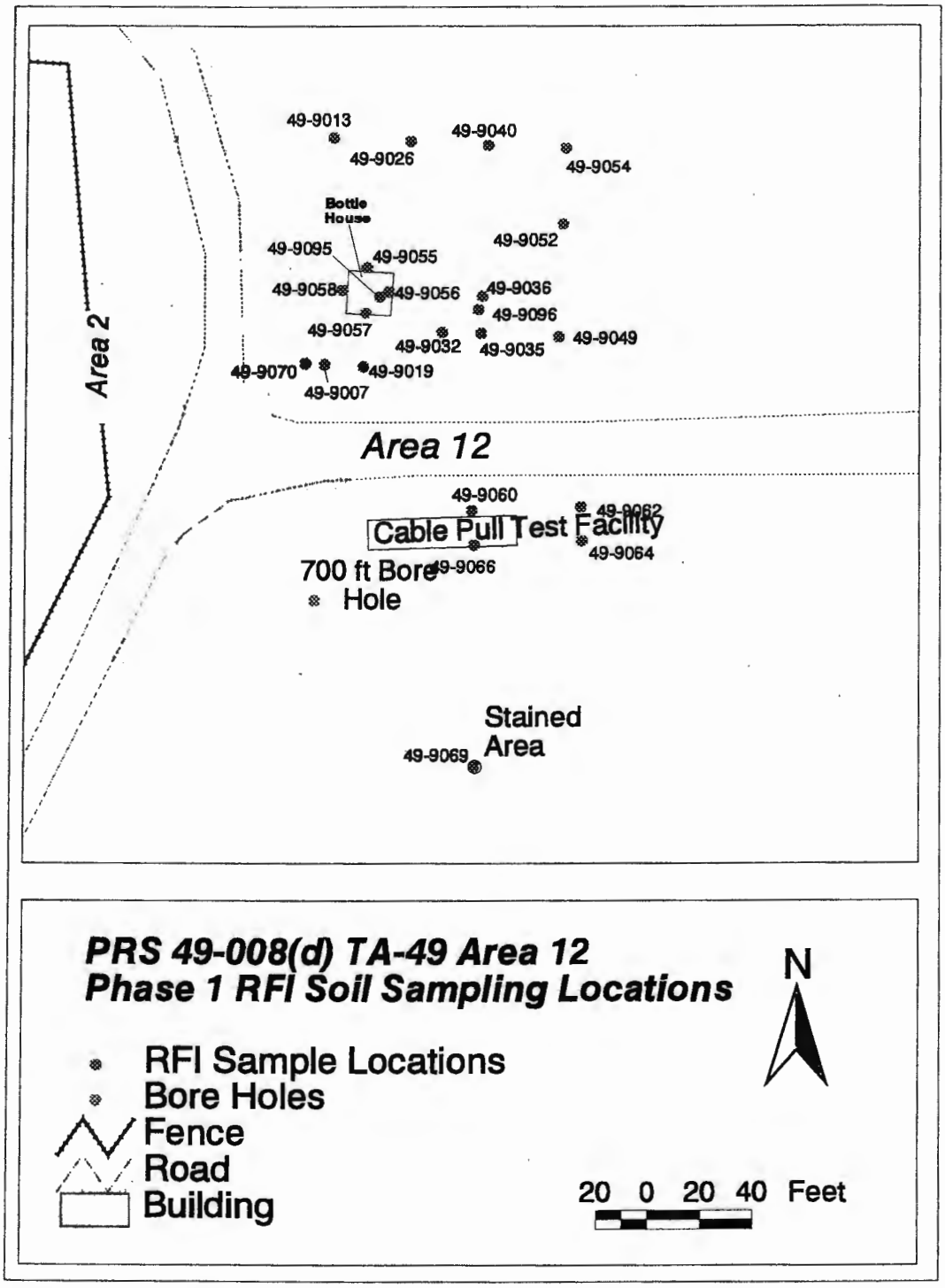

Figure 2.1.2-1. RFI Phase I Sample Collection Locations.

The four samples collected at the Cable Pull Test Facility were collected around the edge of the cement floor. The work plan recommended collecting the samples under the facility; this task was not feasible because the floor of the entire facility consists of a thick concrete slab.

TABLE 2.1.2-1
SUMMARY OF SAMPLES TAKEN AT PRS 49-008(d)-AREA 12- BOTTLE HOUSE AND CABLE PULL TEST FACILITY

LOCATION ID	SAMPLE ID	DEPTH (FT)	MATRIX	SVOCS	PCB	METALS	RAD
Bottle House Area Samples							
49-9007	0549-95-0265	0–0.5	SOIL	NA[a]	NA	870[b]	871
49-9007	0549-95-0266	0.5–1.0	SOIL	NA	NA	870	871
49-9013	0549-95-0267	0–0.5	SOIL	NA	NA	NA	871
49-9019	0549-95-0268	0–0.5	SOIL	NA	NA	870	871
49-9019	0549-95-0269	0.5–1.0	SOIL	NA	NA	870	871
49-9019(DUP)	0549-95-0270	0.5 –1.0	SOIL	NA	NA	870	871
49-9026	0549-95-0271	0–0.5	SOIL	NA	NA	NA	871
49-9032	0549-95-0272	0–0.5	SOIL	NA	NA	870	871
49-9032	0549-95-0273	0.5–1.0	SOIL	NA	NA	870	871
49-9035	0549-95-0274	0–0.5	SOIL	NA	NA	870	871
49-9035	0549-95-0275	0.5–1.0	SOIL	NA	NA	870	871
49-9036	0549-95-0276	0–0.5	SOIL	NA	NA	870	871
49-9036	0549-95-0277	0.5–1.0	SOIL	NA	NA	870	871
49-9040	0549-95-0278	0–0.5	SOIL	NA	NA	NA	871
49-9049	0549-95-0279	0–0.5	SOIL	NA	NA	NA	871
49-9052	0549-95-0280	0–0.5	SOIL	NA	NA	NA	871
49-9054	0549-95-0281	0–0.5	SOIL	NA	NA	NA	871
49-9055	0549-95-0282	0–0.5	SOIL	NA	NA	NA	871
49-9056	0549-95-0283	0–0.5	SOIL	NA	NA	NA	871
49-9057	0549-95-0284	0–0.5	SOIL	NA	NA	NA	871
49-9058	0549-95-0285	0–0.5	SOIL	NA	NA	NA	871
49-9070	0549-95-0291	0–0.5	SOIL	NA	NA	NA	871
49-9096	0549-95-0013	0–0.5	SOIL	NA	NA	870	871
49-9096	0549-95-0014	0.5–1.0	SOIL	NA	NA	870	871

TABLE 2.1.2-1 (concluded)

LOCATION ID	SAMPLE ID	DEPTH (FT)	MATRIX	SVOCS	PCB	METALS	RAD
Cable Pull Facility Samples							
49-9060	0549-95-0006	0–0.5	SOIL	NA	226	NA	NA
49-9060	0549-95-0286	0–0.5	SOIL	869	N/A	NA	871
49-9062	0549-95-0007	0–0.5	SOIL	NA	226	NA	NA
49-9062	0549-95-0287	0–0.5	SOIL	869	NA	NA	871
49-9064	0549-95-0008	0–0.5	SOIL	NA	226	NA	NA
49-9064	0549-95-0288	0–0.5	SOIL	869	NA	NA	871
49-9064(DUP)	0549-95-0289	0–0.5	SOIL	869	NA	NA	871
49-9066	0549-95-0009	0–0.5	SOIL	NA	226	NA	NA
49-9066	0549-95-0290	0–0.5	SOIL	869	NA	NA	871
49-9095	0549-95-0015	0–0.5	SOIL	869	869	870	871
Stained Area Samples							
49-9069	0549-95-0010	0–0.5	SOIL	NA	226	NA	NA
49-9069	0549-95-0292	0–0.5	SOIL	869	NA	NA	871

a = NA not analyzed.

b = Request number.

2.2 49-008(d) Background Comparison Sections

2.2.1 Evaluation of Inorganics

Fourteen soil samples collected at PRS 49-008(d) were analyzed for metals and total uranium. Seven inorganics (chromium, copper, lead, silver, sodium, uranium, and zinc) were detected at concentrations above their respective background screening values. Further background comparisons were performed for chromium, copper, lead, sodium, uranium, and zinc. Silver was not subjected to further background comparisons because the background data for this metal are inadequate to support other statistical tests. In this case, the sample-specific detection limit was used as the background screening value, and detected silver concentrations were carried forward to the screening assessment.

Because the data for the other six metals (chromium, copper, lead, sodium, uranium, and zinc) do not appear to satisfy normality assumptions, nonparametric tests were preferred for further background comparisons. The Gehan modification to the Wilcoxon Rank Sum test and the Quantile test were used for these evaluations. The Gehan test is best suited for assessing complete shifts in distribution, whereas the Quantile test is better suited for assessing partial shifts. These two tests can detect most types of differences between distributions. Observed significance levels (p-values) for these tests are presented in

Table 2.2.1-1. If a p-value is less than some small probability, 0.05, then there is some reason to suspect that there is a difference between the background and site distributions; otherwise, no difference is indicated.

TABLE 2.2.1-1
STATISTICAL TESTS FOR BACKGROUND COMPARISON

ANALYTE	GEHAN TEST P-VALUE	QUANTILE TEST P-VALUE
Chromium	0.99	0.96
Copper	0.0001	<0.00005
Lead	0.91	0.81
Sodium	0.23	0.81
Uranium	<0.00005	<0.00005
Zinc	0.08	0.29

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

Based on the background Upper Tolerance Limit (UTL) comparisons and additional statistical tests performed to compare site and background data, copper, silver, and uranium were identified as COPCs and are carried forward to the screening assessment. The data for these analytes are presented in Table 2.2.1-2.

2.2.2 Evaluation of Radionuclides

Fourteen soil samples collected at PRS 49-008(d) were analyzed for isotopic plutonium and isotopic uranium. These fourteen samples and an additional seventeen samples were also analyzed by gamma spectrometry.

Analyses of radionuclides by gamma spectrometry often leads to the reporting of concentrations for certain radionuclides that are inappropriate to evaluate as potential site contaminants. These include: short-lived activation/fission products, naturally occurring background radionuclides, and daughter radionuclides of naturally occurring radionuclides. These three classes of radionuclides are generally not considered site contaminants for the reasons discussed below.

- Five short-lived activation/fission products reported at PRS 49-008(d) (cesium-134, cobalt-57, manganese-54, ruthenium-106, and sodium-22) have half-lives ranging from a few days to 2.6 years. Several of these radionuclides are used as internal standards to measure equipment performance, laboratory background (or contamination), etc. Because activation/fission products with short half-lives are routinely reported for reasons not related to RFI investigations and are not expected

to occur at this PRS, these short-lived activation/fission products are eliminated as potential radionuclide contaminants.

- Potassium-40 is a naturally occurring radionuclide that is also routinely reported by the analyst because it is used as an internal standard to measure such things as equipment performance, analytical laboratory background (or contamination), etc. There is no process knowledge of the use of potassium-40 at this PRS, and reported concentrations are generally within known background ranges for potassium-40 (Longmire et al. 1995, 55115; Longmire et al. 1995, 52227), including the background range of TA-49 background data. Potassium-40 will not be considered a potential radionuclide contaminant at this site.

TABLE 2.2.1-2
INORGANICS WITH CONCENTRATIONS EXCEEDING BACKGROUND SCREENING VALUES AT PRS 49-008(d)

Location ID	Depth (ft)	Sample ID	Copper (mg/kg)	Silver (mg/kg)	Uranium (mg/kg)
UTL	N/A	N/A	15.5	n/a [b]	5.45
SAL	N/A	N/A	2800	380	230
49-9007	0-0.5	0549-95-0265	14.9	**0.44**	**49.6**
49-9007	0.5–1	0549-95-0266	NA	NA	**23**
49-9019	0-0.5	0549-95-0268	**22.9**	0.43(U)	**209**
49-9019	0.5-1	0549-95-0269	NA	NA	**42.9**
49-9019	0.5-1	0549-95-0270	NA	NA	**10.4**
49-9032	0-0.5	0549-95-0272	**19.1**	0.42(U)	**16.8**
49-9032	0.5-1	0549-95-0273	NA	NA	**13.7**
49-9035	0-0.5	0549-95-0274	8.8	0.43(U)	**18.1**
49-9036	0-0.5	0549-95-0276	NA	NA	**68.4**
49-9036	0.5-1	0549-95-0277	7.5	**0.49**	**8.6**
49-9096	0-0.5	0549-95-0013[a]	**114**	**3.8**	**2087**
49-9096	0.5-1	0549-95-0014	4.3	**0.85**	**67.9**

a = Value represents the maximum of a sample concentration and its laboratory duplicate.
b = For silver, the detection limit (0.43 mg/kg) is used as a background screening value.
N/A = Not applicable.
n/a = Not available.
NA = Not analyzed.

Cesium-137, plutonium-238, plutonium-239/240, uranium-234, uranium-235, and uranium-238 are the remaining radionuclides that were detected. Cesium-137 and plutonium-238 were eliminated from further consideration based on comparison to background screening values. Plutonium-239/240, uranium-234, uranium-235, and uranium-238 were detected above their respective background screening values. The data for each sample that has at least one detected concentration above background screening values for these radionuclides are presented in Table 2.2.2-1. Therefore, plutonium-239/240, uranium-234, uranium-235, and uranium-238 were identified as COPCs and are carried forward to the screening assessment.

TABLE 2.2.2-1
RADIONUCLIDES WITH CONCENTRATIONS EXCEEDING BACKGROUND SCREENING VALUES AT PRS 49-008(d)

Location ID	Depth (ft)	Sample ID	Plutonium-239/240 (pCi/g)	Uranium-234 (pCi/g)	Uranium-235 (pCi/g)	Uranium-238 (pCi/g)
UTL	**N/A**	**N/A**	**0.092[a]**	**1.94**	**0.084**	**1.82**
SAL	N/A	N/A	24	13	10	67
49-9096	0–0.5	0549-95-0013	**0.903**	56.5	12 [c]	685
49-9096	0.5–1	0549-95-0014[b]	0.016	**2.65**	**0.49[c]**	**22**
49-9007	0–0.5	0549-95-0265	0.077	**3.84**	**0.42[c]**	**18**
49-9007	0.5–1	0549-95-0266	0.05	1.88	**0.16[c]**	**7.71**
49-9019	0–0.5	0549-95-0268	0.064	14.9	**1.42[c]**	**66**
49-9019	0.5–1	0549-95-0269	0.015	**3.86**	**0.42[c]**	**14.7**
49-9019	0.5–1	0549-95-0270	0.013	1.8	**0.1[c]**	**4.73**
49-9032	0–0.5	0549-95-0272	**0.483**	1.61	**0.28[c]**	**6.5**
49-9032	0.5–1	0549-95-0273	**0.198**	1.31	**0.23[c]**	**3.36**
49-9035	0–0.5	0549-95-0274	**0.22**	1.51	**0.12[c]**	**6.7**
49-9035	0–0.5	0549-95-0275	0.079	1.34	**0.12[c]**	**2.76**
49-9036	0–0.5	0549-95-0276	**0.211**	**2.85**	**0.4[c]**	**22.7**
49-9036	0.5–1	0549-95-0277	0.012	1.32	**0.09[c]**	**3.23**

a = Value represents the maximum from the Environmental Surveillance reports.
b = Value represents the maximum of a sample concentration and its laboratory duplicate.
c = Uranium-235 was analyzed by alpha spectrometry and gamma spectrometry. The alpha spectrometry result is reported.
N/A = Not applicable.

2.2.3 Evaluation of Organics

Eight soil samples collected at PRS 49-008(d) were analyzed for SVOCs. Additional surface soil samples were subsequently collected at these same locations and analyzed for PCBs and pesticides. Five organics (alpha-BHC, alpha-chlordane, gamma-chlordane, benzo(b)fluoranthene, and bis(2-ethylhexyl)phthalate) were detected in these samples. No PCBs were positively reported in any sample at a concentration greater than EQL, confirming the absence of PCBs at the site. The data for each sample that had at least one detect of these organics are shown in Table 2.2.3-1. These five organics are carried forward to the screening assessment.

TABLE 2.2.3-1
ORGANICS WITH DETECTED CONCENTRATIONS AT PRS 49-008(d)

Location ID	Depth (ft)	Sample ID	Alpha-BHC (mg/kg)	Benzo(b) fluoranthene (mg/kg)	Bis(2-ethylhexyl) phthalate (mg/kg)	Gamma-Chlordane (mg/kg)	Alpha-Chlordane (mg/kg)
SAL	N/A	N/A	0.071	0.61	32	0.34a	0.34a
49-9095	0-0.5	0549-95-0015	**0.0012(J)**	66(U)	66(J)	**0.002(J)**	**0.003(J)**
49-9060	0-0.5	0549-95-0286	NA	0.39(U)	**0.067(J)**	NA	NA
49-9062	0-0.5	0549-95-0287	NA	0.35(U)	**0.064(J)**	NA	NA
49-9064	0-0.5	0549-95-0288	NA	0.42(U)	**0.051(J)**	NA	NA
49-9064	0-0.5	0549-95-0289	NA	**0.26(J)**	0.84(U)	NA	NA
49-9070	0-0.5	0549-95-0291	NA	0.36(U)	**0.051(J)**	NA	NA

N/A = Not applicable.
(U) = Not detected.
(J) = Estimated value.
NA = Not analyzed.
□ = Indicates organic detected but below SAL.

2.3 Human Health Screening Assessment

Uranium was reported in samples associated with Bottle House soils at levels that exceed SAL. The concentration of total uranium as well as the reported activities of U-234, U-235, and U-238 all exceeded their respective SAL at sample location 49-9096. Uranium-234 was also reported above SAL at location 49-9019. No analytical result exceeded SAL at any sample location associated with the Cable Pull Testing Facility, which includes locations 49-9060, 9062, 9064, 9066, 9069, and 9095. Noncarcinogens and radionuclides at PRS 49-008(d) that exceeded SAL are summarized in Tables 2.3-1 and 2.3-2.

TABLE 2.3-1
PRS 49-008(d) NONCARCINOGENS WITH CONCENTRATIONS IN SOIL THAT EXCEED SALs

Sample ID	Location ID	Depth (ft)	Uranium (mg/kg)
UTL	N/A	N/A	5.45
SAL	**N/A**	**N/A**	**230**
49-9096	0549-95-0013	0 - 0.5	2087[a]

N/A = Not applicable
a = Value represents the maximum of laboratory dulplicated analyses

TABLE 2.3-2
PRS 49-008(d) RADIONUCLIDES WITH ACTIVITIES IN SOIL THAT EXCEED SALs

Location ID	Sample ID	Depth (ft)	Uranium-234 (pCi/g)	Uranium-235[a] (pCi/g)	Uranium-238 (pCi/g)
UTL	N/A	N/A	1.94	0.084	1.82
SAL	**N/A**	**N/A**	**13**	**10**	**67**
49-9096	0549-95-0013	0–0.5	56.5	12	685
49-9019	0549-95-0268	0–0.5	14.9	**1.42**	**66**

a = Uranium-235 was analyzed by alpha and gamma spectroscopy. The alpha spectroscopy result is reported.
b = Value represents the maximum of laboratory duplicated analyses.
N/A = Not applicable

Two inorganic chemicals (copper and silver), five organic chemicals (alpha-BHC, benzo(b)fluoranthene, bis(2-ethylhexyl)phthalate, alpha-chlordane and gamma-chlordane), and one radionuclide were reported at concentrations or activities that are less than SAL but exceed background screening values. These chemicals were grouped by toxicological effects and submitted for multiple chemical evaluation (MCE) analysis. Copper and silver are associated with noncarcinogenic effects and result in a total normalized value of <0.1. The five organic chemicals are all associated with carcinogenic effects, and the total normalized value for this group of chemicals was also less than the threshold of 1.0 at 0.4. Plutonium 239/240 was the only radionuclide reported at an activity that was greater than background and less than SAL, and, therefore, no MCE was required. The results of the MCE are summarized in Table 2.3-3.

TABLE 2.3-3
MULTIPLE CHEMICAL EVALUATION FOR SOIL SAMPLES AT PRS 49-008(d)

Chemical	Location ID	Sample ID	Maximum Sample Value	Soil SAL	Normalized Value
Noncarcinogenic Effects (mg/kg)					
Copper	49-9096	0549-95-0013	114	2800	0.04
Silver	49-9096	0549-95-0013	3.8	380	0.01
				Total[b]	<0.1
Carcinogenic Effects of Chemicals (mg/kg)					
alpha-BHC	49-9095	0549-95-0015	0.0012(J)	0.071	0.003
Benzo(b) fluoranthene	49-9064	0549-95-0289	0.26(J)	0.61	0.43
Bis(2-ethylhexly) phthalate	49-9060	0549-95-0286	0.067(J)	32	0.002
gamma-chlordane	49-9095	0549-95-0015	0.002(J)	0.34	0.006
alpha-chlordane	49-9095	0549-95-0015	0.003(J)	0.34	0.008
				Total[b]	0.4

a. Total may not equal sum of normalized values due to rounding.

The results of the RFI and screening assessment of PRS 49-008(d) indicate the following:

- Total uranium and/or uranium isotopes are present in localized areas or "hot spots" associated with soils outside of the Bottle House. Reported concentrations at these hot spots exceed Laboratory residential exposure-based soil SAL by up to an order of magnitude;
- No other inorganic chemicals (excluding uranium) or organic chemicals were found to exceed SAL in any site sample. The MCEs for chemicals less than SAL indicate that these constituents present no unacceptable human health risk at the PRS. In particular, no unacceptable human health risk is associated with media investigated at the Cable Pull Test Facility, the stained soil area, or the soil inside the Bottle House, and no COPCs are identified from these areas.

The Cable Pull Test Facility, stained soil area, and Bottle House interior soils were investigated at a limited, reconnaissance level of investigation based on operational history

and professional judgment in the field. No substantial contamination was reported in any sample, and the investigation appears to have adequately sampled expected worst-case conditions. These areas clearly present no unacceptable human health risk, and no further investigation or action is appropriate for these areas.

The soils surrounding the Bottle House are operationally associated with radiological testing. The RFI Phase I investigation and field screening at the Bottle House confirm that a release did occur at the site. The field screening and analytical results indicate that "hot spots" are present in Bottle House soils, and the investigation, as executed, has been successful in bounding the extent of contamination at the site. Based on the nature and extent of contamination, the Bottle House soils generally fulfill the requirements for a VCA; as previously stated, the remainder of the site presents no unacceptable risk and should be considered for NFA.

2.4 Eco Risk Screening Assessment

An ecological risk evaluation was not performed because the Laboratory ER Project, in cooperation with the New Mexico Environment Department (NMED) and EPA Region 6, is developing an approach for ecological risk assessment. This site will be evaluated for ecological concerns when the ecological risk screening assessment methodology can be conducted for this ecological unit.

3.0 REMEDIAL ACTIVITIES AND RESULTS OF CONFIRMATORY SAMPLING

3.1 Risk Calculations and/or Cleanup Level Derivation

RESRAD default parameters and assumptions from the "Policy for the Derivation and Use of Radionuclide Soil Cleanup Guidelines," (LANL, 1996, 56465) were used to calculate the cleanup guidelines. Pathways selected for the RESRAD model included external gamma, inhalation (w/o radon), soil ingestion, and radon. The generic guidelines shown in Table 3.1-1 are based on target dose rates of 30 mrem/yr above background for the industrial scenario future use and 15 mrem/yr above background for the residential scenario. The actual calculated values were 732.2, 162.7, and 693.5 pCi/g of U-234, U-235, and U-238, respectively. When more than one radionuclide is present, the EM/ER policy guidelines (LANL 1996, 56465) require that the collective impact of the radionuclides be evaluated. This is similar to a MCE in that the final activities of the three uranium radionuclides in the remediated soils are divided by the RESRAD calculated values. The sum of these ratios is required to be less than unity. In order to assure this, the calculated values for the three radionuclides were divided by 3, and these are the cleanup values shown in Section 3.2. The generic soil cleanup guidelines represent the worst-case exposure conditions within the bounds of the exposure scenario, i.e., industrial future use with limited TA-49 site access and continuation of institutional controls over the foreseeable future.

3.2 Remedial Implementation

The Bottle House VCA was conducted on 20 and 21 May 1997. Support, exclusion, and waste storage zones were established at the site. Personnel entering the exclusion zone were dressed in Level C protective clothing (anti-C coveralls, gloves, booties, caps, and full-face air purifying respirators). The soil removal began at the center of the target area at location 49-9096. Workers using shovels and hoes began removing soil while radiation

control technicians continuously monitored the ground surface, Figure 3.2-1. ESP-1 hand-held beta/gamma radiation meters were used to guide the soil removal efforts. Measurements of greater than 1500 cpm on the hand-held meter indicated that additional soil removal was necessary. Soil was placed into 5 gal. buckets lined with polyethylene bags Figure 3.2-2. When full, the bags were sealed and then transferred from the buckets to 55 gal. drums located in the waste storage area. The soil removal proceeded outward from location 49-9096 approximately 4 to 5 ft. After the initial soil removal was complete, an approximate 2-ft by 2-ft grid with 25 grid points was set out (Figure 3.2-3.) When the soil with the highest contamination levels had been removed, the personal protection requirements were downgraded to Level D, and air purifying respirators were not used by the workers. Soil samples were collected from each grid point. Soil removal was halted for the day, and the collected samples were analyzed at TA-59 for gross beta radiation with a gas proportional counter. The target gross beta level prescribed in the VCA Plan (LANL 1997, 55896) was 400 pCi/g. The gross beta results (shown in Table 3.2-1) from this first round of soil removal indicated that the target goal had not been achieved at two of the grid points.

TABLE 3.1-1
CLEANUP GUIDELINES/GOALS FOR PRS 49-008(d)

NUCLIDE	RESIDENTIAL	INDUSTRIAL
U-234	30.8 pCi/g	244 pCi/g
U-235	6.5 pCi/g	54.2 pCi/g
U-238	32.2 pCi/g	231 pCi/g

On 21 May 1997, workers removed additional soil while Radiation Control Technicans (RCT) continued to screen the soil surface. Samples were collected at five of the grid points, and the samples were again analyzed for gross beta radiation. These results were all below 400 pCi/g. The maximum depth of soil removed was 9 to 12 in. at two to three locations, but the typical depth was 6 in. or less. The area of soil removal was approximately 70 ft^2. The VCA Plan identified a possible secondary soil removal target area around location 49-9019. Hand-held instrument screening measurements at this site were found to be below 1500 cpm. However, because there was available storage space in one of the 55 gal. waste disposal drums, a small amount of soil (less than 1 ft^3) was removed from around location 49-9019. Six 55 gal. drums of waste were generated from the cleanup activities.

3.3 Confirmatory Sampling

After the soil removal was completed, the two grid locations with the highest post-cleanup gross beta activities were selected for confirmation sampling. Two surface soil samples were collected at grid locations 7 and 23 and were assigned FIMAD location ids 49-9100 and 49-9101, respectively (Figure 3.3-1). The samples were submitted to the Sample

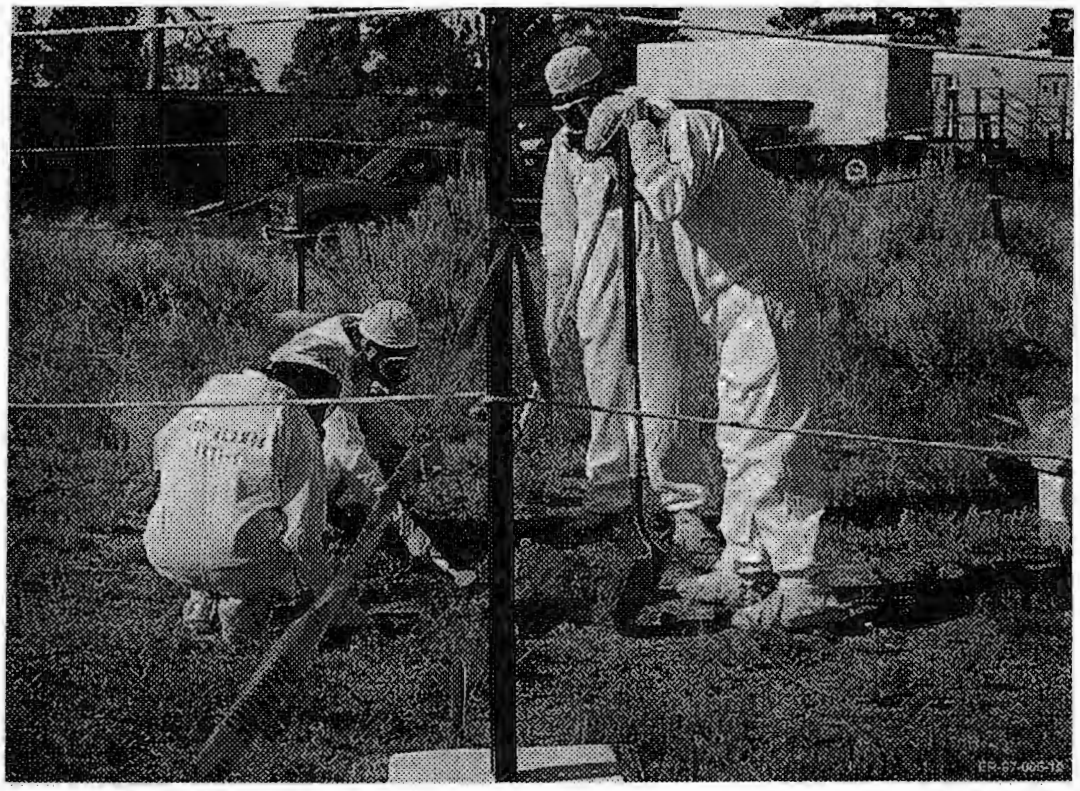

Figure 3.2-1. Radiation Monitoring with Hand-held Meters.

Management Office (SMO) and shipped to a contract analytical laboratory for isotopic uranium analysis. U-238 was the uranium isotope with the highest activity at the site. The confirmatory sample results for U-238 were 24.9 and 48.9 pCi/g, which were far below the U-238 industrial scenario preliminary remediation goal of 231 pCi/g. The cleanup goal was achieved, and NFA is recommended for PRS 49-008(d).

A NMED DOE Oversight Bureau representative also collected a confirmation soil sample from the soil removal area on 01 July 1997. The sample, collected between grid locations 13 and 18, was analyzed for gross alpha and gross beta radiation and for isotopic uranium. The results were 21.7 pCi/g gross alpha and 24.9 pCi/g gross beta. The isotopic uranium results were not available at the time of writing of this report due to a financial contractual issue with the analytical laboratory. However, the NMED gross alpha and beta results provide an additional indication that the site remediation goal was achieved.

Figure 3.2-2. Removal of contaminated soil to lined, 5-gallon containers.

Figure 3.2-3. Sample grid flags at soil removal area.

TABLE 3.2-1
VCA GROSS BETA RESULTS

20 May 1997				21 May 1997	
Flag ID	Gross beta pCi/g	Flag ID	Gross beta pCi/g	Flag ID	Gross beta pCi/g
1	24.1	14	13.9	4	126.3
2	195.7	15	21.7	9	157.4
3	140.5	16	94.4	21	33.2
4	349.2	17	184.9	23	302.7
5	85.5	18	144.7	49-9019	60.7
6	126.8	19	21	49-9100	249.1
7	266.5	20	85.7	49-9101	41.3
8	45.4	21	**562.7**		
9	**911.7**	22	157.6		
10	14.2	23	344.2		
11	34.6	24	33.3		
12	38.4	25	48		
13	118.6				

Indicates value above target gross beta level of 400 pCi/g.

4.0 WASTE MANAGEMENT

4.1 Deviations

Six 55 gal. drums of waste were generated. The waste consisted primarily of soil with a small amount of disposal PPE, plastic liners, and sampling wastes. The waste volume, approximately 40 ft^3, was less than the amount projected in the VCA Plan (50 - 100 ft^3).

4.2 Waste Characterization Data

Data from the RFI investigation were used for waste characterization purposes.

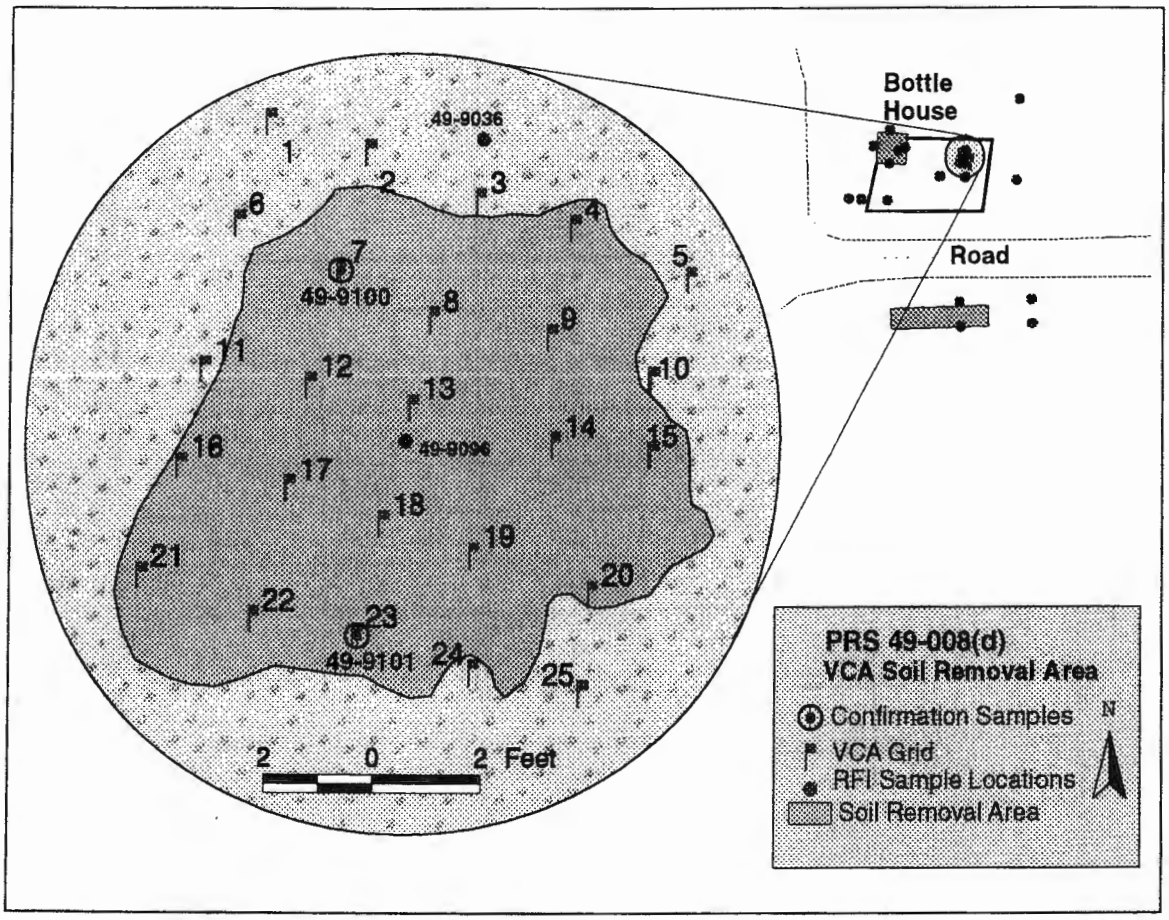

Figure 3.3-1. Grid and confirmation sample locations.

5.0 REFERENCES

Art, B. 1996. "TA-49 FIDLER Survey," Los Alamos National Laboratory memorandum ESH-19:96-0456, Los Alamos, New Mexico. (Art 1996, ER ID 55332)

Dorries, A. M. (Comp.), June 1,1996. "Risk-Based Corrective Action Process," Revision 1, Los Alamos National Laboratory report LA-UR-96-2811, Los Alamos, New Mexico. (Dorries 1996, ER ID 55575)

EPA (US Environmental Protection Agency), September 1, 1995. "Region IX Preliminary Remediation Goals (PRGs) Second Half 1995," San Francisco, California. (EPA 1995, ER ID Number 53970)

EPA (US Environmental Protection Agency), April 28, 19931992. "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, Third Edition, Final Update 1, Office of Solid Waste and Emergency Response, Washington, DC. (EPA 1992, ER ID Number 40070)

LANL (Los Alamos National Laboratory), April 1996. "Policy for the Derivation and Use of Radionuclide Soil Cleanup Guidelines," Los Alamos National Laboratory policy, EM/ER:PCT-096-013, Los Alamos, New Mexico. (LANL 1996, ER ID Number, 56465)

LANL (Los Alamos National Laboratory), May 1992. "RFI Work Plan for Operable Unit 1144," Los Alamos National Laboratory report LA-UR-92-900, Los Alamos, New Mexico (LANL 1992, ER ID 7670)

LANL (Los Alamos National Laboratory), May 1997. "Voluntary Corrective Action Plan for Potential Release Site at TA-49" Los Alamos National Laboratory report LA-UR-96-4596, Los Alamos, New Mexico (LANL 1996, ER ID 55896)

Longmire, P. A., D. E. Broxton, and S. L Reneau (Eds.), October 1995. "Natural Background Geochemistry and Statistical Analysis of Selected Soil Profiles, Sediments, and Bandelier Tuff, Los Alamos, New Mexico," Los Alamos National Laboratory Report LA-UR-95-3486, Los Alamos, New Mexico. (Longmire et al. 1995, 1266, ER ID Number 52227)

Longmire, P., S. Reneau, P. Watt, L. McFadden, J. Gardner, C. Duffy, and R. Ryti, January 1995. "Natural Background Geochemistry, Geomorphology, and Pedogenesis of Selected Soil Profiles and Bandelier Tuff, Los Alamos, New Mexico," (draft) Los Alamos National Laboratory Report LA-12913-MS, Los Alamos, New Mexico. (Longmire et al. 1995, 1142; ER ID Number 55115)

A RESULTS OF QUALITY ASSURANCE/QUALITY CONTROL ACTIVITIES

All samples and the chain of custody documentation were submitted to the SMO for off-site fixed analytical laboratory analyses.

EPA SW-846 methods (EPA 1992, 40070) were used to analyze samples for TAL metals; they included flame atomic absorption, method 7420; electrothermal vapor atomic absorption, method 7041; cold vaporization atomic absorption, method 7471; and inductively coupled plasma emission spectroscopy, method 6010. TAL metals include aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium, lead, mercury, nickel, selenium, silver, and thallium.

EPA SW-846 methods (EPA 1992, 40070) were used to analyze samples for SVOCs and PCBs. Methods included gas chromatography/mass spectroscopy, method 8270, for SVOCs and gas chromatography, method 8081, for PCBs.

Methods used to analyze samples for radionuclides were alpha spectrometry for isotopic uranium and plutonium, kinetic phosphorescence or delayed neutron activation for total uranium, and gamma spectrometry. The methods used for radiological analyses varied between the laboratories.

Data validation was performed on all data from the analytical laboratories. If data did not meet quality control standards, or nonstandard analysis methods were used, data were qualified according to the following subset of codes discussed in Chapter 3.

J	The associated numerical value is an estimated quantity.
J-	Associated numerical value is an estimated quantity biased low.
J+	The associated numerical value is an estimated quantity biased high.
R	The data are unusable (compound may or may not be present). Resampling and reanalysis is necessary for verification.
UJ	The material was analyzed for, but was not detected. The quantitation limit is an estimated quantity.

A.1 Inorganic Analyses

Fourteen soil samples were analyzed for TAL metals. Under request 870, all QC criteria associated with the analyses were met. All sample data are valid and usable.

A.2 Radiochemical Analyses

PRSs 49-002 and 49-005(a), Area 10. Thirty-one samples were analyzed for radionuclides.

Under request number 871, 31 samples were analyzed using gamma spectrometry, and 14 samples were analyzed for plutonium isotopes and total uranium. QC criteria associated with the three analyses were met. All sample data are valid and usable.

A.3 Organic Analyses

PRSs 49-002 and 49-005(a), Area 10. Eight samples were analyzed for SVOCs; one was analyzed for PCBs and pesticides.

Under request 869, eight soil samples were analyzed for SVOCs and one sample for PCBs. The extracts for samples 0549-95-0289 and 0549-95-0015 required additional dilution because of the presence of hydrocarbons in the samples. As a result, the reported value for benzo(b) fluoranthene in sample 0549-95-0289 is qualified as J. Sample 0549-95-0015 was collected from a highly oil-stained area on the dirt floor of the Bottle House. The presence of this hydrocarbon in the sample required the sample extract to be diluted. As a result, the reported values for alpha-BHC, alpha chlordane, and gamma chlordane for sample 0549-95-0015 are qualified as J. These three pesticide results are still well below the corresponding SALs and thus are still considered usable for site characterization purposes.

Under request 718, two soil samples were analyzed for SVOCs. QC criteria were met. All sample data are valid and usable.

B ANALYTICAL DATA

The RFI Characterization data are available in FIMAD and/or can be provided upon request.

C COST COMPARISON

Listed below are the estimated and actual costs of the Bottle House Voluntary Corrective Action. The estimated costs are from the FY 97 Baseline Budget, and the actual costs are from the Laboratory Website "Data Warehouse" at http://datawarehouse.lanl.gov. The higher costs for the VCA plan were due to labor costs required for permit development and approval. The higher costs for field work were due to a greater number of labor hours charged to the project than anticipated. The estimated cost ($4,296) for sample analysis includes the labor cost. The listed actual cost ($349) is for sample analysis, and the labor costs for sample collection are included in the field work line item. The actual costs are as of 15 September 1997, and it is anticipated that the final VCA report costs will be close to the estimated cost.

Estimated Costs:

VCA PLAN	21,097
FIELD WORK	28,151
SAMPLE ANALYSIS	4,296
VCA REPORT	25,926
TOTAL COST	79,470

Actual Costs (as of 9/15/97):

VCA PLAN	33,708
FIELD WORK	39,499
SAMPLE ANALYSIS	349
VCA REPORT	13,684
TOTAL COST	87,240

D

TABLE D-1
CONFIRMATORY SAMPLING RESULTS

Location ID	Depth (ft)	Sample ID	Uranium-234 (pCi/g)	Uranium-235 (pCi/g)	Uranium-238 (pCi/g)
UTL	–	-	1.94	0.084	1.82
PRG	–	-	244	54.2	231
49-9100	0–0.5	0549-97-0001	2.	0.407	24.9
49-9101	0–0.5	0549-97-0002	4.72	0.498	48.9

E CERTIFICATE OF COMPLETION

I certify that all the work pertaining to the VCA Bottle House Area 49-008(d) has been completed in accordance with the Department of Energy-(DOE-)approved VCA plan entitled VCA Plan for Potential Release Site 49-008(d), the Area 12 Bottle House. Based on my personal involvement or inquiry of the person or persons who managed this cleanup, a review of all data gathered and a visit to the site, to the best of my knowledge and belief, all criteria of the plan have been met or exceeded. I believe that the completion of this VCA is both protective to human health and the environment. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

Jonathan Krier

Field Unit 5 Field Project Leader
Environmental Restoration Project
Los Alamos National Laboratory

Oct 30, 1997

Date Signed