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Voluntary Corrective Action Report for Solid Waste Management Unit

0-030(a)

Field Unit 1

Environmental Restoration Project

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A Department of Energy Environmental Cleanup Program

Los Alamos
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1.0 INTRODUCTION

This report outlines the voluntary corrective action (VCA) activities at solid waste management unit (SWMU) 0-030(a). A VCA was proposed for this site in the Los Alamos National Laboratory (LANL) Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) Work Plan for Operable Unit (OU) 1071 (Fig. 1.0-1) (LANL 1992, 0781). This site is included in the Hazardous and Solid Waste Amendments (HSWA) Module of LANL's RCRA operating permit. No further action (NFA) is requested for SWMU 0-030(a) and this report will be included in the next permit modification application/request for regulator concurrence to remove SWMU 0-030(a) from the HSWA Module.

The VCA process is intended to address small-scale SWMUs when the following criteria are met: the nature and extent of chemicals of potential concern (COPCs) have been clearly defined, an obvious remedy may be implemented with a minimum of administrative requirements, implementation of cleanup can occur within six months, and cleanup costs are reasonable. Land-use assumptions must be straightforward and treatment, storage and disposal (TSD) facilities must be available for waste type and volume generated at the site. SWMU 0-030(a) meets the criteria specified above. Sites designated for VCA are typically cleaned up as part of normal facility housekeeping or as best management practices.

SWMU 0-030(a) lies within the former OU 1071 and consists of a single septic system and associated inlet and outlet piping. The septic system was installed during the early 1940s to handle sanitary wastes discharged by the DP Road storage area fuel dispatch office. The former DP Road storage area was used as a fuel tank farm (SWMU 0-027) from 1946 until mid-1948 when it was converted into a drum storage area. The drum storage area was utilized until the late-1950s to store metal 55-gal. drums containing lubricants until they were redistributed to various laboratory job sites and craft shops. It may have remained in service until the site was decommissioned in the late 1950s (Francis 1993, 005-0238). SWMU 0-030(a), shown in Fig. 1.0-2, lies entirely on private property owned by the Columbian Club which operates the Knights of Columbus Hall on the site. Adjacent properties to the east are owned by the Department of Energy (DOE) (south of DP Canyon) and private homeowners (north of DP Canyon). The property is bounded on the south by DP Road, and on the north and northwest by Trinity Drive.

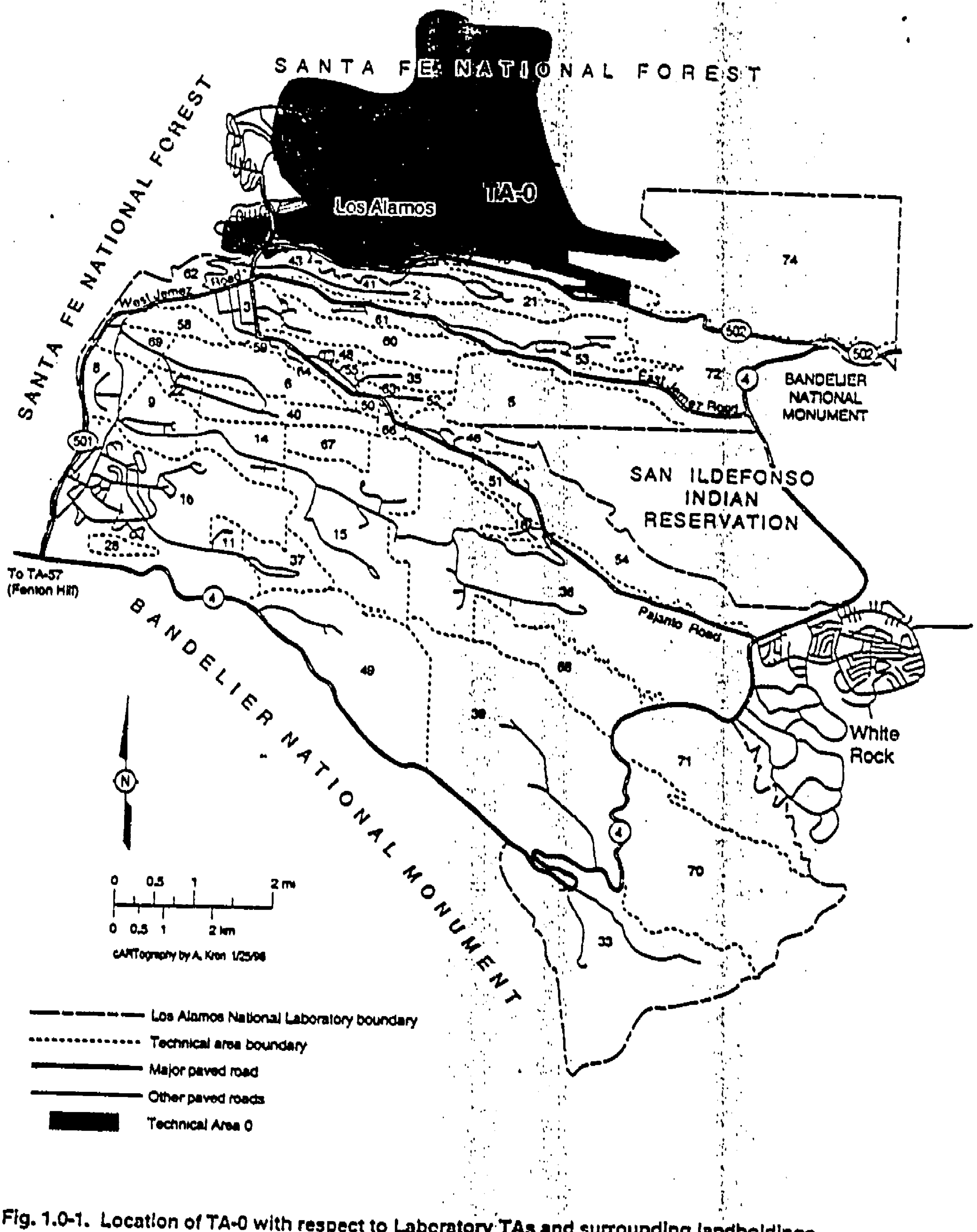

Fig. 1.0-1. Location of TA-0 with respect to Laboratory TAs and surrounding landholdings.

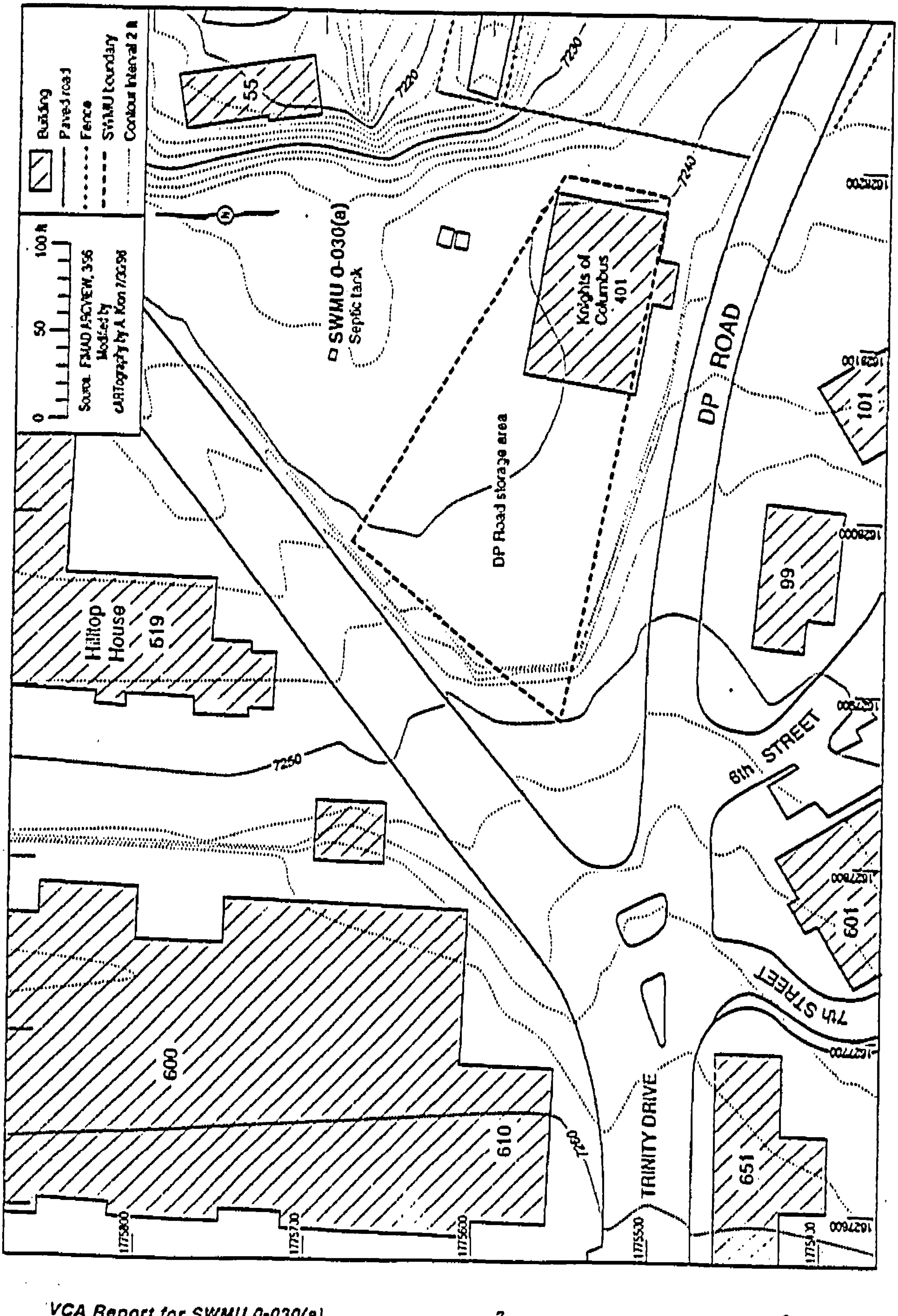

Fig. 1.0-2. Location of SWMU 0-030(a).

The potential for chemical or radiological contamination within this septic tank was believed to be very low. However, because the tank serviced a building involved with early Laboratory operations and due to the nature of operations at the former DP Road storage area, the possibility of contaminants being present was investigated. The COPCs identified in the RFI Work Plan for OU 1071 are volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), total petroleum hydrocarbons (TPH), target analyte list (TAL) metals, polychlorinated biphenyls (PCBs)/pesticides, uranium-234, uranium-236, plutonium-238, plutonium-239/240, americium-241, and tritium (LANL 1992, 0781).

VCA field activities were conducted for SWMU 0-030(a) during the spring and summer of 1996 as part of the LANL Environmental Restoration (ER) Project. Results of the investigation indicated COPCs remaining at SWMU 0-030(a) did not present a significant human or environmental health risk. The septic tank and associated drain lines were crushed and left in place as approved by the New Mexico Environmental Department (NMED) Waste Water Bureau.

2.0 SITE CHARACTERIZATION PRIOR TO REMOVAL

The SWMU 0-030(a) septic tank was investigated in order to determine if it presented a potential risk to human health and/or the environment. Fieldwork for pre-characterization and subsequent corrective action activities at SWMU 0-030(a) were completed in the following field tasks: field surveys, surface sampling, subsurface sampling, and corrective actions. Field surveys consisted of an initial site survey, a geophysical survey, a geodetic survey, and geomorphologic mapping. The field survey activities were nonintrusive.

2.1 Field Survey Activities

2.1.1 Geodetic Survey

A site geodetic survey was conducted between April 3, and April 4, 1996, in order to locate the positions of former structures that were in use when the DP Road SWMU 0-027 storage area was operational in the 1940s and 1950s. (SWMU 0-027 is scheduled for further RFI this fall.) Using available maps, aerial photographs, and engineering drawings, the surveyors identified the locations of several structures including the footprint of the dispatch office, the berms surrounding the drum storage areas, possible location of aboveground storage tanks, and a tentative location for SWMU 0-030(a) septic tank. A 50-ft x 50-ft grid aided in establishing locations of features found during the investigation.

When all excavation activity had been completed, the survey crew returned to the site to establish coordinates for the location of the septic tank.

2.1.2 Geophysical Survey

A geophysical survey was conducted to locate subsurface structures, including SWMU 0-030(a) septic tank. Geophysical techniques used included electromagnetic (EM) induction and magnetic methods. Geophysical data were acquired in April 1996. A man-portable a GEM-2™ EM instrument was used to obtain EM data. Two surveys provided magnetic data. The initial survey employed a Geometrics Model G-846™ proton-precession magnetometer. The second magnetic survey used a cesium-vapor magnetometer Model G-858. Field markings identifying interpreted structures were used to guide excavations.

2.1.3 Site-Characterization Sampling

2.1.3.1 Field Screening

During all excavation activities, excavated soils were monitored in the field using hand-held instruments for the presence of elevated radioactivity and organic compounds. Excavation was guided by the use of field screening with a Thermo Environmental Model 580B™ photoionization detector (PID) for VOCs, an Eberline ESP-1™ beta/gamma ratemeter with an HP-260™ probe, a Ludlum Model 2™ beta/gamma ratemeter with an HP-260™ probe, and a Ludlum 139™ alpha ratemeter with an air proportional probe.

No alpha, beta, or gamma radioactivity was detected at levels above background by the field screening. VOCs were detected in trench fill material and pipe material. Screening results are presented in Table 2.1.3-1.

TABLE 2.1.3-1

FIELD SCREENING RESULTS FOR SWMU 0-030(a) SEPTIC TANK

DATE	LOCATION	PID[a] RESULTS (ppm)[b]	ALPHA RESULTS (cpm)[c]	BETA/GAMMA RESULTS (cpm)
5/3/96	Trench A	0.0	NDA[d]	NDA
5/3/96	Trench B	1.5	NDA	NDA
5/3/96	Trench B	6.0	NDA	NDA
5/7/96	Trench B	23.0	NDA	NDA
5/7/96	Trench C	0.0	NDA	NDA
5/10/96	Trench E	0.0	NDA	NDA
5/10/96	Cast-iron pipe	1.1	NDA	NDA
5/14/96	Pipe	2.0	NA[e]	NA
5/14/96	Inside septic tank	0.0	NDA	NDA
5/14/96	Tank inlet	0.0	NDA	NDA
5/14/96	Tank outlet	0.0	NDA	NDA

[a] PID = Photoionization detector.
[b] ppm = Parts per million.
[c] cpm = Counts per minute.
[d] NDA = No detectable activity above background.
[e] NA = Not analyzed.

2.1.3.2 Subsurface Investigation

Exploratory excavation began in May 1996. A pipe-tracking instrument was used to follow subsurface metallic pipes uncovered during the excavation phase. The septic system was located by tracking a highly weathered steel conduit eastward from the foundation of the nearby dispatch office building.

Subsurface investigation activities, including the excavation, health and safety monitoring, sample collection, and the septic tank abandonment at SWMU 0-030(a), began May 3, 1996, and concluded June 18, 1996. Because of the lack of historical data and inconclusive results of the geophysical survey, several exploratory trenches were excavated in an effort to locate the tank or the tank inlet pipe. These trenches were designated Trench A through G, shown on Fig. 2.1.3-1.

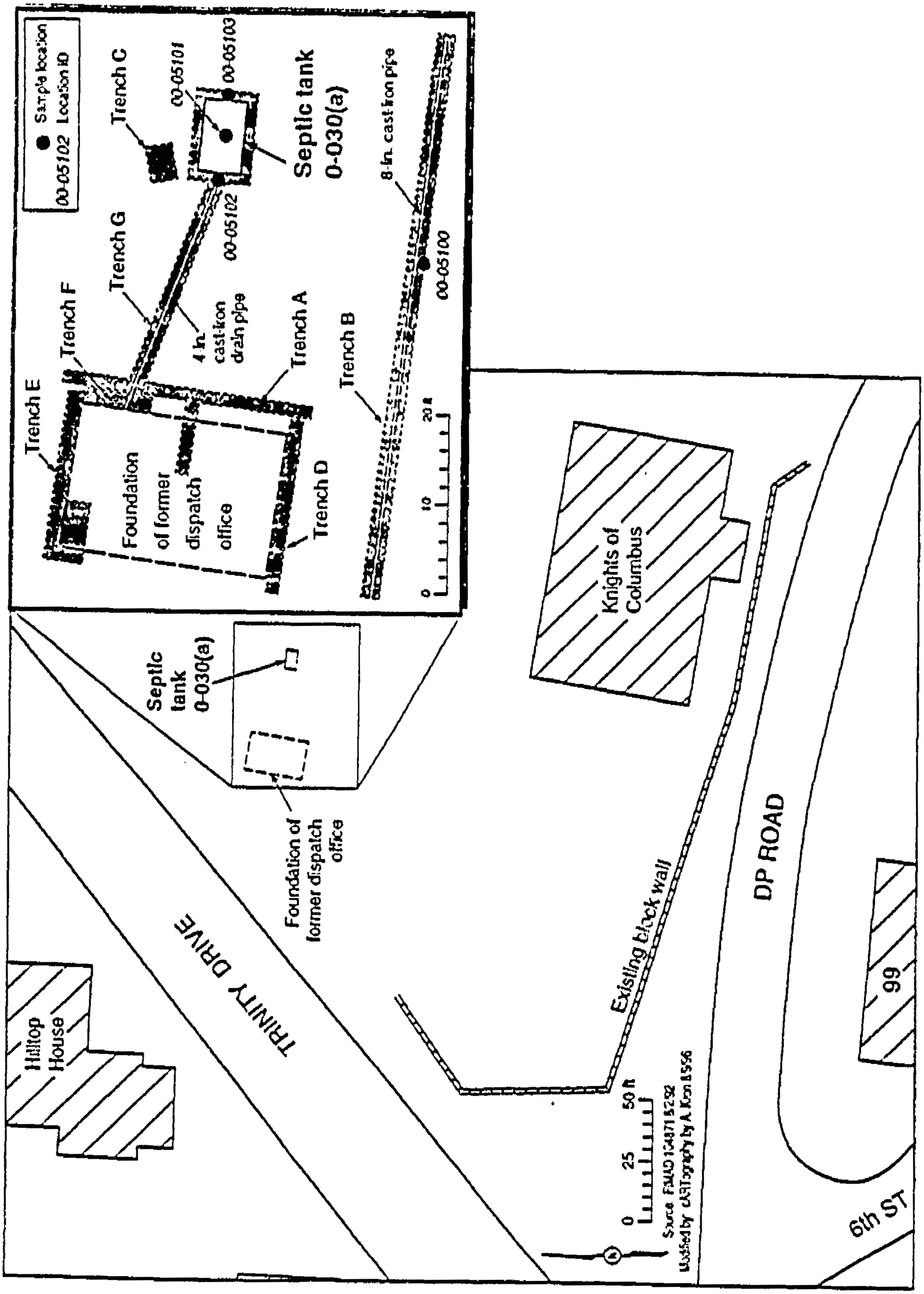

Fig. 2.1.3-1. Location of septic tank, exploratory trenches, and samples for SWMU 0-030(a).

Trench A was excavated and backfilled with the excavated material May 3, 1996. It was located approximately two feet east of, and parallel to, the surveyed location of the eastern wall of the dispatch office. This trench was intended to locate the cast-iron septic pipe exiting the building foundation and leading to the septic tank (available engineering plans indicated the septic system piping exited the building to the east). The trench was approximately 24 ft long, overlapping the identified ends of the dispatch office building, and 13 ft to 14 ft deep. Much of the excavated material consisted of construction fill (concrete, rebar, asphalt, soils, etc.) to a depth of 7.5 ft below ground surface where a 0.3-ft thick layer of asphalt, suspected to be an old roadbed, was located. Below the asphalt, soils extended to a depth of 9.5 ft below ground surface where tuff bedrock was encountered. The pipeline was not immediately located in Trench A. A westward extension of Trench A confirmed the location of the dispatch office building foundation. The foundation location corresponded well with the geodetic survey points that identified the foundation and with the EM and magnetic anomaly found during the geophysical survey of the property.

Trench B, located along an east-west trending magnetic anomaly identified during the geophysical survey, was excavated and backfilled on both May 3 and May 7, 1996. The trench was excavated in an east-to-west direction beginning approximately 15 ft east of the center of the anomaly. The portion of the trench excavated on May 3 was approximately 20 ft long and 13 ft to 14 ft deep. Materials encountered in the trench were very similar to those in Trench A. The asphalt roadbed was located at a depth of approximately eight feet below ground surface. A six-inch steel pipe was located just below the asphalt at a depth of nine feet below ground surface. Soils excavated from below the pipeline had a noticeable petroleum odor. A grab sample (sample identification number 0100-96-0627) of this material was collected and submitted for analysis of TPH and VOCs at the LANL mobile chemical analytical laboratory (MCAL).

Extensions of Trench B, excavated May 7, 1996, revealed no connection between the pipeline and the dispatch office building or a septic tank. The pipeline had been terminated approximately 20 ft east of the center of the magnetic anomaly. The trench was extended westward approximately 30 ft to a point directly south of the western wall of the dispatch office to confirm that there was no connection between the building and the pipeline. The pipeline appeared to continue westward. However, an effort to trace the pipeline using pipe tracking instrumentation was unsuccessful. The strong magnetic anomaly located during the initial geophysical survey was attributed to a large metal plate unearthed during excavation of the trench.

Trench C, excavated and backfilled May 7, 1996, was a pit located approximately 32 ft east of the former dispatch office location at a survey point for the septic tank based upon available engineering drawings. The excavated pit was approximately 14 ft long x 17 ft wide x 15 ft deep. Excavated material consisted of the same type of construction debris noted in earlier trenches. However, the asphalt roadbed extended only two feet to three feet into the pit from the west wall. The septic tank and associated piping were not found in Trench C. The pit was backfilled with excavated material.

May 9, 1996, Trench D was excavated along the southern edge of the dispatch office foundation and backfilled. May 10, 1996, Trench E was excavated along the northern edge of the dispatch office foundation and backfilled. Those trenches were excavated in an attempt to locate any pipelines exiting the building from these sides. Both of these trenches were approximately 16-ft long, which equals the length of the foundation on each of the north and south sides, and 11-ft deep. The trenches were excavated along the foundation edge so that it was scraped clean in each trench. The northwest corner of the foundation floor was uncovered and a floor drain and sink piping were observed. The locations of these features, as well as the foundation thickness and front step, matched the available engineering plans, suggesting the building and associated plumbing system were built in accordance with planned specifications.

Trench F, located along the eastern edge of the building foundation, was excavated and backfilled May 10, 1996. Trench F paralleled Trench A, and was approximately 10-ft long x 11-ft deep. A 4-in. cast-iron outlet pipe was found exiting the building below the bottom of the foundation at a depth of approximately 9 ft below ground surface. The extremely brittle pipe had apparently broken off during the excavation of Trench A and gone unnoticed by the backhoe operator and field personnel. After exposing a portion of the cast-iron pipe, site personnel inserted several lengths of flexible polyvinyl chloride (PVC) piping into the cast-iron pipe as a means of measuring its length and potential orientation. The iron pipe was found to end approximately 32 ft east of the building foundation and only a few feet south of the southernmost extent of Trench C.

Trench G was excavated May 14, 1996, and followed the cast-iron septic line from the dispatch office location eastward. SWMU 0-030(a), a septic tank, was located approximately 45 ft east of the dispatch office at a depth of 9 ft below ground surface. The tank was found to be intact and constructed in accordance with site engineering plans. The tank dimensions, based on the engineering plans, were 6.67-ft long x 3.67-ft wide x 5.5-ft deep. A covered manhole was found in the northwest corner of the tank. Because of the depth of the tank and the instability of soils surrounding the tank, sampling personnel were not allowed to enter the excavation. After using the backhoe to remove the manhole cover, site personnel were able to see into the interior of the tank and while sampling using a hand auger with 18 ft of extensions, were able to determine that the tank had not been backfilled and contained only three inches to four inches of dry sludge. Samples were collected from both the interior and exterior of the tank, as described in the following section. After collecting the samples, the trench excavation was backfilled May 14, 1996.

2.1.3.3 Sampling Activities

May 3, 1996, a grab sample was collected from the bottom of Trench B in gray, moist tuff. The sample had a heavy hydrocarbon odor and was submitted to the MCAL for TPH and VOC analysis.

TPH was detected at a concentration of 2 200 ppm. MCAL results also revealed the presence of 1,3,5-trimethylbenzene at a concentration of 0.39 ppm, 1,2,4-trimethylbenzene at a concentration of 0.58 ppm, and p-isopropylbenzene at a concentration of 3.6 ppm. No other VOCs were detected at concentrations greater than individual analytical detection limits. The source of the petroleum products and the extent of petroleum product contamination, will be addressed during the DP Road storage area RFI, which will be centered on the former aboveground tank locations and the drum storage facility.

May 14, 1996, the septic tank was located approximately 45 ft east of the former dispatch office. Because sampling personnel were not allowed to enter the excavation, hand auger extensions were used to collect the samples. Three soil samples were collected. One sample (0100-96-0601) was collected inside the tank and consisted of a dry, yellowish silt (dry sludge material) with 30% tuff and rock fragments. Two samples were collected from outside the tank (with the backhoe bucket) and consisted of a sandy soil with silt and tuff fragments (also contains iron chips from the cast-iron pipe and small pieces of asphalt). Sample 0100-96-0602 was collected underneath the inlet pipe and sample 0100-96-0603 was collected underneath the outlet pipe. The two samples from beneath the pipes were collected in accordance with LANL-ER-SOP-06.09, Spade and Scoop Method of Collection of Soil Samples (LANL, 0875). The inlet and outlet piping were removed during initial trench sampling operations.

A single sample was collected from within the septic tank (0100-96-0601) using a stainless steel hand auger. Sampling personnel used 18 ft of extensions to insert the auger into the open manhole in the northwest corner of the septic tank. Site personnel were only able to obtain a small volume of sample material because of the small amount of material in the tank bottom and the awkwardness involved with handling the long sampling string. Subsequent attempts to obtain additional sample material failed. Although there was an inadequate amount of material to fill the required sample containers, the fixed laboratory was able to analyze available sample material for all required analyses. Sample material obtained from the interior of the septic tank was collected in accordance with LANL-ER-SOP-06.10, Hand Auger and Thin-Wall Tube Sampler (LANL, 0875). Table 2.1.3-2 presents a summary of samples collected for investigation of SWMU 0-030(a). Figure 2.1.3-1 shows SWMU 0-030(a) sample locations.

The samples were submitted to the Sample Management Office (SMO) for fixed laboratory analysis of the following analytes: VOCs by Environmental Protection Agency (EPA) SW-846 method 8260, SVOCs by EPA SW-846 method 8270, TPH by modified EPA SW-846 method 8015, TAL metals (aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc) by EPA SW-846 method 6010 and mercury by EPA SW-846 method 7470), and PCBs/pesticides by EPA SW-846 method 8080. The samples were also analyzed by toxicity characteristic leaching procedure (TCLP) for TCLP metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver) for waste characterization. Fixed lab analyses of radiological constituents included total uranium (uranium-234 and uranium-236) by inductively coupled plasma/mass spectroscopy (ICP/MS), plutonium (plutonium-238 and plutonium-239/240) by alpha spectroscopy, and americium-241 by gamma spectroscopy.

2.1.3.4 VCA Plan Deviations

Field operations during the SWMU 0-030(a) VCA deviated from the VCA plan because of difficulties in accessing the tank. Although it was anticipated that the tank would be difficult to locate, the amount of trenching required to locate the tank was unexpected. The geophysical survey failed to identify the tank location. The investigation of some geophysical anomalies added to the amount of trenching required.

TABLE 2.1.3-2

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

SAMPLE INFORMATION				ANALYTICAL SUITE AND REQUEST NUMBER							
LOCATION ID	SAMPLE ID	DEPTH	MATRIX	VOCs[a]	SVOCs[b]	PESTI-CIDES	PCBs[c]	TPH[d]	TAL[e] METALS	TCLP[f] METALS	RAD[g]
00-05100	0100-96-0627	11 ft	Soil	2056[h]	NA[i]	NA	NA	2056	NA	NA	NA
00-05101	0100-96-0601	0-4 in	Soil	2097	2097	2097	2097	NA	2098	2098	2099
00-05102	0100-96-0602	20-28 in	Soil	2097	2097	2097	2097	NA	2098	2098	2099
00-05103	0100-96-0603	18-26 in	Soil	2097	2097	2097	2097	NA	2098	2098	2099

[a] VOCs = Volatile organic compounds.
[b] SVOCs = Semivolatile organic compounds.
[c] PCBs = Polychlorinated biphenyls.
[d] TPH = Total petroleum hydrocarbons.
[e] TAL = Target analyte list. TAL metals include aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, mercury, magnesium, manganese, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc.
[f] TCLP = Toxicity characteristic leaching procedure. Metals analyzed using the TCLP include arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver.
[g] RAD = Radiological analyses.
[h] Request number.
[i] NA = Not analyzed.

Once the tank was located, the inability to access the tank directly led to deviations in the sampling plan. As noted above in Section 2.1.3.3, the septic tank was located approximately nine feet below ground surface, making direct access to the tank impossible. The tank also contained very little material available for sampling. Therefore, the number of samples collected and submitted for laboratory analysis was reduced from the anticipated eight samples to three samples. Because odors were detected within the trench one sample from Trench B was submitted to the LANL MCAL for rapid-turnaround analysis of VOCs and TPH.

2.2 Screening and Assessment

The purpose of this section is to assess potential human health effects resulting from exposure to residual contamination in the dried sludge contained in the septic tank of SWMU 0-030(a). Following the methodology in *Risk-Based Corrective Action Process*, screening assessment and qualitative risk assessment were performed on the site-characterization data for this SWMU (ER Project Decision Support Council 1995, 1271). Only data from samples sent to a fixed laboratory were included in this screening and assessment. MCAL results were discussed in the previous section.

2.2.1 Site Characterization Background Comparisons

Data for inorganics and radionuclides at SWMU 0-030(a) were compared with background screening values. The results of the background comparisons are discussed below.

2.2.1.1 Inorganics

Seven inorganics (arsenic, calcium, copper, lead, mercury, vanadium, and zinc) were detected at concentrations exceeding their background screening values. Detected concentrations of these inorganics are shown in Table 2.2.1-1. All inorganic metals concentrations exceeding background screening values were detected in the single soil sample (0100-96-0601) collected from within the septic tank.

TABLE 2.2.1-1

INORGANICS WITH CONCENTRATIONS EXCEEDING BACKGROUND SCREENING VALUES AT SWMU 0-030(a)

LOCATION ID	SAMPLE ID	ARSENIC (mg/kg)	CALCIUM (mg/kg)	COPPER (mg/kg)	LEAD (mg/kg)	MERCURY (mg/kg)	VANADIUM (mg/kg)	ZINC (mg/kg)
UTL[a]	n/a[b]	7.82	6 120	15.5	23.3	0.1	41.9	50.8
SAL[c]	n/a	N/A[d]	N/A	2 800	400	23	540	23 000
00-05101	0100-96-0601	**15.3**[e]	**6 410**	**23.9(J)**[f]	**43.3**	**0.33(J)**	**49.5(J)**	**480**
00-05102	0100-96-0602	2.2	3 590	6.4(J)	14.4	0.02(UJ)[g]	22(J)	34.8
00-05103	0100-96-0603	2.3	2 310	4.7(J)	20	0.02(UJ)	14.5(J)	26.8

[a] UTL = Background screening value.
[b] n/a = Not applicable.
[c] SAL = Screening action level.
[d] N/A = Not available.
[e] Bold values represent those values greater than UTL.
[f] J = Estimated quantity.
[g] UJ = Undetected estimated quantity.

2.2.1.2 Radionuclides

Four radionuclides, and tritium were detected at SWMU 0-030(a). Plutonium-239/240, uranium-234, uranium-238 were detected at concentrations exceeding background screening values. Tritium was also detected; however, tritium has no background screening value with which it may be compared. These radionuclides are presented in Table 2.2.1-2.

TABLE 2.2.1-2

RADIONUCLIDES WITH DETECTED CONCENTRATIONS AT SWMU 0-030(a)

LOCATION ID	SAMPLE ID	TRITIUM (pCi/g)	PLUTONIUM-239/240 (pCi/g)	URANIUM-234 (pCi/g)	URANIUM-238 (pCi/g)
UTL[a]	n/a[b]	N/A[c]	0.0195	1.94	1.82
SAL[d]	n/a	260	24	13	67
00-05101	0100-96-0601	0.15	(U)[e]	**3**[f]	**2.8**
00-05102	0100-96-0602	0.08	(U)	0.99	1
00-05103	0100-96-0603	0.11	**0.445**	1.3	1.3

[a] UTL = Background screening value.
[b] n/a = Not applicable.
[c] N/A = Not available.
[c] SAL = Screening action level.
[e] U = Undetected.
[f] Bold values represent those values greater than UTL.

2.2.2 Evaluation Of Organics

Twenty-three specific organic analytes and other unspecified TPHs were detected at SWMU 0-030(a) at concentrations greater than their estimated quantitation level (EQL) in at least one sample. Concentrations of these organic chemicals are shown in Table 2.2.2-1.

TABLE 2.2.2-1

CONCENTRATIONS OF ORGANIC CHEMICALS DETECTED AT SWMU 0-030(a)

LOCATION ID	SAMPLE ID	ACENAPHTHENE (mg/kg)	ANTHRACENE (mg/kg)	AROCLOR-1254™ (mg/kg)	AROCLOR-1260™ (mg/kg)	BENZO(a) ANTHRACENE (mg/kg)	BENZO(b) FLUORANTHENE (mg/kg)
SAL[a]	n/a[b]	360	19	1	1	0.61	0.61
00-05101	0100-96-0601	0.737(U)[c]	0.737(U)	0.52	0.56	0.143(J)[d]	0.334(J)
00-05102	0100-96-0602	0.046(J)	0.071(J)	0.21	0.034(U)	0.078(J)	0.249(J)
00-05103	0100-96-0603	0.379(U)	0.379(U)	0.036(U)	0.036(U)	0.064(J)	0.084(J)

LOCATION ID	SAMPLE ID	BENZO(a) PYRENE (mg/kg)	BENZO(g,h,i) PERYLENE (mg/kg)	BIS (2-ETHYLHEXYL) PHTHALATE (mg/kg)	BUTYL BENZYL PHTHALATE (mg/kg)	4-CHLOROPHENYL PHENYL ETHER (mg/kg)	CHRYSENE (mg/kg)
SAL	n/a	0.061	N/A[e]	32	13 000	N/A	24
00-05101	0100-96-0601	0.195(J)	0.223(J)	0.128(J)	0.737(U)	0.737(U)	0.21(J)
00-05102	0100-96-0602	0.166(J)	0.143(J)	0.138(J)	0.077(J)	0.046(J)	0.159(J)
00-05103	0100-96-0603	0.054(J)	0.379(U)	0.056(J)	0.379(U)	0.379(U)	0.058(J)

LOCATION ID	SAMPLE ID	DDD[f] (mg/kg)	DDE[g] (mg/kg)	DDT[h] (mg/kg)	DIBENZO(a,h) ANTHRACENE (mg/kg)	DI-N-BUTYL PHTHALATE (mg/kg)	DIMETHYL PHTHALATE (mg/kg)
SAL	n/a	1.9	1.3	1.3	0.061	6 500	100 000
00-05101	0100-96-0601	0.0036(U)	0.0036(U)	0.0036(U)	0.737(U)	0.14(J)	0.737(U)
00-05102	0100-96-0602	0.0034(U)	0.0076	0.0034(U)	0.092(J)	0.043(J)	0.064(J)
00-05103	0100-96-0603	0.0017(J)	0.0018(J)	0.0064	0.379(U)	0.052(J)	0.379(U)

LOCATION ID	SAMPLE ID	FLUORANTHENE (mg/kg)	INDENO(1,2,3-cd) PYRENE (mg/kg)	PHENANTHRENE (mg/kg)	PYRENE (mg/kg)	TOLUENE (mg/kg)	TPH[i] (mg/kg)
SAL	n/a	2 600	0.61	N/A	2 000	1 900	N/A
00-05101	0100-96-0601	0.265(J)	0.194(J)	0.182(J)	0.263(J)	0.001(J)	90
00-05102	0100-96-0602	0.219(J)	0.063(J)	0.076(J)	0.123(J)	0.005(U)	34
00-05103	0100-96-0603	0.139(J)	0.379(U)	0.116(J)	0.103(J)	0.006(U)	16

[a] SAL = Screening action level.
[b] n/a = Not applicable.
[c] U = Undetected quantity.
[d] J = Estimated quantity.
[e] N/A = Not available.
[f] DDD = Dichlorodiphenyldicloroethane.
[g] DDE = Dichlorodiphenyldicloroethylene.
[h] DDT = Dichlorodiphenyltricloroethane.
[i] TPH = Total petroleum hydrocarbons.

2.3 Human Health Screening Assessment

2.3.1 Screening Assessment

COPCs detected at concentrations greater than background screening values or EQLs and all detected chemicals with no background data for comparison, were carried forward from the background comparison and organic chemical evaluation through the screening assessment process. These include 7 inorganic chemicals, 23 specific organic analytes and unspecified TPHs, and 4 radionuclides. The COPCs carried forward were then compared with their respective screening action levels (SALs). SALs are medium- and chemical-specific concentrations that are calculated using chemical-specific toxicity information and conservative default exposure assumptions. All COPCs carried forward through the screening assessment process, were placed in one of three categories: no SAL, greater than SAL, and less than SAL.

2.3.1.1 No SAL

Six chemicals (arsenic, calcium, benzo(g,h,i)perylene, 4-chlorophenylphenyl ether, phenanthrene, and TPH) have no SAL for comparison. Detected concentrations of these chemicals are shown in Tables 2.2.1-1 (inorganics) and 2.2.2-1 (organics). Arsenic is evaluated in Section 2.3.2 of this report.

Of the six chemicals that have no SAL, all except arsenic can be eliminated as a COPC based on the following reasons.

Calcium is an essential nutrient. The recommended daily allowance (RDA) is 800 mg/day for a child and 1 200 mg/day for an adult. The greatest calcium concentration detected at SWMU 0-030(a) was 6 410 mg/kg. At an EPA-estimated child soil ingestion rate of 200 mg/day, the amount of calcium ingested by a child at SWMU 0-030(a) per day would be 1.3 mg. At an EPA-estimated adult soil ingestion rate of 100 mg/day, the amount of calcium ingested by an adult at SWMU 0-030(a) per day would be 0.6 mg (EPA 1989, 0305). Because both amounts are considerably less than the RDAs for adult and child, calcium is eliminated as a COPC.

Benzo(g,h,i)perylene and phenanthrene are polyaromatic hydrocarbons (PAHs) that were detected at very low concentrations. Benzo(g,h,i)perylene is not a known or suspected human carcinogen (EPA carcinogen class D). Pyrene is structurally similar to phenanthrene; therefore, pyrene may be considered a toxicity surrogate for phenanthrene. Phenanthrene, like pyrene, is not suspected to be a carcinogen. In general, the noncarcinogenic PAHs have significantly higher SAL values than the carcinogenic PAHs. Benzo(g,h,i)perylene and phenanthrene are not likely to be more toxic than other detected PAHs that do have toxicity values (concentrations for which SALs have been determined). It is unlikely that the presence of benzo(g,h,i)perylene at concentrations below 1 mg/kg is a human health concern at this SWMU. Phenanthrene was detected at a maximum concentration of 0.182 mg/kg, well below pyrene's SAL of 2 000 mg/kg. On the basis of pyrene as a toxicity surrogate, phenanthrene is judged to present no human health risk at this SWMU. Because benzo(g,h,i)perylene and phenanthrene are not likely to present a human health risk, they are not evaluated further. It should also be noted that asphalt from an old roadbed was present above the septic tank. This asphalt is the most likely source of PAHs in the area.

Although TPH as a category of organic chemicals has no general SAL, a TPH component, n-hexane, does have a SAL of 290 mg/kg. N-hexane is the most toxic of the hydrocarbons commonly included in TPH analyses, and the only TPH component that has a SAL. The highest detected concentration of TPH in the SWMU 0-030(a) samples is 90 mg/kg, which is well below the n-hexane SAL. Therefore, TPH will not be evaluated further.

No toxicity data for 4-chlorophenyl phenyl ether exists in Integrated Risk Information System (IRIS), Health Effects Assessment Summary Tables (HEAST), Registry of Toxic Effects of Chemical Substances (RTECS), or in the National Library of Medicine's Hazardous Substance Data Bank (HSDB). The HSDB states that a specific review on the clinical effects and treatment of individuals exposed to the agent has not yet been prepared. However, the EPA's Office of Water Regulations and Standards lists a chronic ambient water quality criteria (AWQC) of 122 mg/L for haloethers, a class of chemicals that includes 4-chlorophenyl phenyl ether. As the haloethers are nondifferentiated and are treated as a class, the AWQC suggests similar toxicity for all chemicals included in the class. One of these chemicals, bis(2-chloroisopropyl)ether has a soil SAL of 3.9 mg/kg. If this soil SAL can be used as a proxy SAL to represent 4-chlorophenyl phenyl ether, adverse human health effects from the only detected concentration (0.046 mg/kg) of this chemical are not expected. Therefore, 4-chlorophenyl phenyl ether is eliminated as a COPC.

2.3.1.2 Greater than SAL

Two organic chemicals, benzo(a)pyrene and dibenzo(a,h)anthracene were detected at concentrations exceeding their respective SALs. Concentrations of these chemicals are shown in Table 2.3.1-1. No inorganic metals or radionuclides were detected at concentrations greater than SALs.

TABLE 2.3.1-1

CONCENTRATIONS IN SOIL THAT EXCEED SALs

LOCATION ID	SAMPLE ID	BENZO[a] PYRENE (mg/kg)	DIBENZO[a,h] ANTHRACENE (mg/kg)
SAL[a]	n/a[b]	0.061	0.061
00-05101	0100-96-0601	**0.195(J)[c,d]**	0.737(U)[e]
00-05102	0100-96-0602	**0.166(J)**	**0.092(J)**
00-05103	0100-96-0603	0.054(J)	0.379(U)[e]

[a] SAL = Screening action level.
[b] n/a = Not applicable.
[c] J = Estimated quantity.
[d] Bold presents concentration greater than SAL.
[e] U = Undetected quantity at estimated quantitation limit (EQL).

Benzo[a]pyrene and dibenzo[a,h]anthracene are retained as COPCs pending further evaluation.

2.3.1.3 Less than SAL

The 27 remaining chemicals were detected at concentrations below their respective SALs. As described in *Risk-Based Corrective Action Process* (ER Project Decision Support Council 1995, 1271), analytes are divided into three classes (carcinogens, noncarcinogens, and radionuclides) to evaluate possible additive effects for each class of chemicals. This evaluation is a multiple chemical evaluation (MCE). The MCE for SWMU 0-030(a) is presented in Table 2.3.2-4. Any chemical contributing more than 0.1 to a normalized sum greater than one will be retained as a COPC pending further evaluation.

The normalized sums for noncarcinogens (0.2) and radionuclides (0.3) are both less than unity, indicating that the potential for adverse human health effects from exposure is unlikely. Therefore, all noncarcinogens and radionuclides are eliminated as COPCs. However, at 2.2, the normalized sum for carcinogens is greater than one. The five chemicals that contribute more than 0.1 to the normalized sum [Aroclor-1254™, Aroclor-1260™, benzo(a)anthracene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene] are retained as COPCs pending further evaluation.

TABLE 2.3.2-4

MULTIPLE CHEMICAL EVALUATION (MCE) FOR SWMU 0-030(a)

	MAXIMUM CONCENTRATION	SAL[a]	NORMALIZED VALUE
CARCINOGENS			
UNITS	(mg/kg)	(mg/kg)	n/a[b]
Aroclor-1254™	0.52	1	0.52
Aroclor-1260™	0.56	1	0.56
Benzo[a]anthracene	0.143(J)	0.61	0.2
Benzo[b]fluoranthene	0.334(J)	0.61	0.55
Bis(2-ethylhexyl)phthalate	0.138(J)	32	0.004
Chrysene	0.21(J)	24	0.009
DDD[c]	0.0017(J)[d]	1.9	0.0009
DDE[e]	0.0076	1.3	0.006
DDT[f]	0.0064	1.3	0.005
Indeno[1,2,3-cd]pyrene	0.194(J)	0.61	0.32
		NORMALIZED SUM	2.2
NONCARCINOGENS			
UNITS	(mg/kg)	(mg/kg)	n/a
Acenaphthene	0.046(J)	360	0.0001
Anthracene	0.071(J)	19	0.004
Butyl benzyl phthalate	0.077(J)	13 000	5.0×10^{-6}
Dimethylphthalate	0.064(J)	100 000	6.0×10^{-7}
Di-n-butyl phthalate	0.14(J)	6 500	0.00002
Fluoranthene	0.265(J)	2 600	0.0001
Pyrene	0.263(J)	2 000	0.0001
Toluene	0.001(J)	1 900	5.0×10^{-7}
Copper	23.9	2 800	0.009
Mercury	0.33	23	0.01
Lead	43.3	400	0.1
Vanadium	49.5	540	0.09
Zinc	480	23 000	0.02
		NORMALIZED SUM	0.2
RADIONUCLIDES			
UNITS	(pCi/g)	(pCi/g)	n/a
Plutonium-239/240	0.445	24	0.02
Tritium	0.149	260	0.0006
Uranium-234	3	13	0.2
Uranium-238	2.8	67	0.04
		NORMALIZED SUM	0.3

[a] SAL = Screening action level.
[b] n/a = Not applicable.
[c] DDD = Dichlorodiphenyldichloroethane.
[d] J = Estimated quantity.
[e] DDE = Dichlorodiphenyldichloroethane.
[f] DDT = Dichlorodiphenyldichloroethane.

2.3.2 Human Health Risk Assessment

The results of the background and screening assessments on the Phase I data show that benzo(a)pyrene and dibenzo(a,h)anthracene were present at concentrations exceeding SAL and are present most likely due to the asphalt layer (an old roadbed) above the septic tank. In addition, three other carcinogenic PAHs [benzo(a)anthracene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene], and Aroclor-1254™ and Aroclor-1260™ contributed to an MCE value that exceeds one. Arsenic, which has no SAL, was detected within the septic tank at a concentration (15.3 mg/kg) that exceeds its background screening value (7.82 mg/kg).

Human health risk was evaluated for acute and chronic exposures to COPCs. Historical use of the site has been industrial/commercial. The building currently located at the site, the Knights of Columbus Hall, hosts the general public. Although future land use of the site has not been determined, a residential risk scenario has been used because it is the most conservative of the human risk scenarios. An individual may be exposed either chronically to COPCs or an individual may experience a single acute exposure. Both possibilities are assessed. Chronic effects were evaluated based on the SALs comparisons where the SAL for a chemical is based on an excess cancer risk of one in a million for chronic exposure and the SAL for noncarcinogens is based on a hazard of one (a level below which adverse health effects are not expected to occur). Acute effects were evaluated for pica, a single abnormal soil ingestion incident by a child.

For an individual to be exposed to contaminated material an exposure pathway must exist. Because the source is beneath nine feet of fill material, no exposure pathway exists under current conditions. Although several chemicals are present in the dried sludge at apparently unacceptable levels (as demonstrated by the SALs comparisons) for chronic exposures, the small volume of the dried sludge (0.3 yd^3) makes it highly unlikely that adverse human health effects could result from this source. If future construction activities were to release the dried sludge from the septic tank, the small volume of sludge would comprise only a small fraction of a residential exposure unit, such that no adverse health effects would be expected. Because the source is beneath nine feet of fill material, no exposure pathway exists under current conditions, and because the volume of dried sludge is relatively small, chronic exposure is not possible. Closure in place is recommended for SWMU 0-030(a).

To evaluate the human health risk of an acute exposure incident, arsenic has been chosen for the assessment because arsenic is present at concentrations that make it the most acutely toxic of the chemicals detected at SWMU 0-030(a). Acute exposure to a child exhibiting pica, abnormal soil ingestion behavior, was evaluated assuming 10 grams of soil ingested during a pica incident (the amount of soil ingested during pica incidents has not been measured, but 5 and 10 grams per incident are suggested as reasonable estimates by EPA and USDA', respectively (EPA 1989, 0304). The acute hazard for an arsenic pica incident is estimated as follows (EPA 1989, 0305).

Noncancer Hazard Quotient = E/RfD

where:

E = exposure level (or intake);

RfD = reference dose; and

E and RfD are expressed in the same units and represent the same exposure period.

At SWMU 0-030(a), ingestion of 10 grams of dried sludge results in an intake of 0.01 mg arsenic/kg body weight for a 16 kg child. This is below the "lowest observed adverse effect level" (LOAEL) (1 mg/kg/day) reported for humans in a one-week study (there were no "no observed adverse effect levels" (NOAELs) or LOAELs were reported for a one-time exposure), and below the lowest reported lethal dose (2 mg/kg/day for one week) for humans (Life Systems, Inc., 1993, 1334). The estimated noncancer hazard quotient at this LOAEL is 0.01. If an uncertainty factor of 10 is employed to extrapolate from a LOAEL to a NOAEL (the standard uncertainty employed for this extrapolation) the hazard quotient for arsenic becomes 0.1, which is below the level where adverse human health effects would be expected (Miller 1994, 1169). Arsenic concentrations at SWMU 0-030(a) contribute six times more to a hazard index than the next highest contributor (Aroclor-1254™), and several orders of magnitude higher than hazard quotient contributions of all other detected chemicals. Because the most potentially toxic chemical detected at the site (arsenic) poses no adverse human health risk, adverse acute health effects are not expected from a single exposure to the dried sludge.

The increased cancer risk associated with a single pica ingestion incident is estimated as follows:

Risk = CDI x SF

where:

CDI = chronic daily intake averaged over 70 years (mg/kg-day); and

SF = slope factor, in $(mg/kg\text{-}day)^{-1}$.

Estimated excess cancer risk from a single pica ingestion incident of dried sludge at SWMU 0-030(a) is presented in Table 2.3.2-1. The CDI assumes a pica ingestion of 10 grams by a 16 kg child. The excess cancer risk associated with a single ingestion incident is 8.1×10^{-7}. This is below the risk range (10^{-4} to 10^{-6} or one in 10 000 to one in one million) generally considered acceptable (EPA 1989, 0305). Therefore, unacceptable cancer risks are not expected if a pica soil ingesting child were to ingest dried sludge from SWMU 0-030(a).

TABLE 2.3.2-1

ESTIMATED EXCESS CANCER RISK FROM SINGLE PICA INGESTION INCIDENT AT SWMU 0-030(a)

	ORAL SF[a]	MAXIMUM DETECTION (mg/kg)	CDI[b] (mg/kg-day)	EXCESS CANCER RISK
Aroclor-1254™	7.7	0.52	1.272×10^{-8}	9.8×10^{-8}
Aroclor-1260™	7.7	0.56	1.37×10^{-8}	1.1×10^{-7}
Arsenic	1.5	15.3	3.743×10^{-7}	5.6×10^{-7}
Benzo(a)anthracene	0.73	0.143	3.498×10^{-9}	2.6×10^{-9}
Benzo(b)fluoranthene	0.73	0.334	8.17×10^{-9}	6.0×10^{-9}
Benzo(a)pyrene	7.3	0.195	4.77×10^{-9}	3.5×10^{-8}
			TOTAL	8.1×10^{-7}

[a] SF = Slope factor in $(mg/kg\text{-}day)^{-1}$.
[b] CDI = Chronic daily intake averaged over 70 years (mg/kg-day).

3.0 REMEDIAL ACTIVITIES AND RESULTS OF CONFIRMATORY SAMPLING

3.1 Cleanup Derivations

Because of the small volume of material contained within the SWMU 0-030(a) septic tank, the contaminated material poses no significant human health risk. Cleanup of this sludge will result in no significant risk reduction. Therefore, no cleanup derivation was necessary. The tank was to be crushed and left in place. The guidance received from NMED for septic tank abandonment is a deviation of Section I-11a-e of the Uniform Plumbing Code of the State of New Mexico.

3.2 Remedial Implementation

Following receipt of sample analytical results and the data assessment, a variety of remedial alternatives were explored. The method selected consisted of crushing the septic tank in place. June 4,1996, the New Mexico State Drinking Water Bureau (where personnel who enforce the Uniform Plumbing Code reside) concurred with crushing and abandoning the tank in place if the sample analysis results showed no contaminants of concern in the tank or soils. The decision to bury the tank in place was finalized when sample analyses and assessment confirmed the presence of COPCs at SWMU 0-030(a) presented no human health risk. This alternative was selected in part because of the vast amount of concrete debris used as fill material at this site in the past and that still exists in areas surrounding the tank.

June 18, 1996, the tank was re-exposed with a trackhoe and crushed with the trackhoe bucket. Each wall, the bottom, and top of the tank were broken into small fragments and mixed with the surrounding debris and fill material. The trench was backfilled with the overlying fill material and compacted and leveled by tamping with the trackhoe bucket. The concrete rubble that was inadvertently dumped over the east bank was pulled back and piled with the concrete debris pile.

Site restoration activities included the disposal of approximately 80 tons of concrete debris accumulated from the fill material during trenching activities. Much of the concrete could not be placed back into the excavations during backfill operations and was stockpiled on the site. The concrete debris pile, segregated from earlier trenching operations, was taken to the Los Alamos County Landfill with a waste profile form for disposal. Clean fill and gravel were brought in to level the disturbed areas, the site was graded, and base course was added to restore the original gravel roadbed. The affected soil areas were then reseeded.

3.3 Confirmatory Sampling

Because analyses and assessment of the pre-VCA, Phase I site-characterization RFI investigation indicated no significant human health risk would be present at SWMU 0-030(a) after crushing and abandoning the tank in place, no confirmatory samples were collected.

4.0 WASTE MANAGEMENT

It was anticipated that the investigation/VCA field activities would generate approximately 1 ft^3 of sampling waste/personal protective equipment (PPE), between 4 and 20 yd^3 of soil and concrete, 30 gal. of decontamination wash water, and 10 gal. of decontamination rinse water. Field activities actually resulted in the generation of approximately 80 tons of concrete debris, which was disposed of at the Los Alamos County Landfill. PPE and disposable sampling equipment was segregated, bagged, and placed in a lined, 55-gal. drum for disposal with similar wastes from other SWMU 0-030-series septic tank investigations.

4.1 Deviations from VCA Plan

The management of wastes generated during the investigation and VCA differed from the VCA plan. The tank and tank contents were abandoned in place (see Section 3.2). Therefore, no waste was generated due to the removal of the tank and its contents. However, a large quantity of concrete debris was excavated from the fill material around the tank and could not be returned to the trenches as backfill. Approximately 80 tons of this concrete debris were stockpiled on site and then disposed of at the Los Alamos County Landfill.

4.2 Waste Characterization Data

The concrete and PPE/sampling equipment was characterized with the analytical results of the site characterization samples. TCLP metals analyses were performed for waste management purposes. TCLP and site characterization results indicated that the concrete and soils were not contaminated. Thus, the septic tank was closed in place, which greatly minimized the volume of waste generated by this project. The waste concrete and PPE were also characterized as noncontaminated municipal refuse and disposed of, or combined with a similar waste stream from other septic tank investigations.

5.0 REFERENCES

Environmental Restoration Project Decision Support Council, October 1995. "Risk-Based Corrective Action Process" (Draft), Los Alamos National Laboratory and Sandia National Laboratories, New Mexico (Environmental Restoration Project Decision Support Council 1995, 1271)

EPA (US Environmental Protection Agency), May 1989. "Exposure Factors Handbook," EPA/ 600/8-89/043, Office of Health and Environmental Assessment, Washington, DC. (EPA 1989, 0304)

EPA (US Environmental Protection Agency), December 1989. "Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A)," Interim Final, EPA 540/1-89/002, Office of Emergency and Remedial Response, Washington, DC. (EPA 1989, 0305)

LANL (Los Alamos National Laboratory), May 1992. "RFI Work Plan for Operable Unit 1071," Los Alamos National Laboratory Report LA-UR-92-810, Los Alamos, New Mexico. (LANL 1992, 0781)

LANL (Los Alamos National Laboratory). "Los Alamos National Laboratory Environmental Restoration Program Standard Operating Procedures," Los Alamos National Laboratory report, Los Alamos, New Mexico. (LANL, 0875)

Life Systems, Inc., April 1993. "Toxicological Profile for Arsenic," prepared under Contract No. 205-88-0608 to Clement International Corporation for Agency for Toxic Substances and Disease Registry, US Public Health Service, Washington, DC. (Life Systems, Inc., 1993, 1334)

Miller, I. C., March 1994. "Health Effects Assessment Summary Tables Annual Update, FY-1994," 9200.6-303(94-1), EPA 540-R-94-020, prepared by Oak Ridge National Laboratory for the Environmental Protection Agency, Oak Ridge, Tennessee. (Miller 1994, 1169)

The Zia Company, 1948. Engineering Drawing Z-252, "Fuel Tank Farm," 5 sheets, Los Alamos, New Mexico.

Francis, W. C., December 6, 1993. "Supplemental Information About The Zia Company Fuel Yard North Of DP Road", Los Alamos National Laboratory Memorandum CST-10/93-0070 from W. C. Francis to P. Gary Eller, Los Alamos, New Mexico. (Francis 1993, 05-0238)

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APPENDIX A RESULTS OF QUALITY ASSURANCE/QUALITY CONTROL ACTIVITIES FOR SWMU 0-030(A)

A.1 Inorganic Analyses

Three soil samples were analyzed for target analyte list (TAL) metals in request number 2098. One of the quality assurance/quality control (QA/QC) problems with this request was that antimony, chromium, copper, mercury, and vanadium had low recoveries in the matrix spike sample. Barium had a high recovery in the matrix spike sample. Because of the low recoveries, antimony, chromium, copper, mercury, and vanadium are qualified estimated (J), biased low or undetected estimated ('UJ'). Barium detects are qualified J, biased high for the high recovery. Also, copper, lead, and mercury had duplicate values greater than 20% different from the original concentration. Both the duplicate and the matrix spike problems are most probably caused by heterogeneity in the samples considering the method blank, calibrations, and the laboratory control samples (LCS) were all within allowed limits. Because the qualifications are most likely due to sample heterogeneity and not analytical problems, the usability of the data should not be affected by the qualification. All other data are valid and usable without qualification.

A.2 Organic Analyses

Three soil samples were analyzed for VOCs in request number 2097. All QA/QC parameters were within allowed limits; therefore, all data are valid and usable without qualification.

Three soil samples were analyzed for SVOCs in request number 2097. For this request, QA/QC parameters were within allowed limits; therefore, all data are valid and usable without qualification.

Three soil samples were analyzed for pesticides/PCBs in request number 2097. In sample 0100-96-0602 there was one high surrogate recovery, which causes all detects in this sample to be qualified J, biased high. All other data are valid and usable without qualification.

A.3 Radiochemistry Analyses

Three soil samples were analyzed for gamma scan, tritium, percent moisture, plutonium-238, plutonium-239/240 and isotopic uranium in request number 2099. For this request, QA/QC parameters were within allowed limits; therefore, all data are valid and usable without qualification.

TABLE A-1

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

REQUEST NUMBER	SAMPLE ID	SAMPLE MATRIX	ANALYTE SUITE	QUALITY CONTROL (QC) COMMENTS
2097	0100-96-0601	Soil	VOCs[a]	All data are valid and usable without qualification.
2097	0100-96-0602	Soil	VOCs	All data are valid and usable without qualification.
2097	0100-96-0603	Soil	VOCs	All data are valid and usable without qualification.
2097	0100-96-0601	Soil	SVOCs[b]	All data are valid and usable without qualification.
2097	0100-96-0602	Soil	SVOCs	All data are valid and usable without qualification.
2097	0100-96-0603	Soil	SVOCs	All data are valid and usable without qualification.
2097	0100-96-0601	Soil	Pest/PCBs[c]	All data are valid and usable without qualification.
2097	0100-96-0602	Soil	Pest/PCBs	All detects qualified J[d], biased high for high surrogate recovery.
2097	0100-96-0603	Soil	Pest/PCBs	All data are valid and usable without qualification.
2098	0100-96-0601	Soil	TAL[e] Metals	Antimony, chromium, copper, mercury, and vanadium qualified J, biased low or UJ[f] for low recoveries and barium qualified J, biased high for high recoveries in the matrix spike sample.
2098	0100-96-0602	Soil	TAL Metals	Antimony, chromium, copper, mercury, and vanadium qualified J, biased low or UJ for low recoveries and barium qualified J, biased high for high recoveries in the matrix spike sample.
2098	0100-96-0603	Soil	TAL Metals	Antimony, chromium, copper, mercury, and vanadium qualified J, biased low or UJ for low recoveries and barium qualified J, biased high for high recoveries in the matrix spike sample.
2099	0100-96-0601	Soil	RAD[g]	All data are valid and usable without qualification.
2099	0100-96-0602	Soil	RAD	All data are valid and usable without qualification.
2099	0100-96-0603	Soil	RAD	All data are valid and usable without qualification.

[a] VOCs = Volatile organic compounds.
[b] SVOCs = Semivolatile organic compounds
[c] Pest/PCBs = Pesticides and polychlorinated biphenyls (PCBs).
[d] J = Estimated quantity.
[e] TAL = Target analyte list. TAL metals include aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, mercury, magnesium, manganese, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc.
[f] UJ = Undetected estimated quantity.
[g] RAD = Radiological analyses. Radiological analyses include gamma scan, tritium, plutonium-238, plutonium 239/240, and uranium isotopes.

APPENDIX B PHASE I RFI SITE-CHARACTERIZATION DATA

Phase I Resource Conservation and Recovery Act (RCRA) facility investigation (RFI) site-characterization data for solid waste management unit (SWMU) 0-030(a) are available in the Facility For Information Management Analysis And Display (FIMAD). If FIMAD is not available, data will be provided upon request. A hard copy of the data is available from Records Processing Facility (RPF) under analytical data for SWMU 0-030(a) VCA completion report.

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APPENDIX C FINAL COSTS

Final costs for the voluntary corrective action (VCA) at solid waste management unit (SWMU) 0-030(a) are presented in Table C-1.

TABLE C-1

ESTIMATED DISTRIBUTION OF FINAL COSTS

Pre field	$12 590.00
Field	$56 102.00
Analytical	$3 600.00
Post field	$15 000.00
Waste	$500.00
Total	**$87 792.00**

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APPENDIX D CONFIRMATORY SAMPLING RESULTS

Phase I RFI site-determination sampling analyses and assessment and the decision to crush and abandon solid waste management unit (SWMU) 0-030(a) under nine feet of soil indicated no confirmatory sampling was necessary.

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APPENDIX E CERTIFICATION OF COMPLETION

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