UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

December 4, 1997

Mr. Benito Garcia, Chief
Hazardous and Radioactive Materials Bureau
New Mexico Environment Department
P.O. Box 26110
Santa Fe, NM 87502

Re: Los Alamos National Laboratory
EPA ID# NM0890010515

Dear Mr. Garcia:

The Environmental Protection Agency (EPA) has reviewed the RFI Report for Potential Release Sites (PRSs) 16-024 (c,d,f,g,k,m,o,p-s), 16-025(b2,d,g,h,j,k,m-o,y), 16-034(c-f,l,m), C-16-005, and C-16-017 located in Technical Area (TA) 16, dated September 1997. This document provides the results of surface and subsurface soil sampling at former locations of high explosive magazines and machining and storage buildings which were destroyed by intentional burning in 1960.

The RFI recommends No Further Action (NFA) at all of these sites. Based on this review, EPA concurs with this recommendation, as adequate phase I investigations have revealed that RCRA-regulated contaminants have not been released to the environment.

A list of comments is attached. Should you have any questions, please feel free to contact Mr. David Vanlandingham at (214) 665-2254.

Sincerely,

David W. Neleigh, Chief
New Mexico and Federal
Facilities Section

Enclosure

6092

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Comments
RFI Report for Technical Area 16 Potential Release Sites
Los Alamos National Laboratory (NM0890010515)

General Comments

1. LANL has proposed human-health NFA for these sites, with removal from the HSWA permit contingent upon ecological assessments. However, EPA believes that there is a general lack of evidence to suggest that contaminant releases have occurred at these sites and that ecological assessments are not needed. No HE constituents were found, and the few inorganics found above UTLs at these sites could be within background distribution. Polycyclic aromatic hydrocarbons (PAHs) found at these sites are below Estimated Quantitation Limits (EQLs) and process history suggests that PAHs were not used in operations associated with these PRSs. Therefore, EPA believes that the corrective action process, while protective of human health and the environment, may be expedited by removing these sites from the HSWA permit without required ecological assessments.

2. The LANL document *Risk-Based Corrective Action Process* (LA-UR-96-2811)nor the Multiple-Chemical Evaluation (MCE) outlined in this document have been approved by the Administrative Authority. EPA believes that the misapplication of the MCE to phase I investigation results often eliminates contaminants of concern (COCs) from further investigation before the extent of contamination has been delineated. EPA believes that, after adequate site characterization, the simplest way to account for additive effects due to multiple constituents is to compare noncarcinogens concentrations against respective SALs divided by 10.

3. LANL suggests that NFA is appropriate for these sites because constituents are below SALs. EPA believes that a site where constituents are found at significant levels above background, even if below SALs, may require further sampling and analyses in a phase II investigation. It is more appropriate to recommend NFA for these PRSs due to the fact that adequate phase I investigations have shown no evidence of a contaminant release.

ATTACHMENT A

E-mail communication from Roy Michelotti (CST-7) to John Kieling (NMED) concerning the septic tank at PRS 33-002(a).

John Kieling
HRMB/NMED
fax 827-1544

Dear John,

Per a discussion I had with Dave McInroy and Pat Shanley, we agreed to this expeditious and informal communique as a follow up to our 9/19/97 phone conversation. This note is to further advise you of work being performed in two PRSs at TA-33. We are conducting BMPs at two septic system PRSs, 33-002(a) and 33-004(a). The contents of the tanks will be removed from both units, and the tanks will be decontaminated. Waste disposal decisions will be based on the results of waste characterization data.

PRS 33-002(a) is the unit which overflowed earlier this summer, and NMED sampled the contents. This unit has been taken out of service by the operating group. ER is sealing the inlet and outlet pipes, a decision on the final disposition of the tank is pending

PRS 33-004(a) is an active unit which is suspected to have been leaking. LANL ER is working with the facility management organization to inspect the tank and piping for leaks. If we discover stained soil during this inspection we will remove it, characterize it, and dispose it properly. Based on previous RFI data we do not expect to encounter any soil with contamination above human-health risk-based criteria.

We will provide you with an informal summary report when this activity is completed. This will include waste volumes and waste disposal decisions. All information pertaining to these actions will be included in final decision reports on these units.

If you have any questions please contact me directly at 665-7444.

Sincerely,
Roy

cy:
Dave McInroy
Joe Mose
Pat Shanley

ATTACHMENT B

PRS 33-002(b) Section of the TA-33 September 1997 Phase II report.

NFA Report for Potential Release Sites

33-002 (b–c)
33-003 (b)
33-004 (k)
33-006 (a)
33-008 (a–b)
33-011 (d)
33-013
33-017

(located in former
Operable Unit 1122)

Field Unit 3

Environmental
Restoration
Project

September 1997

A Department of Energy
Environmental Cleanup Program

Los Alamos
NATIONAL LABORATORY

LA-UR-97-2944

report, the list of PAHs detected without SALs includes acenaphthylene, a noncarcinogenic PAH very similar to acenaphthene; benzo(g,h,i)perylene, also a noncarcinogenic PAH; phenanthrene, a noncarcinogenic PAH very similar to pyrene; and 2-methylnaphthalene, a noncarcinogenic PAH very similar to naphthalene. Because noncarcinogenic PAHs in this report tend to have high SALs and those without SALs were detected at low concentrations, the evaluation of PAHs in this report is considered to be complete using only PAHs with available SALs.

The PRSs discussed in this section are listed in Table 5.0-1. With the exception of PRS 33-004(k), recommendations for NFA for human health are based on NMED/Environmental Restoration Project Criterion 5: The PRS has been characterized and available data indicate that contaminants are not present or are present in concentrations that pose an acceptable risk under the projected land use. Recommendation for PRS 33-004(k) is based on Criterion 1: The PRS was not located.

TABLE 5.0-1

PRSs IN THIS TA-33 RFI REPORT

SECTION	PRS ID	LOCATION	PRS TYPE	RECOMMENDATION
5.1	33-002(b)	Main Site	Sump at MDA K	NFA, Criterion 5 [a]
5.2	33-002(c)	Main Site	Sump at MDA K	NFA, Criterion 5
5.3	33-003(b)	East Site	Chamber at MDA D	NFA, Criterion 5
5.4	33-004(k)	East Site	Outfall from TA-33-87	NFA, Criterion 1
5.5	33-006(a)	South Site	South Site shot pad	NFA, Criterion 5
5.6	33-008(a)	South Site	South Site landfill	NFA, Criterion 5
5.7	33-008(b)	East Site	East Site landfill	NFA, Criterion 5
5.8	33-011(d)	Main Site	Surface storage at TA-33-20	NFA, Criterion 5
5.9	33-013	Main Site	Surface storage at TA-33-86	NFA, Criterion 5
5.10	33-017	Main Site	Vehicle maintenance area	NFA, Criterion 5

a. NFA for human health only

5.1 PRSs 33-002(b)

PRS 33-002(b) is sump TA-33-134 at MDA K. Phase II sampling was performed in 1996 because Phase I samples were not collected beneath the bottom of the sump. In addition, the sample with the highest MRAL-measured tritium concentration was not analyzed in a fixed laboratory. No contamination was found above levels of concern in either the 1993 or the 1996 sampling campaign. The PRS is recommended for NFA for human health under Criterion 5.

5.1.1 History

PRS 33-002(b) is discussed in the RFI Work Plan for Operable Unit 1122, Sections 3.2.2.1, 4.1.4, and 4.2.3.1. The sump was constructed in 1955 when the tritium facility, TA-33-86, was constructed. A sink and floor drain in the southern section of TA-33-86 are connected to the sump. Archival information indicates that sump TA-33-134 received organic contaminants such as ethanol and methanol (less than 5 gal./year), trichloroethylene, and tritium-contaminated benzene and acetone (approximately 5 gal./year). The sump also may have received beryllium, mercury, and depleted uranium (LANL 1992, 0784).

5.1.2 Description

The sump is a rubble-filled, unlined seepage pit 6 ft in diameter and 9 ft deep. It might better be described as a dry well. Originally, a 3-inch-thick concrete cover, overlaid by 1 in. of soil, topped the sump. The cover was broken during sampling done by Roy F. Weston, Inc., personnel in 1989. The sump is located on a level area approximately 20 ft south of septic tank TA-33-93 (Fig. 5.1.2-1). Broken pieces of concrete mark the site. The entire area was cleared in the past and is now covered with weeds. Soil is pulverized rock with pumice pebbles and broken pieces of tuff.

5.1.3 Previous Investigation

Weston personnel collected a surface sample at sump TA-33-134 during investigations at TA-33 in 1989. That sample was analyzed for inorganic chemicals, radionuclides, pesticides, and PCBs. Only tritium, at 190 000 pCi/ml in soil moisture, was detected. Because no moisture analysis was reported, activity per gram of soil cannot be calculated (LANL 1989, 02-020).

The MDA K Phase I sampling plan, which was carried out in 1993, directed that fluid and sludge samples be collected from the sump. The plan also directed that a borehole be drilled next to the sump and three subsurface samples (plus a duplicate) be collected. This borehole was intended to determine if contamination was migrating from the sump to the environment. During the ER sampling campaign in 1993, only three samples were collected. The fluid and sludge samples were not collected because these components are not present in the sump. The drilling adjacent to the sump encountered the soil/tuff interface at 30 in. Because of the shallow depth of the hole, only a surface sample and a soil/tuff interface sample were collected. A third sample was taken at a depth of 5 ft from within the sump at the point of auger refusal. All samples were analyzed for uranium, tritium, plutonium, gamma emitters, inorganic chemicals, and SVOCs. The two subsurface samples were analyzed for VOCs.

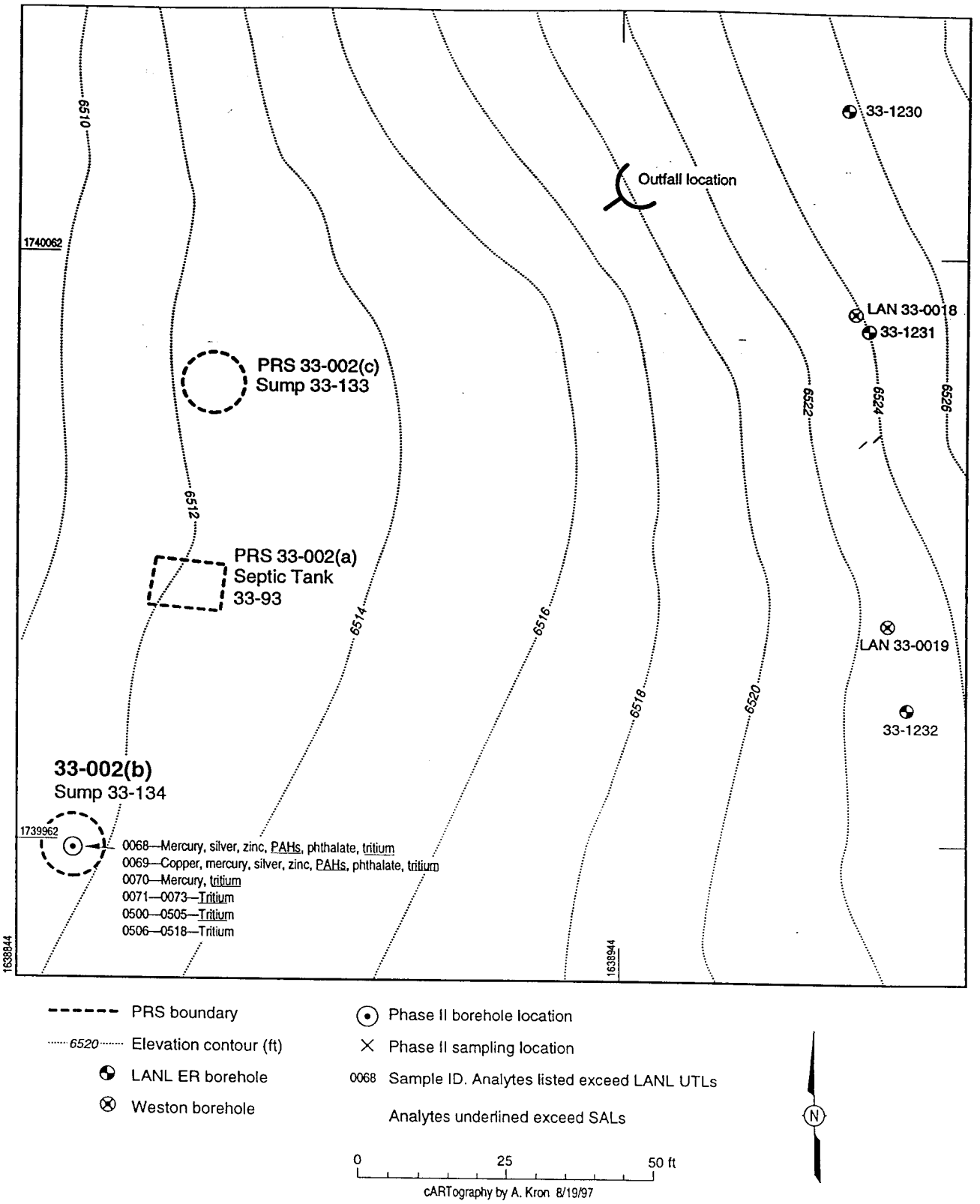

Fig. 5.1.2-1. PRS 33-002(b), sump TA-33-134 at MDA K.

Results indicated that one sample contained cadmium above UTL, but below SAL. Three samples contained trace levels of plutonium above its UTL. Tritium was found in all samples. Tritium exceeded 600 000 pCi/g in one sample. This sample was analyzed only by the MRAL.

Section 4.2 of the September 1995 RFI Report for MDA K, which discusses the Phase I investigation of PRS 33-002(b), is provided as Attachment 1 of this report.

5.1.4 Field Investigation

Sampling at PRS 33-002(b) conformed to the current use (industrial) or construction scenario of the conceptual model described in the RFI Work Plan for Operable Unit 1122, Section 3.1.2 (LANL 1992, 0784). With building waste as the primary source, exposure routes for human receptors are ingestion and dermal contact. Because the sump is a subsurface structure, inhalation is not considered a likely exposure route, and no surface sampling was performed.

In the 1996 sampling campaign, a borehole was drilled directly into the sump. In accordance with the sampling plan, three samples were collected within the first 15 ft and were analyzed for uranium, plutonium, inorganic chemicals, VOCs, and SVOCs (Table 5.1.4-1).

In addition to the samples listed above, samples were collected at approximately 5-ft intervals below the 15-ft level and analyzed for tritium by the MRAL. A subset of samples from the same depth intervals was sent for fixed laboratory analysis (Table 5.1.4-2). The sampling plan directed that three samples be taken and analyzed from below the sample depth in which the MRAL results fell below tritium SAL. The final depth (117 ft) exceeded these requirements.

5.1.5 Evaluation of Inorganic Chemicals

In the three upper samples from the borehole, silver, copper, mercury, and zinc were detected above background but below their SALs (Table 5.1.5-1). Because two of the samples were taken in tuff, the 95%, 0.95 UTLs for Unit 3 of the Bandelier Tuff are shown below for comparison, in addition to LANL mixed-soil UTLs.

TABLE 5.1.4-1

SUMMARY OF SAMPLES (EXCLUDING TRITIUM) TAKEN FOR PRS 33-002(b)

SAMPLE ID	SITE ID	MEDIUM	DEPTH (ft)	RADIO-NUCLIDES	INORGANIC CHEMICALS	VOCs	SVOCs
0333-96-0068	33-1328	Fill	1	2178[a]	2177	2176	2176
0333-96-0069	33-1328	Fill	9.5	2178	2177	2176	2176
0333-96-0070	33-1328	Tuff	15	2178	2177	2176	2176

a. ER analytical request number.

TABLE 5.1.4-2

SUMMARY OF TRITIUM SAMPLES TAKEN FOR PRS 33-002(b)

SAMPLE ID	SITE ID	MEDIUM	DEPTH (ft)	FIXED LABORATORY	MRAL[a]
0333-96-0068	33-1328	Fill	1	2178[b]	2168
0333-96-0069	33-1328	Fill	9.5	2178	2168
0333-96-1001	33-1328	Fill	9.5	2178	2168
0333-96-0070	33-1328	Tuff	15	2178	2168
0333-96-1002	33-1328	Tuff	15	2178	2168
0333-96-0071	33-1328	Tuff	16.3	2178	2168
0333-96-0072	33-1328	Tuff	22.5	2178	2168
0333-96-0073	33-1328	Tuff	27	2178	2168
0333-96-0500	33-1328	Tuff	31	2232	2199
0333-96-1003	33-1328	Tuff	31	2232	2199
0333-96-0501	33-1328	Tuff	36.5	2232	2199
0333-96-0502	33-1328	Tuff	41	2232	2199
0333-96-1004	33-1328	Tuff	41	2232	2199
0333-96-0503	33-1328	Tuff	45	2232	2180
0333-96-0504	33-1328	Tuff	50	NA[c]	2180
0333-96-0505	33-1328	Tuff	52	NA	2180
0333-96-0506	33-1328	Tuff	60	2232	2180
0333-96-0507	33-1328	Tuff	62	NA	2180
0333-96-0508	33-1328	Tuff	65.5	NA	2180
0333-96-0509	33-1328	Tuff	72	2232	MRAL[d]
0333-96-0510	33-1328	Tuff	80	NA	MRAL[d]
0333-96-0511	33-1328	Tuff	84	NA	MRAL[d]
0333-96-0512	33-1328	Tuff	88	2232	MRAL[d]
0333-96-0513	33-1329	Tuff	93.5	NA	MRAL[d]
0333-96-0514	33-1330	Tuff	97	NA	MRAL[d]
0333-96-0515	33-1328	Tuff	103.4	2232	MRAL[d]
0333-96-0516	33-1328	Tuff	110	2232	MRAL[d]
0333-96-0517	33-1328	Tuff	115	2232	MRAL[d]
0333-96-0518	33-1328	Tuff	117	2232	MRAL[d]

a. MRAL = Mobile radiological analytical laboratory
b. ER laboratory analytical request number
c. NA = Not Analyzed
d. No MRAL request number assigned

TABLE 5.1.5-1

INORGANIC CHEMICALS DETECTED ABOVE UTLs AT PRS 33-002(b)

SAMPLE ID	DEPTH (ft)	COPPER (mg/kg)	MERCURY (mg/kg)	SILVER (mg/kg)	ZINC (mg/kg)
SAL	N/A[a]	2 800	23	380	23 000
(95%,.95) UTL	N/A	15.5	0.1	NA[b]	50.8
(95%,.95) UTL QBT3	N/A	2	NA	1.9	55.5
0333-96-0068	1	9.8	0.98	0.13	52.6
0333-96-0069	9.5[c]	22	2.9	0.3	88.4
0333-96-0070	15[c]	9.2	0.74	0.1 (U[d])	40.1

a. N/A = Not Applicable
b. NA = Not analyzed for in LANL background studies
c. n QBT3
d. U = Undetected—the listed value is the detection limit

5.1.6 Evaluation of Radionuclides

In surface sample 0333-96-0068, plutonium-239/240 was detected within the background range ascribed to worldwide fallout from atmospheric atomic testing. In sample 0333-96-0069, both plutonium-238 and plutonium-239/240 were detected (Table 5.1.6-1). This sample was taken at 9.5 ft and described as primarily "engineering fill materials." The levels were very low, and they may be the result of moving former surface material into the sump. Plutonium was not detected in the next sample, which was collected at 15 ft.

Tritium was detected above LANL's UTL in every sample. Both laboratory results and field screening MRAL results indicated that tritium levels are below SAL in all samples below 60 ft (Table 5.1.6-2).

TABLE 5.1.6-1

PLUTONIUM DETECTED AT PRS 33-002(b)

SAMPLE ID	DEPTH (ft)	PLUTONIUM-238 (pCi/g)	PLUTONIUM-239/240 (pCi/g)
SAL	N/A[a]	27	24
LANL UTL	N/A	0.01	0.025
0333-96-0068	1	0.001 (U[b])	0.007
0333-96-0069	9.5	0.003	0.003
0333-96-0070	15	0.001 (U)	0.001 (U)

a. N/A = Not Applicable
b. U = Undetected—the listed value is the detection limit

TABLE 5.1.6-2

TRITIUM DETECTED AT PRS 33-002(b)

SAMPLE ID	DEPTH (ft)	MRAL (pCi/g)	LABORATORY (pCi/g)
SAL	N/A[a]	260	260
LANL UTL	N/A	1	1
0333-96-0068	1	3112	24 852
0333-96-0069	9.5	135 354	104 065
0333-96-1001	9.5	97 466	76 179
0333-96-0070	15	64 181	73 060
0333-96-1002	15	133 651	59 366
0333-96-0071	16.3	12 952	5456
0333-96-0072	22.4	652	773
0333-96-0073	27.25	704	780
0333-96-0500	31.25	428	833
0333-96-1003	31.25	440	826
0333-96-0501	36.7	646	1000
0333-96-0502	41	924	1474
0333-96-1004	41	956	4036
0333-96-0503	45	937	4134
0333-96-0504	50	616	NA[b]
0333-96-0505	52	357	NA
0333-96-0506	60	94	199
0333-96-0507	62	142	NA
0333-96-0508	65	130	NA
0333-96-0509	72.2	75	142
0333-96-0510	80	26	NA
0333-96-0511	84	32	NA
0333-96-0512	88	34	75
0333-96-0513	93	63	NA
0333-96-0514	97	71	NA
0333-96-0515	103.4	6	20
0333-96-0516	110	3	8
0333-96-0517	115	ND[c]	2
0333-96-0518	117.4	3	3

a. N/A = Not Applicable
b. NA = Not Analyzed
c. ND = Not Detected

5.1.7 Evaluation of Organic Chemicals

Trace levels of PAHs that are typical of tar and asphalt products were found in the Phase II samples, as was a common plasticizer, di-n-butylphthlate (Table 5.1.7-1). Benzo(a)pyrene was found above its SAL in two of the three samples. No VOCs were detected.

TABLE 5.1.7-1

DETECTED ORGANIC CHEMICALS FOR PRS 33-002(b)

SAMPLE ID	DEPTH (ft)	ANALYTE	RESULT (mg/kg)	SAL (mg/kg)	EQL (mg/kg)
0333-96-0068	1	Anthracene	0.033 (J)[a]	18 000	0.33
		Benzo[a]anthracene	0.099 (J)	0.61	0.33
		Benzo[a]pyrene	0.099 (J)	0.061	0.33
		Benzo[b]fluoranthene	0.17 (J)	0.61	0.33
		Benzo[g,h,i]perylene	0.099 (J)	NS[b]	0.33
		Bis(2-ethylhexyl)phthalate	0.099 (B,U,J)[c]	32	0.33
		Chrysene	0.13 (J)	61	0.33
		Di-n-butylphthalate	0.033 (J)	6 500	0.33
		Fluoranthene	0.26 (J)	2 600	0.33
		Indeno[1,2,3-cd]pyrene	0.066 (J)	0.61	0.33
		Phenanthrene	0.2 (J)	NS	0.33
		Pyrene	0.23 (J)	1 900	0.33
0333-96-0069	9.5	Benzo[a]pyrene	0.068 (J)	0.061	0.33
		Benzo[b]fluoranthene	0.17 (J)	0.61	0.33
		Benzo[g,h,i]perylene	0.17 (J)	NS	0.33
		Bis(2-ethylhexyl)phthalate	1.5 (B)[d]	32	0.33
		Di-n-butylphthalate	0.2 (J)	6 500	0.33
		Indeno[1,2,3-cd]pyrene	0.14 (J)	0.61	0.33
		Pyrene	0.034 (J)	1 900	0.33
0333-96-0070	15	Bis(2-ethylhexyl)phthalate	0.11(B, J)	32	0.33

a. J = Estimated value—the analyte was detected above the detection limit but below the estimated quantitation limit
b. NS = No SAL available
c. B,U,J = Analyte was detected in the laboratory blank. The analyte was not detected in the sample. The value listed is the estimated detection limit.
d. B = Analyte was detected in the laboratory blank

5.1.8 Risk-Based Screening Assessment

Using the maximum concentrations from both the 1993 and 1996 sampling campaigns at this PRS, an MCE calculation was performed for the noncarcinogenic contaminants. The MCE result for noncarcinogens was 0.2 (Table 5.1.8-1). Benzo[g,h,i]perylene and phenanthrene were not included in the calculation because they have no SALs. (See discussion in Section 5.0 of this report.) This MCE value is less than unity; therefore, no potential human-health risk based on additive effects is identified for this class of chemicals. They are not carried forward in the screening process.

Carcinogenic PAHs at very low concentrations were also detected at this PRS (Table 5.1.8-2). Benzo(a)pyrene was detected in two of three samples above its SAL of 0.061 mg/kg.

TABLE 5.1.8-1

MCE FOR NONCARCINOGENIC EFFECTS AT PRS 33-002(b)

CHEMICAL	LOCATION ID	SAMPLE ID	MAXIMUM SAMPLE VALUE (mg/kg)	SOIL SAL (mg/kg)	NORMALIZED VALUE
Cadmium	33-1520	AAA3900[a]	4	38	0.1
Copper	33-1328	0333-96-0069	22	2 800	0.007
Mercury	33-1328	0333-96-0069	2.9	23	0.1
Silver	33-1328	0333-96-0069	0.3	380	0.0008
Zinc	33-1328	0333-96-0069	88.4	23 000	0.004
Anthracene	33-1328	0333-96-0068	0.033	18 000	0.000002
Bis(2-ethylhexyl)-phthalate	33-1328	0333-96-0068	0.099	32	0.003
Chrysene	33-1328	0333-96-0068	0.13	61	0.002
Di-n-butylphthalate	33-1328	0333-96-0069	0.2	6 500	0.00003
Fluoranthene	33-1328	0333-96-0068	0.26	2 600	0.0001
Pyrene	33-1328	0333-96-0068	0.23	1 900	0.0001
				Total	0.2

a. 1993 sample—the 1993 report is include as Attachment 1 of this report

TABLE 5.1.8-2

PRS 33-002(b) CARCINOGENS WITH CONCENTRATIONS IN SOIL THAT EXCEED SALs

SAMPLE ID	LOCATION ID	DEPTH (ft)	BENZO[a]PYRENE (mg/kg)
SAL	N/A[a]	N/A	0.061
PRG[b]	N/A	N/A	0.26
0333-96-0068	33-1328	1	0.099(J[c])
0333-96-0069	33-1328	9.5	0.068(J)

a. N/A = Not Applicable
b. PRG = Preliminary Remediation Goal for industrial sites (EPA 1996, 1307)
c. J = Estimated value—the analyte was detected above the detection limit but below the estimated quantitation limit

An MCE performed for the remaining carcinogens indicates that human health risk is low for those constituents (Table 5.1.8-3). Benzo[g,h,i]perylene was not included in the calculation because it has no SAL. No organic compounds were detected in the 1993 sampling campaign. There is no indication that PAHs were used as experimental compounds at the tritium facility. Concentrations at this sump are typical of industrial environments and are below the EPA Region 9 PRG of 0.26 mg/kg for benzo(a)pyrene. Because benzo(a)pyrene, a common industrial pollutant, was the only carcinogenic constituent detected above SAL, and the

concentrations of other PAHs were very low, PAHs are not carried forward in the screening assessment.

TABLE 5.1.8-3

MCE FOR CARCINOGENIC EFFECTS (EXCEPT BENZO[A]PYRENE) AT PRS 33-002(b)

CHEMICAL	LOCATION ID	SAMPLE ID	MAXIMUM SAMPLE VALUE (mg/kg)	SOIL SAL (mg/kg)	NORMALIZED VALUE
Benzo[a]anthracene	33-1328	0333-96-0068	0.099	0.61	0.007
Benzo[b]fluoranthene	33-1328	0333-96-0069	0.17	0.61	0.3
Indeno[1,2,3-cd]pyrene	33-1328	0333-96-0069	0.14	0.61	0.2
				Total	0.5

Tritium was detected above SAL in 16 samples to a depth of 52 ft (Table 5.1.8-4). Therefore, tritium is carried forward in the screening process.

TABLE 5.1.8-4

PRS 33-002(b) TRITIUM WITH CONCENTRATIONS IN SOIL THAT EXCEED SALs

SAMPLE ID	LOCATION ID	DEPTH (ft)	MRAL (pCi/g)	LABORATORY (pCi/g)
SAL	N/A[a]	N/A	260	260
LANL UTL	N/A	N/A	1	1
0333-96-0068	33-1328	1	3112	24 852
0333-96-0069	33-1328	9.5	135 354	104 065
0333-96-1001	33-1328	9.5	97 466	76 179
0333-96-0070	33-1328	15	64 181	73 060
0333-96-1002	33-1328	15	133 651	59 366
0333-96-0071	33-1328	16.3	12 952	5456
0333-96-0072	33-1328	22.4	652	773
0333-96-0073	33-1328	27.25	704	780
0333-96-0500	33-1328	31.25	428	833
0333-96-1003	33-1328	31.25	440	826
0333-96-0501	33-1328	36.7	646	1000
0333-96-0502	33-1328	41	924	1474
0333-96-1004	33-1328	41	956	4036
0333-96-0503	33-1328	45	937	4134
0333-96-0504	33-1328	50	616	NA[b]
0333-96-0505	33-1328	52	357	NA

a. N/A = Not Applicable
b. NA = Not Analyzed

5.1.9 Human-Health Risk Assessment

A radiation dose due to tritium exposure was calculated for a worker at PRS 33-002(b). This assessment of risk was performed using the tritium plume subroutine of the Residual Radioactive Material (RESRAD) computer model, ver. 5.61.

The source term was estimated as the upper confidence limit (UCL) for the mean tritium activity, calculated using data from the uppermost 25 ft of the exposure unit, where approximately 95% of the tritium was detected. Because fixed laboratory and MRAL measurements agree well (a correlation coefficient of approximately 0.98 between the logarithms), both data sets were used to calculate the UCL. However, these 19 observations are not uniformly distributed across the first 25 ft below the surface. In addition, they show a trend within this depth (the highest values are at depths of 4–15 ft, with lower values both near the surface and below 15 feet). Therefore, it is inappropriate to estimate the mean tritium activity or its UCL within the exposure unit by a parametric method which assumes that the data constitute a random sample from a single distribution of known form such as the normal. Instead, a bootstrap procedure, a nonparametric, computer-based method that makes use of a Monte Carlo algorithm to generate an approximate distribution for the sample mean, was used. (For a discussion of statistical bootstrapping techniques and theory, see Efron and Tibshirani, 1986, 02-123.) To apply this algorithm in the present case, the data were resampled to produce 5000 "bootstrap data sets" distributed approximately uniformly with depth. The mean of each data set was computed and the 95% UCL was estimated as the 95th percentile of the 5000 means. The estimate of the mean activity obtained in this way was approximately 46 000 pCi/g, and the 95% UCL was 101 000 pCi/g. By comparison, the maximum concentration in the sump was 104 065 pCi/g at 9.5 ft. A duplicate at that depth had a tritium concentration of 76 179 pCi/g.

Long-term plans for TA-33 and MDA K indicate continued laboratory use (i.e., an industrial scenario). Based on future land use, the exposure pathways deemed credible at PRS 33-002(b) are inhalation resulting from tritium emissions from the soil; soil ingestion; and inhalation of dust. Based on PCT 96-013 guidance, most of the generic RESRAD parameters for mesa top sites were used and are provided in Appendix C of this report (Project Consistency Team 1996, 1210). Site-specific RESRAD parameters used in the calculation of dose from exposure to this sump area were selected as a reasonable maximum exposure for a receptor evaluated under a continued laboratory operations scenario.

Certain parameters listed in the RESRAD output are critical to the manner in which the dose is calculated. These parameters include the area of contamination, the thickness of the contaminated zone, the erosion rate of the contaminated zone, the evapotranspiration coefficient, and particulate loading in air.

The size of the contaminated area may affect dose via soil ingestion, dust inhalation, external gamma irradiation, and inhalation of tritium. RESRAD modifies daily soil and air intake values to reflect the potential contribution to total daily intake associated with the site. The thickness and erosion rate of the contaminated zone, as well as the infiltration rate, can affect the calculation of dose with time. The dose from exposure to this sump area has been calculated by assuming minimal erosion, an approximate area of 100 ft², an initial uniform contamination depth of 25 ft, and an evapotranspiration coefficient that specifies no infiltration. These assumptions result in a static contaminated zone. A modeling period of 1000 years (approximately 80 tritium half-lives) is used as the time limit for dose calculations.

For calculating dose, the evapotranspiration coefficient has been set at the RESRAD limit of 0.999, effectively eliminating leaching of radionuclides from the contaminated zone by water and resulting in a maximal soil-based dose. This value is based on the fact that the annual average evapotranspiration rate for the Los Alamos area exceeds the average annual infiltration rate, assuming no irrigation and a relatively high runoff coefficient of approximately 0.5. Because the value used for the evapotranspiration coefficient results in no infiltration, vadose- and saturated-zone hydrogeologic parameters in RESRAD have no influence on the calculation of dose.

The key RESRAD parameters used in the modeling for this sump area are presented in Table 5.1.9-1. Other parameters are detailed in the RESRAD calculations in Appendix C of this report.

TABLE 5.1.9-1

PARAMETERS USED IN RESRAD MODEL FOR PRS 33-002(b)

PARAMETER	VALUE	RATIONALE
Area of contaminated zone	9 m^2	10-ft diameter of sump
Thickness of contaminated zone	8 m	25 ft depth of maximum contamination
Initial tritium soil concentration	100 000 pCi/g	UCL of first 25 ft of contamination
Contaminated zone erosion rate	0.001 m/year	RESRAD default. At this rate, the depth of the contaminated zone is effectively infinite over the 1000-year modeling period.
Inhalation rate	14 900 m^3	Half of a worker's time is spent at light (0.8 m^3/hr) and half at moderate (2.5 m^3/hr) levels of activity.
Mass loading for inhalation	0.00009 g/m^3	Based on air-monitoring data reported in the 1990 Environmental Surveillance Report.
Fraction of total time spent outdoors on site	0.042	Exposure frequency is assumed to be 8 hr/day, 250 day/yr. The fraction of the work time spent indoors is assumed to be 80%.

Using the parameters described above, RESRAD results show that the dose for an individual working at the sump site in summer 1996, the year in which the tritium samples were collected, was 5.8 mrem/year. After one year, the dose falls to 4.2 mrem/yr. DOE regulations governing the protection of workers at DOE-owned sites is contained in 10CFR Part 835, Occupational Radiation Protection. The occupational dose limit for general employees is 5 000 mrem/yr. Dose to members of the public is limited to 100 mrem/year from DOE activities.

5.1.10 Preliminary Ecological Assessment

In cooperation with the New Mexico Environment Department and EPA Region 6, the Laboratory ER Project is developing an approach for ecological risk assessment. Further ecological risk assessment at these sites will be deferred until the sites can be assessed as part of the ecological exposure unit methodology currently being developed.

5.1.11 Conclusion and Recommendation

Phase I sampling did not penetrate the bottom of the sump. Because tritium was found at elevated levels during the Phase I investigation, 1996 sampling at PRS 33-002(b) was extended through the sump and into tuff to a depth of 117.5 ft. Although tritium was detected above SAL in all samples to a depth approaching 60 ft, a RESRAD-calculated dose of 5.8 mrem/year in 1996 indicates that concentrations are insufficient to exceed the recommended DOE dose limit of 100 mrem/year. This dose is reduced each year as tritium, with a half-life of 12.5 years, decays. Tritium concentrations drop dramatically with depth beyond 60 ft. The plume is bounded in the vertical direction relative to SALs. Tritium concentrations between 110 and 117 ft fall to 3 pCi/g.

Driving forces for vertical migration of the tritium plume in this area of MDA K have been minimized. Sand bags have been installed to divert runoff from the paved area around TA-33-86. A cooling water outfall and septic system discharges have been eliminated. Depth to groundwater at this part of TA-33 is estimated to be 800 ft. It is, therefore, highly unlikely that the tritium concentrations detected at depth at this PRS represent a source of contamination to the regional aquifer. In the absence of hydraulic driving forces, the tritium peak ceases its downward migration. Diffusion will continue to decrease the maximum activity within the plume, both vertically and horizontally. Radioactive decay of tritium will decrease overall activities within this area of TA-33.

An MCE for noncarcinogenic effects yielded a result of 0.1, far below the target level of 1. One carcinogenic PAH was found above its SAL in the sump, but below industrial PRG. There is no

pathway to the environment. Concentrations of PAHs at PRS 33-002(b) are below those commonly found in urban and industrial environments.

Because contaminant concentrations, including tritium, are below levels of concern, PRS 33-002(b) is proposed for NFA for human health under Criterion 5 because it has been investigated and evaluated.

5.2 PRSs 33-002(c)

PRS 33-002(c) is sump TA-33-133 at MDA K. Because the sump was not located during the 1993 sampling campaign, Phase II sampling was performed at this PRS. Tritium concentrations were below human health risk levels, as were concentrations of other contaminants. Therefore, this PRS is proposed for NFA for human health.

5.2.1 History

Sump TA-33-133 is discussed in the RFI Work Plan for Operable Unit 1122 in Sections 3.2.2.1, 4.1.4, and 4.2.4. The sump was constructed in 1955 when TA-33-86 was built. It originally served four sinks and four floor drains in the north section of TA-33-86. Sump TA-33-133 was disconnected in 1959. The drain line from the building was extended approximately 90 ft past the sump to create a noncontact cooling water drain and outfall. The sump may have received tritium and small quantities of solvents such as trichloroethylene, methanol, ethanol, acetone, and propanol. It has been inactive since 1959.

5.2.2 Description

PRS 33-002(c) is located approximately 100 ft east of the tritium facility and approximately 30 ft north of septic tank TA-33-93 (Fig. 5.2.2-1). The sump is an unlined pit, 6 ft in diameter and 8 ft in depth, that might better be called a dry well. Originally, the sump had a 3-inch-thick concrete cover overlain by soil. The cover was destroyed during Weston sampling in 1989. Piles of dirt mixed with broken tuff surround the sump location. Pieces of broken concrete are strewn about the site. The ground is level with a sparse growth of chamisa and weeds. A few juniper trees grow nearby. On the surface, the soil is fine sand intermixed with silt and clay, with abundant tuff pieces. There is little organic material. At 2.5 ft, a drilling core indicated that the soil is a fine sand and clay, mixed with pulverized tuff that is presumed to be bedrock.

ATTACHMENT C

PRS 33-002(c) Section of the TA-33 September 1997 Phase II report.

NFA Report for Potential Release Sites

33-002(b–c)
33-003(b)
33-004(k)
33-006(a)
33-008(a–b)
33-011(d)
33-013
33-017

(located in former
Operable Unit 1122)

Field Unit 3

Environmental
Restoration
Project

September 1997

A Department of Energy
Environmental Cleanup Program

Los Alamos
NATIONAL LABORATORY

LA-UR-97-2944

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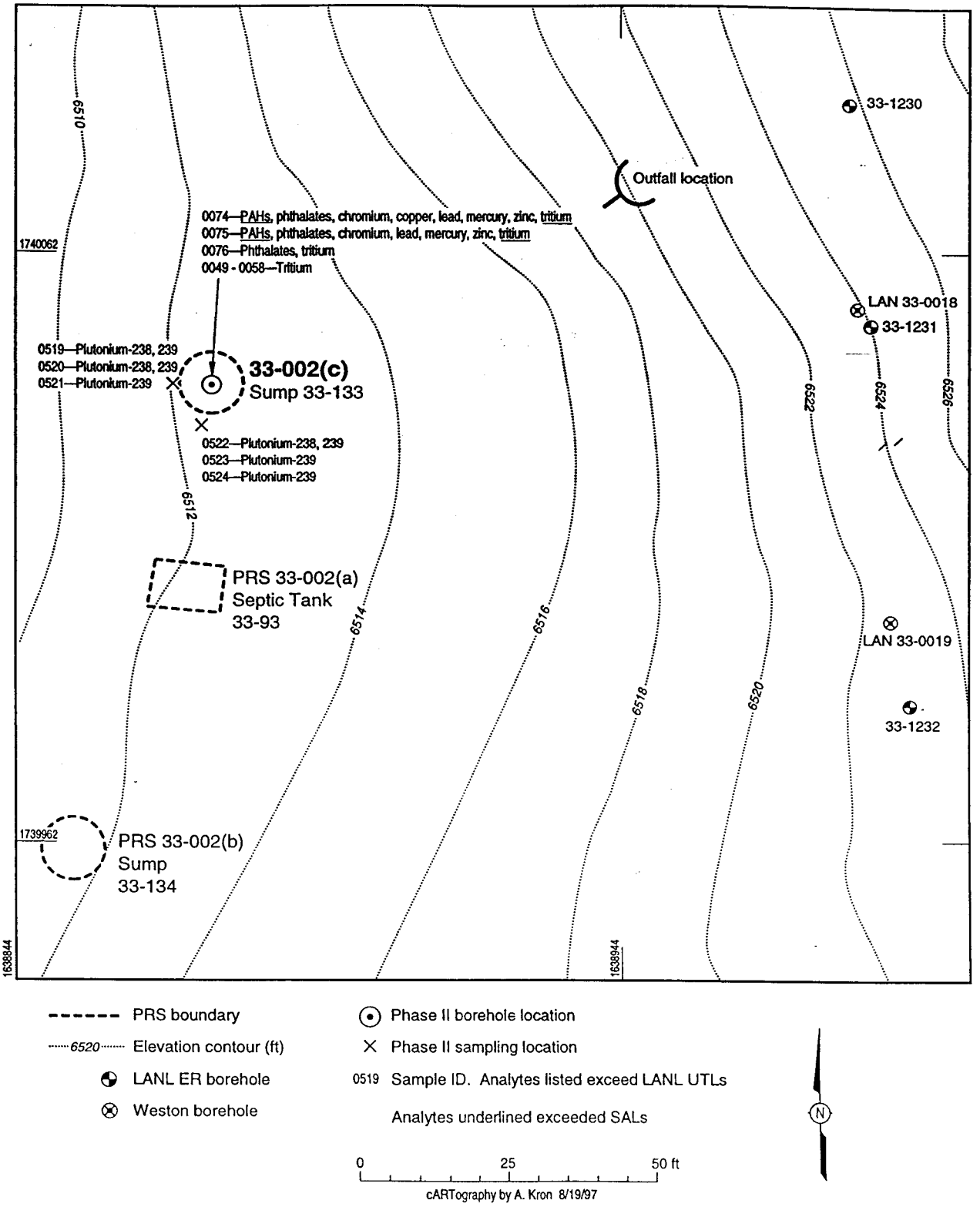


Fig. 5.2.2-1. PRS 33-002(c), sump TA-33-133 at MDA K.

5.2.3 Previous Investigation

Weston personnel collected two surface samples at sump TA-33-133 in 1989. Samples were analyzed for inorganic chemicals, radionuclides, VOCs, SVOCs, pesticides, and PCBs. Tritium was detected at 90 and 890 pCi/g. Trace levels of SVOCs were detected.

The Phase I sampling plan, which was carried out in 1993, directed that fluid and sludge samples be collected from the sump. The plan also directed that a borehole be drilled next to the sump. Three subsurface samples (plus one duplicate) were to be taken from the borehole to determine if possible contamination was migrating from the sump to the environment. During the ER sampling campaign in 1993, fluid and sludge were not present in the sump. Samples were not collected for these components. Drilling adjacent to the sump encountered the soil/tuff interface at 30 in. Because of the shallow depth of the hole, only a surface sample and a soil/tuff interface sample were collected. A sample was taken at a depth of 4 ft from within the sump at the point of auger refusal. All samples were analyzed for uranium, tritium, plutonium, gamma emitters, inorganic chemicals, and SVOCs. The two subsurface samples were analyzed for VOCs.

Plutonium-238 and plutonium-239/240, the solvent 2-hexanone (0.059 mg/kg), and tritium were found above background but below their SALs (Environmental Restoration Project 1995, 1263).

Section 4.3 of the September 1995 RFI Report for MDA K, which discusses the Phase I investigation of PRS 33-002(c), is provided as Attachment 2 of this report.

5.2.4 Field Investigation

Sampling at PRS 33-002(c) conformed to the current use (industrial) or construction scenario of the conceptual model described in the RFI Work Plan for Operable Unit 1122, Section 3.1.2 (LANL 1992, 0784). With building waste as the primary source, exposure routes for human receptors are ingestion and dermal contact. Because the sump is a subsurface structure, inhalation is not considered a likely exposure route, and no surface sampling was performed.

In the 1996 sampling campaign, one borehole was drilled in the center of the sump, to a depth of 62 ft. Sample logs report a sharp change from fill to sump gravel at 4 ft. The tuff interface was located at 8 ft 3 in. The remaining samples were collected in tuff. The character of the tuff was soft and friable near the bottom of the sump and became progressively more consolidated with depth. For the first 12 ft, samples were analyzed for tritium, uranium, inorganic chemicals, VOCs, and SVOCs (Table 5.2.4-1).

TABLE 5.2.4-1

SUMMARY OF SAMPLES (EXCEPT TRITIUM) TAKEN FOR PRS 33-002(c)

SAMPLE ID	SITE ID	MEDIUM	DEPTH (ft)	RADIO-NUCLIDES	INORGANIC CHEMICALS	VOCs	SVOCs
0333-96-0074	33-1697	Fill	5	2190[a]	2189	2188	2188
0333-96-0075	33-1697	Interface	8.5	2190	2189	2188	2188
0333-96-0076	33-1697	Tuff	12	2190	2189	2188	2188

a. ER analytical request number.

Samples collected every 5 ft thereafter were analyzed only for tritium by both fixed laboratory and by the MRAL (Table 5.2.4-2).

TABLE 5.2.4-2

SUMMARY OF TRITIUM SAMPLES TAKEN FOR PRS 33-002(c)

SAMPLE ID	SITE ID	MEDIUM	DEPTH (ft)	FIXED LABORATORY	MRAL[a]
0333-96-0049	33-1697	Tuff	19.5	2195[b]	4/6/96[c]
0333-96-0050	33-1697	Tuff	24	2195	4/6/96
0333-96-0051	33-1697	Tuff	29	2195	4/6/96
0333-96-0052	33-1697	Tuff	31.5	2195	4/6/96
0333-96-0053	33-1697	Tuff	36	2195	4/6/96
0333-96-0054	33-1697	Tuff	40.5	2195	4/6/96
0333-96-0055	33-1697	Tuff	48.5	2195	4/6/96
0333-96-0056	33-1697	Tuff	52	2195	4/6/96
0333-96-0057	33-1697	Tuff	58.5	2195	4/6/96
0333-96-0058	33-1697	Tuff	62	2195	4/6/96

a. MRAL = Mobile radiological analytical laboratory
b. ER analytical request number
c. Date analyzed—no MRAL request number assigned

In the 1993 sampling campaign, plutonium-238 was detected, although it was well below its SAL. In 1996, additional analyses were performed to address concerns that plutonium might be widespread or present at higher concentrations. The three samples (0333-96-0074 through -0076) taken from the upper level of the sump were analyzed for plutonium by a fixed laboratory. Six additional samples from two locations near the original 1993 hand-augered hole were collected for MRAL analysis (Table 5.2.4-3).

TABLE 5.2.4-3

SUMMARY OF PLUTONIUM SAMPLES TAKEN FOR PRS 33-002(c)

SAMPLE ID	SITE ID	MEDIUM	DEPTH (ft)	PLUTONIUM
0333-96-0074	33-1697	Fill	5	2190[a]
0333-96-0075	33-1697	Fill	8.5	2190
0333-96-0076	33-1697	Tuff	12	2190
0333-96-0519	33-1650	Soil	0.7	2247 MRAL[b]
0333-96-0520	33-1650	Tuff	1.3	2247 MRAL
0333-96-0521	33-1651	Tuff	0.7	2247 MRAL
0333-96-0522	33-1651	Tuff	2	2247 MRAL
0333-96-0523	33-1651	Tuff	2.5	2247 MRAL
0333-96-0524	33-1650	Tuff	1.7	2247 MRAL

a. ER analytical request number
b. MRAL = Mobile radiological analytical laboratory

5.2.5 Evaluation of Inorganic Chemicals

Chromium, copper, mercury, lead, and zinc were detected above background UTLs but below SALs in the initial 12-ft depth of the sump samples (Table 5.2.5-1). Because two of the samples were taken in tuff, the 95%,0.95 UTLs for Unit 3 of the Bandelier Tuff are shown below for comparison, in addition to LANL mixed-soil UTLs.

TABLE 5.2.5-1

INORGANIC CHEMICALS DETECTED ABOVE UTLs AT PRS 33-002(c)

SAMPLE ID	DEPTH (ft)	CHROMIUM (mg/kg)	COPPER (mg/kg)	MERCURY (mg/kg)	LEAD (mg/kg)	ZINC (mg/kg)
SAL	N/A[a]	210	2 800	23	400	23 000
95%,.95 UTL	N/A	19.3	15.5	0.1	23.3	50.8
95%,.95 UTL QBT3	N/A	2.1	2	NA[b]	16.2	55.5
0333-96-0074	5	173	36.7	1.4	126	271
0333-96-0075	8.5	46.4	12.3	0.3	86.4	86.8
0333-96-0076	12	18	1.6 (U[c])	0.09	5.8	28.5

a. N/A = Not Applicable
b. NA = Not Analyzed
c. U = Undetected—the listed value is the detection limit

5.2.6 Evaluation of Radionuclides

Uranium and plutonium, as analyzed by fixed laboratory, were not detected above LANL UTLs in the upper 5-12 ft of the borehole in the sump. Because a total digestion was used for sample preparation for uranium analysis, uranium results were compared to the total background UTL of 5.45 mg/kg (see Section 4.2 of this report). Uranium results at PRS 33-002(c) ranged from 2.9 to 3.6 mg/kg.

The samples collected from the two locations near the 1993 hand-augered site were analyzed by the MRAL. These samples contained plutonium above LANL UTLs but well below SALs (Table 5.2.6-1). MRAL plutonium-detection methods were inadequate to measure levels below background, but were adequate for comparing to SALs. Because plutonium concentrations are below SALs, plutonium will not be carried forward in the screening process.

TABLE 5.2.6-1

PLUTONIUM DETECTED BY MRAL ANALYSES AT PRS 33-002(c)

SAMPLE ID	DEPTH (ft)	PLUTONIUM-238 (pCi/g)	PLUTONIUM-239/240 (pCi/g)
SAL	N/A[a]	27	24
LANL UTL	N/A	0.014	0.052
0333-96-0519	0.5	0.83 (J)[b]	0.7 (J)
0333-96-0520	1	0.71 (J)	0.6 (J)
0333-96-0521	0.5	0.101 (U)[c]	1.21 (J)
0333-96-0522	1.5	0.65 (J)	4.97 (J)
0333-96-0523	2.5	0.8 (U)	0.67 (J)
0333-96-0524	1.5	0.79 (U)	0.67 (J)
0333-96-0524	1.5	0.70 (J)	0.59(U)

a. N/A = Not Applicable
b. J = Estimated—value is above detection limit but below the estimated quantitation limit
c. U = Undetected—value listed is the 1-sigma uncertainty

Tritium was detected above its LANL UTL in every sample, including samples screened by the MRAL. Samples taken at 4.5 and 8 ft contained tritium above its SAL (Table 5.2.6-2).

TABLE 5.2.6-2

TRITIUM DETECTED AT PRS 33-002(c)

SAMPLE ID	DEPTH (ft)	FIXED LABORATORY (pCi/g)	MRAL (pCi/g)
SAL	N/A[a]	260	260
LANL UTL	N/A	1	1
0333-96-0074	5	**305**	NA[b]
0333-96-0075	8.5	**370**	NA
0333-96-0076	12	113	NA
0333-96-0049	19.5	144	137
0333-96-0050	24	132	116
0333-96-0051	29	142	153
0333-96-0052	31.5	82	42
0333-96-0053	36	54	39
0333-96-0054	40.5	32	28
0333-96-0055	48.5	26	24
0333-96-0056	52	18	23
0333-96-0057	58.5	14	11
0333-96-0058	62	10	8

a. N/A = Not Applicable
b. NA = Not Analyzed

5.2.7 Evaluation of Organic Chemicals

Both common PAHs that are typical of tar and a common plasticizer were detected in Phase II sampling. Although three PAHs were found above their SALs, all were confined within the sump or at the interface (Table 5.2.7-1).

5.2.8 Risk-Based Screening Assessment

Using the maximum concentrations from both the 1993 and 1996 sampling campaigns at this PRS, an MCE calculation was performed for the noncarcinogenic contaminants (Table 5.2.8-1). Benzo[g,h,i]perylene and phenanthrene were not included in the calculation because they have no SALs. (See discussion in Section 5.0 of this report.) The MCE result for noncarcinogens was less than 1, indicating that noncarcinogens are not a human health risk at PRS 33-002(c). Therefore, noncarcinogens are not carried forward in the screening process.

TABLE 5.2.7-1

DETECTED ORGANIC CHEMICALS FOR PRS 33-002(c)

SAMPLE ID	DEPTH (ft)	ANALYTE	RESULT mg/kg)	SAL (mg/kg)	EQL (mg/kg)
0333-96-0074	5	Acenaphthene	0.38	360	0.33
		Anthracene	0.1(J[a])	18 000	0.33
		Benzo[a]pyrene	**0.42**	0.061	0.33
		Benzo[a]anthracene	**0.66**	0.61	0.33
		Benzo[b]fluoranthene	**1.1**	0.61	0.33
		Benzo[g,h,i]perylene	0.59	NS[b]	0.33
		Bis(2-ethylhexyl)phthalate	0.45 (B[c],U[d])	32	0.33
		Chrysene	0.52	61	0.33
		Di-n-butylphthalate	0.069(J)	6 500	0.33
		Fluoranthene	0.49	2 600	0.33
		Indeno[1,2,3-cd]pyrene	0.56	0.61	0.33
		Phenanthrene	0.24(J)	NS	0.33
		Pyrene	0.45	1 900	0.33
0333-96-0075	8.5	Acenaphthene	0.067(J)	2 200	0.33
		Benzo[a]pyrene	**0.13(J)**	0.061	0.33
		Benzo[b]fluoranthene	0.27(J)	0.61	0.33
		Benzo[g,h,i]perylene	0.13(J)	NS	0.33
		Bis(2-ethylhexyl)phthalate	0.43 (B,U)	32	0.33
		Di-n-butyl phthalate	0.067(J)	6 500	0.33
		Fluoranthene	0.13(J)	2 600	0.33
		Indeno[1,2,3-cd]pyrene	0.10(J)	0.61	0.33
		Phenanthrene	0.10(J)	NS	0.33
		Pyrene	0.13(J)	1 900	0.33
0333-96-0076	12	Di-n-butylphthalate	0.07(J)	6 500	0.33

a. J = Estimated value—the analyte was detected above the detection limit but below the estimated quantitation limit
b. NS = No SAL available
c. B = Analyte was detected in the laboratory blank
d. U = Undetected—result given is the detection limit

TABLE 5.2.8-1

MCE FOR NONCARCINOGENIC EFFECTS AT PRS 33-002(c)

CHEMICAL	LOCATION ID	SAMPLE ID	MAXIMUM SAMPLE VALUE (mg/kg)	SOIL SAL (mg/kg)	NORMALIZED VALUE
Copper	33-1697	0333-96-0074	36.7	2 800	0.01
Mercury	33-1697	0333-96-0074	1.4	23	0.06
Lead	33-1697	0333-96-0074	126	400	0.3
Zinc	33-1697	0333-96-0074	271	23 000	0.01
Acenaphthene	33-1697	0333-96-0074	0.067	2 200	0.00003
Anthracene	33-1697	0333-96-0074	0.1	18 000	0.000006
Chrysene	33-1697	0333-96-0074	0.52	61	0.009
Di-n-butylphthlate	33-1697	0333-96-0074	0.07	6 500	0.00001
Fluoranthene	33-1697	0333-96-0074	0.49	2 600	0.0002
Pyrene	33-1697	0333-96-0074	0.45	1 900	0.0002
				Total	0.4

Three carcinogenic PAHs were found above SALs (Table 5.2.8-2). PAHs are carried forward in the screening process.

TABLE 5.2.8-2

PRS 33-002(c) CARCINOGENS WITH CONCENTRATIONS IN SOIL THAT EXCEED SALs

SAMPLE ID	LOCATION ID	DEPTH (ft)	BENZO[a]PYRENE (mg/kg)	BENZO[a]ANTHRACENE (mg/kg)	BENZO[b]FLUORANTHENE (mg/kg)
SAL	N/A[a]	N/A	0.061	0.61	0.61
PRG[b]	N/A	N/A	0.26	2.6	2.6
0333-96-0074	33-1697	5	0.42	0.66	1.1
0333-96-0075	33-1697	8.5	0.13(J[c])	0.33(U[d])	0.27(J)

a. N/A = Not Applicable
b. PRG = Preliminary Remediation Goal for industrial sites (EPA 1996, 1307)
c. J = Estimated value—the analyte was detected above the detection limit but below the estimated quantitation limit
d. U = Undetected—value listed is the detection limit of the analytical instrument

Two additional carcinogens, chromium and Ideno[1,2,3-cd]pyrene, were detected below SAL but above UTLs. An MCE result of 1.7 indicates that these contaminants may represent a carcinogenic hazard to human health at PRS 33-002(c) (Table 5.2.8-3). Therefore, these contaminants are carried forward in the screening process.

TABLE 5.2.8-3

MCE FOR CARCINOGENIC EFFECTS AT PRS 33-002(c)

CHEMICAL	LOCATION ID	SAMPLE ID	MAXIMUM SAMPLE VALUE (mg/kg)	SOIL SAL (mg/kg)	NORMALIZED VALUE
Chromium	33-1697	0333-96-0074	173	210	0.8
Ideno[1,2,3-cd]pyrene	33-1697	0333-96-0074	0.56	0.61	0.9
				Total	1.7

5.2.9 Human-Health Risk Assessment

In two samples, tritium was found above its SAL. The risk assessment for PRS 33-002(b), described in Section 5.1.9 of this report, determined that a site-specific concentration of 101 000 pCi/g of tritium produces a dose of 5.8 mrem/year, far below the DOE exposure limit to the public of 100 mrem/year. Because the maximum tritium concentration (370 pCi/g) at sump 33-002(c) is far below 101 000 pCi/g, no separate risk assessment was performed. Because the relation of activity to dose is linear, a dose at PRS 33-002(c) can be estimated at 0.02 mrem/year under the same assumptions used at PRS 33-002(b).

An MCE for carcinogens indicates that PAHs and chromium may be of concern at this PRS. PAHs are common industrial pollutants. Except for benzo(a)pyrene in one sample, levels at this PRS are below industrial PRGs and do not indicate that PAHs were used experimentally in the tritium facility. Therefore, LANL does not propose a cleanup at this site for PAHs.

The industrial cleanup level for chromium is 450 mg/kg. The sample containing highest chromium was collected at a depth of 5 ft. Two samples—one at 8.5 ft and one at 12 ft—were collected below it and showed decreasing concentrations, with the level below UTL at 12 feet. Because the concentration is approximately one-third of the cleanup level and contamination has been bounded, no cleanup of the sump is proposed.

5.2.10 Preliminary Ecological Assessment

In cooperation with the New Mexico Environment Department and EPA Region 6, the Laboratory ER Project is developing an approach for ecological risk assessment. Further ecological risk assessment at these sites will be deferred until the sites can be assessed as part of the ecological exposure unit methodology currently being developed.

5.2.11 Conclusion and Recommendation

Phase I sampling, which used hand augering, did not locate sump TA-33-133. Phase II sampling, using a drill rig, located the sump and drilled through it into tuff to a depth of 62 ft. An MCE for noncarcinogenic effects determined that these chemicals do not present a hazard to human health. Radiological screening by the MRAL confirmed that plutonium is present above background, but well below SAL. Low levels of PAHs found in the sump are not inconsistent with industrial sites. Chromium is present well above background UTLs, but below industrial cleanup levels. Because contamination is confined to the sump and contamination is bounded above 12 ft, no cleanup is proposed for these contaminants.

Tritium was detected somewhat above its SAL, but far below levels that could produce a dose of the DOE limit of 100 mrem/year. Tritium contamination relative to SAL was bounded at depth by sampling between 8 ft and 12 ft. Because of the low tritium levels and the short tritium half-life, contamination of regional groundwater is considered to be unlikely. No perched aquifer was found by deep drilling near PRS 33-002(c) during the Phase I investigation of MDA K (Environmental Restoration Project 1995, 1263).

Because tritium and other contaminant concentrations are below human health risk-based levels of concern, PRS 33-002(c) is proposed for NFA for human health under Criterion 5.

5.3 PRS 33-003(b)

PRS 33-003(b) is chamber TA-33-6 at MDA D, East Site. It is discussed in the RFI Work Plan for Operable Unit 1122, Sections 3.5.2.1 and 4.5.3.1 (LANL 1992, 0784). HE and inorganic chemicals, principally beryllium, were identified in the work plan as potential contaminants. Subsequent archival investigation indicated that less than 5 lb. of PCBs may have been present in neutron detectors in the chamber. Because PCBs may have been deposited on the surface by an explosive test shot in the chamber, a revised sampling plan for the surface- and subsurface-soil components was included in the September 1995 TA-33 RFI report (Environmental Restoration Project 1995, 1265).

Based on results of the revised sampling, PRS 33-003(b) is recommended for NFA for human health.

5.3.1 History

Chamber TA-33-6 was constructed in 1948 and used for initiator tests involving milligram quantities of beryllium. Polonium-210 (with a half-life of 138 days) was the radiological component of the initiators. Chamber TA-33-6 was used twice, once in December 1948 and again in April 1952. Both tests required detonation of HE, and the second test destroyed the chamber. Debris from the detonation was ejected through the elevator shaft and spread over the mesa. A 10-ft-deep crater formed around the chamber (Blackwell 1952, 02-034). The crater was later filled with the ejected debris and covered with uncontaminated soil (Blackwell 1953, 02-035). In 1963 the depression was refilled (The Zia Company 1963, 02-030).

5.3.2 Description

MDA D is located at East Site. The mesa is level; no drainage patterns are evident. A thin layer of hard-packed soil covers bedrock tuff. The area is covered with weeds interspersed with a few chamisa shrubs. A surface concrete pad—the staging area for chamber TA-33-6—is located

ADDENDUM 1

Analytical Data for PRSs in the September 1995 RFI Report for TA-33 MDA K.

Errata: According to FIMAD, there are two errors in Table 4-6, p. 27:

Fixed lab result for AAA3884 (33-1230, 0 feet) should be 1 600 pCi/g instead of 1.6 pCi/g.

RV result for AAA3319 (33-1231, 210 feet) should be 0.32 pCi/g instead of 320 pCi/g

LANL apologizes for these errors.

RESPONSE TO REQUEST FOR SUPPLEMENTAL INFORMATION

REGARDING THE TA-33 RFI REPORT OF JANUARY 1995

GENERAL COMMENTS

1. LANL shall provide a summary of all analytical data regardless of non-detectable concentrations.

Response: As per an October 22, 1997, telephone agreement between Tracy Glatzmaier of LANL and John Kieling of NMED, summaries of 1993 analytical data are provided for all PRSs that were included in the January 1995 RFI Report.

The data are provided on floppy disk in Excel™ 4 format as Addendum 1 to this response. Two copies of each PRS file are provided. One copy is locked as a read-only archival file. The other file is provided as an unlocked file for the convenience of the NMED when reviewing the data. The data include sample ID, request number, analytical suite, analytical result and qualifier (if any), and units.

Additional sampling and analysis has occurred at PRSs 33-007(c) since the 1993 sampling campaign was completed. Analytical data for PRSs 33-004(g), 33-010(f), 33-011(e), and 33-012(a) will be resubmitted with the reports for these PRSs in which each PRS is recommended for NFA.

2. LANL may submit a Class 3 permit modification for the 33-010(e) under the Document of Understanding No Further Action Criterion 5.

Response: LANL will submit a Class 3 permit modification request for no further action at PRS 33-010(e).

SPECIFIC COMMENTS

1. **33-004(i) Outfall:** LANL must include lead within the screening risk assessment for 33-017 since it is attributable to the vehicle maintenance area.

Response: A baseline risk assessment for lead at PRS 33-017 was included in Appendix D, Section 3.0, of the RFI Report submitted by Field Unit 3 in September 1995. The exposure unit of approximately 0.15 acres (500 m^2) included the vehicle maintenance area, the two 33-004(i) outfalls and drainages, and storage area PRS 33-012(a). Lead concentrations from all samples within the exposure unit were used in the risk calculations regardless of the PRS to which they were assigned. Results of this risk assessment indicate an acceptable risk for lead exposure under EPA guidelines. Because the concentrations of lead on the east side of shop TA-33-39 were higher than one would expect from leaded gasoline emissions, it is reasonable to presume that lead came from the shop,

which contained lead melting apparatus. Therefore, lead contamination was attributed to PRS 33-004(i) which contains the two outfalls from TA-33-39.

For the convenience of NMED when reviewing this risk assessment, Appendix D, Section 3.0 of the September 1995 RFI Report is included as Attachment A to this response.

2. **33-005(a-c) Septic System, Industrial Drain Line and Leach field associated with TA-33-21:** LANL did not respond to the information requested in the notice of deficiency dated April 22, 1995 regarding blank contamination. LANL must report all laboratory contamination in the RFI Report Tables and identify them with a qualifier ("B").

Response: Blank contamination was not applied as a qualifier in 1993 data. Other qualifiers for analytical results for these PRSs are included in Excel tables provided as Addendum 1 to this response. These results are extracted from the ER Project FIMAD database and include qualifiers assigned as a result of data validation. Because data validation is an independent function not subject to modification in FIMAD by field unit personnel, LANL cannot comply with this request to include a "B" qualifier.

LANL presumes that NMED's concern lies in the EPA practice of allowing five times the blank contamination concentration to be subtracted from the analyte concentration in the field samples. This correction is a function of the decision makers. Neither the analytical laboratory or the data qualifiers correct any sample data for blank contamination. [Personal communication on November 13, 1997 between Dorothy Hoard (EM/ER) and Peggy Gautier (validation section leader, CST-3) and between Chris Leibman (organic analysis section leader, CST-12)]. Results listed in the Excel tables provided in this response are the actual concentrations of analyte in the samples. They have not been corrected for blank contamination. Please note that blank contamination of a sample would result in a high bias.

Blank sample data are not provided in the Excel tables included in Addendum 1. Quality control analyses, which includes the analysis of blanks, are a function of the analytical request number (the analytical batch) rather than the PRS or the field sample.

3. **33-004(d) Septic System:** LANL must conduct additional sampling at depth for this PRS. LANL must submit a Phase II SAP.

Response: LANL recognizes that there is no agreement between DOE/LANL and NMED on adequate bounding of vertical extent of contamination at PRSs slated for characterization by the ER Project. However, for the reasons described below, LANL believes that characterization of hazardous constituents at depth adequately bounds contamination at PRS 33-004(d). Because LANL's written justification of the adequacy of the approved sampling

was not accepted by NMED, further detail is provided below in an effort to fully describe and justify LANL's recommendation of NFA.

- At this PRS, LANL completed three boreholes that were sampled at depths of 5 ft and 7-8 ft for a total of six subsurface samples. (Note that two samples at depth—AAA2131 and AAA2129—were resampled for volatiles because VOC analyses were not performed on the original samples.) These boreholes were located at sites where leakage from the septic system was deemed most likely : adjacent to the tank and near the line of the drainpipe. Thus, LANL believes that subsurface samples were taken at locations where high levels of contamination were likely if the septic system had significantly contaminated the subsurface environment near the tank.

- The subsurface samples all contained constituents at levels well below SALs. Constituents found above background UTLs in these samples include uranium, cyanide, and acetone. Cyanide values range from non-detects to 22.5 mg/kg (at 5 ft) in some subsurface samples. However, this level is orders of magnitude below the SAL for cyanide (1 600 mg/kg). Acetone levels range from 0.047 to 0.066 mg/kg, more than six orders of magnitude below the SAL of 8 000 mg/kg. LANL believes that subsurface contamination by cyanide and acetone is bounded beneath the septic tank and drainline. Not only are subsurface concentrations of constituents well below SALs, but the deeper samples show lower or comparable levels when compared to the shallower samples. For example, the highest level cyanide sample, AAA2133 (22.5 mg/kg at 5 ft), is bounded at depth by sample AAA2134 and by down-drainage samples in which cyanide was not detected.

- Subsurface uranium concentrations, which range from 2.8 to 4.7 mg/kg, are slightly greater than both the lab-wide background UTLs for soils that was in use in 1995 (2.82 mg/kg) and that in use now (1.87 mg/kg). (Sample logs indicate the subsurface drainline is in fill material; therefore, soil UTLs are appropriate.) However, none of these values are above the site-specific TA-33 UTL (4.84 mg/kg) that was calculated in 1995. Please see Section 3.2.2 of the January 1995 RFI Report for derivation of the TA-33 site-specific background. Note that Area 6 is located on a basaltic cinder cone and is not typical of the LANL site-wide tuff backgrounds. Uranium in these samples may not be anthropogenic; it may represent higher local background values due to the higher uranium (7.12 mg/kg) from subunits of the Tshirege (Units 2 and 3) Formation that outcrop to the west. Uranium values are well below both the natural uranium SAL that was in use in 1995 (95 mg/kg) and that currently in use (29 mg/kg).

- LANL acknowledges that the sediment samples taken within the downgradient drainage are not bounded at depth. Because this drainage is near bedrock levels, no samples at depths greater than 6 in. were collected in the drainage. However, the levels of constituents in this drainage are at very low levels. Samples AAA2138 through AAA2144 contain uranium at levels that range from 1.1 to 3.6 mg/kg (current LANL background UTL = 1.87 mg/kg; current SAL = 29 mg/kg). As noted above, such uranium levels may represent local background

concentrations of uranium because they are below the TA-33 site-specific uranium UTL that was calculated in 1995.

One sample (AAA2140) contained non-carcinogenic PAHs at levels from 0.49 to 0.62 mg/kg (current SALs: fluoranthene = 2 600 mg/kg; phenanthrene = no SAL; pyrene = 19 000 mg/kg). This sample was located down drainage from a pile of asphalt deposited at the head of the drainage and from a creosote-treated telephone pole, which are likely sources for these PAHs.

Because of these extremely low levels of constituents and because a head of standing water for driving constituent migration to depth would not have existed for long periods of time in this drainage, LANL believes that the likelihood of finding additional high levels of constituents at depths greater than 6 in. within the drainage is small.

In summary, LANL believes that Phase I sampling (1) determined the nature of releases at PRS 33-004(d) and (2) bounded the low levels of hazardous constituents in both the vertical and surface-downgradient directions. LANL believes that additional sampling at this PRS would not significantly increase the technical defensibility of the decision to request NFA for this PRS. LANL asks that NMED reconsider its request for a Phase II SAP at this PRS. If, after reviewing the arguments presented above, NMED still believes that a SAP is necessary, LANL requests both a more specific rationale for sampling and recommendations on sample depths considered adequate for NMED decision-making at this PRS.

4. **33-004(g) Septic System:** LANL must conduct additional sampling that includes analyses for SVOCs and sampling at depth for this PRS. LANL must submit a Phase II SAP.

Response: A sampling and analysis plan for PRS 33-004(g) is submitted as Attachment B to this response.

5. **33-004(h) Warehouse Outfall:** LANL must conduct additional sampling at depth for this PRS. LANL must submit a Phase II SAP.

Response: Phase I investigation of this PRS revealed negligible amounts of surface contamination. Because of a grade of approximately 10%, there is never standing water in this drainage to provide a hydrologic head that could drive contaminants into the tuff. In addition, because there is no evidence of a pathway or release from TA-33-20, LANL requests that NMED reconsider the need for additional sampling.

PRS 33-004(h) is the unlocated outfall from two floor drains in TA-33-20, a warehouse without a water supply (Santa Fe Engineering 1992. See Attachment C). Undocumented evidence (a July 22, 1993 conversation among Roy Michelotti (CST-7), Dorothy Hoard (EM/ER) and Paul Vidrine (FSS-6), LANL project engineer for a TA-33 utilities upgrade) indicated that the outfall pipe was most likely routed to the Main Site septic tank in the 1950s or 1960s. The drainage into which the outfall may have emptied carries a large volume of surface runoff water from

the Main Site pavements. In places, this drainage is scoured to tuff, and where sediments are present they are very shallow. At the east edge of the pavement, the overall slope is about 10% and increases to the east.

The existing data provide no indication of a significant release to this drainage from the warehouse, in which beryllium and uranium were stored in dry form. The surface samples described in this report showed nickel (40 mg/kg; SAL = 1 500 mg/kg) and zinc (110 mg/kg; SAL = 23 000 mg/kg) above background, residual pesticides at levels slightly above the quantitation limit, and noncarcinogenic polyaromatic hydrocarbons at less than 0.5 mg/kg. The main drainage below this site continues to be investigated due to potential releases from other PRSs.

Attachment C is the report of the inspection of TA-33-20 by Santa Fe Engineering, Inc., as part of a LANL-wide investigation of wastewater streams.

LANL believes that PRS 33-004(h) itself has been adequately characterized. LANL requests that NMED reconsider its request for a Phase II SAP at this PRS. If, after reviewing the arguments presented above, NMED still believes that a SAP is necessary, LANL requests a more specific statement of NMED's concerns.

6. **33-010(f) Surface Disposal:** Since the piles are located on the slopes of a tributary, LANL must collect samples in the drainage and analyze them for inorganics, semivolatile organic compounds, pesticides and PCBs. LANL must submit a sampling and analysis plan (SAP) for this PRS.

Response: A sampling and analysis plan for PRS 33-010(f) is submitted as Attachment D to this response.

7. **33-011(e) Drum Storage Area:** LANL must at a minimum use aerial photographs, other suitable historical information, interviews, etc. to determine the location of the drums. In addition, LANL must also resample the drum storage area for inorganics, SVOCs, and volatile organic compounds. LANL must submit a SAP to address these concerns.

Response: LANL believes that this area was misidentified as a drum storage area by the authors of the SWMU Report. Recent (November 1997) informal communication with a member of the operating group (EES-1) at the time of the ER reconnaissance and identification of SWMUs (1986—1987) indicates that bunker TA-33-22 was used for storage and for thin-section preparation of geological samples. Drums containing kerosene, cutting oil, and isopropanol were stored on the pavement near the door to the bunker. Waste from the thin-section operation, which consisted of rags used for wiping cutting oil and kerosene, was taken to a dumpster located at Main Site. The thin-section preparation work was moved to Main Site after a few months because bunker TA-33-22 has no water supply and is not heated.

Because LANL cannot account for the period between 1972 and 1986, a sampling and analysis plan for PRS 33-011(e) is submitted as Attachment E to this response. Aerial photographs from 1984, 1986, and 1987 are also provided. These photographs also show PRS 33-011(a), a drum storage area that is also northwest of TA-33-22 and may be the intended area in the SWMU Report. PRS 33-011(a) was sampled intensively in 1993.

8. **33-012(a) Drum Storage:** The polychlorinated biphenyl (PCB) action levels presented for this PRS does not represent the Environmental Protection Agency's position on PCB action levels. Depending on the site specific considerations, the regional Administrator may determine that a different action/cleanup level is more protective than those presented. Environmental Protection Agency (EPA) Region 6 has a policy of requiring cleanup of PCBs in any drainage areas or areas leading to surface water of 1 part per million in soil. Official notification of identified PCBs should be made to the Toxic Substance Control Act (TSCA) personnel.[See EPA Comments on Draft LANL Guidance, Cleanup of Polychlorinated Biphenyls dated May 8, 1995, and EPA letter dated September 20, 1995, PCB Spill Cleanup Policy.]

Response: LANL recommends rescinding our request for NFA at this PRS pending further investigation and possible cleanup of PCBs.

The TA-33 RFI Report of January 1995 was written in accordance with guidance available at the time of submission. Since that time, the action level for PCB cleanup has been reduced by an order of magnitude to 1 mg/kg in locations that may contribute runoff to a watercourse. LANL is aware of EPA and NMED concerns for PCBs in areas potentially impacting surface water. As a best management practice, straw bales are in place in the drainage below 33-012(a) and several other PRSs that contribute runoff to this drainage. A voluntary corrective action is proposed in this drainage, as described below.

The ER Project has instituted a practice to provide copies to TSCA EPA Region 6 of all ER documents that identify PCB contamination.

After the submittal of the January 1995 RFI Report, additional investigations were performed both at the 33-012(a) area, which is embedded in PRS 33-017, and within the adjacent drainage area. Sampling and analysis plans for this work were submitted in the September 1995 RFI Report for TA-33. The results are summarized here.

Summary of subsequent sampling: An additional three fixed-laboratory samples were collected in 1996 in the asphalt storage area that constitutes the source area for 33-012(a). Three more laboratory samples were collected on the slope below, which overlaps the vehicle maintenance area of PRS 33-017, and another laboratory sample was collected in the main drainage. An additional half dozen screening samples in the area screened negative for PCBs using a field immunoassay kit and were not submitted for laboratory analysis; one of these was from the

asphalted storage area of PRS 33-012(a). Of the seven laboratory samples collected at the storage area (including the four in the January 1995 report), PCBs were detected above 1 mg/kg in only one—AAA2032—for which the result (2.3 mg/kg of Aroclor 1254) is included in Table 4-11 of the January 1995 report. Results for the other six samples were below 0.3 ppm. AAA2032 was collected beneath asphalt. The figure in Attachment F shows PCB sampling points and the relationship of PRSs in this area.

Investigations and remedial actions in the nearby drainage are continuing. Aroclor 1254 [the type that appears to be associated with PRS 33-012(a)] was detected at 2.4 mg/kg in one of the slope samples below PRS 33-012(a) within PRS 33-017 vehicle maintenance area, and below 1 mg/kg in one sample from the main drainage. Aroclor 1260 (associated with the Main Site transformer PRS C-33-001 several hundred feet away) was measured at levels up to 5.5 mg/kg in the sediments of the main drainage channel. As a best management practice, straw bales are in place in the drainage and are inspected at least annually.

9. **33-015 Incinerator:** LANL must revise the screening assessment for this PRS based on recent regulatory guidance [Risk Assessment Guidance for Superfund Volume 1, Human Health Evaluation Manual (Part A) pp. 8-12, 8-13. OSWER 9285.7-01A, December 1989].

Response: The conclusions presented in this January 1995 RFI Report detail a screening assessment conducted in accordance with the process outlined in Appendix J of the 1993 version of the IWP. This was the best and most recent guidance available to the report writers at that time. The screening assessment process performed in this report is essentially the same as is conducted today under recent regulatory guidance. The recent regulatory guidance used in the development of the LANL screening process is based primarily on the Proposed Subpart S RCRA Corrective Action regulation, and EPA's Soil Screening Guidance Document itself (EPA Soil Screening Guidance Fact Sheet, Users Guide, and Technical Background Document, 1996).

The multiple constituenct evaluation in the January 1995 RFI Report was based on an MCE for individual samples. Current LANL guidance directs that MCEs be based on the highest concentration of each contaminant in the entire sampling set for each PRS. For the convenience of NMED, LANL has redone the MCE using current SALs and LANL background UTLs (Table 9-1). Phenanthrene (detected at 0.37 mg/kg) is not included in the MCE because it has no SAL.

TABLE 9-1

MCE FOR NONCARCINOGENIC EFFECTS AT PRS 33-015

CHEMICAL	LOCATION ID	SAMPLE ID	MAXIMUM SAMPLE VALUE (mg/kg)	SOIL SAL (mg/kg)	NORMALIZED VALUE
Cadmium	33-1094	AAA2039	8.9	380	0.03
Lead	33-1093	AAA2038	350	400	.88
Silver	33-1093	AAA2038	19	380	0.05
Zinc	33-1093	AAA2038	740	23 000	0.03
Fluoranthene	33-1109	AAA2056	0.41	2 600	0.0002
Pyrene	33-1109	AAA2056	0.36	1 900	0.0002
				Total	**1**

Lead is by far the leading contributor to the MCE result. At the time of the January 1995 report, LANL was instructed to presume that TA-33 may be released from laboratory control. Current guidance indicates that the technical area will remain under institutional control. Therefore, from a human health risk assessment standpoint, an industrial scenario with a cleanup level of 1 000 mg/kg for lead is appropriate. The maximum concentration for lead (350 mg/kg) is well below this threshold. LANL presumes that the lead and silver contamination derive from paint on the incinerator. If TA-33 is released to public, the incinerator will be removed under decontamination and decommissioning protocol.

10. **33-007(c) Firing Area:**

a. LANL shall conduct a Phase II investigation to determine the nature and extent of contamination above background and UTLs.

Response: LANL believes that no further investigations are necessary. Surface sampling in the area potentially affected by firing site activities at 33-007(c) has been extensive. Thirty-one surface samples from 22 locations covering approximately 3.5 acres around this firing site are discussed in the January 1995 RFI Report. These samples reveal no widespread contamination.

Above-background levels of antimony, cadmium, chromium, lead, nickel, and zinc were found at one location, near the barricade that separates the excavated part of the cinder cone from the main section of Area 6. A revised MCE for noncarcinogenic effects (using the maximum contaminant concentration over the entire data set) indicates that these contaminants do not present a hazard to human health (Table 10-1). Chromium, a carcinogen,

is not included in the MCE. Uranium was found above SAL; however, extensive sampling indicates that high levels of uranium are not widespread at Area 6. The range of uranium concentrations (3—5.5 mg/kg) above UTL, other than at this one location near the barricade, are little above background UTL (1.87 mg/kg).

TABLE 10-1

MCE FOR NONCARCINOGENIC EFFECTS AT PRS 33-007(c)

CHEMICAL	LOCATION ID	SAMPLE ID	MAXIMUM SAMPLE VALUE (mg/kg)	SOIL SAL (mg/kg)	NORMALIZED VALUE
Antimony	33-1211	AAA2164	2.6	31	0.08
Cadmium	33-1211	AAA2038	4.4	200	.02
Lead	33-1211	AAA2038	150	400	0.4
Nickel	33-1211	AAA2039	850	6 500	0.1
Zinc	33-1211	AAA2056	220	23 000	0.01
				Total	**0.6**

Across the entire PRS, only nickel (21—67 mg/kg) appeared to be widespread in the area when compared with LANL background, as shown in Table 4-14 of the January 1995 report. However, the background samples of the basaltic cinder cone material that underlies Area 6 show that nickel concentrations in this substrate are unusually high (see Figure 3-2 and the discussion in Section 3.2.2.1 of the January 1995 report). By comparison with these data, the impact of Area 6 activities on nickel concentrations is minimal, and in any case well below screening action levels.

Except for the barricade sample mentioned above, lead (36—80 mg/kg), zinc (75—130 mg/kg), and beryllium (2.3—2.4 mg/kg) are detected only sporadically and at concentrations far below screening action levels (Table 4-14 of the January 1995 RFI Report). LANL believes that the extent of surface contamination has been adequately characterized by the Area 6—wide sampling of the 1993 campaign.

Because extensive sampling has not shown widespread contamination and no surface ponding areas have been identified at Area 6 that could drive contaminants into the subsurface, LANL believes that no further investigations at 33-007(c) are needed. If, after reviewing the arguments presented above, NMED still believes that a SAP is necessary, LANL requests a more specific statement of NMED's concerns.

b. The AA recommends that LANL perform an interim action to remove the uranium chunks at this PRS.

Response: LANL appreciates NMED's interest in the radioactive component of this PRS. Please be advised that LANL conducted a pilot project in 1996 consisting of a voluntary corrective action to remove uranium from the catcher boxes at PRS 33-007(c). Methodology included separation of contaminated soil from clean soil using the commercial Segmented Gate System™ of ThermoNutech™. A report of the cleanup has been written and submitted to DOE. A draft of that report is included as Attachment G to this response. The final report awaits assessment for ecotoxicological and other applicable regulations at TA-33.

11. **33-011(a) Storage Area:** LANL must revise the screening risk assessment to include PAHs. The PAH levels are not comparable to the urban values presented in "Background Levels of Polycyclic Aromatic Hydrocarbon (PAH) and Selected Metals in New England Urban Soils" [EPA letter to Mr. Taylor dated may 19, 1995: Evaluation of Interim Guidance for Evaluating Polycyclic Aromatic Hydrocarbons in Soil].

Response: LANL acknowledges that the Bradley approach to screening for PAHs is no longer acceptable to EPA and has been withdrawn from use by the ER Project. However, LANL does not feel that this screening assessment need be revised for this PRS because the authors conservatively proceeded to the next step and presented a human health risk evaluation for PAHs. Decisions for this PRS are based on the preliminary risk calculations. Results from the risk evaluation indicate acceptable levels of risk under residential and recreational scenarios.

LANL recommends no further action for human health effects at PRS 33-011(a) under Criterion 5. The area has been used extensively as a parking lot and as a storage area for drilling equipment for many years. Contaminants found during the 1993 sampling campaign consist of constituents associated with these uses and concentrations are not out of line with similar areas at LANL.

ATTACHMENT A

Appendix D, Section 3.0 of the September 1995 TA-33 RFI Report.

Risk calculations for lead at PRS 33-017.

Reference: Environmental Restoration Project, September 29, 1995. "RFI Report for TA-33, PRSs 33-003(a), 33-004(a), 33-007(c), 33-009, 33-011(d), 33-013, 33-016, 33-017 and Revised Sampling Plans for PRSs 33-003(b), 33-004(k), 33-008(a), 33-008(b), C-33-001, C-33-002," Los Alamos National Laboratory Report LA-UR-95-3625, Los Alamos, New Mexico. **Environmental Restoration Project 1995, 1265)**

3.0 RISK CALCULATION FOR LEAD AT SWMU 33-017 VEHICLE MAINTENANCE AREA

Preliminary risk assessment results for the area east of TA-33-39 were discussed in Subsection 4.8.3.3 of this RFI report. This subsection discusses the calculations leading to these results. Analytical results for lead used in the calculations are given in Table D-1.

TABLE D-1

LEAD VALUES IN EXPOSURE UNIT EAST OF TA-33-39

PRS[a]	SITE ID	SAMPLE ID	LEAD (mg/kg)
33-004(i), north	33-1055	AAA1975	10
	33-1056	AAA1976	79
	33-1057	AAA1977	73
33-004(i), south	33-1058	AAA1978	800
	33-1059	AAA1979	71
	33-1060	AAA1980	210
33-012(a)	33-1086	AAA2031	104
	33-1087	AAA2032	118
	33-1088	AAA2033	53
	33-1089	AAA2034	9
33-017, vehicle maintenance area	33-1102	AAA2049	64
	33-1103	AAA2050	90
	33-1104	AAA2051	170
33-017, top of main drainage	33-1105	AAA2052	46
	33-1106	AAA2053	98
	33-1107	AAA2054	200

[a] PCB = Polychlorinated biphenyls.

3.1 Calculations for Lead at the SWMU 33-017 Exposure Unit

The calculation of the mean and upper confidence bound for lead contamination in the exposure unit east of TA-33-39 followed the method for minimum variance unbiased (MVU) estimation for lognormal populations described by Gilbert (1987, 0506), pp. 165-166. The data in Table D-1 are seen to be approximately lognormally distributed in the probability plot of Fig. D-1. (This is a probability plot, that is, the observed values have been sorted and plotted on a logarithmic scale against order statistics from the standard normal distribution. Data from a log-normal distribution should fall approximately along a straight line in such a plot. The departures from a straight line that occur at the low end in Fig. D-1 inflate the estimate of the variance and the estimates of the mean, see Equation 1 below, and especially of the upper confidence interval.)

The MVU estimate of the mean is

$$\hat{\mu} = [\exp(\bar{y})]\Psi_n\left(\frac{s_y^2}{2}\right) \qquad (1)$$

where is the sample mean of the logged data, is the sample variance, n is the sample size, and is a function tabled in Gilbert's book (although for our calculations we programmed this function using the series expansion given on p. 165 of that book and verified our program by comparing its results with Gilbert's Table A9.) An unbiased estimator of the variance of is given by

$$s^2(\hat{\mu}) = \exp(2\bar{y})\left\{\left[\Psi_n\left(\frac{s_y^2}{2}\right)\right]^2 - \Psi_n\left(\frac{s_y^2(n-2)}{n-1}\right)\right\} \qquad (2)$$

and thus a 95% upper confidence interval for the mean is computed finally as

$$\hat{\mu} + t_{n-1,0.95}s(\hat{\mu}) \qquad (3)$$

assuming approximate normality of the estimate (an application of the Central Limit Theorem of probability theory) with the usual number of degrees of freedom.

Risks were estimated using the EPA's Integrated Exposure Uptake Biokinetic (IEUBK) Model, Version 0.99d (EPA 1994, 1178). This model considers exposure to lead from several pathways and correlates total exposure to a blood lead level, which is the standard descriptor of lead exposure. The IEUBK model applies to young children from birth to seven years because children are more sensitive to lead toxicity than adults. According to EPA, an acceptable risk for lead exposure is less than 5% of the population expected to have blood lead levels of greater than 10 µg/dL. Results of the modeling effort for TA-33 reveal that 1.66% of a hypothetical population of children exposed to 416.3 mg/kg of lead would exceed the standard value of 10 µg/dL, indicating that adverse health effects from lead exposure are unlikely at this site.

ATTACHMENT B

Sampling and Analysis Plan for PRS 33-004(g).

SAMPLING AND ANALYSIS PLAN
SUPPLEMENTAL SAMPLING AT PRS 33-004(g)

1.0 PROBLEM DEFINITION

PRS 33-004(g), an outfall at TA-33 Area 6, was sampled in May 1993. The Phase I results and discussion are included in the January 1995 RFI Report for TA-33 (LANL 1995, 1212). Samples were collected at the end of the outfall pipe, in the drainage channel below, and at the downgradient end of a culvert draining into the same channel a few feet from the outfall. All were surface samples except the first, for which the end of the pipe had to be excavated so that the sample could be collected immediately below it. This was the only sample in which significant levels of contamination were observed (barium, lead, silver and zinc). This work plan will provide additional samples at depth in order to bound the extent of contamination at this location.

1.1 Site Description

TA-33, located at the southeastern section of the Laboratory, is divided into five discontinuous areas. Area 6, South Site, and East Site were firing sites. PRS 33-004(g) was the outfall from building TA-33-16 at Area 6. A drainline of vitrified clay pipe exits the northwest corner of the building and daylights at the rim of the leveled area above a channel leading to a tributary of Chaquehui Canyon. The outfall discharged at the rim of a steep-sided canyon about 70 ft deep.

The soil is a mixture of clay, small basalt cinders, and tuff pebbles with organic matter from a thick growth of chamisa. The soil is 3—4 ft deep, deposited as a result of leveling the site for construction. Because Area 6 is built upon a large cinder cone, it is unlikely that tuff bedrock underlies the outfall. West of the outfall, soils become thin and intermix with tuff outcrops. The area receives sheet runoff from nearby asphalt paving. West of the outfall area is a steep 40-ft drop into the adjacent tributary of Chaquehui Canyon. This part of the channel consists of tuff blocks and boulders with little soil. A short culvert under an unimproved road also empties into this channel a few yards west of the outfall. The culvert drains much of the Area 6 pavement.

At present, all runoff at this site is from rain or snow. TA-33-16 no longer has a water supply.

1.2 Historical Data

TA-33-16 was used as a gun building for initiator tests at Area 6 between 1948 and 1955. Photo developing may have been performed in the building or in a small trailer parked next to the drainage. In 1956, TA-33-16 was used for experiments in laminating materials containing barium, titanium, lead, and zinc. The building was later used for a library and storage. It has been empty since 1991.

Potential contaminants expected from the archival investigation were inorganics, VOCs, SVOCs, high explosives, and uranium. In the 1993 sampling campaign, five samples were collected: one immediately below the outfall, three more in sediment traps about 100 ft apart in the drainage, and one at the outfall of the nearby culvert. All samples were analyzed for SVOCs, uranium, gamma emitters, inorganics, and explosives. Results indicated that radionuclides were within background ranges for all samples. No explosives were reported above detection levels. Other analytes were either within Laboratory background ranges or below detection levels in all samples except sample AAA2145, the sample at the SWMU 33-004(g) outfall. In this sample, elevated levels of silver, barium, lead, and zinc were observed, consistent with archival information about the laminating experiments and photo developing in TA-33-16. Table 1.1-2 lists the contaminants in comparison to current (November 1997) Laboratory background UTLs and SALs. PCBs were also reported as TICs in sample AAA2145. PCBs were not considered to be a potential contaminant associated with PRS 33-004(g). However, they are one of the primary contaminants associated with overlapping PRS 33-009. Further investigation and possible cleanup of PRS 33-009 has been proposed.

TABLE 1.1-2

INORGANIC CHEMICALS DETECTED IN SAMPLE AAA2145

SAMPLE ID	SILVER (mg/kg)	BARIUM (mg/kg)	LEAD (mg/kg)	ZINC (mg/kg)
SAL[a]	380	5 300	400	23 000
LANL UTL[b]	Not Calculated	315	23.3	50.8
AAA2145	16.7	1 320	244	285

a. EPA Region 9 1996 SALs
b. 0.95, 95% LANL UTLs

2.0 SAMPLING AND ANALYSIS DESIGN

2.1 Survey Activities

Sample locations will be recorded using global positioning system technology. No other survey activities are anticipated.

2.2 Sampling and Analysis

One borehole will be drilled at the outfall at the location of 1993 sample AAA2145 (Fig. 2.2-1). One surface sample (that is, a sample immediately beneath the end of the outfall pipe) will be collected and analyzed for PCBs (which were reported as tentatively identified compounds in AAA2145). Additional samples will be collected at 2 ft and at 5 ft or at the soil/tuff interface, whichever is shallower. However, a soil/tuff interface is not expected within five feet of the surface in this area because of the presence of the extensive basaltic cinder cone and fill material.

One field duplicate (split sample) will be collected at the 2-ft depth.

TABLE 2.2-1
SAMPLES AND ANALYSES FOR PRS 33-004(g)

DEPTH (in)	MEDIUM	NUMBER OF SAMPLES	ANALYTICAL SUITES
0-6[a]	Soil	1	VOCs, PCBs
18-30	Soil or soil/tuff	1+duplicate	Inorganics, VOCs, PCBs
48-60	Soil or soil/tuff	1	Inorganics, VOCs, PCBs

[a] Depth is to be measured from the bottom edge of the outfall pipe, which may have to be reexcavated to obtain this "surface" sample

All samples will be analyzed for inorganics, VOCs, and PCBs. Concentration ranges, precision, and bias of analytical techniques specified under the current LANL ER statement of work will be adequate to meet the critical ranges of interest at this PRS. In addition, contract laboratories will provide standard quality control measurements: surrogates, blanks, check standards, matrix spikes, etc., as specified by the analytical procedures requested, and will supply complete analytical data packages supporting the reported results, as specified in the current LANL ER statement of work for contract laboratories.

3.0 SAMPLING PLAN IMPLEMENTATION

Details of field implementation will be described in a TA-33 field implementation plan. All work will be conducted using LANL ER Project standard operating procedures (SOPs).

3.1 Field Methods

Sample location AAA2145 will not be resurveyed.

All samples will be collected using the applicable LANL-ER SOPs for the collection, preservation, identification, storage, transport, and documentation of environmental samples, as described in the ER Project quality assurance project plan (QAPP) (LANL 1996, 1292). Decontamination of sampling equipment will be performed in accordance with LANL-ER-SOP-01.08, R0: "Field Decontamination of Drilling and Sampling Equipment." Wash water and other wastes generated during the sampling operation will be managed and disposed of in accordance with LANL-ER-AP-05.3: "Management of ER Program Wastes."

3.2 Sampling

Appropriate health and safety precautions will be undertaken under the site-specific health and safety plan for TA-33 in accordance with 29 CFR 1910.120, the LANL radiological control manual, and the LANL generic health and safety plan.

Sampling Techniques Surface samples will be collected using a spade and scoop method according to LANL-ER-SOP-06.09. Subsurface sediment samples will be collected with the hand auger and thin-walled tube sampler method according to LANL-ER-SOP-06.10. Borehole samples will be collected using drilling techniques according to LANL-ER-SOP-04.01, R0.

3.3 Laboratory Analyses

All soil, sediment, and tuff samples submitted for laboratory analyses will be analyzed using routine laboratory contract methods under the current statement of work. Inorganic analyses will be performed by EPA SW-846 method 6010 or equivalent. VOC analyses will be by EPA SW-846 method 8260 or equivalent. Laboratory samples will be analyzed for PCBs by EPA method 8080A (EPA 1990, 11-240).

3.4 Sample Handling, Packaging, and Shipping

Samples will be handled, packaged, and shipped in accordance with the latest revisions of the applicable LANL ER Program SOPs: LANL-ER-SOP-01.01, "General Instructions for Field Investigations;" LANL-ER-SOP-01.02, "Sample Containers and Preservation;" LANL-ER-SOP-01.03, "Handling, Packaging, and Shipping of Samples;" LANL-ER-SOP-01.04, "Sample Control and Field Documentation;" and LANL-ER-SOP-01.05, "Field Quality Control Samples." Samples will be submitted to off-site contract analytical laboratories through the ER sample management office (SMO) under the current statement of work.

3.5 Waste Management

Waste management and minimization will conform to LANL policies EM/ER:95-PCT-025, "Management of Investigation Derived Waste" and EM/ER:96-PCT-002, "Management of Samples Returned from Analytical Laboratories."

3.6 Schedule

All sampling will be completed by September 30, 1999, unless otherwise agreed upon by LANL and NMED. The RFI Report will be completed as scheduled by the ER Project. A detailed schedule will be provided in the field implementation plan (see Section 5.1).

4.0 DATA ASSESSMENT

4.1 Verification

Data packages will be checked for completeness and reported deficiencies by routine data verification and validation procedures (Environmental Restoration Project 1995, 1292). Focused validation will be performed only if routine validation indicates possible problems with analytes of concern.

4.2 Transmittal of Results

Field data will be collected and documented in field notebooks and field sample collection logs. Additionally, required field data will be provided in electronic form and uploaded to FIMAD within two weeks of the completion of fieldwork.

Analytical results will be returned to the SMO from off-site contract analytical laboratories. Complete data packets, adequate to support focused validation if necessary, will be provided. Data will be uploaded into the FIMAD database by the SMO (Environmental Restoration Project 1996, 1292).

5.0 ADMINISTRATION

5.1 Task Organization

Task organization, training, records, and oversight will be detailed in the field implementation plan, which will be made available for review by the project manager at least one week prior to the scheduled readiness review for this activity.

Records Copies of field logs and other field information will be supplied, together with information captured in the field database. Field information will include a detailed description of the subsurface material at the selected sampling location.

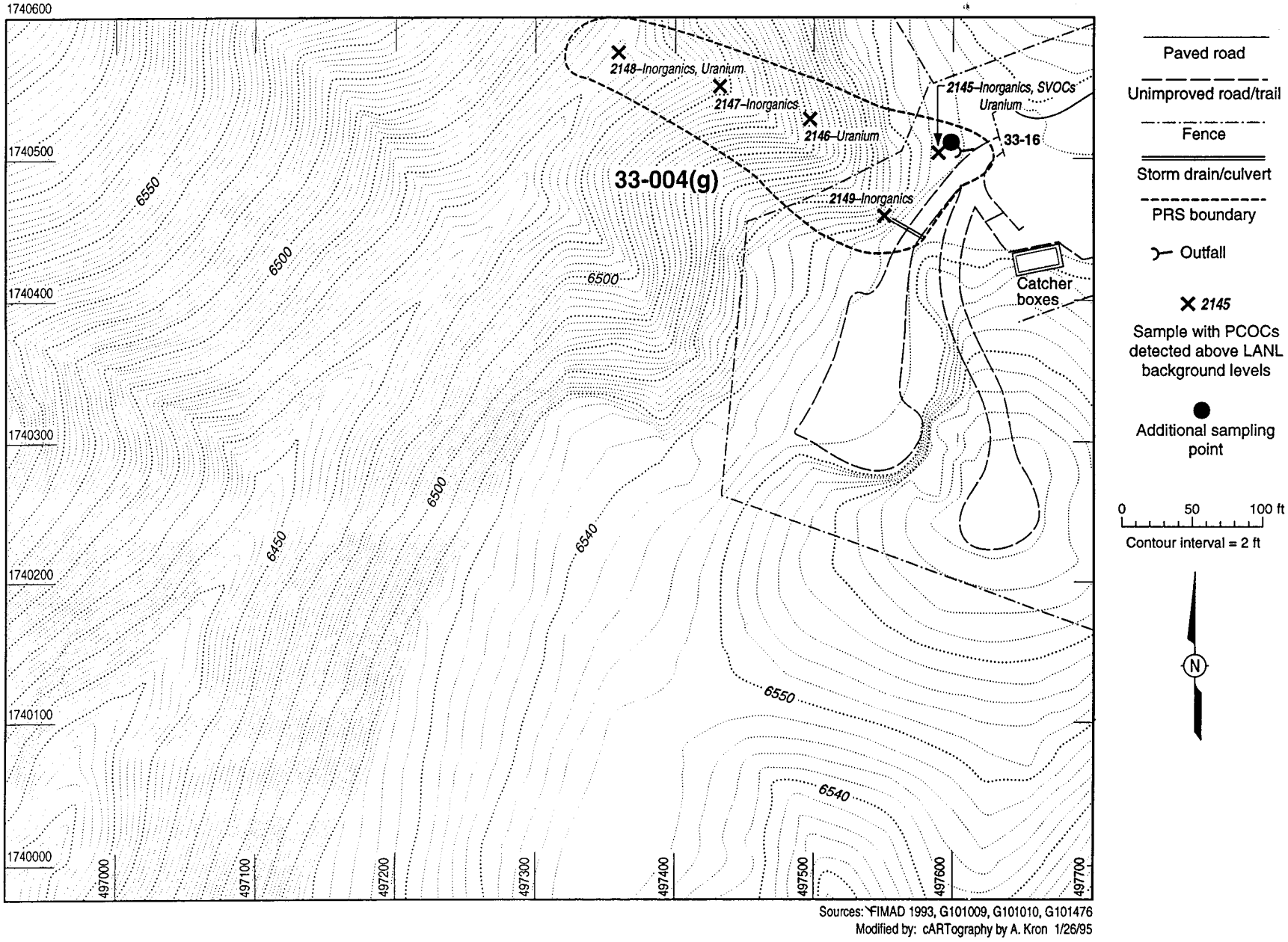
Reports A field summary report prepared following the field activities will be submitted to the ER records processing facility.

REFERENCES

Environmental Restoration Project, January 31, 1995. RFI Report for Potential Release Sites at TA-33 (located in former Operable Unit 1122), Field Unit 3, Los Alamos National Laboratory Report No. LA-UR-95-882, Los Alamos, New Mexico. **(Environmental Restoration Project 1995, 1212)**

LANL (Los Alamos National Laboratory), November 1990. "Solid Waste Management Units Report," Volumes I through IV, Los Alamos National Laboratory Report No. LA-UR-90-3400, prepared by International Technology Corporation under Contract 9-XS8-0062R-1, Los Alamos, New Mexico. **(LANL 1990, 0145)**

LANL (Los Alamos National Laboratory), March 1996. "Quality Assurance Project Plan Requirements for Sampling and Analysis," Los Alamos National Laboratory Report No. LA-UR-96-441, Los Alamos, New Mexico. **(LANL 1996, 1292)**



Sources: FIMAD 1993, G101009, G101010, G101476
Modified by: cARTography by A. Kron 1/26/95

Fig. 2.2-1. Area 6: PRSs 33-004(g).

ATTACHMENT C

Santa Fe Engineering report for TA-33-20.

Reference: LANL (Los Alamos National Laboratory), January 1992. "Wastewater Stream Characterization for TA-33, 39, 49, and 69," prepared for the Los Alamos National Laboratory, Los Alamos, New Mexico under subcontract 9-XG8-2874P-1 by Santa Fe Engineering, Santa Fe, New Mexico. **(LANL 1992, 02-096)**

WASTEWATER STREAM CHARACTERIZATION FOR TA-33, 39, 49 AND 69

ENVIRONMENTAL STUDY

prepared for:
THE LOS ALAMOS NATIONAL LABORATORY
Los Alamos, New Mexico

under subcontract 9-XG8-2874P-1

by:
Santa Fe Engineering, Ltd.
P.O. Box 1764
Santa Fe, New Mexico 87504
(505) 988-7438

January, 1992

UPDATED PER EM-8 COMMENTS SEPTEMBER 1993

equipment drains (six) and an air compressor. The air compressor discharge should be containerized. The mechanical equipment drains (boiler (3), water heater (1), backflow preventer (1) and expansion tank (1)) should be repiped to discharge to daylight and should be included in a general Laboratory Notice of Intent (NOI) to discharge. No permitting is recommended. No EPA Forms were completed.

6.0 RECOMMENDATIONS FOR BUILDING 33-20

Table 3 is a list of the drains to the building outfall and Figure 3 is a schematic of the piping. This building has two floor drains that are supposed to go to daylight to the canyon east of the building. The outfall pipe could not be located. The building has no source of water for the drains. Plugging of the floor drains is recommended. No permitting is recommended and no EPA Forms were completed.

7.0 RECOMMENDATIONS FOR BUILDING 33-23

Table 4 is a list of the drains to the building outfall and Figure 4 is a schematic of the piping. The sink that flows to this outfall does not presently have any water supply. Schon Levy of the Geology and Geochemistry Group (EES-1) would like to be able to use the sink for hand washing. For this purpose, the existing outlet to daylight from the settling tank should be plugged and the tank included on the schedule for the vacuum truck that cleans out the septic tanks. No permitting is recommended and no EPA Forms were completed. It should be noted that there is a septic system holding tank (LA-124/33-206) located immediately adjacent to this building. This tank was installed to service a mobile home trailer that has been removed. This tank does not service building 33-23 and should be decommissioned and the state permit eliminated.

TABLE 1: TA 33-1 DRAIN SUMMARY

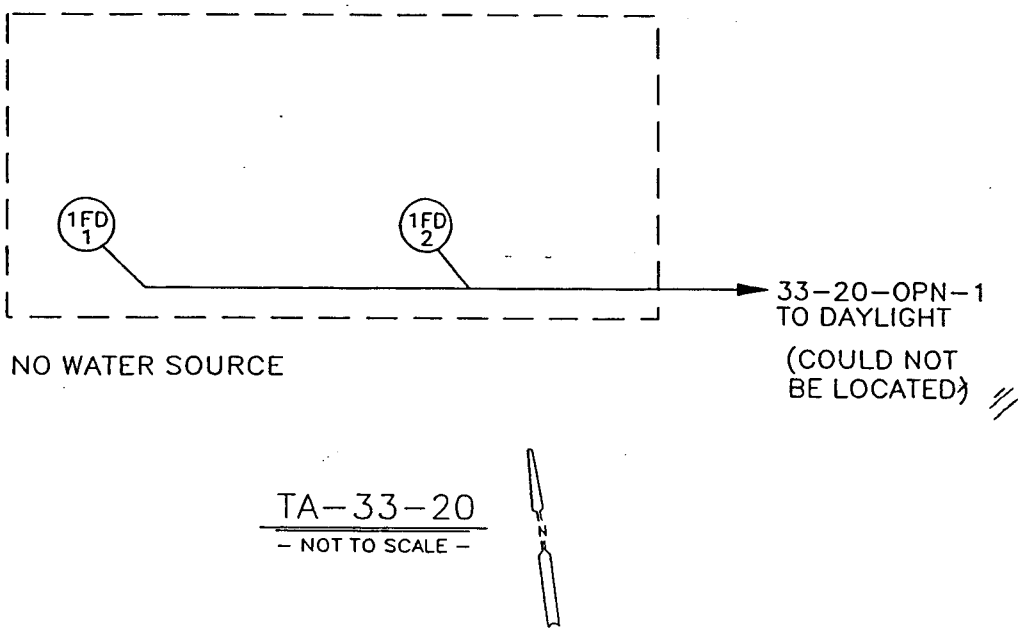
OUTFALL NUMBER	ID NUMBER	ROOM ACTIVITY	ROOM NUMBER	STATUS OR RECOMMENDATIONS	EPA FO PREPAR
33-1-OPN-1	1LV1	REST ROOM		PLUG	no
SEPTIC TANK	1TL1	REST ROOM		PLUG	
LA-36					
33-1-OPN-2	N/A	WATER HEATER		ELIMINATE	no
33-1-OPN-3	N/A	STEAM CONDENSATE		ELIMINATE	no

TABLE 2: TA 33-19 DRAIN SUMMARY

OUTFALL NUMBER	ID NUMBER	ROOM ACTIVITY	ROOM NUMBER	STATUS OR RECOMMENDATIONS	EPA FO PREPAR
33-19-OPN-1	1ED1	LAB	4	NO CHANGE	no
SEPTIC TANK	1FD1	CORRIDOR	N/A	NO CHANGE	
LA-32	1FD2	LAB	2	NO CHANGE	
	1FD3	LADIES REST ROOM	8	NO CHANGE	
	1FD4	MEN'S REST ROOM	9	NO CHANGE	
	1FD5	EQUIPMENT ROOM	10	MODIFY	
	1LV1	LADIES REST ROOM	8	NO CHANGE	
	1LV2	MEN'S REST ROOM	9	NO CHANGE	
	1LV3	MEN'S REST ROOM	9	NO CHANGE	
	1SD1	LAB/OFFICE	4	NO CHANGE	
	1SD2	JANITOR'S CLOSET		NO CHANGE	
	1SD3	LAB	3	REMOVED	
	1SD4	CORRIDOR		REMOVED	
	1SD5	LAB/OFFICE	5	NO CHANGE	
	1SH1	LOCKER ROOM	7	NO CHANGE	
	1SH2	LOCKER ROOM	7	NO CHANGE	
	1SH3	LADIES REST ROOM	8	NO CHANGE	
	1TL1	LADIES REST ROOM	8	NO CHANGE	
	1TL2	MEN'S REST ROOM	9	NO CHANGE	
	1TL3	MEN'S REST ROOM	9	NO CHANGE	
	1UR1	MEN'S REST ROOM	9	NO CHANGE	
	1WF1	CORRIDOR	N/A	NO CHANGE	
	RD1	ROOF	N/A	SEPARATE	
	RD2	ROOF	N/A	SEPARATE	
	RD3	ROOF	N/A	SEPARATE	
	RD4	ROOF	N/A	SEPARATE	

TABLE 3: TA 33-20 DRAIN SUMMARY

OUTFALL NUMBER	ID NUMBER	ROOM ACTIVITY	ROOM NUMBER	STATUS OR RECOMMENDATIONS	EPA FC PREPA
33-20-OPN-1	1FD1	WAREHOUSE		PLUG	no
DAYLIGHT	1FD2	WAREHOUSE		PLUG	



TA-33-20

– NOT TO SCALE –

SYMBOL LEGEND	
FD	FLOOR DRAIN

NOTE:

SCHEMATIC BASED ON DRAWINGS C-11538, C-11588 & R-3023 AND SITE VISIT

SANTA FE ENGINEERING, LTD.

TA-33-20
DRAIN SCHEMATIC

DRAWN	G.S.
DESIGN	S.C.
CHECKED	S.C.
DATE	6-2

SUBMITTED | RECOMMENDED | APPROVED

Los Alamos — Los Alamos National Laboratory, Los Alamos, New Mexico 87545

SHEET

CLASSIFICATION | REVIEWER | DATE

REQUESTING DIVISION	LAB JOB NO.	DRAWING NO.
REQUESTING GROUP EM-8	11056-26	FIGURE 3

ATTACHMENT D

Sampling and Analysis Plan for PRS 33-010(f).

SAMPLING AND ANALYSIS PLAN
SUPPLEMENTAL SAMPLING AT PRS 33-010(f)

1.0 PROBLEM DEFINITION

PRS 33-010(f), a small surface disposal area at TA-33 Main Site, was sampled in May, 1993. The Phase I results and discussion are included in the January 1995 RFI Report for TA-33 (LANL 1995, 1212). Samples were collected from beneath the piles of discarded material at the site. Although no contamination was found in these samples, this supplemental sampling plan will provide additional samples from the small drainage leading away from the area.

1.1 Site Description

TA-33, located at the southeastern section of the Laboratory, is divided into five discontinuous areas. Area 6, South Site, and East Site were firing sites. Main Site is the location of offices, shops, and a warehouse. PRS 33-010(f) is located at the southeast corner of Main Site, approximately 100 ft southeast of MDA K and 350 ft southeast of the decommissioned tritium facility, TA-33-86.

PRS 33-010(f) is located approximately 100 ft southeast of MDA K and 350 ft southeast of the decommissioned tritium facility, TA-33-86. The PRS consists of two small piles: one about 15 ft square, the other about 10 ft wide and 20 ft long. One pile consists of pieces of concrete, the concrete and metal pipe remains of a culvert, piles of tuff, and piles of cured asphalt. The other pile contains rusty metal rebar, rusty metal strapping bands, rusty metal cans, and other debris. The piles are located about 50 ft apart on the slope of a small tributary to the main drainage leading east from Main Site.

The soil consists of pumaceous pebbles mixed with clay. Though the soil depth is unknown, nearby bedrock drainages indicate soil/tuff interfaces at 1—5 ft may be expected. The area is sparsely wooded with piñon and juniper trees and covered with scattered grasses. All runoff is from rain or snow; there are no water sources or standing water.

1.2 Historical Data

PRS 33-010(f) surface disposal area appears to be a dumping area for items not associated with experimental activities at TA-33. Nothing is known of the origins of the debris piles. One of the debris piles appears to be the result of culvert replacement, but the former location of the culvert is not known. The other pile contains empty tin cans and metal strapping bands. No labels remain on the cans to indicate the contents. Potential contaminants included inorganics, radionuclides, herbicides, and pesticides.

During the 1993 sampling campaign, SWMU 33-010(f) was included in the general grid-based radiation survey called for in the RFI Work Plan for OU 1122. As specified in the work plan, one sample was collected at random within each pile, one in duplicate, one in triplicate, for a total of five sets of results. Because there were no visible indications of soil staining, sampling locations were chosen at random from each pile. Samples were analyzed for inorganics, gamma emitters, and tritium. (Also, as part of the TA-33 strategy to analyze a subset of samples for pesticides and herbicides, one pair was analyzed for these suites.) Trace levels (0.0024—0.011 mg/kg) of pesticides were found in one sample. Low levels (1.4—1.8 pCi/g) of tritium were found in all samples, far below the soil SAL of 820 pCi/g. No other analytes were found above LANL background 0.95, 95% UTLs.

2.0 SAMPLING AND ANALYSIS DESIGN

2.1 Survey Activities

Sample locations will be recorded using global positioning system technology. No other survey activities are anticipated.

2.2 Sampling and Analysis

One sample location will be identified in the drainage at a sediment trap below but within 100 feet of the lower debris pile (Fig. 2.2-1). A surface sample will be collected at 0—6 in. One subsurface sample will be collected at 5 ft or at soil/tuff interface, whichever is shallower.

Both samples will be analyzed for inorganic constituents and uranium. No herbicides or pesticides will be analyzed for because sampling in 1993 determined that both were used in the customary manner.

TABLE 2.2-1
SAMPLES AND ANALYSES FOR PRS 33-010(f)

DEPTH (in)	MEDIUM	NUMBER OF SAMPLES	ANALYTICAL SUITES
0-6	Soil	1	Inorganics, total uranium
48-60	Soil or soil/tuff	1	Inorganics, total uranium

Concentration ranges, precision, and bias of analytical techniques specified under the current LANL ER statement of work will be adequate for the ranges of interest at this PRS. In addition, contract laboratories will provide standard quality control measurements: surrogates, blanks, check standards, matrix spikes, etc., as

specified by the analytical procedures requested and will supply complete analytical data packages supporting the reported results, as specified in the current LANL ER statement of work for contract laboratories.

3.0 SAMPLING PLAN IMPLEMENTATION

Details of field implementation will be described in a TA-33 field implementation plan. All work will be conducted using LANL ER Project standard operating procedures (SOPs).

3.1 Field Methods

Land Surveys: Following sample collection, the sample point will be staked, documented, and surveyed using global positioning system technology. These data will be recorded on the base map. The surveying will be performed by licensed professionals working to minimum standards for land surveying in New Mexico with oversight by the field team leader.

All samples will be collected using the applicable LANL-ER SOPs for the collection, preservation, identification, storage, transport, and documentation of environmental samples, as described in the ER Project quality assurance project plan (QAPP) (LANL 1996, 1292). Decontamination of sampling equipment will be performed in accordance with LANL-ER-SOP-01.08, R0: "Field Decontamination of Drilling and Sampling Equipment." Wash water and other wastes generated during the sampling operation will be managed and disposed of in accordance with LANL-ER-AP-05.3: "Management of ER Program Wastes."

3.2 Sampling

Appropriate health and safety precautions will be undertaken under the site-specific health and safety plan for TA-33 in accordance with 29 CFR 1910.120, the LANL radiological control manual, and the LANL generic health and safety plan.

Sampling Techniques Surface samples will be collected using a spade and scoop method according to LANL-ER-SOP-06.09. Subsurface sediment samples will be collected with the hand auger and thin-walled tube sampler methods according to LANL-ER-SOP-06.10. Borehole samples will be collected using drilling techniques according to LANL-ER-SOP-04.01, R0.

3.3 Laboratory Analyses

All soil, sediment, and tuff samples submitted for laboratory analyses will be analyzed using routine laboratory contract methods under the current statement of work. Inorganic analyses will be performed by EPA SW-846 method 6010 or equivalent. Uranium will be analyzed by inductively-coupled plasma mass spectrometry (ICP-MS) using a total uranium digestion.

3.4 Sample Handling, Packaging, and Shipping

Samples will be handled, packaged, and shipped in accordance with the latest revisions of the applicable LANL ER Program SOPs: LANL-ER-SOP-01.01, "General Instructions for Field Investigations;" LANL-ER-SOP-01.02, "Sample Containers and Preservation;" LANL-ER-SOP-01.03, "Handling, Packaging, and Shipping of Samples;" LANL-ER-SOP-01.04, "Sample Control and Field Documentation;" and LANL-ER-SOP-01.05, "Field Quality Control Samples." Samples will be submitted to off-site contract analytical laboratories through the ER sample management office (SMO) under the current statement of work.

3.5 Waste Management

Waste management and minimization will conform to LANL policies EM/ER:95-PCT-025, "Management of Investigation Derived Waste" and EM/ER:96-PCT-002, "Management of Samples Returned from Analytical Laboratories."

3.6 Schedule

All sampling will be completed by September 30, 1999. The RFI report will be completed as scheduled by the ER Project. A detailed schedule will be provided in the field implementation plan (see Section 5.1).

4.0 DATA ASSESSMENT

4.1 Verification

Data packages will be checked for completeness and reported deficiencies by routine data verification and validation procedures (Environmental Restoration Project 1995, 1292). Focused validation will be performed only if routine validation indicates possible problems with analytes of concern.

4.2 Transmittal of Results

Field data will be collected and documented in field notebooks and field sample collection logs. Additionally, required field data will be provided in electronic form and uploaded to FIMAD within two weeks of the completion of fieldwork.

Analytical results will be returned to the SMO from off-site contract analytical laboratories. Complete data packets, adequate to support focused validation if necessary, will be provided. Data will be uploaded into the FIMAD database by the SMO (Environmental Restoration Project 1996, 1292).

5.0 ADMINISTRATION

5.1 Task Organization

Task organization, training, records, and oversight will be detailed in the field implementation plan, which will be made available for review by the project manager at least one week prior to the scheduled readiness review for this activity.

Records Copies of field logs and other field information will be supplied, together with information captured in the field database. Field information will include a detailed description of the subsurface material at the selected sampling location.

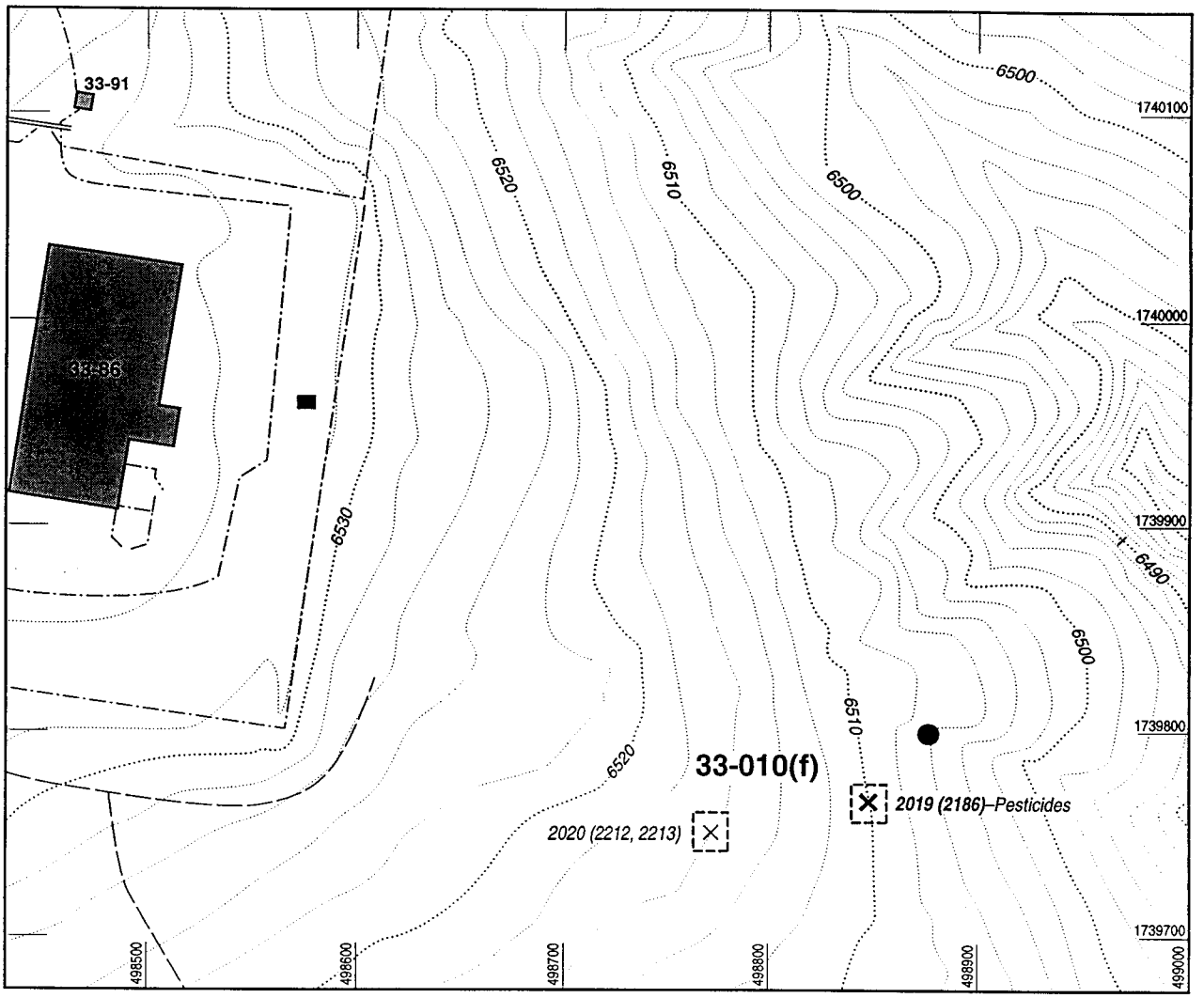
Reports A field summary report prepared following the field activities will be submitted to the ER records processing facility.

REFERENCES

Environmental Restoration Project, January 31, 1995. RFI Report for Potential Release Sites at TA-33 (located in former Operable Unit 1122), Field Unit 3, Los Alamos National Laboratory Report No. LA-UR-95-882, Los Alamos, New Mexico. **(Environmental Restoration Project 1995, 1212)**

LANL (Los Alamos National Laboratory), November 1990. "Solid Waste Management Units Report," Volumes I through IV, Los Alamos National Laboratory Report No. LA-UR-90-3400, prepared by International Technology Corporation under Contract 9-XS8-0062R-1, Los Alamos, New Mexico. **(LANL 1990, 0145)**

LANL (Los Alamos National Laboratory), March 1996. "Quality Assurance Project Plan Requirements for Sampling and Analysis," Los Alamos National Laboratory Report No. LA-UR-96-441, Los Alamos, New Mexico. **(LANL 1996, 1292)**



Sources: FIMAD 1993, G101016 & G101476
Modified by: cARTography by A. Kron 1/19/95

Permanent structure
Temporary structure
Paved road
Unimproved road/trail
Fence
Storm drain/culvert
PRS boundary
2020 Sample location and number—no elevated levels found
2019 Sample with PCOCs detected above LANL background levels
(2212, 2213) Duplicate samples are shown in parentheses
Additional sampling point

0 50 100 ft
Contour interval = 2 ft

N

Fig. 2.2-1. Main Site: PRS 33-010(f).

ATTACHMENT E

Sampling and Analysis Plan for PRS 33-011(e).

SAMPLING AND ANALYSIS PLAN
SUPPLEMENTAL SAMPLING AT PRS 33-011(e)

1.0 PROBLEM DEFINITION

PRS 33-011(e), a former drum storage area near TA-33 Main Site, was sampled in May 1993. The Phase I results and discussion are included in the January 1995 RFI Report for TA-33 (LANL 1995, 1212). Based on information available at the time, samples were analyzed only for uranium and gamma emitters. Due to regulator concerns, further sampling and analysis for additional potential chemicals is proposed.

1.1 Site Description

TA-33, located at the southeastern section of the Laboratory, is divided into five discontinuous areas: Main Site, Area 6, South Site, East Site, and the site of a radio telescope. PRS 33-011(e) is located on the level mesa in the piñon-juniper habitat south of Main Site, along the road leading to South Site.

PRS 33-011(e) is located northwest of bunkered magazine TA-33-22. No trace remains of the former storage location, nor are drums visible on any aerial photograph of the area. Except for the parking lot in front of the bunker, the area is unpaved with a sparse grass cover. It is level with a very slight slope to the southwest into a tributary of Chaquehui Canyon. All runoff is from rain or snow; there are no water sources or standing water. Soil is sandy and rocky. Depths are unknown but nearby bedrock outcrops indicate soil/tuff interface may be within 3 ft. Tuff bedrock outcrops nearby on the canyon rim.

1.2 Historical Data

TA-33-22 was built and used as a storage facility for high explosives until the operating group left in 1972. In 1986-1987, bunker TA-33-22 was used for preparation of thin-section geological samples by EES-1 geologists. This operation was moved to Main Site within a year because the bunker has no heat or water. Drums containing kerosene, cutting oil, and isopropanol were stored on pavement near the door of the bunker. The drums contain original reagents; no waste was stored in drums at this site. LANL cannot find documentation on use of the site for other periods.

The LANL SWMU Report identified SWMU 33-011(e) as located northwest of TA-33-22, commenting that, "The DOE Environmental Survey observed and sampled an area where materials stored in drums have contaminated the soil." However, the report cited as the DOE Environmental Survey provided a map identifying the location of a nearby drum storage area, PRS 33-011(a), which was extensively sampled in 1993. (See Photographs 1, 2, and 3 for the relative positions of these areas.) This evidence cast some doubt on drum storage in the unpaved area adjacent to bunker TA-33-22.

The SWMU Report further states that in 1987, "Soil sampling near building TA-33-22 has detected uranium and gamma emitters above natural activity." (LANL 1990, 0145). The map provided in the SWMU Report indicated the location of SWMU 33-011(e) as being immediately northwest of TA-33-22. This area was analyzed for these radionuclides in 1993 by the ER Project. Prior to sampling in 1993, a grid-based radiation survey was conducted at PRS 33-011(e). This presampling radiation survey showed no levels above background. Because there were no screening or surface indications to bias sampling, two surface soil samples and a duplicate were taken at random locations within a 20 x 100 ft area. In addition, sample AAA2123 from the large-scale SWMU 33-017 sampling grid is located approximately 20 ft north of the site.

All samples were analyzed for uranium and gamma emitters. (Also, as part of the TA-33 strategy to analyze a subset of samples for pesticides and herbicides, two were analyzed for herbicides and one for pesticides.) The grid sample was also analyzed for inorganics, tritium, plutonium, and SVOCs. Uranium was found at background levels (2.2—2.8 mg/kg) in all samples, as were gamma emitters. Aniline was found at 0.4 mg/kg in the grid sample (SAL = 19 mg/kg).

2.0 SAMPLING AND ANALYSIS DESIGN

2.1 Survey Activities

Sample locations will be recorded using global positioning system technology. No other survey activities are anticipated.

2.2 Sampling and Analysis

A minimum of two samples will be located within the PRS. Because there are no visible or other indications of the exact location of former drums, sample locations will be selected at random within the area , using EPA-approved randomization methods (Fig. 2.2-1). The area near the bunker door, where the EES-1 drums are known to have been stored, will be examined as a possible sampling point. No samples will be taken on or under asphalt because SVOCs are a common component of asphalt.

Samples and analyses are summarized in Table 2.2-1. Two surface soil samples will be collected at 0—6 in. Exposed soil under the samples will be collected and field-screened for total petroleum hydrocarbons (TPH). If screening results are positive, an additional laboratory sample will be taken at 2 ft or at the soil/tuff interface (whichever is shallower) and screening will continue with the possibility of a third sample from a depth of up to 4 ft or the soil/tuff interface. If field-screening results are positive below a sample collected at 4 ft or at the soil/tuff interface, sampling will stop and the site will be evaluated for cleanup.

One field duplicate sample will be collected, collocated with one of the two surface samples. A field trip blank will be included with the VOC samples.

TABLE 2.2-1
SAMPLES AND ANALYSES FOR PRS 33-011(e)

DEPTH (in)	MEDIUM	NUMBER OF SAMPLES	ANALYTICAL SUITES
0-6	Soil	2+collocated QA	SVOCs, VOCs
12-24	Soil or soil/tuff	0—2	SVOCs, VOCs
36-48	Soil or soil/tuff	0—2	SVOCs, VOCs
NA	Distilled water	1	VOCs

All laboratory samples will be analyzed for VOCs and SVOCs. Concentration ranges, precision, and bias of analytical techniques specified under the LANL ER statement of work current will be adequate for the ranges of interest at this PRS. In addition, contract laboratories will provide standard quality control measurements: surrogates, blanks, check standards, matrix spikes, etc., as specified by the analytical procedures requested, and will supply complete analytical data packages supporting the reported results, as specified in the LANL ER statement of work for contract laboratories then current.

3.0 SAMPLING PLAN IMPLEMENTATION

Details of field implementation will be described in a TA-33 field implementation plan. All work will be conducted using LANL ER Project standard operating procedures (SOPs).

3.1 Field Methods

3.1 Field Methods

Land Surveys Following sample collection, the sample points will be staked, documented, and surveyed using global positioning system technology. These data will be recorded on the base map. The surveying will be performed by licensed professionals working to minimum standards for land surveying in New Mexico with oversight by the field team leader.

All samples will be collected using the applicable LANL ER SOPs for the collection, preservation, identification, storage, transport, and documentation of environmental samples, as described in the ER Project quality assurance project plan (QAPP) (LANL 1996, 1292). Field screening for TPH will follow LANL-ER-SOP 10.05, R0 "Field Analysis of Total Hydrocarbons Using the Hanby Method." Decontamination of sampling equipment will be performed in accordance with LANL-ER-SOP-01.08, R0: "Field Decontamination of Drilling and Sampling

Equipment." Wash water and other wastes generated during the sampling operation will be managed and disposed of in accordance with LANL-ER-AP-05.3: "Management of ER Program Wastes."

3.2 Sampling

Prior to sampling, all sample locations will be field-screened for radioactivity and VOCs to identify gross concentrations of contaminants. Appropriate health and safety precautions will be undertaken under the site-specific health and safety plan for TA-33 in accordance with 29 CFR 1910.120, the LANL radiological control manual, and the LANL generic health and safety plan.

Sampling Techniques Surface samples will be collected using a spade and scoop method according to LANL-ER-SOP-06.09. Subsurface sediment samples will be collected with the hand auger and thin-walled tube sampler method according to LANL-ER-SOP-06.10. Borehole samples will be collected using drilling techniques according to LANL-ER-SOP-04.01, R0.

3.3 Laboratory Analyses

All soil, sediment, and tuff samples submitted for laboratory analyses will be analyzed using routine laboratory contract methods under the current statement of work. Analyses will be performed by EPA SW-846 method 8260 for VOCs and 8270 for SVOCs or equivalent.

3.4 Sample Handling, Packaging, and Shipping

Samples will be handled, packaged, and shipped in accordance with the latest revisions of the applicable LANL ER Program SOPs: LANL-ER-SOP-01.01, "General Instructions for Field Investigations;" LANL-ER-SOP-01.02, "Sample Containers and Preservation;" LANL-ER-SOP-01.03, "Handling, Packaging, and Shipping of Samples;" LANL-ER-SOP-01.04, "Sample Control and Field Documentation;" and LANL-ER-SOP-01.05, "Field Quality Control Samples." Samples will be submitted to off-site contract analytical laboratories through the ER sample management office (SMO) under the current statement of work.

3.5 Waste Management

Waste management and minimization will conform to LANL policies EM/ER:95-PCT-025, "Management of Investigation Derived Waste" and EM/ER:96-PCT-002, "Management of Samples Returned from Analytical Laboratories."

3.6 Schedule

All sampling will be completed by September 30, 1999. The RFI report will be completed as scheduled by the ER Project. A detailed schedule will be provided in the field implementation plan (see Section 5.1).

4.0 DATA ASSESSMENT

4.1 Verification

Data packages will be checked for completeness and reported deficiencies by routine data verification and validation procedures (Environmental Restoration Project 1995, 1292). Focused validation will be performed only if routine validation indicates possible problems with analytes of concern.

4.2 Transmittal of Results

Field data will be collected and documented in field notebooks and field sample collection logs. Additionally, required field data will be provided in electronic form and uploaded to FIMAD within two weeks of the completion of fieldwork.

Analytical results will be returned to the SMO from off-site contract analytical laboratories. Complete data packets, adequate to support focused validation if necessary, will be provided. Data will be uploaded into the FIMAD database by the SMO (Environmental Restoration Project 1996, 1292).

5.0 ADMINISTRATION

5.1 Task Organization

Task organization, training, records, and oversight will be detailed in the field implementation plan, which will be made available for review by the project manager at least one week prior to the scheduled readiness review for this activity.

Records Copies of field logs and other field information will be supplied, together with information captured in the field database. Field information will include TPH screening results and a map of the area finally identified as most likely to have contained the drums used by EES-1.

Reports A field summary report prepared following the field activities will be submitted to the ER records processing facility.

REFERENCES

Environmental Restoration Project, January 31, 1995. RFI Report for Potential Release Sites at TA-33 (located in former Operable Unit 1122), Field Unit 3, Los Alamos National Laboratory Report No. LA-UR-95-882, Los Alamos, New Mexico. **(Environmental Restoration Project 1995, 1212)**

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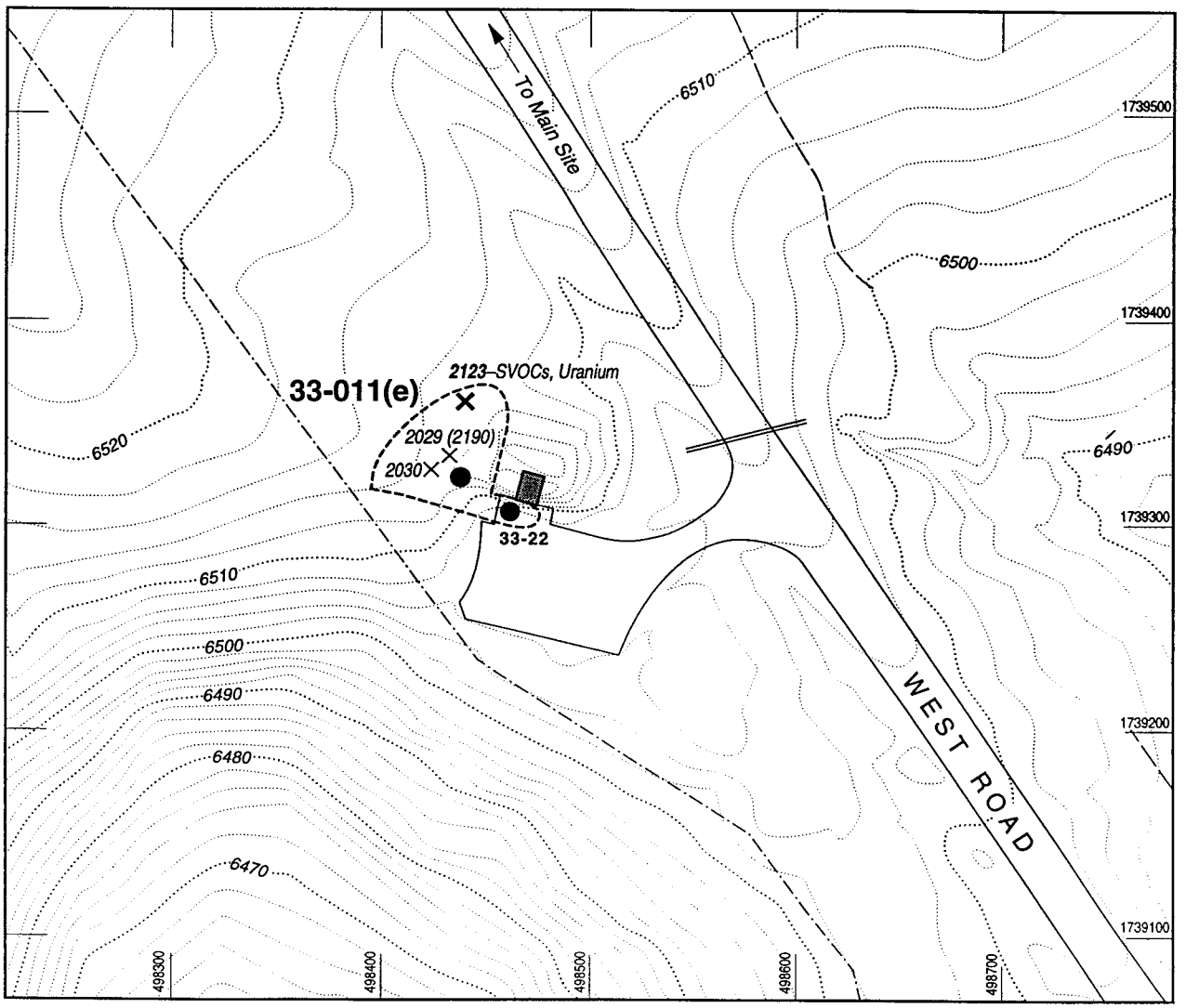


Sources: FIMAD 1993, G101011 & G101476
Modified by: cARTography by A. Kron 1/26/95

Permanent structure
Paved road
Unimproved road/trail
Fence
Storm drain/culvert
PRS boundary
× 2030 Sample location and number—no elevated levels found
✕ 2123 Sample with PCOCs detected above LANL background levels
(2190) Duplicate samples are shown in parentheses
● Conceptual sample location. Actual locations will be selected by EPA-approved randomization techniques.

0 50 100 ft
Contour interval = 2 ft

N

Fig. 2.2-1. Main Site: PRS 33-011(e).

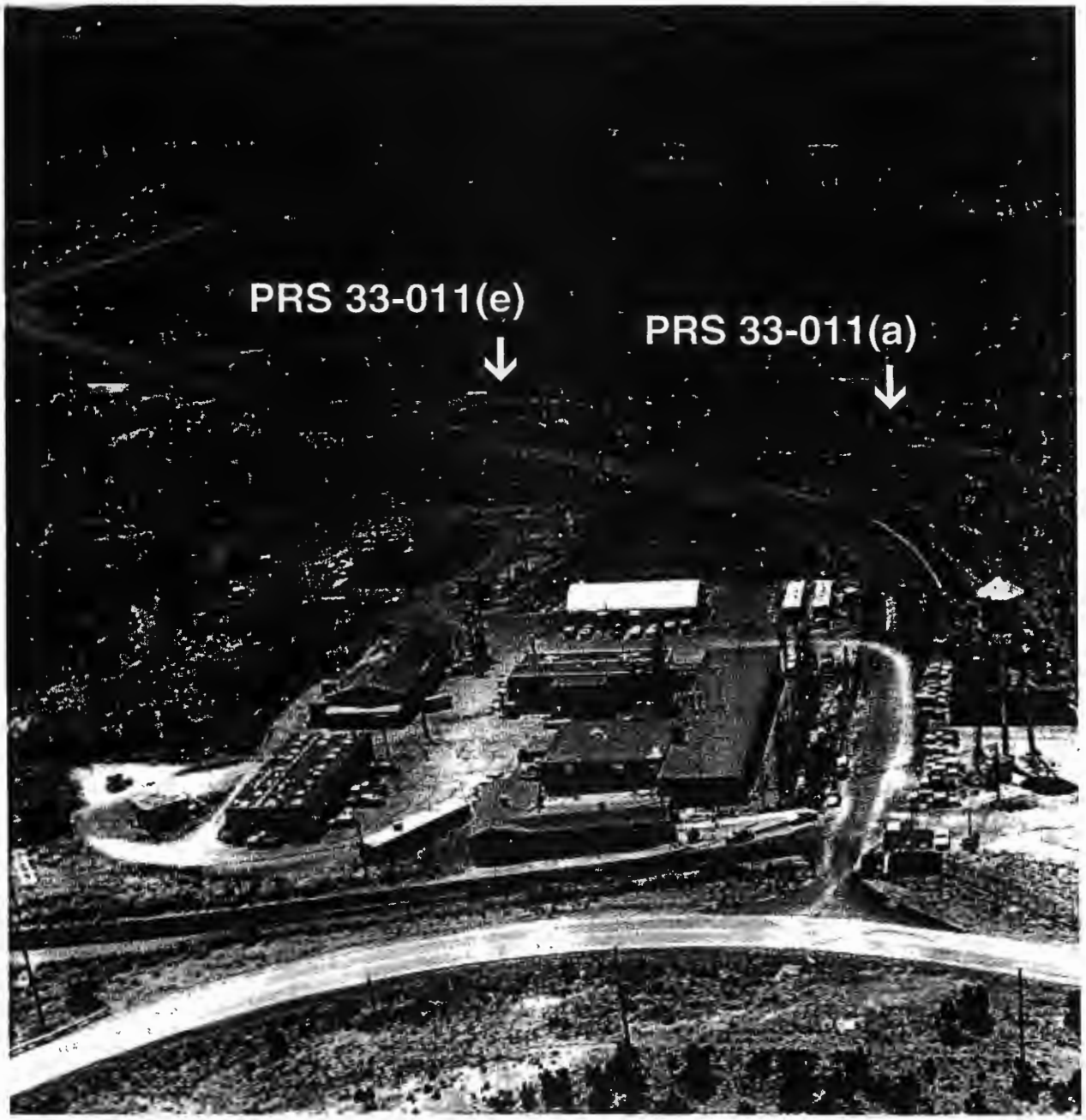


Fig. 3. TA-33 Main Site showing location of PRSs 33-011(a) and 33-011(e). Photo taken 1984.

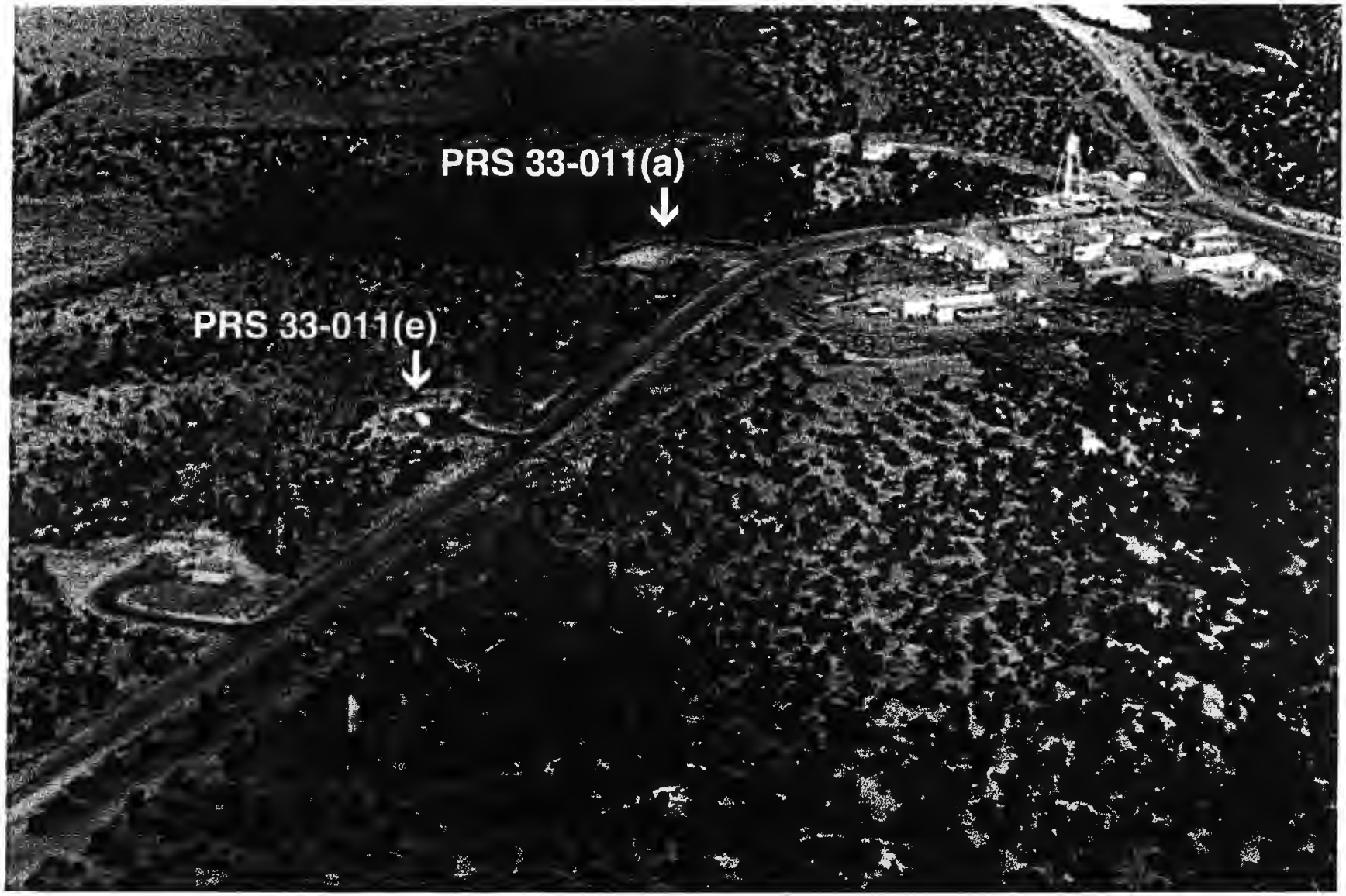
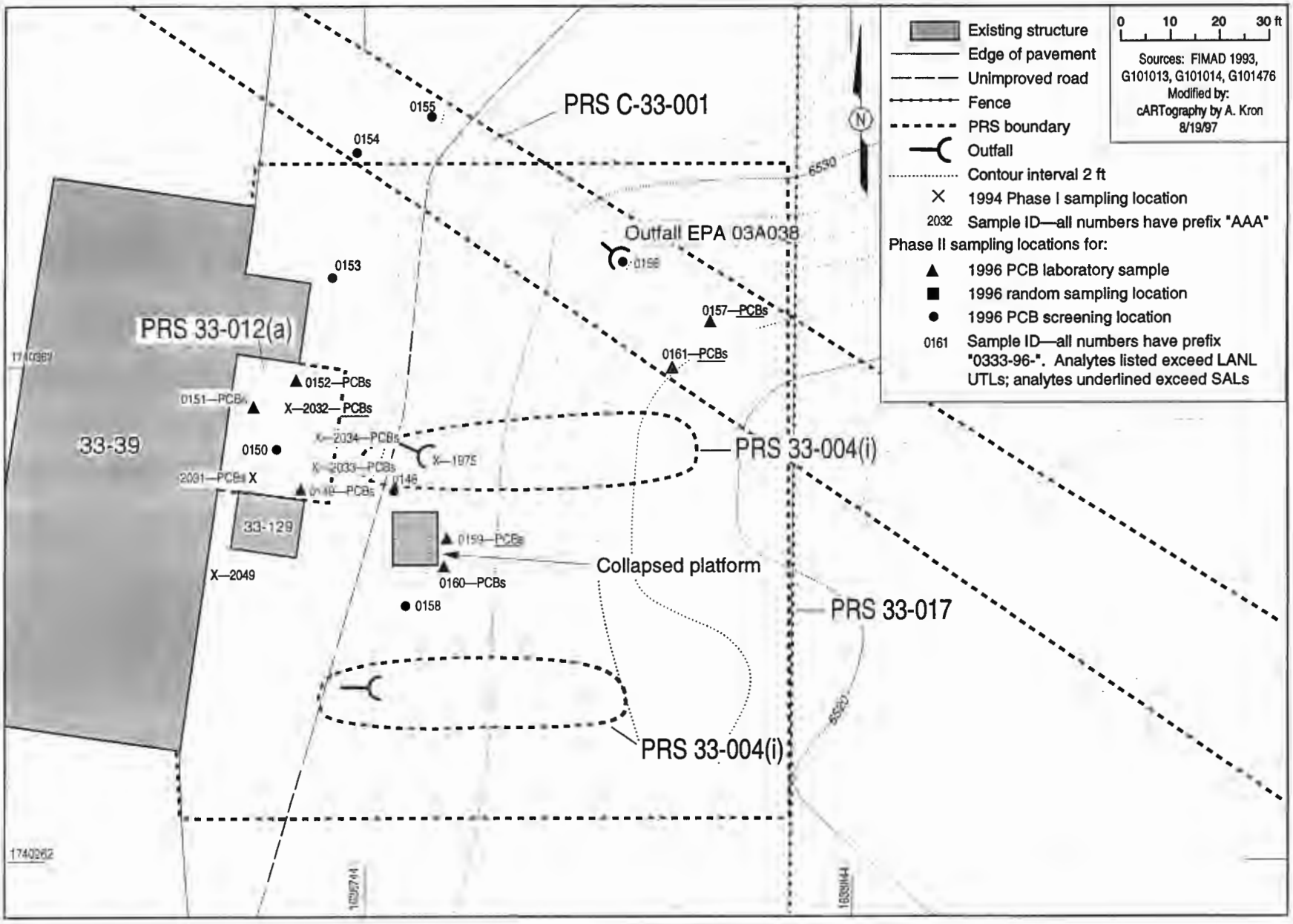


Fig. 2. TA-33 Main Site showing location of bunker TA-33-22 and PRS 33-011(e) and PRS 33-011(a). Photo taken 1986.

Fig. 1. Bunker TA-33-22, showing the area to the northeast identified as PRS 33-011(e). Photo taken 1987.

ATTACHMENT F

PCB Sampling points at PRSs 33-017, showing embedded PRSs 33-012(a) and 33-004(i) and runoff area from PRS C-33-001.



Attachment F. PRS 33-017 and embedded PRSs showing PCB sampling locations.

ATTACHMENT G

Voluntary Corrective Action Report for cleanup of catcher boxes at PRS 33-007(c) [DRAFT].