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Voluntary Corrective Action Completion Report for Potential Release Sites

73-004(a,b)
73-007
C-73-005(a–f)

Field Unit 1

Environmental Restoration Project

September 1996

A Department of Energy
Environmental Cleanup Program

Los Alamos
NATIONAL LABORATORY

LA-UR-96-3350

EXECUTIVE SUMMARY

This report addresses the Phase I characterization and voluntary corrective action (VCA) activities at potential release sites (PRSs) 73-004(a), 73-004(b), 73-007 septic tanks, and septic pits C-73-005(a-f) (areas of concern [AOCs]). PRSs 73-004(a) and 73-004(b) are solid waste management units (SWMUs) listed in the Hazardous and Solid Waste Amendments (HSWA) Module of Los Alamos National Laboratory's (LANL's) Resource Conservation and Recovery Act (RCRA) Part B Operating Permit (EPA 1990, 0306). PRS 73-007 was added to the permit after its discovery in 1996.

PRS 73-004(a), located northwest of the airport terminal building, was composed of a septic system that received sanitary waste from the toilet and shower facilities located in the adjacent incinerator building. Using a backhoe, the septic tank and outlet drainline were exposed and characterization samples were collected. The decision was made to remove the tank and its contents and abandon the outlet drainline in place. Confirmatory sample results indicate that remaining pesticide and polynuclear aromatic hydrocarbon (PAH) concentrations do not pose an unacceptable human health risk. Elevated metals concentrations are believed to be associated with the incinerator ash disposal area (PRS 73-002) and will be considered further within the context of a Phase II investigation of that PRS. No further action is recommended for PRS 73-004(a).

PRS 73-004(b), located west of the airport terminal building, was comprised of a septic system that received wash water from a former steam cleaning plant that was used to clean out garbage trucks, cans, and dumpsters that contained municipal waste. Using a backhoe, the septic tank and drainlines were exposed and characterization samples were collected. The decision was made to remove the tank and its contents and abandon the drainlines in place. Confirmatory sample results indicate that remaining pesticides, PAHs, and metals do not pose an unacceptable human health risk. No further action is recommended for PRS 73-004(b).

PRS 73-007, located south of Highway 502, was comprised of a septic system that supposedly received sanitary waste from an unknown facility within the former contractors row during the mid to late 1940s. Characterization samples were collected from within the tank and at the end of the outlet drainline. The decision was made to remove the tank and its contents and abandon the drainlines in place. Confirmatory sample results indicate that no COPCs remain at the site; therefore, PRS 73-007 is recommended for no further action.

PRSs C-73-005(a-f) are located south of Highway 502, within an area that parallels the highway for approximately 2 700 feet. PRSs C-73-005(a-f) are composed of unlined pits in the tuff, some with inlet and/or outlet drainlines, and are considered to represent septic systems that received sanitary waste from unknown facilities within the former contractors' row during the mid to late 1940s. Characterization samples were collected at each PRS and it was subsequently decided that no remedial activities were required. However, the pits were all backfilled to eliminate any physical hazards presented by their continued existence. PRSs C-73-005(a-f) are recommended for no further action.

All work was conducted in accordance with the VCA Plan and the Waste Characterization Strategy Form. Waste Profile Forms and Chemical Waste Disposal Requests were submitted, as appropriate, for each waste stream. All wastes but the personal protective equipment and disposable sampling equipment have been disposed according to their assigned classifications.

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1.0 INTRODUCTION

This report addresses the Phase I characterization and voluntary corrective action (VCA) activities at potential release sites (PRSs) 73-004(a), 73-004(b), 73-007 septic tanks, and septic pits C-73-005(a-f) (areas of concern [AOCs]). PRSs 73-004(a) and 73-004(b) are solid waste management units (SWMUs) listed in the Hazardous and Solid Waste Amendments (HSWA) Module of Los Alamos National Laboratory's (LANL's) Resource Conservation and Recovery Act (RCRA) Hazardous Waste Facility Permit (EPA 1990, 0306). PRS 73-007 was added to the permit after its discovery in 1996.

TA-73 is located on Department of Energy (DOE) property in Los Alamos County (Fig. 1.0-1) (LANL 1992, 0781), and is also known as the Los Alamos airport. All of the areas addressed in this VCA report are shown in Fig. 1.0-2.

PRS 73-004(a) (Septic System). A concrete septic tank, PRS 73-004(a), served the incinerator at PRS 73-002 and was located northwest of the incinerator building. Overflow was diverted through a 6-in. vitrified clay pipe (VCP) to an outfall in Pueblo Canyon (W.C. Kruger Co. 1947, 05-0052). The period of operation of this septic system was concurrent with the occupation of the incinerator building (1947 to 1973). Incinerator operations ceased in 1948. PRS 73-004(a) handled sanitary waste from the toilet and shower facilities located on the charging floor of the incinerator building (W.C. Kruger Co. 1947, 05-0053).

PRS 73-004(b) (Septic System). PRS 73-004(b), a concrete septic tank, was located approximately 80 ft to the northwest of the former steam cleaning plant. Overflow was diverted through a 6-in. VCP to an outfall in Pueblo Canyon (The Zia Company 1949, 05-0138). PRS 73-004(b) apparently received wash water from the steam cleaning plant, which was used to wash down garbage trucks, cans, and dumpsters that contained municipal waste (LANL 1992, 0781).

PRS 73-007 (Septic System). During a 1996 site survey, a cylindrical steel septic tank (PRS 73-007) was discovered on DOE property, south of Highway 502. It is assumed that this septic system served a facility located in the former contractors' row (PRS 73-005) during the mid to late 1940s. However, there is no historical information to document the identity of the facility or the contents of the waste discharged to this septic system.

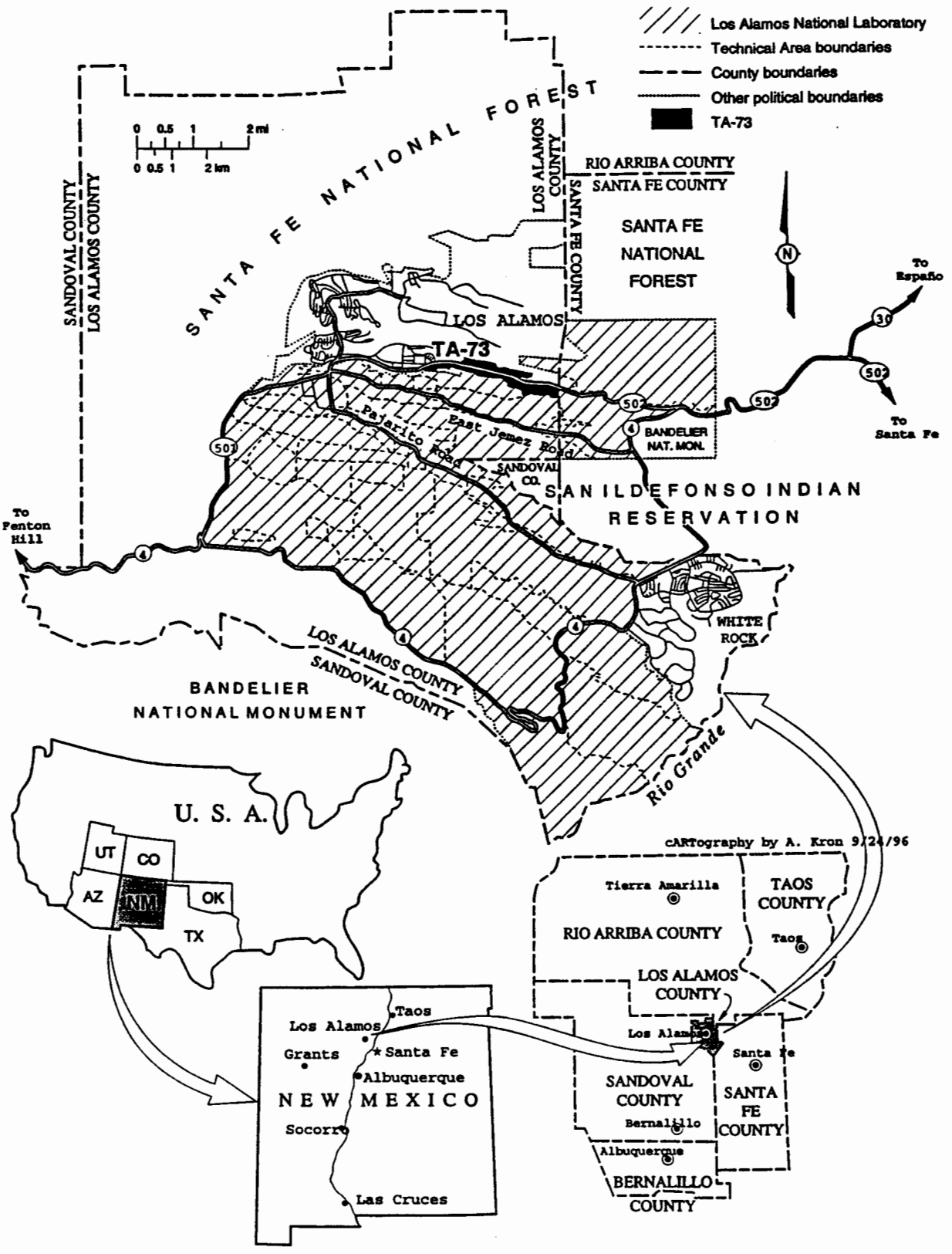

Fig. 1.0-1. Location of technical area (TA) 73 within Los Alamos National Laboratory, Los Alamos County, New Mexico.

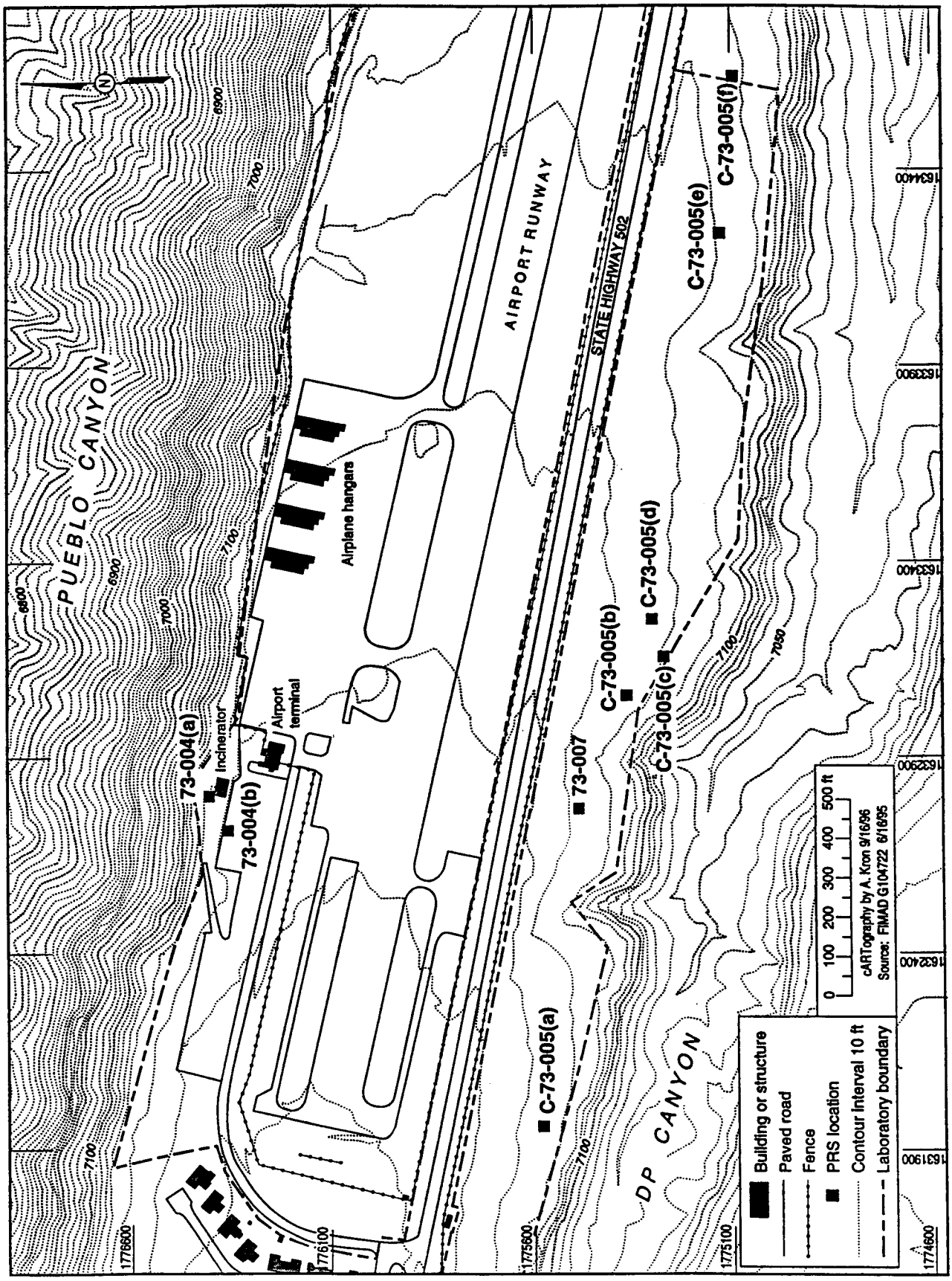

Fig. 1.0-2. Location of PRSs 73-004(a,b), C-73-005(a–f), and 73-007.

PRSs C-73-005(a-f) (Septic Systems). During a 1996 site survey, six pits of various dimensions were discovered on DOE property, south of Highway 502. Two of these pits had VCP inlet and/or outlet drainlines. All were assumed to have received sanitary waste from facilities within the former contractors' row during the mid to late 1940s. However, there is no historical information to document this assumption.

2.0 PRS 73-004(a)

2.1 Site Description and History

Septic system 73-004(a) was installed during the mid to late 1940s and remained in use until 1973. The septic tank was located on DOE property, approximately 10 ft northwest of the incinerator building (TA-73-02) that is northwest of the airport terminal (Fig. 2.1-1). The tank served the incinerator building and handled sanitary waste from the toilet and shower facilities located on the charging floor. The tank was constructed of concrete with a vitrified clay outfall pipe that discharged into Pueblo Canyon.

2.2 Site Characterization Before Removal

Phase 1 RCRA Facility Investigation (RFI) activities were not previously performed at PRS 73-004(a). The potential for chemical or radiological contamination within this septic system was considered to be low. However, the septic tank, associated drainlines, and the outfall were to be investigated during the site characterization activities to determine if contamination was present. It was considered possible that the incinerator operations may have inadvertently introduced contaminants into this septic system.

Discussion of Field Work

PRS 73-004(a) was found to have been left in place after the facility was decommissioned. The tank was located precisely where engineering drawings indicated it to be. During characterization activities, the tank was partially excavated with a backhoe. The intent was to minimize excavation work until screening and analytical results determined if any contamination was associated with the septic system. Therefore, only the top of the tank was uncovered, as well as portions of the outlet drainline. The outfall was also located and uncovered.

The VCA plan called for the collection of characterization samples from the tank, beneath the associated drainlines, and from the outfalls. After receiving the analytical results for the septic tank, the data were assessed to determine if remedial actions were required. The remedial

options were then reviewed with the final remedial activity being determined. The OU 1071 RFI Work Plan specified that tanks containing sanitary waste would be removed if mixed waste were not generated (LANL 1992, 0781).

The 73-004(a) septic tank was found to be intact. The cover was constructed of six individual concrete panels laid side-by-side across the top of the tank. The tank was constructed of concrete and was roughly 6 x 3 x 6.8 ft. Although the tank was designed to have removable baffles, none of the baffles were present. The inlet drainline was a 6-in. VCP, but the section adjacent to the tank had been removed, probably during installation of a nearby buried utility. Because of poor access and the proximity of the buried utilities, no attempt was made to trace the inlet drainline back to the incinerator building. The outlet drainline, a 6-in. diameter VCP, was uncovered in a trench approximately 17 ft north of the tank. The outfall itself was located at the edge of the mesa within the upper portion of the ash disposal area (PRS 73-002).

It was noted that the septic tank had two inlet and two outlet openings, one approximately 1 ft below the other at each end of the tank. The upper set of openings were within six inches of the top of the tank. It was determined that the lower openings were the functional inlet and outlet openings. Although the upper openings were not being used, they had not been plugged and could allow infiltrating rainwater to enter the tank.

The tank contained approximately 3 to 3.5 ft of sediment and 1 to 1.5 ft of water. The sediment consisted of sand, silt, and clay-sized particles with occasional gravel and larger tuff fragments that may have fallen into the tank when the cover was removed. Because of the relatively small size of the tank, it was decided to collect a single sediment sample (sample no. 0173-96-0234), a duplicate sediment sample (sample no. 0173-96-0235), and a single water sample (sample no. 0173-96-0238). The water sample was collected from a stagnant pool before collecting the sediment sample. The sediment sample was then collected approximately 2 ft from the inlet end of the tank (Fig. 2.1-1). These samples were the basis for waste characterization and disposal requirements.

The sediment sample was collected by slowly pushing a piece of 2-in. diameter PVC pipe through the sediment to the bottom of the tank. The pipe was then withdrawn while covering the top end, thus using the resulting vacuum to keep the sample from sliding out until it was over the sample pan. A volatile organic compound (VOC) sample was then immediately collected by filling the sample container with grabs from along the entire 3- to 3.5-ft thick sediment layer. The remaining sediment was then homogenized and placed into the other sample containers.

The analytical results for samples of tank contents were used for waste decisions and are presented in Section 6.0.

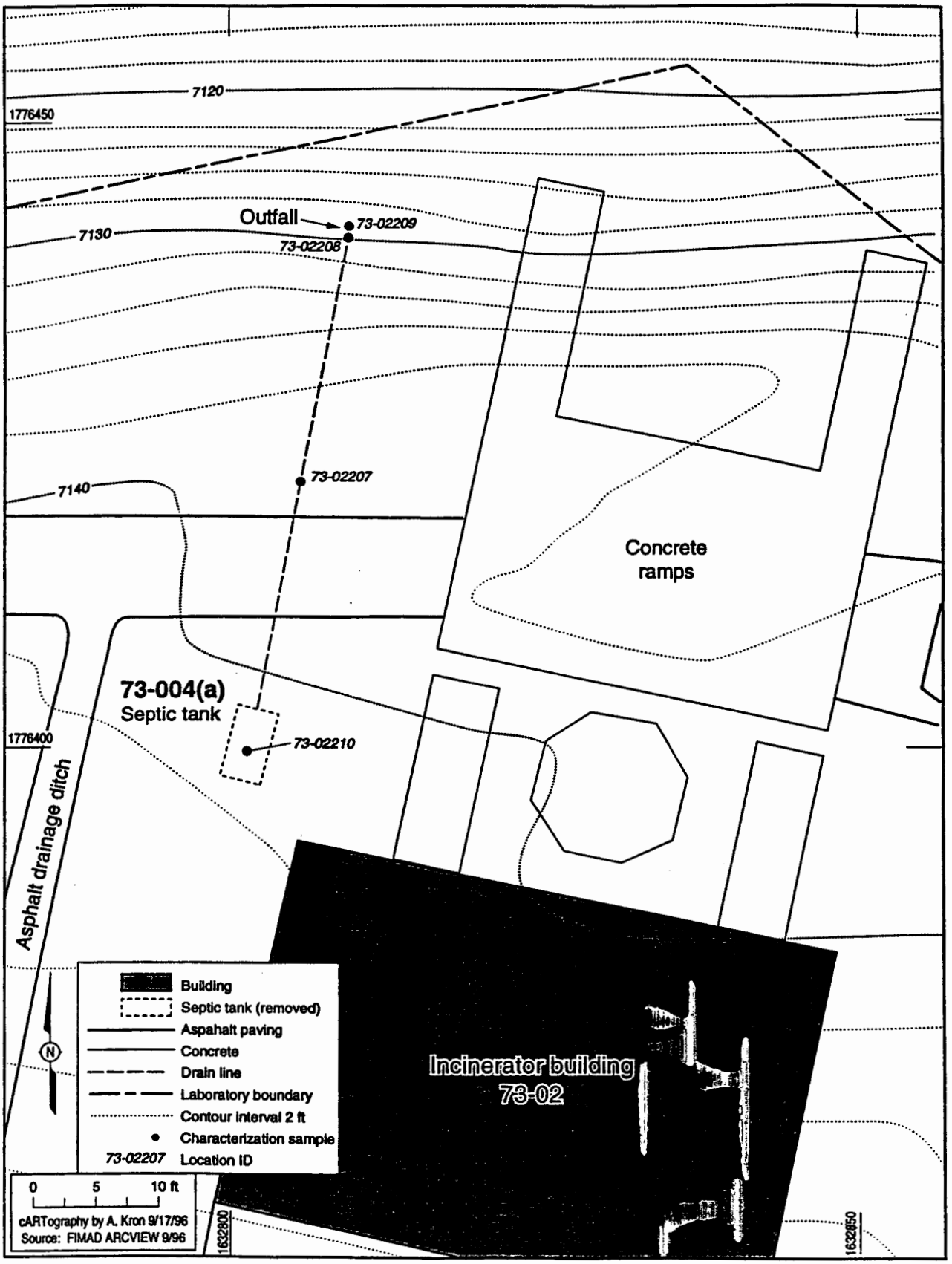

Fig. 2.1-1. Characterization sample locations at PRS 73-004(a).

To determine if a release occurred from the outlet drainline, samples were collected using the spade and scoop method. One sample (sample no. 0173-96-0231) was collected from beneath a joint in the VCP, approximately 17 ft north of the septic tank (Table 2.2-1). Two samples were also collected from the end of the outlet drainline, which is located on the hillside in an area where it appears that ash material from the incinerator (PRS 73-002) was disposed. One sample (sample no. 0173-96-0232) was collected from within the end of the VCP and a second sample (sample no. 0173-96-0233) was collected from the head of the outfall channel, approximately 1 ft downgradient of the end of the drainline. Both samples appeared to be composed of ash material rather than soil; therefore, the presence of chemicals in these samples may not be indicative of a release from the septic tank. Further assessment of the ash material will be addressed at a later date within the context of a Phase II investigation of PRS 73-002. Table 2.2-1 summarizes the characterization sample information, including the sample numbers, FIMAD numbers, and analyses requested.

All sample containers were appropriately labeled and assigned unique LANL sample identification numbers with bar codes for tracking purposes. The samples were documented on sample collection logs, placed in coolers with blue ice, and transported to the Sample Management Office (SMO) under chain-of-custody. All sampling was conducted in accordance with LANL Environmental Resoration (ER) Project procedures.

Field Screening

Field screening was performed to protect worker health and safety, to comply with LANL waste minimization policies, and to guide soil sampling. Samples and excavated soil were screened by the site safety officer (SSO) to detect volatile organic chemical and gross radiological contamination. The soil was screened for volatile organic vapors using a Thermo Environmental Instruments, Inc. organic vapor monitor (Model 580B), which is a photionization detector with an 11.8 eV bulb. Soil was also screened for ionizing radiation using a Ludlum Model 139 rate meter with an air proportional (alpha) probe and an Eberline ESP-1 rate meter with a beta/ gamma probe. The excavation and soils were screened for flammable gases using a MSA Model 361 combustible gas indicator. All field screening instruments were calibrated and checked by the SSO as required.

Health and safety action levels were not exceeded during field operations. Field screening results were recorded in the SSO logbook, field screening forms, and sample collection logs.

TABLE 2.2-1

SUMMARY OF CHARACTERIZATION SAMPLES COLLECTED AT PRS 73-004(a)

SAMPLE INFORMATION				ANALYTICAL SUITE AND REQUEST NUMBER				
LOCATION ID	SAMPLE ID	LOCATION DESCRIPTION AND DEPTH	MATRIX	VOCs[a]	SVOCs[b]	PCBs/ PEST.[c]	TAL[d] METALS	RAD[e]
73-02207	0173-96-0231	Below outlet pipe, 17.5 ft north of tank at 3.5–3.8 ft	Soil	2385	2385	2385	2384	2389
73-02208	0173-96-0232	Inside end of outlet pipe	Soil	2385	2385	2385	2384	2389
73-02209	0173-96-0233	Head of outfall channel at 0.3–0.8 ft	Soil	2385	2385	2385	2384	2389
73-02210	0173-96-0234	Inside septic tank, slightly south of middle	Soil	2385	2385	2385	2384	2389
73-02210	0173-96-0235	Duplicate of 0173-96-0234	Soil	2385	2385	2385	2384	2389
73-02210	0173-96-0238[f]	Inside septic tank, slightly south of middle	Water	2385	2385	2385	2384	2389

[a] VOCs = Volatile organic compounds.
[b] SVOCs = Semivolatile organic compounds.
[c] PCBs/Pest. = Polychlorinated biphenyls/Pesticides.
[d] TAL = Target analyte list metals.
[e] RAD = Radiological analyses.
[f] This sample was also analyzed for total petroleum hydrocarbons (TPH) under request no. 2385.

2.3 Remedial Implementation and Confirmation Results

The VCA plan for 73-004(a) stated that remedial actions would be developed on a case-by-case basis, depending on the nature and extent of the contamination. If VCA activities were required, they might include removing the entire septic system (tank contents, septic tank, and drainlines) or removing just the tank contents and closing and leaving the tank and drainlines in place with no further action.

The remedial option selected for PRS 73-004(a) was to remove the tank and its contents and leave the outlet drainline in place. The decision to remove the tank and its contents was influenced by the knowledge that DOE currently owns the property and is considering transferring the land to Los Alamos County. The outfall pipe samples indicated that the tank may have been a source of hazardous constituents. By removing the tank the underlying materials, which were potentially contaminated, allowed for visual inspection of releases and confirmatory sample collection. The characterization samples representative of soil remaining at the site and confirmatory samples of soil taken under the tank were used in the human health assessment described later in this report.

2.3.1 Clean-up level derivation

No clean-up levels were derived for PRS 73-004(a).

2.3.2 Remedial Implementation

On August 26, 1996, removal of the septic tank began. The tank was first emptied of water and sediment using a super sucker vacuum truck. A power washer was used to clean the sides and floor of the tank, and the wash water was also removed using the vacuum truck. After visually verifying that the tank was clean, a trackhoe began digging along the south and west sides of the tank. The tank was small enough that removal in one piece was attempted. However, the tank had been poured in place using the tuff as the outer form, which created a tight bond between the concrete and tuff. The tank was finally freed but was much heavier and more massive than expected, due in part to the amount of tuff bonded to the sides and bottom of the tank. To facilitate removal, the tank had to be broken into smaller pieces and removed with the trackhoe bucket. The washed concrete pieces were placed in a staging area for loading and transport to the Los Alamos County landfill, in accordance with approved waste disposal documents.

After removing the septic tank at PRS 73-004(a), one confirmation sample (sample no. 0173-96-0503) and a duplicate sample (sample no. 0173-96-0510) were collected from the

TABLE 2.3.2-1

SUMMARY OF CONFIRMATORY SAMPLES COLLECTED AT PRS 73-004(a)

SAMPLE INFORMATION				ANALYTICAL SUITE AND REQUEST NUMBER				
LOCATION ID	SAMPLE ID	LOCATION DESCRIPTION AND DEPTH	MATRIX	VOCs	SVOCs	PCBs/ PEST.	TAL METALS	RAD
73-02328	0173-96-0503	Below middle of former septic tank at 9–10 ft	Soil	2568	2568	2568	2569	2570
73-02328	0173-96-0510	Duplicate of 0173-96-0503	Soil	2568	2568	2568	2569	2570

approximate mid-point beneath the tank, 11 ft below ground surface (bgs). Table 2.3.2-1 summarizes the sample information and analyses requested.

Immediately after collecting the confirmation samples, the excavation was backfilled and compacted. Additional clean fill was brought in to complete the backfilling operation and return the site to its original contours. A low berm lined with sand bags was constructed to limit the amount of storm water runoff crossing the disturbed area until it could be seeded and covered with jute matting.

2.3.3 Human health assessment

This section presents potential human health effects resulting from exposure to residual contamination associated with PRS 73-004(a). Samples collected from beneath a joint in the outlet drainline, from the end of the outlet drainline, and one confirmation sample collected under the tank after its removal are considered confirmatory samples for PRS 73-004(a). A screening assessment was performed on the data for these confirmatory samples following methodology presented in Risk-Based Corrective Action Process (Environmental Restoration Project Decision Support Council 1995, 1271). Only data from samples sent to a fixed laboratory were included in the screening assessment. These data were validated and the quality assurance/quality control (QA/QC) evaluations are presented in Appendix A.

Background Comparisons

Data for inorganics and radionuclides at PRS 73-004(a) were compared to background screening values presented in Statistical Comparisons to Background, Part I (Environmental Restoration Project Decision Support Council 1995, 1218). The results of the background comparison are discussed below.

Inorganics. Five soil samples collected from outside the tank at PRS 73-004(a) were analyzed for target analyte list (TAL) metals; two of these samples were confirmatory samples from beneath the tank. Fifteen inorganics (arsenic, barium, cadmium, calcium, chromium, copper, iron, lead, manganese, mercury, nickel, silver, sodium, vanadium, and zinc) were detected at concentrations exceeding their respective background screening values in at least one sample.

Based on the background comparisons, all 15 inorganics are carried forward to the screening assessment. The concentrations for each sample that has at least one value above background screening values for these analytes are presented in Table 2.3.3-1. Locations of these analytes are presented in Fig. 2.3.3-1.

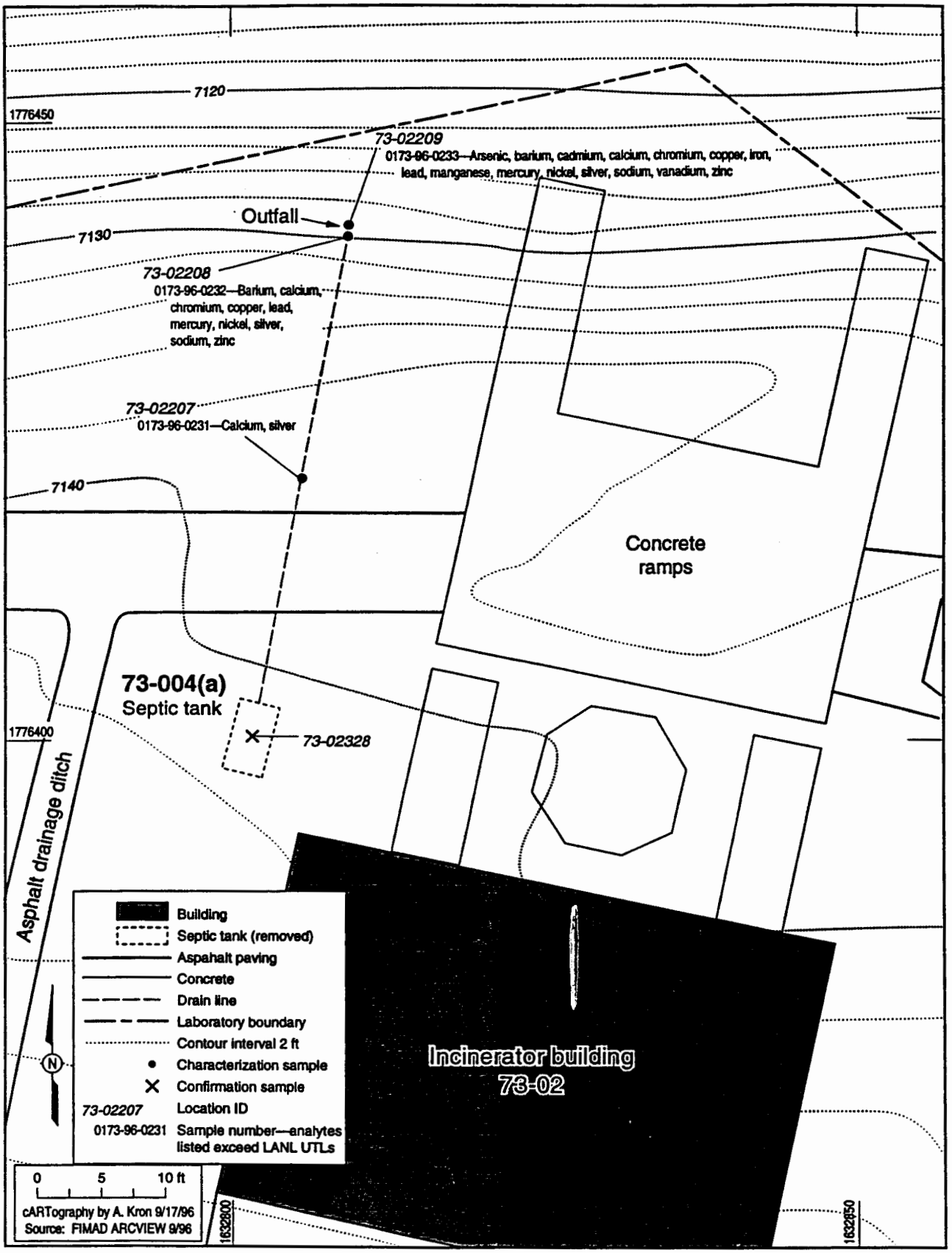

Fig. 2.3.3-1. Sample locations with inorganics above background at PRS 73-004(a).

TABLE 2.3.3-1

INORGANICS WITH CONCENTRATIONS EXCEEDING BACKGROUND SCREENING VALUES AT PRS 73-004(a)

LOCATION ID	UTL	SAL	73-02207	73-02208	73-02209
SAMPLE ID	N/A[a]	N/A	0173-96-0231	0173-96-0232	0173-96-0233
Arsenic	7.82[b]	n/a[c]	3.7	7.2	**45**[d]
Barium	315	5 300	170(J-)[e]	**3 300(J-)**	**4 400(J-)**
Cadmium	2.6[f]	38	0.61(U)[g]	2.5	**4.6**
Calcium	6 120	n/a	**18 000**	**7 400**	**9 100**
Chromium	19.3	211	5.4	**36**	**110**
Copper	15.5	2 800	12	**220**	**960**
Iron	21 300	n/a	6 800	17 000	**120 000**
Lead	23.3	400	17(J-)	**1 300(J-)**	**2 700(J-)**
Manganese	714	n/a	120	380	**790**
Mercury	0.1[c]	23	0.12(U)	0.55(J+)[h]	**1(J+)**
Nickel	15.2	1 500	4.4	**17**	**76**
Silver	n/a	380	**2.4**	**160**	**220**
Sodium	915	n/a	210	**2 200**	**1 200**
Vanadium	41.9	540	11	19	**62**
Zinc	50.8	23 000	44	**1 100**	**2 000**

[a] N/A = Not applicable.
[b] All SAL, UTL, and sample values are in mg/kg.
[c] n/a = Not available.
[d] Values in bold are above background screening values.
[e] (J-) = Estimated quantity, possibly biased low.
[f] Value represents the maximum reported background concentration in soil.
[g] (U) = Not detected.
[h] (J+) = Estimated quantity, possibly biased high.

Radionuclides. Three soil samples collected from outside the tank at PRS 73-004(a) were analyzed for tritium. All tritium results are less than the background screening value. Therefore, tritium will not be carried forward to the screening assessment. These three soil samples were also analyzed for gross alpha, beta, and gamma. These analytical results were compared to various sources, including "Radionuclides and Radioactivity in Soils Within and Around Los Alamos National Laboratory,1974 through 1994: Concentrations, Trends, and Dose Comparisons," (Fresquez et al. 1996, 05-0243). The gross alpha and gross beta radiation results (mean + 2 standard deviaitons) were less than reported regional background values (mean + 2 standard deviations).The gross gamma radiation results (mean + 2 standard deviations) were approximately twice the reported regional background value (mean + 2 standard deviations). However, given that radionuclide concentrations in natural soil vary widely and that soil samples for gross radiation analysis are prepared differently by different laboratories, these gross gamma results probably do not indicate soil radionuclide concentrations greater than natural background concentrations. Therefore, gross alpha, beta, and gamma will not be carried forward to the screening assessment.

Organics. Five soil samples collected from outside the tank at PRS 73-004(a) were analyzed for volatiles, semivolatiles, pesticides, and PCBs; two of these samples were confirmatory samples from beneath the tank. Sixteen organic chemicals (4,4'-DDD, 4,4'-DDE, 4,4'-DDT, chlordane, 2-methylnaphthalene, benzo(b)fluoranthene, benzoic acid, bis(2-ethylhexyl)phthalate, chrysene, di-n-butylphthalate, fluoranthene, naphthalene, phenanthrene, phenol, pyrene, and trichlorofluoromethane) were detected at PRS 73-004(a). The concentrations for each sample that had at least one detected value for these 16 chemicals are presented in Table 2.3.3-2. Locations of these analytes are presented in Fig. 2.3.3-2.

These 16 chemicals will be carried forward to the screening assessment.

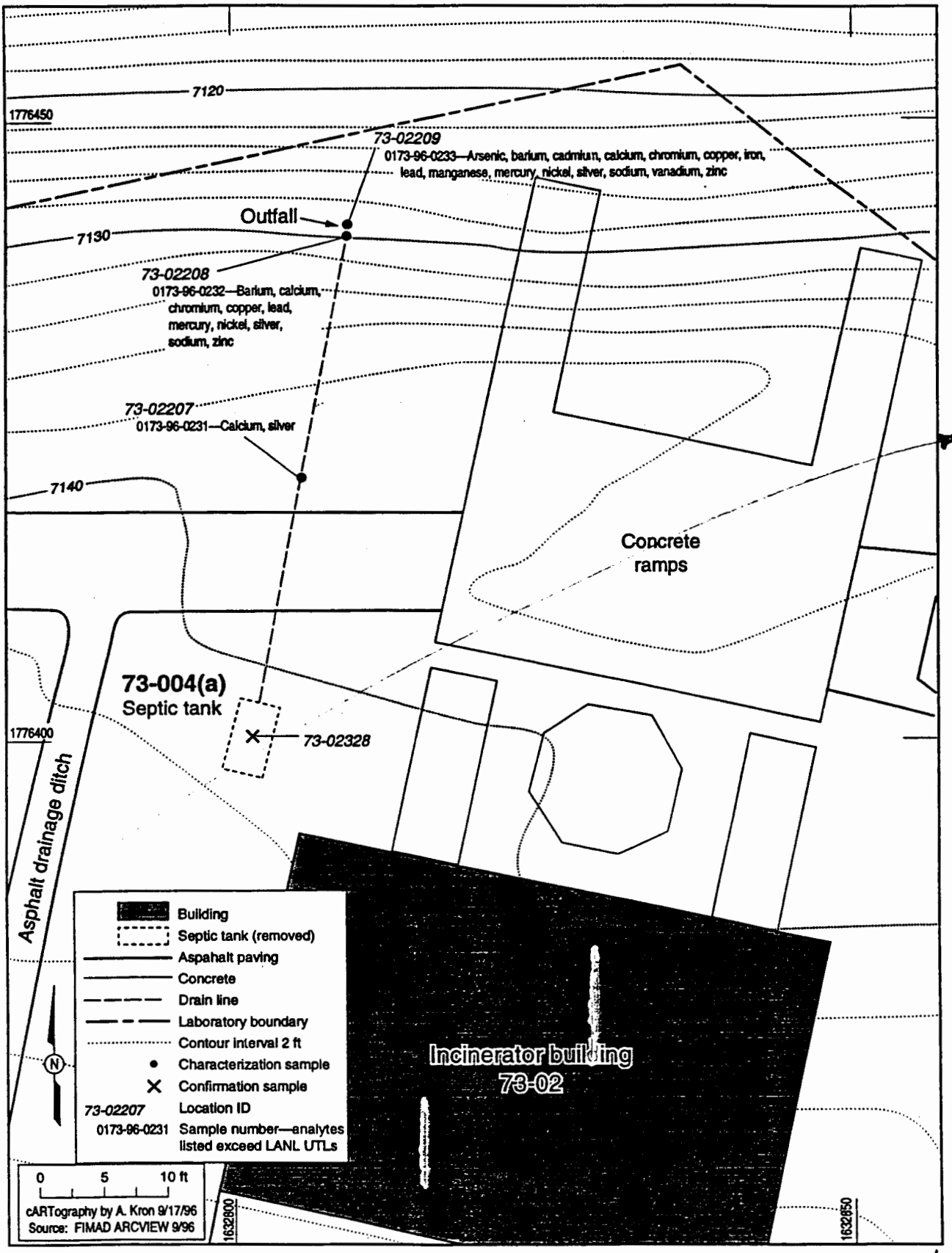

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Fig. 2.3.3-2. Sample locations with ~~inorganics above background at PRS 73-004(a).~~ deleted organics

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TABLE 2.3.3-2

ORGANICS WITH DETECTED CONCENTRATIONS AT PRS 73-004(a)

LOCATION ID	SAL	73-02207	73-02208	73-02209
SAMPLE ID	N/A[a]	0173-96-0231	0173-96-0232	0173-96-0233
4,4'-DDD	1.9[b]	0.173	6.8	1.3
4,4'-DDE	1.3	0.145	4.38	0.82
4,4'-DDT	1.3	0.533	35.4	3.32
Chlordane (alpha & gamma)	0.34	0.004(U)[c]	0.415	0.235
2-Methylnaphthalene	n/a[d]	0.22	0.71(U)	0.25
Benzo(b)fluoranthene	0.61	0.77(U)	0.21	1.8(U)
Benzoic acid	100 000	7.7(U)	0.19	18(U)
Bis(2-ethylhexyl) phthalate	32	0.77(U)	0.92	1.8(U)
Chrysene	24	0.77(U)	0.12	1.8(U)
Di-n-butylphthalate	6 500	0.77(U)	0.71(U)	0.25
Fluoranthene	2 600	0.77(U)	0.16	0.36
Naphthalene	800	0.16	0.08	0.36
Phenanthrene	n/a	0.1	0.092	0.28
Phenol	39 000	0.77(U)	0.71(U)	0.52
Pyrene	2 000	0.77(U)	0.14	1.8(U)
Trichlorofluoromethane	710	0.007	0.005(U)	0.005(U)

[a] N/A = Not applicable.
[b] All SAL and sample values are in mg/kg.
[c] (U) = Not detected.
[d] n/a = Not available.

Of the organics that were not detected in any sample collected from 73-004(a), nine had reporting limits (RPLs) greater than SAL (screening action level) [benzo[a]pyrene, bis(2-chloroethyl)ether, 3,3'-dichlorobenzidine, dibenzo[a,h]anthracene, hexachlorobenzene, indeno(1,2,3-cd)pyrene, N-nitrosodi-n-propylamine, N-nitrosodimethylamine, and vinyl chloride]. In addition, 27 others do not have SALs to which the RPLs can be compared (acenaphthylene, benzo[a]anthracene, benzo[g,h,i]perylene, delta-BHC, bis[2-chloroethoxy]methane, bromobenzene, bromochloromethane, n-butylbenzene, sec-butylbenzene, 4-chloro-3-methylphenol, 4-chlorophenylphenyl ether, 1,3-dichloropropane, 2,2-dichloropropane, 1,1-dichloropropene, cis-1,3-dichloropropene, trans-1,3-dichloropropene, 4,6-dinitro-2-methylphenol, 4-bromophenyl phenylether, 4-chlorotoluene, 4-isopropyltoluene, 2-hexanone, 3-nitroaniline, 4-nitroaniline, 2-nitrophenol, 4-nitrophenol, phenanthrene, and propylbenzene).

Of these 36 organic chemicals, acenaphthylene, benzo(a)anthracene, benzo(a)pyrene, benzo(g,h,i)perylene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene, are carried forward to the screening assessment process because several other polycyclic aromatic hydrocarbon (PAHs) have been detected in samples collected from PRS 73-004(a). The remaining 30 chemicals are not expected to be associated with operation of the former incinerator and would not be expected to be present at this site; therefore, these 30 organic chemicals are not carried forward through the screening assessment process.

Screening Assessment

Thirty-seven chemicals were carried forward from the background and reporting limit comparisons. Five of the chemicals (chlordane, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, and lead) were detected at concentrations greater than SAL at one or more locations (Fig. 2.3.3-3). Four other chemicals (benzo[a]anthracene, benzo[a]pyrene, dibenzo[a,h]anthracene, and indeno[1,2,3-cd]pyrene) were not detected in any sample; however, the reporting limits were greater than their respective SALs. Therefore, these nine chemicals are identified as COPCs.

Eight of the chemicals do not have SALs to which the detected concentrations (arsenic, calcium, iron, sodium, 2-methylnaphthalene, and phenanthrene) or reporting limits (acenaphthylene and benzo[g,h,i]perylene) can be compared. Arsenic was detected in one of the five samples collected at PRS 73-004(a) at a concentration greater than background. This sample was taken on the hill slope slightly downgradient of the outfall pipe; therefore, arsenic is identified as a COPC. It should be noted, however, that the elevated concentrations of arsenic and other metals on the slope are not believed to be associated with PRS 73-004(a), as discussed later in this section. None of the remaining seven chemicals are considered further in this screening assessment for the following reasons.

- The maximum detected values for 2-methylnaphthalene and phenanthrene were 0.25 and 0.28 mg/kg, respectively, which are significantly lower than the SALs for structurally similar compounds (i.e., 240 mg/kg for naphthalene and 5.7 mg/kg for anthracene, respectively). Similarly, the maximum reporting limit for acenaphthylene and benzo(g,h,i)perylene was 1.8 mg/kg. This value also is significantly lower than the SALs for structurally similar compounds (i.e., 110 mg/kg for acenaphthene and 100 mg/kg for pyrene).

- Calcium, iron, and sodium are essential nutrients, and exposure at environmental levels is not associated with adverse health effects.

None of the remaining 20 chemicals were detected at concentrations greater than SAL; therefore, these chemicals (i.e., barium, benzo[b]fluoranthene, benzoic acid, bis[2-ethylhexyl]phthalate, cadmium, chromium, chrysene, copper, di-n-butylphthalate, fluoranthene, manganese, mercury, naphthalene, nickel, phenol, pyrene, silver, trichlorofluoromethane, vanadium, and zinc) are included in the following multiple chemical evaluation (MCE).

A MCE is performed separately for three classes of analytes: noncarcinogens, nonradioactive carcinogens, and radionuclides. In this case, two classes of analytes (noncarcinogens and nonradioactive carcinogens) were identified for the MCE. Even though cadmium is considered to be a probable human carcinogen through inhalation, it is evaluated as a noncarcinogen because the SAL is based on noncarcinogenic effects, which is considered a more sensitive endpoint for this chemical.

Table 2.3.3-3 presents the results of the MCE for PRS 73-004(a). The total normalized value is 2.4 for noncarcinogens and 0.91 for nonradioactive carcinogens. These results suggest that there may be a potential for noncarcinogenic health effects due to the cumulative exposure to the noncarcinogenic chemicals included in this MCE. However, cumulative exposure to the carcinogenic chemicals included in this MCE should not pose an unacceptable cancer risk. Therefore, those noncarcinogenic chemicals with individual normalized values greater than 0.1 (i.e., barium, cadmium, copper, manganese, silver, and vanadium) are identified as COPCs.

TABLE 2.3.3-3

MULTIPLE CHEMICAL EVALUATION FOR SOIL SAMPLES FROM PRS 73-004(a)

ANALYTE	LOCATION ID	SAMPLE ID	SAMPLE VALUE (mg/kg)	SOIL SAL (mg/kg)	NORMALIZED VALUE
Noncarcinogenic Health Effects					
Barium	73-02209	0173-96-0233	4 400(J-)[a]	5 300	0.83
Benzoic Acid	73-02208	0173-96-0232	0.19	100 000	0.0000019
Cadmium	73-02209	0173-96-0233	4.6	38	0.12
Copper	73-02209	0173-96-0233	960	2 800	0.34
Di-n-butylphthalate	73-02209	0173-96-0233	0.25	6 500	0.000038
Fluoranthene	73-02209	0173-96-0233	0.36	2 600	0.000014
Manganese	73-02209	0173-96-0233	790	3 200	0.24
Mercury	73-02209	0173-96-0233	1(J+)[b]	23	0.043
Naphthalene	73-02209	0173-96-0233	0.36	240	0.0015
Nickel	73-02209	0173-96-0233	76	1 500	0.051
Phenol	73-02209	0173-96-0233	0.52	39 000	0.000013
Pyrene	73-02208	0173-96-0232	0.14	100	0.0014
Silver	73-02209	0173-96-0233	220	380	0.58
Trichlorofluoromethane	73-02207	0173-96-0231	0.007	380	0.000018
Vanadium	73-02209	0173-96-0233	62	540	0.11
Zinc	73-02209	0173-96-0233	2 000	23 000	0.087
				Total:	**2.4**
Carcinogenic Health Effects					
Benzo(b)fluoranthene	73-02208	0173-96-0232	0.21	0.61	0.34
Bis(2-ethylhexyl) phthalate	73-02208	0173-96-0232	0.92	32	0.029
Chromium	73-02209	0173-96-0233	110	210	0.53
Chrysene	73-02208	0173-96-0232	0.12	7.2	0.0167
				Total:	**0.91**

[a] (J-) = Estimated quantity, possibly biased low.
[b] (J+) = Estimated quantity, possibly biased high.

Based on the results of this screening assessment, 16 chemicals (arsenic, barium, benzo[a]anthracene, benzo[a]pyrene, cadmium, copper, chlordane, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, dibenzo[a,h]anthracene, indeno[1,2,3-cd]pyrene, lead, manganese, silver, and vanadium) were identified as COPCs. These chemicals belong to three distinct chemicals groups: metals, organochlorine pesticides, and PAHs. The need for further evaluation (risk assessment or site characterization) of the chemicals in these chemical groups is discussed below.

- None of the PAHs identified as COPCs were detected in samples collected at PRS 73-004(a). These chemicals were identified as COPCs because other PAHs were detected at the site and their respective reporting limits in one or more samples exceeded SAL. As described above, none of the detected PAHs are present at concentrations exceeding SAL or, when considered in the MCE, are present at concentrations that may be of concern following cumulative exposure. In addition, the range of detection limits for the identified COPCs (0.2 to 1.8 mg/kg) is well within the range of concentrations that could be associated with run-off from nearby asphalt pavement along the mesa top. Therefore, further evaluation of benzo(a)anthracene, benzo(a)pyrene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene is not warranted.

- The organochlorine pesticides identified as COPCs were detected at low concentrations in a sample collected immediately beneath a joint in the outfall pipe, at somewhat higher concentrations in a sample collected at the end of the outfall pipe, and then at low concentrations in a sample collected approximately 1 ft downgradient of the outfall pipe. Based on these results, it would appear that small amounts of organochlorine pesticides may have been associated with the septic tank. The concentration of total DDT (the sum of 4,4'-DDD, 4,4,'-DDE, 4,4'-DDT) in the downgradient outfall sample is 5.4 mg/kg, which is approximately four times the SAL for 4,4'-DDT. This residual concentration of total DDT is not expected to present a human health risk given that the SAL is based on long-term exposure by a resident whereas this sample was collected from a very steep slope that would not

be suitable for residential development. Therefore, further evaluation of chlordane, 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT is not warranted.

- The metals identified as COPCs were detected at relatively low concentrations in a sample collected beneath the joint in the outfall pipe; however, the concentrations increased significantly in the sample collected at the end of the outfall pipe and were highest in the sample collected on the hill slope immediately downgradient of the outfall. As discussed in Section 2.2, the outfall pipe discharges onto a slope that is covered with ash material associated with the former incinerator. In fact, the end of the outfall pipe was completely covered by the ash material, and the sample collected at the end of the outfall pipe resembled ash material, as did the downgradient sample. Given that these metals were present at relatively low concentrations in the sample beneath the septic tank outfall pipe, it is believed that the elevated metal concentrations are associated with the ash material, not discharges from the septic tank. Therefore, further evaluation of arsenic, barium, cadmium, copper, lead, manganese, silver, and vanadium is not warranted as part of the VCA for PRS 73-004(a). However, further assessment of the ash material will be addressed at a later date within the context of a Phase II investigation of PRS 73-002, and these data from PRS 73-004(a) will be considered in that evaluation.

2.4 Conclusions and Recommendations

Based on the results of the screening assessment for PRS 73-004(a), several pesticides, PAHs, and metals were identified as COPCs. Upon further evaluation of the pesticide and PAH data, it does not appear that these compounds are present at concentrations that would pose an unacceptable human health risk. With regard to the metals, it is believed that the presence of these compounds in the outfall samples at 73-004(a) is related to ash material presumably associated with the incinerator (PRS 73-002), not operation of the septic tank. These chemicals will be considered further within the context of a Phase II Investigation of PRS 73-002. No further action is recommended for PRS 73-004(a).

3.0 PRS 73-004(b)

3.1 Site Description and History

Septic system 73-004(b) was installed in 1949, but its period of operation is uncertain. However, the steam cleaning plant that this system served was demolished in 1971. The tank received wash water from the former steam cleaning plant which was used to wash down garbage trucks, cans, and dumpsters that contained municipal waste. This tank was also constructed of concrete with a vitrified clay outfall pipe that discharged to Pueblo Canyon.

PRS 73-004(b) is located on DOE property, west of the incinerator building and beneath the existing asphalt parking lot for the airport terminal building. An engineering drawing dated April 25, 1949, illustrated the septic tank to be approximately 90 ft west of the existing incinerator building's southwest corner (Fig. 3.1-1). The tank was not visible on aerial photographs taken in the late 1940s and 1950s, and a field reconnaissance did not locate any evidence of the tank or its outfall.

3.2 Site Characterization Before Removal

Phase 1 RFI activities were not previously performed at PRS 73-004(b). The potential for chemical or radiological contamination within this septic system was considered to be low. However, the septic tank, associated drainlines, and outfall point were to be investigated during the site characterization activities to determine if contamination was present. It was considered possible that steam cleaning facility operations may have inadvertently introduced contaminants into this septic system.

Discussion of Field Work

During characterization activities, the tank at PRS 73-004(b) was partially excavated with a backhoe. The intent was to minimize excavation work until screening and analytical results determined if any contamination was associated with the septic system. Therefore, only the top of the tank was uncovered, as well as portions of the inlet and outlet drainlines. The outfall was also located and uncovered.

The septic tank at 73-004(b) was found to have been left in place after the steam cleaning facility was decommissioned. The tank was located precisely where the engineering drawings indicated it to be. The geophysical survey information confirmed the location of the septic tank. The tank was accessible beneath the asphalt parking lot, but buried utilities made access difficult to portions of the outlet drainline.

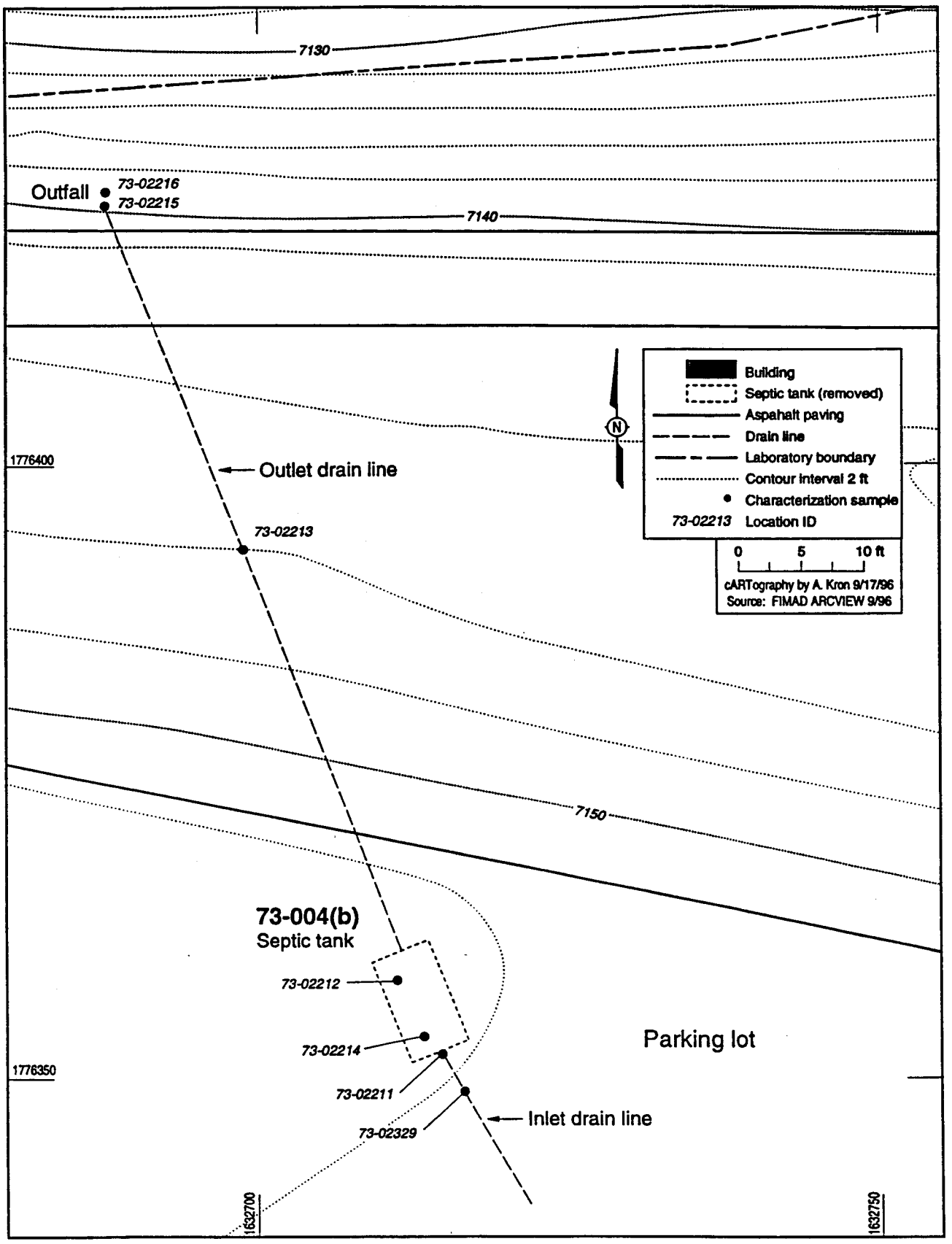

Fig. 3.1-1. Characterization sample locations at PRS 73-004(b).

The work plan called for the collection of characterization samples from within the tank, beneath the associated drainlines, and from the outfall. After receiving the analytical results for the septic tank, the data were to be assessed to determine if remedial actions were required. The remedial options were then to be reviewed with the final remedial activity being determined on a site-by-site basis.

The 73-004(b) septic tank, including the cover, was found to be intact. The concrete tank was roughly 10.5 x 6 x 7.5 ft. There was no evidence that the tank had contained baffles. The inlet drainline was constructed of 6-in. diameter, cast iron pipe that was exposed for a distance of approximately 2 ft before it connected to the septic tank. The outlet drainline, a 6-in. diameter VCP, was exposed in a trench approximately 34 ft northwest of the tank and again at the outfall.

The tank initially contained from 1 to 2 ft of sediment. The sediment consisted of a dry, dense layer of sand, silt, and clay particles with some gravel. However, after a storm water control berm failed during a rainfall event, the tank filled with additional sediment and approximately 3 ft of storm water runoff. Because of the larger size of this tank, two sediment samples (sample nos. 0173-96-0241 and 0173-96-0244) and a duplicate (sample no. 0173-96-0242) were collected, one from each end of the tank (Fig. 3.1-1). The water was not sampled as it was introduced into the tank after the sediment sampling event. The sediment was sampled with a stainless steel hand auger using the hand auger and thin-wall tube sampling method. These samples were the basis for waste classfication and disposal requirements.

The analytical results for samples of tank contents were used for waste decisions and are prsented in Section 6.0 of this report.

To determine if a release occurred from the outlet drainline, a sample (sample no. 0173-96-0249) was collected from beneath a joint in the VCP approximately 34 ft north of the septic tank. Two samples were also collected from the end of the outlet drainline: one (sample no. 0173-96-0245) from within the end of the VCP and a second (sample no. 0173-96-0246) from the head of the outfall channel, approximately 1 ft downgradient of the end of the drainline. These samples were collected using the spade and scoop method.

No joints in the cast iron inlet pipeline were exposed under which to collect a sample. Therefore, a sample (sample no. 0173-96-0243) was collected from beneath the inlet pipeline, immediately at its connection to the septic tank using the spade and scoop method. After receiving preliminary results for this sample, two additional inlet line samples were collected approximately 10 ft to the south of the tank: one above (sample no. 0173-96-0504) and one below (sample no. 0173-96-0505) the pipe. Table 3.2-1 summarizes the characterization sample information, including the sample number, FIMAD number, and analyses requested.

TABLE 3.2-1

SUMMARY OF CHARACTERIZATION SAMPLES COLLECTED AT PRS 73-004(b)

SAMPLE INFORMATION				ANALYTICAL SUITE AND REQUEST NUMBER				
LOCATION ID	SAMPLE ID	LOCATION DESCRIPTION AND DEPTH	MATRIX	VOCs	SVOCs	PCBs/ PEST.	TAL METALS	RAD
73-02211	0173-96-0243	Below inlet pipe at junction with septic tank at 7.2–7.4 ft	Soil	2391	2391	2391	2390	2392
73-02212	0173-96-0241	Inside septic tank, northwest quadrant	Soil	2391	2391	2391	2390	2392
73-02212	0173-96-0242	Duplicate of 0173-96-0241	Soil	2391	2391	2391	2390	2392
73-02213	0173-96-0249	Below outlet pipe, 34 ft north of tank at 4.2–4.5 ft	Soil	2391	2391	2391	2390	2392
73-02214	0173-96-0244	Inside septic tank, southwest quadrant	Soil	2391	2391	2391	2390	2392
73-02215	0173-96-0245	Inside end of outlet pipe	Soil	2487	2487	2487	2488	2490
73-02216	0173-96-0246	Head of outfall channel at 2.2–2.5 ft	Soil	2487	2487	2487	2488	2490
73-02329	0173-96-0504	Above inlet pipe, 10 ft south of tank at 3–4 ft	Soil	NA[a]	NA	2611	NA	NA
73-02329	0173-96-0505	Below inlet pipe, 10 ft south of tank at 7–7.5 ft	Soil	NA	NA	2611	NA	NA

[a] NA = Not analyzed.

All sample containers were appropriately labeled and assigned unique LANL sample identification numbers with bar codes for tracking purposes. The samples were documented on sample collection logs, placed in coolers with blue ice, and transported to the SMO under chain-of-custody. All sampling was conducted in accordance with LANL ER Project procedures.

Field Screening

Field screening was performed to protect worker health and safety, to comply with LANL waste minimization policies, and to guide soil sampling. Samples and excavated soil were screened by the SSO to detect volatile organic chemical and gross radiological contamination. The soil was screened for volatile organic vapors using a Thermo Environmental Instruments, Inc. organic vapor monitor (Model 580B), which is a photionization detector with an 11.8 eV bulb. Soil was also screened for ionizing radiation using a Ludlum Model 139 rate meter with an air proportional (alpha) probe and an Eberline ESP-1 rate meter with a beta/gamma probe. The excavation and soils were screened for flammable gases using a MSA Model 361 combustible gas indicator. All field screening instruments were calibrated and checked by the SSO as required.

Health and safety action levels were not exceeded during field operations. Field screening results were recorded in the SSO logbook, field screening forms, and sample collection logs.

3.3 Remedial Implementation and Confirmation Results

The VCA plan stated that remedial actions would be developed on a case-by-case basis, depending on the nature and extent of the contamination. If VCA activities were required, they might include removing the entire septic system (tank contents, septic tank, and drainlines) or removing just the tank contents and leaving the tank and drainlines in place with no further action.

The remedial option selected for PRS 73-004(b) was removing the tank and its contents and abandoning the inlet and outlet drainlines in place. The decision to remove the tank and its contents was influenced by the knowledge that DOE currently owns the property and is considering transferring the land to Los Alamos County. The outfall pipe samples indicated that the tank may have been a source of hazardous constituents. By removing the tank the underlying materials, which were potentially contaminated, were exposed and allowed for visual inspection of releases and confirmatory sample collection. The characterization samples representative of soil remaining at the site and confirmatory samples of soil taken under the tank were used in the human health assessment described later in this report.

3.3.1 Clean-up level derivation

No clean-up levels were derived for PRS 73-004(b).

3.3.2 Remedial Implementation

On August 23, 1996, removal of the septic tank began. The tank was first emptied of water and sediment using a super sucker vacuum truck. A power washer was used to clean the sides and floor of the tank, and the wash water was also removed using the vacuum truck. After visually verifying that the tank was clean, a trackhoe began digging along the east and west sides of the tank. Since the tank had been poured in place using the tuff as the outer form, a tight bond had been created between the concrete and tuff. To facilitate removal, the walls were collapsed inward. The washed concrete pieces were then removed with the trackhoe bucket. The concrete was piled near the excavation for loading and transport to the Los Alamos County landfill, in accordance with approved waste disposal documents.

Immediately after collecting the confirmation samples, the excavation was backfilled and compacted to LANL-required specifications. Additional clean fill was brought in to complete the backfilling operation. Several inches of base course material were added and compacted, and the entire excavation area was covered by asphalt. Openings broken through the parking lot curb for storm water run-on control were also repaired.

Weekly storm water inspections will be conducted and documented until all site restoration activities are completed. Inspections will then be conducted monthly until final acceptance of site restoration activities is issued by ESH.

3.3.3 Human health assessment

This section presents an assessment of the potential human health effects resulting from exposure to residual contamination associated with PRS 73-004(b). Samples collected from beneath a joint in the inlet pipeline, beneath a joint in the outlet drainline, from the end of the outlet drainline, and under the tank after its removal are considered confirmatory samples for PRS 73-004(b). A screening assessment was performed on the data for these confirmatory samples following methodology presented in Risk-Based Corrective Action Process (Environmental Restoration Project Decision Support Council 1995, 1271). Only data from samples sent to a fixed laboratory were included in the screening assessment. These data were validated and the quality assurance/quality control (QA/QC) evaluations are presented in Appendix A.

TABLE 3.3.2-1

SUMMARY OF CONFIRMATORY SAMPLES COLLECTED AT PRS 73-004(b)

SAMPLE INFORMATION				ANALYTICAL SUITE AND REQUEST NUMBER				
LOCATION ID	SAMPLE ID	LOCATION DESCRIPTION AND DEPTH	MATRIX	VOCs	SVOCs	PCBs/ PEST.	TAL METALS	RAD
73-02326	0173-96-0501	Below north half of former septic tank at 14–15 ft	Soil	2568	2568	2568	2569	2570
73-02327	0173-96-0502	Below south half of former septic tank at 14–15 ft	Soil	2568	2568	2568	2569	2570

Background Comparisons

Data for inorganics and radionuclides at PRS 73-004(b) were compared to background screening values presented in Statistical Comparisons to Background, Part I (Environmental Restoration Project Decision Support Council 1995, 1218). The results of the background comparison are discussed below.

Inorganics. Six soil samples collected from outside the septic tank at PRS 73-004(b) were analyzed for TAL metals. Seven inorganics (arsenic, chromium, copper, lead, mercury, vanadium, and zinc) were detected at concentrations exceeding their respective background screening values in at least one sample.

Based on the background comparisons, all seven inorganics are carried forward to the screening assessment. The concentrations for each sample that has at least one value above background screening values for these analytes are presented in Table 3.3.3-1. Locations of these analytes are shown in Fig. 3.3.3-1.

Radionuclides. Four soil samples collected from PRS 73-004(b) were analyzed for tritium. All tritium results are less than the background screening value. Therefore, tritium will not be carried forward to the screening assessment. These four soil samples were also analyzed for gross alpha, beta, and gamma. These analytical results were compared to various sources, including "Radionuclides and Radioactivity in Soils Within and Around Los Alamos National Laboratory,1974 through 1994: Concentrations, Trends, and Dose Comparisons," (P.Fresquez et al., LANL report LA-13149-MS, April 1996). The gross alpha and gross beta radiation results (mean + 2 standard deviaitons) were less than reported regional background values (mean + 2 standard deviations).The gross gamma radiation results (mean + 2 standard deviations) were approximately twice the reported regional background value (mean + 2 standard deviations). However, given that radionuclide concentrations in natural soil vary widely and that soil samples for gross radiation analysis are prepared differently by different laboratories, these gross gamma results probably do not indicate soil radionuclide concentrations greater than natural background concentrations. Therefore, gross alpha, beta, and gamma will not be carried forward to the screening assessment.

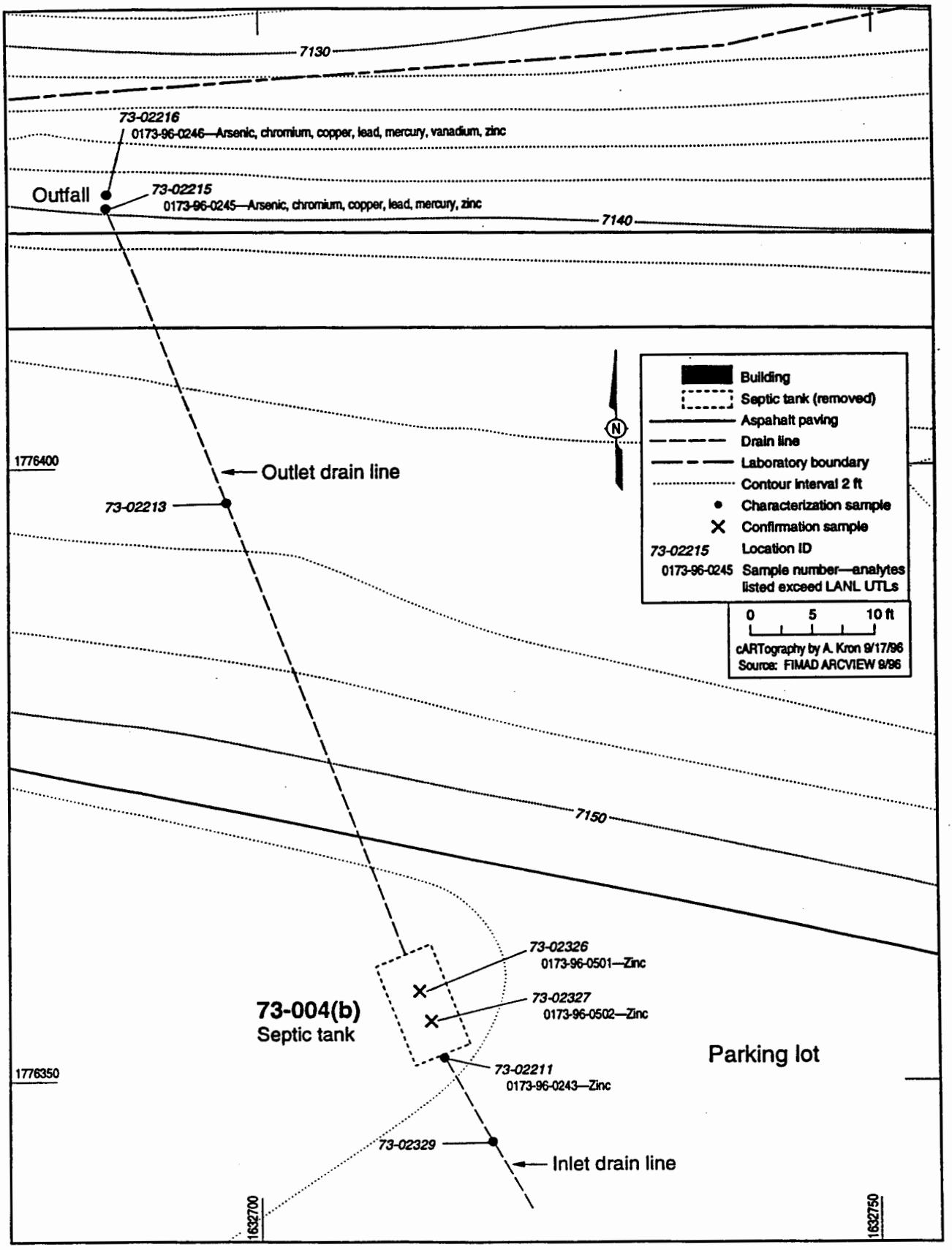

Fig. 3.3.3-1. Sample locations with inorganics above background at PRS 73-004(b).

TABLE 3.3.3-1

INORGANICS WITH CONCENTRATIONS EXCEEDING BACKGROUND SCREENING VALUES AT PRS 73-004(b)

LOCATION ID	UTL	SAL	73-02211	73-02215	73-02216	73-02326	73-02327
LOCATION DESCRIPTION	N/A[a]	N/A	Under inlet pipe	Outlet pipe sample	Outfall sample	Confirmation sample under north end of tank	Confirmation sample under south end of tank
Sample ID	N/A	N/A	0173-96-0243	0173-96-0245	0173-96-0246	0173-96-0501	0173-96-0502
Arsenic	7.82[b]	n/a[c]	3.2	8.8(J-)[d]	13(J-)	2.4	2.4
Chromium	19.3	211	5.3	30	36	3.9	4.5
Copper	15.5	2 800	4.6	20(J+)[e]	23(J+)	4.7	4.8
Lead	23.3	400	13	35	190	21	7.4
Mercury	0.1[f]	23	0.11(U)[g]	0.2	0.93	0.12(U)	0.12(U)
Vanadium	41.9	540	13	40	42	8.4	8.5
Zinc	50.8	23 000	80	210	150	260	61

[a] N/A = Not applicable.
[b] All UTL, SAL, and sample values are in mg/kg.
[c] n/a = Not available.
[d] (J-) = Estimated value, possibly biased low.
[e] (J+) = Estimated value, possibly biased high.
[f] Value represents the maximum reported background concentration in soil.
[g] (U) = Not detected.

Organics. Six soil samples collected from outside the septic tank at PRS 73-004(b) were analyzed for volatiles, semivolatiles, pesticides, and PCBs. Seventeen organic chemicals (benzo[a]anthracene benzo[a]pyrene, benzo[g,h,i]perylene, benzo[k]fluoranthene, benzo[b]fluoranthene, bis[2-ethylhexyl]phthalate, alpha chlordane, gamma chlordane, chrysene, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, fluoranthene, indeno[1,2,3-cd]pyrene, phenanthrene, pyrene, and toxaphene) were detected at PRS 73-004(b). The concentrations for each sample that had at least one detected value for these 17 chemicals are presented in Table 3.3.3-2. Locations of these analytes are shown in Fig. 3.3.3-2.

These 17 chemicals were carried forward to the screening assessment.

As discussed in Appendix A, the detection limits for several pesticides and PCBs were elevated in some of the samples collected at PRS 0-004(b) due to matrix effects (i.e., the sample had to be diluted up to 10 000 times before other compounds present in the sample were diluted to concentrations within the linear range of the laboratory equipment). Two of these samples, 0173-96-243 and 0173-96-0249, were collected outside of the septic tank and are considered in this analysis. Two other samples collected outside the tank (0173-96-0245 and 0173-96-0246) and two samples collected beneath the tank (0173-96-0501 and 0173-96-0502) do not appear to have been affected by matrix effects and do not have elevated detection limits, even though DDT and its isomers, alpha chlordane, gamma chlordane, and toxaphene were detected in these samples. With the exception of these pesticides, none of the PCBs or other pesticides included in the analytical suite were detected in any of the samples collected at PRS 0-004(b). In addition, none of these compounds were reported to be present in preliminary results for less diluted aliquots (therefore lower detection limits) of samples 0173-96-0243 and 0173-96-0249. Given that PCBs and the majority of the pesticides were not detected in the less diluted samples, it is unlikely that they are present in the other samples that have elevated detection limits as a result of matrix effects. Therefore, only the detected pesticides (DDTand its isomers, alpha chlordane, gamma chlordane, and toxaphene) are carried forward to the screening assessment.

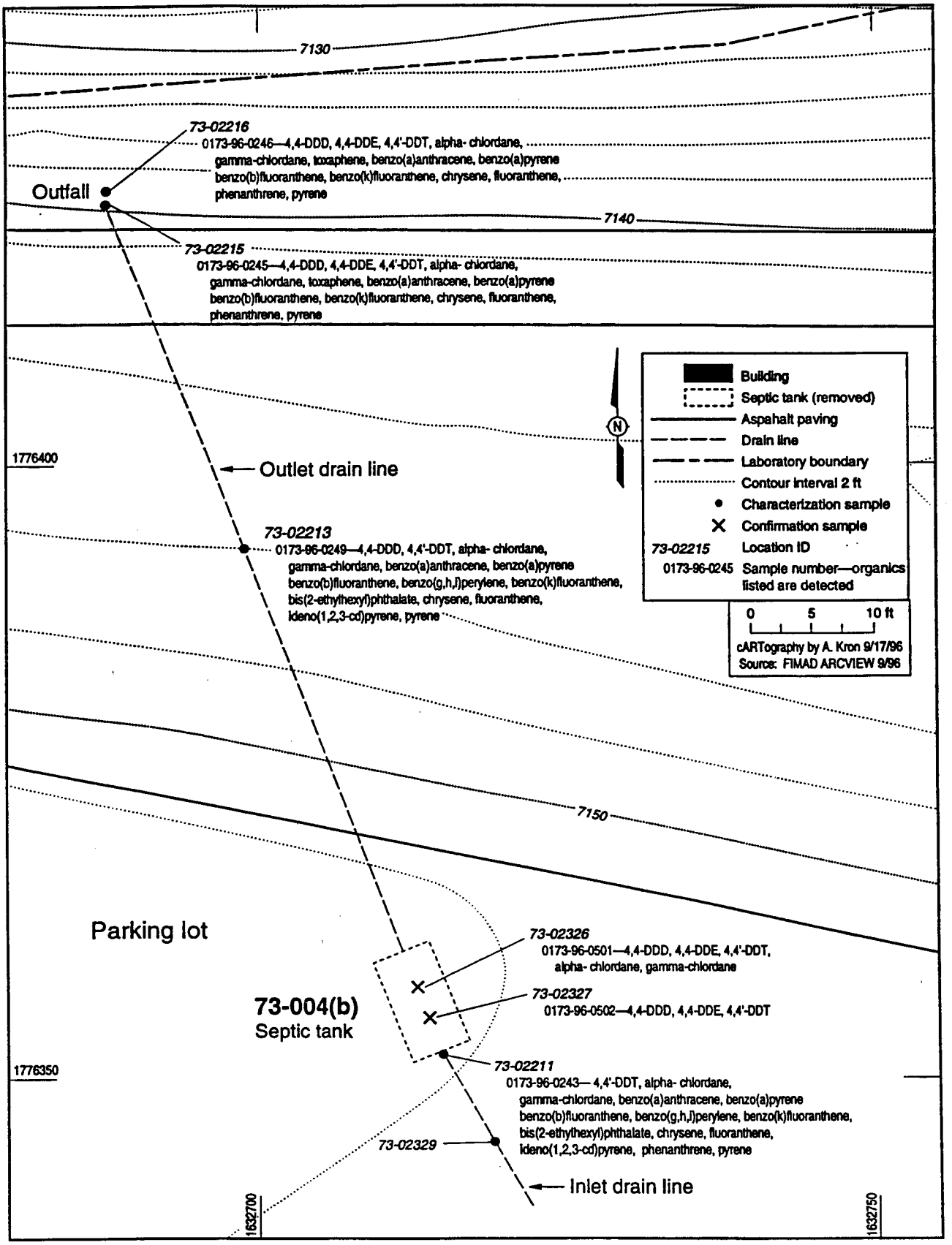

Fig. 3.3.3-2. Sample locations with detected organics at PRS 73-004(b).

TABLE 3.3.3-2

ORGANICS WITH DETECTED CONCENTRATIONS AT PRS 73-004(b)

LOCATION ID	SAL (mg/kg)	73-02211	73-02213	73-02215	73-02216	73-02326	73-02327
LOCATION DESCRIPTION	N/A[a]	Under inlet pipe	Under outlet pipe	Outfall sample	Outfall sample	Confirmation sample under north end of tank	Confirmation sample under south end of tank
Sample ID	N/A	0173-96-0243	0173-96-0249	0173-96-0245	0173-96-0246	0173-96-0501	0173-96-0502
4,4'-DDD	1.9[b]	37(U)[c]	4.7	1.3	1.5	0.31	0.042
4,4'-DDE	1.3	37(U)	0.73(U)	0.18	0.13	0.089	0.01
4,4'-DDT	1.3	170	0.15	0.054	0.34	0.11	0.021
Chlordane (gamma)	0.34[d]	0.84[e]	0.069	0.26	0.52	0.028	0.002 (U)
Chlordane (alpha)	0.34[d]	1[e]	0.066	0.21	0.46	0.038	0.002 (U)
Toxaphene	0.4	7.4	0.004(U)[f]	2.7	2.1	0.19 (U)	0.19 (U)
Benzo(a)anthracene	0.61	0.14	0.28	0.33	0.39	0.19 (U)	0.19 (U)
Benzo(a)pyrene	0.061	0.13	0.32	0.36	0.35	0.19 (U)	0.19 (U)
Benzo(b)fluoranthene	0.61	0.27[g]	0.56[g]	0.38	0.37	0.19 (U)	0.19 (U)
Benzo(g,h,i)perylene	n/a[h]	0.089	0.17	0.27 (U)	0.21 (U)	0.19 (U)	0.19 (U)
Benzo(k)fluoranthene	6.1	0.27[g]	0.56[g]	0.36	0.29	0.19 (U)	0.19 (U)
Bis(2-ethylhexyl) phthalate	32	0.64	0.34	0.27 (U)	0.21 (U)	0.19 (U)	0.19 (U)
Chrysene	7.2[i]	0.16	0.29	0.46	0.46	0.19 (U)	0.19 (U)
Fluoranthene	2 600	0.36	0.27	0.67	0.7	0.19 (U)	0.19 (U)
Indeno (1,2,3-cd)pyrene	0.61	0.077	0.17	0.27 (U)	0.21 (U)	0.19 (U)	0.19 (U)
Phenanthrene	n/a	0.17	0.37 (U)	0.28	0.38	0.19 (U)	0.19 (U)
Pyrene	1 000[i]	0.28	0.25	0.56	0.54	0.19 (U)	0.19 (U)

[a] N/A = Not applicable.
[b] All SAL and sample values are in mg/kg.
[c] (U) = Not detected.
[d] SAL for total chlordane.
[e] Results from analysis with dilution factor of 200.
[f] Results from analysis with dilution factor of 1.
[g] Result was reported for benzo(b&k)fluoranthene.
[h] = Not available.
[i] ...e SAL table is currently being updated; this value represents an updated SAL.

Of the organics that were not detected in any sample collected from 73-004(b), six had RPLs greater than SALs (bis[2-chloroethyl]ether, dibenzo[a,h]anthracene, hexachlorobenzene, N-nitrosodi-n-propylamine, N-nitrosodimethylamine, and vinyl chloride). In addition, 25 others do not have SALs to which the RPLs can be compared (acenaphthylene, delta-BHC, bis[2-chloroethoxy]methane, bromobenzene, bromochloromethane, n-butylbenzene, sec-butylbenzene, 4-chloro-3-methylphenol, 4-chlorophenylphenyl ether, 1,3-dichloropropane, 2,2-dichloropropane, 1,1-dichloropropene, cis-1,3-dichloropropene, trans-1,3-dichloropropene, 4,6-dinitro-2-methylphenol, 4-bromophenyl phenylether, 4-chlorotoluene, 4-isopropyltoluene, 2-hexanone, 2-methylnaphthalene, 3-nitroaniline, 4-nitroaniline, 2-nitrophenol, 4-nitrophenol, and propylbenzene).

Of these 31 organic chemicals, acenaphthylene and dibenzo(a,h)anthracene are carried forward to the screening assessment process because several other PAHs have been detected in samples collected from PRS 73-004(b). The remaining 29 chemicals are not expected to be associated with operation of the former steam cleaning facility and would not be expected to be present at this site. Therefore, these 29 organic chemicals are not carried forward through the screening assessment process.

Screening Assessment

Twenty-six chemicals were carried forward from the background and reporting limit comparisons. Six of the chemicals (benzo[a]pyrene, alpha-chlordane, gamma-chlordane, 4,4'-DDD, 4,4'-DDT, and toxaphene) were detected at concentrations greater than SAL at one or more locations, as shown on Figure 3.3.3-3. One other chemical (dibenzo[a,h]anthracene) was not detected in any sample; however, the reporting limit was greater than its SAL. Therefore, these seven chemicals are identified as COPCs.

Four of the chemicals do not have SALs to which the detected concentrations (arsenic, benzo[g,h,i]perylene, and phenanthrene) or reporting limits (acenaphthylene) can be compared. Arsenic was detected in two of the five samples collected at PRS 73-004(b) at a concentration greater than background. These samples were taken at the end of the outfall pipe and on the hill slope slightly downgradient of the outfall pipe; therefore, arsenic is identified as a COPC. None of the remaining three chemicals are considered further in this screening assessment for the following reasons:

- The maximum detected values for benzo(g,h,i)perylene and phenanthrene were 0.17 and 0.38 mg/kg, respectively, and are significantly lower than the

SALs for structurally similar compounds (i.e., 100 mg/kg for pyrene and 5.7 mg/kg for anthracene, respectively).

- The maximum reporting limit for acenaphthylene was 0.37 mg/kg. This value also is significantly lower than the SAL for a structurally similar compound (i.e., 110 mg/kg for acenaphthene).

None of the remaining 15 chemicals were detected at concentrations greater than SAL; therefore, these chemicals (i.e., benzo[a]anthracene, benzo[b]fluoranthene, benzo[k]fluoranthene, bis[2-ethylhexyl]phthalate, chromium, chrysene, copper, 4,4'-DDE, fluoranthene, indeno[1,2,3-cd]pyrene, lead, mercury, pyrene, vanadium, and zinc) are included in the following MCE.

A MCE is performed separately for three classes of analytes: noncarcinogens, carcinogens (nonradioactive), and radionuclides. In this case, two classes of analytes (noncarcinogens and carcinogens [nonradioactive]) were identified for the MCE. Lead is evaluated as a noncarcinogen because, even though it has been identified as a probable human carcinogen, a toxicity value has not been identified for this health endpoint.

Table 3.3.3-3 presents the results of the MCE for PRS 73-004(b). The total normalized value is 0.62 for noncarcinogens and 2.3 for carcinogens (nonradioactive). These results suggest that noncarcinogenic chemicals included in this MCE should not pose a noncarcinogenic health risk. However, cumulative exposure to the carcinogenic chemicals included in this MCE may pose an unacceptable cancer risk under certain conditions. Therefore, those carcinogenic chemicals with individual normalized values greater than 0.1 (i.e., benzo[a]anthracene, benzo[b]anthracene, chromium, 4,4'-DDE, and indeno[1,2,3-cd]pyrene) are identified as COPCs.

Based on the results of this screening assessment, 13 chemicals (arsenic, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, alpha-chlordane, gamma-chlordane, chromium, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, dibenzo[a,h]anthracene, indeno[1,2,3-cd]pyrene, and toxaphene) were identified as COPCs. These chemicals belong to three distinct chemicals groups: metals, organochlorine pesticides, and PAHs. The need for further evaluation (risk assessment or site characterization) of the chemicals in these chemical groups is discussed below.

TABLE 3.3.3-3

MULTIPLE CHEMICAL EVALUATION FOR SOIL SAMPLES FROM PRS 73-004(b)

ANALYTE	LOCATION ID	SAMPLE ID	SAMPLE VALUE (mg/kg)	SOIL SAL (mg/kg)	NORMALIZED VALUE
Noncarcinogenic Health Effects					
Copper	73-02216	0173-96-0246	23(J+)[a]	2 800	0.0082
Fluoranthene	73-02216	0173-96-0246	0.7	2 600	0.00027
Lead	73-02216	0173-96-0246	190	400	0.48
Mercury	73-02216	0173-96-0246	0.93	23	0.040
Pyrene	73-02215	0173-96-0245	0.56	100[b]	0.0056
Vanadium	73-02216	0173-96-0246	42	540	0.078
Zinc	73-02326	0173-96-0501	260	23 000	0.011
				Total:	**0.62**
Carcinogenic Health Effects					
Benzo(a)anthracene	73-02216	0173-96-0246	0.39	0.61	0.64
Benzo(b)fluoranthene	73-02213	0173-96-0249	0.56[c]	0.61	0.92
Benzo(k)fluoranthene	73-02213	0173-96-0249	0.56[c]	6.1	0.092
Bis(2-ethylhexyl) phthalate	73-02211	0173-96-0243	0.64	32	0.020
Chromium	73-02216	0173-96-0246	36	210	0.17
Chrysene	73-02215/ 73-02216	0173-96-0245/ 0173-96-0246	0.46	7.2[b]	0.064
4,4'-DDE	73-02215	0173-96-0245	0.18	1.3	0.14
Indeno(1,2,3-cd) pyrene	73-02213	0173-96-0249	0.17	0.61	0.28
				Total:	**2.3**

[a] (J+) = Estimated quantity, possibly biased high.
[b] The SAL table is being updated; this value represents an updated SAL.
[c] Result was reported for benzo(b&k)fluoranthene.

- Benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene were detected at concentrations ranging from 0.13 to 0.56 mg/kg. Dibenzo(a,h)anthracene was not detected in any samples collected at PRS 73-004(b) at detection limits ranging from 0.19 to 0.37 mg/kg. The range of detected values and detection limits is well within the range of concentrations that could be associated with run-off from nearby asphalt pavement along the mesa top. Therefore, further evaluation of benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene is not warranted.

- The organochlorine pesticides identified as COPCs were detected at high concentrations (e.g., greater than 100 mg/kg total DDT [sum of 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT]) in a sample immediately beneath the joint where the inlet pipe connected to the septic tank. The detected concentrations decreased dramatically in samples collected beneath a joint in the outlet pipe (e.g., 5.6 mg/kg total DDT), at the end of the outfall pipe and on the hill slope downgradient of the outfall pipe (e.g., 1.5 and 2.0 mg/kg total DDT), and beneath the septic tanks (e.g., 0.073 and 0.51 mg/kg total DDT). Organochlorine pesticides were not detected in samples collected approximately 10 ft upgradient of where the inlet pipe connected to the septic tank. Based on these results, it would appear that organochlorine pesticides were present in the septic tank; however, the concentrations in the samples collected from beneath the tank, at the end of the outfall pipe, and on the hill slope are relatively low (up to approximately 0.5 mg/kg alpha- or gamma-chlordane, 2 mg/kg total DDT, 2.7 mg/kg toxaphene). These concentrations are slightly greater than their respective SALs (0.34 mg/kg for chlordane, 1.3 mg/kg for 4,4'-DDT, and 0.4 mg/kg for toxaphene); however, they are not expected to present a human health risk given that the SALs are based on long-term exposure by a resident whereas these samples were collected approximately 15 ft bgs and 2 ft bgs or on a very steep slope that would not be suitable for residential development. Finally, soil containing relatively high concentrations of organochlorine pesticides in the vicinity of where the inlet pipe connected to the septic tank is currently at least 8 ft bgs, under an asphalt parking lot, and limited in extent; the potential for human exposure to this soil or migration of these chemicals away from their present location is very low. Therefore, further evaluation

of alpha-chlordane, gamma-chlordane, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, and toxaphene is not warranted.

- Arsenic and chromium were the only metals identified as COPCs. These and other metals were detected at relatively low concentrations in samples collected beneath the septic tank, and beneath the joint in the outfall pipe. The concentrations increased slightly in the sample collected at the end of the outfall pipe and were generally highest in the sample collected on the hill slope immediately downgradient of the outfall. However, even the highest detected concentrations were relatively low (13 mg/kg arsenic versus a background UTL of 7.2 mg/kg and 23 mg/kg chromium versus a background UTL of 19.3 mg/kg). It is unclear why the concentrations of metals in the outfall are slightly higher than for the other samples collected at 73-004(b); however, these concentrations should not pose an unacceptable risk to human health given the limited potential for exposure to soil on the hill slope. Therefore, further evaluation of arsenic and chromium is not warranted.

3.4 Conclusions and Recommendations

Based on the results of the screening assessment for PRS 73-004(b), several pesticides, PAHs, and metals were identified as COPCs. Upon further evaluation of the data, it does not appear that these compounds are present at concentrations that would pose an unacceptable human health risk. Therefore, no further action is recommended for PRS 73-004(b).

4.0 PRS 73-007

4.1 Site Description and History

PRS 73-007 is located on DOE property, south of Highway 502, between the highway and the edge of the mesa (Figure 1.0-2). The septic tank was discovered during a field reconnaissance visit to the site in 1996. There are no engineering drawings or other historical information available for this system, but it is known that it served facilities on the former contractors' row during the late 1940s and early 1950s. The former contractors' row was located within an area that extends from near the west end of the runway to the east for approximately 2 700 ft. Only a single set of aerial photographs dated 1949 show buildings within the former contractors' row.

These photographs were all taken at oblique angles and it was impossible to see the septic systems or determine which buildings might have been served by them.

4.2 Site Characterization Before Removal

Phase 1 RFI activities were not previously performed at PRS 73-007. The potential for chemical or radiological contamination within this septic system was considered to be low. However, the septic tank, associated drainlines, and outfall point were to be investigated during the site characterization activities to determine if contamination was present.

Discussion of Field Work

The VCA work plan called for the collection of characterization samples from within the tank, beneath associated drainlines, and from the outfall. After receiving the analytical results, the data were assessed to determine if remedial actions were required.

The 73-007 septic tank was constructed of a steel cylinder set vertically into a hole dug in the tuff. The tank was 4.3 x 5 ft and had an integral steel bottom. The cover was also steel with a narrow lip that fit over the edge of the tank when the lid was placed into position. Narrow steel tabs, welded to the outside of the tank, were bent over the lid to hold it in position. There were no baffles other than pieces of steel plate welded into position over both the inlet and outlet openings. The inlet drainline was constructed of 4-inch diameter cast iron pipe. The outlet drainline was constructed of 4-in. diameter VCP. Both drainline openings were positioned six inches below the top of the tank. The outfall itself was located 67 ft south of the tank at a depth of 1.5 ft.

Other than badly rusted walls and a rusted floor, the tank appeared to be intact. There were no visible corrosion holes or other openings through which fluids might have leaked from the tank. The tank contained approximately 1 to 2 inches of sediment and no water. The sediment appeared to primarily consist of rusted metal fragments. Due to the small size of the tank and the lack of baffles, it was decided to collect a single sediment sample (sample no. 0173-96-0252) and a duplicate (sample no. 0173-96-0282) (Fig. 4.2.1-1). The samples were collected using a garden hoe to scrape the sludge from the bottom and raise it out of the tank.

To determine if a release occurred from the outlet drainline, a single sample (sample no. 0173-96-0251) was collected from the end of the drainline. This sample was collected using the spade and scoop method. Table 4.2-1 summarizes the characterization sample information including the sample numbers, FIMAD numbers, and analyses requested.

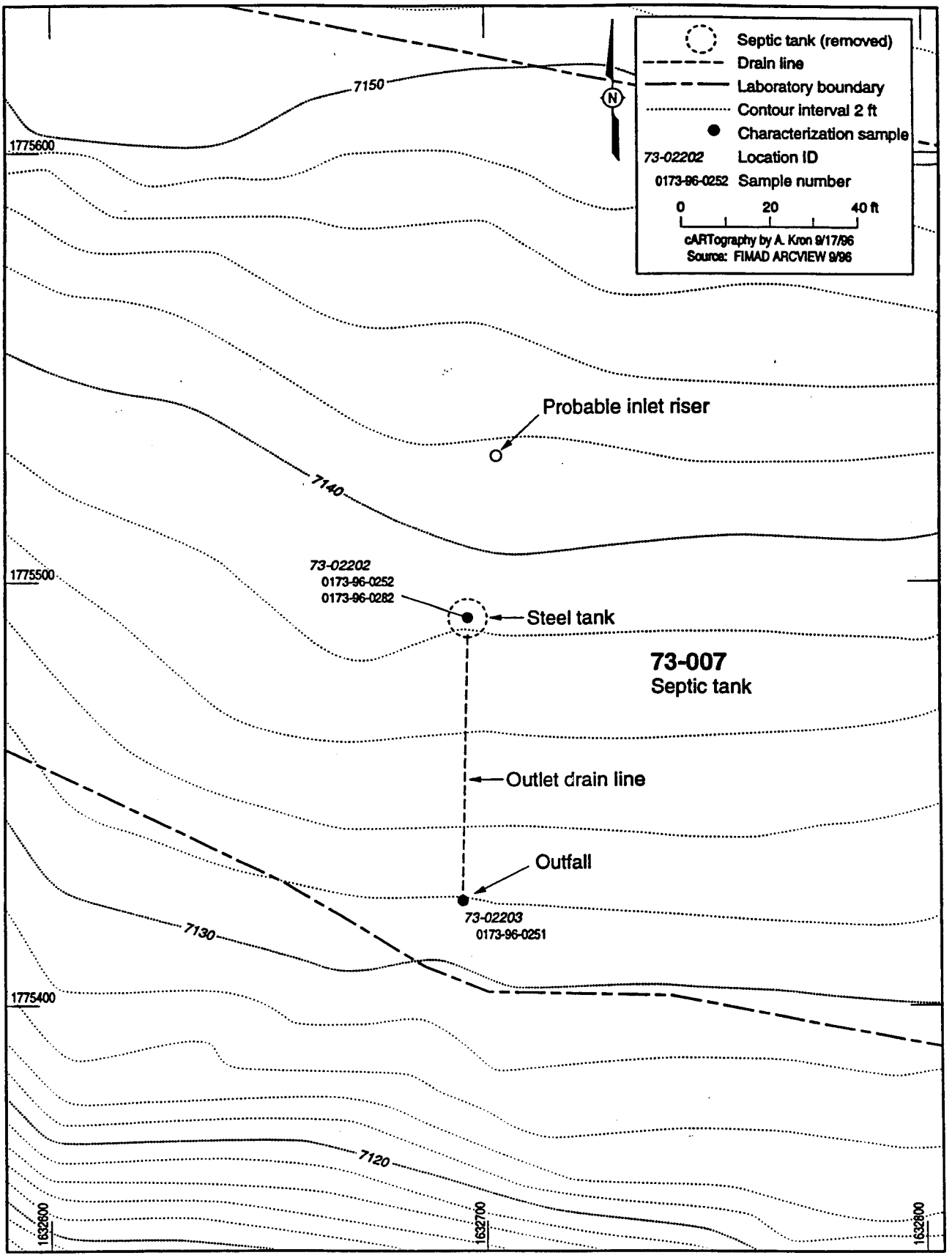

Fig. 4.2.1-1. Characterization sample locations at PRS 73-007.

TABLE 4.2-1

SUMMARY OF CHARACTERIZATION SAMPLES COLLECTED AT PRS 73-007

SAMPLE INFORMATION				ANALYTICAL SUITE AND REQUEST NUMBER				
LOCATION ID	SAMPLE ID	LOCATION DESCRIPTION AND DEPTH	MATRIX	VOCs	SVOCs	PCBs/ PEST.	TAL METALS	RAD
73-02202	0173-96-0252	Inside septic tank	Soil	2286	2286	2286	2287	2288
73-02202	0173-96-0282	Duplicate of 0173-96-0252	Soil	2286	2286	2286	2287	2288
73-02203	0173-96-0251	End of outlet pipe at 1.8–2.1 ft	Soil	2286	2286	2286	2287	2288

All sample containers were appropriately labeled and assigned unique LANL sample identification numbers with bar codes for tracking purposes. The samples were documented on sample collection logs, placed in coolers with blue ice, and transported to the SMO under chain-of-custody. All sampling was conducted in accordance with LANL ER Project procedures.

Field Screening

Field screening was performed to protect worker health and safety, to comply with LANL waste minimization policies, and to guide soil sampling. Samples and excavated soil were screened by the SSO to detect volatile organic chemical and gross radiological contamination. The soil was screened for volatile organic vapors using a Thermo Environmental Instruments, Inc. organic vapor monitor (Model 580B), which is a photionization detector with an 11.8 eV bulb. Soil was also screened for ionizing radiation using a Ludlum Model 139 rate meter with an air proportional (alpha) probe and an Eberline ESP-1 rate meter with a beta/gamma probe. The excavation and soils were screened for flammable gases using a MSA Model 361 combustible gas indicator. All field screening instruments were calibrated and checked by the SSO as required.

Health and safety action levels were not exceeded during field operations. Field screening results were recorded in the SSO logbook, field screening forms, and sample collection logs.

4.3 Remedial Implementation and Confirmation Results

The VCA work plan stated that remedial actions would be developed, depending on the nature and extent of the contamination, on a site-by-site basis. If VCA activities were required, they might include removing the entire septic system (tank contents, septic tank, and drainlines) or remvoving just the tank contents and leaving the tank and drainlines in place with no further action.

The remedial option selected for PRS 73-007 was to remove of the tank and its contents and leave the inlet and outlet drainlines in place. The decision to remove the tank and its contents was influenced by the knowledge that DOE currently owns the property and is considering transferring the land to Los Alamos County. Removal and closure on place options were estimated to cost the same, so the tank was removed. The characterization samples representative of soil remaining at the site and confirmatory samples of soil taken under the tank were used in the human health assessment described later in this report.

4.3.1 Clean-up level derivation

No clean-up levels were derived for PRS 73-007.

4.3.2 Remedial implementation

On August 13, 1996, removal of the septic tank began. During the hiatus between sample collection and remedial implementation, a small amount of rain water had gotten into the tank. This water was pumped into a 55-gal. drum. A backhoe was then used to dig down along three sides of the tank. A strap was threaded through the inlet and outlet openings and used to pull the tank out of the ground. In spite of the heavy corrosion, there did not appear to be any holes in the tank other than holes knocked through the side during excavation activities. The tank was laid on its side next to the excavation and shovels were used to scrape off and remove sediment. Before disposal at the Los Alamos County landfill, a power washer was used to clean the sides and floor of the tank. This wash water was included with the liquid wastes from PRSs 73-004(a and b) for disposal.

After removing the septic tank, one confirmation sample (sample no. 0173-96-0254) was collected from the approximate mid-point beneath the tank at a depth of 5.5 to 6 ft bgs. Table 4.3.2-1 summarizes the sample information and analyses requested.

Following collection of the confirmation sample, the excavation was backfilled and compacted. Additional clean fill was brought in to complete the backfilling operation and aid in returning the site to its original contours.

TABLE 4.3.2-1

SUMMARY OF CONFIRMATORY SAMPLES COLLECTED AT PRS 73-007

SAMPLE INFORMATION				ANALYTICAL SUITE AND REQUEST NUMBER				
LOCATION ID	SAMPLE ID	LOCATION DESCRIPTION AND DEPTH	MATRIX	VOCs	SVOCs	PCBs/ PEST.	TAL METALS	RAD
73-02202	0173-96-0254	Below middle of former septic tank at 5–5.3 ft	Soil	2496	2496	2496	2497	NA[a]

[a] NA = Not analyzed.

4.3.3 Human health assessment

This section presents an assessment of potential human health effects resulting from exposure to residual contamination associated with PRS 73-007. A sample collected at the end of the outlet drainline and one confirmation sample collected under the tank after its removal are considered confirmatory samples for PRS 73-007. A screening assessment was performed on the data for these confirmatory samples following methodology presented in Risk-Based Corrective Action Process (Environmental Restoration Project Decision Support Council 1995, 1271). Only data from samples sent to a fixed laboratory were included in the screening assessment. These data were validated and the QA/QC evaluations are presented in Appendix A.

Background Comparisons

Data for inorganics and radionuclides at PRS 73-007 were compared to background screening values presented in *Statistical Comparisons to Background, Part I* (Environmental Restoration Project Decision Support Council 1995, 1218). The results of the background comparison are discussed below.

Inorganics. Two soil samples collected from outside the tank at PRS 73-007 were analyzed for TAL metals. Four inorganics (lead, silver, thallium, and zinc) were detected at concentrations exceeding their respective background screening values in at least one sample. Locations of these analytes are shown in Fig. 4.3.3-1.

Based on the background comparisons, all four inorganics are carried forward to the screening assessment. The concentrations for these analytes are presented in Table 4.3.3-1.

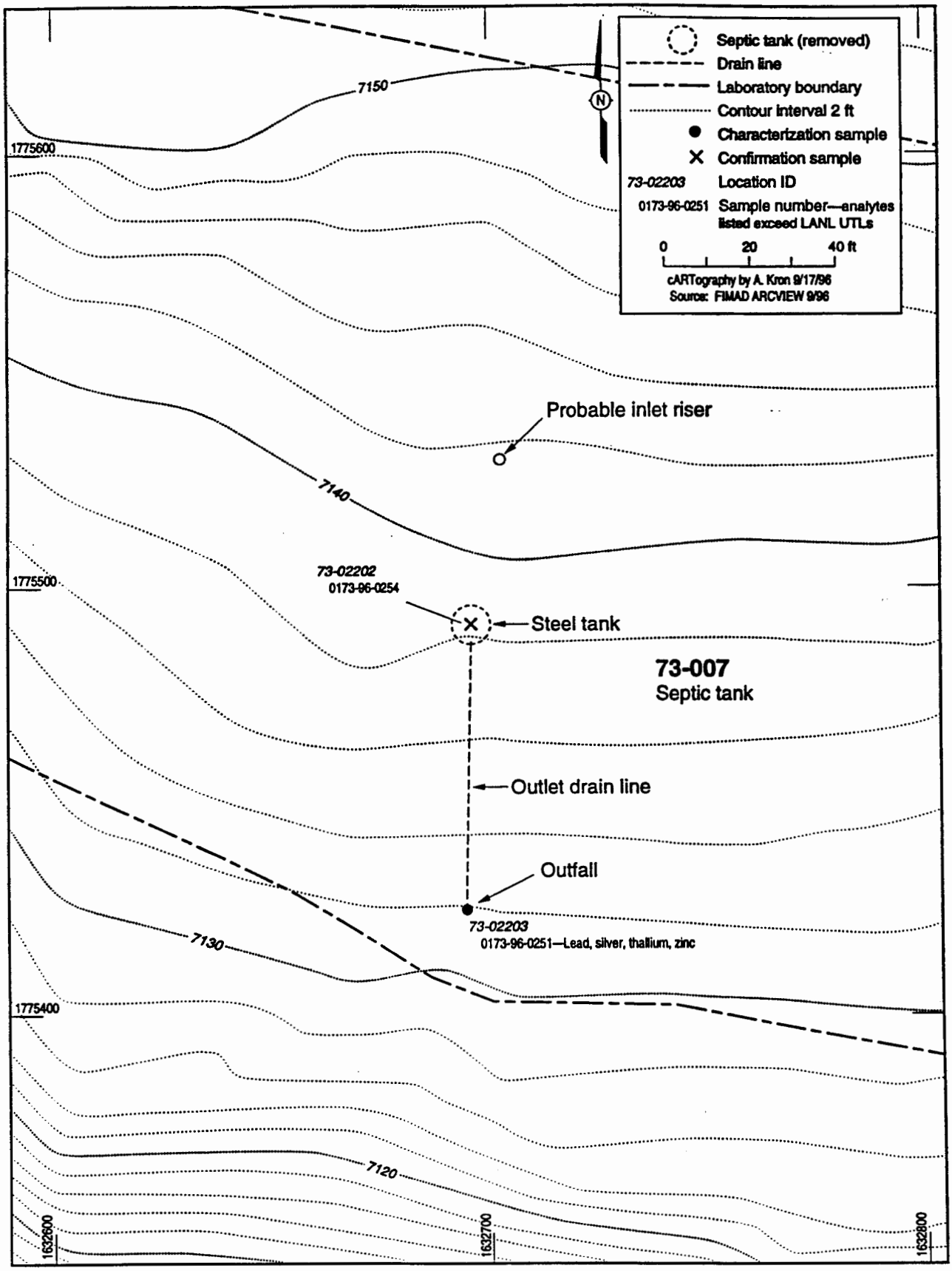

Fig. 4.3.3-1. Sample locations with inorganics above background at PRS 73-007.

TABLE 4.3.3-1

INORGANICS WITH CONCENTRATIONS EXCEEDING BACKGROUND SCREENING VALUES AT PRS 73-007

LOCATION DESCRIPTION	LOCATION ID	DEPTH (ft)	SAMPLE ID	LEAD (mg/kg)	SILVER (mg/kg)	THALLIUM (mg/kg)	ZINC (mg/kg)
UTL	N/A[a]	N/A	N/A	23.3	n/a[b]	1	50.8
SAL	N/A	N/A	N/A	400	380	5.4	23 000
Outfall sample	73-02203	1.8–2.1	0173-96-0251	50	2.2	1.4	120
Confirmation sample	73-02202	5–5.3	0173-96-0254	8.6	2(U)[c]	1.3(U)	29

[a] N/A = Not applicable.
[b] n/a = Not available. For silver, the detection limit is used as a background screening value.
[c] (U) = Not detected.

Radionuclides. One soil sample collected from PRS 73-007 was analyzed for tritium. The tritium result is less than the background screening value. Therefore, tritium will not be carried forward to the screening assessment. This soil sample was also analyzed for gross alpha, beta, and gamma. These analytical results were compared to various sources, including "Radionuclides and Radioactivity in Soils Within and Around Los Alamos National Laboratory,1974 through 1994: Concentrations, Trends, and Dose Comparisons," (Fresquez et al. 1996, 05-0243). The gross alpha and gross beta radiation result was less than reported regional background values (mean + 2 standard deviations).The gross gamma radiation result was approximately twice the reported regional background value (mean + 2 standard deviations). However, given that radionuclide concentrations in natural soil vary widely and that soil samples for gross radiation analysis are prepared differently by different laboratories, this gross gamma result probably does not indicate soil radionuclide concentrations greater than natural background concentrations. Therefore, gross alpha, beta, and gamma will not be carried forward to the screening assessment.

Organics. Two soil samples collected from PRS 73-007 were analyzed for volatiles, semivolatiles, pesticides, and PCBs. One semivolatile chemical, di-n-butylphthalate, was detected at PRS 73-007. The concentrations for this chemical are presented in Table 4.3.3-2. Locations of this analyte is shown in Fig. 4.3.3-2.

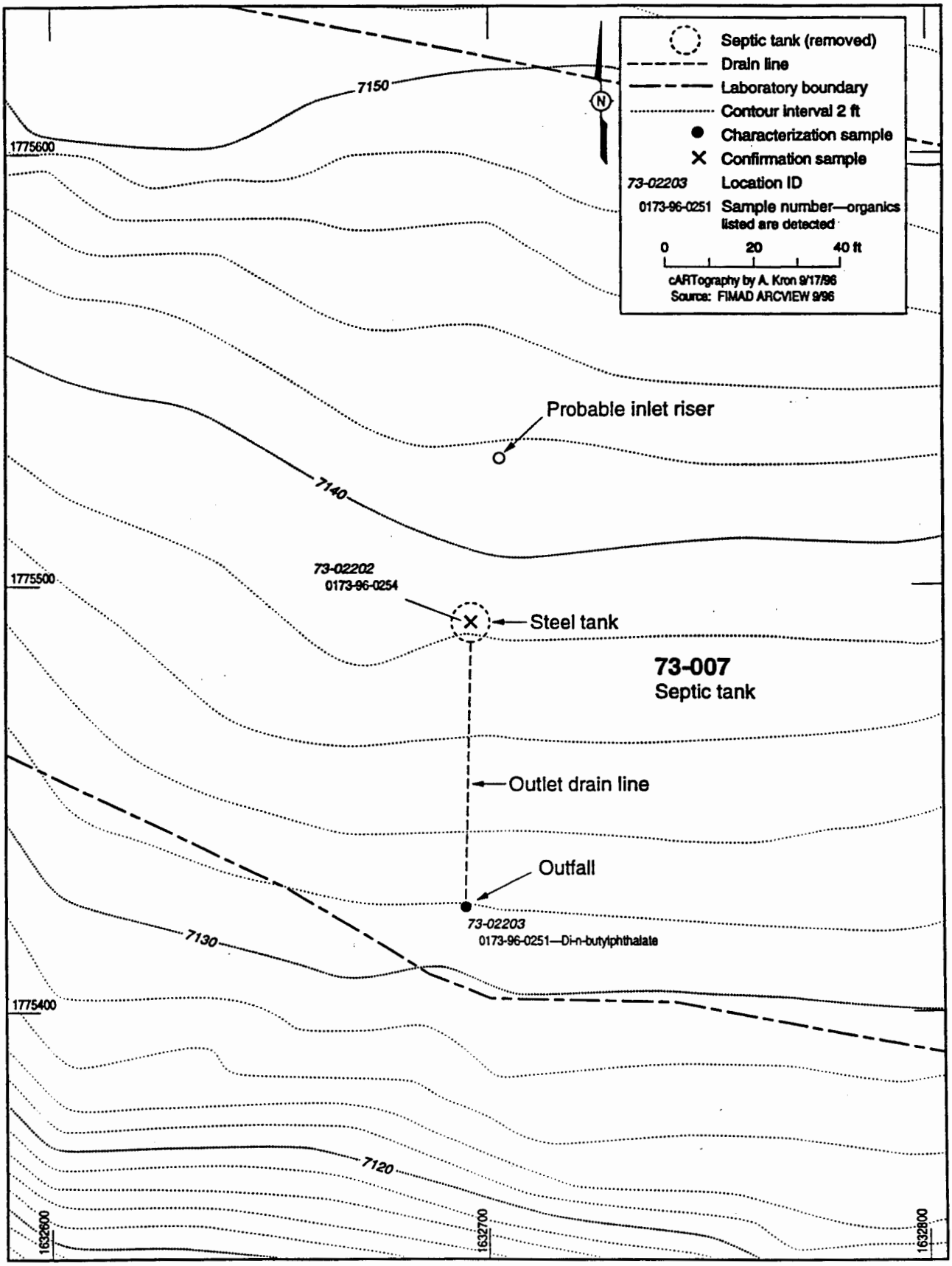

Fig. 4.3.3-2. Sample locations with detected organics at PRS 73-007.

TABLE 4.3.3-2

ORGANICS WITH DETECTED CONCENTRATIONS AT PRS 73-007

LOCATION DESCRIPTION	LOCATION ID	DEPTH	SAMPLE ID	Di-n-butylphthalate (mg/kg)
SAL	N/A[a]	N/A	N/A	6 500
Outfall sample	73-02203	1.8–2.1	0173-96-0251	0.96
Confirmation sample	73-02202	5–5.3	0173-96-0254	0.17(U)[b]

[a] N/A = Not applicable.
[b] (U) = Not detected.

Di-n-butylphthalate is carried forward to the screening assessment.

Of the organics that were not detected in any sample collected from 73-007, six had RPLs greater than SALs (benzo[a]pyrene, bis[2-chloroethyl]ether, dibenzo[a,h]anthracene, N-nitrosodi-n-propylamine, N-nitrosodimethylamine, and vinyl chloride). In addition, 28 others do not have SALs to which the RPLs can be compared (acenaphthene, acenaphthylene, anthracene, benzo[g,h,i]perylene, delta-BHC, bis[2-chloroethoxy]methane, bromobenzene, bromochloromethane, n-butylbenzene, sec-butylbenzene, 4-chloro-3-methylphenol, 4-chlorophenylphenyl ether, 1,3-dichloropropane, 1,1-dichloropropene, cis-1,3-dichloropropene, trans-1,3-dichloropropene, 4,6-dinitro-2-methylphenol, 4-bromophenyl phenylether, 4-chlorotoluene, 4-isopropyltoluene, 2-hexanone, 2-methyl naphthalene, 3-nitroaniline, 4-nitroaniline, 2-nitrophenol, 4-nitrophenol, phenanthrene, and propylbenzene). These 34 organic chemicals are not expected to be associated with former contractor operations/buildings that may have served this septic tank. Therefore, these 34 organic chemicals are not carried forward to the screening assessment.

Screening Assessment

Five chemicals were carried forward from the background and reporting limit comparisons. None of these chemicals were detected at concentrations greater than SAL; therefore, di-n-butylphthalate, lead, silver, thallium, and zinc are included in the following MCE.

A MCE is performed separately for three classes of analytes: noncarcinogens, carcinogens (nonradioactive), and radionuclides. In this case, two classes of analytes (noncarcinogens and carcinogens [nonradioactive]) were identified for the MCE. Lead is evaluated as a noncarcinogen because, even though it has been identified as a probable human carcinogen, a toxicity value has not been identified for this health endpoint. Lead is the only chemical considered to be carcinogen (nonradioactive); therefore, a MCE was not conducted for this class of analytes.

Table 4.3.3-3 presents the results of the MCE for PRS 73-007. The total normalized value is 0.40 for noncarcinogenic effects. These results indicate that the chemicals included in the MCE should not pose an unacceptable noncarcinogenic health risk. Therefore, none are identified as COPCs.

TABLE 4.3.3-3

MULTIPLE CHEMICAL EVALUATION FOR SOIL SAMPLES FROM PRS 73-007

ANALYTE	LOCATION ID	SAMPLE ID	SAMPLE VALUE (mg/kg)	SOIL SAL (mg/kg)	NORMALIZED VALUE
Noncarcinogenic Health Effects					
Di-n-butylphthalate	73-02203	0173-96-0251	0.96	6 500	0.00015
Lead	73-02203	0173-96-0251	50	400	0.13
Silver	73-02203	0173-96-0251	2.2	380	0.0058
Thallium	73-02203	0173-96-0251	1.4	5.4	0.26
Zinc	73-02203	0173-96-0251	120	23 000	0.0052
				Total:	**0.40**

4.4 Conclusions and Recommendations

No chemicals were identified as COPCs in the screening assessment at PRS 73-007. Therefore, PRS 73-007 is recommended for no further action.

5.0 PRSs C-73-005(a–f)

5.1 Site Description and History

Phase 1 RFI activities were not previously performed at PRSs C-73-005(a-f). The potential for chemical or radiological contamination within these septic systems was considered to be low. However, there was absolutely no historical information regarding these systems other than the fact that they served facilities on the former contractors row during the late 1940s and early 1950s.

PRSs C-73-005(a-f) are located on DOE property, south of Highway 502, between the highway and the edge of the mesa (Fig. 1.0-2). They are located within the former contractors' row that extended from near the west end of the runway to the east for approximately 2 700 ft. The six septic pits were discovered during several field reconnaissance visits to the site. There are no

engineering drawings or other historical information available that illustrate former facility or septic pit locations within this area. Only a single set of aerial photographs dated 1949 show the former contractors' row. These photographs were all taken at oblique angles and it was impossible to see any of the septic pits or determine which buildings might have been served by them.

5.2 Site Characterization

Phase 1 RFI activities were not previously performed at PRSs C-73-005(a-f). The potential for chemical or radiological contamination within these septic systems was considered to be low. However, the septic pits, associated drainlines, and outfall points were to be investigated during the site characterization activities to determine if contamination were present.

The PRSs C-73-005(a-f) septic pits were all excavated directly into tuff with no secondary walls or floors. The pits ranged in dimension from 3 to 6 ft wide, 5 to 12 ft long, and 2.5 to 6 ft deep. There was no evidence that any of the pits had contained baffles. Only 73-005(a) had an inlet drainline that was constructed of 4-inch diameter VCP. No attempt was made to trace this inlet line to its origin because the 73-005(a) pit samples were benign. The 73-005(a) pit was connected to the edge of the mesa by a shallow trench that may have contained an outfall drainline at one time, or may have directly acted as an open drainage ditch. Only 73-005(b) had an outlet drainline that was constructed of 4-inch diameter VCP. The drainline was 23 ft long with an outfall that was well back from the edge of the mesa.

The PRSs C-73-005(a-f) septic pits contained fill material ranging from 1 to approximately 3.8 ft thick. For the most part, the fill material consisted of natural soil and tuff fragments that had washed into the pits over the years. Some of the fill material contained abundant vegetative debris, and occasional glass, metal, and charred wood fragments. In every case, the original excavated material had been piled next to the pit.

The decision was made to collect two samples from the bottom of each septic pit (Figs. 5.2-1 and 5.2-2). To determine if releases occurred from the outlet drainlines, one sample was also collected from the 73-005(a) outfall trench and one from the 73-005(b) outfall. Table 5.2-1 summarizes the characterization sample information for 73-005(a-f) including the sample numbers, FIMAD numbers, and analyses requested. The fill material was sampled with a stainless steel hand auger using the hand auger and thin-wall tube sampling method.

TABLE 5.2-1

SUMMARY OF CHARACTERIZATION SAMPLES COLLECTED AT PRSs C-73-005(a-f)

SAMPLE INFORMATION				ANALYTICAL SUITE AND REQUEST NUMBER				
LOCATION ID	SAMPLE ID	LOCATION DESCRIPTION AND DEPTH	MATRIX	VOCs	SVOCs	PCBs/ PEST.	TAL METALS	RAD
73-02204	0173-96-0259	005(a) - inside septic pit at 2.6–3.7 ft	Soil	2286	2286	2286	2287	2288
73-02205	0173-96-0258	005(a) - inside septic pit at 2.7–3.8 ft	Soil	2286	2286	2286	2287	2288
73-02206	0173-96-0260	005(a) - outlet trench at 0.0–0.7 ft	Soil	2286	2286	2286	2287	2288
73-02199	0173-96-0263	005(b) - inside septic pit at 1.3–2.1 ft	Soil	2286	2286	2286	2287	2288
73-02200	0173-96-0262	005(b) - inside septic pit at 1.0–2.0 ft	Soil	2286	2286	2286	2287	2288
73-02201	0173-96-0264	005(b) - end of outlet Pipe at 0.0–0.2 ft	Soil	2286	2286	2286	2287	2288
73-02197	0173-96-0268	005(c) - inside septic pit at 0.0–0.8 ft	Soil	2271	2271	2271	2272	2273
73-02198	0173-96-0269	005(c) - inside septic pit at 0.4–1.2 ft	Soil	2271	2271	2271	2272	2273
73-02195	0173-96-0271	005(d) - inside septic pit at 1.9–2.9 ft	Soil	2271	2271	2271	2272	2273
73-02196	0173-96-0272	005(d) - inside septic pit at 1.5–2.5 ft	Soil	2271	2271	2271	2272	2273
73-02193	0173-96-0274	005(e) - inside septic pit at 1.0–1.9 ft	Soil	2271	2271	2271	2272	2273
73-02194	0173-96-0275	005(e) - inside septic pit at 1.0–2.0 ft	Soil	2271	2271	2271	2272	2273
73-02191	0173-96-0280	005(f) - inside septic pit at 1.5–2.5 ft	Soil	2271	2271	2271	2272	2273
73-02192	0173-96-0281	005(f) - Inside septic pit at 1.5–2.5 ft	Soil	2271	2271	2271	2272	2273

All sample containers were appropriately labeled and assigned unique LANL sample identification numbers with bar codes for tracking purposes. The samples were documented on sample collection logs, placed in coolers with blue ice, and transported to the SMO under chain-of-custody. All sampling was conducted in accordance with LANL ER Project procedures.

Field Screening

Field screening was performed to protect worker health and safety, to comply with LANL waste minimization policies, and to guide soil sampling. Samples and excavated soil were screened by the SSO to detect volatile organic chemical and gross radiological contamination. The soil was screened for volatile organic vapors using a Thermo Environmental Instruments, Inc. organic vapor monitor (Model 580B), which is a photionization detector with an 11.8 eV bulb. Soil was also screened for ionizing radiation using a Ludlum Model 139 rate meter with an air proportional (alpha) probe and an Eberline ESP-1 rate meter with a beta/gamma probe. The excavation and soils were screened for flammable gases using a MSA Model 361 combustible gas indicator. All field screening instruments were calibrated and checked by the SSO as required.

Health and safety action levels were not exceeded during field operations. Field screening results were recorded in the SSO logbook, field screening forms, and sample collection logs.

5.3 Human Health Assessment

This section presents an assessment of potential human health effects resulting from exposure to residual contamination associated with PRSs C-73-005(a-f). A screening assessment was performed on the data for samples collected from the bottom of each septic pit, from the 73-005(a) outfall trench, and from the 73-005(b) outfall following methodology presented in *Risk-Based Corrective Action Process* (Environmental Restoration Project Decision-Support Council 1995, 1271). Only data from samples sent to a fixed laboratory were included in the screening assessment. These data were validated and the QA/QC evaluations are presented in Appendix A.

Background Comparisons

Data for inorganics and radionuclides at PRSs C-73-005(a-f) were compared to background screening values presented in *Statistical Comparisons to Background, Part I* (Environmental Restoration Project Decision Support Council 1995, 1218). The results of the background comparison are discussed below.

Inorganics. Fourteen soil samples collected at PRSs C-73-005(a-f) were analyzed for TAL metals. Seven inorganics (copper, lead, manganese, mercury, silver, thallium, and zinc) were detected at concentrations exceeding their respective background screening values in at least one sample.

Based on the background comparisons, all seven inorganics are carried forward to the screening assessment. The concentrations for these analytes are presented in Table 5.3.3-1. Locations of these analytes are shown in Figs. 5.3.3-1 and 5.3.3-2.

TABLE 5.3.3-1

INORGANICS WITH CONCENTRATIONS EXCEEDING BACKGROUND SCREENING VALUES AT PRSs C-73-005(a-f)

LOCATION ID	SAMPLE ID	Copper (mg/kg)	Lead (mg/kg)	Manganese (mg/kg)	Mercury (mg/kg)	Silver (mg/kg)	Thallium (mg/kg)	Zinc (mg/kg)
UTL	N/A[a]	15.5	23.3	714	0.1[b]	n/a[c]	1	50.8
SAL	N/A	2 800	400	n/a	23	380	5.4	23 000
73-02205	0173-96-0258	**20**[d]	**41**	**1 100**	**0.42**	**2.2**	**1.4**	**110**
73-02204	0173-96-0259	**16**	**41**	95	**0.26**	**2.2**	**1.4**	**110**
73-02206	0173-96-0260	6.8	**29**	340	0.11(U)[e]	**2.1**	**1.3**	44
73-02200	0173-96-0262	6.6	9.9	190	0.1(U)	2(U)	**1.3**	23
73-02199	0173-96-0263	6.9	18	200	0.1(U)	**2.1**	1.3(U)	31
73-02201	0173-96-0264	12	31	210	0.1(U)	2(U)	**1.3**	43
73-02197	0173-96-0268	6.9	**24**	390	0.11	2.1(U)	1.3(U)	**110**
73-02198	0173-96-0269	7.7	16	400	0.11(U)	2.1(U)	1.3(U)	39
73-02195	0173-96-0271	14	**200**	380	0.11(U)	2.2(U)	1.3(U)	**290**
73-02196	0173-96-0272	9.7	**90**	400	0.11	2.1(U)	1.3(U)	**150**
73-02193	0173-96-0274	7.1	**26**	240	0.11	2.1(U)	1.3(U)	**70**
73-02194	0173-96-0275	6.5	18	250	0.11	2.2(U)	1.4(U)	36
73-02191	0173-96-0280	9.5	**30**	320	0.11	2.2(U)	1.3(U)	**61**
73-02192	0173-96-0281	6.4	19	330	0.11	2.1(U)	1.3(U)	37

[a] N/A = Not applicable.
[b] Value represents the maximum reported background concentration in soil.
[c] n/a = Not available. For silver, the detection limit is used as a background screening value.
[d] Values in bold are above background screening values.
[e] (U) = Not detected.

Radionuclides. Fourteen soil samples collected from PRSs C-73-005(a-f) was analyzed for tritium. The tritium result is less than the background screening value. Therefore, tritium will not be carried forward to the screening assessment. These fourteen soil samples were also analyzed for gross alpha, beta, and gamma. These analytical results were compared to various sources, including "Radionuclides and Radioactivity in Soils Within and Around Los Alamos National Laboratory,1974 through 1994: Concentrations, Trends, and Dose Comparisons," (Fresquez et al. 1996, 05-0243). The gross alpha and gross beta radiation results (mean + 2 standard deviaitons) were less than reported regional background values (mean + 2 standard deviations).The gross gamma radiation results (mean + 2 standard deviations) were approximately twice the reported regional background value (mean + 2 standard deviations). However, given that radionuclide concentrations in natural soil vary widely and that soil samples for gross radiation analysis are prepared differently by different laboratories, these gross gamma results probably do not indicate soil radionuclide concentrations greater than natural background concentrations. Therefore, gross alpha, beta, and gamma will not be carried forward to the screening assessment.

Organics. Fourteen soil samples collected from PRSs C-73-005(a-f) were analyzed for volatiles, semivolatiles, pesticides, and PCBs. Thirteen organics (4-4'-DDT, 4-isopropyltoluene, acetone, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, chrysene, fluoranthene, methylene chloride, phenanthrene, pyrene, and toluene) were detected. The concentrations for these chemicals are presented in Table 5.3.3-2. Locations of these analytes are shown in Figs. 5.3.3-3 and 5.3.3-4.

These 13 organics were carried forward to the screening assessment.

Of the organics that were not detected in any sample collected from PRSs C-73-005(a-f), six had RPLs greater than SALs (bis[2-chloroethyl]ether, dibenzo[a,h]anthracene , indeno[1,2,3-cd]pyrene, N-nitrosodi-n-propylamine, N-nitrosodimethylamine, and vinyl chloride). In addition, 24 others do not have SALs to which the RPLs can be compared (acenaphthylene, benzo[g,h,i]perylene, delta-BHC, bis[2-chloroethoxy]methane, bromobenzene, bromochloromethane, n-butylbenzene, sec-butylbenzene, 4-chloro-3-methylphenol, 4-chlorophenylphenyl ether, 1,3-dichloropropane, 1,1-dichloropropene, cis-1,3-dichloropropene, trans-1,3-dichloropropene, 4,6-dinitro-2-methylphenol, 4-bromophenyl phenylether, 4-chlorotoluene, 2-hexanone, 2-methylnaphthalene, 3-nitroaniline, 4-nitroaniline, 2-nitrophenol, 4-nitrophenol, and propylbenzene).

TABLE 5.3.3-2

ORGANICS WITH DETECTED CONCENTRATIONS AT PRSs C-73-005(a-f)

LOCATION ID	SAMPLE ID	4,4'-DDT	4-Isopropyl toluene	Acetone	Benzo(a) anthracene	Benzo(a) pyrene	Benzo(b) fluoranthene	Benzo(K) fluoranthene
SAL	N/A[a]	1.3	n/a[b]	2 000	0.61	0.061	0.61	6.1
73-02205	0173-96-0258	0.0036(U)[c]	0.0055(U)	0.022(U)	0.18(U)	0.18(U)	0.18(U)	0.18(U)
73-02204	0173-96-0259	0.0036(U)	0.0054(U)	0.022(U)	0.18(U)	0.18(U)	0.18(U)	0.18(U)
73-02206	0173-96-0260	0.0035(U)	0.0054(U)	0.022(U)	0.29	0.23	0.3	0.23
73-02200	0173-96-0262	0.0034(U)	0.0051(U)	0.02(U)	0.17(U)	0.17(U)	0.17(U)	0.17(U)
73-02199	0173-96-0263	0.01(J-)[d]	0.0052(U)	0.024(J+)[e]	0.17(U)	0.17(U)	0.17(U)	0.17(U)
73-02201	0173-96-0264	0.0034(U)	0.012	0.08(J+)	0.17(U)	0.17(U)	0.17(U)	0.17(U)
73-02197	0173-96-0268	0.0035(U)	0.0053(U)	0.021(U)	0.18(U)	0.18(U)	0.18(U)	0.18(U)
73-02198	0173-96-0269	0.0033(U)	0.0051(U)	0.02(U)	0.17(U)	0.17(U)	0.17(U)	0.17(U)
73-02195	0173-96-0271	0.01(J-)	0.0053(U)	0.021(U)	0.18(U)	0.18(U)	0.18(U)	0.18(U)
73-02196	0173-96-0272	0.01(J-)	0.0053(U)	0.021(U)	1.1(U)	1.1(U)	1.1(U)	1.1(U)
73-02193	0173-96-0274	0.0035(U)	0.0053(U)	0.054	0.17(U)	0.17(U)	0.17(U)	0.17(U)
73-02194	0173-96-0275	0.0035(U)	0.0086	0.041	0.18(U)	0.18(U)	0.18(U)	0.18(U)
73-02191	0173-96-0280	0.0059(J-)	0.0053(U)	0.021(U)	0.18(U)	0.18(U)	0.18(U)	0.18(U)
73-02192	0173-96-0281	0.0035(U)	0.0053(U)	0.021(U)	0.17(U)	0.17(U)	0.17(U)	0.17(U)

TABLE 5.3.3-2 (CONTINUED)

ORGANICS WITH DETECTED CONCENTRATIONS AT PRSs C-73-005(a-f)

LOCATION ID	SAMPLE ID	Chrysene	Fluoranthene	Methylene Chloride	Phenanthrene	Pyrene	Toluene
SAL	N/A	24	2 600	11	n/a	2 000	1 900
73-02205	0173-96-0258	0.18(U)	0.18(U)	0.0055(U)	0.18(U)	0.2	0.0055(U)
73-02204	0173-96-0259	0.18(U)	0.2	0.0054(U)	0.18(U)	0.21	0.0054(U)
73-02206	0173-96-0260	0.35	0.63	0.0054(U)	0.26	0.42	0.0054(U)
73-02200	0173-96-0262	0.17(U)	0.17(U)	0.0051(U)	0.17(U)	0.17(U)	0.0051(U)
73-02199	0173-96-0263	0.17(U)	0.17(U)	0.0052(U)	0.17(U)	0.17(U)	0.0052(U)
73-02201	0173-96-0264	0.17(U)	0.17(U)	0.01(J+)	0.17(U)	0.17(U)	0.0061(J+)
73-02197	0173-96-0268	0.18(U)	0.18(U)	0.0053(U)	0.18(U)	0.18(U)	0.0053(U)
73-02198	0173-96-0269	0.17(U)	0.17(U)	0.0051(U)	0.17(U)	0.17(U)	0.0051(U)
73-02195	0173-96-0271	0.18(U)	0.18(U)	0.0053(U)	0.18(U)	0.18(U)	0.0053(U)
73-02196	0173-96-0272	1.1(U)	1.1(U)	0.0053(U)	1.1(U)	1.1(U)	0.0053(U)
73-02193	0173-96-0274	0.17(U)	0.17(U)	0.0053(U)	0.17(U)	0.17(U)	0.0053(U)
73-02194	0173-96-0275	0.18(U)	0.18(U)	0.0054(U)	0.18(U)	0.18(U)	0.0065
73-02191	0173-96-0280	0.18(U)	0.18(U)	0.0053(U)	0.18(U)	0.18(U)	0.0053(U)
73-02192	0173-96-0281	0.17(U)	0.17(U)	0.0053(U)	0.17(U)	0.17(U)	0.0053(U)

[a] N/A = Not applicable.
[b] n/a = Not available.
[c] (U) = Not detected.
[d] (J-)= Estimated quantity, biased low.
[e] (J+) = Estimated quantity, biased high.

Of these 30 organic chemicals, acenaphthylene, benzo(g,h,i)perylene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, and 2-methylnaphthalene are carried forward to the screening assessment process because several other PAHs have been detected in one of the samples collected from PRSs C-73-005(a-f). The remaining 25 chemicals are not expected to be associated with former contractor operations/buildings that may have served these septic pits. Therefore, these 25 organic chemicals are not carried forward through the screening assessment process.

Screening Assessment

Twenty-five chemicals were carried forward from the background and reporting limit comparisons. One chemical (benzo[a]pyrene) was detected at a concentration greater than SAL at one location. Two other chemicals (dibenzo[a,h]anthracene and indeno[1,2,3-cd]pyrene) were not detected in any sample; however, the reporting limits were greater than their respective SALs. Therefore, benzo(a)pyrene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene are identified as COPCs.

Five other chemicals do not have SALs to which the detected concentrations (4-isopropyltoluene and phenanthrene) or reporting limits (acenaphthylene, benzo[g,h,i]perylene, and 2-methylnaphthalene) can be compared. These chemicals are not considered further in this screening assessment for the following reasons:

- 4-isopropyltoluene was detected in two samples at concentrations of 0.0086 and 0.012 mg/kg. These values are significantly lower than the SAL for a structurally similar compound (i.e., 19 mg/kg for isopropylbenzene [cumene]).

- Phenanthrene was detected in a single sample at a concentration of 0.26 mg/kg, which is significantly lower that the SAL for a structurally similar compound (5.7 mg/kg for anthracene). Similarly, the maximum reporting limit for acenaphthylene, benzo(g,h,i)perylene, and 2-methylnaphthalene was 1.1 mg/kg. This value also is significantly lower than the SALs for structurally similar compounds (110 mg/kg for acenaphthene, 100 mg/kg for pyrene, and 280 mg/kg for naphthalene).

None of the remaining 17 chemicals were detected at concentrations greater than SAL; therefore, these chemicals (acetone, benzo[a,]anthracene, benzo[b]fluoranthene, benzo[k]fluoranthene, chrysene, copper, 4,4'-DDT, fluoranthene, lead, manganese, mercury, methylene chloride, pyrene, silver, thallium, toluene, and zinc) are included in the following MCE.

A MCE is performed separately for three classes of analytes: noncarcinogens, carcinogens (nonradioactive), and radionuclides. In this case, two classes of analytes (noncarcinogens and carcinogens [nonradioactive]) were identified for the MCE. Lead is evaluated as a noncarcinogen because, even though it has been identified as a probable human carcinogen, a toxicity value has not been identified for this health endpoint.

Table 5.3.3-3 presents the results of the MCE for PRSs C-73-005(a-f). The total normalized value is 1.2 for noncarcinogens and 1.1 for carcinogens (nonradioactive). Although these values are slightly greater than 1, it is not believed that the chemicals included in this MCE pose an unacceptable noncarcinogenic or carcinogenic health risk because (1) the screening assessment relies on maximum detected concentrations and (2) the SALs are based on default assumptions regarding human exposure under a residential scenario. A more realistic assessment of potential health risks that took into account all of the concentration data and more realistic estimates of human exposure would support this conclusion. Therefore, none of the 17 chemicals included in the MCE are identified as COPCs.

Based on the results of this screening assessment, three chemicals (benzo[a]pyrene, dibenzo[a,h]anthracene, and indeno[1,2,3-cd]pyrene) were identified as COPCs. Benzo(a)pyrene was detected at a concentration of 0.23 mg/kg in a single sample collected from PRSs C-73-005(a-f), which is slightly greater than its SAL of 0.061 mg/kg. Dibenzo(a,h)anthracene and indeno(1,2,3-cd)pyrene were not detected in any sample collected from PRSs C-73-005(a-f); however, the detection limits in these samples ranged up to 1.1 mg/kg, which is greater than their respective SALs of 0.061 mg/kg and 0.61 mg/kg. The single detected concentration of benzo(a)pyrene and the detection limits for all three chemicals in the remaining samples are well within the range of concentrations that could be associated with run-off from nearby asphalt pavement. In addition, much of the soil within the former contractors' row area contained asphalt debris. Therefore, further evaluation of benzo(a)pyrene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene is not warranted.

TABLE 5.3.3-3

MULTIPLE CHEMICAL EVALUATION FOR SOIL SAMPLES FROM PRSs C-73-005(a-f)

ANALYTE	LOCATION ID	SAMPLE ID	SAMPLE VALUE (mg/kg)	SOIL SAL (mg/kg)	NORMALIZED VALUE
Noncarcinogenic Health Effects					
Acetone	73-02201	0173-96-0264	0.08 (J+)[a]	2 100[b]	0.00038
Copper	73-02205	0173-96-0258	20	2 800	0.0071
Fluoranthene	73-02206	0173-96-0260	0.63	2 600	0.00024
Lead	73-02195	0173-96-0271	200	400	0.50
Manganese	73-02205	0173-96-0258	1 100	3 200[b]	0.34
Mercury	73-02205	0173-96-0258	0.42	23	0.018
Pyrene	73-02206	0173-96-0260	0.42	100[b]	0.0042
Silver	73-02204/ 73-02205	0173-96-0259/ 0173-96-0260	2.2	380	0.0058
Thallium	73-02204/ 73-02205	0173-96-0259/ 0173-96-0260	1.4	5.4	0.26
Toluene	73-02194	0173-96-0275	0.0065	790[b]	0.0000082
Zinc	73-02195	0173-96-0271	290	23 000	0.013
				Total:	**1.2**
Carcinogenic Health Effects					
Benzo(a)anthracene	73-02206	0173-96-0260	0.29	0.61	0.48
Benzo(b)fluoranthene	73-02206	0173-96-0260	0.3	0.61	0.49
Benzo(k)fluoranthene	73-02206	0173-96-0260	0.23	6.1	0.038
Chrysene	73-02206	0173-96-0260	0.35	7.2[b]	0.049
4,4'-DDT	73-02199	0173-96-0263	0.01 (J+)	1.3	0.0077
Methylene Chloride	73-02201	0173-96-0264	0.01 (J+)	7.8[b]	0.0013
				Total:	**1.1**

[a] (J+) = Estimated quantity , biased high.
[b] The SAL table is being updated; this value represents an updated SAL.

5.4 Remedial Implementation and Confirmation Results

PRSs C-73-005(a-f) were not reported to contain concentrations of contaminants requiring remedial action. Therefore, the decision was made to conduct no further action at any of these sites. However, at least three of the open pits represented a physical fall hazard. Because of this, on August 12, 1996, a backhoe was used to backfill all of the pits using the original excavated material that was stockpiled next to them. An effort was made to cause minimal disturbance to each site as it was backfilled and slightly compacted.

5.5 Conclusions and Recommendations

Based on the results of the screening assessment for PRSs C-73-005(a-f), three chemicals, all PAHs, were identified as COPCs. Upon further evaluation of the PAH data, it does not asppear tht these compounds are present at concentrations that would pose an unacceptable human health risk. Therefore, PRSs C-73-005(a-f) is recommended for no further action.

6.0 WASTE MANAGEMENT

PRSs 73-004(a) and 73-004(b)

All work was conducted in accordance with the VCA plan and the waste characterization strategy form. The types of waste generated, the waste classification, and the volume generated are presented in Table 6.0-1.

TABLE 6.0-1.

SUMMARY OF WASTE GENERATED AT PRS 73-004(a) AND 73-004(b)

WASTE TYPE	WASTE CLASSIFICATION	WASTE VOLUME	COST
PPE[a]/Disposable Sampling Equipment	Municipal Waste	0.3 yd^3	$0
Tank Contents (Water and Sediment)	Hazardous Waste	3 600 gallons	$37 500
Concrete Tanks	Municipal Waste	14 yd^3	$0
Decon Wash Water	Liquid Nonhazardous	3 gallons	$0

[a] PPE = Personal protective equipment.

The personal protective equipment (PPE)/disposable sampling equipment waste is considered to be municipal waste by reason of knowledge of process and is currently being stored on site. This waste will be disposed as soon as a waste profile form (WPF) has been submitted and processed.

A WPF was submitted for the tank contents (less than a 55-gal. drum each of liquid and solid), which were classified as hazardous based on the elevated concentrations of metals and pesticides. Tables 6.0-2 and 6.0-3 list the analyte concentrations of the waste samples. The contents were removed and transported off-site for appropriate disposal.

The concrete tanks were classified as municipal waste following removal of the contents and power washing of the walls and floors. The 73-004(a) tank was transported off-site for disposal. The 73-004(b) tank was used as fill material for an off-site parking lot expansion project.

In order to minimize decontamination wash water waste, a dry decontamination step was implemented to remove excess soil from sampling equipment. This additional decontamination step reduced the amount of decontamination water generated during the characterization and VCA activities. What little decontamination water was generated (approx. 3 gals.) was discharged on site according to the site-specific Spill Prevention, Control, and Countermeasures Plan. A final decontamination rinse with methanol and deionized water was not required. Decontamination water from power washing the septic tanks was included and transported with the septic tank contents.

PRS 73-007 and PRSs C-73-005(a-f)

All work was conducted in accordance with the VCA work plan and the waste characterization strategy form. The types of waste generated, the waste classification, and the volume generated are presented in Table 6.0-4.

TABLE 6.0-2

ANALYTE CONCENTRATIONS IN WASTE SAMPLES AT PRS 73-004(a)

ANALYTE	UTL	SAL	0173-96-0234 (mg/kg)	0173-96-0235 (mg/kg)	0173-96-0238 (µg/L)
INORGANICS					
Aluminum	38 700	77 000	6 000	7 000	5.7
Antimony	1	31	18(UJ)[a]	16(UJ)	0.02(UJ)
Arsenic	7.82	n/a[b]	8.4	8.5	0.006
Barium	315	5 300	150(J-)[c]	160(J-)	0.19(J-)
Beryllium	1.95	n/a	0.88(U)[d]	0.82(U)	0.004(U)
Cadmium	2.7	38	0.98	0.84	0.005(U)
Calcium	6 120	n/a	2 300	2 300	45
Chromium	19.3	211	9.5	11	0.01(U)
Cobalt	19.2	4 600	5.6	4.8	0.02(U)
Copper	15.5	2 800	46	66	0.02(U)
Iron	21 300	n/a	8 600	9 000	4
Lead	23.3	400	54(J-)	64(J-)	0.013(J-)
Magnesium	4 610	n/a	1 300	1 400	6
Manganese	714	n/a	280	210	0.15
Mercury	0.1	23	0.6(J+)[e]	0.61(J+)	0.0002(U)
Nickel	15.2	1 500	7	7	0.04(U)
Potassium	3 410	n/a	1 400	1 400	13
Selenium	1.7	380	0.35(U)	0.33(U)	0.004(U)
Silver	NA	380	3.5(U)	3.3(U)	0.01(U)
Sodium	915	n/a	190	2 000	31
Thallium	1	5.4	2.2(UJ)	2(UJ)	0.005(UJ)
Vanadium	41.9	540	26	26	0.01
Zinc	50.8	23 000	210	200	0.11
ORGANICS					
4,4'-DDD	n/a	1.9	0.917	4.13	4.36
4,4'-DDE	n/a	1.3	0.21	1.07	0.329
4,4'-DDT	n/a	1.3	0.794	0.748	1.72
delta-BHC	n/a	n/a	0.00104(U)	0.00155(U)	0.195
Endosulfan I	n/a	3.3	0.057	0.145	0.142
2-Methylnaphthalene	n/a	n/a	0.11	0.2	11(U)
4-Methylphenol	n/a	330	0.11	0.3	11(U)
Anthracene	n/a	19	0.15	0.31	11(U)
Benzo(a)anthracene	n/a	0.61	0.22	0.62	11(U)
Benzo(a)pyrene	n/a	0.061	0.15	0.41	11(U)
Benzo(b)fluoranthene	n/a	0.61	0.3	0.66	11(U)
Benzo(g,h,i)perylene	n/a	n/a	0.51(U)	0.14	11(U)
Benzo(K)fluoranthene	n/a	6.1	0.097	0.28	11(U)
Bis(2-ethylhexyl)phthalate	n/a	32	0.27	0.25	1
Carbazole	n/a	22	0.12	0.25	11(U)
Chrysene	n/a	24	0.3	0.75	11(U)

TABLE 6.0-2 (CONTINUED)

ANALYTE CONCENTRATIONS IN WASTE SAMPLES AT PRS 73-004(a)

ANALYTE	UTL	SAL	0173-96-0234 (mg/kg)	0173-96-0235 (mg/kg)	0173-96-0238 (µg/L)
ORGANICS (CONTINUED)					
Di-n-butylphthalate	n/a	6 500	0.067	0.27	11(U)
Dibenzofuran	n/a	260	0.51(U)	0.14	11(U)
Fluoranthene	n/a	2 600	1.3	3.2	11(U)
Indeno(1,2,3-cd)pyrene	n/a	0.61	0.51(U)	0.14	11(U)
Naphthalene	n/a	800	0.058	0.13	11(U)
Phenanthrene	n/a	n/a	0.92	1.8	11(U)
Pyrene	n/a	2 000	0.99	2.4	11(U)
N-butylbenzene	n/a	n/a	0.008(U)	0.006	5(U)
Trichlorofluoromethane	n/a	710	0.032	0.012(U)	5(U)

[a] (UJ) = Estimated undetected quantity.
[b] n/a = Not available.
[c] (J-) = Estimated quantity, possibly biased low.
[d] (U) = Not detected.
[e] (J+) = Estimated quantity, possibly biased high.

TABLE 6.0-3

ANALYTE CONCENTRATIONS IN WASTE SAMPLES AT PRS 73-004(b)

ANALYTE	UTL	SAL	0173-96-0241 (mg/kg)	0173-96-0242 (mg/kg)	0173-96-0244 (mg/kg)
INORGANICS					
Aluminum	38 700	77 000	10 100	6 800	3 100
Antimony	1	31	14(UJ)[a]	13(UJ)	11(UJ)
Arsenic	7.82	n/a[b]	53.9	59	4.9
Barium	315	5 300	415	360	200
Beryllium	1.95	n/a	9.5	0.78	0.57(U)[c]
Cadmium	2.7	38	13.1	12	8
Calcium	6 120	n/a	8 900	7 600	7 000
Chromium	19.3	211	45	45	14
Cobalt	19.2	4 600	12.2	5.4	2.4
Copper	15.5	2 800	200	200	380
Iron	21 300	n/a	14 800	12 000	7 700
Lead	23.3	400	700	740	440
Magnesium	4 610	n/a	3 260	2 500	1 100
Manganese	714	n/a	220	170	110
Mercury	0.1	23	0	0	10.046
Nickel	15.2	1 500	16.5	13	8.2
Potassium	3 410	n/a	2 200	1 700	600
Selenium	1.7	380	1.02	0.67	0.37
Silver	n/a	380	6.1	6.1	2.3(U)
Sodium	915	n/a	760	640	630
Thallium	1	5.4	1.7(UJ)	1.6(UJ)	1.4(UJ)
Vanadium	41.9	540	110	130	14
Zinc	50.8	23 000	3 800	3 300	1 700
ORGANICS					
4,4'-DDD ✓	n/a	1.9	260	200	29
4,4'-DDE ✓	n/a	1.3	12	8.3	2.4
4,4'-DDT ✓	n/a	1.3	4.5	44	1.5
Aldrin	n/a	0.026	2.3	1.7	1.9
Chlordane (gamma) ✓	n/a	0.34	130	78	4.5
Chlordane (alpha) ✓	n/a	0.34	120	71	3.8
Benzo(a)anthracene ✓	n/a	0.61	4.4(U)	45(U)	3.5
Benzo(a)pyrene ✓	n/a	0.061	1	45(U)	4.1
Benzo(b)fluoranthene ✓	n/a	0.61	1.7	15	8.5
Benzo(g,h,i)perylene ✓	n/a	n/a	4.4(U)	45(U)	1.2
Bis(2-ethylhexyl)phthalate ✓	n/a	32	4	45(U)	3.8(U)
Chrysene ✓	n/a	24	1.1	45(U)	4.2
Di-n-butylphthalate	n/a	6 500	4.4(U)	45(U)	1.2
Fluoranthene ✓	n/a	2 600	1.9	21	6.9
benzo(K) fluoranthene ✓					
~~Toxaphene~~ ✓					

TABLE 6.0-3 (CONTINUED)

ANALYTE CONCENTRATIONS IN WASTE SAMPLES AT PRS 73-004(b)

ANALYTE	UTL	SAL	0173-96-0241 (mg/kg)	0173-96-0242 (mg/kg)	0173-96-0244 (mg/kg)
ORGANICS (CONTINUED)					
Indeno(1,2,3-cd)pyrene ✓	n/a	0.61	4.4(U)	45(U)	1.4
Naphthalene	n/a	800	4.4(U)	45(U)	0.96
Phenanthrene ✓	n/a	n/a	0.96	12	4.5
Pyrene ✓	n/a	2 000	1.9	16	5.5

[a] (UJ) = Estimated undetected value.
[b] n/a = Not available.
[c] (U) = Not detected.

TABLE 6.0-4.

SUMMARY OF WASTE GENERATED AT PRS 73-007 AND PRSs c-73-005(a-f)

WASTE TYPE	WASTE CLASSIFICATION	WASTE VOLUME	COST
PPE[a]/disposable sampling equipment	Municipal waste	0.2 yd^3	$0
Tank contents (water and sediment)	Hazardous waste	65 gallons	est. $200
Steel tank	Municipal waste	Compacted to a 2'x2'x6" bundle	$0
Decon wash water	Liquid nonhazardous	2 gallons	$0

[a] PPE = Personal protective equipment.

The PPE and disposable sampling equipment waste is considered to be municipal waste by reason of knowledge of process and is currently being stored onsite. This waste will be disposed as soon as a WPF has been processed.

The tank contents (less than a 55-gal. drum each of liquid and solid) were classified as hazardous based on the elevated metal concentrations. The contents were removed and transported under manifest to a 90-day storage area at TA-3, SM-271. Table 6.0-5 lists the analyte concentrations of the waste samples for PRS 73-007. From there the waste will be transported under manifest to TA-54, Area L for offsite disposal.

TABLE 6.0-5

ANALYTE CONCENTRATIONS IN WASTE SAMPLES AT PRS 73-007

ANALYTE	UTL	SAL	0173-96-0252	0173-96-0282
Inorganics				
Aluminum	38 700	77 000	8 800	4 700
Antimony	1	31	53(UJ)	540(UJ)
Arsenic	7.82	n/a	86	170
Barium	315	5 300	670	150
Beryllium	1.95	n/a	2.7(U)	27(U)
Cadmium	2.7	38	8.7	27
Calcium	6 120	n/a	1700	1 100
Chromium	19.3	211	47	54
Cobalt	19.2	4 600	7.1	26
Copper	15.5	2 800	480	160
Iron	21 300	n/a	120 000	270 000
Lead	23.3	400	440	870
Magnesium	4 610	n/a	1100	550
Manganese	714	3 200	360	970
Mercury	0.1	23	1.1	1.5
Nickel	15.2	1 500	14	21
Potassium	3 410	n/a	1100	640
Selenium	1.7	380	2.1	4.3
Silver	NA	380	11	27
Sodium	915	n/a	270	85
Thallium	1	5.4	1.3	1.4
Vanadium	41.9	540	210	53
Zinc	50.8	23 000	640	290
Organics				
2-Butanone	n/a	8 700	0.17	0.074(J+)
4,4'-DDD	n/a	1.9	0.076(J+)	0.054(J+)
4,4'-DDE	n/a	1.3	0.16(J+)	0.12(J+)
4,4'-DDT	n/a	1.3	0.023(J-)	0.026(J-)
4-Isopropyltoluene	n/a	n/a	0.011(J+)	0.015(J+)
Acetone	n/a	2 000	0.51(J+)	0.2(J+)
Benzo(a)anthracene	n/a	0.61	1.6	0.69(U)
Chrysene	n/a	24	0.53(U)	1.5
Methylene Chloride	n/a	11	0.054(J+)	0.043(J+)
N-Propylbenzene	n/a	n/a	0.011(U)	0.012(J+)
Toluene	n/a	1 900	0.011(J+)	0.011(UJ)
Trichlorofluoromethane	n/a	710	0.013	0.011(U)

The steel tank was classified as municipal waste following removal of the contents and power washing of the sides and floor. The tank was crushed, compacted, and transported off-site for disposal.

To minimize decontamination wash water waste, a dry decontamination step was implemented to remove excess soil from sampling equipment. This additional decontamination step reduced the amount of decontamination water generated during the characterization and VCA activities. What little decontamination water was generated (approx. 2 gals.) was discharged on site according to the site-specific Spill Prevention, Control, and Countermeasures Plan. A final decontamination rinse with methanol and deionized water was not required. Decontamination water from power washing the septic tank was included and transported with the septic tank contents.

7.0 REFERENCES

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APPENDIX A RESULTS OF QUALITY ASSURANCE/QUALITY CONTROL (QC/QA) ACTIVITIES

1.0 QA/QC FOR PRS 73-004(a)

Inorganic Analyses

One water and five soil samples were analyzed for TAL Metals in request 2384. One of the QC problems with this request was that barium, lead, antimony, and thallium had low recoveries in the matrix spike sample. Mercury had a high recovery in the matrix spike sample. Post digestion spikes were done for the above elements and were within allowed limits. However, because of the low recoveries, barium, lead, antimony, and thallium data are qualified J- or UJ. Also, because of the high recovery, mercury detects are qualified J+. Also, silver, copper, antimony, selenium, vanadium, and zinc had duplicate values greater than 20% different from the original concentration. The duplicate problems are most probably caused by heterogeneity in the samples since the method blank, calibrations, and the LCS samples were all within allowed limits. All other data are valid and usable without qualification.

For final verification two soil samples were analyzed for TAL Metals in request 2569. The qualifications to this request follow. The spike sample results for aluminum and iron are high; the results for these analytes should be regarded as estimated and biased high (J+). The spike sample results for antimony, copper and zinc are low; the results for these analytes should be regarded as estimated and biased low (J-). The relative percent differences (RPDs) from the duplicate analysis for: antimony, cobalt, lead, mercury, selenium, thallium and zinc are greater than 20%. The results for these analytes should be regarded as estimated (J). The result for silver in the laboratory control sample is high; the result for silver should be regarded as estimated and biased high (J+).

Organic Analyses

One water and five soil samples were analyzed for volatiles in request 2385. There were problems for two samples in this request. For sample 0173-96-0232, the third internal standard was outside allowed limits and there was one high and one low surrogate recovery due to matrix effects. Therefore, all analytes associated with these surrogates or internal standards are qualified UJ (nondetects). For sample 0173-96-0233 the last two internal standards were outside allowed limits and there was one high and one low surrogate recovery due to matrix effects. Therefore, all analytes associated with these surrogates or internal standards are qualified UJ (nondetects). Also, methylene chloride and acetone were found in the method blank. All sample values less than ten times the blank values were changed to nondetects (at the level detected if above the EQL). All other data are valid and usable without qualification.

For final verification two soil samples were analyzed for volatiles in request 2568. For this request, all QA/QC parameters were within allowed limits; therefore, all data are valid and usable without qualification.

One water and five soil samples were analyzed for semivolatiles in request 2385. For this request, all QA/QC parameters were within allowed limits; therefore, all data are valid and usable without qualification.

For final verification two soil samples were analyzed for semivolatiles in request 2568. For this request, all QA/QC parameters were within allowed limits; therefore, all data are valid and usable without qualification.

One water and five soil samples were analyzed for pesticides/PCBs in request 2385. For this request, all QA/QC parameters were within allowed limits; therefore, all data are valid and usable without qualification.

For final verification two soil samples were analyzed for pesticides/PCBs in request 2568. For this request, all QA/QC parameters were within allowed limits; therefore, all data are valid and usable without qualification.

Radiochemistry Analyses

One water and five soil samples were analyzed for gross alpha, beta gamma activity and tritium in request 2389. For this request, all QA/QC parameters were within allowed limits; therefore, all data are valid and usable without qualification.

For final verification two soil samples were analyzed for gross alpha, beta and gamma activity in request 2570. For this request, all QA/QC parameters were within allowed limits; therefore, all data are valid and usable without qualification.

2.0 QA/QC RESULTS FOR PRS 73-004(b)

Inorganic Analyses

Five soil samples were analyzed for TAL Metals in request 2390. One of the QC problems with this request was that antimony and thallium had low recoveries in the matrix spike sample. Post digestion spikes were done for antimony and thallium and were within allowed limits. However, because of the low recoveries, antimony and thallium data are qualified J- or UJ. Also, antimony and selenium had duplicate values greater than 20%, different from the original concentration. The duplicate problems are most probably caused by heterogeneity in the samples since the method blank, calibrations, and the LCS samples were all within allowed limits. All other data are valid and usable without qualification.

Two soil samples were analyzed for TAL Metals in request 2488. One of the QC problems with this request was that antimony, arsenic, and selenium had low recoveries in the matrix spike sample. Beryllium, cadmium, copper, and nickel had high recoveries in the matrix spike sample. Post digestion spikes were done for antimony, arsenic, and selenium and were within allowed limits. However, because of the low recoveries, antimony, arsenic, and selenium data are qualified J- or UJ. Beryllium, cadmium, copper, and nickel detects are qualified J+ because of the high recoveries. Also, aluminum, antimony, beryllium, cadmium, chromium, iron, lead, magnesium, nickel, silver, sodium, vanadium, and zinc had duplicate values greater than 20%, different from the original concentration. The duplicate problems are most probably caused by heterogeneity in the samples since the method blank, calibrations and the LCS samples were all within allowed limits. All other data are valid and usable without qualification.

For final verification two soil samples were analyzed for TAL Metals in request 2569. The qualifications to this request follow. The spike sample results for aluminum and iron are high; the results for these analytes should be regarded as estimated and biased high (J+). The spike sample results for antimony, copper and zinc are low; the results for these analytes should be regarded as estimated and biased low (J-). The relative percent differences (RPDs) from the duplicate analysis for: antimony, cobalt, lead, mercury, selenium, thallium and zinc are greater than 20%. The results for these analytes should be regarded as estimated (J). The result for silver in the laboratory control sample is high; the result for silver should be regarded as estimated and biased high (J+).

Organic Analyses

Five soil samples were analyzed for volatiles in request 2391. There were problems for four samples in this request. For samples 0173-96-0241, -0242, -0243, and -0244, all of the internal standards were outside allowed limits and all of the surrogate recoveries were high or low due to matrix effects (probably caused by the pesticides or semivolatiles in the samples). Therefore, all analytes for these samples are qualified UJ (no detects). Also, methylene chloride and acetone were found in the method blank. All sample values less than ten times the blank values were changed to nondetects (at the level detected if above the EQL). All other data are valid and usable without qualification.

Two soil samples were analyzed for volatiles in request 2487. There were problems for both samples in this request. For sample 0173-96-0246, all of the internal standards were outside allowed limits and two of the surrogate recoveries were high due to matrix effects. Therefore, all analytes for this sample are qualified UJ (nondetects). For sample 0173-96-0245, two of the internal standards were outside allowed limits and two of the surrogate recoveries were high due to matrix effects. Therefore, all analytes associated with the two internal standards for this sample are qualified UJ (nondetects).

For final verification two soil samples were analyzed for volatiles in request 2568. For sample 0173-96-0501 the sample EQLs associated with the internal standard dibromofluoromethane should be regarded as estimated and biased low (J-). Dibromofluoromethane exhibited a low response both on the analysis and re-analysis due to a matrix effect. For sample 0173-96-0502 all QA/QC parameters were within allowed limits; therefore, this sample is valid and usable without qualification.

Five and two soil samples were analyzed for semivolatiles in requests 2391 and 2487 respectively. For these requests, all QA/QC parameters were within allowed limits; therefore, all data are valid and usable without qualification.

For final verification two soil samples were analyzed for semivolatiles in request 2568. For sample 0173-96-0501 phthalic anhydride reported as TIC and should be regarded as estimated (J). For sample 0173-96-0502 the sample EQLs associated with the internal standard 2-fluorobiphenyl should be regarded as estimated and biased low (J-) due to a low response for this internal standard.

Two soil samples were analyzed for pesticides/PCBs in request 2487. For this request, all QA/QC parameters were within allowed limits, therefore, all data are valid and usable without qualification.

One water and five soil samples were analyzed for pesticides in request 2391. For this request, all QA/QC parameters were within allowed limits; therefore, all data are valid and usable without qualification. It should be noted that because of the presence of several pesticides at fairly high levels, the samples had to be diluted to get all analytes within the linear range of the instrument. Because of these dilutions, the detection limits (or EQLs) for many of the analytes were elevated by factors up to 10 000.

For final verification two soil samples were analyzed for pesticides/PCBs in request 2568. For sample 0173-96-0501 the results for 4,4'-DDE (0.089 mg/kg), 4,4'-DDD (0.310 mg/kg), 4,4'-DDT (0.11 mg/kg), alpha chlordane (0.028 mg/kg) and gamma chlordane (0.038 mg/kg) should be regarded as estimated (J) because the sample was diluted. For sample 0173-96-0502 the results for 4,4'-DDD (0.042 mg/kg) and 4,4'-DDT (0.021 mg/kg), should be regarded as estimated (J) because the sample was diluted. For final verification two soil samples were also analyzed for pesticides/PCBs in request 2611. For this request, all QA/QC parameters were within allowed limits, therefore, all data are valid and usable without qualification.

Radiochemistry Analyses

Five and two soil samples were analyzed for gross alpha, beta gamma activity and tritium in requests 2392 and 2490, respectively. For these requests, all QA/QC parameters were within allowed limits; therefore, all data are valid and usable without qualification.

For final verification two soil samples were analyzed for gross alpha, beta and gamma activity in request 2570. For this request, all QA/QC parameters were within allowed limits; therefore, all data are valid and usable without qualification

3.0 QA/QC RESULTS FOR PRS 73-007

Inorganic Analyses

Three soil samples were analyzed for TAL Metals in request 2287. One of the QC problems with this request was that antimony had low a recovery in the matrix spike sample. A post digestion spike was done for antimony and was within allowed limits. However, because of the low recovery, antimony data are qualified UJ. Also, aluminum, cadmium, chromium, cobalt, copper, iron, nickel, potassium, silver, thallium, and vanadium had duplicate values greater than 20%, different from the original concentration. The duplicate problems are most probably caused by heterogeneity in the samples since the method blank, calibrations, and the LCS samples were all within allowed limits. All other data are valid and usable without qualification.

One soil sample was analyzed for TAL Metals in request 2497. One of the QC problems with this request was that antimony, arsenic, and selenium had low recoveries in the matrix spike sample. Beryllium, cadmium, copper, and nickel had high recoveries in the matrix spike sample. A post digestion spike was done for all of the above elements and all recoveries were within allowed limits. However, because of the low recovery, antimony, arsenic, and selenium data are qualified UJ and beryllium, cadmium, copper, and nickel detects are qualified J+. Also aluminum, antimony, beryllium, cadmium, chromium, iron, lead, magnesium, potassium, silver, sodium, vanadium, and zinc had duplicate values greater than 20%, different from the original concentration. The duplicate problems are most probably caused by heterogeneity in the samples since the method blank, calibrations, and the LCS samples were all within allowed limits. All other data are valid and usable without qualification.

Organic Analyses

Three soil samples were analyzed for volatiles in request 2286. There were problems for all of the samples in this request. For sample 0173-96-0252 all of internal standards were outside allowed limits and one or more surrogate recoveries were high. For sample 0173-96-0282, two of the internal standards were outside allowed limits and one or more surrogate recoveries were high. For sample 0173-96-0251, one of the internal standards was outside allowed limits due to matrix effects. All analytes associated with the internal standards and surrogates mentioned above are qualified J+ if detected and UJ if not detected. Acetone was found in the method blank. All sample values less than ten times the blank value were changed to nondetects (at the level detected if above the EQL). All other data are valid and usable without qualification.

One soil sample was analyzed for volatiles in request 2496. All QA/QC parameters were within allowed limits; therefore, all data are valid and usable without qualification.

Three and one soil samples were analyzed for semivolatiles in requests 2496 and 2286, respectively. For these requests, all QA/QC parameters were within allowed limits; therefore, all data are valid and usable without qualification.

Three soil samples were analyzed for pesticides/PCBs in request 2286. The only problem with this request was that the ending check standard for DDT was greater than 15% difference from the initial standard check for samples 0173-96-0252 and -0282. This was caused by matrix problems in the samples and caused a reduced response for the DDT and an increased responce for DDD and DDE. Therefore, all DDT detects are qualified J- and all DDE and DDD detects are qualified J+. All other data are valid and usable without qualification.

One soil sample was analyzed for pesticides/PCBs in request 2496. For this request, all QA/QC parameters were within allowed limits; therefore, all data are valid and usable without qualification.

Radiochemistry Analyses

Three soil samples were analyzed for gross alpha, beta gamma activity, and tritium in request 2288. For this request, all QA/QC parameters were within allowed limits; therefore, all data are valid and usable without qualification.

4.0 QA/QC FOR PRSs C-73-005(a-f)

Inorganic Analyses

Eight soil samples were analyzed for TAL Metals in request 2272. One of the QC problems with this request was that antimony had low a recovery in the matrix spike sample. A post digestion spike was done for antimony and was within allowed limits. However, because of the low recovery, antimony data are qualified UJ. Also, antimony, cadmium, manganese, silver, and thallium had duplicate values greater than 20%, different from the original concentration. The duplicate problems are most probably caused by heterogeneity in the samples since the method blank, calibrations, and the LCS samples were all within allowed limits. All other data are valid and usable without qualification.

Six soil samples were analyzed for TAL Metals in request 2287. One of the QC problems with this request was that antimony had a low recovery in the matrix spike sample. A post digestion spike was done for antimony and was within allowed limits. However, because of the low recovery, antimony data are qualified UJ. Also, aluminum, cadmium, chromium, cobalt, copper, iron, nickel, potassium, silver, thallium, and vanadium had duplicate values greater than 20%, different from the original concentration. The duplicate problems are most probably caused by heterogeneity in the samples since the method blank, calibrations, and the LCS samples were all within allowed limits. All other data are valid and usable without qualification.

Organic Analyses

Eight soil samples were analyzed for volatiles in request 2271. There were problems for all of the samples in this request. For samples 0173-96-0271 and -0281, all of the internal standards were outside allowed limits due to matrix effects. Therefore, all analytes for these samples are qualified UJ (nondetects). For samples 0173-96-0272, -0274, and -0280, two of the internal standards were outside allowed limits. For samples 0173-96-0268, -0269, and -0275, one of the internal standards were outside allowed limits due to matrix effects. All analytes associated with the internal standards mentioned above are qualified UJ. All other data are valid and usable without qualification.

Six soil samples were analyzed for volatiles in request 2286. There were problems for five of the samples in this request. For samples 0173-96-0260, -0263, and -0264, two of the internal standards were outside allowed limits and one or more surrogate recoveries were high. For samples 0173-96-0258 and -0259, one of the internal standards were outside allowed limits and one or more surrogate recoveries were high due to matrix effects. All analytes associated with the internal standards and surrogates mentioned above are qualified J+ if detected and UJ if not detected. Acetone was found in the method blank. All sample values less than ten times the blank value were changed to nondetects (at the level detected if above the EQL). All other data are valid and usable without qualification.

Eight and six soil samples were analyzed for semivolatiles in requests 2271 and 2286, respectively. For these requests, all QA/QC parameters were within allowed limits; therefore, all data are valid and usable without qualification.

Eight soil samples were analyzed for pesticides/PCBs in request 2271. The only problem with this request was that the ending check standard for DDT was greater than 15% difference from the initial standard check for samples 0173-96-0271, -0272, and -0280. This was caused by matrix problems in the samples and caused a reduced response for the DDT. Therefore, all DDT detects are qualified J-. All other data are valid and usable without qualification.

Six soil samples were analyzed for pesticides/PCBs in request 2286. The only problem with this request was that the ending check standard for DDT was greater than 15% difference from the initial standard check for sample 0173-96-0263. This was caused by matrix problems in the sample and caused a reduced response for the DDT. Therefore, all DDT detects are qualified J-. All other data are valid and usable without qualification.

Radiochemistry Analyses

Eight and six soil samples were analyzed for gross alpha, beta gamma activity, and tritium in requests 2273 and 2288 respectively. For these requests, all QA/QC parameters were within allowed limits; therefore, all data are valid and usable without qualification.

TABLE A-1

SUMMARY TABLE OF QUALITY CONTROL RESULTS FOR PRS 73-004(a)

REQUEST NUMBER	SAMPLE ID	SAMPLE MATRIX	ANALYTE SUITE	QUALITY CONTROL (QC) COMMENTS
2385	0173-96-0231	Soil	VOCs	Methylene chloride and acetone were detected in the method blank. EQLs were raised appropriately.
2385	0173-96-0232	Soil	VOCs	4th IS outside allowed limits and 1 high and 1 low surrogate recovery due to matrix effects. All associated analytes are qualified UJ. Methylene chloride and acetone were detected in the method blank. EQLs were raised appropriately.
2385	0173-96-0233	Soil	VOCs	3rd and 4th IS outside allowed limits and 1 high and 1 low surrogate recovery due to matrix effects. All associated analytes are qualified UJ. Methylene chloride and acetone were detected in the method blank. EQLs were raised appropriately.
2385	0173-96-0234	Soil	VOCs	Methylene chloride and acetone were detected in the method blank. EQLs were raised appropriately.
2385	0173-96-0235	Soil	VOCs	Methylene chloride and acetone were detected in the method blank. EQLs were raised appropriately.
2385	0173-96-0238	Water	VOCs	Methylene chloride and acetone were detected in the method blank. EQLs were raised appropriately.
2384	0173-96-0231	Soil	Metals[a]	Ba, Pb, Sb and Tl qualified J- or UJ for low recovery and Hg qualified J+ for high recovery in the matrix spike sample.
2384	0173-96-0232	Soil	Metals	Ba, Pb, Sb and Tl qualified J- or UJ for low recovery and Hg qualified J+ for high recovery in the matrix spike sample.
2384	0173-96-0233	Soil	Metals	Ba, Pb, Sb and Tl qualified J- or UJ for low recovery and Hg qualified J+ for high recovery in the matrix spike sample.
2384	0173-96-0234	Soil	Metals	Ba, Pb, Sb and Tl qualified J- or UJ for low recovery and Hg qualified J+ for high recovery in the matrix spike sample.
2384	0173-96-0235	Soil	Metals	Ba, Pb, Sb and Tl qualified J- or UJ for low recovery and Hg qualified J+ for high recovery in the matrix spike sample.
2384	0173-96-0238	Water	Metals	Ba, Pb, Sb and Tl qualified J- or UJ for low recovery and Hg qualified J+ for high recovery in the matrix spike sample.
2569	0173-96-0503	Soil	Metals	The spike sample results for aluminum and iron are high; the results for these analytes should be regarded as estimated and biased high (J+). The spike sample results for antimony, copper and zinc are low; the results for these analytes should be regarded as estimated and biased low (J-). The relative percent differences (RPDs) from the duplicate analysis for: antimony, cobalt, lead, mercury, selenium, thallium and zinc are greater than 20%. The results for these analytes should be regarded as estimated (J). The result for silver in the laboratory control sample is high; the result for silver should be regarded as estimated and biased high (J+).
2569	0173-96-0510	Soil	Metals	The spike sample results for aluminum and iron are high; the results for these analytes should be regarded as estimated and biased high (J+). The spike sample results for antimony, copper and zinc are low; the results for these analytes should be regarded as estimated and biased low (J-). The relative percent differences (RPDs) from the duplicate analysis for: antimony, cobalt, lead, mercury, selenium, thallium and zinc are greater than 20%. The results for these analytes should be regarded as estimated (J). The result for silver in the laboratory control sample is high; the result for silver should be regarded as estimated and biased high (J+).

[a] Metals = Target analyte list for metals plus total uranium.

Need to have info for SVOCs for 4a).
There are J + B qualifiers in final

TABLE A-2

SUMMARY TABLE OF QUALITY CONTROL RESULTS FOR PRS 73-004(b)

REQUEST NUMBER	SAMPLE ID	SAMPLE MATRIX	ANALYTE SUITE	QUALITY CONTROL (QC) COMMENTS
2391	0173-96-0241	Soil	VOCs	All IS outside allowed limits and all surrogate recoveries were high or low due to matrix effects. All analytes are qualified 'UJ'. Methylene chloride and acetone were detected in the method blank. EQLs were raised appropriately.
2391	0173-96-0242	Soil	VOCs	All IS outside allowed limits and all surrogate recoveries were high or low due to matrix effects. All analytes are qualified 'UJ'. Methylene chloride and acetone were detected in the method blank. EQLs were raised appropriately.
2391	0173-96-0243	Soil	VOCs	All IS outside allowed limits and all surrogate recoveries were high or low due to matrix effects. All analytes are qualified 'UJ'. Methylene chloride and acetone were detected in the method blank. EQLs were raised appropriately.
2391	0173-96-0244	Soil	VOCs	All IS outside allowed limits and all surrogate recoveries were high or low due to matrix effects. All analytes are qualified 'UJ'. Methylene chloride and acetone were detected in the method blank. EQLs were raised appropriately.
2391	0173-96-0249	Soil	VOCs	Methylene chloride and acetone were detected in the method blank. EQLs were raised appropriately.
2390	0173-96-0241	Soil	Metals[a]	Sb and Tl qualified 'J-' or 'UJ' for low recovery in the matrix spike sample.
2390	0173-96-0242	Soil	Metals	Sb and Tl qualified 'J-' or 'UJ' for low recovery in the matrix spike sample.
2390	0173-96-0243	Soil	Metals	Sb and Tl qualified 'J-' or 'UJ' for low recovery in the matrix spike sample.
2390	0173-96-0244	Soil	Metals	Sb and Tl qualified 'J-' or 'UJ' for low recovery in the matrix spike sample.
2390	0173-96-0249	Soil	Metals	Sb and Tl qualified 'J-' or 'UJ' for low recovery in the matrix spike sample.
2487	0173-96-0245	Soil	VOCs	2l IS outside allowed limits and 2 surrogate recoveries were high due to matrix effects. All associated analytes are qualified 'UJ'.
2487	0173-96-0246	Soil	VOCs	All IS outside allowed limits and 2 surrogate recoveries were high due to matrix effects. All analytes are qualified 'UJ'.
2488	0173-96-0245	Soil	Metals	Sb, As and Se qualified 'J-' or 'UJ' for low recovery in the matrix spike sample. Be, Cd, Cu, Ni detects qualified 'J+' for high matrix spike recoveries.
2488	0173-96-0246	Soil	Metals	Sb, As and Se qualified 'J-' or 'UJ' for low recovery in the matrix spike sample. Be, Cd, Cu, Ni detects qualified 'J+' for high matrix spike recoveries.
2570	0173-96-0501	Soil	Metals	The spike sample results for aluminum and iron are high; the results for these analytes should be regarded as estimated and biased high (J+). The spike sample results for antimony, copper and zinc are low; the results for these analytes should be regarded as estimated and biased low (J-). The relative percent differences (RPDs) from the duplicate analysis for: antimony, cobalt, lead, mercury, selenium, thallium and zinc are greater than 20%. The results for these analytes should be regarded as estimated (J). The result for silver in the laboratory control sample is high; the result for silver should be regarded as estimated and biased high (J+).
2570	0173-96-0502	Soil	Metals	The spike sample results for aluminum and iron are high; the results for these analytes should be regarded as estimated and biased high (J+). The spike sample results for antimony, copper and zinc are low; the results for these analytes should be regarded as estimated and biased low (J-). The relative percent differences (RPDs) from the duplicate analysis for: antimony, cobalt, lead, mercury, selenium, thallium and zinc are greater than 20%. The results for these analytes should be regarded as estimated (J). The result for silver in the laboratory control sample is high; the result for silver should be regarded as estimated and biased high (J+).

TABLE A-2 (CONTINUED)

SUMMARY TABLE OF QUALITY CONTROL RESULTS FOR PRS 73-004(b)

REQUEST NUMBER	SAMPLE ID	SAMPLE MATRIX	ANALYTE SUITE	QUALITY CONTROL (QC) COMMENTS
2568	0173-96-0501	Soil	Pest/PCBs	The results for 4,4'-DDE (0.089 mg/kg), 4,4'-DDD (0.310 mg/kg), 4,4'-DDT (0.11 mg/kg), alpha chlordane (0.028 mg/kg) and gamma chlordane (0.038 mg/kg) should be regarded as estimated (J) because the sample was diluted.
2568	0173-96-0502	Soil	Pest/PCBs	The results for 4,4'-DDD (0.042 mg/kg) and 4,4'-DDT (0.021 mg/kg), should be regarded as estimated (J) because the sample was diluted.
2568	0173-96-0501	Soil	VOCs	The sample EQLs associated with the internal standard dibromofluoromethane should be regarded as estimated and biased low (J-). Dibromofluoromethane exhibited a low response both on the analysis and re-analysis due to a matrix effect.
2568	0173-96-0501	Soil	SVOCs	Phthalic anhydride reported as TIC and should be regarded as estimated (J).
2568	0173-96-0502	Soil	SVOCs	The sample EQLs associated with the internal standard 2-fluorobiphenyl should be regarded as estimated and biased low (J-) due to a low response for this internal standard.

[a] Metals = Target analyte list for metals plus total Uranium.

TABLE A-3

SUMMARY TABLE OF QUALITY CONTROL RESULTS FOR PRS 73-005

REQUEST NUMBER	SAMPLE ID	SAMPLE MATRIX	ANALYTE SUITE	QUALITY CONTROL (QC) COMMENTS
2271	0173-96-0268	Soil	VOCs	The 4th internal standard outside allowed limits matrix effects. All analytes associated with the 4th IS are qualified 'UJ'.
2271	0173-96-0269	Soil	VOCs	The 4th internal standard outside allowed limits matrix effects. All analytes associated with the 4th IS are qualified 'UJ'.
2271	0173-96-0271	Soil	VOCs	All internal standards outside allowed limits due to matrix effects. All analytes are qualified 'UJ'.
2271	0173-96-0272	Soil	VOCs	The 3rd and 4th internal standards outside allowed limits matrix effects. All analytes associated with the 3rd and 4th IS are qualified 'UJ'.
2271	0173-96-0274	Soil	VOCs	The 3rd and 4th internal standards outside allowed limits matrix effects. All analytes associated with the 3rd and 4th IS are qualified 'UJ'.
2271	0173-96-0275	Soil	VOCs	The 4th internal standard outside allowed limits matrix effects. All analytes associated with the 4th IS are qualified 'UJ'.
2271	0173-96-0280	Soil	VOCs	The 3rd and 4th internal standards outside allowed limits matrix effects. All analytes associated with the 3rd and 4th IS are qualified 'UJ'.
2271	0173-96-0281	Soil	VOCs	All internal standards outside allowed limits due to matrix effects. All analytes are qualified 'UJ'.
2271	0173-96-0271	Soil	Pest/PCBs	DDT qualified 'J-' for check standard >15% D due to matrix interference.
2271	0173-96-0272	Soil	Pest/PCBs	DDT qualified 'J-' for check standard >15% D due to matrix interference.
2271	0173-96-0280	Soil	Pest/PCBs	DDT qualified 'J-' for check standard >15% D due to matrix interference.
2272	0173-96-0268	Soil	Metals[a]	Sb qualified 'UJ' for low recovery in the matrix spike sample.
2272	0173-96-0269	Soil	Metals	Sb qualified 'UJ' for low recovery in the matrix spike sample.
2272	0173-96-0271	Soil	Metals	Sb qualified 'UJ' for low recovery in the matrix spike sample.
2272	0173-96-0272	Soil	Metals	Sb qualified 'UJ' for low recovery in the matrix spike sample.
2272	0173-96-0274	Soil	Metals	Sb qualified 'UJ' for low recovery in the matrix spike sample.
2272	0173-96-0275	Soil	Metals	Sb qualified 'UJ' for low recovery in the matrix spike sample.
2272	0173-96-0280	Soil	Metals	Sb qualified 'UJ' for low recovery in the matrix spike sample.
2272	0173-96-0281	Soil	Metals	Sb qualified 'UJ' for low recovery in the matrix spike sample.
2286	0173-96-0258	Soil	VOCs	One IS outside allowed limits. All associated analytes are qualified 'UJ' or 'J'. Acetone was found in the method blank. EQLs were raised appropriately
2286	0173-96-0259	Soil	VOCs	One IS outside allowed limits. All associated analytes are qualified 'UJ' or 'J'. Acetone was found in the method blank. EQLs were raised appropriately
2286	0173-96-0260	Soil	VOCs	2 IS outside allowed limits. All associated analytes are qualified 'UJ' or 'J'. Acetone was found in the method blank. EQLs were raised appropriately
2286	0173-96-0262	Soil	VOCs	Acetone was found in the method blank. EQLs were raised appropriately
2286	0173-96-0263	Soil	VOCs	2 IS outside allowed limits and high surrogate recoveries. All associated analytes are qualified 'UJ' if not detected or 'J+' if detected. Acetone was found in the method blank. EQLs were raised appropriately
2286	0173-96-0264	Soil	VOCs	2 IS outside allowed limits and high surrogate recoveries. All associated analytes are qualified 'UJ' if not detected or 'J+' if detected. Acetone was found in the method blank. EQLs were raised appropriately
2286	0173-96-0263	Soil	Pest/PCBs	DDT qualified 'J-' for ending check standard >15%D due to matrix effects which was caused a depressed instrument response..
2287	0173-96-0258	Soil	Metals	Sb qualified 'UJ' for low recovery in the matrix spike sample.
2287	0173-96-0259	Soil	Metals	Sb qualified 'UJ' for low recovery in the matrix spike sample.

TABLE A-3 (CONTINUED)

SUMMARY TABLE OF QUALITY CONTROL RESULTS FOR PRS 73-005

REQUEST NUMBER	SAMPLE ID	SAMPLE MATRIX	ANALYTE SUITE	QUALITY CONTROL (QC) COMMENTS
2287	0173-96-0260	Soil	Metals	Sb qualified 'UJ' for low recovery in the matrix spike sample.
2287	0173-96-0262	Soil	Metals	Sb qualified 'UJ' for low recovery in the matrix spike sample.
2287	0173-96-0263	Soil	Metals	Sb qualified 'UJ' for low recovery in the matrix spike sample.
2287	0173-96-0264	Soil	Metals	Sb qualified 'UJ' for low recovery in the matrix spike sample.

[a] Metals = Target analyte list for metals plus total Uranium.

TABLE A-4

SUMMARY TABLE OF QUALITY CONTROL RESULTS FOR PRS 73-007

REQUEST NUMBER	SAMPLE ID	SAMPLE MATRIX	ANALYTE SUITE	QUALITY CONTROL (QC) COMMENTS
2286	0173-96-0251	Soil	VOCs	One IS outside allowed limits. All associated analytes are qualified 'UJ' or 'J'. Acetone was found in the method blank. EQLs were raised appropriately
2286	0173-96-0252	Soil	VOCs	All IS outside allowed limits and 2 high surrogate recoveries. All analytes are qualified 'UJ' or 'J+'. Acetone was found in the method blank. EQLs were raised appropriately
2286	0173-96-0282	Soil	VOCs	2 IS outside allowed limits and 2 high surrogate recoveries. All associated analytes are qualified 'UJ' or 'J+'. Acetone was found in the method blank. EQLs were raised appropriately
2286	0173-96-0252	Soil	Pest/PCBs	DDT qualified 'J-' and DDD and DDE qualified 'J+' for ending check standard >15%D due to matrix effects which was caused a depressed instrument response for DDT and an increased response for DDD and DDE.
2286	0173-96-0282	Soil	Pest/PCBs	DDT qualified 'J-' and DDD and DDE qualified 'J+' for ending check standard >15%D due to matrix effects which was caused a depressed instrument response for DDT and an increased response for DDD and DDE.
2287	0173-96-0251	Soil	Metals[a]	Sb qualified 'UJ' for low recovery in the matrix spike sample.
2287	0173-96-0252	Soil	Metals	Sb qualified 'UJ' for low recovery in the matrix spike sample.
2287	0173-96-0282	Soil	Metals	Sb qualified 'UJ' for low recovery in the matrix spike sample.
2497	0173-96-0254	Soil	Metals	Sb, As and Se qualified 'J' or 'UJ' for low recoveries in the matrix spike sample. Be, Cd, Cu and Ni detects are qualified 'J+' for high recoveries in the matrix spike sample.

a Metals = Target analyte list for metals plus total Uranium.

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APPENDIX B COST COMPARISON

TABLE B-1

COST COMPARISON FOR THE LA AIRPORT VCAs
[PRSs 73-004(a,b), 73-007, and C-73-005(a-f)]

ACTIVITIES	ESTIMATED COSTS	ACTUAL COSTS
Pre-field activities	$26 000	$28 000
Field activities	$97 500	$104 500
Analytical costs	$110 000	$53 600
Waste management	$3 500	$38 000
Post-field activities	$14 000	$14 700
TOTAL	**$251 000**	**$238 800**

CERTIFICATION OF COMPLETION

I certify that all the work pertaining to the Voluntary Corrective Action Report has been completed in accordance with the Department of Energy approved VCA plan entitled VCA Plan for Potential Release Site 73-004(a,b), 73-007, C-73-005(a-f). Based on my personal involvement or inquiry of the person or persons who managed this cleanup, a review of all data gathered and a visit to the site, to the best of my knowledge and belief, all criteria of the plan have been met or exceeded. I believe that the completion of this VCA is both protective to human health and the environment. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

GR Allen

Field Unit 1 Field Project Leader
Environmental Restoration Project
Los Alamos National Laboratory

30 Sept 96

Date Signed