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Date: March 19, 1999
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Hsum LANL 2/1093/18

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

SUBJECT: VCM PLAN FOR PRSs 18-003 (a-h)

Dear Mr. Garcia:

Enclosed please find the Voluntary Corrective Measures (VCM) Plan for 8 septic tanks, potential release sites (PRSs) 18-003 (a-h), located within Technical Area 18. The VCM work will begin next fiscal year unless otherwise scheduled based on prioritization under the new aggregation and watershed approach.

If you have any questions, please call Dave McInroy at (505) 667-0819 or Danny Katzman at (505) 667-0599 of the Los Alamos National Laboratory or Joe Mose at (505) 667-5808 of the Department of Energy.

Sincerely,

Julie A. Canepa

Julie A. Canepa, Program Manager
LANL/ER Project

Sincerely,

for Joseph H. Mose

Theodore J. Taylor, Program Manager
DOE/LAAO

JC/TT/RB/gt

Enclosure: VCM PLAN FOR PRSs 18-003 (a-h)

1555

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Voluntary Corrective Measures Plan for Potential Release Sites

18-003(a-h)
Septic Tank Systems

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1999

Environmental Restoration Project
A Department of Energy Environmental Cleanup Program

Los Alamos
NATIONAL LABORATORY
Los Alamos, NM 87545

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ACRONYMS

BMP	best management practice
BV	background value
COPC	chemical of potential concern
COPEC	chemical of potential ecological concern
CSF	characterization strategy form
DOE	US Department of Energy
EC	expedited cleanup
ER	environmental restoration
ERA	ecological risk assessment
IA	interim action
NMED	New Mexico Environment Department
NMWQCC	New Mexico Water Quality Control Commission
PIDAS	Perimeter Intrusion Detection Assessment System
PPE	personal protective equipment
QA	quality assurance
QC	quality control
PRS	potential release site
RCRA	Resource Conservation and Recovery Act
RFI	RCRA facility investigation
SVOC	semivolatile organic compound
SWSC	Sanitary Wastewater System Consolidation
TA	technical area
TAL	target analyte list
VCM	voluntary corrective measure
VCP	vitrified clay pipe
VOC	volatile organic compound

EXECUTIVE SUMMARY

This voluntary corrective measure (VCM) was prepared to investigate and remediate as necessary, eight potential release sites (PRSs) identified as PRSs 18-003 (a, b, c, d, e, f, g, h) located within Technical Area (TA) 18 at Los Alamos National Laboratory (the Laboratory). The eight PRSs addressed in this VCM include five inactive septic tank systems, two active septic systems, and one inactive settling tank. They are grouped into this VCM plan on the basis of similarities in design, construction, location, and environmental setting.

The eight PRSs contained in the VCM were first investigated in 1994 as part of a Resource Conservation and Recovery Act facility investigation (RFI) Phase I investigation at TA-18. Subsequent to the RFI report, the Laboratory conducted expedited cleanup activities and interim actions, which involved removing water and sludge from the tanks and decontaminating the interior of the tanks to prepare for planned tank removal activities. Additional activities included collecting alluvial groundwater samples from PRS 18-003(d) on a quarterly basis for eight quarters to monitor alluvial groundwater quality conditions at this site.

The objectives of this VCM are to collect supplemental surface and subsurface soil samples at each septic system; determine the nature and extent of soil contamination (if present) from the supplemental data; assess the potential human health and ecological risks to the environment from each septic system; and remediate (by excavation), as necessary, inactive septic systems following Laboratory Environmental Restoration Project best management practices.

A project best management practice is to remove inactive septic tank systems that occupy canyon-bottom settings in order to mitigate potential environmental issues that may remain if not managed. Exceptions to this practice may occur if the system is inaccessible (due to facility operations) or if removal is unwarranted from a risk perspective. PRSs 18-003 (b, c, d, f) are scheduled for removal. PRSs 18-003(a and e) have been grouted in-place making removal impractical. PRSs 18-003(g and h) are active systems and are not scheduled for removal at this time. The schedule for the removal will be based on the results of the VCM, regulatory review, and acceptance of the remedial approach.

1.0 INTRODUCTION

This voluntary corrective measure (VCM) plan presents an approach for characterizing and remediating eight potential release sites (PRSs) in Technical Area (TA) 18 at Los Alamos National Laboratory (the Laboratory). The PRSs addressed in this plan are PRS 18-003(a), PRS 18-003(b), PRS 18-003(c), PRS 18-003(d), PRS 18-003(e), PRS 18-003(f), PRS 18-003(g) and PRS 18-003(h). Due to the proximity of PRS 18-003(a) to PRS 18-003(b), their consolidation into one PRS was considered, but not conducted. These sites are listed in Table A of the Hazardous and Solid Waste Amendments Module.

The PRSs include five inactive septic tank systems, two active septic systems, and one inactive settling tank. Figure 1-1 shows the locations of the PRSs. The similar environmental settings of the sites and similar septic system designs support grouping the PRSs under one VCM plan. Additionally, an Environmental Restoration (ER) Project best management practice (BMP) is to remove inactive septic tank structures in canyon-bottom settings if removal is (1) feasible, or (2) warranted to mitigate potential environmental issues that may remain if they are not managed. The objective of this VCM is to complete remedial actions at TA-18 with respect to the septic tanks and their associated drain lines and drain fields. To meet this objective, the Laboratory will conduct the following activities:

- Supplement previous Resource Conservation and Recovery Act (RCRA) investigatory data and subsequent interim action (IA) and expedited cleanup (EC) data pertinent to each PRS with additional site characterization data (as needed). This data will be used to determine nature and extent of contaminated soil associated with past septic tank, drain line, and drain field operations.
- Assess human health and ecological risk, based on nature and extent of contamination from previous data and supplemental data collected for each PRS.
- Determine the remedial approach for each PRS, based on human health and ecological risk screening results, nature and extent of contamination, and current PRS.
- Conduct removal activities (as necessary) using cost-effective, environmentally acceptable methods while minimizing waste generation or disruption to facility operations.

1.1 Site Type and Description

TA-18 is located at the confluence of Pajarito and Threemile Canyons (Figure 1-1). The site consists of the main complex of administrative buildings at the juncture of the canyons and three outlying nuclear criticality facilities commonly referred to as kivas (Figure 1-1). Kiva I is northwest of the main complex in Pajarito Canyon while Kiva II is in Threemile Canyon. Kiva III is slightly southeast of the main complex in Pajarito Canyon. The kivas and main complex are located near the canyon floors. Small ephemeral streams are present in each canyon. The streams merge at the confluence of the canyons and continue eastward down the length of Pajarito Canyon. Seasonal ephemeral flow consists of snowmelt, short-lived summer storms, and spring discharges into Threemile Canyon. Where it is present, alluvium is recharged by the ephemeral drainages in the canyons. Measurements in the alluvial monitoring wells near Kivas I, II, and III indicate depth to groundwater fluctuates seasonally, ranging from 5 to 15 ft below ground surface.

The septic systems and settling tank that served the kivas and main complex building are the subject of this VCM effort. PRSs 18-003(a and b) consist of a settling tank and septic system, respectively, which served Kiva I. Septic systems PRSs 18-003(c and d) served Kivas II and III, respectively. PRSs 18-003(e and f) are inactive systems that served administrative buildings in the main complex. PRSs 18-003(g and h) are active septic systems in the main complex that serve Buildings TA-18-1 and TA-18-147. These systems received sanitary sewage and wash water from industrial drains and sinks. PRSs 18-003(a, b, c, d, e, and f) are permanently inactive.

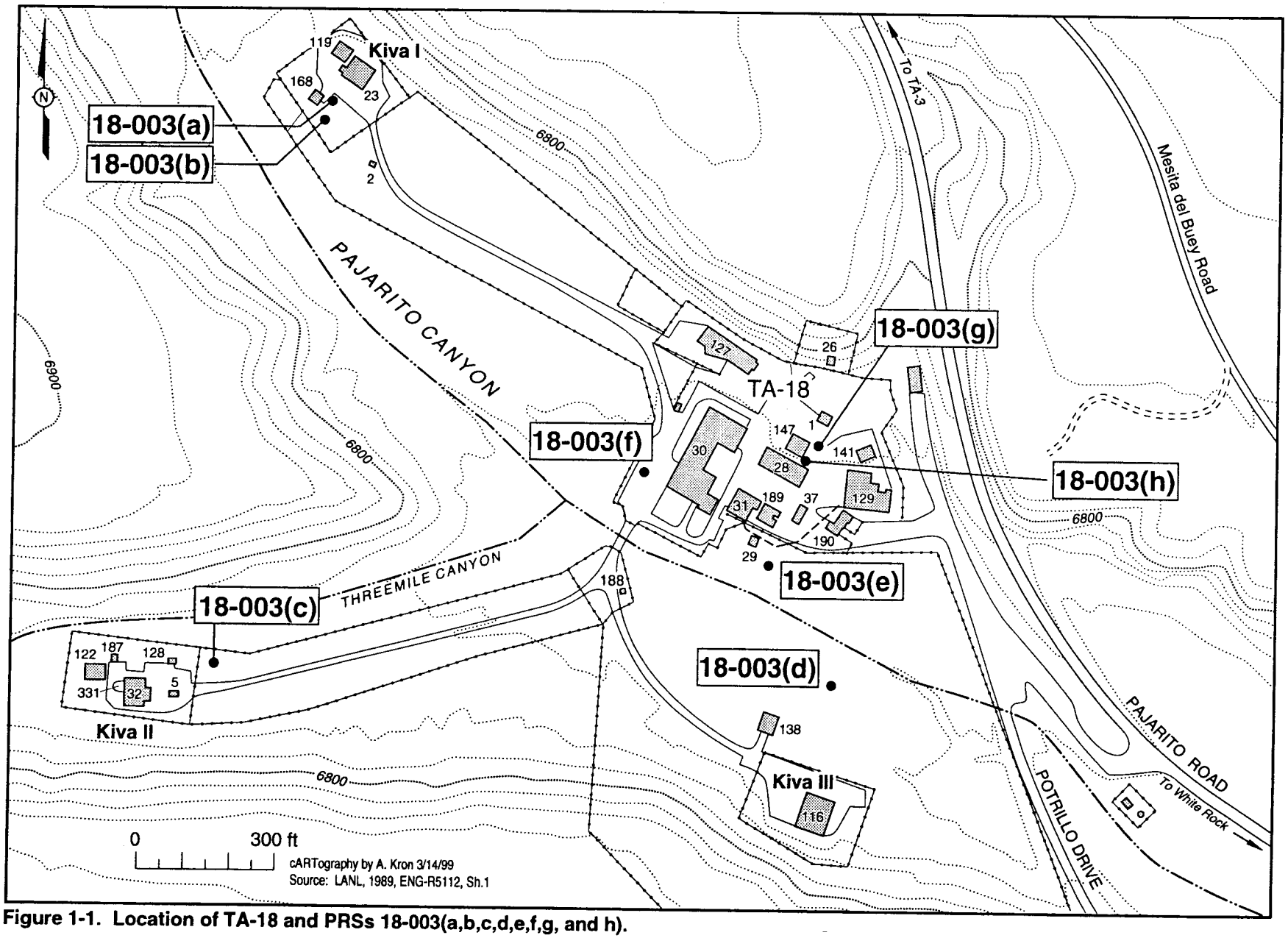

Figure 1-1. Location of TA-18 and PRSs 18-003(a,b,c,d,e,f,g, and h).

1.1.1 Operational History

TA-18 was first developed in 1943 during the Manhattan Project to study rates of spontaneous fission from radioactive materials. Originally, the critical assembly work was conducted manually in buildings within the present administrative area. Due to safety issues associated with criticality experiments, manual experiments were replaced by remotely controlled experimental test methods. To accommodate these tests, Kivas I, II, III, were constructed from 1947 to 1960. The seven septic systems, PRSs 18-003(b, c, d, e, f, g, and h), and settling tank PRS 18-003(a) were constructed in conjunction with the kivas and original research buildings. Table 1-1 lists the periods of operation and buildings served by each of these systems.

TABLE 1-1
WASTE MANAGEMENT SYSTEMS IN THE VCM PLAN

PRS ID	Description	Building Served	Status	Period of Operation
18-003(a)	Settling tank	Kiva I	Inactive	1947 – 1991
18-003(b)	Septic system	Kiva I	Inactive	1947 – 1995
18-003(c)	Septic system	Kiva II	Inactive	1952 – 1995
18-003(d)	Septic system	Kiva III	Inactive	1960 – 1995
18-003(e)	Septic system	Admin. Bldgs.	Inactive	1951 – 1969
18-003(f)	Septic system	Bldg. TA-18-30	Inactive	1951 – 1969
18-003(g)	Septic system	Bldg. TA-18-1	Active	1944 – present
18-003(h)	Septic system	Bldg. TA-18-147	Active	1967 – present

1.1.2 Regulatory History

The regulatory activities of the PRSs subject to this VCM are summarized in Table 1-2.

TABLE 1-2
REGULATORY ACTIVITY AT TA-18

Date	Activity	Report
May 1993	Submittal of 1093 RFI Phase I work plan for PRSs 18-003(a-h)	RFI work plan for operable unit 1093 LA-UR-93-422 (LANL 1993, 15310)
October 1995	Submittal of 1093 RFI Phase I report for PRSs 18-003(a-h)	RFI report for PRSs 18-003(a-c), 18-003(a-h), 18-004(a,b), 18-005(a), 18-008, 18-010(b-f), 18-011, 18-012(a-c), 18-013, 27-002, located in former operable unit 1093 LA-UR-95-3833 (LANL 1995, 52183)
June 1, 1995	Submittal of expedited cleanup plan for PRS 18-003(e)	EC plan for SWMU 18-003(e), Revision 0 (LANL 1995, 52976.14)

TABLE 1-2 (continued)
REGULATORY ACTIVITY AT TA-18

Date	Activity	Report
January 1, 1996	Submittal of expedited cleanup report for PRS 18-003(e)	EC completion report for PRS 18-003(e), septic system, Field Unit 2, Revision 1 LA-UR-96-446 (LANL 1996, 54488.1)
January 1997	Submittal of corrective action report for TA-18	Corrective action report for TA-18 (located in former Operable Unit 1093), Field Unit 2, Revision 1 (LANL 1997, 55120.2)
1997	NMED NOD comments on RFI report	Notice of Deficiency, RFI report for TAs 18 and 27, LANL. (LANL 1997, 62871)
June 1997	Submittal of RFI report for groundwater sampling at PRS 18-003(d)	RFI report for groundwater sampling, PRS 18-003(d) TA-18 LA-UR-97-2856 (LANL 1997, 57015)
July 15, 1997	Laboratory submittal of responses to NMED comments on RFI report	Response to NOD for RFI report for PRSs in TA-18 and TA-27 (LANL 1997, 55680.3)
September 1998	Submittal of work plan for Pajarito Canyon	Work plan for Pajarito Canyon LA-UR-98-2550 (LANL 1998, 58820.2)

NMED = New Mexico Environment Department.
NOD = Notice of Defficiency.
RFI = Resource Conservation Recovery Act facility investigation.

1.1.3 Rationale for Proposed Remedial Action

An ER Project BMP is to mitigate the possibility that potential contaminants could enter alluvial groundwater from inactive septic systems situated within or immediately above the alluvial groundwater. PRSs 18-003(a, b, c, d, e, and f) meet this BMP. Mitigation typically involves removing structures when removal is feasible and appropriate. However, PRSs 18-003(g and h) are active systems. Additional investigative activities will be conducted at these PRSs in conjunction with the other inactive tank investigations. The inactive septic tank systems, with the exception of PRS 18-003(f), have undergone several tank-cleaning and sludge-removal efforts since 1996. PRSs 18-003(a and e) were grouted in place; inactive septic tanks 18-003(b, c, and d) are empty. PRS 18-003(f) was decommissioned and backfilled with sand. Documented results from field activities and confirmatory rinsate sampling results show no sludge remains in the tanks. The remaining remedial action issues primarily are related to the remaining tank structures and inlet and outlet drain lines, based on nature and extent of contamination.

1.1.4 Alluvial Groundwater Assessment

Alluvial groundwater monitoring began in the TA-18 area in 1990. Monitoring wells initially were installed in the vicinity of PRSs 18-003(a and b). The ER Project installed and monitored these and numerous additional monitoring wells to characterize the alluvial groundwater at TA-18. TA-18 contains a total of 23 alluvial monitoring wells, including baseline water quality wells in Pajarito and Threemile Canyons. Monitoring wells are situated near and downgradient from each septic system, to identify any potential adverse effects from the PRSs. To date, sampling results show no elevated contaminant concentrations directly attributable to any of the septic system PRSs.

Characterization of the alluvial groundwater system within Pajarito Canyon and Threemile Canyon will be conducted by the ER Project Canyons Focus Area. This characterization approach is presented in the work plan for Pajarito Canyon (LANL 1998, 58820.2). Groundwater data will be assessed, along with surface water and sediment data, to support decisions regarding human health and ecological risk.

2.0 PREVIOUS SITE CHARACTERIZATION

This section describes PRS sites, previous field investigations, and IAs. It also lists constituents for each PRS that are greater than background values (BVs).

As part of this VCM, surface and subsurface soil data from previous investigations at each PRS (LANL 1995, 52183) were compared to Laboratory-specific BVs (Ryti et al. 1998, 58093). Inorganic and radionuclide constituent data were compared with the BVs in Ryti et al. (1998) and organic constituent data were retained for further analysis only if the sample was deemed to be a detected concentration (i.e., "u" qualified data, or undetected analytes were eliminated).

2.1 PRS 18-003(a)

2.1.1 Site Description

PRS 18-003(a) is a settling tank that received industrial and radioactive wastewater from Building TA18-23 located within Kiva I (Figure 2-1). The tank was placed into service in 1947, and operated until 1991 (LANL 1995, 52183). The PRS consisted of a steel tank mounted on steel rails within a concrete vault. The tank capacity was approximately 120 gal. The concrete vault measured approximately 5.5 ft long x 5.5 ft wide x 10 ft deep. The base of the vault consisted of a gravel drainage layer, which was open at the bottom. Originally, a subgrade inlet line extended from the building and discharged to the steel tank. The tank was emptied frequently and the waste disposed of off-site. Any overflow from the tank would have discharged through a drain line that connects to the PRS 18-003(b) drain line and drain field. The inlet line leading to the tank is approximately 55 ft long; the outlet line is approximately 70 ft long. The drain field is shared with PRS 18-003(b); the total length of the drain field lines is approximately 270 ft.

2.1.2 Previous Field Investigations

A RCRA facility investigation (RFI) Phase I investigation was conducted at PRS 18-003(a) in 1993 (LANL 1995, 52183). As part of this effort, the tank contents were sampled and analyzed. In 1994, subsurface soils adjacent to the discharge line and drain field common to both PRS 18-003(a) and 18-003(b) were sampled and analyzed (LANL 1995, 52183). Previous sample locations at PRS 18-003(a) are shown in Figure 2-1.

In 1994, a permanent alluvial groundwater monitoring well (MW-7) was installed immediately downgradient of the drain field to characterize alluvial groundwater for future monitoring purposes (LANL 1995, 52183).

In 1996, as part of an IA, the contents of the steel settling tank at 18-003(a) were removed and the interior was cleaned. The tank contents were sampled for waste disposal characterization (LANL 1997, 55120.2). Samples from the vault's gravel floor were also collected and analyzed.

A BMP effort was conducted in 1997 to eliminate a potential pathway to alluvial groundwater. The effort included removing and disposing of the steel settling tank, plugging the inlet and outlet lines as they entered the vault, and then grouting the interior of the vault with flowcrete to prevent any potential releases to alluvial groundwater. Additional soil samples were collected adjacent to the vault near the inlet and outlet lines at approximately the same depth as the vault floor to characterize soils at that level. During remedial activities, a section of the outlet line vitrified clay pipe (VCP) was inadvertently removed by a backhoe. The pipe section and its contents were submitted for laboratory analysis.

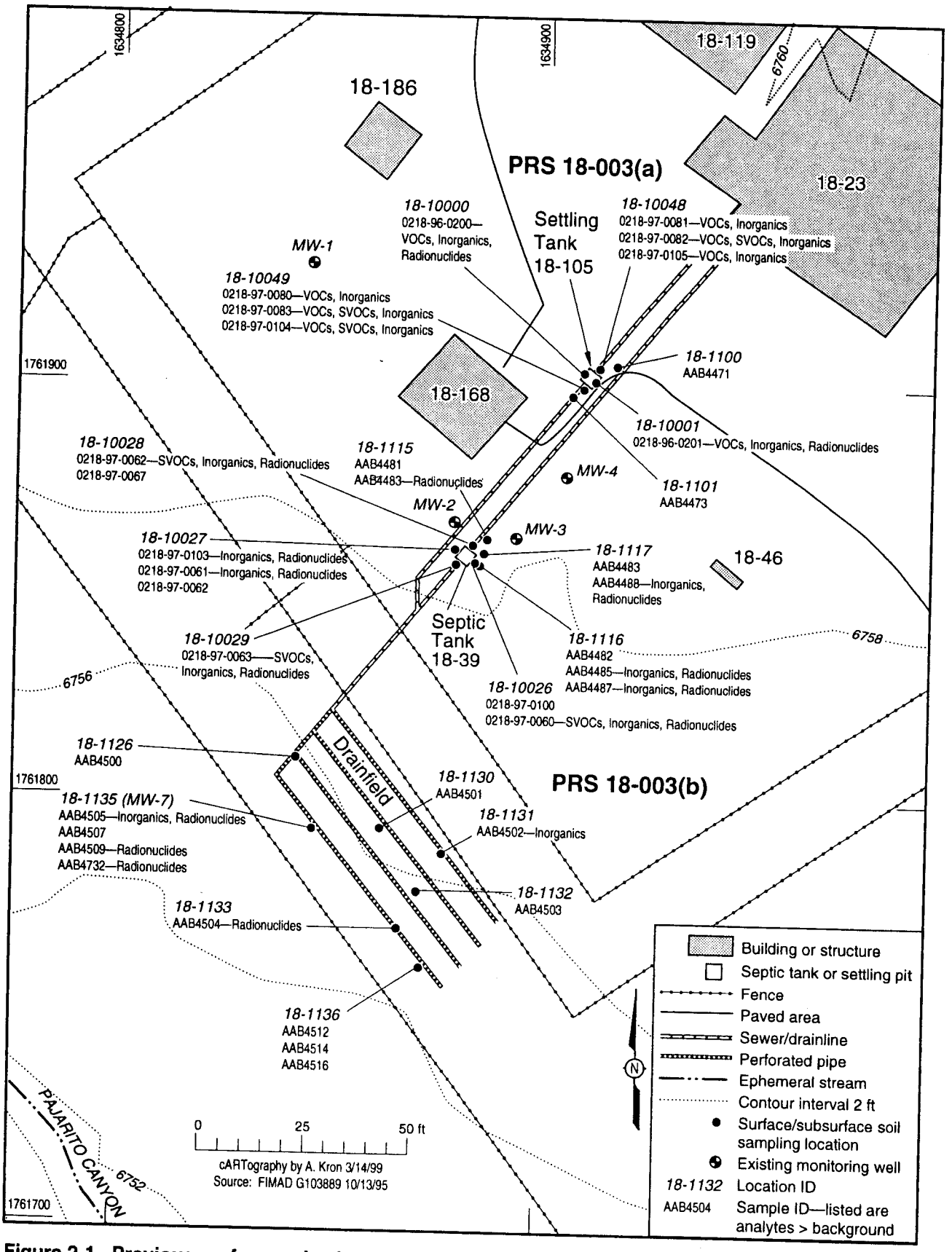

Figure 2-1. Previous surface and subsurface soil sampling locations at PRSs 18-003(a and b).

2.1.3 Results of Investigation at PRS 18-003(a)

Using the methodology described in Section 2.0, existing data was reviewed to identify constituents present at concentrations greater than BVs at PRS 18-003(a). The results of this background comparison are presented in Table 2-1 and Figure 2-1.

TABLE 2-1
ANALYTES DETECTED ABOVE BACKGROUND VALUES IN SURFACE OR SUBSURFACE SOILS, PRS 18-003(a)

Location ID	Sample ID	Analyte	Sample Interval (in.)	Sample Result	Background Value	Reporting Units
Organics						
18-10000	0218-96-0200	Trichloroethene	6-8	0.0028	NA	
18-10000	0218-96-0200	Trichlorofluoromethane	6-8	0.001	NA	mg/kg
18-10001	0218-96-0201	Trichloroethene	6-8	0.009	NA	mg/kg
18-10048	0218-97-0081	Acetone	114-138	0.01	NA	mg/kg
18-10048	0218-97-0082	Acetone	42-54	0.0099	NA	mg/kg
18-10048	0218-97-0082	Di-n-butylphthalate	42-54	0.076	NA	mg/kg
18-10048	0218-97-0082	Naphthalene	42-54	0.0046	NA	mg/kg
18-10048	0218-97-0082	Trichloroethene	42-54	0.12	NA	mg/kg
18-10048	0218-97-0082	Trimethylbenzene[1,2,4-]	42-54	0.0056	NA	mg/kg
18-10048	0218-97-0105	Acetone	162-166	0.0049	NA	mg/kg
18-10049	0218-97-0080	Acetone	126-132	0.0065	NA	mg/kg
18-10049	0218-97-0083	Acetone	66-72	0.01	NA	mg/kg
18-10049	0218-97-0083	Methylnaphthalene[2-]	66-72	0.11	NA	mg/kg
18-10049	0218-97-0083	Naphthalene	66-72	0.014	NA	mg/kg
18-10049	0218-97-0083	Trichloroethene	66-72	0.0032	NA	mg/kg
18-10049	0218-97-0083	Trimethylbenzene[1,2,4-]	66-72	0.003	NA	mg/kg
18-10049	0218-97-0104	Acetone	162-168	0.023	NA	mg/kg
18-10049	0218-97-0104	Bis(2-ethylhexyl)phthalate	162-168	0.09	NA	mg/kg
Inorganics						
18-10000	0218-96-0200	Barium	6-8	1030.0	295.0	mg/kg
18-10000	0218-96-0200	Cadmium	6-8	11.9	0.4	mg/kg
18-10000	0218-96-0200	Copper	6-8	60.3	14.7	mg/kg
18-10000	0218-96-0200	Lead	6-8	181.0	22.3	mg/kg
18-10000	0218-96-0200	Mercury	6-8	0.43	0.1	mg/kg
18-10000	0218-96-0200	Zinc	6-8	813.0	48.8	mg/kg
18-10001	0218-96-0201	Cadmium	6-8	4.2	0.4	mg/kg
18-10001	0218-96-0201	Copper	6-8	30.3	14.7	mg/kg
18-10001	0218-96-0201	Lead	6-8	60.2	22.3	mg/kg
18-10001	0218-96-0201	Mercury	6-8	0.17	0.1	mg/kg
18-10001	0218-96-0201	Zinc	6-8	364.0	48.8	mg/kg
18-10048	0218-97-0081	Calcium	114-138	8410.0	6120.0	mg/kg
18-10048	0218-97-0081	Chromium, Total	114-138	25.7	19.3	mg/kg
18-10048	0218-97-0081	Cobalt	114-138	12.0	8.64	mg/kg
18-10048	0218-97-0081	Copper	114-138	52.6	14.7	mg/kg
18-10048	0218-97-0081	Nickel	114-138	16.1	15.4	mg/kg
18-10048	0218-97-0081	Zinc	114-138	50.1	48.8	mg/kg

TABLE 2-1 (continued)
ANALYTES DETECTED ABOVE BACKGROUND VALUES IN SURFACE OR SUBSURFACE SOILS, PRS 18-003(a)

Location ID	Sample ID	Analyte	Sample Interval (in.)	Sample Results	Background Values	Reporting Units
Inorganics (continued)						
18-10048	0218-97-0082	Copper	42-54	23.3	14.7	mg/kg
18-10048	0218-97-0105	Copper	162-166	30.5	14.7	mg/kg
18-10049	0218-97-0080	Copper	126-132	82.9	14.7	mg/kg
18-10049	0218-97-0080	Nickel	126-132	19.6	15.4	mg/kg
18-10049	0218-97-0080	Zinc	126-132	57.1	48.8	mg/kg
18-10049	0218-97-0083	Barium	66-72	349.0	295.0	mg/kg
18-10049	0218-97-0083	Chromium, Total	66-72	25.6	19.3	mg/kg
18-10049	0218-97-0104	Cobalt	162-168	9.4	8.64	mg/kg
18-10049	0218-97-0104	Copper	162-168	145.0	14.7	mg/kg
18-10049	0218-97-0104	Nickel	162-168	32.8	15.4	mg/kg
18-10049	0218-97-0104	Zinc	162-168	105.0	48.8	mg/kg
Radionuclides						
18-10000	0218-96-0200	Plutonium-239	6-8	0.545	0.054	pCi/g
18-10000	0218-96-0200	Uranium	6-8	9.61	1.82	mg/kg
18-10001	0218-96-0201	Plutonium-239	6-8	0.432	0.054	pCi/g

NA = not applicable.

NOTES:
1. For consistency, Facility for Information Management, Analysis, and Display reporting values and units were converted to milligrams per kilogram where applicable.
2. Total thallium, thorium, and uranium values are included under radionuclides.

2.2 PRS 18-003(b)

2.2.1 Site Description

PRS 18-003(b) is an inactive septic system that served Kiva I Building TA-18-23 until 1995 (Figure 2-1). The system received sanitary wastes and wash water from 1947 to 1995. The PRS includes the septic tank, inlet line, discharge line, and drain field. The reinforced concrete septic tank is an estimated 7 ft long x 4 ft wide x 5.5 ft high, having a capacity of approximately 650 gal. A large wooden baffle is located at each end of the tank. The drain field consists of four drain lines, each of which is approximately 68 ft long, spaced 10 ft apart. This drain field is shared with PRS 18-003(a). The inlet line leading to the tank is approximately 100 ft long; the outlet line is approximately 50 ft long.

The total length of the drain field lines is approximately 270 ft. Water service to the Kiva I restroom has been shut off and the doors locked. The sewer lines leading from the facility have not been plugged.

2.2.2 Previous Field Investigations

An RFI Phase I field investigation was conducted at PRS 18-003(b) in 1993 and 1994 (LANL 1995, 52183). Media sampled included the tank contents, surface and subsurface soils adjacent to drain lines, and the tank. Previous sample locations at PRS 18-003(b) are presented in Figure 2-1. In addition, soils and grab alluvial groundwater samples from temporary wells were collected from the drain field. In 1994, a permanent alluvial groundwater monitoring well (MW-7) was installed immediately downgradient from the drain field shared by PRS 18-003(a) and PRS 18-003(b) (LANL 1995, 52183).

In 1996, an IA was conducted at PRS 18-003(b) to remove the contents of the tank and pressure-wash the tank interior (LANL 1997, 55120.2). The tank contents were sampled for waste disposal characterization.

The tank was sampled again in 1997 to more fully characterize the tank structure and soils adjacent to the tank. Concrete and wood samples were collected from the tank interior while soil samples were obtained from beneath the inlet and outlet. Soil samples also were collected adjacent to the tank, both at the approximate depth of the tank floor and 2 ft deeper.

2.2.3 Results of Investigation at PRS 18-003(b)

Using the methodology described in Section 2.0, existing data was reviewed to identify constituents present at concentrations greater than BVs at PRS 18-003(b). The results of the background comparison are presented in Table 2-2 and Figure 2-1.

TABLE 2-2
ANALYTES DETECTED ABOVE BACKGROUND VALUES IN SURFACE OR SUBSURFACE SOILS, PRS 18-003(b)

Location ID	Sample ID	Analyte	Sample Interval (in.)	Sample Results	Background Values	Reporting Units
Organics						
18-10026	0218-97-0060	Di-n-butylphthalate	66-68	0.092	NA	mg/kg
18-10028	0218-97-0062	Benzoic Acid	40-44	0.23	NA	mg/kg
18-10028	0218-97-0062	Bis(2-ethylhexyl)phthalate	40-44	0.039	NA	mg/kg
18-10029	0218-97-0063	Bis(2-ethylhexyl)phthalate	30-34	0.079	NA	mg/kg
18-10029	0218-97-0063	Di-n-butylphthalate	30-34	0.1	NA	mg/kg
Inorganics						
18-1116	AAB4485	Cadmium	0-60	2.4	0.4	mg/kg
18-1116	AAB4485	Copper	0-60	16.8	14.7	mg/kg
18-1116	AAB4487	Cadmium	0-60	2.1	0.4	mg/kg
18-1117	AAB4488	Cadmium	0-60	1.2	0.4	mg/kg
18-1131	AAB4502	Cadmium	0-6	1.2	0.4	mg/kg
18-1135	AAB4505	Chromium, Total	0-60	46.3	19.3	mg/kg
18-1135	AAB4505	Nickel	0-60	22.6	15.4	mg/kg
18-10026	0218-97-0060	Cadmium	66-68	1.1	0.4	mg/kg
18-10027	0218-97-0061	Cadmium	66-72	1.7	0.4	mg/kg
18-10027	0218-97-0103	Cadmium	84-90	1.2	0.4	mg/kg
18-10027	0218-97-0103	Copper	84-90	16.4	14.7	mg/kg
18-10028	0218-97-0062	Cadmium	40-44	1.5	0.4	mg/kg
18-10029	0218-97-0063	Copper	30-34	21.5	14.7	mg/kg
18-10029	0218-97-0063	Mercury	30-34	2.4	0.1	mg/kg
Radionuclides						
18-1115	AAB4483	Plutonium-238	0-12	0.03	0.023	pCi/g
18-1115	AAB4483	Radium-226	0-12	2.8229	2.59	pCi/g
18-1116	AAB4485	Plutonium-238	0-60	0.1	0.023	pCi/g
18-1116	AAB4485	Radium-226	0-60	5.1693	2.59	pCi/g

TABLE 2-2 (continued)
ANALYTES DETECTED ABOVE BACKGROUND VALUES IN SURFACE OR SUBSURFACE SOILS, PRS 18-003(b)

Location ID	Sample ID	Analyte	Sample Interval (In.)	Sample Results	Background Values	Reporting Units
Radionuclides (continued)						
18-1116	AAB4485	Uranium	0-60	7.07	1.82	mg/kg
18-1116	AAB4485	Uranium-235	0-60	0.3004 pC	0.2	pCi/g
18-1116	AAB4487	Plutonium-238	0-60	0.04	0.023	pCi/g
18-1116	AAB4487	Radium-226	0-60	5.3411	2.59	pCi/g
18-1116	AAB4487	Uranium-235	0-60	0.2869	0.2	pCi/g
18-1117	AAB4488	Plutonium-238	0-60	0.05	0.023	pCi/g
18-1117	AAB4488	Radium-226	0-60	4.8416	2.59	pCi/g
18-1117	AAB4488	Uranium-235	0-60	0.2639	0.2	pCi/g
18-1133	AAB4504	Uranium	0-6	3.58	1.82	mg/kg
18-1135	AAB4505	Americium-241	0-60	0.048	0.013	pCi/g
18-1135	AAB4505	Radium-226	0-60	6.5537	2.59	pCi/g
18-1135	AAB4505	Uranium-235	0-60	0.5154	0.2	pCi/g
18-1135	AAB4509	Americium-241	0-60	0.079	0.013	pCi/g
18-1135	AAB4732	Americium-241	216-240	0.015	0.013	pCi/g
18-1135	AAB4732	Uranium	216-240	1.84	1.82	mg/kg
18-10026	0218-97-0060	Uranium-234	66-68	4.32	2.59	pCi/g
18-10026	0218-97-0060	Uranium235 + Uranium-236	66-68	0.225	0.2	pCi/g
18-10026	0218-97-0060	Uranium-238	66-68	4.21	2.29	pCi/g
18-10027	0218-97-0061	Thallium	66-72	0.8	0.73	mg/kg
18-10027	0218-97-0061	Uranium-234	66-72	3.32	2.59	pCi/g
18-10027	0218-97-0061	Uranium-238	66-72	2.53	2.29	pCi/g
18-10027	0218-97-0103	Uranium-238	84-90	2.59	2.29	pCi/g
18-10028	0218-97-0062	Uranium-234	40-44	7.1	2.59	pCi/g
18-10028	0218-97-0062	Uranium-235 + Uranium-236	40-44	0.286	0.2	pCi/g
18-10028	0218-97-0062	Uranium-238	40-44	5.28	2.29	pCi/g
18-10029	0218-97-0063	Uranium-234	30-34	21.1	2.59	pCi/g
18-10029	0218-97-0063	Uranium235 + Uranium-236	30-34	0.836	0.2	pCi/g
18-10027	0218-97-0103	Uranium-234	84-90	3.08	2.59	pCi/g

NA = not applicable.

NOTES:
1. For consistency, Facility for Information Management, Analysis, and Display reporting values and units were converted to milligrams per kilogram where applicable.
2. Total thallium, thorium, and uranium values are included under radionuclides.

2.3 PRS 18-003(c)

2.3.1 Site Description

PRS 18-003(c) is an inactive septic system that served Kiva II (Building TA18-32), from 1952 to 1995 (Figure 2-2). The current system includes a reinforced concrete septic tank, an inlet line, discharge line, drain field, and outfall. The former outfall was located at the distal end of the drain field, which discharged into an ephemeral stream in Threemile Canyon. The cylindrical tank capacity is approximately 650 gal.

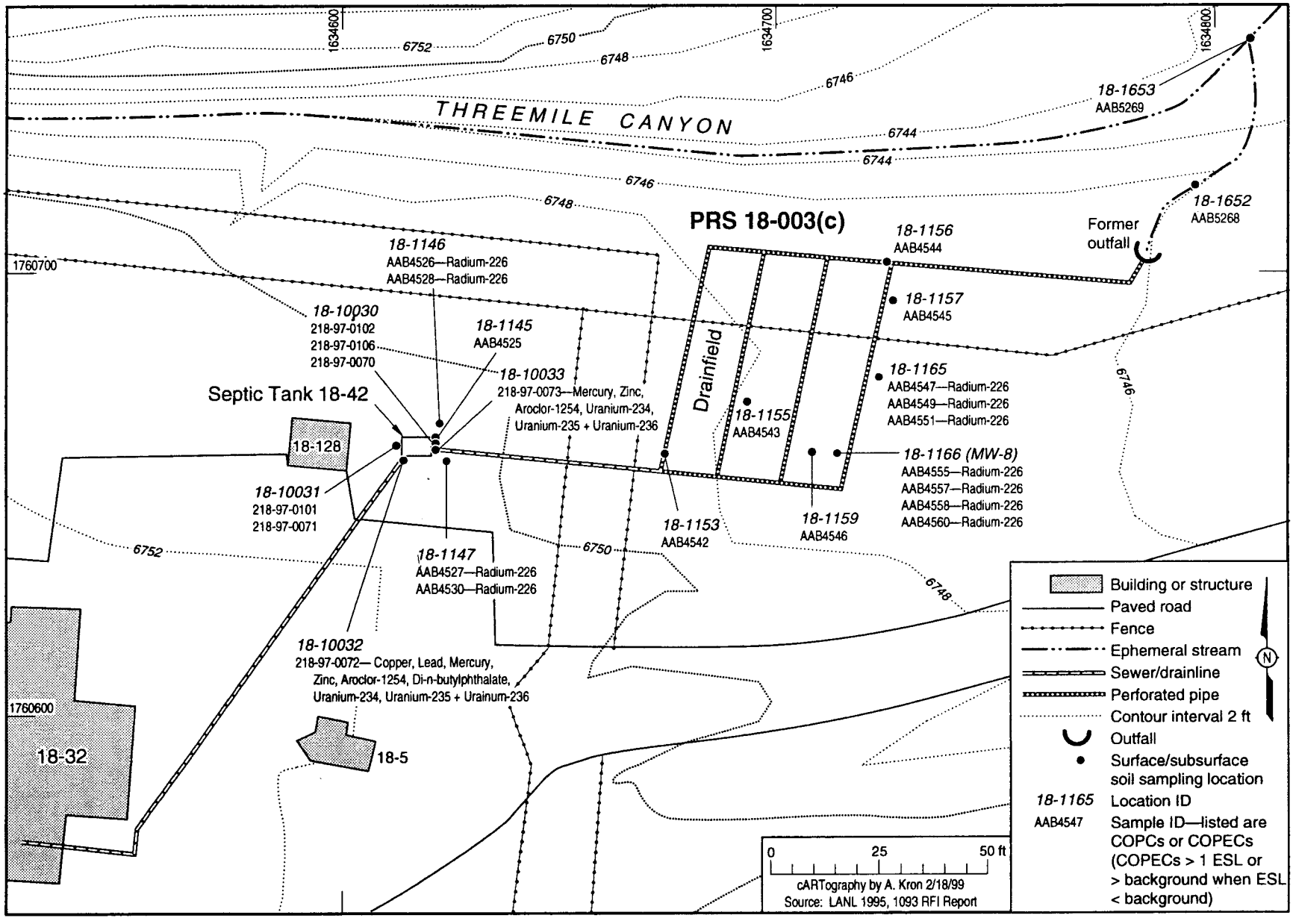

Figure 2-2. Previous surface and subsurface soil sampling locations at PRS 18-003(c).

The tank is approximately 6 ft in diameter x 5 ft high. The drain field consists of four drain lines, each of which is approximately 75 ft long, spaced 10 ft apart. The inlet line leading to the tank measures approximately 130 ft; the outlet line approximately 115 ft. The total length of the drain field lines is approximately 300 ft. Although water service to the restroom has been shut off and the doors locked, the sewer lines from the facility have not been plugged.

2.3.2 Previous Field Investigations

An RFI Phase I field investigation was conducted from 1993 to 1994 at PRS 18-003(c) (LANL 1995, 52183). Media sampled included the tank contents and surface and subsurface soils adjacent to the tank. Drain field samples were collected from surface and subsurface soil samples. Grab alluvial groundwater samples were collected from temporary wells. Previous surface and subsurface sample locations at PRS 18-003(c) are shown in Figure 2-2. A permanent alluvial monitoring well (MW-8) was installed within the drain field for future monitoring purposes. Two soil samples were obtained in soils immediately below the former outfall area.

In 1996, an IA was conducted at this PRS. The contents of the tank were removed and the interior was pressure-washed (LANL 1997, 55120.2). Samples of the tank liquids and sludge were collected for waste disposal characterization.

The tank and adjacent soil were sampled again in 1997 for waste characterization and site assessment purposes. Concrete samples were collected from the tank interior and soil samples were obtained from beneath the inlet and outlet lines. Soil samples also were collected adjacent to the tank at approximately the depth of the tank floor and 2 ft deeper (Figure 2-2).

2.3.3 Results of Investigation at PRS 18-003(c)

Using the methodology described in Section 2.0, existing data was reviewed to identify constituents present at concentrations greater than BVs at PRS 18-003(c). The results of the background comparison are presented in Table 2-3 and Figure 2-2.

TABLE 2-3
ANALYTES DETECTED ABOVE BACKGROUND VALUES IN SURFACE OR SUBSURFACE SOILS, PRS 18-003(c)

Location ID	Sample ID	Analyte	Sample Interval (in.)	Sample Results	Background Values	Reporting Units
Organics						
18-1166	AAB4558	Anthracene	60-120	1.1	NA	mg/kg
18-1166	AAB4558	Benzo(a)pyrene	60-120	1.0	NA	mg/kg
18-1166	AAB4558	Benzo(g,h,i)perylene	60-120	5.4	NA	mg/kg
18-1166	AAB4558	Bis(2-chloroethyl)ether	60-120	1.4	NA	mg/kg
18-1166	AAB4558	Bis(2-ethylhexyl)phthalate	60-120	2.9	NA	mg/kg
18-1166	AAB4558	Chloro-3-methylphenol[4-]	60-120	6.0	NA	mg/kg
18-1166	AAB4558	Chloronaphthalene[2-]	60-120	1.8	NA	mg/kg
18-1166	AAB4558	Chrysene	60-120	4.9	NA	mg/kg
18-1166	AAB4558	Dibenzofuran	60-120	9.3	NA	mg/kg
18-1166	AAB4558	Dichlorobenzene[1,2-]	60-120	0.69	NA	mg/kg
18-1166	AAB4558	Diethylphthalate	60-120	6.2	NA	mg/kg
18-1166	AAB4558	Dinitrotoluene[2,4-]	60-120	6.6	NA	mg/kg

TABLE 2-3 (continued)
ANALYTES DETECTED ABOVE BACKGROUND VALUES IN SURFACE OR SUBSURFACE SOILS, PRS 18-003(c)

Location ID	Sample ID	Analyte	Sample Interval (in.)	Sample Results	Background Values	Reporting Units
Organics (continued)						
18-1166	AAB4558	Dinitrotoluene[2,6-]	60-120	4.1	NA	mg/kg
18-1166	AAB4558	Hexachloroethane	60-120	0.92	NA	mg/kg
18-1166	AAB4558	Methylphenol[4-]	60-120	3.9	NA	mg/kg
18-1166	AAB4558	Naphthalene	60-120	3.6	NA	mg/kg
18-1166	AAB4558	Pentachlorophenol	60-120	6.6	NA	mg/kg
18-1166	AAB4558	Pyrene	60-120	1.2	NA	mg/kg
18-1166	AAB4558	Trichlorobenzene[1,2,4-]	60-120	1.0	NA	mg/kg
18-1166	AAB4558	Trichlorophenol[2,4,6-]	60-120	5.3	NA	mg/kg
18-10030	0218-97-0102	Benzo(b)fluoranthene	113-120	0.055	NA	mg/kg
18-10030	0218-97-0102	Fluoranthene	113-120	0.11	NA	mg/kg
18-10030	0218-97-0102	Phenanthrene	113-120	0.061	NA	mg/kg
18-10030	0218-97-0102	Pyrene	113-120	0.12	NA	mg/kg
18-10030	0218-97-0106	Methylene Chloride	84-101	0.0035	NA	mg/kg
18-10030	0218-97-0106	Naphthalene	84-101	0.047	NA	mg/kg
18-10030	0218-97-0106	Phenanthrene	84-101	0.048	NA	mg/kg
18-10031	0218-97-0101	Bis(2-ethylhexyl)phthalate	120-126	0.046	NA	mg/kg
18-10032	0218-97-0072	Aroclor-1254	34-40	27.0	NA	mg/kg
18-10032	0218-97-0072	Di-n-butylphthalate	34-40	0.52	NA	mg/kg
18-10033	0218-97-0073	Aroclor-1254	29-35	3.9	NA	mg/kg
Inorganics						
18-1159	AAB4546	Zinc	0-4	56.0	48.8	mg/kg
18-1166	AAB4560	Zinc	0-180	61.5	48.8	mg/kg
18-10032	0218-97-0072	Cadmium	34-40	0.5	0.4	mg/kg
18-10032	0218-97-0072	Copper	34-40	16.5	14.7	mg/kg
18-10032	0218-97-0072	Lead	34-40	27.7	22.3	mg/kg
18-10032	0218-97-0072	Mercury	34-40	0.49	0.1	mg/kg
18-10032	0218-97-0072	Zinc	34-40	211.0	48.8	mg/kg
18-10033	0218-97-0073	Cadmium	29-35	0.67	0.4	mg/kg
18-10033	0218-97-0073	Mercury	29-35	0.24	0.1	mg/kg
18-10033	0218-97-0073	Zinc	29-35	73.7	48.8	mg/kg
Radionuclides						
18-1145	AAB4525	Uranium	0-4	2.54	1.82	mg/kg
18-1146	AAB4526	Plutonium-238	0-12	0.03	0.023	pCi/g
18-1146	AAB4526	Radium-226	0-12	2.855	2.59	pCi/g
18-1146	AAB4528	Plutonium-238	0-60	0.06	0.023	pCi/g
18-1153	AAB4542	Uranium	0-4	3.99	1.82	mg/kg
18-1153	AAB4542	Uranium	0-4	2.93	1.82	mg/kg
18-1155	AAB4543	Uranium	0-4	2.85	1.82	mg/kg
18-1156	AAB4544	Americium-241	0-4	0.105	0.013	pCi/g
18-1156	AAB4544	Uranium	0-4	3.62	1.82	mg/kg
18-1157	AAB4545	Americium-241	0-4	0.138	0.013	pCi/g
18-1157	AAB4545	Uranium	0-4	4.67	1.82	mg/kg

TABLE 2-3 (continued)
ANALYTES DETECTED ABOVE BACKGROUND VALUES IN SURFACE OR SUBSURFACE SOILS, PRS 18-003(c)

Location ID	Sample ID	Analyte	Sample Interval (in.)	Sample Results	Background Values	Reporting Units
Radionuclides (continued)						
18-1159	AAB4546	Americium-241	0-4	0.038	0.013	pCi/g
18-1159	AAB4546	Uranium	0-4	3.29	1.82	mg/kg
18-1165	AAB4547	Radium-226	30-60	3.0753	2.59	pCi/g
18-1165	AAB4549	Radium-226	90-120	3.819	2.59	pCi/g
18-1166	AAB4555	Radium-226	0-60	3.585	2.59	pCi/g
18-1166	AAB4557	Radium-226	60-120	2.877	2.59	pCi/g
18-1166	AAB4558	Radium-226	60-120	4.076	2.59	pCi/g
18-1166	AAB4560	Radium-226	0-180	2.983	2.59	pCi/g
18-1166	AAB4560	Uranium-235	0-180	0.171	0.2	pCi/g
18-10032	0218-97-0072	Plutonium-239	34-40	3.0	0.054	pCi/g
18-10032	0218-97-0072	Uranium-234	34-40	43.5	2.59	pCi/g
18-10032	0218-97-0072	Uranium235 + Uranium-236	34-40	1.152	0.2	pCi/g
18-10033	0218-97-0073	Plutonium-239	29-35	0.327	0.054	pCi/g
18-10033	0218-97-0073	Uranium-234	29-35	5.71	2.59	pCi/g
18-10033	0218-97-0073	Uranium235 + Uranium-236	29-35	0.217	0.2	pCi/g

NA = not applicable.

NOTES:
1. For consistency, Facility for Information Management, Analysis, and Display reporting values and units were converted to milligrams per kilogram where applicable.
2. Total thallium, thorium, and uranium values are included under radionuclides.

2.4 PRS 18-003(d)

2.4.1 Site Description

This inactive septic tank served the criticality facility restroom in Kiva III (Building TA-18-116) from 1960 until 1995 (Figure 2-3). This cylindrical concrete tank is approximately 4 ft in diameter x 6 ft high. The tank capacity is approximately 500 gal. The system includes the inlet line, septic tank, distribution box, and drain field. The drain field consists of four drain lines, each approximately 59 ft long, spaced 10 ft apart. The total length of the inlet line leading to the tank is 275 ft; the outlet line is approximately 10 ft long. The total length of the drain field lines is approximately 235 ft. In 1995, all floor drains were plugged and the sinks and toilets were removed.

2.4.2 Previous Field Investigations

An RFI field investigation for PRS 18-003(d) was conducted in 1993 and 1994 (LANL 1995, 52183). Septic tank liquids and sludge were sampled and analyzed, as were subsurface soils adjacent to the distribution box. Samples collected from the drain field included surface and subsurface soils and grab alluvial groundwater samples from temporary wells. Previous sample locations are shown in Figure 2-3.

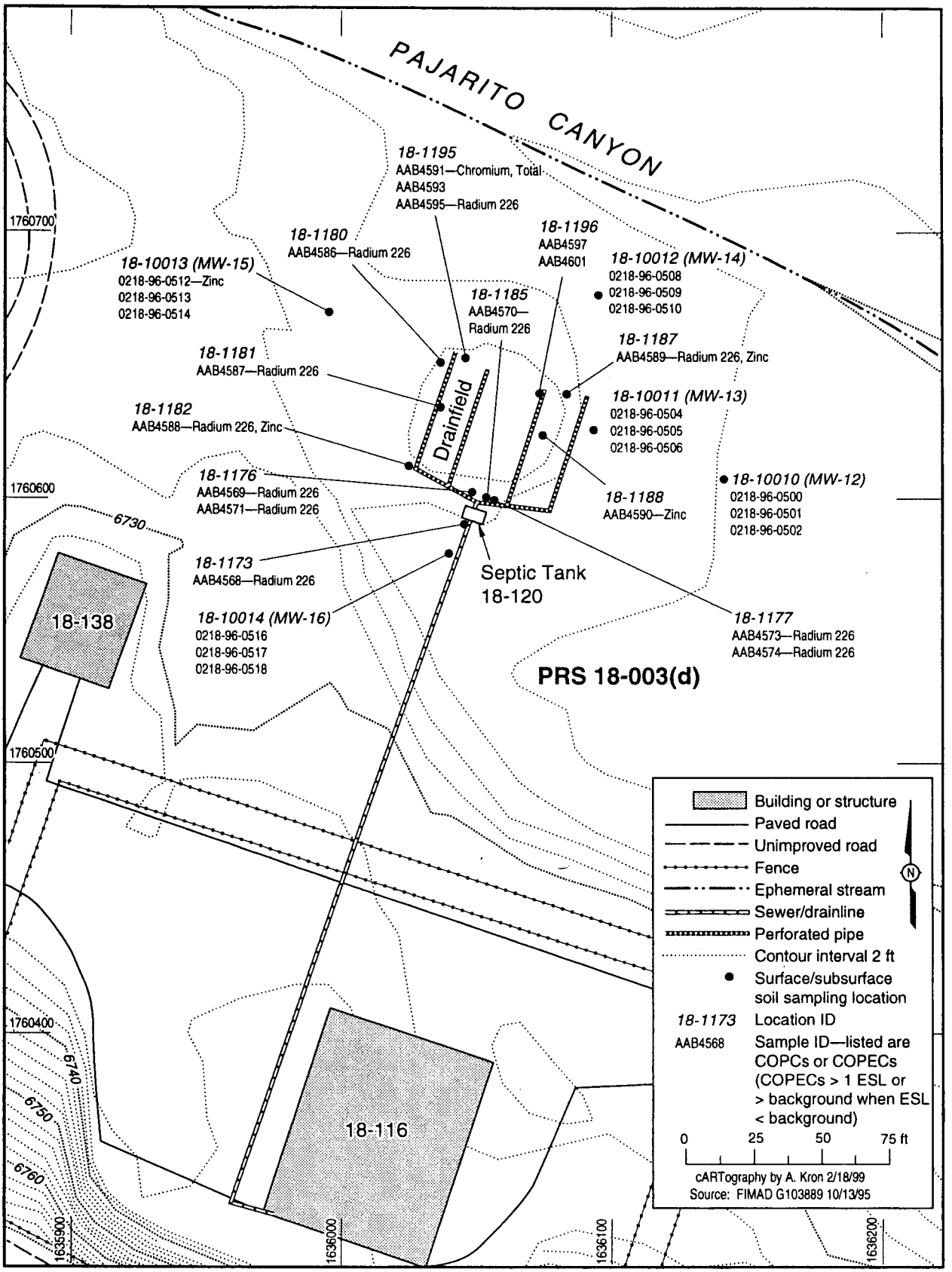

Figure 2-3. Previous surface and subsurface soil sampling locations at PRS 18-003(d).

An IA was conducted at the site during the summer of 1996 to remove the contents of the tank, pressure-wash the tank interior, and sample the tank contents for waste disposal characterization (LANL 1997, 55120.2).

In late 1996, corrective action monitoring was initiated through the New Mexico Environment Department (NMED) Ground Water Bureau. The action was based on an analytical result from an unfiltered groundwater sample collected from an undeveloped alluvial groundwater monitoring well at the PRS 18-003(d) drain field. The analytical result from the sample indicated 1,2-dichloroethane was present at a concentration greater than the New Mexico Water Quality Control Commission (NMWQCC) standard for protection of human health (LANL 1997, 57015). Five permanent alluvial monitoring wells were installed as part of the corrective action in and around the PRS 18-003(d) drain field (Figure 2-3). The wells sampled for radionuclides, volatile organic compounds (VOCs), and metals for eight quarters (winter 1996 to fall 1998). The final quarterly report was issued to NMED in February 1999 (LANL 1999, 62884). Results for all eight quarters did not identify any organic chemicals of potential concern (COPCs) (including 1,2-dichloroethane) above their respective NMWQCC standards (NMWQCC 1995, 54406).

2.4.3 Results of Investigation at PRS 18-003(d)

Using the methodology described in Section 2.0, existing data were reviewed to identify constituents present at concentrations greater than BVs at PRS 18-003(d). The results of the background comparison are presented in Table 2-4 and Figure 2-3.

TABLE 2-4
ANALYTES DETECTED ABOVE BACKGROUND VALUES IN SURFACE OR SUBSURFACE SOILS, PRS 18-003(d)

Location ID	Sample ID	Analyte	Sample Interval (in.)	Sample Results	Background Values	Reporting Units
Organics						
18-1176	AAB4571	Xylene (Total)	0-60	0.012	NA	mg/kg
18-1196	AAB4597	Trichlorofluoromethane	0-60	0.027	NA	mg/kg
18-1196	AAB4601	Trichlorofluoromethane	60-120	0.024	NA	mg/kg
18-10010	0218-96-0502	Acetone	0-480	0.027	NA	mg/kg
18-10014	0218-96-0516	Methylene Chloride	24-48	0.0023	NA	mg/kg
Inorganics						
18-1182	AAB4588	Zinc	0-6	60.8	48.8	mg/kg
18-1187	AAB4589	Zinc	0-6	56.2	48.8	mg/kg
18-1188	AAB4590	Zinc	0-6	54.4	48.8	mg/kg
18-1195	AAB4591	Chromium, Total	0-60	26.3	19.3	mg/kg
18-1195	AAB4595	Chromium, Total	120-180	32.7	19.3	mg/kg
18-1195	AAB4595	Nickel	120-180	16.4	15.4	mg/kg
18-10013	0218-96-0512	Zinc	24-48	54.0	48.8	mg/kg
Radionuclides						
18-1173	AAB4568	Plutonium-239	0-6	0.06	0.054	pCi/g
18-1176	AAB4571	Plutonium-238	0-60	0.03	0.023	pCi/g
18-1177	AAB4573	Radium-226	0-60	3.3931	2.59	pCi/g
18-1180	AAB4586	Plutonium-238	0-6	0.06	0.023	pCi/g
18-1181	AAB4587	Plutonium-238	0-6	0.1	0.023	pCi/g
18-1182	AAB4588	Plutonium-238	0-6	0.09	0.023	pCi/g

TABLE 2-4 (continued)
ANALYTES DETECTED ABOVE BACKGROUND VALUES IN SURFACE OR SUBSURFACE SOILS, PRS 18-003(d)

Location ID	Sample ID	Analyte	Sample Interval (in.)	Sample Results	Background Values	Reporting Units
Radionuclides (continued)						
18-1188	AAB4590	Plutonium-238	0-6	1.0	0.023	pCi/g
18-1188	AAB4590	Plutonium-239	0-6	0.7	0.054	pCi/g
18-10011	0218-96-0505	Thallium	96-118	3.0	0.73	mg/kg
18-10014	0218-96-0517	Thallium	72-96	0.84	0.73	mg/kg

NA = not applicable.

NOTES:
1. For, Facility for Information Management, Analysis, and Display reporting values and units were converted to milligrams per kilogram where applicable.
2. Total thallium, thorium, and uranium values are included under radionuclides.

2.5 PRS 18-003(e)

2.5.1 Site Description

PRS 18-003(e) consists of an inactive cylindrical tank, two inlet lines, a drain field, and a former outfall (Figure 2-4). The tank is approximately 6 ft high and 6 ft in diameter, with a capacity of 500 gal. The system served several buildings in the main administrative area from 1951 until 1969. The septic lines exiting these buildings have been rerouted to connect to the Laboratory Sanitary Wastewater System Consolidation (SWSC). The drain field is believed to be adjacent to the tank and consists of four drain lines, each of which is approximately 40 ft long and 10 ft apart. The drain lines merge into the distal line that continues an estimated 100 ft, terminating at the former septic outfall.

2.5.2 Previous Field Investigations

In 1994, RFI sampling was conducted at PRS 18-003(e). Samples were collected from the tank interior and drain field and the former outfall area. Previous sample locations are shown in Figure 2-4. Temporary and permanent groundwater monitoring wells also were installed and sampled (LANL 1995, 52976.14). Results from the RFI report indicated slightly elevated levels of VOCs in the sand fill inside the inactive tank.

In 1995, an EC was conducted to remove the sand fill and pressure-wash the tank interior. The septic tank is located in an area where excavating the structure would be difficult and dangerous to workers. Therefore the tank was filled in-place with grout to prevent potential surface water infiltration (LANL 1996, 54488.1).

2.5.3 Results of Investigation at PRS 18-003(e)

Using the methodology described in Section 2.0, existing data were reviewed to identify constituents present at concentrations greater than BVs at PRS 18-003(e). The results of the background comparison are presented in Table 2-5 and Figure 2-4.

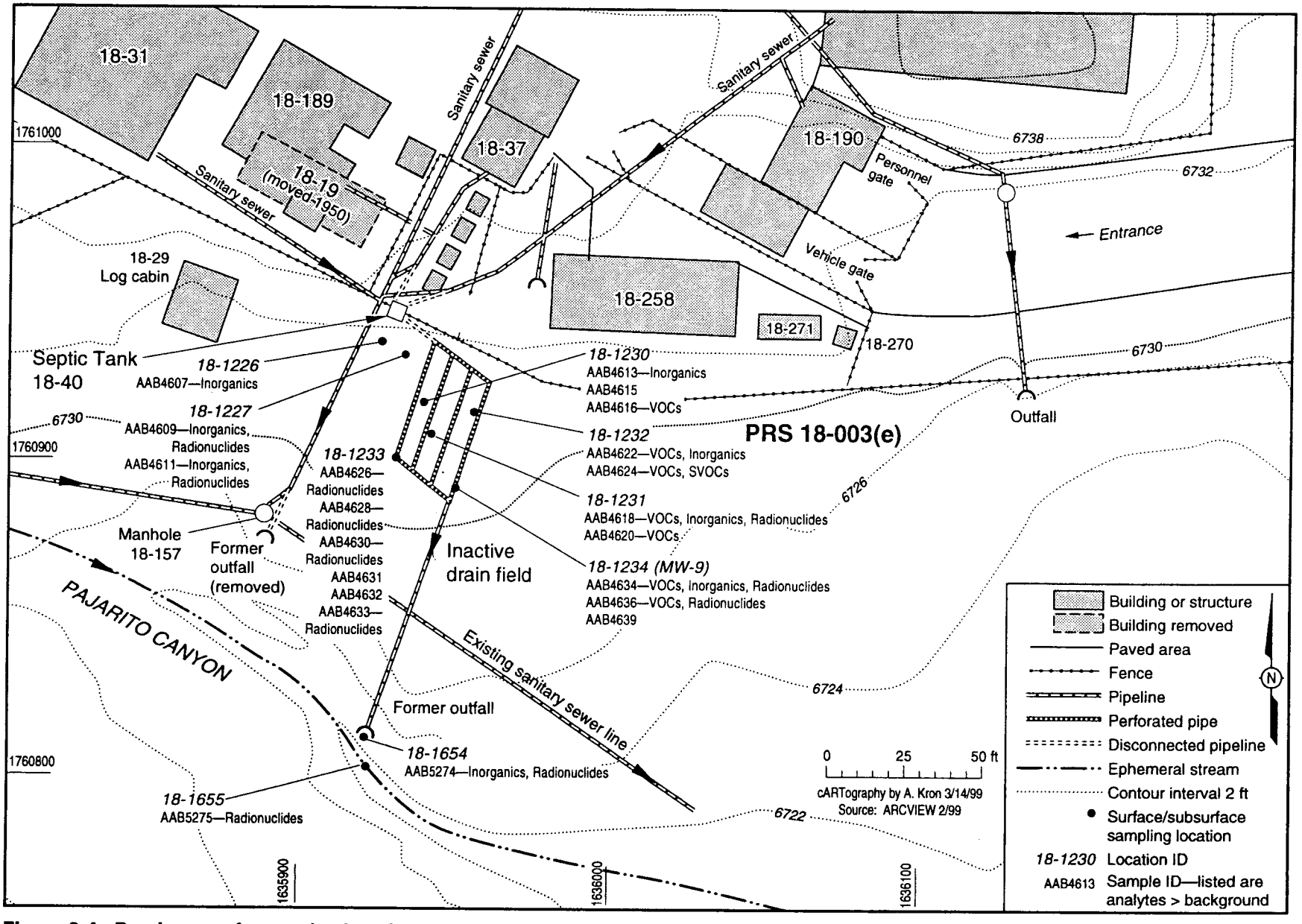

Figure 2-4. Previous surface and subsurface soil sampling locations at PRS 18-003(e).

TABLE 2-5
ANALYTES DETECTED ABOVE BACKGROUND VALUES IN SURFACE OR SUBSURFACE SOILS, PRS 18-003(e)

Location ID	Sample ID	Analyte	Sample Interval (in.)	Sample Results	Background Values	Reporting Units
Organics						
18-1230	AAB4616	Acetone	60-120	0.038	NA	mg/kg
18-1231	AAB4618	Trichloroethene	6-60	0.02	NA	mg/kg
18-1231	AAB4620	Acetone	60-120	0.026	NA	mg/kg
18-1232	AAB4622	Acetone	6-60	0.031	NA	mg/kg
18-1232	AAB4624	Acetone	60-120	0.029	NA	mg/kg
18-1232	AAB4624	Diethylphthalate	60-120	6.3	NA	mg/kg
18-1234	AAB4634	Acetone	6-60	0.031	NA	mg/kg
18-1234	AAB4636	Acetone	60-120	0.041	NA	mg/kg
Inorganics						
18-1226	AAB4607	Lead	6-60	23.8	22.3	mg/kg
18-1226	AAB4607	Zinc	6-60	76.9	48.8	mg/kg
18-1227	AAB4609	Zinc	60-120	51.8	48.8	mg/kg
18-1227	AAB4611	Zinc	6-60	65.9	48.8	mg/kg
18-1230	AAB4613	Lead	6-60	26.7	22.3	mg/kg
18-1231	AAB4618	Lead	6-60	56.2	22.3	mg/kg
18-1231	AAB4618	Copper	6-60	16.7	14.7	mg/kg
18-1232	AAB4622	Lead	6-60	50.3	22.3	mg/kg
18-1232	AAB4622	Copper	6-60	104.0	14.7	mg/kg
18-1234	AAB4634	Lead	6-60	25.5	22.3	mg/kg
18-1234	AAB4634	Copper	6-60	19.1	14.7	mg/kg
18-1654	AAB5274	Lead	0-6	28.6	22.3	mg/kg
18-1654	AAB5274	Zinc	0-6	58.9	48.8	mg/kg
Radionuclides						
18-1227	AAB4609	Plutonium-238	60-120	0.06	0.023	pCi/g
18-1227	AAB4611	Americium-241	0-6	0.103	0.013	pCi/g
18-1231	AAB4618	Uranium	0-6	2.09	1.82	mg/kg
18-1233	AAB4626	Americium-241	0-6	0.041	0.013	pCi/g
18-1233	AAB4626	Uranium	0-6	2.69	1.82	mg/kg
18-1233	AAB4626	Uranium	0-6	2.33	1.82	mg/kg
18-1233	AAB4628	Americium-241	60-120	0.051	0.013	pCi/g
18-1233	AAB4628	Plutonium-238	60-120	0.03	0.023	pCi/g
18-1233	AAB4630	Americium-241	120-180	0.067	0.013	pCi/g
18-1234	AAB4634	Uranium	0-6	2.43	1.82	mg/kg
18-1234	AAB4636	Uranium	60-120	2.15	1.82	mg/kg
18-1654	AAB5274	Uranium	0-6	4.68	1.82	mg/kg
18-1655	AAB5275	Uranium	0-6	4.0	1.82	mg/kg

NA = not applicable.

NOTES:
1. For consistency, Facility for Information Management, Analysis, and Display reporting values and units were converted to milligrams per kilogram where applicable.
2. Total thallium, thorium, and uranium values are included under radionuclides.

2.6 PRS 18-003(f)

2.6.1 Site Description

PRS 18-003(f) is an inactive septic system and associated drain field that serviced Building TA-18-30 from 1951 to 1969. Located west of Building TA-18-30 (Figure 2-5), the 1000-gal., reinforced concrete tank received sanitary waste from Building TA-18-30 and subsequently drained to a leachfield west of the tank. According to available engineering drawings, the leachfield discharged to a former outfall. The tank was deactivated in 1969 and filled with sand.

2.6.2 Previous Field Investigations

PRS 18-003(f) was sampled in August 1994 as part of an RFI Phase I investigation. Sample locations are shown in Figure 2-5. Sampling included the tank contents (dry sludge and sand), soils around the inlet and outlet lines, and subsurface locations inside and downgradient from the drain field. The drain field samples consisted of subsurface soils and alluvial groundwater.

2.6.3 Results of Investigation at PRS 18-003(f)

Using the methodology described in Section 2.0, existing data were reviewed to identify constituents present at concentrations greater than BVs at PRS 18-003(f). The results of the background comparison are presented in Table 2-6 and Figure 2-5.

2.7 PRS 18-003(g)

2.7.1 Site Description

Septic system PRS 18-003(g) is an active septic system that has served Building TA-18-1 in the main facility since 1944 (Figure 2-6). Previously, Building TA-18-1 included a photochemical laboratory that was demolished in 1968. Currently the building is used as an electronic assembly and storage area.

Although the tank presently is not used as a traditional septic tank, the lines are still active, allowing sanitary waste to pass through and accumulate in the tank before exiting through the outlet lines leading to the Laboratory SWSC. The reinforced concrete tank has an estimated capacity of 500 gal. and is approximately 3 ft wide x 5 ft long x 5 ft high. Initially, the septic tank drained to an outfall (presumed to be a gravel-filled trench) in Pajarito Canyon. In 1969, wastes were rerouted to the TA-18 sewage lagoons. Since 1992, wastes have been pumped to the Laboratory SWSC. The total length of the inlet line is approximately 75 ft. The current outlet line is approximately 300 ft long and ties into the SWSC drain line.

2.7.2 Previous Field Investigations

An RFI field investigation was conducted at PRS 18-003(g) in 1993 and 1994 (LANL 1995, 52183). Samples were collected and analyzed from the septic tank liquids and sludge and from subsurface soil downgradient of the tank and adjacent to the discharge line. Previous sample locations are shown in Figure 2-6. A permanent alluvial groundwater monitoring well (MW-11) was installed approximately 10 ft southeast of the septic tank for future monitoring purposes.

In 1996, an IA was conducted to remove the contents of the tank, pressure-wash the tank interior, and sample the tank contents for waste disposal characterization.

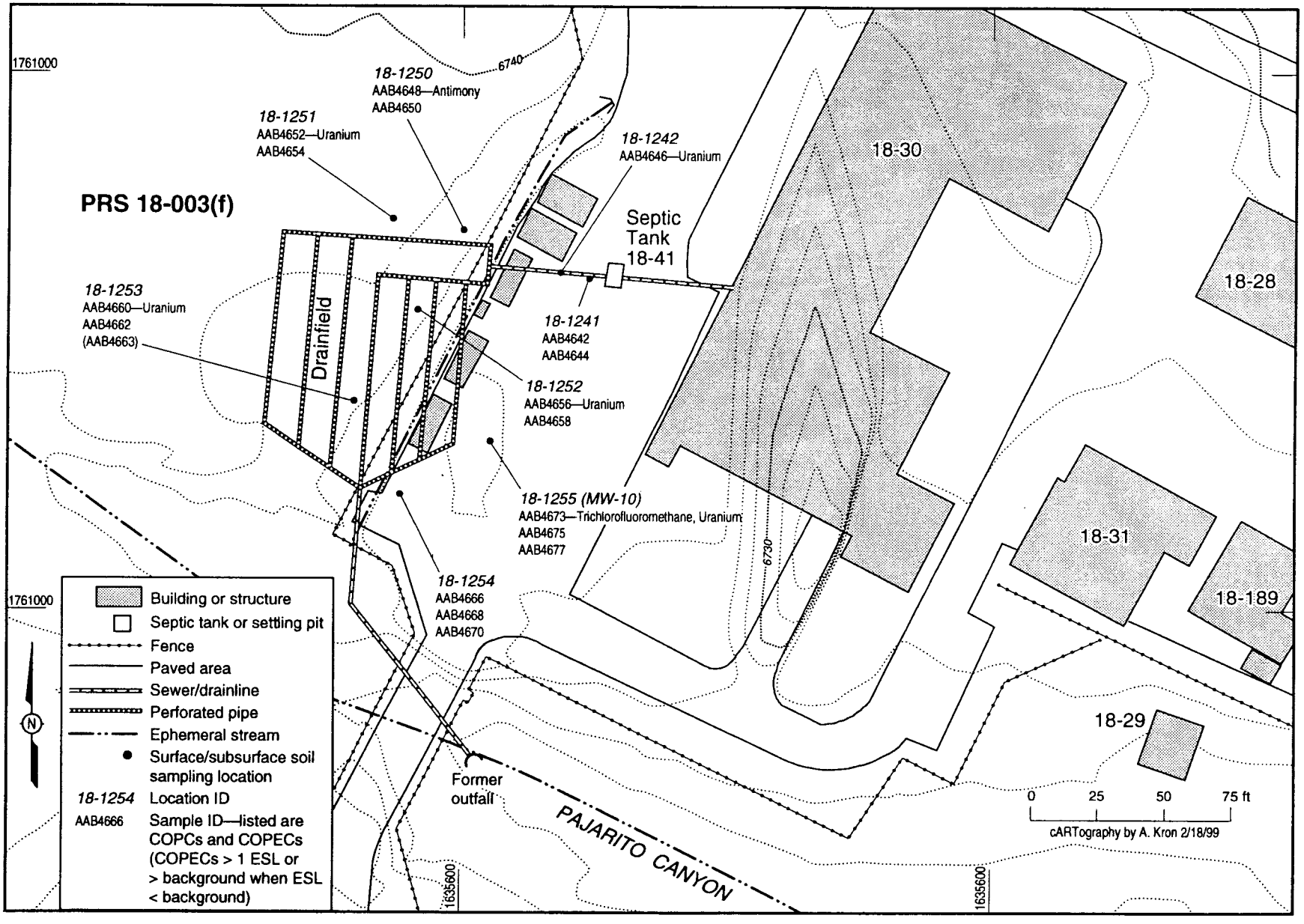

Figure 2-5. Previous surface and subsurface soil sampling locations at PRS 18-003(f).

TABLE 2-6
ANALYTES DETECTED ABOVE BACKGROUND VALUES IN SURFACE OR SUBSURFACE SOILS, PRS 18-003(f)

Location ID	Sample ID	Analyte	Sample Interval (in.)	Sample Results	Background Values	Reporting Units
Organics						
18-1254	AAB4666	Trichlorofluoromethane	30-60	0.014	NA	mg/kg
18-1254	AAB4668	Trichlorofluoromethane	90-108	0.016	NA	mg/kg
18-1255	AAB4673	Trichlorofluoromethane	12-30	0.014	NA	mg/kg
Inorganics						
18-1250	AAB4648	Antimony	42-60	11.9	0.83	mg/kg
18-1255	AAB4677	Chromium, Total	120-180	31.8	19.3	mg/kg
Radionuclides						
18-1242	AAB4646	Uranium	30-48	2.01	1.82	mg/kg
18-1251	AAB4652	Uranium	0-60	2.19	1.82	mg/kg
18-1252	AAB4656	Uranium	30-42	2.35	1.82	mg/kg
18-1252	AAB4658	Uranium	102-120	2.1	1.82	mg/kg
18-1253	AAB4660	Uranium	42-60	2.0	1.82	mg/kg
18-1253	AAB4662	Uranium	96-120	2.05	1.82	mg/kg
18-1253	AAB4663	Uranium	96-120	2.52	1.82	mg/kg
18-1254	AAB4668	Uranium	90-108	124.0	1.82	mg/kg
18-1255	AAB4673	Uranium	12-30	6.88	1.82	mg/kg

NA = not applicable.

NOTES:
1. For consistency, Facility for Information Management, Analysis, and Display reporting values and units were converted to milligrams per kilogram where applicable.
2. Total thallium, thorium, and uranium values are included under radionuclides.

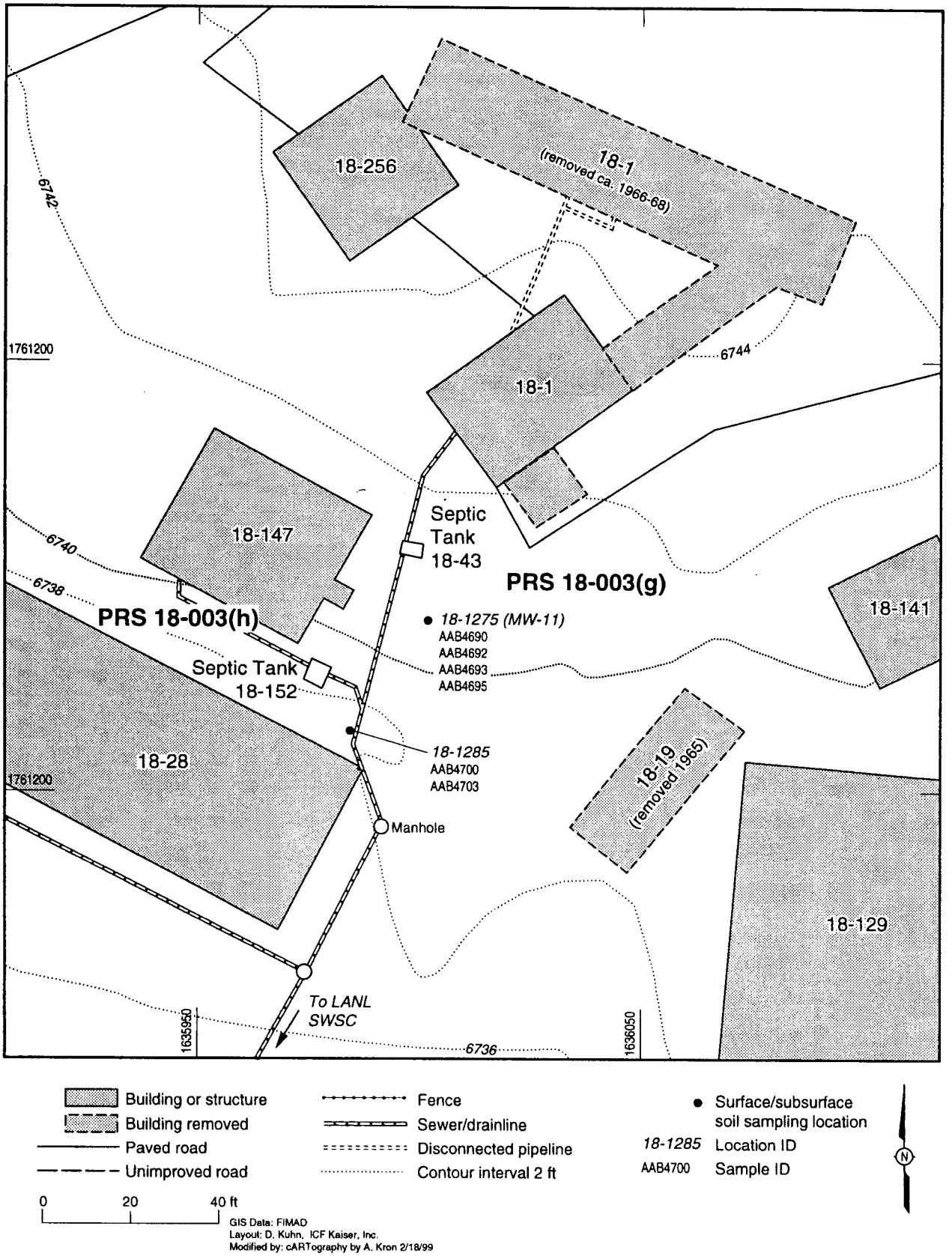

Figure 2-6. Previous surface and subsurface soil sampling locations at PRSs 18-003(g and h).

2.7.3 Results of Investigation at PRS 18-003(g)

Using the methodology described in Section 2.0, existing data were reviewed at PRS 18-003(g). The results of the background comparison are presented in Table 2-7 and Figure 2-6.

TABLE 2-7
ANALYTES DETECTED ABOVE BACKGROUND VALUES IN SURFACE OR SUBSURFACE SOILS, PRS 18-003(g)

Location ID	Sample ID	Analyte	Sample Interval (in.)	Sample Results	Background Value	Reporting Units
Organics						
18-1275	AAB4693	Trichloro-1,2,2-trifluoroethane[1,1,2-]	84-120	13.0	NA	mg/kg
Inorganics						
18-1275	AAB4690	Zinc	42-60	50.8	48.8	mg/kg
18-1275	AAB4692	Zinc	84-120	51.5	48.8	mg/kg
18-1275	AAB4695	Chromium, Total	120-180	34.3	19.3	mg/kg
Radionuclides						
18-1275	AAB4690	Uranium	42-60	2.73	1.82	mg/kg
18-1275	AAB4690	Uranium	42-60	2.81	1.82	mg/kg
18-1275	AAB4692	Uranium	84-120	2.01	1.82	mg/kg
18-1275	AAB4693	Uranium	84-120	2.4	1.82	mg/kg
18-1275	AAB4695	Uranium	120-180	1.9	1.82	mg/kg

NA = not applicable.

NOTES:
1. For consistency, Facility for Information Management, Analysis, and Display reporting values and units were converted to milligrams per kilogram where applicable.
2. Total thallium, thorium, and uranium values are included under radionuclides.

2.8 PRS 18-003(h)

2.8.1 Site Description

PRS 18-003(h) is an active septic tank serving Building TA-18-147 (Figure 2-6). The 500-gal. steel tank, put in service in 1967, currently is active and is connected to the Laboratory SWSC. Therefore, the tank function is that of a settling pit similar to that at PRS 18-003(g). The tank outlet line connects with the outlet line of 18-003(g) and discharges to the Laboratory SWSC.

2.8.2 Previous Field Investigations

The contents of the tank were sampled as part of RFI activities conducted in 1993. Two samples of liquid were collected from within the tank (no sludge was present). Sample locations are shown in Figure 2-6.

In August 1994, subsurface soil samples were collected from a borehole located in a shallow storm water ditch approximately 10 ft downgradient (southeast) of the tank. Groundwater samples could not be collected because the auger inadvertently penetrated the active sanitary sewer line from Building TA-18-152. Another borehole could not be drilled due to lack of rig access.

2.8.3 Results of Investigation at PRS 18-003(h)

Using the methodology described in Section 2.0, existing data were reviewed to identify constituents present at concentrations greater than BVs at PRS 18-003(h). The results of the background comparison are presented in Table 2-8 and Figure 2-6.

TABLE 2-8
ANALYTES DETECTED ABOVE BACKGROUND VALUES IN SURFACE OR SUBSURFACE SOILS, PRS 18-003(h)

Location ID	Sample ID	Analye	Sample Interval (In.)	Sample Result	Background Value	Reporting Units
18-1285	AAB4703	Uranium	96-120	2.2	1.82	mg/kg

NOTES:
1. For consistency, Facility for Information Management, Analysis, and Display reporting values and units were converted to milligrams per kilogram where applicable.
2. Total thallium, thorium, and uranium values are included under radionuclides.

2.9 Basis for Cleanup Levels

The basis for cleanup levels will be determined by the results of the human health risk screens, human health risk assessments, ecological risk assessments (ERAs), and/or in some cases by statute or regulatory mandate. The basis for the VCM cleanup effort of the tanks and distribution boxes is driven by ER Project BMPs to remove (if appropriate and necessary) septic tank systems that are situated within canyon-bottom alluvium. Because these structures have been cleaned, they pose minimal potential risk to human health and the environment. These structures are within heavily secured areas on US Department of Energy (DOE) property and are isolated from public access roads. Their anticipated future land use is Laboratory operations exclusively (i.e., industrial land use only).

Cleanup levels for each PRS that are protective of human health will be based on an industrial land-use scenario. The COPCs will be identified in the screening assessment for human health and cleanup levels will be developed for each COPC. Cleanup levels protective of ecological receptors and the ecosystems they represent will be derived using information from the ecological scoping process, which identifies chemicals of potential ecological concern (COPECs) and potential complete exposure pathways, and an ERA, if warranted. The scoping process and the screening ERA will be prepared in accordance with ecological risk assessment guidance developed specifically for the Laboratory (Kelly et al. 1998, 57916).

Although the tanks are structurally intact and do not appear to present a health threat, removal of these structures is preferred to prevent the release of COPCs that may remain in the structures.

3.0 PROPOSED REMEDIAL ACTIONS

The proposed remedy for each inactive septic tank system is dependent upon the findings of the previous site investigation activities discussed in Section 2.0 and current ER Project BMPs. In general, a phased approach will be conducted using the following procedures:

- The drain fields will be characterized for nature and extent of contamination in soil. Data will be used to assess human health and ecological risk. Risk results will be used to identify areas for remediation, as necessary.
- The inlet and outlet piping associated with inactive systems initially will be characterized by conducting video inspections of the drain line interior. Any pipe contents will be sampled as well. Visual data will help determine if breaches are present and help identify locations that can be sampled from the ground surface for nature and extent. Whether or not video inspection is successful, samples will be collected from soils adjacent to and beneath the pipe at key locations along the drain line and from the pipe interior at a local cross trench. Analytical data from the pipe interior also will be used to support remediation decisions.
- Soils surrounding the septic tank structures and distribution boxes (if present) will be sampled for nature and extent of contamination. The structures then will be removed and confirmation samples will be collected beneath the structures.
- Other components of the septic system or surrounding soils will be excavated.

The following sections present the remedial strategy for each PRS based on ER Project BMPs and the phased approach described previously.

3.1 Nature and Extent of Contamination

A step-wise approach will be followed to assess the nature and extent of the residual contamination resulting from past septic tank operations. The approach is intended to resolve issues related to the remaining tank structures and drain lines. To achieve these objectives the Laboratory will employ the following cost-effective activities, which are consistent with NMED guidelines. The Laboratory will

- combine previous site-specific environmental information with direct, nonintrusive sampling and analytical strategies to effectively conduct the tank structure removal effort;
- design the tank-structure removal effort to provide an acceptable level of protection to human health and the environment during and after completion;
- implement the tank-structure removal effort to achieve the greatest improvement and/or least adverse impact to the environment over the shortest possible time period;
- reassign the active septic tank structures PRS 18-003(g and h) to the facility;
- perform nonintrusive video inspection activities on remaining inlet and outlet drain lines; assess integrity of piping material; grout inlet and outlet drain lines with permanent seal, and cap;
- collect soil samples adjacent to and below suspect breaches in inlet and outlet drain lines;
- remove drain lines (if necessary or feasible) based on environmental risk, drain line accessibility, security, and cost; and
- adhere to cost/benefit decisions in conducting all activities, to maximize the environmental benefit-reasonable cost ratio.

Sections 3.1.1 and 3.1.2 discuss a stepped approach to determining the nature and extent of contamination in the drain lines and drain fields.

3.1.1 Drain Lines

The objective of the drain line investigation is to further characterize the nature and extent of potential soil contamination resulting from operations of these lines. To accomplish this objective, a better definition of the drain line integrity and characteristics is required. Inlet and outlet lines will be inspected using an innovative, nonintrusive in-line video camera to view the length of the line, and locate sludge accumulation areas or breaches in pipe integrity. The camera will be equipped with a transmitter to pinpoint and reference land coordinates, sludge, and/or line breaks. Inlet and outlet lines will be investigated following the steps below.

Inlet Lines

Step 1 – Dig access pit to reach inlet line from tank-inlet junction. If unable to access drain lines, feed video camera from building inlet drain toward tank.

Step 2 – If inlet and outlet drain lines cannot be inspected with a video camera, proceed with supplemental sampling plan discussed in Section 3.1.3.

Step 3 – Conduct video-camera inspection of inlet pipe from tank inlet to first obstruction; inspect pipe integrity; identify breaches (if any), and locate residual sludge (if present).

Step 4 – Plot coordinates of breaches and/or accumulations of residual sludge (if present) to determine soil sampling locations both immediately below pipe and above water table (deeper samples). Base locations on alluvial water levels in the area (as necessary).

Step 5 – Collect soil samples immediately below breached pipe sections and immediately above water table; conduct full suite analyses. Determine exact number and location of soil samples, based on number and severity of breaches.

Step 6 – If no breach is encountered, collect residual sample of sludge (if present) from inside pipe and analyze.

Step 7 – If no sludge residue is encountered and no breached sections are identified in inlet pipe, perform supplemental sampling as discussed in Section 3.1.3.

Step 8 – Plug and cap inlet line; backfill inlet pipe access pit and soil sampling locations.

Step 9 – Assess analytical sampling results from a risk perspective to determine if additional samples are required.

Outlet Lines

The investigative approach for the outlet lines will be similar to the investigative approach for the inlet lines. Once the outlet line is exposed through digging, the investigation will consist of a video-camera inspection to assist in defining a sampling strategy for drain lines and adjacent soils. If outlet lines cannot be video-accessed, samples will be collected in accordance with the supplemental sampling plan discussed in Section 3.1.3.

Step 1 - Conduct video-camera inspection of outlet pipe from tank outlet to first perforated section or obstruction; the first obstruction could be a distribution box at PRS 18-003(d). Inspect pipe integrity, identify breaches (if present), and identify areas of sludge residue (if present).

Step 2 – Plot coordinates of breaches and/or sludge accumulation areas to determine intrusive sampling locations (if required).

Step 3 – Collect soil samples immediately below breached pipe sections (if present) and deeper soil samples immediately above water table; analyze for full suite analyses. Determine exact number and locations of soil samples, based on pipe integrity and number and severity of breaches.

Step 4 – If no breaches are encountered, collect sample of sludge residue (if present) from inside of pipe and analyze.

Step 5 – If no sludge residue is encountered and no breaches are identified, perform Step 6.

Step 6 – Plug and cap outlet line; backfill outlet pipe access pit and soil sample locations.

Step 7 - Assess analytical results from a risk perspective to determine if additional samples are required.

The above step-wise sampling strategy to define nature and extent pertains only to PRSs 18-003(a, b, c, d, e, and f). The septic lines at PRS 18-003(g and h) currently are active and cannot be accessed.

3.1.2 Drain Fields

Drain fields are present at five of the septic systems. The dimensions and layout of the drain fields are discussed in Sections 2.0. through 2.8.3. Supplemental drain field subsurface soil samples will be collected from locations shown in Figures 3-1 through 3-6. The sampling areas were selected based on previous RFI analytical data, data gaps, location, and accessibility. Two samples per sampling location will be collected. A shallow sample will be collected immediately below the perforated pipe (approximately 4 ft below grade) in bedding soils. A deeper sample will be collected immediately above the water table (based on alluvial water level data) at each sample location. This sampling configuration will help determine the horizontal as well as the vertical extent of contamination in the drain field. Analyses of drain field soil samples will include, but will not be limited to, all constituents detected at concentrations greater than Laboratory-specific BVs.

Additional shallow and deep soil samples will be collected around the drain field perimeter and former outfalls (if present) to better understand local characteristics and nature and extent conditions. Perimeter sampling locations are shown in Figures 3-1 through 3-6. Drain field, perimeter, and former-outfall samples will be collected using a small backhoe or hand-held augering equipment. Shallow perimeter samples will be collected at approximately the same depth as the drain field samples (approximately 4 ft below grade); a deeper sample, based on alluvial water level data, will be collected immediately above the water table. The perimeter sample results will establish the limits of contamination (if present) associated with the drain field. Analyses of perimeter soil samples will include, but will not be limited to, all constituents detected at concentrations greater than Laboratory-specific BVs.

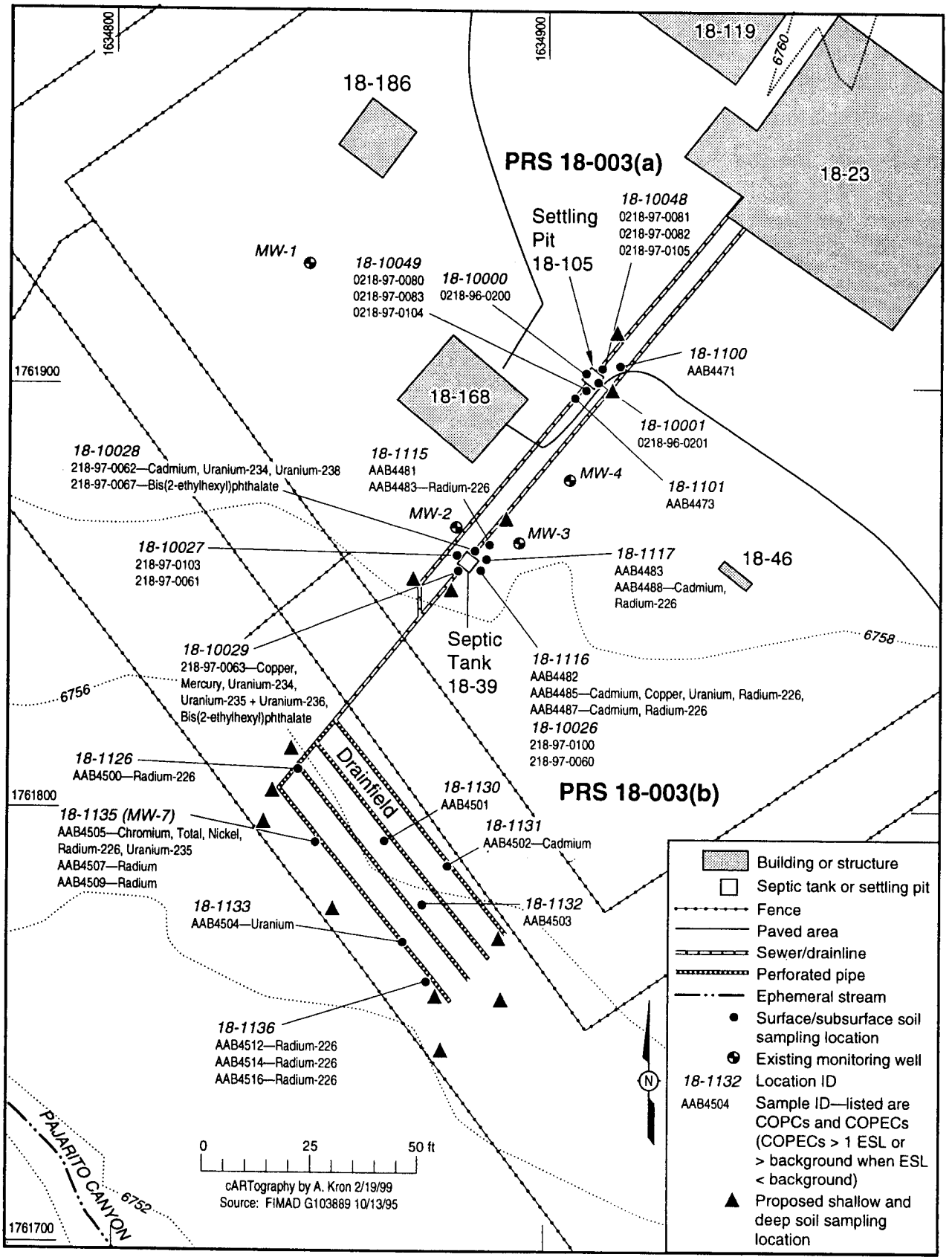

Figure 3-1. Proposed surface and subsurface soil sampling locations at PRSs 18-003(a and b).

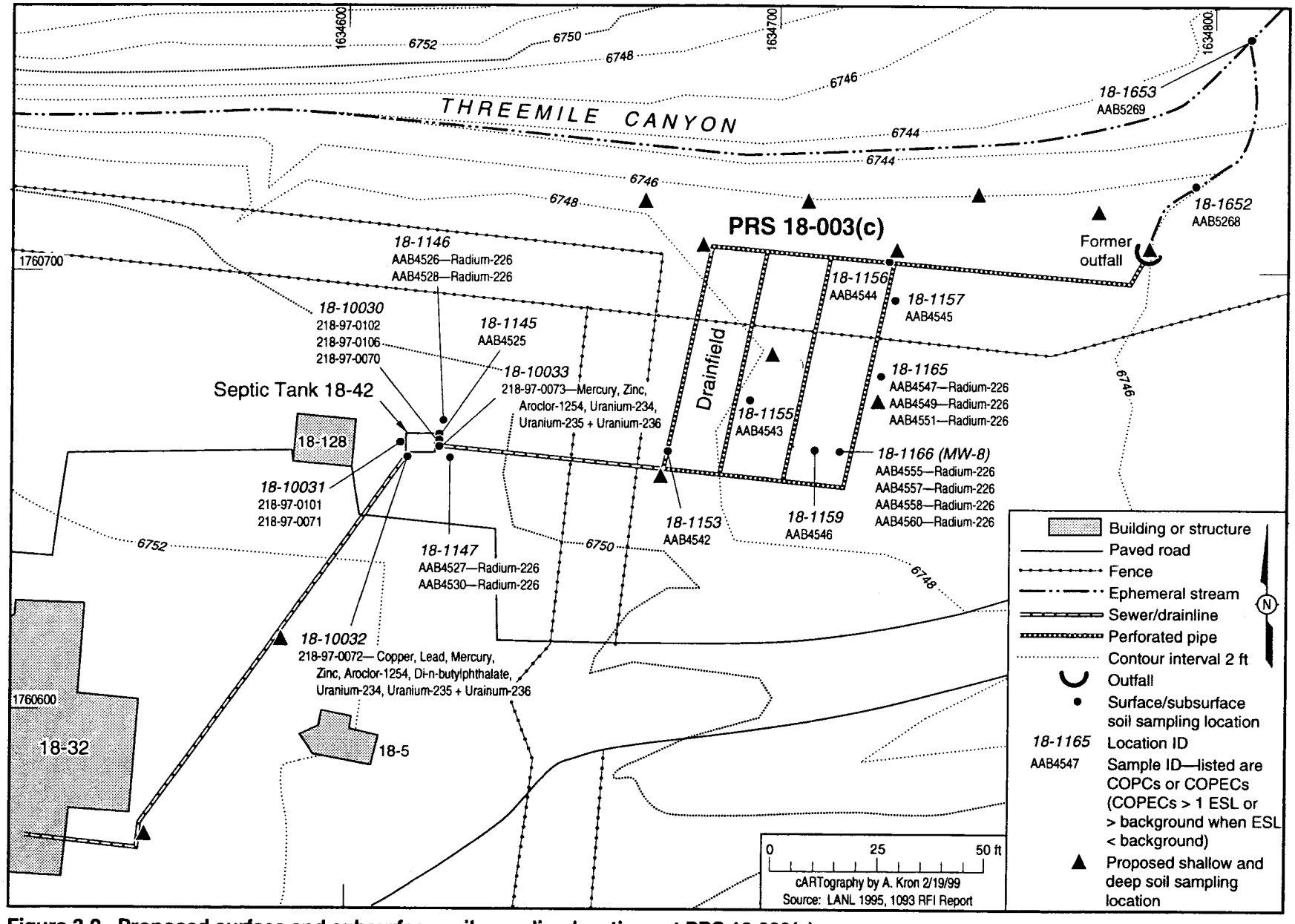

Figure 3-2. Proposed surface and subsurface soil sampling locations at PRS 18-003(c).

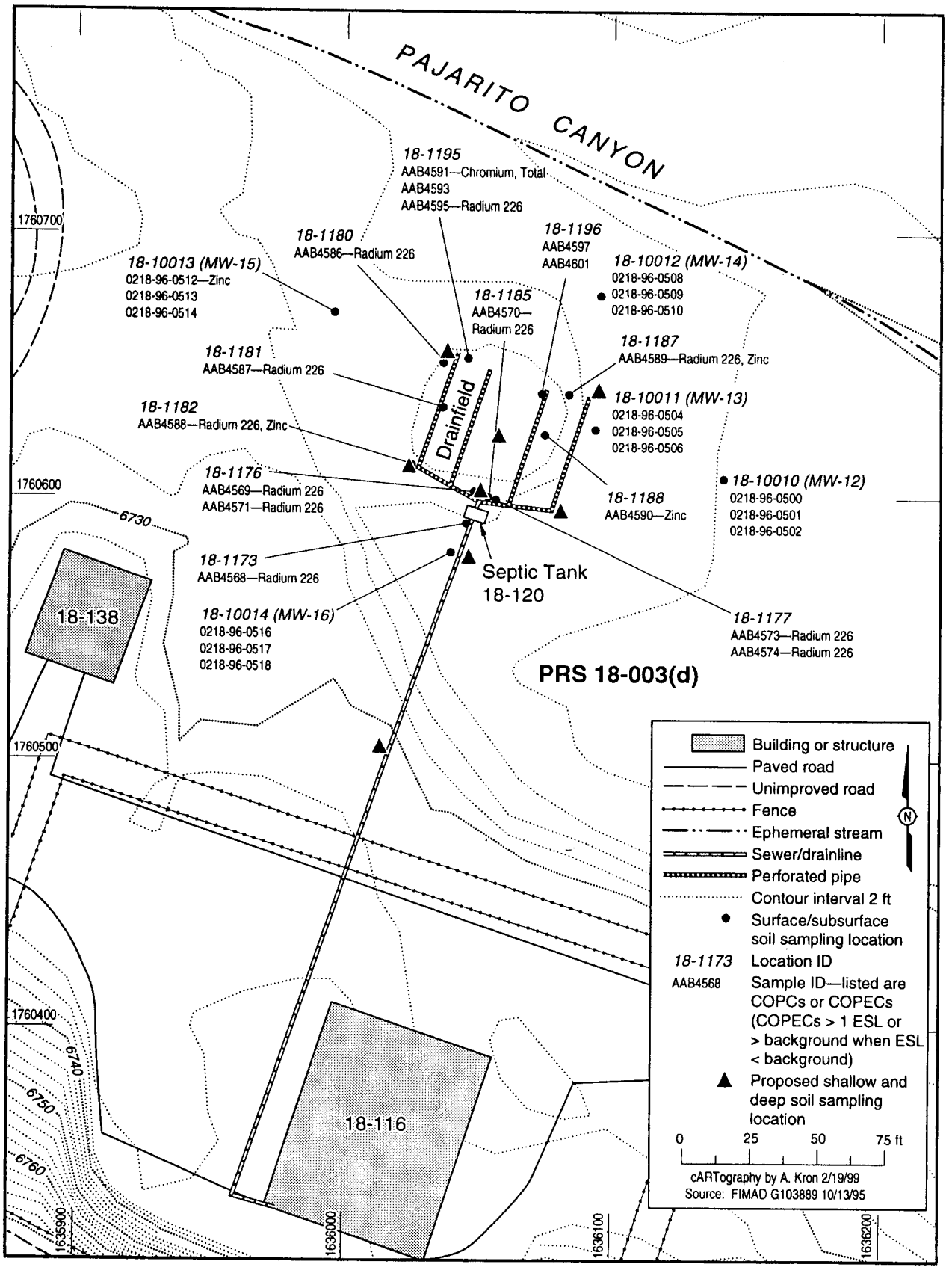

Figure 3-3. Proposed surface and subsurface soil sampling locations at PRS 18-003(d).

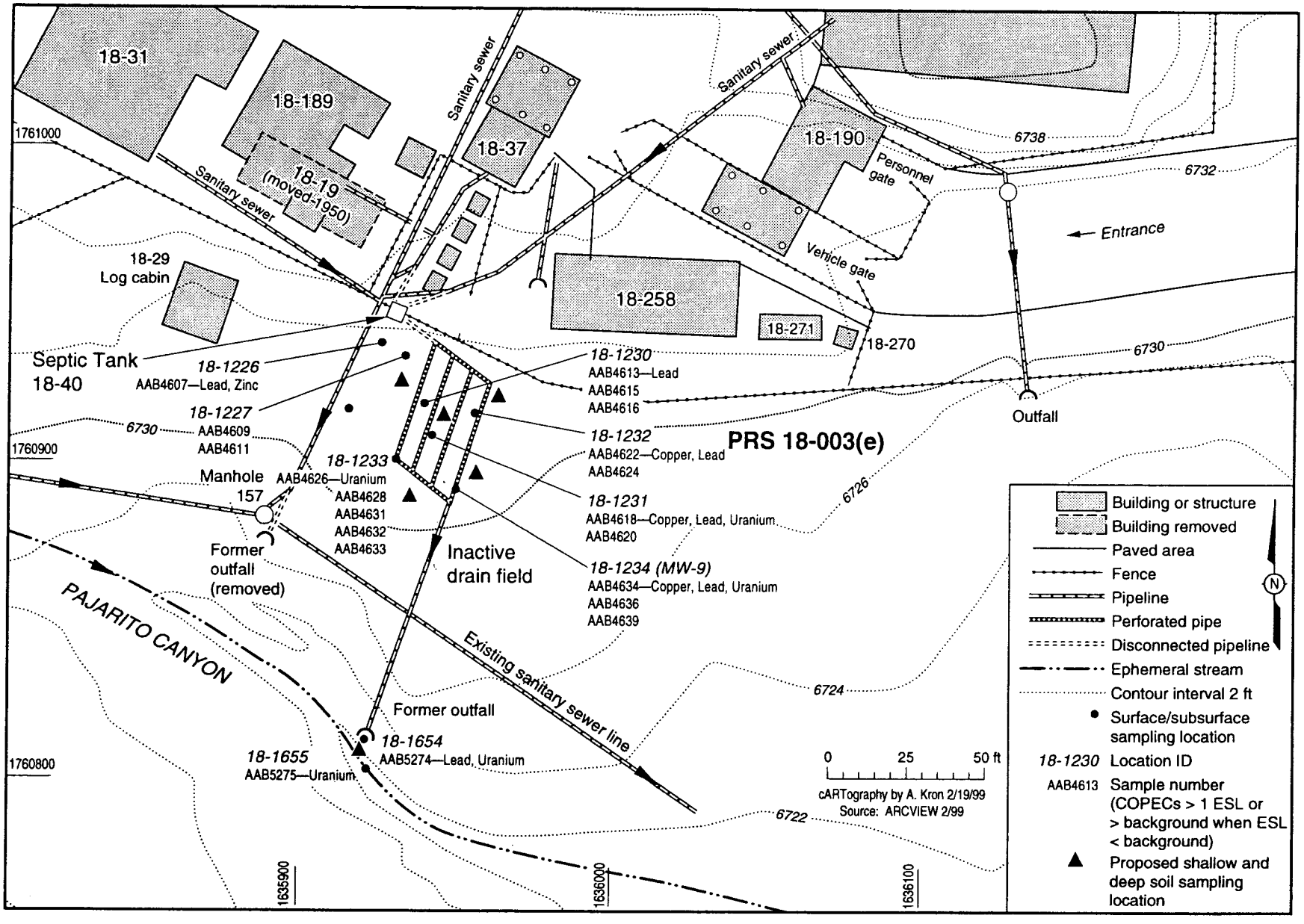

Figure 3-4. Proposed surface and subsurface soil sampling locations at PRS 18-003(e).

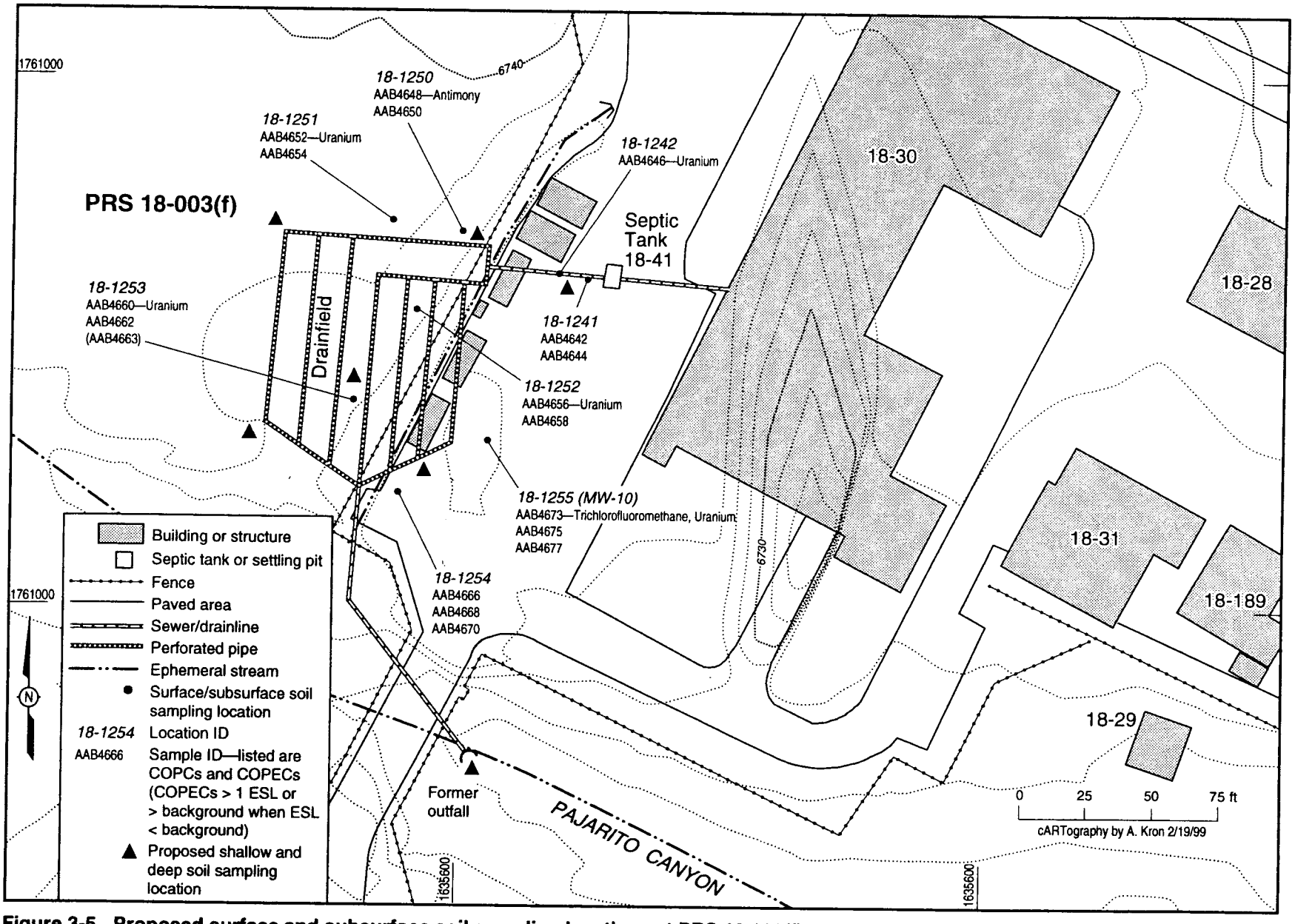

Figure 3-5. Proposed surface and subsurface soil sampling locations at PRS 18-003(f).

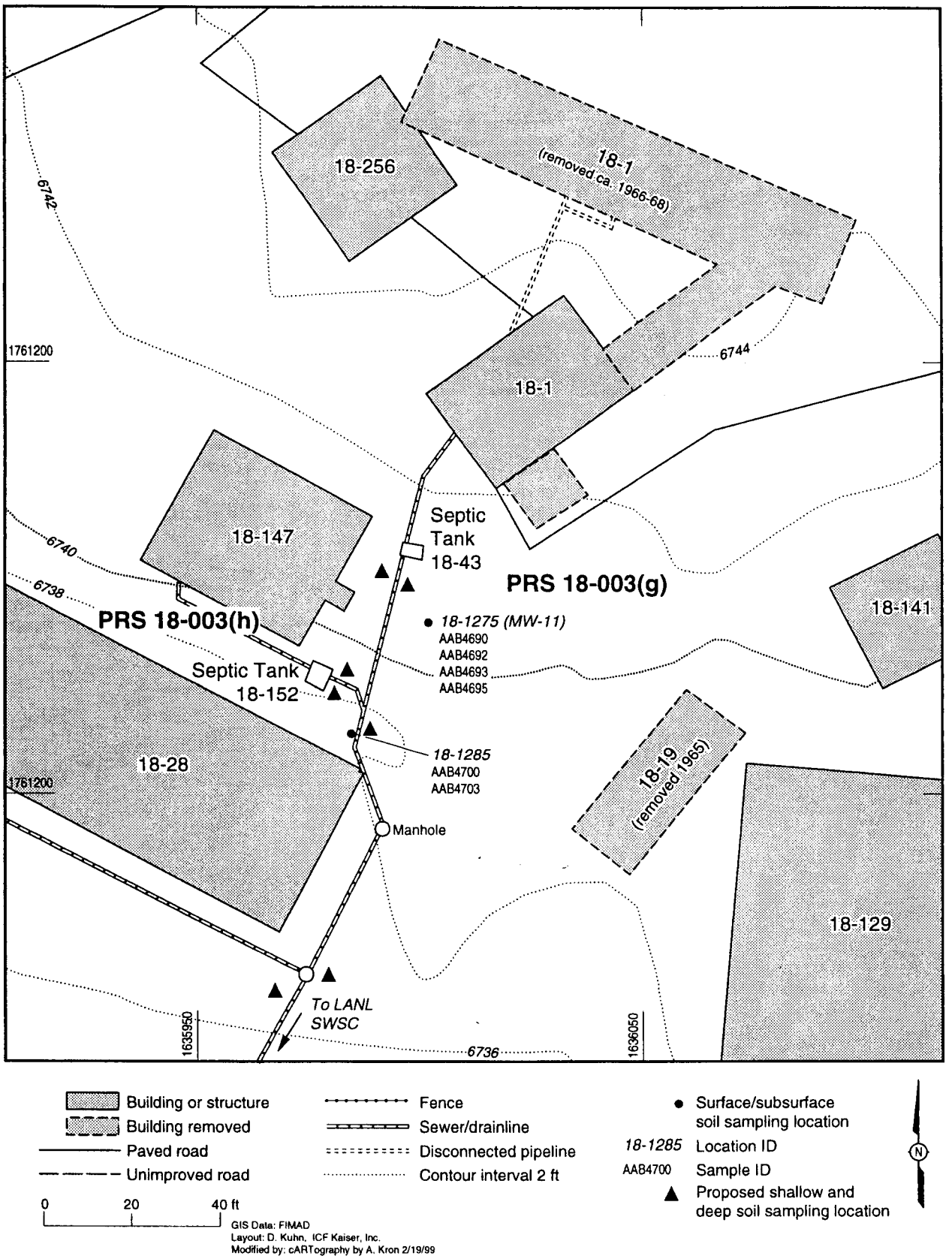

Figure 3-6. Proposed surface and subsurface soil sampling locations at PRSs 18-003(g and h).

3.1.3 Supplemental Soil Sampling Plan

In the unlikely event that unforeseen circumstances preclude the use of the video-inspection equipment, supplemental sampling will replace the video-inspection and sampling approach. Sampling locations will be based on site knowledge and designed from existing soil information provided in the RFI report (LANL 1995, 52183) and ECs and IAs at each PRS. The supplemental sampling locations will target potentially contaminated soils near suspect leakage areas such as elbows, distribution boxes, and pipe junctions.

Table 3-1 shows a proposed supplemental soil sampling plan for each PRS. This plan will support previous RFI investigation data and further characterize the nature and extent of potential contamination. Locations of proposed inlet, outlet, and drain field soil sampling locations are shown in Table 3-1 and Figures 3-1 through 3-6. The locations were selected based on evidence from previous RFI, IA, and EC investigations; inlet and outlet structures; and potential pipe breach or sludge-accumulation areas. Two samples will be collected from each location. A shallow soil sample will be obtained from the bedding soils immediately below the inlet or outlet pipe (approximately 4 ft below grade). A deeper soil sample, based on alluvial water level data, will be collected immediately above the water table to determine the vertical extent of contamination (if present). A total of 94 soil samples (not including duplicates or quality assurance/quality control [QA/QC] samples) are proposed for this effort. Table 3-1 presents the number, location, and description of supplemental soil sampling locations and the respective PRSs.

Sampling data obtained from this effort will be combined with previously reported soil data (LANL 1995, 52183) to determine nature and extent of potential soil contamination from the drain lines. Supplemental soil sampling locations will be selected carefully to avoid redundancy from previous sampling efforts, underground utilities, or high-security areas that may create unsafe conditions for field or facility personnel.

3.3 Site Restoration

Site restoration activities will be conducted (where required) at PRSs 18-003(a, b, c, d, e, and f). PRSs 18-003(a and e) were remediated under separate IAs. The following sections discuss these restoration activities. PRSs 18-003(g and h) are active septic systems that will be transferred to the facility at the conclusion of the VCM.

3.3.1 Restoration of PRS 18-003(a)

The VCM effort for 18-003(a) will focus on the collection of soil samples along inlet and outlet lines, based on the video survey results discussed in Section 3.1 and shown in Figure 3-1. As stated in Section 2.1.2, the settling tank and its contents have been removed and the remaining concrete vault grouted to mitigate potential releases to groundwater. The inlet and outlet lines will be sampled as described in Section 3.1.1. Additional shallow and deeper soil samples will be collected to determine nature and extent of contamination. Removal of the grouted tank vault is not proposed as a remedial option as the vault does not present a risk to the environment nor is its removal technically practical or cost-effective.

3.3.2 Restoration of PRS 18-003(b)

Removing the septic tank will involve excavating soils adjacent to the tank to expose the tank walls. The tank will be separated from the inlet and outlet lines and pulled as a single unit. Should this fail, the tank will be broken into sections using a backhoe-mounted powerjack. These sections then will be placed in B-25s for disposal. Shallow and deep soil samples will be collected to determine nature and extent from this

TABLE 3-1
SUPPLEMENTAL SAMPLING LOCATIONS FOR DETERMINING NATURE AND EXTENT OF CONTAMINATION

PRS ID	Inlet Sample Location	Outlet Sample Location	Drain Field Sample Location[a]	Analytical Suite[b]	Total No. Samples	Remarks
18-003(a)	2 samples: 1 shallow, 1 deep; located 10 ft up inlet line from pipe/tank junction	2 samples: 1 shallow; 1 deep; collected 5 ft above junction with PRS 18-003(b) outlet line	Samples collected in conjunction with PRS 18-003(b); see 18-003(b) for number of samples.	Full suite	4	PRS 18-003(a) shares common outlet line and drain field with PRS 18-003(b).
18-003(b)	4 samples: 2 shallow, 2 deep; collected 10 ft up inlet line from tank/pipe junction and 50 ft up inlet line from tank/pipe junction	2 samples: 1 shallow, 1 deep; collected 5 ft below PRS 18-003(b) above junction with PRS 18-003(a) outlet line	14 samples: 7 shallow, 7 deep; collected at 3 distal points of drain field and 4 perimeter locations	Full suite	20	PRS 18-003(b) shares a common outlet line and drain field with PRS 18-003(a).
18-003(c)	4 samples: 2 shallow, 2 deep, collected 50 ft up inlet line from tank and 100 ft up inlet line near Building 18-32 (at bend)	2 samples: 1 shallow, one deep; collected 50 ft east of tank/outlet line junction near intersection with drain field lateral	18 samples: 9 shallow, 9 deep; collected at 2 distal points of drain field, central drain field, 5 perimeter locations, and 1 former outfall location	Full suite	16	Possible security clearance issues at inlet sampling locations.
18-003(d)	4 samples: 2 shallow, 2 deep, collected 10 ft up inlet line from tank/inlet line junction, and 100 ft up inlet line from tank	2 samples: 1 shallow, 1 deep, collected 10 ft down from tank at distribution (splitter) box	10 samples: 5 shallow, 5 deep, collected at 4 distal points of drain field, and from central drain field	Full suite	16	Security issues may preclude collecting inlet sample close to Building 18-116.
18-003(e)	None	None	10 samples: collected from drain field and perimeter	Full suite	10	No COPCs identified from previous investigations. Analytical suite developed from previous RFI data.
18-003(f)	None	2 samples: 1 shallow, 1 deep, collected 10 feet down outlet line	12 samples: collected from drain field and perimeter	Full suite	14	
18-003(g)	None	10 samples: collected from 5 locations near outlet pipe and manhole	None; no drain field exists.	Full suite	10	No COPCs or COPECs identified from previous investigations, analytical suite developed from previous RFI data.
18-003(h)	None	4 samples: collected near tank outlet	None; no drain field exists.	Full suite	4	No COPCs or COPECs identified from previous investigations, analytical suite developed from previous RFI data.

[a]Drain field and perimeter soil samples will be collected from the locations described regardless of the video-survey inspection results obtained from inlet and outlet drain lines. Shallow samples (immediately below the perforated pipe) are estimated to be 4 ft below grade. Deeper soil sample collection depths will vary depending on depth to water (based on alluvial well data). This investigation assumes that mechanized soil sampling equipment will be used (e.g., small maneuverable and mobile drill rig or similar vehicle).

[b]Full suite analysis for soil samples including SVOCs, VOCs, target analyte list metals, radionuclides.

PRS (Figure 3-1). Confirmatory samples will be collected from the base of the tank hold as described in Section 4.0. Inlet lines will be plugged and capped with grout. A Bentomat™ clay curtain will be installed to block potential surface water inflow from bedding material surrounding the pipe.

PRS 18-003(b) shares a common drain field with PRS 18-003(a). Although the PRS 18-003(a) settling tank has been cleaned and removed and the vault has been filled with flowcrete, additional sampling may be conducted along the inlet and outlet lines if a breach is identified. Soil near the lines will be sampled using a small backhoe to expose the line at the desired sample interval, which will be based on the in-line video survey results.

The outlet lines from the two tanks join approximately 20 ft south of PRS 18-003(b) and proceed southward under the Perimeter Intrusion Detection Assessment System (PIDAS) fence to the drain field. Should removal of the outlet lines be necessary, the excavation will be done without disturbing the PIDAS fence. This will be accomplished by excavating the pipe on each side of the fence using a backhoe and cutting the pipe near and on each side of the fence. The section of pipe that passes under the fence will be excavated by hand and removed.

3.3.3 Restoration of PRS 18-003(c)

The removal of the septic tank will involve the excavation of soils adjacent to the tank to expose the tank walls. It is possible that groundwater may be encountered at the base of the tank. Shallow and deeper soil samples will be collected to determine nature and extent at this PRS (Figure 3-2). Once the tank is separated from the inlet and outlet lines, the field team will attempt to remove the tank as a single unit. This will reduce the risk of the excavation caving in on remaining sections of the tank. It will also eliminate the need for shoring.

The PRS 18-003(c) septic inlet line and tank and a portion of the outlet line are located within the PIDAS area of Kiva II. The outlet line passes beneath the PIDAS security fences to the associated drain field. Should removal of the outlet lines be necessary, the excavation will be done without disturbing the PIDAS fence. This will be accomplished by excavating the pipe on each side of the fence using a backhoe and cutting the pipe near and on each side of the fence. The section of pipe that passes under the fence will be excavated by hand and removed.

This drain field includes an outfall located near a small ephemeral channel just outside the TA-18 boundary fence. Shallow and deeper soils samples will be collected from the drain field and from the outfall area to determine nature and extent of contamination and to supplement the existing RFI data (LANL 1995, 52183). As a result of the stream channel's proximity to the drain field and outfall, BMPs will be implemented to ensure that surface water quality will not be affected during sampling or removal activities.

3.3.4 Restoration of PRS 18-003(d)

Based on groundwater elevation measurements collected from five monitoring wells around the PRS, the base of the structure is near or below the alluvial water table. Shallow and deeper soil samples will be collected in advance of the tank removal effort and to determine nature and extent of contamination (Figure 3-3).

Once the preexcavation sampling is completed the tank structure will be removed. Water, if encountered, will be removed from the tank structure during initial field activities. Once its contents have been removed, the tank will be removed. Shallow and deeper soil samples from the tank hold will be collected before tank removal by drilling boreholes adjacent to the structure and collecting soil samples at approximately the depth of the inlet and outlet lines and the tank floor. Once the soil samples have been collected and

analyzed, the tank will be excavated and removed as a single unit. Should problems arise with this proposed method, shoring will be installed to maintain the integrity of the excavation area until the tank is removed and confirmatory soil samples are collected.

Drain lines will be left in place unless pipe conditions, soil chemical concentrations, or removal costs favor removal. Boreholes will be advanced to the desired sample interval and samples will be collected immediately adjacent to and beneath the drain lines (based on the video survey inspection).

PRS 18-003(d) likely includes a distribution box. The box will be located using a small backhoe and residual material within the structure will be sampled. The distribution box will be removed if the residual concentrations in the distribution box warrant removal.

3.3.5 Restoration of PRS 18-003(e)

The VCM effort for 18-003(e) will focus on the collection of soil samples along the inlet and outlet lines and drain field at the locations shown in Figure 3-4. Final sample locations will be based in part on the results of the video survey discussed in Section 3.1. As stated in Section 2.5.2, the contents of the septic tank have been removed and the remaining concrete tank has been grouted. The inlet and outlet lines will be sampled as described in Section 3.1.1. Additional soil samples (both shallow and deeper) will be collected in the drain field and former outfall to determine nature and extent of contamination. Removal of the grouted tank is not proposed as a remedial option as the tank does not present a risk to the environment nor is removal technically practical or cost-effective.

3.3.6 Restoration of PRS 18-003(f)

Removing the septic tank will involve excavating soils adjacent to the tank to expose the tank walls. Once the tank is separated from the inlet and outlet lines, the field team will attempt to remove the tank as a single unit. This will reduce the risk of the excavation's caving in on remaining sections of the tank and eliminate the need for shoring.

A portion of the drain field line passes beneath temporary buildings and permanent security fences. If necessary the drain field lines will be removed by excavating the line on each side of the fence using a backhoe and cutting the line near and on each side of the fence. The section of line that passes under the fence will be excavated by hand and removed. It is possible that temporary buildings will require relocation to allow access to contaminated drain field lines and soil.

Shallow and deeper soils samples will be collected from the drain field to determine nature and extent of contamination (Figure 3-5) and to supplement the existing RFI data (LANL 1995, 52183) as discussed in Section 4.0, BMPs will be implemented to ensure that surface water quality will not be affected during sampling or removal activities.

3.3.7 Restoration of PRS 18-003(g)

Although the tank does not serve as a traditional septic tank, it is part of the septic lines and currently receives wastes as they pass through the tank to the outlet line connecting to the SWSC. No detailed engineering drawings have been located that establish if the inlet and outlet lines are constructed of VCP or steel. Steel is the likely material of construction because the system formerly drained to the waste lagoons at TA-27 and now drains to the SWSC.

Shallow and deep soil samples will be collected adjacent to the active tank structure at the locations shown in Figure 3-6. Additional samples will be collected at the junction of PRS 18-003(h). Access to these sampling locations may be difficult due to the concentration of underground and overhead utilities in

this area. Because this system was put into service in 1944, prior to the construction of many buildings and utilities at the facility, lines are purposely unmarked for security reasons. Damage to one of these lines through accidentally contacting or potentially severing subsurface lines could greatly impact facility operations, worker safety, and security.

The ER plan for this tank is to return ownership to the facility. If decommissioning of the tank is required under future routine site decommissioning activities, the facility will manage this effort.

3.3.8 Restoration of PRS 18-003(h)

PRS 18-003(h) is an active septic tank and currently receives wastes as they pass through the tank to the outlet line connecting to SWSC. No detailed engineering drawings have been located that establish if the inlet and outlet lines are constructed of VCP or steel.

A shallow and a deep soil sample will be collected from the outlet line leading from PRS 18-003(h), as shown in Figure 3-6. Another set of shallow and deep soil samples will be collected at the junction of PRSs 18-003(g) and 18-003(h) (Figure 3-6). Additional shallow and deeper soil samples will be collected at the manhole located near Building TA-18-28 (Figure 3-6). As at PRS 18-003(g), there is also a very high likelihood of inadvertently encountering underground utilities if sampling were conducted (previous sampling activities encountered underground obstructions, as described in Section 2.8). Lines that are purposely unmarked for security reasons compound the problem in this area. Damage to one of these lines through accidental contact or severing subsurface lines could greatly impact facility operations, worker safety, and security.

The ER Project plan for this tank is to return ownership to the facility. If tank decommissioning is required under future routine site decommissioning activities, the facility will manage this effort.

4.0 CONFIRMATORY SAMPLING

Confirmatory sampling will be conducted as part of this VCM. The suite of analytes is based on RFI results and subsequent sampling data specific to each PRS. The total number of samples collected will be dependent on the extent of the removal effort, although a total of 38 samples is proposed for this VCM. Based on the results from previous investigations and current site knowledge, the empty, in-ground tank structures associated with PRSs 18-003(b, c, d, and f) will be removed. The grouted tank structures at PRSs 18-003(a and e) will be left in place; therefore no confirmatory sampling is anticipated for those areas. Like the nature and extent sampling, two samples will be collected at each area of interest, a shallow sample will be collected immediately from the base of the excavation, and a deeper sample will be collected immediately above the water table. In some instances, water may be encountered at the base of the excavation. In this event, only one sample will be collected from the excavation pit. The active septic systems, PRSs 18-003(g and h), will not be dismantled; nature and extent sampling will be conducted in soils adjacent to and immediately below the active drain line.

Removing drain lines is not anticipated at this time. However, if the nature and extent investigation discussed in Section 3.0 reveals that soils present an unacceptable risk, a remedial action will be prepared to mitigate the risk. Then additional confirmatory samples may be required to reach closure.

Table 4-1 presents the confirmatory sampling strategy for the PRSs at TA-18.

TABLE 4-1
CONFIRMATORY SAMPLING LOCATIONS AND ANALYTICAL SUITES, PRSs 18-003(b, c, and d)

ID	Pre-excavation Sample Locations[a]	Post-excavation Confirmatory Sample Locations[a]	Analytical Suite for Soil Samples[b]	Total No. of Confirmatory Samples[c]	Remarks
PRS 18-003(b)	4 samples: 2 from base of inlet/tank junction, 2 from base of outlet/tank junction	4 samples: 2 from pit floor below inlet, 2 from pit floor below outlet	Full suite	8	Assumes no inlet or outlet piping is removed; if piping removed, additional samples will be collected.
PRS 18-003(c)	4 samples: 2 from base of inlet/tank junction, 1 from base of outlet/tank junction	4 samples: 2 from pit below inlet, 2 from pit floor below outlet	Full suite	8	PCBs collected based on potential human health and ecological risk.
PRS 18-003(d)	8 samples: collected from soils adjacent to septic tank to determine depth to water and to design removal plan (i.e., dewatering, shoring needs, etc.)	6 samples: 4 from pit floor, 2 from below distribution (splitter) box	Full suite	14	Assumes distribution box will be removed during tank structure removal.
PRS 18-003(f)	4 samples: 2 from base of inlet/tank junction, 2 from base of outlet/tank junction	4 samples: 2 from pit floor below inlet, 2 from pit floor below outlet	Full suite	8	

[a]Samples will be collected from soils immediately below the excavated structure, and a second sample collected immediately above the water table from the same pit. It is possible that groundwater will be encountered in the excavation of various PRSs, especially PRS 18-003(d). In this event, the confirmation sampling strategy will be modified to account for saturated conditions.
[b]Full suite analyses includes SVOCs, VOCs, target analyte list metals, and radionuclides.
[c]Sample total does not include duplicates, rinsates, or QA/QC samples; assumes no ancillary piping is excavated during tank structure removal.

PCB = polychlorinated biphenyl.

5.0 WASTE MANAGEMENT

5.1 Estimated Types and Volumes of Waste

Table 5-1 summarizes the potential wastes generated during the VCM work for PRSs 18-003(a, b, c, d, e, f, g, and h).

TABLE 5-1
ANTICIPATED WASTE TYPE AND VOLUME FOR VCM, PRSs 18-003(a, b, c, and d)

Item	Waste Type	Anticipated Volume
PRS 18-003(a)		
Sampling waste/PPE	Solid – nonhazardous/nonradioactive	<1 yd^3
Decontamination liquids	Liquid – nonhazardous/nonradioactive	200 gal.
PRS 18-003(b)		
Residual tank liquid	Liquid – low level radioactive	<20 gal.
Sampling waste/PPE	Solid – nonhazardous/nonradioactive	<1 yd^3
Concrete pieces	Solid – low level radioactive	5 yd^3
Decontamination liquids	Liquid – nonhazardous/nonradioactive	200 gal.
PRS 18-003(c)		
Residual tank liquid	Liquid-low-level radioactive/PCB	<20 gal.
Sampling waste/PPE	Solid – PCB	<1 yd^3
Concrete pieces	Solid – low level radioactive/PCB	6 yd^3
Decontamination liquids	Liquid – nonhazardous/nonradioactive	350 gal.
PRS 18-003(d)		
Residual tank liquid	Liquid – low level radioactive	400 gal.
Sampling waste/PPE	Solid – nonhazardous/nonradioactive	<1 yd^3
Concrete pieces	Solid – low level radioactive	4 yd^3
Decontamination liquids	Liquid – nonhazardous/nonradioactive	350 gal.
PRS 18-003(e)		
Sampling waste/PPE	Solid - nonhazardous/nonradioactive	<1 yd^3
Decontamination liquids	Liquid – nonhazardous/nonradioactive	200 gal.
PRS 18-003(f)		
Sand fill in septic tank	Solid – low level radioactive	<3 yd^3
Sampling waste/PPE	Solid – nonhazardous/nonradioactive	<1 yd^3
Concrete pieces	Solid – low level radioactive	5 yd^3
Decontamination liquids	Liquid – nonhazardous/nonradioactive	350 gal.
PRS 18-003(g)		
Sampling waste/PPE	Solid – nonhazardous/nonradioactive	<0.5 yd^3
Decontamination liquids	Liquid – nonhazardous/nonradioactive	100 gal.
PRS 18-003(h)		
Sampling waste/PPE	Solid – nonhazardous/nonradioactive	<0.5 yd^3
Decontamination liquids	Liquid – nonhazardous/nonradioactive	100 gal.

PCB = polychlorinated biphenyl.
PPE = personal protective equipment.

A characterization strategy form (CSF) for each PRS will be prepared for submission to DOE Environmental Management Solid Waste Operations and Environment, Safety and Health (ESH-19). The waste characterization/strategy requirements and uncertainties of waste types and volumes described in the CSF for each PRS are summarized below.

5.2 Method of Management and Disposal

Activities at PRSs 18-003(b, c, d, and f) involve collecting and disposing of tank structural materials, personal protective equipment (PPE)/sampling equipment, and decontamination water. Activities at PRSs 18-003(a, e, g, and h) involve only sampling around the septic tanks and drain lines.

The concrete and any residual liquids removed from the tank will be analyzed for target analyte list (TAL) metals, VOCs, semivolatile organic compounds (SVOCs), isotopic uranium, and plutonium. The concrete and liquids will be disposed of according to their waste classifications, based on the analytical results of the samples generated before and during the VCM.

PPE/sampling equipment will be thoroughly decontaminated and disposed of as nonhazardous and nonradioactive waste. If radiation levels remain above background after decontamination or if visible contamination cannot be removed, these wastes will be disposed of under the same waste classification as the concrete pieces and residual tank liquids.

Decontamination liquids used to clean the PPE/sampling equipment will be minimized; dry-decontamination approaches will be used where possible. Decontamination water will be sampled for TAL metals, VOCs, SVOCs, isotopic uranium, and isotopic plutonium. If these analytes are not detected, the decontamination liquids will be disposed of as nonhazardous and nonradioactive waste. If hazardous analytes or above-background uranium and plutonium are detected, these liquids will be disposed of according to their proper waste classification (e.g., hazardous, radioactive, or mixed).

6.0 ESTIMATED TIME TO COMPLETE ACTION AND UNCERTAINTIES

The estimated time to compete the VCM is subject to (1) the timely review and approval of the VCM by NMED, (2) budgetary constraints, and (3) priorities. Using PRS 18-003(d) as an example, the field mobilization time is expected to take one day. The video inspection of drain lines and preexcavation sampling is expected to take three days. Tank excavation activities should take two days, which would include one day to pull the tank and one day to backfill and grade the excavation. Analytical results from waste characterization sampling and nature and extent results are expected within 30 days. Waste removal from on-site storage is expected within 60 days. Thus, the total time frame for the VCM from mobilization to waste removal is an estimated 100 days.

Many uncertainties are associated with each individual PRS cleanup plan. The volume of waste and waste streams generated is the largest uncertainty. The waste streams and volumes presented in this plan represent only the tank structures, PPE, and decontamination water and do not include soil volumes or excavation dewatering. Another uncertainty is the ability of the video-inspection equipment to successfully survey the entire length of the inlet and outlet drain lines. The potential for physical obstructions in the pipe (such as roots) or collapsed areas may preclude complete pipe inspection. If this occurs, a contingency sampling plan will be initiated along the pipelines to achieve essentially the same level of confidence. Additional uncertainties include equipment access in high security areas and the number and exact locations of undocumented utilities, which may be accidentally contacted or severed or obstruct excavation activities.

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