TA 21

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Date: August 31, 2005
Refer to: ER2005-0648

Mr. James Bearzi
NMED – Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505-6303

RECEIVED
AUG 2005

SUBJECT: REVISED APPENDIX C FOR THE DP SITE AGGREGATE AREA WORK PLAN

Dear Mr. Bearzi:

Enclosed are two hard copies with electronic files of Appendix C, the "Management Plan for Investigation-Derived Waste," of the "Investigation Work Plan for DP Site Aggregate Area at Technical Area 21." This submittal fulfills Ms. Kathryn Chamberlain's email request, dated August 12, 2005, to resubmit the plan.

If you have questions, please contact Mark Thacker at (505) 665-5342 (mthacker@lanl.gov) or Woody Woodworth at (505) 665-5820 (lwoodworth@doeal.gov).

Sincerely,

David McInroy, Deputy Program Director
Environmental Remediation & Surveillance
Los Alamos National Laboratory

Sincerely,

David Gregory, Federal Project Director
Department of Energy
Los Alamos Site Office

DM/DG/MT/jk

Enclosure: 1) Two hard copies with electronic files of Appendix C, the "Management Plan for Investigation-Derived Waste" of the "Investigation Work Plan for DP Site Aggregate Area at Technical Area 21" (ER2005-0192 July 2005 and ER2004-0409 August 2004)

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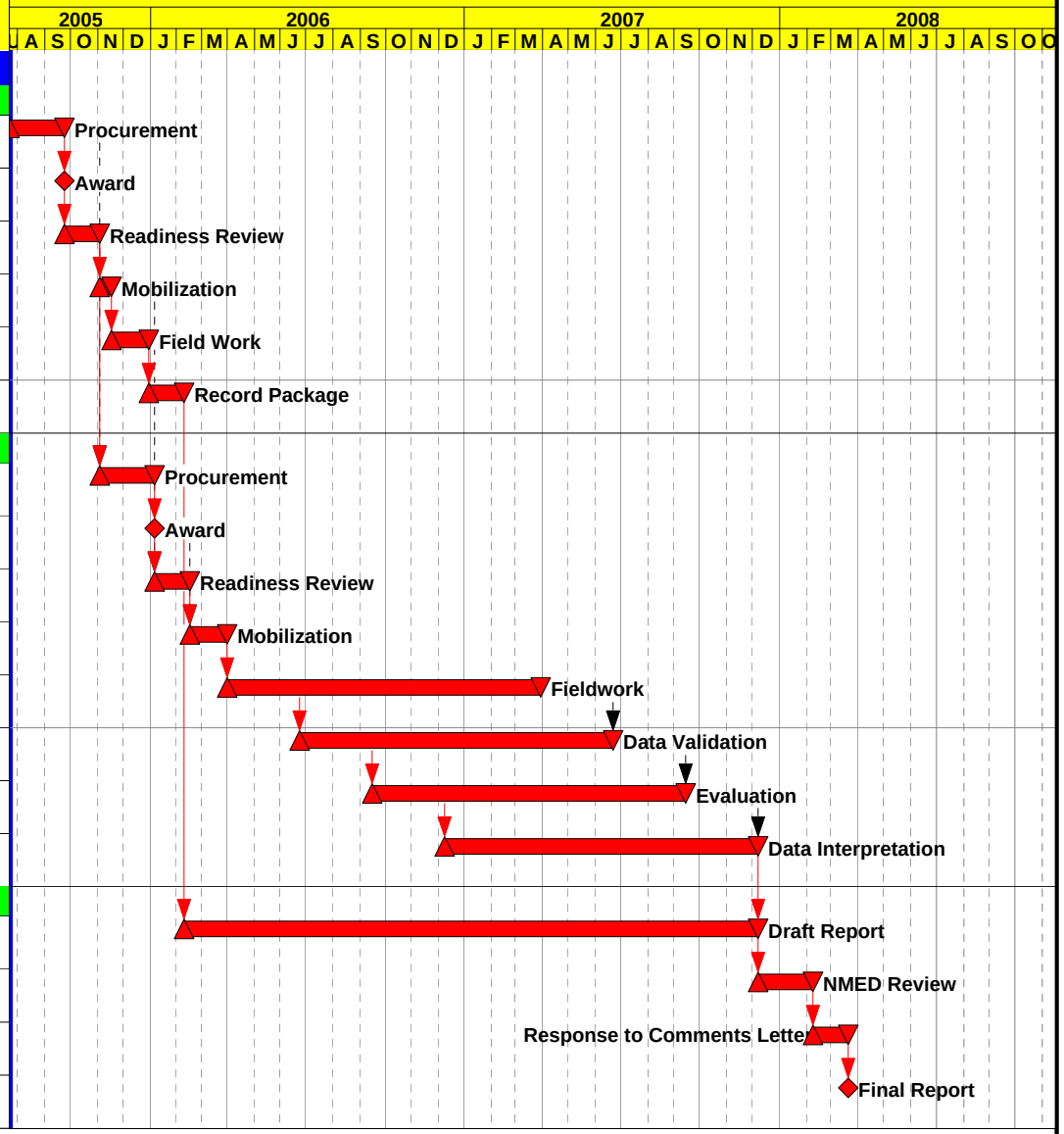
Attachments

New Section 1 Tables; Revised Section 5 Text, Figures, and Tables; and Revised Appendixes for the "Investigation Work Plan for DP Site Aggregate Area at Technical Area 21"

LA-UR-05-3218

Activity ID	Activity Description	Orig Dur	Rem Dur	%	Early Start	Early Finish
1.0 Delta Prime						
1.1 Delta Prime RFI						
080	Procurement	45	45	0	22JUL05	22SEP05
090	Award	0	0	0		22SEP05
200	Readiness Review	30	30	0	23SEP05	03NOV05
300	Mobilization	10	10	0	04NOV05	17NOV05
400	Field Work	30	30	0	18NOV05	29DEC05
500	Record Package	30	30	0	30DEC05	09FEB06
1.2 VCA						
750	Procurement	45	45	0	04NOV05	05JAN06
775	Award	0	0	0		05JAN06
800	Readiness Review	30	30	0	06JAN06	16FEB06
900	Mobilization	30	30	0	17FEB06	30MAR06
1000	Fieldwork	260	260	0	31MAR06	29MAR07
1010	Data Validation	260	260	0	23JUN06	21JUN07
1020	Evaluation	260	260	0	15SEP06	13SEP07
1030	Data Interpretation	260	260	0	08DEC06	06DEC07
1.3 RFI Report						
1040	Draft Report	475	475	0	10FEB06	06DEC07
1050	NMED Review	45	45	0	07DEC07	07FEB08
1060	Response to Comments Letter	30	30	0	08FEB08	20MAR08
1070	Final Report	0	0	0		20MAR08



Sheet 1 of 1

Start Date	22JUL05
Finish Date	20MAR08
Data Date	22JUL05
Run Date	26JUL05 12:46

Early Bar
Progress Bar
Critical Activity

RAND

DP Site Aggregate

Date	Revision	Checked	Approved

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Table 1.2-1
Inorganic Chemical Soil Screening Levels

Chemical	Residential Soil (mg/kg)	Industrial/Occupational Soil (mg/kg)
Aluminum	77800	100000
Antimony	31.3	454
Arsenic	3.9	17.7
Barium	5450	78300
Beryllium	156	2250
Cadmium	74.1	8600
Calcium	n/a[a]	n/a
Chromium	2100[b]	5000[b]
Cobalt	1520	20500
Copper	3130	45400
Iron	23500	100000
Lead	400	750
Lithium	1600[b]	23000[b]
Manganese	1550	21800
Magnesium	n/a	n/a
Mercury	23[b]	340[b]
Molybdenum	391	5680
Nickel	1560	22500
Potassium	n/a	n/a
Selenium	391	5680
Silver	391	5680
Sodium	n/a	n/a
Strontium	46900	100000
Thallium	5.16	74.9
Uranium	16[c]	200[c]
Vanadium	548	7950
Zinc	23500	100000

Note: Unless otherwise noted, soil screening levels are from the "Technical Background Document for Development of Soil Screening Levels, Revision 2," NMED 2004, 85615.

[a] n/a = Not applicable.

[b] EPA Region 6 value, EPA 2004, 87478.

[c] EPA Region 9 value, http://www.epa.gov/region9/waste/sfund/prg/index.html.

Table 1.2-2
Organic Chemical Soil Screening Levels

Chemical	Residential Soil (mg/kg)	Industrial/Occupational Soil (mg/kg)
Acenaphthene	4690	34800
Acetone	70400	100000
Anthracene	23500	264000
Benzo(a)anthracene	6.21	23.4
Benzo(b)fluoranthene	6.21	23.4
Benzo(k)fluoranthene	62.1	234
Bis(2-ethylhexyl) phthalate	347	1370
Chrysene	621	2340
Cumene (isopropylbenzene)	700*	2730*
Dichlorodifluoromethane	144	205
Diethyl phthalate	48000	100000
Di-n-butyl phthalate	6000	68400
2,4-Dinitrotoluene	120	1370
Fluoranthene	2250	24400
Fluorene	3130	29400
Indeno(1,2,3-c,d)pyrene	6.21	23.4
4-Methyl 2-pentanone	5430*	6900*
Methylene chloride	165	440
Naphthalene	71.9	98.3
Pentachlorophenol	29.8	100
Phenanthrene	1800	20500
Aroclor 1260	2.22	8.26
Pyrene	2300	31300
Tetrachloroethene	9.83	24.6
Toluene	248	248
o-Xylene	98.6	98.6
Xylenes	132	132

Note: Unless otherwise noted, soil screening levels are from the "Technical Background Document for Development of Soil Screening Levels, Revision 2," NMED 2004, 85615.

*EPA Region 6 value, EPA 2004, 87478.

Table 1.2-3
Radionuclide Screening Action Levels
(RESRAD Version 6.21), May 2005

Radionuclide	Residential SAL (pCi/g)	Industrial SAL (pCi/g)
Americium-241	30	180
Cobalt-60	1.3	5.1
Cesium-134	2.4	9.7
Cesium-137+D[a]	5.6	23
Europium-152	2.9	11
Europium-154	2.7	11
Europium-155	110	450
Tritium	750	4.4×10^5
Iodine-129	44	1800
Manganese-54	5.5	22
Sodium-22	1.6	6.5
Nickel-63	8900	1.3×10^6
Neptunium-237+D	2.4	50
Plutonium-238	37	240
Plutonium-239[b]	33	210
Radium-226+D[c]	5	5
Radium-228+D[c]	5	5
Ruthenium-106+D	20	83
Strontium-90+D	5.7	1900
Technetium-99	36	2.8×10^5
Thorium-228+D	2.3	9.0
Thorium-230[c]	5	5
Thorium-232[c]	5	5
Uranium-234	170	1500
Uranium-235+D	17	87
Uranium-238+D	86	430

Note: Unless otherwise noted, screening action levels are from "Derivation and Use of Radionuclide Screening Action Levels, Revision 1," LANL 2005, 88493.

[a] Includes contribution to dose of radionuclide progeny.

[b] Plutonium-239 and plutonium-240 are typically are unresolved in laboratory analysis. SALs for the two isotopes are identical.

[c] The SAL is the generic soil guideline for release of property published in Chapter 4 (Residual Radioactive Material) of DOE Order 5400.5. Five pCi/g applies to the concentration averaged over the first 15 cm of soil below the surface, for subsequent 15-cm-thick layers the generic soil guideline is 15 pCi/g. If both thorium-230 and radium-226, or both thorium-232 and radium-228, are present and not in secular equilibrium, or if other mixtures of radon-generating radionuclides occur, refer to DOE Order 5400.5 for guidance in establishing soil criteria.

5.0 SCOPE OF ACTIVITES FOR CORRECTIVE ACTION SITES

The scope of activities is dependent on the current knowledge of operational history and the degree of prior characterization of each site. A phased approach will be used to determine the activities for each site, including site reconnaissance, characterization sampling, excavation, confirmation sampling, and evaluation of survey and sample data. This approach will allow for the review of the results prior to demobilization so additional removal actions/confirmation sampling can be conducted to assess if the investigation objectives are met. The phased approach is illustrated in the decision flowchart, Figure 5.0-1, and is discussed in the following sections.

The objectives of the corrective actions are to conduct characterization sampling and analysis, if necessary, assist in finalizing the implementation approach to the corrective action, remove and inspect the structure(s), remove contaminated material, and conduct confirmation sampling. Confirmation sampling will be conducted to assess if the nature and extent of any residual contamination have been determined and do not pose any potential unacceptable risk to human health or the environment (i.e., concentrations are less than industrial SSLs/SALs, Tables 1.2-1 through 1.2-3). Both characterization and remediation activities are proposed in the following sections. The characterization activities are based on the requirements outlined in the March 1, 2005, Compliance Order on Consent signed by NMED, DOE, and the UC, as well as the data needs identified for each site. Additionally, pipelines connected to active buildings associated with Consolidated Unit 21-022(h)-99 and SWMUs 21-024(e), 21-024(d), 21-024(h), 21-024(i), 21-024(j), 21-024(k), and 21-024(n) may be in use (tied into the current sanitary sewer system) or near utility lines currently in use. Verification of their status (i.e., currently in use or not in use) will be conducted prior to initiation of activities at these sites. Pipelines in use or near other active utilities will not be removed until a later date when they are no longer active. Portions of SWMUs located underneath structures will be addressed when these areas become accessible. The TA-21 industrial complex and corrective action SWMU locations are shown on Figure 5.0-2.

An operational history, summary of previous investigations, and scope of activities for each corrective action site are presented below. In developing the summary of previous investigations, all historical data were evaluated. This evaluation concluded that for all the corrective action sites, the existing data are not sufficient for decision making. The QA/QC data for validation of the data are lacking, as well as sufficient sampling locations to define the nature and extent. Additionally, previous sampling did not include a full suite of analytical parameters and was not of sufficient density to define the extent of contamination. Therefore, presentation of the previous sampling results for the corrective action sites is for information purposes and to complete the administrative record. These results will not be used to conduct risk screening assessments at the corrective action sites and will not be presented again in the final report. Only the results from the proposed investigations in this work plan will be presented in the final report and will be used to make recommendations for the corrective action sites.

The samples proposed below will be analyzed for TAL metals, cyanide, nitrates, perchlorates, organic chemicals (VOCs and SVOCs [VOCs only in samples deeper than 0.5 ft bgs]), radionuclides (gamma spectroscopy, americium-241, isotopic plutonium, isotopic uranium, strontium-90, and tritium), moisture, and pH. If field screening indicates the presence of VOCs, a deeper sample will be collected and analyzed for full suite. Field screening will determine the sample(s) with the highest radionuclide and/or organic contamination. If field-screening instruments cannot determine which sample(s) contain(s) the highest levels of radionuclides or organic compounds, samples collected from the location where contamination would most likely be present as indicated by site history (i.e., sump, outfall, etc.) will be selected. The selected sample(s) will be sent to an off-site fixed laboratory for quick turn-around analysis of PCBs, HE, dioxins, and furans (NMED 2005, 89314). The sample results will be transmitted to NMED, via fax, for

review. Within 1 week of receipt of the results, we anticipate that NMED will contact the LANL project leader to discuss the results. If analytes from the four additional analyses are not detected, or detected at low levels reflective of anthropogenic activity, the remaining samples will not be analyzed for the four additional analyses per agreement with NMED. If the additional analytes are detected at levels attributable to the site, the remaining stored aliquots will be submitted to the analytical laboratory for the additional analyses. Prior to demobilization, laboratory results will be reviewed to assess if the nature and extent of contamination have been determined. If nature and extent have not been determined, then step-out samples will be collected. If a structure or evidence of a former structure is not identified during field activities, confirmation samples will be collected from location(s) where the structure was most likely located, using the proposed sampling map as a guide.

5.1 Consolidated Unit 21-006(c)-99, Seepage Pits

Consolidated Unit 21-006(c)-99 consists of SWMUs 21-006(a), 21-006(b), 21-006(c), and 21-006(d). These SWMUs are inactive underground seepage pits. In addition to a seepage pit, SWMU 21-006(b) also includes a drainline and outfall from the seepage pit (Figure 5.1-1).

5.1.1 Operational History

SWMU 21-006(a) consists of an unmarked underground seepage pit of about 0.1 acre, located between Building 21-002 and former Building 21-003.

- ~1945—The seepage pit was installed. According to the 1991 “TA-21 Operable Unit RFI Work Plan for Environmental Restoration” (LANL 1991, 07529; p.18-14), the pit received Hanford container wash water, bomb electrolytic decontamination solution (ethylene glycol, phosphoric acid, and plutonium), and chemical makeup room wastewater. Approximately 12 gal. of the decontamination solution may have been emptied into the drain in Room 322 each day. Assays from 1947 indicated that approximately 1.9 mg of plutonium was released daily.
- Unknown date—Documentation is not available indicating when use of the seepage pit ended.
- Unknown date—The pit was apparently backfilled and is not visible today. Documentation is not available indicating whether the pit was located on the north or south side of the corridor that connected the buildings. If it was on the south side, it may be the same pit as SWMUs 21-006(c) and 21-006(d).

SWMU 21-006(b) consists of a brick manhole placed within a trench (seepage pit 21-118) including a drainline and outfall (LANL 1991, 07529; p. 15-103). The drainline and pit were installed to receive ether waste from the ethyl ether extraction process, part of the original TA-21 plutonium purification process (Christensen and Maraman 1969, 04779; p. 8).

- 1945—The seepage pit and associated lines were installed during the construction of Building 21-003 (LANL 1991, 07529; p. 15-103). A 3-in. cast iron drainline exited the southeast side of Building 21-002, and extended approximately 160 ft southward to a seepage pit, Structure 21-118. A 2-in. cast iron outlet line ran approximately 100 ft southward from the pit to an outfall approximately 8 ft above the surface of a bench below the mesa top.
- 1945, September—The ether extraction process was discontinued (Christensen and Maraman 1969, 04779; p. 48).
- Unknown date—Documentation is not available indicating when use of the pit ended. The location of the pit and drainline has not been conclusively identified.

SWMUs 21-006(c) and 21-006(d) are thought to be the same site because descriptions place them in close proximity (LANL 1991, 07529; p. 18-10). SWMU 21-006(c) consists of a seepage pit located 15 ft outside the door to the bomb-cleaning room (Room 322) at Building 21-003. The pit reportedly received bomb electrolytic decontamination solution from a drain in Room 322. The room may have been contaminated with plutonium. The pit is thought to be partially or entirely beneath current Building 21-313 and/or the remaining central corridor portion of Building 21-003. As with SWMUs 21-006(a) and 21-006(b), the period of operation has not been found in any available documentation. SWMU 21-006(d) may have been associated with a concrete pad and French drain system called the 21-272 dock. Waste from a second-story chemical makeup room was reportedly dumped or pumped into a stone-filled seepage pit, most likely the pit identified as SWMU 21-006(c).

5.1.2 Summary of Previous Investigations

Summarized below are previous investigations conducted at Consolidated Unit 21-006(c)-99.

- 1992—A Phase I RFI was conducted at a portion of SWMU 21-006(b). The investigation consisted of collecting six surface (0–0.33 or 0–0.5 ft) soil samples, one at each of six locations (21-01355, -01356, -01357, -01358, -01359, and -01360) associated with SWMU 21-006(b). These samples were analyzed at an off-site fixed laboratory for inorganic chemicals and radionuclides (americium-241, isotopic plutonium, isotopic uranium, and strontium-90). The seepage pit was not located; therefore, boreholes were not drilled as required by the work plan. The data from the RFI samples were presented in the “Phase Report 1C, TA-21 Operable Unit RCRA Facility Investigation, Outfalls Investigation” (LANL 1994, 31591). This report stated that a decision regarding disposition of SWMU 21-006(b) would be deferred until the seepage pit investigation had been completed.
- 1999—A gamma radiological survey was conducted, one goal of which was to identify the location(s) of the seepage pit(s) in the area between Buildings 21-002 and 21-003. Trenching was also done on the south side of the Building 21-002 to 21-003 corridor to locate underground lines between Buildings 21-002 and 21-003. The lines were located, but the trenching failed to show any evidence of a seepage pit. The survey (LANL 1999, 71295, p.38) concluded that the likely location of a seepage pit was just south of the former Building 21-003 footprint.
- 2004—Radiological and geophysical surveys were completed (results are presented in Appendixes D and E, respectively). The geophysical survey failed to locate any seepage pit. However, the manhole and a portion of the pipelines associated with SWMU 21-006(b) were identified.

Consolidated Unit 21-006(c)-99 Data

The Consolidated Unit 21-006(c)-99 site data from 1992 were collected from soil and compared with soil BVs and FVs (LANL 1998, 59730). Table 5.1-1 and Figure 5.1-1 present Consolidated Unit 21-006(c)-99 inorganic chemical concentrations greater than BVs. Table 5.1-2 and Figure 5.1-2 present Consolidated Unit 21-006(c)-99 radionuclide activities greater than FVs. Sample results for inorganic chemicals and radionuclides were also compared to the maximum of the range of their respective background data sets. Those analytes with detections and/or detection limits greater than their respective BVs/FVs and the maximum of the background data set were designated as COPCs.

Inorganic Chemicals

Inorganic Chemicals Detected at Concentrations Greater Than BVs. Cadmium and lead were detected at concentrations greater than their respective BVs (Figure 5.1-1).

- Cadmium was detected in six soil samples ranging from 0.52 to 0.85 mg/kg (the maximum was from location 21-01357, 0- to 0.5-ft depth interval), concentrations greater than the soil BV (0.4 mg/kg) but less than the maximum cadmium concentration in the soil background data set (2.6 mg/kg). Therefore, cadmium is not a COPC.
- Lead was detected in one surface soil sample at 40.1 mg/kg (location 21-01356, 0- to 0.5-ft depth interval), a concentration greater than the soil BV (22.3 mg/kg) and the maximum lead concentration in the soil background data set (28.0 mg/kg). Therefore, lead is a COPC.

Inorganic Chemicals not Included in Background Data. Lithium and strontium are not included in the background data and, therefore, have no BVs for comparison.

- Lithium was detected in all six samples ranging from 2.8 to 4.7 mg/kg (the maximum was from location 21-01358). No established background levels are available for lithium. The lithium concentrations at this site are similar to the concentrations found at most of the corrective action sites (most are below 11 mg/kg), indicating that the lithium levels are not elevated as a result of releases. Therefore, lithium is not a COPC.
- Strontium was detected in six samples ranging from 4.4 to 8.6 mg/kg (the maximum was from location 21-01357). No established background levels are available for strontium. The strontium concentrations at this site are similar to the concentrations found at most of the corrective action sites (most are below 36 mg/kg), indicating that the strontium levels are not elevated as a result of releases. Therefore, strontium is not a COPC.

Inorganic Chemicals with Detection Limits Greater Than BVs. Antimony was not detected at concentrations greater than its respective BV. However, its detection limits were greater than its respective BV in some samples.

- Antimony detection limits, ranging from 4.7 to 4.8 mg/kg (the maximum detection limit was from location 21-01358), were greater than the soil BV (0.83 mg/kg) and the maximum antimony concentration in the soil background data set (1.0 mg/kg) in all six soil samples. Therefore, antimony is a COPC due to elevated detection limits.

Inorganic Chemical Summary. Antimony and lead are inorganic COPCs.

Organic Chemicals

VOCs. VOCs were not analyzed at an off-site fixed laboratory.

SVOCs. SVOCs were not analyzed at an off-site fixed laboratory.

Organic Chemical Summary. Organic chemicals were not analyzed at an off-site fixed laboratory; therefore, the potential for organic chemical contamination was not addressed.

Radionuclides

Fallout Radionuclides. Americium-241 and plutonium-239 were detected at activities greater than their respective FVs (Figure 5.1-2). Since FVs are only applicable within the first 0.5 ft of surface soils, all fallout radionuclides detected in the samples deeper than the first 0.5 ft of surface soils are COPCs.

- Americium-241 was detected in all six soil samples ranging from 0.02 to 0.10 pCi/g (the maximum was from location 21-01360, 0- to 0.5-ft depth interval), activities greater than the soil FV and the maximum americium-241 activity in the soil background data set (both are 0.013 pCi/g). Therefore, americum-241 is a COPC.
- Plutonium-239 was detected in all six soil samples ranging from 0.22 to 0.90 pCi/g (the maximum was from location 21-01356, 0- to 0.5-ft depth interval), activities greater than the soil FV (0.054 pCi/g) and the maximum plutonium-239 activity of in the soil background data set (0.055 pCi/g). Therefore, plutonium-239 is a COPC.

Radionuclide Summary. Americium-241 and plutonium-239 are radionuclide COPCs.

5.1.3 Scope of Activities for Consolidated Unit 21-006(c)-99

Sampling and Excavation Activities

The proposed sample locations at Consolidated Unit 21-006(c)-99 are shown in Figure 5.1-3. Table 5.1-3 provides a summary of the proposed sample locations, depths, objectives each sample addresses, and proposed analytical suites.

Samples will be analyzed for TAL metals, cyanide, nitrates, perchlorates, organic chemicals (VOCs and SVOCs [VOCs only in samples deeper than 0.5 ft bgs]), radionuclides (gamma spectroscopy, americium-241, isotopic plutonium, isotopic uranium, strontium-90, and tritium), moisture, and pH. If field screening indicates the presence of VOCs, a deeper sample will be collected and analyzed for full suite. Field screening will determine the sample(s) with the highest radionuclide and/or organic contamination. If field-screening instruments cannot determine which sample(s) contain(s) the highest levels of radionuclides or organic compounds, samples collected from the location where contamination would most likely be present as indicated by site history (i.e., sump, outfall, etc.) will be selected. The selected sample(s) will be sent to an off-site fixed laboratory for quick turn-around analysis of PCBs, HE, dioxins, and furans (NMED 2005, 89314). The sample results will be transmitted to NMED, via fax, for review. Within 1 week of receipt of the results, we anticipate that NMED will contact the LANL project leader to discuss the results. If analytes from the four additional analyses are not detected, or detected at low levels reflective of anthropogenic activity, the remaining samples will not be analyzed for the four additional analyses per agreement with NMED. If the additional analytes are detected at levels attributable to the site, the remaining stored aliquots will be submitted to the analytical laboratory for the additional analyses. Prior to demobilization, laboratory results will be reviewed to assess if the nature and extent of contamination have been determined. If nature and extent have not been determined, then step-out samples will be collected.

During structure removal activities, excavation of soil and/or rock (including all visibly stained areas) will proceed until the radionuclide and organic vapor field-screening results indicate all contaminated material has been removed. Confirmation samples will be collected as these activities are completed. Analytical laboratory results will be reviewed to determine if additional removal activities and associated confirmation sampling are required due to the presence of areas with contaminant concentrations greater than industrial

SSLs or SALs. Structure removal and confirmation sampling at Consolidated Unit 21-006(c)-99 will consist of the following activities:

- *Seepage pit excavation and sampling.* The seepage pits will be carefully excavated and inspected (e.g., field screening, stained soil). The SWMU 21-006(b) seepage pit will be sampled after all structures are removed, with a minimum of three boreholes. One borehole will be advanced beneath the former location of the brick manhole in the center of the pit, and one borehole each will be advanced near the east and west ends of the larger pit (Figure 5.1-3, locations BH-1, BH-2, and BH-3). Borehole samples will be collected from the 0- to 1.0-ft, 5.0- to 6.0-ft, 10.0- to 11.0-ft, 15.0- to 16.0-ft, and 20.0- to 21.0-ft depth intervals. If the other seepage pits [SWMU 21-006(a), 21-006(c), and 21-006(d)] are clearly identified by trenching, boreholes will be advanced in the approximate centers of the pits. These boreholes will have samples collected from the same depth intervals as BH-1 through BH-3 (Figure 5.1-3, locations BH-5, BH-6, and BH-7).
    - The seepage pits were not identified by the 2004 geophysical survey; therefore, exploratory trenching will be conducted to determine whether they exist and, if so, to identify their location(s). Trenching will be conducted with a backhoe and will progress from the surface to approximately 5 ft bgs. The trench will be visually logged for evidence of non-native materials, disturbed bedding horizons, and areas of visible staining. Elevated radiological or organic vapor field-screening results will be documented. Trenching will continue in the historically identified areas until the pits are located and their boundaries have been determined, evidence of a former pit is found, or the absence of a pit in each area has been verified. All seepage pit structures that can be located will be excavated and removed for disposal. If a seepage pit or evidence of a former seepage pit is not identified during field activities, confirmation samples will be collected from location(s) where the pit was most likely located using the proposed sampling map as a guide.
- *Pipeline excavation and sampling.* The pipelines include the cast iron pipe from Building 21-002 to the SWMU 21-006(b) seepage pit, manhole 21-273, and from the south side of the seepage pit 21-118 to the outfall at the mesa edge. A portion of the pipelines was identified by the 2004 geophysical survey. Any pipelines and backfilled former pipeline beds will be carefully excavated and inspected for visible signs of leakage. Where elevated levels of VOCs and/or radionuclides are present, as determined by field screening, or where visible evidence of a leak is found (e.g., stained soil, break in the pipe), soil samples will be collected immediately beneath the pipeline. Otherwise, samples will be collected approximately every 50 ft along all pipes, with a minimum of one sample location along each pipe length (Figure 5.1-3, locations 1, 2, and 3), under the manhole 273 (Figure 5.1-3, location 4), and at the inlet and outlet to the seepage pit Structure 21-118 (Figure 5.1-3, locations 13 and 14). All samples beneath the pipes will be collected at 0- to 1.0-ft and 2.0- to 3.0-ft depth intervals. The zero depth is defined as immediately beneath the pipe or at the bottom of the pipe bed for pipelines that no longer exist.
- *Outfall investigation*. The outfalls were not identified by the 2004 geophysical survey. If identified by visual inspection, field screening, or exploratory trenching, one borehole will be advanced in the center of the outfall 0.5 ft downslope from the mouth of each outfall pipe (Figure 5.1-3, locations BH-4 and BH-8). If not located, samples will be collected from estimated locations based on previous sampling locations and by using the proposed sampling map as a guide (Figure 5.1-3). The borehole samples will be collected from the 0- to 0.5-ft, 2.0- to 3.0-ft, and 5.0- to 6.0-ft depth intervals. Samples will be collected 5 ft to the west and east of the boreholes (Figure 5.1-3, locations 5, 6, 15, and 16) at the 0- to 0.5-ft and 2.0- to 3.0-ft depth intervals. Two additional sample locations will be established downslope from the mouth of the manhole angled pipe, in the center of a distinguishable drainage, or in a catchment basin aligned with the mouth of the pipe

10 ft and 30 ft downslope from BH-4 (Figure 5.1-3, locations 8 and 11). Location 8 will be flanked by sample locations 10 ft to the west and east (Figure 5.1-3, locations 7 and 9). Location 11 will be flanked by sample locations 20 ft to the west and east (Figure 5.1-3, locations 10 and 12). Samples will be collected at depths of 0–0.5 ft and 2.0–3.0 ft.

- *Bench investigation.* On the topographical bench beneath the mesa cliff edge, one location will be established downslope from the mouth of the seepage pit Structure 21-118 pipe in the center of a distinguishable drainage, or in a catchment basin aligned with the mouth of the pipe at the south end of the bench (Figure 5.1-3, location 18). This location will be flanked by one sample location 20 ft to the west and one sample location 20 ft to the east (Figure 5.1-3, locations 17 and 19). Samples will be collected at depths of 0–0.5 ft and 2.0–3.0 ft.

5.2 SWMU 21-012(b), Dry Well and Pipelines

SWMU 21-012(b) consists of two concrete steam blowdown pits, a separate drainline that drained each pit toward the southern edge of DP Mesa, a seepage pit filled with river stones, a dry well, an outfall pipe associated with floor drains in Building 21-009, and piping conveying effluent between structures (Figure 5.2-1).

5.2.1 Operational History

- 1945—Building 21-009 was built to serve as a steam plant.
- 1945 to 1971—Boiler blowdown was discharged through 3-in. steel drainlines into two concrete pits (Structures 21-266 and 21-267, 10-ft square by unknown depth), each of which was drained by a 6-in. steel drainline that discharged effluent to the southern edge of DP Mesa. Floor drains from Building 21-009 were directed into a 6-in. vitrified clay pipe (VCP) that discharged on the mesa.
- 1971—Boiler blowdown was routed to an aboveground tank and overflow went through a 3-in. steel drainline into a 6-ft square, 2-ft deep seepage pit filled with river stones.
- 1980—A 4-ft square by 54-ft deep dry well constructed to replace seepage pit.
- 1985—Building 21-009 was removed and replaced with new steam plant, Building 21-357. The area was re-graded; documentation is not available indicating if the dry well, pits, or piping were removed (LANL 1991, 07529, p. 17-37 through 17-40).

5.2.2 Summary of Previous Investigations

SWMU 21-012(b) has not been previously sampled. However, radiological and geophysical surveys were completed in 2004. The geophysical survey located pipelines, Structure 21-266 and the seepage pit but not the dry well, Structure 21-267, or evidence of the above-ground tank (Figure 5.2-1).

SWMU 21-012(b) Data

No sampling has been conducted at SWMU 21-012(b); therefore, there are no sample results to discuss.

5.2.3 Scope of Activities for SWMU 21-012(b)

Sampling and Excavation Activities

The proposed sample locations at SWMU 21-012(b) are shown in Figure 5.2-2. Table 5.2-1 provides a summary of the proposed sample locations, depths, objectives each sample addresses, and proposed analytical suites.

Samples will be analyzed for TAL metals, cyanide, nitrates, perchlorates, organic chemicals (VOCs and SVOCs [VOCs only in samples deeper than 0.5 ft bgs]), radionuclides (gamma spectroscopy, americium-241, isotopic plutonium, isotopic uranium, strontium-90, and tritium), moisture, and pH. If field screening indicates the presence of VOCs, a deeper sample will be collected and analyzed for full suite. Field screening will determine the sample(s) with the highest radionuclide and/or organic contamination. If field-screening instruments cannot determine which sample(s) contain(s) the highest levels of radionuclides or organic compounds, samples collected from the location where contamination would most likely be present as indicated by site history (i.e., sump, outfall, etc.) will be selected. The selected sample(s) will be sent to an off-site fixed laboratory for quick turn-around analysis of PCBs, HE, dioxins, and furans (NMED 2005, 89314). The sample results will be transmitted to NMED, via fax, for review. Within 1 week of receipt of the results, we anticipate that NMED will contact the LANL project leader to discuss the results. If analytes from the four additional analyses are not detected, or detected at low levels reflective of anthropogenic activity, the remaining samples will not be analyzed for the four additional analyses per agreement with NMED. If the additional analytes are detected at levels attributable to the site, the remaining stored aliquots will be submitted to the analytical laboratory for the additional analyses. Prior to demobilization, laboratory results will be reviewed to assess if the nature and extent of contamination have been determined. If nature and extent have not been determined, then step-out samples will be collected.

During structure removal activities, excavation of soil and/or rock (including all visibly stained areas) will proceed until the radionuclide and organic vapor field-screening results indicate all contaminated material has been removed. Confirmation samples will be collected as these activities are completed. Analytical laboratory results will be reviewed to determine if additional removal activities and associated confirmation sampling are required due to the presence of areas with contaminant concentrations greater than industrial SSLs or SALs. Sampling at SWMU 21-012(b) will consist of the following activities:

- *Pit excavation and sampling.* The two concrete steam blowdown pits and the one river stone-filled seepage pit will be carefully excavated and inspected for evidence of leaks (e.g., field screening, stained soil). One borehole will be advanced in the center of each excavation. (Figure 5.2-2, locations BH-3, BH-4, and BH-5). Borehole samples will be collected from the 0- to 1.0-ft, 5.0- to 6.0-ft, 10.0- to 11.0-ft, 15.0- to 16.0-ft, and 20.0- to 21.0-ft depth intervals.
    - Blowdown pit Structure 21-267 was not located by the 2004 geophysical survey; therefore, exploratory trenching will be conducted to identify the location of Structure 21-267. Trenching will be conducted with a backhoe and will progress from the surface to approximately 5 ft bgs. The trench will be visually logged for evidence of non-native materials, disturbed bedding horizons and areas of visible staining. Elevated radiological or organic vapor field-screening results will be documented. Trenching will continue in the historically identified area until the pit is located, evidence of a former pit is found, or the absence of a pit at that location has been verified. If a pit or evidence of a former pit is not identified during field activities, confirmation samples will be collected from location(s) where the pit was most likely located using the proposed sampling map as a guide.
- *Dry well sampling.* One borehole will be located 5 ft to the south of the dry well location and advanced to the 76.0-ft depth (Figure 5.2-2, BH-6). Samples will be collected at 5-ft intervals down

to 76 ft starting at the same depth as the dry well which is approximately 54 ft deep (55.0- to 56.0-ft, 60.0 to 61.0-ft, 65.0- to 66.0-ft, 70.0- to 71.0-ft, and 75.0 to 76.0-ft depth intervals) for a total of five samples (Figure 5.2-2, location BH-6).

- The dry well was not located by the geophysical 2004 survey; therefore, exploratory trenching will be conducted to determine whether it exists and, if so, to identify the location(s). Trenching will be conducted with a backhoe and will progress from the surface to approximately 5 ft bgs. The trench will be visually logged for evidence of non-native materials, disturbed bedding horizons and areas of visible staining. Elevated radiological or organic vapor field-screening results will be documented. Trenching will continue in the historically identified area until the dry well is located, evidence of a former dry well is found, or the absence of a dry well at that location has been verified. If a dry well or evidence of a former dry well is not identified during field activities, confirmation samples will be collected from location(s) where the dry well was most likely located using the proposed sampling map as a guide.

- *Pipeline excavation and sampling.* The following pipelines will be excavated and the underlying soil sampled:
  - Blowdown pit Structure 21-266 – pipe from former Building 21-009 south to Structure 21-266 and continuing south to the outfall. Samples will be collected at the inlet and outlet connections of the blowdown pit Structure 21-266 (Figure 5.2-2, locations 1 and 2), and approximately 50 and 100 ft south of the blowdown pit (Figure 5.2-2, locations 4 and 5), at a pipe joint, if present.
  - Blowdown pit Structure 21-267 (not located by the 2004 geophysical survey) – pipe from former Building 21-009 south to Structure 21-267 and continuing south to the outfall. Samples will be collected at the inlet and outlet connections of the blowdown pit Structure 21-267 (Figure 5.2-2, locations 24 and 26), and approximately 50 and 100 ft south of the blowdown pit (Figure 5.2-2, locations 28 and 29), at a pipe joint, if present.
  - Blowdown tank – pipes from each blowdown pit to the blowdown tank (aboveground tank removed). Samples will be collected at the outlet connections of both blowdown pits to the blowdown tank (Figure 5.2-2, locations 3 and 25) and at the inlet connection of the blowdown tank (Figure 5.2-2, location 23).
  - Seepage pit – pipe from the blowdown tank south to the seepage pit and continuing south to the dry well (not located by the 2004 geophysical survey). Samples will be collected immediately downslope of the seepage pit (Figure 5.2-2, location 13).
  - Surveyed pipe from near blowdown pit 266 southeast to blowdown pit 267 outfall – samples will be collected from the northern most end of the pipe (Figure 5.2-2, location 22) and at the connection with the pipe that runs south from blowdown pit Structure 21-267 (Figure 5.2-2, location 27).
  - Middle (floor drain) pipeline (not located by the 2004 geophysical survey) – samples will be collected where the pipe exited the former Building 21-009 and along the length of the pipe approximately every 50 ft south (Figure 5.2-2, locations 14, 15, and 16).

  For any pipeline not identified by the 2004 geophysical survey, exploratory trenching will be conducted to determine whether it exists and, if so, to identify the location. Trenching will be conducted with a backhoe and will progress from the surface to approximately 5 ft bgs. The trench will be visually logged for evidence of non-native materials, disturbed bedding horizons and areas of visible staining. Elevated radiological or organic vapor field-screening results will be

documented. Trenching will continue in the historically identified areas until the middle pipeline is located, evidence of a former pipeline is found, or the absence of the middle pipeline in the historical area has been verified. If a pipe or evidence of a former pipe is not identified during field activities, confirmation samples will be collected from location(s) where the pipe was most likely located using the proposed sampling map as a guide.

Found pipelines and backfilled former pipeline beds will be carefully excavated and inspected for visible signs of leakage. Where elevated levels of VOCs and/or radionuclides are present, as determined by field screening, or where visible evidence of a leak is found (e.g., stained soil, break in the pipe), soil samples will be collected immediately beneath the pipeline to define vertical extent.

At each location, a sample will be collected at the 0- to 1.0-ft and 2.0- to 3.0-ft depth intervals. The zero depth is defined as immediately beneath the pipe or at the bottom of the pipe bed for pipelines that no longer exist.

- *Outfall investigation. The outfall areas of the pipes coming from the blowdown pits and the middle pipeline will be sampled.*
    - Blowdown pit Structure 21-266 pipe outfall. One borehole will be advanced in the center of the outfall, 0.5 ft downslope from the mouth of the outfall pipe (Figure 5.2-2, location BH-1). Samples will be collected from the 0- to 0.5-ft, 2.0- to 3.0-ft, and 5.0- to 6.0-ft depth intervals. Samples will be collected 5 ft to the west and east of the borehole location (Figure 5.2-2, locations 6, and 7), at the 0- to 0.5-ft and 2.0- to 3.0-ft depth intervals. Samples will be collected north of the fence (Figure 5.2-2, locations 8, 9, and 10), and 20 ft and 30 ft downslope of location 8 (Figure 5.2-2, locations 11 and 12). Samples will be collected at the 0- to 0.5-ft and 2.0- to 3.0-ft depth intervals.
    - Middle (floor drain) pipeline outfall. One borehole will be advanced in the center of the outfall, 0.5 ft downslope of the mouth of the outfall pipe (Figure 5.2-2, location BH-7). Samples will be collected from the 0- to 0.5-ft, 2.0- to 3.0-ft, and 5.0- to 6.0-ft depth intervals. Samples will be collected 5 ft to the west and east of the borehole location (Figure 5.2-2, locations 17, and 18), at the 0- to 0.5-ft and 2.0- to 3.0-ft depth intervals. One sample location will be located downslope of the borehole and just north of the fence (Figure 5.2-2, location 19) and 20 ft and 30 ft downslope of location 19 (Figure 5.2-2, locations 20 and 21, respectively). Samples will be collected at the 0- to 0.5-ft and 2.0- to 3.0-ft depth intervals.
    - Blowdown pit Structure 21-267 pipe outfall. One borehole will be advanced in the center of the outfall, 0.5 ft downslope of the mouth of the outfall pipe (Figure 5.2-2, location BH-2). Samples will be collected from the 0- to 0.5-ft, 2.0- to 3.0-ft, and 5.0- to 6.0-ft depth intervals. Samples will be collected 5 ft to the west and east of the borehole location (Figure 5.2-2, locations 30, and 31), at the 0- to 0.5-ft and 2.0- to 3.0-ft depth intervals. Samples will be collected north of the fence (Figure 5.2-2, locations 32, 33, and 34), and 20 ft and 30 ft downslope of location 34 (Figure 5.2-2, locations 35 and 36, respectively). Samples will be collected at the 0- to 0.5-ft and 2.0- to 3.0-ft depth intervals.

5.3 SWMU 21-022(f), Sump and Pipeline

SWMU 21-022(f) consists of a sump and a pipeline (Figure 5.3-1).

5.3.1 Operational History

- 1945—Building 21-152 was originally built to serve as a laboratory for polonium initiator research and production. A sump (Structure 21-173) conveyed liquid effluent that originated from the building's laboratory sinks through a 6-in. diameter steel pipe to MDA U (Francis 2001, 76211; LASL 1946, 24460). The brick-lined sump was approximately 5 ft 4 in. in diameter and located approximately 13 ft from the northeast corner of Building 21-152 (LASL 1946, 24460; LASL 1945, 01093). The depth of the sump is a minimum of 6 ft 10 in. bgs.
- 1965—The sump (Structure 21-173) was connected to manhole 21-221 which connects to the Waste Disposal Plant (Building 21-257) (Francis 2001, 76211).

5.3.2 Summary of Previous Investigations

SWMU 21-022(f) has not previously been sampled. However, in 2004, radiological and geophysical surveys were completed (results are presented in Appendixes D and E, respectively). The geophysical survey located the manhole and sump but did not locate any pipelines.

SWMU 21-022(f) Data

No sampling has been conducted at SWMU 21-022(f); therefore, there are no sample results to discuss.

5.3.3 Scope of Activities for SWMU 21-022(f)

Sampling and Excavation Activities

The proposed sample locations at SWMU 21-022(f) are shown in Figure 5.3-2. Table 5.3-1 provides a summary of the proposed sample locations, depths, objectives each sample addresses, and proposed analytical suites.

Samples will be analyzed for TAL metals, cyanide, nitrates, perchlorates, organic chemicals (VOCs and SVOCs [VOCs only in samples deeper than 0.5 ft bgs]), radionuclides (gamma spectroscopy, americium-241, isotopic plutonium, isotopic uranium, strontium-90, and tritium), moisture, and pH. If field screening indicates the presence of VOCs, a deeper sample will be collected and analyzed for full suite. Field screening will determine the sample(s) with the highest radionuclide and/or organic contamination. If field-screening instruments cannot determine which sample(s) contain(s) the highest levels of radionuclides or organic compounds, samples collected from the location where contamination would most likely be present as indicated by site history (i.e., sump, outfall, etc.) will be selected. The selected sample(s) will be sent to an off-site fixed laboratory for quick turn-around analysis of PCBs, HE, dioxins, and furans (NMED 2005, 89314). The sample results will be transmitted to NMED, via fax, for review. Within 1 week of receipt of the results, we anticipate that NMED will contact the LANL project leader to discuss the results. If analytes from the four additional analyses are not detected, or detected at low levels reflective of anthropogenic activity, the remaining samples will not be analyzed for the four additional analyses per agreement with NMED. If the additional analytes are detected at levels attributable to the site, the remaining stored aliquots will be submitted to the analytical laboratory for the additional analyses. Prior to demobilization, laboratory results will be reviewed to assess if the nature and extent of contamination have been determined. If nature and extent have not been determined, then step-out samples will be collected.

During structure removal activities, excavation of soil and/or rock (including all visibly stained areas) will proceed until the radionuclide and organic vapor field-screening results indicate all contaminated material has been removed. Confirmation samples will be collected as these activities are completed. Analytical

laboratory results will be reviewed to determine if additional removal activities and associated confirmation sampling are required due to the presence of areas with contaminant concentrations greater than industrial SSLs or SALs. Sampling at SWMU 21-022(f) will consist of the following activities:

- *Sump 21-173 excavation and sampling.* The 5 ft 4 in.-diameter brick-lined sump will be carefully excavated and inspected for evidence of leaks (e.g., field screening, stained soil). One borehole will be advanced in the center of the excavation to determine the vertical extent of contamination (Figure 5.3-2, location BH-1). Borehole samples will be collected from the 0- to 1.0-ft, 5.0- to 6.0-ft, and 10.0- to 11.0-ft depth intervals.
- *Pipeline excavation and sampling.* The following pipelines will be excavated and sampled:
    - The pipeline or backfilled former pipeline bed that runs from the sump (Structure 21-173) northeast to MDA U. The pipeline will be carefully excavated and inspected for evidence of leaks. Where elevated levels of VOCs and/or radionuclides are present, as determined by field screening, or where visible evidence of a leak is found (e.g., stained soil, break in the pipe), samples will be collected immediately beneath the pipe to define vertical extent. If no field-screening evidence or no visible evidence of a leak is found, samples will be collected from locations beneath the pipeline (or where evidence of a former pipeline exists) at the sump outlet connection to the pipeline, approximately every 50 ft northeast of sump (beneath a pipeline joint, if present), and at the northeast end of the pipe just south of the MDA U fence (Figure 5.3-2, locations 2 through 5).
    - The pipeline or backfilled former pipeline bed that runs from the sump (Structure 21-173), north to manhole 21-221. The pipeline will be carefully excavated and inspected for evidence of leaks. Where elevated levels of VOCs and/or radionuclides are present, as determined by field screening, or where visible evidence of a leak is found (e.g., stained soil, break in the pipe), samples will be collected immediately beneath the pipe to define vertical extent. If no field-screening evidence or no visible evidence of a leak is found, samples will be collected from beneath the pipeline (or where evidence of a former pipeline exists) at the sump outlet connection to the pipeline, and at the pipeline connection with the manhole (Figure 5.3-2, locations 1 and 6).
    - At each location, a sample will be collected at the 0- to 1.0-ft and 2.0- to 3.0-ft depth intervals. The zero depth is defined as immediately beneath the pipe or at the bottom of the pipe bed for pipelines that no longer exist.
    - No pipelines were located during the geophysical survey. If the pipelines or evidence of former pipelines are not found by visual inspection or field screening during excavation activities, exploratory trenching will be conducted to identify their location. Trenching will be conducted with a backhoe and will progress from the surface to approximately 5 ft bgs. The trench will be visually logged for evidence of non-native materials, disturbed bedding horizons and areas of visible staining. Elevated radiological or organic vapor field-screening results will be documented. Trenching will continue in the historically identified area until the pipeline is located, evidence of a former pipeline is found, or the absence of a pipeline at that location has been verified. If a pipe or evidence of a former pipe is not identified during field activities, confirmation samples will be collected from location(s) where the pipe was most likely located using the proposed sampling map as a guide.

5.4 Consolidated Unit 21-022(h)-99, Sumps, Pipeline, and Outfall

Consolidated Unit 21-022(h)-99 consists of SWMUs 21-022(h) (a sump, drainline, and outfall), 21-022(i) (a sump), and 21-022(j) (a sump) (Figure 5.4-1).

5.4.1 Operational History

SWMU 21-022(h) consists of a sump (Structure 21-202), its drainline, and an outfall.

- 1961 to 1962—Structure 21-202 was constructed of 36-in. diameter corrugated metal pipe to receive industrial waste water and drainage from the Building 21-150 basement floor and roof drains and route effluent through a 24-in.-diameter pipe that discharged to Los Alamos Canyon (LANL 1991, 07529, p. 18-55).
- 1991—The outfall discharged only treated cooling water from this time forward, and no documentation of removal of structures is available (LANL 1991, 07529, p. 15-53).

SWMU 21-022(i) consists of a sump in the equipment room at the southeast corner of Building 21-002.

- 1945—Building 21-002 was constructed, but no documentation is available indicating if the sump was constructed at the same time (LANL 1991, 07529, p. 18-55).
- 1994/1995—Sump was removed during the D&D of Building 21-003. The discharge point for sump effluent is unclear since no drainlines were identified south of the equipment room.

SWMU 21-022(j) consists of a sump (18 in. × 18 in. × 8 ft deep) at the south end of Building 21-003 that received drainage from the equipment room.

- 1945—Building 21-003 was constructed, but no documentation is available indicating if the sump was constructed at the same time (LANL 1991, 07529, p. 18-55 and 18-58).
- 1994/1995—The sump was removed during D&D activities at Building 21-003. The floor of the sump was located approximately 14 ft below ground level (LANL 1996, 53784, p. 1)

5.4.2 Summary of Previous Investigations

Summarized below are previous investigations conducted at this site.

- 1992—An RFI was conducted (LANL 1994, 31591) at the outfall portion of SWMU 21-022(h). A radiological field survey was conducted and eight soil samples were collected from three locations in the outfall channel. Soil samples were collected from the 0- to 0.5-ft, 0.5- to 1.0-ft, and 1.0- to 1.5-ft depth intervals from locations 21-01380 and 21-01381 (Figure 5.4-1). Bedrock was encountered at the 1.0-ft depth at location 21-01382, therefore, soil samples were collected from the 0- to 0.5-ft and 0.5- to 1.0-ft depth intervals. Soil samples were analyzed at an off-site fixed laboratory for inorganic chemicals and radionuclides (americium-241, isotopic plutonium, and strontium-90). The RFI Outfalls Investigation report recommended deferring a decision about SWMU 21-022(h) until the associated sump (Structure 21-202) had been characterized (LANL 1994, 31591).
- 1995—A VCA was conducted at SWMU 21-022(j) in conjunction with D&D activities at Building 21-003 that included removal of the sump (LANL 1996, 53784). The VCA consisted of sampling beneath the removed sump to characterize potential contamination. Three confirmatory samples were collected from one location (21-04041) in the center of the footprint of the former sump. The samples were collected in tuff from the 0- to 0.5-ft, 0.5- to 1.0-ft, and 1.0- to 1.5-ft depth interval beneath the floor of the sump. Samples were field screened for radiation and sent to an off-site fixed laboratory to be analyzed for inorganic chemicals, organic chemicals (VOCs, SVOCs), and radionuclides (americium-241, gamma spectroscopy, tritium, isotopic uranium, isotopic plutonium, isotopic thorium, and strontium-90).

- SWMU 21-022(i) has not been previously investigated or sampled.
- 2004—Radiological and geophysical surveys were completed (results are presented in Appendixes D and E, respectively). The geophysical survey located the sump, drainline, and outfall associated with 21-022(h). Evidence of previously removed sumps of SWMUs 21-022(i) and (j) was not identified.

SWMU 21-022(h) Data

The SWMU 21-022(h) site data from 1992 were collected from soil and compared with soil BVs/FVs (LANL 1998, 59730). Table 5.4-1 and Figure 5.4-1 present SWMU 21-022(h) inorganic chemical concentrations greater than BVs. Table 5.4-2 and Figure 5.4-2 present SWMU 21-022(h) radionuclide activities greater than FVs and at depths where the FV does not apply. Sample results for inorganic chemicals and radionuclides were also compared to the maximum of the range of their respective background data sets. Those analytes with detections and/or detection limits greater than their respective BVs/FVs and the maximum of the background data set were designated as COPCs.

Inorganic Chemicals

Inorganic Chemicals Detected at Concentrations Greater Than BVs. Antimony, cadmium, calcium, copper, lead, and zinc were detected at concentrations greater than their respective BVs (Figure 5.4-1).

- Antimony was detected in one soil sample at 8.3 mg/kg (location 21-01380, 0.5- to 1.0-ft depth interval), a concentration greater than the soil BV (0.83 mg/kg) and the maximum antimony concentration in the soil background data set (1.0 mg/kg). Therefore, antimony is a COPC.
- Cadmium was detected in six soil samples ranging from of 0.68 to 0.97 mg/kg (the maximum was from location 21-01380, 0- to 0.5-ft depth interval), concentrations were greater than the soil BV (0.4 mg/kg) but less than the maximum cadmium concentration in the soil background data set (2.6 mg/kg). Therefore, cadmium is not a COPC.
- Calcium was detected in one soil sample at 6600 mg/kg (location 21-01382, 0- to 0.5-ft depth interval), a concentration greater than the soil BV (6120 mg/kg), but less than the maximum calcium concentration in the soil background data set (14,000 mg/kg). Therefore, calcium is not a COPC.
- Copper was detected in two soil samples at 28.3 and 49.3 mg/kg (the maximum was from location 21-01380, 0- to 0.5-ft depth interval), concentrations greater than the soil BV (14.7 mg/kg) and the maximum copper concentration in the soil background data set (16.0 mg/kg). Therefore, copper is a COPC.
- Lead was detected in two soil samples at 22.5 and 26.2 mg/kg (the maximum was from location 21-01380, 0- to 0.5-ft depth interval), concentrations greater than the soil BV (22.3 mg/kg), but less than the maximum lead concentration in the soil background data set (28.0 mg/kg). Therefore, lead is not a COPC.
- Zinc was detected in two soil samples at 85.1 and 119 mg/kg (the maximum was from location 21-01380, 0- to 0.5-ft depth interval), concentrations greater than the soil BV (48.8 mg/kg) and the maximum zinc concentration in the soil background data set (75.5 mg/kg). Therefore, zinc is a COPC.

Inorganic Chemicals not Included in Background Data. Lithium, molybdenum, and strontium do not have background data and, therefore, have no BVs for comparison.

- Lithium was detected in eight samples ranging from 2.3 to 6.6 mg/kg (the maximum was from location 21-01382, 0.5- to 1.0-ft depth interval). No established background levels are available for lithium. The lithium concentrations at this site are similar to the concentrations found at most of the corrective action sites (most are below 11 mg/kg), indicating that the lithium levels are not elevated as a result of releases. Therefore, lithium is not a COPC.
- Molybdenum was detected in one sample at 6.4 mg/kg (location 21-01380, 0.5- to 1.0-ft depth interval). Therefore, molybdenum is a COPC.
- Strontium was detected in eight samples ranging from 5.4 to 24.9 mg/kg (the maximum was from location 21-01382, 0- to 0.5-ft depth interval). No established background levels are available for strontium. The strontium concentrations at this site are similar to the concentrations found at most of the corrective action sites (most are below 36 mg/kg), indicating that the strontium levels are not elevated as a result of releases. Therefore, strontium is not a COPC.

Inorganic Chemicals with Detection Limits Greater Than BVs. Antimony and cadmium detection limits were greater than their respective BVs in some samples.

- Antimony detection limits, ranging from 4.6 to 7.1 mg/kg (the maximum detection limit was from location 21-01380), were greater than the soil BV (0.83 mg/kg) and the maximum antimony concentration in the soil background data set (1.0 mg/kg) in seven soil samples. Antimony was already determined to be a COPC due to detected concentrations greater than BVs. Therefore, antimony is a COPC due to detected concentrations and detection limits greater than BVs.
- Cadmium detection limits, 0.55 and 0.62 mg/kg (the maximum detection limit was from location 21-01380), were greater than the soil BV (0.4 mg/kg), but less than the maximum cadmium concentration in the soil background data set (2.6 mg/kg) in two soil samples. Therefore, cadmium is not a COPC due to elevated detection limits.

Inorganic Chemical Summary. Antimony, copper, molybdenum, and zinc are inorganic COPCs.

Organic Chemicals

VOCs. VOCs were not analyzed at an off-site fixed laboratory.

SVOCs. SVOCs were not analyzed at an off-site fixed laboratory.

Organic Chemical Summary. Organic chemicals were not analyzed at an off-site fixed laboratory; therefore, the potential for organic chemical contamination was not addressed.

Radionuclides

Fallout Radionuclides. Americium-241, plutonium-238, and plutonium-239 were detected at activities greater than their respective FVs in samples collected from the outfall area of SWMU 21-022(h) (Figure 5.4-2). Since FVs are only applicable within the first 0.5 ft of surface soils, all fallout radionuclides detected in the samples deeper than the first 0.5 ft of surface soils are COPCs.

- Americium-241 was detected in all three surface soil samples ranging from 0.35 to 1.41 pCi/g (the maximum was from location 21-01380, 0- to 0.5-ft depth interval), activities greater than the soil FV and the maximum americium-241 activity in the soil background data set (both are 0.013 pCi/g). Americium-241 was also detected ranging from 0.08 to 0.68 pCi/g (the maximum was from location 21-01380, 0.5- to 1.0-ft depth interval) in three outfall subsurface samples at depths where the FV does not apply. Therefore, americium-241 is a COPC.

- Plutonium-238 was detected in all three surface soil samples ranging from 0.78 to 4.9 pCi/g (the maximum was from location 21-01380, 0- to 0.5-ft depth interval), activities greater than the soil FV (0.023 pCi/g), and greater than the maximum plutonium-238 activity in the soil background data set (0.037 pCi/g). Plutonium-238 was also detected ranging from 0.28 to 3.67 pCi/g (the maximum was from location 21-01380, 0.5- to 1.0-ft depth interval) in three outfall subsurface samples at depths where the FV does not apply. Therefore, plutonium-238 is a COPC.
- Plutonium-239 was detected in all three surface soil samples ranging from 2.63 to 14.77 pCi/g (the maximum was from location 21-01380, 0- to 0.5-ft depth interval), activities greater than the soil FV (0.054 pCi/g) and the maximum plutonium-239 activity in the soil background data set (0.055 pCi/g). Plutonium-239 was also detected ranging from 0.62 to 6.53 pCi/g (the maximum was from location 21-01380, 0.5- to 1.0-ft interval) in three outfall subsurface samples at depths where the FV does not apply. Therefore, plutonium-239 is a COPC.

Radionuclide Summary. Americium-241, plutonium-238, and plutonium-239 are radionuclide COPCs.

5.4.3 Scope of Activities for SWMU 21-022(h)

Sampling and Excavation Activities

The proposed sample locations at SWMU 21-022(h) are shown in Figure 5.4-3. Table 5.4-3 provides a summary of the proposed sample locations, depths, objectives each sample addresses, and proposed analytical suites.

Samples will be analyzed for TAL metals, cyanide, nitrates, perchlorates, organic chemicals (VOCs and SVOCs [VOCs only in samples deeper than 0.5 ft bgs]), radionuclides (gamma spectroscopy, americium-241, isotopic plutonium, isotopic uranium, strontium-90, and tritium), moisture, and pH. If field screening indicates the presence of VOCs, a deeper sample will be collected and analyzed for full suite. Field screening will determine the sample(s) with the highest radionuclide and/or organic contamination. If field-screening instruments cannot determine which sample(s) contain(s) the highest levels of radionuclides or organic compounds, samples collected from the location where contamination would most likely be present as indicated by site history (i.e., sump, outfall, etc.) will be selected. The selected sample(s) will be sent to an off-site fixed laboratory for quick turn-around analysis of PCBs, HE, dioxins, and furans (NMED 2005, 89314). The sample results will be transmitted to NMED, via fax, for review. Within 1 week of receipt of the results, we anticipate that NMED will contact the LANL project leader to discuss the results. If analytes from the four additional analyses are not detected, or detected at low levels reflective of anthropogenic activity, the remaining samples will not be analyzed for the four additional analyses per agreement with NMED. If the additional analytes are detected at levels attributable to the site, the remaining stored aliquots will be submitted to the analytical laboratory for the additional analyses. Prior to demobilization, laboratory results will be reviewed to assess if the nature and extent of contamination have been determined. If nature and extent have not been determined, then step-out samples will be collected.

During structure removal activities, excavation of soil and/or rock (including all visibly stained areas) will proceed until the radionuclide and organic vapor field-screening results indicate all contaminated material has been removed. Confirmation samples will be collected as these activities are completed. Analytical laboratory results will be reviewed to determine if additional removal activities and associated confirmation sampling are required due to the presence of areas with contaminant concentrations greater than industrial SSLs or SALs. Sampling at SWMU 21-022(h) will consist of the following activities:

- *Sump 21-202 excavation and sampling.* The 36-in. diameter corrugated metal sump will be carefully excavated and inspected for evidence of leaks (e.g., field screening, stained soil, holes in

the metal). One borehole will be advanced in the center of the excavation to determine the vertical extent of contamination (Figure 5.4-3, location BH-1). Borehole samples will be collected from the 0 to 1.0-ft, 5.0- to 6.0-ft, and 10.0- to 11.0-ft depth intervals. Samples will also be collected from beneath the pipeline at the inlet and outlet connections to the sump (Figure 5.4-3, locations 1 and 2) at the 0- to 1.0-ft and 2.0- to 3.0-ft depth intervals.

- *Pipeline excavation and sampling.* The pipeline that runs south from Building 21-150 to the sump (Structure 21-202) to the outfall will be carefully excavated and inspected for evidence of leaks. Where elevated levels of VOCs and/or radionuclides are present, as determined by field screening, or where visible evidence of a leak is found (e.g., stained soil, break in the pipe), samples will be collected immediately beneath the pipe to define vertical extent. If no field-screening evidence or visible evidence of a leak is found, samples will be collected from locations beneath the pipeline at approximately every 50 ft south of the sump (beneath a pipeline joint, if present) (Figure 5.4-3, locations 3 and 4). At each location, a sample will be collected at the 0- to 1.0-ft and 2.0- to 3.0-ft depth intervals. The zero depth is defined as immediately beneath the pipe.
- *Outfall investigation.* One borehole will be advanced in the center of the outfall, 0.5 ft downslope from the mouth of the outfall pipe (Figure 5.4-3, location BH-2). Borehole samples will be collected from the 0- to 0.5-ft, 2.0- to 3.0-ft, and 5.0- to 6.0-ft depth intervals. Samples will be collected 5 ft to the west and east of the borehole location (Figure 5.4-3, locations 5 and 6). One sample location will be established downslope from the mouth of the pipe, in the center of a distinguishable drainage, or in a catchment basin aligned with the mouth of the pipe 10 ft downslope (or as close to the mesa cliff edge as possible) from BH-2 (Figure 5.4-3, location 8). This sample location will be flanked by sample locations 10 ft to the west and east (Figure 5.4-3, locations 7 and 9). Samples will be collected from the 0- to 0.5-ft and 2.0- to 3.0-ft depth intervals.
- *Bench investigation.* On the topographical bench beneath the mesa cliff edge, two sample locations will be established downslope from the mouth of the pipe in the center of a distinguishable drainage, or in a catchment basin aligned with the mouth of the pipe at the north and south ends of the bench (Figure 5.4-3, locations 11 and 14). These sample locations will each be flanked by one sample location 20 ft to the west and one sample location 20 ft to the east (Figure 5.4-3, locations 10, 12, 13, and 15). Samples will be collected at depths of 0–0.5 ft and 2.0–3.0 ft.

SWMU 21-022(i) Data

No sampling has been conducted at SWMU 21-022(i); therefore, there are no sample results to discuss.

5.4.4 Scope of Activities for SWMU 21-022(i)

Sampling and Excavation Activities

The proposed sample locations at SWMU 21-022(i) are shown in Figure 5.4-3. Table 5.4-3 provides a summary of the proposed sample locations, depths, objectives each sample addresses, and proposed analytical suites.

Samples will be analyzed for TAL metals, cyanide, nitrates, perchlorates, organic chemicals (VOCs and SVOCs [VOCs only in samples deeper than 0.5 ft bgs]), radionuclides (gamma spectroscopy, americium-241, isotopic plutonium, isotopic uranium, strontium-90, and tritium), moisture, and pH. If field screening indicates the presence of VOCs, a deeper sample will be collected and analyzed for full suite. Field screening will determine the sample(s) with the highest radionuclide and/or organic contamination. If field-screening instruments cannot determine which sample(s) contain(s) the highest levels of radionuclides or

organic compounds, samples collected from the location where contamination would most likely be present as indicated by site history (i.e., sump, outfall, etc.) will be selected. The selected sample(s) will be sent to an off-site fixed laboratory for quick turn-around analysis of PCBs, HE, dioxins, and furans (NMED 2005, 89314). The sample results will be transmitted to NMED, via fax, for review. Within 1 week of receipt of the results, we anticipate that NMED will contact the LANL project leader to discuss the results. If analytes from the four additional analyses are not detected, or detected at low levels reflective of anthropogenic activity, the remaining samples will not be analyzed for the four additional analyses per agreement with NMED. If the additional analytes are detected at levels attributable to the site, the remaining stored aliquots will be submitted to the analytical laboratory for the additional analyses. Prior to demobilization, laboratory results will be reviewed to assess if the nature and extent of contamination have been determined. If nature and extent have not been determined, then step-out samples will be collected.

During structure removal activities, excavation of soil and/or rock (including all visibly stained areas) will proceed until the radionuclide and organic vapor field-screening results indicate all contaminated material has been removed. Confirmation samples will be collected as these activities are completed. Analytical laboratory results will be reviewed to determine if additional removal activities and associated confirmation sampling are required due to the presence of areas with contaminant concentrations greater than industrial SSLs or SALs. Sampling at SWMU 21-022(i) will consist of the following activities:

- *Location of removed sump investigation.* Exploratory trenching will be conducted to identify the former sump location. Trenching will be conducted with a backhoe and will progress from the surface to approximately 5 ft bgs. The trench will be visually logged for evidence of non-native materials, disturbed bedding horizons and areas of visible staining. Elevated radiological or organic vapor field-screening results will be documented. Trenching will continue in the historically identified area until evidence of a former sump is found or the absence of evidence a sump at that location has been verified. If found, one borehole will be advanced in the center of the sump excavation area (Figure 5.4-3, location BH-3) to determine the vertical extent of contamination. Borehole samples will be collected from the 0- to 1.0-ft, 5.0- to 6.0-ft and 10.0- to 11.0-ft depth intervals. If evidence of a former sump is not identified during field activities, confirmation samples will be collected from location(s) where the sump was most likely located using the proposed sampling map as a guide.

SWMU 21-022(j) Data

The SWMU 21-022(j) site data from the 1995 VCA (LANL 1996, 53784) were collected from tuff and compared with tuff BVs/FVs (LANL 1998, 59730). Table 5.4-4 and Figure 5.4-1 present SWMU 21-022(j) inorganic chemical concentrations greater than BVs. Table 5.4-5 and Figure 5.4-1 present SWMU 21-022(j) detected VOC and SVOC concentrations. Table 5.4-6 and Figure 5.4-2 present SWMU 21-022(j) radionuclide activities greater than BVs/FVs and at depths where the FV does not apply. Sample results for inorganic chemicals and radionuclides were also compared to the maximum of the range of their respective background data sets. Those analytes with detections and/or detection limits greater than their respective BVs/FVs and the maximum of the background data set were designated as COPCs. Detected organic chemicals were designated as COPCs.

Inorganic Chemicals

Inorganic Chemicals Detected at Concentrations Greater Than BVs. Barium, calcium, cobalt, copper, nickel, and zinc were detected at concentrations greater than their respective BVs (Figure 5.4-1).

- Barium was detected in two tuff samples at 88 and 100 mg/kg (the maximum was from location 21-04041, 0.5- to 1.0-ft depth interval), concentrations greater than the tuff BV (46 mg/kg) and the maximum barium concentration in the tuff background data set (51.6 mg/kg). Therefore, barium is a COPC.
- Calcium was detected in all three tuff samples ranging from 3740 to 6430 mg/kg (the maximum was from location 21-04041, 0- to 0.5-ft depth interval), concentrations greater than the tuff BV (2200 mg/kg) and the maximum calcium concentration in the tuff background data set (2230 mg/kg). Therefore, calcium is a COPC.
- Cobalt was detected in two tuff samples at 3.6 mg/kg each (location 21-04041, 0- to 0.5-ft and 0.5- to 1.0-ft depth intervals), concentrations greater than the tuff BV (3.14 mg/kg and there is no maximum cobalt concentration in the tuff background data set). Therefore, cobalt is a COPC.
- Copper was detected in two tuff samples at 6.0 and 6.4 mg/kg (the maximum was from location 21-04041, 0.5- to 1.0-ft depth interval), concentrations greater than the tuff BV (4.66 m/kg) and one concentration greater than the maximum copper concentration in the tuff background data set (6.2 mg/kg). Therefore, copper is a COPC.
- Nickel was detected in one tuff sample at 7.2 mg/kg (location 21-04041, 0.5- to 1.0-ft depth interval), a concentration greater than the tuff BV (6.58 mg/kg), and slightly greater than the maximum nickel concentration in the tuff background data set (7.0 mg/kg). Therefore, nickel is a COPC.
- Zinc was detected in one tuff sample at 65.5 mg/kg (location 21-04041, 0.5- to 1.0-ft depth interval), a concentration greater than the tuff BV (63.5 mg/kg) and equal to the maximum zinc concentration in the tuff background data set (65.5 mg/kg). Therefore, zinc is a COPC.

Inorganic Chemicals with Detection Limits Greater Than BVs. Antimony was not detected at concentrations greater than the BV. However, the detection limits were greater than the tuff BV.

- Antimony detection limits of 6.1 and 6.2 mg/kg (the maximum detection limit was from location 21-04041) were greater than the tuff BV (0.5 mg/kg) and the maximum antimony concentration in the tuff background data set (0.4 mg/kg) in all three tuff samples. Therefore, antimony is a COPC due to elevated detection limits.

Inorganic Chemical Summary. Antimony, barium, calcium, cobalt, copper, nickel, and zinc are inorganic COPCs.

Organic Chemicals

VOCs. VOCs were detected in all three samples (Figure 5.4-1).

- Methyl-2-pentanone, 4- was detected in all three tuff samples ranging from 0.003 to 0.004 mg/kg (the maximum was from location 21-04041, at both the 0.5- to 1.0-ft and 1.0- to 1.5-ft depth intervals). Therefore, 4-methyl-2-pentanone is a COPC.
- Xylene, 1,2- was detected in two tuff samples at 0.001 and 0.002 mg/kg (location 21-04041, at the 0- to 0.5-ft and 0.5- to 1.0-ft depth intervals, respectively). Therefore, 1,2-xylene is a COPC.

- Xylene (total) was detected in two tuff samples at 0.002 mg/kg (location 21-04041, at both the 0- to 0.5-ft and 0.5- to 1.0-ft depth intervals). Therefore, xylene (total) is a COPC.

SVOCs. An SVOC was detected all three samples (Figure 5.4-1).

- Bis(2-ethylhexyl)phthalate was detected in all three samples ranging from 0.11 to 0.18 mg/kg (the maximum was from location 21-04041, 1.0- to 1.5-ft depth interval). Therefore, bis(2-ethylhexyl)phthalate is a COPC.

Organic Chemical Summary. Bis(2-ethylhexyl)phthalate, 4-methyl-2-pentanone, 1,2-xylene, and xylene (total) are organic COPCs.

Radionuclides

Fallout Radionuclides. Americium-241, cesium-137, plutonium-238, plutonium-239, and strontium-90 were detected in each sample collected beneath the sump (Figure 5.4-2). Since FVs are only applicable within the first 0.5 ft of surface soils, all fallout radionuclides detected in the samples deeper than the first 0.5 ft of surface soils are COPCs.

- Americium-241 was detected in all three tuff samples ranging from 0.4 to 1.5 pCi/g (the maximum was from location 21-04041, 0.5- to 1.0-ft depth interval). Therefore, americium-241 is a COPC.
- Cesium-137 was detected in all three tuff samples ranging from 0.34 to 3.72 pCi/g (the maximum was from location 21-04041, 0.5- to 1.0-ft depth interval). Therefore, cesium-137 is a COPC.
- Plutonium-238 was detected in all three tuff samples ranging from 0.1 to 0.2 pCi/g (the maximum was from location 21-04041, 0- to 0.5-ft and 0.5- to 1.0-ft depth intervals). Therefore, plutonium-238 is a COPC.
- Plutonium-239 was detected in all three tuff samples ranging from 8.1 to 26.2 pCi/g (the maximum was from location 21-04041, 0.5- to 1.0-ft depth interval). Therefore, plutonium-239 is a COPC.
- Strontium-90 was detected in all three tuff samples ranging from 1.38 to 3.07 pCi/g (the maximum was from location 21-04041, 0.5- to 1.0-ft depth interval). Therefore, strontium-90 is a COPC.

Naturally Occurring Radionuclides. Uranium-234 and uranium-235 were detected in each sample collected from the footprint of the sump above background (Figure 5.4-2).

- Uranium-234 was detected in all three tuff samples ranging from 8.66 to 24.3 pCi/g (the maximum was from location 21-04041, 0.5- to 1.0-ft depth interval), activities greater than the tuff BV (1.98 pCi/g). Therefore, uranium-234 is a COPC.
- Uranium-235 was detected in all three tuff samples ranging from 0.49 to 1.92 pCi/g (the maximum was from location 21-04041, 0.5- to 1.0-ft depth interval), activities greater than the tuff BV (0.09 pCi/g). Therefore, uranium-235 is a COPC.

Radionuclide Summary. Americium-241, cesium-137, plutonium-238, plutonium-239, strontium-90, uranium-234, and uranium-235 are radionuclide COPCs.

5.4.5 Scope of Activities for SWMU 21-022(j)

Sampling and Excavation Activities

The proposed sample location at SWMU 21-022(j) is shown in Figure 5.4-3. Table 5.4-3 provides a summary of the proposed sample location, depths, objectives the sample addresses, and proposed analytical suites.

Samples will be analyzed for TAL metals, cyanide, nitrates, perchlorates, organic chemicals (VOCs and SVOCs [VOCs only in samples deeper than 0.5 ft bgs]), radionuclides (gamma spectroscopy, americium-241, isotopic plutonium, isotopic uranium, strontium-90, and tritium), moisture, and pH. If field screening indicates the presence of VOCs, a deeper sample will be collected and analyzed for full suite. Field screening will determine the sample(s) with the highest radionuclide and/or organic contamination. If field-screening instruments cannot determine which sample(s) contain(s) the highest levels of radionuclides or organic compounds, samples collected from the location where contamination would most likely be present as indicated by site history (i.e., sump, outfall, etc.) will be selected. The selected sample(s) will be sent to an off-site fixed laboratory for quick turn-around analysis of PCBs, HE, dioxins, and furans (NMED 2005, 89314). The sample results will be transmitted to NMED, via fax, for review. Within 1 week of receipt of the results, we anticipate that NMED will contact the LANL project leader to discuss the results. If analytes from the four additional analyses are not detected, or detected at low levels reflective of anthropogenic activity, the remaining samples will not be analyzed for the four additional analyses per agreement with NMED. If the additional analytes are detected at levels attributable to the site, the remaining stored aliquots will be submitted to the analytical laboratory for the additional analyses. Prior to demobilization, laboratory results will be reviewed to assess if the nature and extent of contamination have been determined. If nature and extent have not been determined, then step-out samples will be collected.

During structure removal activities, excavation of soil and/or rock (including all visibly stained areas) will proceed until the radionuclide and organic vapor field-screening results indicate all contaminated material has been removed. Confirmation samples will be collected as these activities are completed. Analytical laboratory results will be reviewed to determine if additional removal activities and associated confirmation sampling are required due to the presence of areas with contaminant concentrations greater than industrial SSLs or SALs. Sampling at SWMU 21-022(j) will consist of the following activities:

- *Location of removed sump investigation.* Exploratory trenching will be conducted to identify the former sump location. Trenching will be conducted with a backhoe and will progress from the surface to approximately 5 ft bgs. The trench will be visually logged for evidence of non-native materials, disturbed bedding horizons and areas of visible staining. Elevated radiological or organic vapor field-screening results will be documented. Trenching will continue in the historically identified area until evidence of a former sump is found or the absence of evidence a sump at that location has been verified. If found, one borehole will be advanced in the center of the sump excavation area (Figure 5.4-3, location BH-4) to determine the vertical extent of contamination. Borehole samples will be collected from the 0- to 1.0-ft, 5.0- to 6.0-ft and 10.0- to 11.0-ft depth intervals. If evidence of a former sump is not identified during field activities, confirmation samples will be collected from location(s) where the sump was most likely located using the proposed sampling map as a guide.

5.5 Consolidated Unit 21-023(a)-99, Septic Systems

Consolidated Unit 21-023(a)-99 consists of SWMU 21-023(a) (a septic tank and drainlines), SWMU 21-023(b) (a septic tank and drainlines), and SWMU 21-023(d) (a septic tank and drainlines) (Figure 5.5-1).

5.5.1 Operational History

SWMU 21-023(a) consists of a steel-reinforced concrete septic tank, and 4-in.cast iron inlet and outlet lines connected to existing waste lines to the north and manhole 21-274 to the south (LANL 1999, 71295).

- 1945—Building 21-003 was constructed. Documentation of the septic system construction date is not available.
- 1966—Septic tank (Structure 21-225, 5 × 9 × 6 ft deep) and lines were removed when additions were made to Building 21-003 and the new sewage treatment plant opened.

SWMU 21-023(b) consists of a septic tank (Structure 21-142) and 4-in. cast iron inlet and outlet lines connected to Structure 21-084, which connected to existing waste lines to the north and manhole 21-274 to the south (LANL 1999, 71295).

- 1945—Building 21-003 and the septic system were constructed.
- 1966—Septic tank (500-gal., approximately 6.5-ft-diameter, circular) and lines may have been removed when the new sewage treatment plant opened.

SWMU 21-023(d) consists of a septic tank and 4-in. cast iron inlet and outlet lines, which were probably connected to the north to the 4-in. line leading to the treatment facilities (Building 21-035) and to the south to manhole 21-273 (LANL 1999, 71295).

- 1960—The 5 × 3 × 5.5 ft deep steel-reinforced concrete septic tank (Structure 21-187) was installed under room 364 of Building 21-003 and received industrial waste and sewage.
- 1966 (approximately)—The septic tank was bypassed, and the pipeline was connected to the new sewage treatment plant.
- 1966—The septic tank and lines were removed when additions were made to Building 21-003 and the new sewage treatment plant opened.

5.5.2 Summary of Previous Investigations

Summarized below are previous investigations conducted at this site.

- 1998/1999—D&D characterization included direct surveys of alpha and beta activity (using a pancake GM detector and a 75-cm^2 alpha scintillation detector). No beta or alpha activity was detected in the locations of any of the tanks.
- 1999—A geophysical investigation confirmed that the septic tanks had been removed. The inlet and outlet lines associated with SWMU 21-023(a) and SWMU 21-023(b) were also confirmed as removed. The inlet and outlet lines associated with SWMU 21-023(d) were determined to have been left in place (LANL 1999, 71295).
- 2004—Radiological and geophysical surveys were completed (results are presented in Appendixes D and E, respectively). The cleanout for tank 21-023(d) was visible in the field. The line itself was not located due to the interference from reinforced concrete which was present in the vicinity of the pipeline. No evidence of the removed tank excavation area was identified.

Consolidated Unit 21-023(a)-99 Data

No sampling has been conducted at Consolidated Unit 21-023(a)-99; therefore, there are no sample results to discuss.

5.5.3 Scope of Activities for Consolidated Unit 21-023(a)-99

Sampling and Excavation Activities

The proposed sample locations at Consolidated Unit 21-023(a)-99 are shown in Figure 5.5-2. Table 5.5-1 provides a summary of the proposed sample locations, depths, objectives each sample addresses, and proposed analytical suites.

Samples will be analyzed for TAL metals, cyanide, nitrates, perchlorates, organic chemicals (VOCs and SVOCs [VOCs only in samples deeper than 0.5 ft bgs]), radionuclides (gamma spectroscopy, americium-241, isotopic plutonium, isotopic uranium, strontium-90, and tritium), moisture, and pH. If field screening indicates the presence of VOCs, a deeper sample will be collected and analyzed for full suite. Field screening will determine the sample(s) with the highest radionuclide and/or organic contamination. If field-screening instruments cannot determine which sample(s) contain(s) the highest levels of radionuclides or organic compounds, samples collected from the location where contamination would most likely be present as indicated by site history (i.e., sump, outfall, etc.) will be selected. The selected sample(s) will be sent to an off-site fixed laboratory for quick turn-around analysis of PCBs, HE, dioxins, and furans (NMED 2005, 89314). The sample results will be transmitted to NMED, via fax, for review. Within 1 week of receipt of the results, we anticipate that NMED will contact the LANL project leader to discuss the results. If analytes from the four additional analyses are not detected, or detected at low levels reflective of anthropogenic activity, the remaining samples will not be analyzed for the four additional analyses per agreement with NMED. If the additional analytes are detected at levels attributable to the site, the remaining stored aliquots will be submitted to the analytical laboratory for the additional analyses. Prior to demobilization, laboratory results will be reviewed to assess if the nature and extent of contamination have been determined. If nature and extent have not been determined, then step-out samples will be collected.

During structure removal activities, excavation of soil and/or rock (including all visibly stained areas) will proceed until the radionuclide and organic vapor field-screening results indicate all contaminated material has been removed. Confirmation samples will be collected as these activities are completed. Analytical laboratory results will be reviewed to determine if additional removal activities and associated confirmation sampling are required due to the presence of areas with contaminant concentrations greater than industrial SSLs or SALs. Sampling at Consolidated Unit 21-023(a)-99 will consist of the following activities:

SWMU 21-023(a)

- *SWMU 21-023(a) location of removed septic tank (Structure 21-225) investigation.* Exploratory trenching will be conducted to identify the former tank location. Trenching will be conducted with a backhoe and will progress from the surface to approximately 5 ft bgs. The trench will be visually logged for evidence of non-native materials, disturbed bedding horizons and areas of visible staining. Elevated radiological or organic vapor field-screening results will be documented. Trenching will continue in the historically identified area until evidence of a former tank is found or the absence of evidence a tank at that location has been verified. If found, one borehole will be advanced in the center of the previous excavation (Figure 5.5-2, location BH-1) to determine vertical extent of contamination. The first depth interval to be sampled will be 0 to 1.0 ft below the depth that corresponds to the bottom of the septic tank based on previous excavations. Additional

borehole samples will be collected from 5.0- to 6.0-ft and 10.0- to 11.0-ft depth intervals. Samples will be collected immediately beneath the septic tank inlet and outlet connections to the pipeline (Figure 5.5-2, locations 1 and 2), at the 0- to 1.0-ft and 2.0- to 3.0-ft depth intervals. If the area of the former tank is not identified during field activities, confirmation samples will be collected from location(s) where the tank was most likely located using the proposed sampling map as a guide.

- *SWMU 21*-023(a) *location of removed inlet and outlet lines investigation.* Exploratory trenching will be conducted to identify the former pipeline and manhole locations. If found, the footprint of the excavated inlet and outlet lines and manhole will be carefully uncovered and the previous bed of the pipeline will be inspected for evidence of a release. Where elevated levels of VOCs and/or radionuclides are present, as determined by field screening, or where visible evidence of a leak is found (e.g., stained soil), samples will be collected to define vertical extent. Samples will be collected at any bends in the pipe (Figure 5.5-2, location 6), at the connection to the building (Figure 5.5-2, locations 7 and 20), every 50 ft from the building (Figure 5.5-2, location 9) and under the manhole floor (Figure 5.5-2, location 10). Samples will be collected at the 0- to 1.0-ft and 2.0- to 3.0-ft depth intervals. If a pipe and/or manhole or evidence of either is not identified during field activities, confirmation samples will be collected from location(s) where these were most likely located using the proposed sampling map as a guide.

SWMU 21-023(b)

- *SWMU 21-023(b) location of removed septic tank (Structure 21-142) investigation.* Exploratory trenching will be conducted to identify the former tank location. Trenching will be conducted with a backhoe and will progress from the surface to approximately 5 ft bgs. The trench will be visually logged for evidence of non-native materials, disturbed bedding horizons and areas of visible staining. Elevated radiological or organic vapor field-screening results will be documented. Trenching will continue in the historically identified area until evidence of a former tank is found or the absence of evidence a tank at that location has been verified. If found, one borehole will be advanced in the center of the previous excavation (Figure 5.5-2, location BH-2) to determine vertical extent of contamination. The first depth interval to be sampled will be 0- 1.0 ft below the depth that corresponds to the bottom of the septic tank based on previous excavations. Additional borehole samples will be collected from 5.0- to 6.0-ft and 10.0- to 11.0-ft depth intervals below this sample. Samples will be collected immediately beneath the septic tank inlet and outlet connections to the pipeline (Figure 5.5-2, locations 3 and 4), at the 0- to 1.0-ft and 2.0- to 3.0-ft depth intervals. If the area of the former tank is not identified during field activities, confirmation samples will be collected from location(s) where the tank was most likely located using the proposed sampling map as a guide.
- *SWMU 21-023(b) location of removed inlet and outlet lines investigation.* Exploratory trenching will be conducted to identify the former pipeline locations. If found, the footprint of the excavated inlet and outlet lines will be carefully uncovered and the previous bed of the pipeline will be inspected for evidence of a release. Where elevated levels of VOCs and/or radionuclides are present, as determined by field screening, or where visible evidence of a leak is found (e.g., stained soil), samples will be collected to define vertical extent. Samples will be collected from each connection of the inlet and outlet lines to structures (Figure 5.5-2, locations 5 and 8) at the 0- to 1.0-ft and 2.0- to 3.0-ft depth intervals. If a pipe or evidence of a former pipe is not identified during field activities, confirmation samples will be collected from location(s) where the pipe was most likely located using the proposed sampling map as a guide.

SWMU 21-023(d)

- *SWMU 21-023(d) location of removed septic tank (Structure 21-187) excavation and sampling.* The pipe cleanout associated with this septic tank was visible at the time of the geophysical survey. One borehole will be advanced in the center of the previous tank excavation (Figure 5.5-2, location BH-3) to determine vertical extent of contamination. The first depth interval to be sampled will be 0- 1.0 ft below the depth that corresponds to the bottom of the septic tank based on previous excavations. Additional borehole samples will be collected from 5.0- to 6.0- and 10.0- to 11.0-ft depth intervals. Samples will be collected immediately beneath the septic tank inlet and outlet connections to the pipeline (Figure 5.5-2, locations 13, 14 and 15), at the 0- to 1.0-ft and 2.0- to 3.0-ft depth intervals. If the area of the former tank is not identified during field activities, confirmation samples will be collected from location(s) where the tank was most likely located using the proposed sampling map as a guide.
- *SWMU 21-023(d) location of removed inlet and outlet lines excavation and sampling.* The pipe cleanout associated with this septic tank was visible at the time of the geophysical survey, however, no pipelines were located. The cleanout will be followed to locate any existing pipelines. Trenching may also be necessary. Where elevated levels of VOCs and/or radionuclides are present, as determined by field screening, or where visible evidence of a leak is found (e.g., stained soil, break in the pipe), samples will be collected immediately beneath the pipe to define vertical extent. Samples will also be collected from where the pipe makes a bend (Figure 5.5-2, locations 12 and 16), and at approximately 50 ft north of location 16 (at a pipeline joint if present) (Figure 5.5-2, location 17) and at the connection to structures or the industrial waste pipelines (locations 11, 18, and 19). At each location, samples will be collected at the 0- to 1.0-ft and 2.0- to 3.0-ft depth intervals. If a pipe or evidence of a former pipe is not identified during field activities, confirmation samples will be collected from location(s) where the pipe was most likely located using the proposed sampling map as a guide.
- *SWMU 21-023(d) connection to manhole 21-273.* This portion of the line is being sampled as part of Consolidated Unit 21-006(c)-99.

5.6 SWMU 21-024(a), Septic System

SWMU 21-024(a) consists of a septic tank, pipelines, and associated outfall (Figure 5.6-1).

5.6.1 Operational History

- 1945—A steam plant (Building 21-009) was built and the septic system was constructed at the same time (LASL 1954, 01519). The septic system consisted of a 6-in.-diameter VCP inlet line, a 9 x 5.75 x 7.25-ft deep septic tank (Structure 21-053), and a 4- or 6-in.-diameter VCP outlet line (LASL 1954, 01519; LASL 1946, 71218).
- 1966—The septic system was no longer used and left in place.
- 1985—Building 21-009 was removed and replaced with new a steam plant, Building 21-357. The area was regraded, but documentation is not available indicating that the piping or tank were removed.

5.6.2 Summary of Previous Investigations

Summarized below are previous investigations conducted at this site.

- 1992—A radiological survey was conducted in the area between the suspected outfall release point and the edge of the mesa (LANL 1995, 52350, p. 3-2). Eighteen soil samples were collected at six locations (21-01385, -01386, -01387, -01388, -01389, and -01390) (0- to 0.5-ft, 0.5- to 1.0-ft, and 1.0- to 1.5-ft depth intervals) (Figure 5.6-1). Samples were analyzed at an off-site fixed laboratory for inorganic chemicals and radionuclides (americium-241, isotopic plutonium, and strontium-90).
- 1993—One borehole (location 21-01666) (Figure 5.6-1) was drilled downslope from the septic tank outlet pipe to a depth of 20 ft and sampled at 5-ft intervals resulting in four tuff samples collected. Samples were analyzed at an off-site fixed laboratory for inorganic chemicals, SVOCs, and radionuclides (americium-241, gamma spectroscopy, isotopic plutonium, isotopic uranium, strontium-90, and tritium).
- 2004—Radiological and geophysical surveys were completed (results are presented in Appendixes D and E, respectively). The geophysical survey located portions of the pipeline from former Building 21-009, the tank, and the outlet pipe. The exact location of the outfall was not identified.

SWMU 21-024(a) Data

The SWMU 21-024(a) site data from 1992 were collected from soil and compared with soil BVs/FVs; the borehole data from 1993 were collected from tuff and compared with tuff BVs (LANL 1998, 59730). Table 5.6-1 and Figure 5.6-1 present SWMU 21-024(a) inorganic chemical concentrations greater than BVs. Table 5.6-2 and Figure 5.6-2 present SWMU 21-024(a) radionuclide activities greater than FVs and/or at depths where the FV does not apply. Sample results for inorganic chemicals and radionuclides were also compared to the maximum of the range of their respective background data sets. Those analytes with detections and/or detection limits greater than their respective BVs/FVs and the maximum of the background data set were designated as COPCs.

Inorganic Chemicals

Inorganic Chemicals Detected at Concentrations Greater Than BVs. Barium, beryllium, cadmium, calcium, chromium, copper, iron, lead, nickel, sodium, and zinc were detected at concentrations greater than their respective BVs (Figure 5.6-1).

- Barium was detected in one soil sample at 320 mg/kg (location 21-01390, 1.0- to 1.5-ft depth interval), a concentration greater than the soil BV (295 mg/kg), but less than the maximum barium concentration in the soil background data set (410 mg/kg). Therefore, barium is not a COPC.
- Beryllium was detected in one soil sample at 1.9 mg/kg (location 21-01390, 1.0- to 1.5-ft depth interval), a concentration greater than the soil BV (1.83 mg/kg), but less than the maximum beryllium concentration in the soil background data set (3.95 mg/kg). Therefore, beryllium is not a COPC.
- Cadmium was detected in 15 samples ranging from 0.64 to 4.5 mg/kg (the maximum was from location 21-01389, 0- to 0.5-ft depth interval), concentrations greater than the soil BV (0.4 mg/kg) and two of those concentrations were greater than the maximum cadmium concentration in the soil background data set (2.6 mg/kg). Therefore, cadmium is a COPC.

- Calcium was detected in five soil samples ranging from 8400 to 20,800 mg/kg (the maximum was from location 21-01389, 1.0- to 1.5-ft depth interval), concentrations greater than the soil BV (6120 mg/kg) and three sample concentrations were greater than the maximum calcium concentration in the soil background data set (14,000 mg/kg). Therefore, calcium is a COPC.
- Chromium was detected in four soil samples ranging from 26.5 to 131 mg/kg (the maximum was from location 21-01390, 1.0- to 1.5-ft depth interval), concentrations greater than the soil BV (19.3 mg/kg), and only the highest concentration was greater than the maximum chromium concentration in the soil background data set (36.5 mg/kg). Chromium was detected in two of the four borehole tuff samples at 12.7 and 17.8 mg/kg (the maximum was from location 21-01666, 15.0- to 20.0-ft interval), concentrations greater than the tuff BV (7.14 mg/kg) and only the highest concentration was greater than the maximum chromium concentration in the tuff background data set (13 mg/kg). Therefore, chromium is a COPC.
- Copper was detected in 16 soil samples ranging from 17 to 424 mg/kg (the maximum was from location 21-01389, 0- to 0.5-ft depth interval), concentrations greater than the soil BV (14.7 mg/kg), and greater than the maximum copper concentration in the soil background data set (16 mg/kg). Therefore, copper is a COPC.
- Iron was detected in one soil sample at 24,000 mg/kg (location 21-01389, 0- to 0.5-ft depth interval), a concentration greater than the soil BV (21,500 mg/kg), but less than the maximum iron concentration in the soil background data set (36,000 mg/kg). Therefore, iron is not a COPC.
- Lead was detected in 11 soil samples ranging from 26.1 to 204 mg/kg (location 21-01386, 0- to 0.5-ft depth interval), concentrations greater than the soil BV (22.3 mg/kg), and ten concentrations were greater than the maximum lead concentration in the soil background data set (28.0 mg/kg). Therefore, lead is a COPC.
- Nickel was detected in one sample at 73.6 mg/kg (location 21-01390, 1.0- to 1.5-ft depth interval), a concentration greater than the soil BV (15.4 mg/kg) and the maximum nickel concentration in the soil background data set (29 mg/kg). Therefore, nickel is a COPC.
- Sodium was detected in eight soil samples ranging from 952 to 3470 mg/kg (the maximum was from location 21-01390, 1.0- to 1.5-ft depth interval), concentrations greater than the soil BV (915 mg/kg) and four sample concentrations were greater than the maximum sodium concentration in the soil background data set (1800 mg/kg). Therefore, sodium is a COPC.
- Zinc was detected in nine soil samples ranging from 71.1 to 362 mg/kg (the maximum was from location 21-01389, 0- to 0.5-ft depth interval), concentrations greater than the soil BV (48.8 mg/kg) and all except the lowest sample concentration were greater than the maximum zinc concentration in the soil background data set (75.5 mg/kg). Therefore, zinc is a COPC.

Inorganic Chemicals not Included in Background Data. Lithium, molybdenum, and strontium do not have background data and, therefore, have no BVs for comparison.

- Lithium was detected in 18 soil samples ranging from 3.2 to 29.7 mg/kg (the maximum was from location 21-01390, 1.0- to 1.5-ft depth interval). No established background levels are available for lithium. The lithium concentrations at this site are not similar to the concentrations found at most of the corrective action sites (most are below 11 mg/kg), indicating that the lithium levels are elevated as a result of releases. Therefore, lithium is a COPC.
- Molybdenum was detected in one location at 3.4 mg/kg (location 21-01387, 1.0- to 1.5-ft depth interval). Therefore, molybdenum is a COPC.

- Strontium was detected in 18 soil samples ranging from 2.3 to 265 mg/kg (the maximum was from location 21-01389, 0- to 0.5-ft depth interval). No established background levels are available for strontium. The strontium concentrations at this site are not similar to the concentrations found at most of the corrective action sites (most are below 36 mg/kg), indicating that the strontium levels are elevated as a result of releases. Therefore, strontium is a COPC.

Inorganic Chemicals with Detection Limits Greater Than BVs. Antimony, cadmium, nickel, selenium, and silver had detection limits were greater than their respective BVs in some samples.

- Antimony detection limits, ranging from 4.7 to 6.8 mg/kg (the maximum detection limit was from location 21-01390), were greater than the soil BV (0.83 mg/kg) and the maximum antimony concentration in the range of the soil background data set (1.0 mg/kg) in 18 soil samples. Therefore, antimony is a COPC due to elevated detection limits.
- Cadmium detection limits, ranging from 0.42 to 0.43 mg/kg (the maximum detection limit was from location 21-01387), were greater than the soil BV (0.4 mg/kg), but less than the maximum cadmium concentration in the soil background data set (2.6 mg/kg), in three soil samples. Therefore, cadmium is not a COPC due to elevated detection limits. However, cadmium was already determined to be a COPC due to detected concentrations above BVs.
- Nickel detection limit, 8.4 mg/kg (location 21-01666), was greater than the tuff BV (6.58 mg/kg) and the maximum nickel concentration in the tuff background data set (7.0 mg/kg) in one sample. Nickel was already determined to be a COPC due to detected concentrations greater than BVs. Therefore, nickel is a COPC due to detected concentrations and detection limits greater than BVs
- The selenium detection limit, 0.44 mg/kg (location 21-01666), was greater than the tuff background (0.3 mg/kg) and the maximum selenium concentration in the background data set (0.105 mg/kg) in all four samples in the borehole. Therefore, selenium is a COPC due to elevated detection limits.
- The silver detection limit, 1.1 mg/kg (location 21-01666), was greater than the tuff BV (1.0 mg/kg) but less than the maximum silver concentration in the tuff background data set (1.9 mg/kg) in all four samples in the borehole. Therefore, silver is not a COPC due to elevated detection limits.

Inorganic Chemical Summary. Antimony, cadmium, calcium, chromium, copper, lead, lithium, molybdenum, nickel, selenium, sodium, strontium, and zinc are inorganic COPCs.

Organic Chemicals

VOCs. VOCs were not analyzed at an off-site fixed laboratory.

SVOCs. SVOCs were not detected.

Organic Chemical Summary. VOCs were not analyzed for at an off-site fixed laboratory; therefore, the potential for VOC contamination has not been addressed.

Radionuclides

Fallout Radionuclides. Americium-241, plutonium-238, and plutonium-239 were detected in samples at SWMU 21-024(a) above soil FVs (Figure 5.6-2). Since FVs are only applicable within the first 0.5 ft of surface soils, all fallout radionuclides detected in the samples deeper than the first 0.5 ft of surface soils are COPCs.

- Americium-241 was detected in six surface soil samples from 0.02 to 0.22 pCi/g (the maximum was from location 21-01389, 0- to 0.5-ft depth interval), activities greater than the soil FV and the

maximum americium-241activity in the soil background data set (both are 0.013 pCi/g). Americium-241 was also detected in subsurface samples ranging from 0.01 to 0.04 pCi/g (the maximum was from location 21-01388, 0.5- to 1.0-ft depth interval), at depths where the FV does not apply. Therefore, americium-241 is a COPC.

- Plutonium-238 was detected in three surface soil samples ranging from 0.03 to 0.06 pCi/g (the maximum was from location 21-01388, 0- to 0.5-ft depth interval), activities greater than the soil FV (0.023 pCi/g) and the highest activity was greater than the maximum plutonium-238 activity in the soil background data set (0.037 pCi/g). Plutonium-238 was also detected in subsurface samples ranging from 0.01 to 0.03 pCi/g (the maximum was from location 21-01388, 0.5- to 1.0-ft depth interval), at depths where the FV does not apply. Therefore, plutonium-238 is a COPC.
- Plutonium-239 was detected in six surface soil samples ranging from 0.2 to 3.0 pCi/g (the maximum was from location 21-01390, 0- to 0.5-ft depth interval), activities greater than the soil FV (0.054 pCi/g) and the maximum plutonium-239 activity in the soil background data set (0.055 pCi/g). Plutonium-239 was also detected in subsurface samples ranging from 0.02 to 0.5 pCi/g (the maximum was from location 21-01388, 0.5- to 1.0-ft depth interval), at depths where the FV does not apply. Therefore, plutonium-239 is a COPC.
- Tritium was detected in all depths of the borehole at a maximum activity of 0.06 pCi/g (location 21-01666, 0- to 5.0-ft and 5.0- to 10.0-ft depth intervals), at depths where the FV does not apply. Therefore, tritium is a COPC.

Radionuclide Summary. Americium-241, plutonium-238, plutonium-239, and tritium are radionuclide COPCs.

5.6.3 Scope of Activities for SWMU 21-024(a)

Sampling and Excavation Activities

The proposed sample locations at SWMU 21-024(a) are shown in Figure 5.6-3. Table 5.6-3 provides a summary of the proposed sample locations, depths, objectives each sample addresses, and proposed analytical suites.

Samples will be analyzed for TAL metals, cyanide, nitrates, perchlorates, organic chemicals (VOCs and SVOCs [VOCs only in samples deeper than 0.5 ft bgs]), radionuclides (gamma spectroscopy, americium-241, isotopic plutonium, isotopic uranium, strontium-90, and tritium), moisture, and pH. If field screening indicates the presence of VOCs, a deeper sample will be collected and analyzed for full suite. Field screening will determine the sample(s) with the highest radionuclide and/or organic contamination. If field-screening instruments cannot determine which sample(s) contain(s) the highest levels of radionuclides or organic compounds, samples collected from the location where contamination would most likely be present as indicated by site history (i.e., sump, outfall, etc.) will be selected. The selected sample(s) will be sent to an off-site fixed laboratory for quick turn-around analysis of PCBs, HE, dioxins, and furans (NMED 2005, 89314). The sample results will be transmitted to NMED, via fax, for review. Within 1 week of receipt of the results, we anticipate that NMED will contact the LANL project leader to discuss the results. If analytes from the four additional analyses are not detected, or detected at low levels reflective of anthropogenic activity, the remaining samples will not be analyzed for the four additional analyses per agreement with NMED. If the additional analytes are detected at levels attributable to the site, the remaining stored aliquots will be submitted to the analytical laboratory for the additional analyses. Prior to demobilization, laboratory results will be reviewed to assess if the nature and extent of contamination have been determined. If nature and extent have not been determined, then step-out samples will be collected.

During structure removal activities, excavation of soil and/or rock (including all visibly stained areas) will proceed until the radionuclide and organic vapor field-screening results indicate all contaminated material has been removed. Confirmation samples will be collected as these activities are completed. Analytical laboratory results will be reviewed to determine if additional removal activities and associated confirmation sampling are required due to the presence of areas with contaminant concentrations greater than industrial SSLs or SALs. Sampling at SWMU 21-024(a) will consist of the following activities:

- *Septic tank 21-053 excavation and sampling.* The 9 x 5.75 x 7.25-ft deep septic tank will be carefully excavated and inspected for evidence of leaks (e.g., field screening, stained soil, holes in the tank). One borehole will be advanced in the center of the excavation to determine the vertical extent of contamination (Figure 5.6-3, location BH-1). Borehole samples will be collected from the 0- to 1.0-ft, 5.0- to 6.0-ft, and 10.0- to 11.0-ft depth intervals. Samples will be collected immediately beneath the septic tank inlet and outlet connections to the pipeline (Figure 5.6-3, locations 1 and 2) at the 0- to 1.0-ft and 2.0- to 3.0-ft depth intervals. The zero depth is defined as immediately beneath the inlet and outlet connections.
- *Pipeline excavation and sampling.* A portion of the inlet and outlet lines were found by the 2004 geophysical survey. The pipelines found and/or any backfilled former pipeline beds that run from former Building 21-009 to the septic tank and from the septic tank to the outfall will be carefully excavated and inspected for evidence of leaks. Where elevated levels of VOCs and/or radionuclides are present, as determined by field screening, or where visible evidence of a leak is found (e.g., stained soil, break in the pipe), samples will be collected immediately beneath the pipe to define vertical extent. If no field-screening evidence or visible evidence of a leak is found, samples will be collected from locations beneath the pipeline immediately south of the former Building 21-009 (beneath a pipeline joint, if present) (Figure 5.6-3, location 3), and at approximately 50 ft south of former Building 21-009 (Figure 5.6-3, location 4). If the entire length of the outfall pipe is not found during excavation of the located portion of the pipe, the pipe bed between the tank and the outfall will be followed toward the outfall and a sample will be collected halfway between the tank and the outfall area (Figure 5.6-3, location 5). At each location, a sample will be collected at the 0- to 1.0-ft and 2.0- to 3.0-ft depth intervals. The zero depth is defined as immediately beneath the pipe or at the bottom of the pipe bed for pipelines that no longer exist.
- *Outfall investigation.* The outfall was not identified by the 2004 geophysical survey. If identified by field screening, visual inspection, or exploratory trenching, one borehole will be advanced in the center of the outfall 0.5 ft, downslope from the mouth of the outfall pipe (Figure 5.6-3, location BH-2), and samples will be collected from the 0- to 0.5-ft, 2.0- to 3.0-ft, and 5.0- to 6.0-ft depth intervals. If the outfall is not identified, the borehole location will be estimated based on previous outfall sampling locations. Samples will be collected 5 ft to the west and east of the borehole (Figure 5.6-3, locations 6 and 7). Two additional sample locations will be established downslope from the mouth of the pipe, in the center of a distinguishable drainage, or in a catchment basin aligned with the mouth of the pipe 10 ft and 30 ft downslope from BH-2 (Figure 5.6-3, locations 9 and 12). Location 9 will be flanked by sample locations 10 ft to the west and east (Figure 5.6-3, locations 8 and 10). Location 12 will be flanked by sample locations 20 ft to the west and east (Figure 5.6-3, locations 11 and 13). Samples will be collected at depths of 0–0.5 ft and 2.0–3.0 ft.
- *Bench investigation.* On the topographical bench beneath the mesa cliff edge (Figure 5.6-3), sample locations will be established downslope from the mouth of the pipe, in the center of a distinguishable drainage, or in a catchment basin aligned with the mouth of the pipe on the north and south ends of the bench (Figure 5.6-3, locations 15 and 18). These sample locations will be flanked by one sample location 20 ft to the west and one sample location 20 ft to the east

(Figure 5.6-3, locations 14, 16, 17, and 19). Samples will be collected at depths of 0–0.5 ft and 2.0–3.0 ft.

5.7 SWMU 21-024(b), Septic System

SWMU 21-024(b) consists of a septic tank, pipelines, and associated outfall (Figure 5.7-1).

5.7.1 Operational History

- 1945—Building 21-017 (a passageway connecting Buildings 21-004 and 21-005) was constructed, and the sanitary sewer system routed sewage through a reinforced concrete septic tank 9 × 5.75 × 7.25 ft deep (Structure 21-055) to the surface soil south of Building 21-005 (LANL 1991, 07529, p.15-34; LASL 1946, 71281). The inlet and outlet pipelines are 6-in. and 4-in. VCP, respectively (LASL 1946, 71281).
- 1969—Building 21-017 underwent D&D activities (LANL 1991, 07529, p. 15-34).

5.7.2 Summary of Previous Investigations

Summarized below are previous investigations conducted at this site.

- 1992—Radionuclide field survey was performed as outlined in the 1994 “Phase Report 1C, TA-21 Operable Unit RCRA Facility Investigation, Outfalls Investigation” (LANL 1994, 31591, p. 8-10). In addition, eight soil samples were collected from three locations (21-01377, -01378, and -01379) at depths of 0- to 0.5-ft, 0.5- to 1.0-ft, and 1.0- to 1.5-ft bgs within the outfall drainage channel. These samples were analyzed at an off-site fixed laboratory for inorganic chemicals and radionuclides (americium-241, isotopic plutonium, isotopic thorium, and strontium-90).
- 1993—A borehole (location 21-01668) was drilled near the septic tank, and four samples were collected at depths of 0- to 2.0-ft, 2.0- to 4.0-ft, 4.0- to 6.0-ft, 6.0- to 7.5-ft bgs. These samples were analyzed at an off-site fixed laboratory for inorganic chemicals, SVOCs, and radionuclides (americium-241, gamma spectroscopy, tritium, isotopic plutonium, isotopic thorium, isotopic uranium and strontium-90).
- 2004—Radiological and geophysical surveys were completed (results are presented in Appendixes D and E, respectively). The geophysical survey identified the pipeline from former Building 21-017 to the septic tank, the septic tank, but not the outfall.

SWMU 21-024(b) Data

The SWMU 21-024(b) site data from 1992 and 1993 were collected from soil, fill, and tuff regions and compared with their respective BVs/FVs (LANL 1998, 59730). Table 5.7-1 and Figure 5.7-1 present SWMU 21-024(b) inorganic chemical concentrations greater than BVs. Table 5.7-2 and Figure 5.7-2 present SWMU 21-024(b) radionuclide activities greater than FVs and/or at depths where the FV does not apply. Sample results for inorganic chemicals and radionuclides were also compared to the maximum of the range of their respective background data sets. Those analytes with detections and/or detection limits greater than their respective BVs/FVs and the maximum of the background data set were designated as COPCs.

Inorganic Chemicals

Inorganic Chemicals Detected at Concentrations Greater Than BVs. Antimony, cadmium, calcium, chromium, copper, lead, and zinc were detected at concentrations greater than their respective BVs (Figure 5.7-1).

- Antimony was detected in two soil samples at 5.1 mg/kg and 5.4 mg/kg (the maximum was from location 21-01377, 0- to 0.5-ft depth interval), concentrations greater than the soil BV (0.83 mg/kg) and the maximum antimony concentration in the soil background data set (1.0 mg/kg). Therefore, antimony is a COPC.
- Cadmium was detected in six soil samples ranging from 0.67 to 1.6 m/kg (the maximum was from location 21-01379, 0- to 0.5-ft depth interval), concentrations greater than the soil BV (0.4 mg/kg), but less than the maximum cadmium concentration in the soil background data set (2.6 mg/kg). Therefore, cadmium is not a COPC.
- Calcium was detected in one tuff sample at 9600 mg/kg (location 21-01668, 6.0-to 7.5-ft depth interval), a concentration greater than the tuff BV (2200 mg/kg) and the maximum calcium concentration in the tuff background data set (2230 mg/kg). Therefore, calcium is a COPC.
- Chromium was detected in two soil samples at 23.6 and 27.1 mg/kg (the maximum was from location 21-01379, 0- to 0.5-ft depth interval), concentrations greater than the soil BV (19.3 mg/kg) but less than the maximum chromium concentration in the soil background data set (36.5 mg/kg). Therefore, chromium is not a COPC.
- Copper was detected in one soil sample, one fill sample, and one tuff sample ranging from 8.6 to 33.2 mg/kg (the maximum was from location 21-01379, 0- to 0.5-ft depth interval). The soil and fill samples concentrations were greater than the soil BV (14.7 m/kg), but only the soil sample concentration was greater than the maximum copper concentration in the soil background data set (16.0 mg/kg). Copper was detected in the borehole (21-01668) in the tuff region, at 8.6 mg/kg (4.0- to 6.0-ft depth interval), a concentration greater than the tuff BV (4.66 mg/kg) and the maximum copper concentration in the tuff background data set (6.2 mg/kg). Therefore, copper is a COPC.
- Lead was detected in one soil sample at 30 mg/kg (location 21-01379, 0- to 0.5-ft depth interval), a concentration greater than the soil BV (22.3 mg/kg) and the maximum lead concentration in the range of the soil background data set (28.0 mg/kg). Therefore, lead is a COPC.
- Zinc was detected in six soil samples, two fill samples, and one tuff sample ranging from 58.1 to 246 mg/kg (the maximum was from location 21-01379, 0- to 0.5-ft depth interval). All eight of the soil and fill concentrations were greater than the soil BV (48.8 mg/kg) and five of the eight sample concentrations were greater than the maximum zinc concentration in the soil background data set (75.5 mg/kg). The one tuff detection at location 21-1668 in the 4.0-6.0 ft interval at 79.8 mg/kg, was greater than the tuff BV (63.5 mg/kg) and the maximum zinc concentration in the tuff background data set (65.6 mg/kg). Therefore, zinc is a COPC.

Inorganic Chemicals not Included in Background Data. Lithium and strontium do not have background data and, therefore, have no BVs for comparison.

- Lithium was detected in eight samples ranging from 2.9 to 9.0 mg/kg (the maximum was from location 21-01378, 0- to 0.5-ft depth interval). No established background levels are available for lithium. The lithium concentrations at this site are similar to the concentrations found at most of the corrective action sites (most are below 11 mg/kg), indicating that the lithium levels are not elevated as a result of releases. Therefore, lithium is not a COPC.

- Strontium was detected in eight samples and one tuff sample ranging from 2.1 mg/kg to 42.4 mg/kg (the maximum was from location 21-01379, 0- to 0.5-ft depth interval). No established background levels are available for strontium. The strontium concentrations at this site are not similar to the concentrations found at most of the corrective action sites (most are below 36 mg/kg), indicating that the strontium levels are elevated as a result of releases. Therefore, strontium is a COPC.

Inorganic Chemicals with Detection Limits Greater Than BVs. Antimony, cadmium, selenium and silver had detection limits greater than their respective BVs in some samples.

- Antimony detection limits, ranging from 4.7 to 5 mg/kg (the maximum detection limit was from locations 21-01378 and -01379), were greater than the soil BV (0.83 mg/kg) and the maximum antimony concentration in the soil background data set (1.0 mg/kg) in six soil samples. Antimony was already determined to be a COPC due to detected concentrations greater than BVs. Therefore, antimony is a COPC due to detected concentrations and detection limits greater than BVs.
- Cadmium detection limits, ranging from 0.41 to 0.63 mg/kg (the maximum detection limit was from location 21-01668), were greater than the soil BV (0.4 mg/kg), but less than the maximum cadmium concentration in the soil background data set (2.6 mg/kg) in four samples. Therefore, cadmium is not a COPC due to elevated detection limits.
- The selenium detection limit of 0.42 mg/kg (location 21-01668) was greater than the tuff BV (0.3 mg/kg) and the maximum selenium concentration in the tuff background data set (0.105 mg/kg) in two tuff borehole samples. Therefore, selenium is a COPC due to elevated detection limits.
- The silver detection limit of 1.1 mg/kg (location 21-01668) was greater than the tuff BV (1.0 mg/kg) but less than the maximum silver concentration in the tuff background data set (1.9 mg/kg) in one tuff sample. Therefore, silver is not a COPC due to elevated detection limits.

Inorganic Chemical Summary. Antimony, calcium, copper, lead, selenium, strontium, and zinc are inorganic COPCs.

Organic Chemicals

VOCs. VOCs were not analyzed for at an off-site fixed laboratory.

SVOCs. SVOCs were not detected in the borehole samples. The outfall samples were not analyzed for SVOCs at an off-site fixed laboratory.

Organic Chemical Summary. Outfall samples were not analyzed for organic chemicals at an off-site fixed laboratory; therefore, the potential for organic chemical contamination in the outfall area has not been addressed.

Radionuclides

Fallout Radionuclides. Americium-241, plutonium-238, and plutonium-239 (Figure 5.7-2) were detected at activities greater than their respective FVs in soil samples collected from the septic tank and outfall area of SWMU 21-024(b). Since FVs are only applicable within the first 0.5 ft of surface soils, all fallout radionuclides detected in the samples deeper than the first 0.5 ft of surface soils are COPCs.

- Americium-241 was detected in three surface soil samples ranging from 0.91 to 15.06 pCi/g (the maximum was from location 21-01379, 0- to 0.5-ft depth interval), activities greater than the soil FV and the maximum americium-241 activity in the soil background data set (both are 0.013 pCi/g). Americium-241 was also detected ranging from 0.05 to 3.69 pCi/g (the maximum was from location 21-01379, 1.0- to 1.5-ft depth interval) in nine subsurface samples at depths where the FV does not apply. Therefore, americium-241 is a COPC.
- Plutonium-238 was detected in one surface soil sample at 3.25 pCi/g (location 21-01379, 0- to 0.5-ft depth interval), an activity greater than the soil FV (0.023 pCi/g), and the maximum plutonium-238 activity in the soil background data set (0.037 pCi/g). Plutonium-238 was also detected ranging from 0.01 to 0.26 pCi/g (the maximum was from location 21-01668, 4.0- to 6.0-ft depth interval) in seven subsurface samples at depths where the FV does not apply. Therefore, plutonium-238 is a COPC.
- Plutonium-239 was detected above FVs in three surface soil samples ranging from 22.01 to 324 pCi/g (the maximum was from location 21-01379, 0- to 0.5-ft depth interval), activities greater than the soil FV (0.054 pCi/g) and the maximum plutonium-239 activity in the soil background data set (0.055 pCi/g). Plutonium-239 was also detected ranging from 0.96 to 83.63 pCi/g (the maximum was from location 21-01379, 1.0- to 1.5-ft interval) in nine subsurface samples at depths where the FV does not apply. Therefore, plutonium-239 is a COPC.
- Tritium was detected in the borehole at a maximum activity of 0.16 pCi/g (location 21-01668, 0- to 2.0-ft depth interval), at a depth where the FV does not apply. Therefore, tritium is a COPC.

Radionuclide Summary. Americium-241, plutonium-238, plutonium-239, and tritium are radionuclide COPCs.

5.7.3 Scope of Activities for SWMU 21-024(b)

Sampling and Excavation Activities

The proposed sample locations at SWMU 21-024(b) are shown in Figure 5.7-3. Table 5.7-3 provides a summary of the proposed sample locations, depths, objectives each sample addresses, and proposed analytical suites.

Samples will be analyzed for TAL metals, cyanide, nitrates, perchlorates, organic chemicals (VOCs and SVOCs [VOCs only in samples deeper than 0.5 ft bgs]), radionuclides (gamma spectroscopy, americium-241, isotopic plutonium, isotopic uranium, strontium-90, and tritium), moisture, and pH. If field screening indicates the presence of VOCs, a deeper sample will be collected and analyzed for full suite. Field screening will determine the sample(s) with the highest radionuclide and/or organic contamination. If field-screening instruments cannot determine which sample(s) contain(s) the highest levels of radionuclides or organic compounds, samples collected from the location where contamination would most likely be present as indicated by site history (i.e., sump, outfall, etc.) will be selected. The selected sample(s) will be sent to an off-site fixed laboratory for quick turn-around analysis of PCBs, HE, dioxins, and furans (NMED 2005, 89314). The sample results will be transmitted to NMED, via fax, for review. Within 1 week of receipt of the

results, we anticipate that NMED will contact the LANL project leader to discuss the results. If analytes from the four additional analyses are not detected, or detected at low levels reflective of anthropogenic activity, the remaining samples will not be analyzed for the four additional analyses per agreement with NMED. If the additional analytes are detected at levels attributable to the site, the remaining stored aliquots will be submitted to the analytical laboratory for the additional analyses. Prior to demobilization, laboratory results will be reviewed to assess if the nature and extent of contamination have been determined. If nature and extent have not been determined, then step-out samples will be collected.

During structure removal activities, excavation of soil and/or rock (including all visibly stained areas) will proceed until the radionuclide and organic vapor field-screening results indicate all contaminated material has been removed. Confirmation samples will be collected as these activities are completed. Analytical laboratory results will be reviewed to determine if additional removal activities and associated confirmation sampling are required due to the presence of areas with contaminant concentrations greater than industrial SSLs or SALs. Sampling at SWMU 21-024(b) will consist of the following activities:

- *Septic tank 21-055 excavation and sampling.* The 9 × 5.75 × 7.25 ft septic tank will be carefully excavated and inspected for evidence of leaks (e.g., field screening, stained soil, holes in the tank). One borehole will be advanced in the center of the excavation to determine the vertical extent of contamination (Figure 5.7-3, location BH-1). Borehole samples will be collected from the 0- to 1.0-ft, 5.0- to 6.0-ft, and 10.0- to 11.0-ft depth intervals. Samples will be collected immediately beneath the septic tank inlet and outlet connections to the pipeline (Figure 5.7-3, locations 1 and 2) at the 0- to 1.0-ft and 2.0- to 3.0-ft depth intervals.
- *Pipeline excavation and sampling.* The pipeline from former Building 21-017 to septic tank 21-055 will be carefully excavated and inspected for evidence of leaks. Where elevated levels of VOCs and/or radionuclides are present, as determined by field screening, or where visible evidence of a leak is found (e.g., stained soil, break in the pipe), samples will be collected immediately beneath the pipe to define vertical extent. If no field-screening evidence or visible evidence of a leak is found, samples will be collected from locations beneath the pipeline (or where evidence of a former pipeline exists) at the edge of Building 21-116, and approximately every 50 ft (beneath a pipeline joint, if present) south to the septic tank (Figure 5.7-3, locations 3, 4, 5, and 6). At each location, a sample will be collected at the 0- to 1.0-ft and 2.0- to 3.0-ft depth intervals. The zero depth is defined as immediately beneath the pipe.
    - The pipeline from the septic tank to the outfall was not located by the 2004 geophysical survey. If the outfall piping or evidence of outfall piping is not found by visual inspection during the septic tank removal, exploratory trenching will be conducted to identify the outfall pipeline location. Trenching will be conducted with a backhoe and will progress from the surface to approximately 5 ft bgs. The trench will be visually logged for evidence of non-native materials, disturbed bedding horizons and areas of visible staining. Elevated radiological or organic vapor field-screening results will be documented. Trenching will continue in the historically identified area until the pipeline is located, evidence of a former pipeline is found, or the absence of a pipeline at that location has been verified. If a pipe or evidence of a former pipe is not identified during field activities, confirmation samples will be collected from location(s) where the pipe was most likely located using the proposed sampling map as a guide.
- *Outfall investigation.* The outfall was not identified by the 2004 geophysical survey. If identified by visual inspection, field screening or exploratory trenching, one borehole will be advanced in the center of the outfall 0.5 ft, downslope from the mouth of the outfall pipe (Figure 5.7-3, location BH-2), and samples will be collected from the 0- to 0.5-ft, 2.0- to 3.0-ft, and 5.0- to 6.0-ft depth

intervals. If the outfall is not identified, the borehole location will be estimated based on previous outfall sampling locations. Samples will be collected 5 ft to the west and east of the borehole (Figure 5.7-3, locations 7 and 8) at the 0- to 0.5-ft and 2.0- to 3.0-ft depth intervals

- *Bench investigation.* On the topographical bench beneath the mesa cliff edge, two sample locations will be established downslope from the mouth of the pipe in the center of a distinguishable drainage, or in a catchment basin aligned with the mouth of the pipe at the north and south ends of the bench (Figure 5.7-3, locations 10 and 13). These sample locations will each be flanked by one sample location 20 ft to the west and one sample location 20 ft to the east (Figure 5.7-3, locations 9, 11, 12, and 14). Samples will be collected at depths of 0–0.5 ft and 2.0–3.0 ft.

5.8 SWMU 21-024(d), Septic System

SWMU 21-024(d) consists of a septic tank, pipelines, and associated outfall (Figure 5.8-1).

5.8.1 Operational History

- 1945—Building 21-001 was constructed as an office building and the sanitary sewer system routed sewage via 6-in. VCP pipelines (LASL 1946, 71281) through a reinforced concrete 17.5 × 9.5 × 8.83 ft deep septic tank (Structure 21-106), until the pipe surfaced on the south rim of DP Mesa above Los Alamos Canyon (LANL 1991, 07529, p. 15-34).
- Early 1960s—Building 21-001 was removed (LANL 1999, 87442, p. 67).
- 1995—The septic tank was filled with pea gravel and left in place. The inlet and outlet pipelines were grouted with concrete and left in place (LANL 1996, 53789, p. 2).

5.8.2 Summary of Previous Investigations

Summarized below are previous investigations conducted at this site.

- 1992—Radiological survey of the discharge area at the canyon rim and on the topographical bench immediately below the mesa top was performed as outlined in the 1994 “Phase Report 1C, TA-21 Operable Unit RCRA Facility Investigation, Outfalls Investigation” (LANL 1994 31591, p. 8-28). Four soil samples were collected from two locations (the mesa top [21-01347; 0- to 0.5-ft deep] and the bench area [21-01348; 0- to 0.5-ft, 0.5- to 1.0-ft, 1.0- to 1.5-ft depths]). These samples were analyzed at an off-site fixed laboratory for inorganic chemicals and radionuclides (americium-241, isotopic plutonium, isotopic thorium, and strontium-90).
- 1993—Location 21-01670, an 8-ft borehole, was drilled adjacent to septic tank Structure 21-106 and one sample collected from each 2-ft interval (total of 4). The samples were analyzed at an off-site fixed laboratory for inorganic chemicals, SVOCs, and radionuclides (americium-241, gamma spectroscopy, isotopic plutonium, isotopic thorium, isotopic uranium, and strontium-90). As a result of the findings, the extent of contamination was considered to be adequately characterized (LANL 1995, 52350, p. 6-4).
- 1995—As described in the 1996 VCA Completion Report (LANL 1996, 53789, p. 1-2), the tank interior was sampled, the drainage area below the tank was surveyed for gamma radiation, field instruments were used to identify alpha activity, and five confirmatory samples (21-04063, 21-4086, 21-04087, 21-04090, 21-04092; each 0- to 0.5-ft depth intervals) were sent to an off-site-fixed laboratory and analyzed for plutonium-238 and -239. Additionally, the solid/liquid contents of the septic tank were removed (LANL 1996, 53789, p. 1-2).

- 2004—Radiological and geophysical surveys were completed (results are presented in Appendixes D and E, respectively). The geophysical survey identified two pipes running from former Building 21-001 and converging in a manhole just north of the septic tank. A small fragment of pipe was also located just south of the current passageway. Both the septic tank and outfall were identified.

SWMU 21-024(d) Data

The SWMU 21-024(d) site data from 1992, 1993 and 1995 were collected from soil, tuff, and sediment and compared with their respective BVs/FVs (LANL 1998, 59730). Table 5.8-1 and Figure 5.8-1 present SWMU 21-024(d) inorganic chemical concentrations greater than BVs. Table 5.8-2 and Figure 5.8-2 present SWMU 21-024(d) radionuclide activities greater than BVs/FVs and/or at depths where the FV does not apply. Sample results for inorganic chemicals and radionuclides were also compared to the maximum of the range of their respective background data sets. Those analytes with detections and/or detection limits greater than their respective BVs/FVs and the maximum of the background data set were designated as COPCs.

Inorganic Chemicals

Inorganic Chemicals Detected at Concentrations Greater Than BVs. Arsenic, barium, cadmium, calcium, chromium, copper, lead, silver, vanadium, and zinc were detected at concentrations greater than their respective BVs (Figure 5.8-1).

- Arsenic was detected in one soil and two tuff samples from the borehole (21-01670) ranging from 5.5 to 9.7 mg/kg (the maximum was from location 21-01670, 0- to 2.0-ft depth interval). Arsenic was detected at 9.7 mg/kg, a concentration greater than the soil BV (8.17 mg/kg), and the maximum arsenic concentration in the soil background data set (9.3 mg/kg). The remaining two samples were from the tuff region, at 5.5 and 6.5 mg/kg, greater than the tuff BV (2.79 mg/kg) and the maximum arsenic concentration in the tuff background data set (5 mg/kg). Therefore, arsenic is a COPC.
- Barium was detected above background in one tuff sample at 52.6 mg/kg (location 21-01670, 4.0- to 6.0-ft depth interval), a concentration greater than the tuff BV (46 mg/kg) and the maximum barium concentration in the tuff background data set (51.6 mg/kg). Therefore, barium is a COPC.
- Cadmium was detected in four soil samples ranging from 0.41 to 1.9 m/kg (the maximum was from location 21-01670, 0- to 2.0-ft depth interval), concentrations greater than the soil BV (0.4 mg/kg), but less than the maximum cadmium concentration in the soil background data set (2.6 mg/kg). Therefore, cadmium is not a COPC.
- Calcium was detected in one tuff sample at 5080 mg/kg (location 21-01670, 4.0- to 6.0-ft depth interval), a concentration greater than the tuff BV (2200 mg/kg) and the maximum calcium concentration in the tuff background data set (2230 mg/kg). Therefore, calcium is a COPC.
- Chromium was detected in one soil sample and two tuff samples from the borehole (21-01670) ranging from 15.2 to 22.1 mg/kg (the maximum was from location 21-01670, 0- to 2.0-ft soil depth interval). The soil sample concentration of 22.1 mg/kg is greater than the soil BV (19.3 mg/kg), but less than the maximum chromium concentration in the soil background data set (36.5 mg/kg). The two tuff samples at 15.2 and 16.8 mg/kg are greater than the tuff BV (7.14 mg/kg) and the maximum chromium concentration in the tuff background data set (13 mg/kg). Therefore, chromium is a COPC.

- Copper was detected in all four intervals of the borehole (three tuff and one soil sample) ranging from 12.0 to 73.0 mg/kg (the maximum concentration was in the 2.0- to 4.0-ft tuff depth interval). Copper was detected in soil at 49.9 mg/kg (0- to 2.0-ft interval), a concentration greater than the soil BV (14.7 m/kg) and the maximum copper concentration in the soil background data set (16.0 mg/kg). Copper was detected in the three tuff samples ranging from 12 to 73 mg/kg, concentrations greater than the tuff BV (4.66 mg/kg) and the maximum copper concentration in the tuff background data set (6.2 mg/kg). Therefore, copper is a COPC.
- Lead was detected in five soil samples and three tuff samples ranging from 16.7 to 146 mg/kg (the maximum was from location 21-01348, 1.0- to 1.5-ft soil depth interval). All five soil concentrations were greater than the soil BV (22.3 mg/kg) and the maximum lead concentration in the soil background data set (28.0 mg/kg). All three tuff concentrations were greater than the tuff BV (11.2 mg/kg) and the maximum lead concentration in the tuff background data set (15.5 mg/kg). Therefore, lead is a COPC.
- Silver was detected in five soil samples ranging from 2.1 to 19.4 mg/kg (the maximum was from location 21-01348, 0- to 0.5-ft depth interval), concentrations greater than the soil BV (1.0 mg/kg, the maximum is not available). Therefore, silver is a COPC.
- Vanadium was detected in two tuff samples and one soil sample from the borehole (21-01670) ranging from 28.2 to 54.5 mg/kg (the maximum was from location 21-01670, 0- to 2.0-ft depth interval). Vanadium was detected in soil at 54.5 mg/kg, a concentration greater than the soil BV (39.6 mg/kg), but less than the maximum vanadium concentration in the soil background data set (56.5 mg/kg). Vanadium was detected in tuff at 28.2 mg/kg and 30.3 mg/kg, concentrations greater than the tuff BV (17 mg/kg) and the maximum vanadium concentration in the tuff background data set (21 mg/kg). Therefore, vanadium is a COPC.
- Zinc was detected in three soil samples and one tuff sample ranging from 57.2 to 108 mg/kg (the maximum was from location 21-01670, 0- to 2.0-ft depth interval). The soil samples ranged from 57.2 to 108 mg/kg, concentrations greater than the soil BV (48.8 mg/kg) and one of the three soil sample concentrations was greater than the maximum zinc concentration in the soil background data set (75.5 mg/kg). Zinc was detected in the tuff sample at 85.2 mg/kg (location 21-01670, 4.0- to 6.0-ft interval), a concentration greater than the tuff BV (63.5 mg/kg) and the maximum zinc concentration in the tuff background data set (65.6 mg/kg). Therefore, zinc is a COPC.

Inorganic Chemicals not Included in Background Data. Lithium and strontium do not have background data and, therefore, have no BVs for comparison.

- Lithium was detected in four soil samples ranging from 2.6 to 6.9 mg/kg (the maximum was from location 21-01347, 0- to 0.5-ft depth interval). No established background levels are available for lithium. The lithium concentrations at this site are similar to the concentrations found at most of the corrective action sites (most are below 11 mg/kg), indicating that the lithium levels are not elevated as a result of releases. Therefore, lithium is not a COPC.
- Strontium was detected in four soil samples ranging from 4.9 mg/kg to 27.5 mg/kg (the maximum was from location 21-01347, 0- to 0.5-ft depth interval. No established background levels are available for strontium. The strontium concentrations at this site are similar to the concentrations found at most of the corrective action sites (most are below 36 mg/kg), indicating that the strontium levels are not elevated as a result of releases. Therefore, strontium is not a COPC.

Inorganic Chemicals with Detection Limits Greater Than BVs. Antimony, barium, cadmium, selenium, and silver detection limits were greater than their respective BVs in some samples.

- Antimony detection limits, ranging from 4.7 to 4.8 mg/kg (the maximum detection limit was from location 21-01347), were greater than the soil BV (0.83 mg/kg) and the maximum antimony concentration in the soil background data set (1.0 mg/kg) in four soil samples. Therefore, antimony is a COPC due to elevated detection limits.
- The barium detection limit of 46.1 mg/kg (location 21-01670) was greater than the tuff BV (46 mg/kg) but less than the maximum barium concentration in the tuff background data set (51.6 mg/kg) in one sample. Therefore, barium is not a COPC due to elevated detection limits. However, barium was determined to be a COPC due to detected concentrations above BVs.
- The cadmium detection limit of 0.41 mg/kg (location 21-01348) was greater than the soil BV (0.4 mg/kg), but less than the maximum cadmium concentration in the soil background data set (2.6 mg/kg) in one sample. Therefore, cadmium is not a COPC due to elevated detection limits.
- Selenium detection limits, ranging from 0.45 to 0.46 mg/kg (the maximum detection limit was from location 21-01670), were greater than the tuff BV (0.3 mg/kg) and the maximum selenium concentration in the tuff background data set (0.105 mg/kg) in three borehole samples. Therefore, selenium is a COPC due to elevated detection limits.
- Silver detection limits, ranging from 1.1 to 2.1 mg/kg (the maximum detection limit was from location 21-01670), were greater than the soil BV (1.0 mg/kg, the maximum is not available) in three samples. Silver was already determined to be a COPC due to detected concentrations greater than BVs. Therefore, silver is a COPC due to detected concentrations and detection limits greater than BVs.

Inorganic Chemical Summary. Antimony, arsenic, barium, calcium, chromium, copper, lead, selenium, silver, vanadium, and zinc are inorganic COPCs.

Organic Chemicals

VOCs. VOCs were not analyzed for at an off-site fixed laboratory.

SVOCs. SVOCs were not detected in the borehole samples 21-01670). The outfall samples were not analyzed for SVOCs at an off-site fixed laboratory.

Organic Chemical Summary. Outfall samples were not analyzed for organic chemicals at an off-site fixed laboratory; therefore, the potential for organic chemical contamination in the outfall area has not been addressed.

Radionuclides

Fallout Radionuclides. Americium-241, plutonium-238, and plutonium-239 (Figure 5.8-2) were detected at activities greater than their respective FVs in soil samples collected from beneath the septic tank and outfall area of SWMU 21-024(d). Since FVs are only applicable within the first 0.5 ft of surface soils, all fallout radionuclides detected in the samples deeper than the first 0.5 ft of surface soils are COPCs.

- Americium-241 was detected in two surface soil samples at 0.40 and 0.96 pCi/g (the maximum was from location 21-01348, 0- to 0.5-ft depth interval), activities greater than the soil FV and the maximum americium-241 activity in the soil background data set (both are 0.013 pCi/g). Americium-241 was also detected ranging from 0.05 to 1.13 pCi/g (the maximum was from location

21-01670, 0- to 2.0-ft and 2.0- to 4.0-ft depth intervals) in six subsurface tuff samples at depths where the FV does not apply. Therefore, americium-241 is a COPC.

- Plutonium-238 was detected in four surface soil samples ranging from 0.08 to 0.64 pCi/g (the maximum was from location 21-04086, 0- to 0.5-ft depth interval), activities greater than the soil FV (0.023 pCi/g), and the maximum plutonium-238 activity in the soil background data set (0.037 pCi/g). Plutonium-238 was detected in two sediment samples, at 0.02 and 0.1 pCi/g (the maximum was from location 21-04092, 0- to 0.5-ft depth interval), activities greater than the sediment FV and maximum plutonium-238 activity in the sediment background data set (both are 0.006 pCi/g). Plutonium-238 was also detected ranging from 0.01 to 0.20 pCi/g (the maximum was from location 21-01670, 0- to 2.0-ft depth interval) in five subsurface tuff samples at depths where the FV does not apply. Therefore, plutonium-239 is a COPC.
- Plutonium-239 was detected in five surface soil samples ranging from 9.71 to 66.9 pCi/g (the maximum was from location 21-04087, 0- to 0.5-ft depth interval), activities greater than the soil FV (0.054 pCi/g) and the maximum plutonium-239 activity in the soil background data set (0.055 pCi/g). Plutonium-239 was detected in two sediment samples, at 3.83 and 17.5 pCi/g (the maximum was from location 21-04092, 0- to 0.5-ft depth interval), activities greater than the sediment FV (0.068 pCi/g) and maximum plutonium-239 activity in the sediment background data set (0.065 pCi/g). Plutonium-239 was also detected ranging from 1.9 to 33.9 pCi/g (the maximum was from location 21-01670, 2.0- to 4.0-ft interval) in six subsurface tuff samples at depths where the FV does not apply. Therefore, plutonium-239 is a COPC.
- Tritium was detected at all intervals of borehole 21-01670 ranging from 0.27 to 1.92 pCi/g (the maximum was in the 0- to 2.0-ft depth interval) at depths where the FV does not apply. Therefore, tritium is a COPC.

Naturally Occurring Radionuclides. Uranium-234 and uranium-238 were detected in borehole samples above background (Figure 5.8-2).

- Uranium-234 was detected in one soil sample and two tuff samples ranging from 2.45 to 4.37 pCi/g (the maximum was from location 21-01670, 0- to 2.0-ft depth interval), activities greater than the BVs (2.59 pCi/g for soil, 1.98 pCi/g for tuff) and the maximum uranium-234 activity in the soil background data set (2.5 pCi/g for soil, not available for tuff). Therefore, uranium-234 is a COPC.
- Uranium-238 was detected in one soil sample and two tuff samples ranging from 1.97 to 3.31 pCi/g (the maximum was from location 21-01670, 0- to 2.0-ft depth interval), activities greater than BVs (2.29 pCi/g for soil, 1.93 pCi/g for tuff), and the maximum uranium-238 activity in the background data set (2.1 pCi/g for soil, not available for tuff). Therefore, uranium-238 is a COPC.

Radionuclide Summary. Americium-241, plutonium-238, plutonium-239, tritium, uranium-234, and uranium-238 are radionuclide COPCs.

5.8.3 Scope of Activities for SWMU 21-024(d)

Sampling and Excavation Activities

The proposed sample locations at SWMU 21-024(d) are shown in Figure 5.8-3. Table 5.8-3 provides a summary of the proposed sample locations, depths, objectives each sample addresses, and proposed analytical suites.

Samples will be analyzed for TAL metals, cyanide, nitrates, perchlorates, organic chemicals (VOCs and SVOCs [VOCs only in samples deeper than 0.5 ft bgs]), radionuclides (gamma spectroscopy, americium-241, isotopic plutonium, isotopic uranium, strontium-90, and tritium), moisture, and pH. If field screening indicates the presence of VOCs, a deeper sample will be collected and analyzed for full suite. Field screening will determine the sample(s) with the highest radionuclide and/or organic contamination. If field-screening instruments cannot determine which sample(s) contain(s) the highest levels of radionuclides or organic compounds, samples collected from the location where contamination would most likely be present as indicated by site history (i.e., sump, outfall, etc.) will be selected. The selected sample(s) will be sent to an off-site fixed laboratory for quick turn-around analysis of PCBs, HE, dioxins, and furans (NMED 2005, 89314). The sample results will be transmitted to NMED, via fax, for review. Within 1 week of receipt of the results, we anticipate that NMED will contact the LANL project leader to discuss the results. If analytes from the four additional analyses are not detected, or detected at low levels reflective of anthropogenic activity, the remaining samples will not be analyzed for the four additional analyses per agreement with NMED. If the additional analytes are detected at levels attributable to the site, the remaining stored aliquots will be submitted to the analytical laboratory for the additional analyses. Prior to demobilization, laboratory results will be reviewed to assess if the nature and extent of contamination have been determined. If nature and extent have not been determined, then step-out samples will be collected.

During structure removal activities, excavation of soil and/or rock (including all visibly stained areas) will proceed until the radionuclide and organic vapor field-screening results indicate all contaminated material has been removed. Confirmation samples will be collected as these activities are completed. Analytical laboratory results will be reviewed to determine if additional removal activities and associated confirmation sampling are required due to the presence of areas with contaminant concentrations greater than industrial SSLs or SALs. Sampling at SWMU 21-024(d) will consist of the following activities:

- *Septic tank 21-106 excavation and sampling.* The 17.5 × 9.5 × 8.83-ft septic tank will be carefully excavated and inspected for evidence of leaks (e.g., field screening stained soil, holes in the tank). One borehole will be advanced in the center of the excavation to determine the vertical extent of contamination (Figure 5.8-3, location BH-1). Borehole samples will be collected from the 0- to 1.0-ft, 5.0- to 6.0-ft, and 10.0- to 11.0-ft depth intervals. Samples will be collected immediately beneath the septic tank inlet and outlet connections to the pipeline (Figure 5.8-3, locations 1 and 2) at the 0- to 1.0-ft and 2.0- to 3.0-ft depth intervals.
- *Pipeline excavation and sampling.* The three pipelines (west, middle, and east) from former Building 21-001 south to septic tank 21-106 and the pipeline from the septic tank to the outfall and any backfilled former pipeline beds will be carefully excavated and inspected for evidence of leaks. Where elevated levels of VOCs and/or radionuclides are present, as determined by field screening or where visible evidence of a leak is found (e.g., stained soil, break in the pipe), samples will be collected immediately beneath the pipes to define vertical extent. If no field-screening evidence or visible evidence of a leak is found, samples will be collected from locations beneath the pipelines (or where evidence of a former pipeline exists) at connections to former buildings (Figure 5.8-3, locations 3, 5, 9, 13, and 15), connections of pipes (Figure 5.8-3, locations 6 and 14), and approximately every 50 ft from the building to the tank (Figure 5.8-3, locations 4, 7, 8, 10, 11, and 12), (beneath a pipeline joint, if present). At each location, a sample will be collected at the 0- to 1.0-ft and 2.0- to 3.0-ft depth intervals. The zero depth is defined as immediately beneath the pipe or at the bottom of the pipe bed for pipelines that no longer exist.
    - The western pipeline north of passageway 21-18 was not identified by the 2004 geophysical survey. If not found, or evidence of a former pipeline is not found by visual inspection or field screening during located pipeline excavation activities, exploratory trenching will be conducted to identify the location. Trenching will be conducted with a

backhoe and will progress from the surface to approximately 5 ft bgs. The trench will be visually logged for evidence of non-native materials, disturbed bedding horizons and areas of visible staining. Elevated radiological or organic vapor field-screening results will be documented. Trenching will continue in the historically identified area until the pipeline is located, evidence of a former pipeline is found, or the absence of a pipeline at that location has been verified. If a pipe or evidence of a former pipe is not identified during field activities, confirmation samples will be collected from location(s) where the pipe was most likely located using the proposed sampling map as a guide.

- *Outfall investigation.* One borehole will be advanced in the center of the outfall, 0.5 ft downslope from the mouth of the outfall pipe (Figure 5.8-3, location BH-2), and samples will be collected from the 0- to 0.5-ft, 2.0- to 3.0-ft, and 5.0- to 6.0-ft depth intervals. Samples will be collected 5 ft to the west and east of the borehole (Figure 5.8-3, locations 16 and 17). One sample location will be established downslope from the mouth of the pipe, in the center of a distinguishable drainage, or in a catchment basin aligned with the mouth of the pipe 10 ft downslope (or as close to the mesa cliff edge as possible) from BH-2 (Figure 5.8-3, location 19). This sample location will be flanked by sample locations 10 ft to the west and east (Figure 5.8-3, locations 18 and 20). Samples will be collected from the 0- to 0.5-ft and 2.0- to 3.0-ft depth intervals.
- *Bench investigation.* On the topographical bench beneath the mesa cliff edge, two sample locations will be established downslope from the mouth of the pipe in the center of a distinguishable drainage, or in a catchment basin aligned with the mouth of the pipe at the north and south ends of the bench (Figure 5.8-3, locations 22 and 25). These sample locations will each be flanked by one sample location 20 ft to the west and one sample location 20 ft to the east (Figure 5.8-3, locations 21, 23, 24, and 26). Samples will be collected at depths of 0–0.5 ft and 2.0–3.0 ft.

5.9 SWMU 21-024(e), Septic System

SWMU 21-024(e) consists of a septic tank, pipelines, and associated outfall (Figure 5.9-1).

5.9.1 Operational History

- 1945—Building 21-020 was constructed as a laundry facility. The sanitary sewer system routed sewage via 6-in. VCP drainlines (LASL 1958, 71281) or via 4-in. cast iron pipe for the first 5 ft from Building 21-020 and then via 4-in. VCP (Francis 1995, 87271) through a 1000-gal. steel septic tank (Structure 21-123, 11.33 × 6.33 × 8 ft deep), and then 17 ft to the outfall (LASL 1958, 71281). The outfall was located approximately 20 ft from the southern edge of DP Mesa above Los Alamos Canyon (LASL 1946, 24460).
- 1946/1947—Building 21-014 was constructed as a diesel power plant and shop (LANL 1999, 87442, p. 156). A 4-in. tile pipe exited the southeast corner of the building and connected to septic tank 21-123 as well as connected to the laundry building (LASL 1946, 87574). There was also an exterior grease trap connected to the pipeline exiting the building.
- 1947/1948—Building 21-046, a diesel power plant and warehouse, was constructed as an addition to the existing power plant (Building 21-014) (LANL 1999, 87442, p. 174). No researched engineering drawings depict a pipeline connection from this building to septic tank 21-123. However, the geophysical survey conducted in 2004 indicates there may have been at one time.

- 1965—The laundry facility underwent D&D activities (LANL 1991, 07529, p. 15-38).
- 1996—The septic tank was emptied and filled with pea gravel, inlet and outlet lines were grouted with concrete, and the surrounding area was restored and reseeded (LANL 1996, 53788).

5.9.2 Summary of Previous Investigations

Summarized below are previous investigations conducted at this site.

- 1992—Radiological field survey and soil sampling were conducted. Two samples were collected from location 21-01341 at 0- to 0.5-ft and 0.5- to 1.0-ft depth intervals, and one sample was collected from location 21-01342 at the 0- to 0.33-ft depth interval for a total of three soil samples. Refusal was encountered in location 21-01342 at the 0.33-ft depth; therefore a deeper sample was not collected. Samples were analyzed at an off-site fixed laboratory for inorganic chemicals and radionuclides (americium-241, isotopic thorium, isotopic plutonium, and strontium-90).
- 1993—A 20-ft borehole was drilled downslope of the septic tank (location 21-01671) to characterize potential contamination from any releases from the tank. One sample was collected from each 5-ft depth interval resulting in four soil/fill samples. Samples were analyzed at an off-site fixed laboratory for inorganic chemicals, SVOCs, and radionuclides (americium-241, isotopic thorium, isotopic plutonium, gamma spectroscopy, isotopic uranium, strontium-90, and tritium).
- 1995—A VCA was conducted to address radionuclide contamination. The VCA consisted of sampling the tank contents, conducting a radiological field survey, collecting confirmation soil samples from one depth (0- to 0.5-ft or 0.5- to 1.0-ft depth intervals) at six locations in the outfall area (locations 21-04065, -04066, -04068, -04069, -04072, -04075), removing the septic tank contents (resulting in disposing of approximately 18 cubic yards of waste), grouting the inlet and outlet lines with concrete, and leaving the septic tank in place by filling it with pea gravel. The confirmation samples from the outfall area were analyzed at an off-site fixed laboratory for isotopic plutonium, isotopic uranium, and gamma spectroscopy. Subsequently, the area over the septic tank was regraded, reseeded, and restored to its original condition (LANL 1996, 53788).
- 2004—Radiological and geophysical surveys were completed (results are presented in Appendixes D and E, respectively). The geophysical survey located the main pipeline connecting the septic tank to former Building 21-020 up to MDA V. In addition, two more pipes were identified, one tying into the pipeline and heading towards Building 21-046, and one connected to the tank heading towards Building 21-014. The septic tank was located, however, the outfall pipe was not found.

SWMU 21-024(e) Data

The site data from 1992, 1993, and 1995 were collected from soil and fill and compared with soil BVs/FVs (LANL 1998, 59730). Table 5.9-1 and Figure 5.9-1 present SWMU 21-024(e) inorganic chemical concentrations greater than BVs. Table 5.9-2 and Figure 5.9-2 present SWMU 21-024(e) radionuclide activities greater than BVs/FVs and/or at depths where the FV does not apply. Sample results for inorganic chemicals and radionuclides were also compared to the maximum of the range of their respective background data sets. Those analytes with detections and/or detection limits greater than their respective BVs/FVs and the maximum of the background data set were designated as COPCs.

Inorganic Chemicals

Inorganic Chemicals Detected at Concentrations Greater Than BVs. Cadmium, chromium, copper, lead, vanadium, and zinc were detected at concentrations greater than their respective BVs (Figure 5.9-1).

- Cadmium was detected in three soil samples ranging from 2.3 to 7.9 mg/kg (the maximum was from location 21-01341, 0- to 0.5-ft depth interval), concentrations greater than the soil BV (0.4 mg/kg) and two concentrations were greater than the maximum cadmium concentration in the soil background data set (2.6 mg/kg). Therefore, cadmium is a COPC.
- Chromium was detected in one soil sample at 30.5 mg/kg (location 21-01341, 0- to 0.5-ft depth interval), a concentration greater than the soil BV (19.3 mg/kg) but less than the maximum chromium concentration in the soil background data set (36.5 mg/kg). Therefore, chromium is not a COPC.
- Copper was detected in one soil sample at 37.5 mg/kg (location 21-01341, 0- to 0.5-ft depth interval), a concentration greater than the soil BV (14.7 mg/kg) and the maximum copper concentration in the soil background data set (16 mg/kg). Therefore, copper is a COPC.
- Lead concentrations was detected in three soil samples ranging from 29.4 to 75 mg/kg (the maximum was from location 21-01341, 0- to 0.5-ft depth interval), concentrations were greater than the soil BV (22.3 mg/kg) and the maximum lead concentration in the soil background data set (28.0 mg/kg). Therefore, lead is a COPC.
- Vanadium was detected in one soil sample at 48.3 mg/kg (location 21-01341, 0- to 0.5-ft depth interval), a concentration greater than the soil BV (39.6 mg/kg), but less than the maximum vanadium concentration in the soil background data set (56.6 mg/kg). Therefore, vanadium is not a COPC.
- Zinc was detected in three soil samples ranging from 136 to 262 mg/kg (the maximum was from location 21-01341, 0- to 0.5-ft depth interval), concentrations greater than the soil BV (48.8 mg/kg), and the maximum zinc concentration in the soil background data set (75.5 mg/kg). Therefore, zinc is a COPC.

Inorganic Chemicals not Included in Background Data. Lithium, molybdenum, and strontium do not have background data and, therefore, have no BVs for comparison.

- Lithium was detected in seven samples ranging from 1.7 to 10.9 mg/kg (the maximum was from location 21-01342, 0- to 0.33-ft depth interval). No established background levels are available for lithium. The lithium concentrations at this site are similar to the concentrations found at most of the corrective action sites (most are below 11 mg/kg), indicating that the lithium levels are not elevated as a result of releases. Therefore, lithium is not a COPC.
- Molybdenum was detected in one sample at 3.2 mg/kg (location 21-01342, 0- to 0.33-ft depth interval). Therefore, molybdenum is a COPC.
- Strontium was detected in seven samples ranging from 0.93 to 30.2 mg/kg (the maximum was from location 21-01341, 0- to 0.5-ft depth interval). No established background levels are available for strontium. The strontium concentrations at this site are similar to the concentrations found at most of the corrective action sites (most are below 36 mg/kg), indicating that the strontium levels are not elevated as a result of releases. Therefore, strontium is not a COPC.

Inorganic Chemicals with Detection Limits Greater Than BVs. Antimony and cadmium detection limits were greater than their respective BVs in some samples.

- Antimony detection limits, ranging from 4.8 to 5.1 mg/kg (the maximum detection limit was from location 21-01342), were greater than the soil BV (0.83 mg/kg) and the maximum antimony concentration in the range of the soil background data set (1.0 mg/kg) in three soil samples. Therefore, antimony is a COPC due to elevated detection limits.
- Cadmium detection limits, ranging from 0.61 to 0.63 mg/kg (the maximum detection limit was from location 21-01671), were greater than the soil BV (0.4 mg/kg), but less than the maximum cadmium concentration in the soil background data set (2.6 mg/kg), in all four borehole samples. Therefore, cadmium is not a COPC due to elevated detection limits. However, cadmium was already determined to be a COPC due to detected concentrations above BVs.

Inorganic Chemical Summary. Antimony, cadmium, copper, lead, molybdenum, and zinc are inorganic COPCs.

Organic Chemicals

VOCs. VOCs were not analyzed at an off-site fixed laboratory.

SVOCs. SVOCs were not detected.

Organic Chemical Summary. VOCs were not analyzed at an off-site fixed laboratory; therefore, the potential for organic chemical contamination has not been addressed.

Radionuclides

Fallout Radionuclides. Americium-241, plutonium-238, and plutonium-239 were detected in the outfall samples above their respective FVs (Figure 5.9-2). Since FVs are only applicable within the first 0.5 ft of surface soils, all fallout radionuclides detected in the samples deeper than the first 0.5 ft of surface soils are COPCs.

- Americium-241 was detected in four surface soil samples in the outfall ranging from 0.46 to 1.59 pCi/g (the maximum was from location 21-04066, 0- to 0.5-ft depth interval), activities greater than the soil FV and the maximum americium-241 activity in the soil background data set (both are 0.013 pCi/g). Americium-241 was also detected at sample depths where the FV does not apply, ranging from 0.01 to 0.61 pCi/g (the maximum detection was from location 21-01341, 0.5- to 0.92-ft depth interval). Therefore, americium-241 is a COPC.
- Cesium-137 was detected in one outfall sample at 0.23 pCi/g (location 21-04072, 0.5- to 1.0-ft depth interval), at a depth where the FV does not apply, cesium-137 is a COPC.
- Plutonium-238 was detected in four surface soil samples ranging from 0.04 to 0.14 pCi/g (the maximum was from location 21-04069, 0- to 0.5-ft depth interval) activities greater than the soil FV (0.023 pCi/g) and all but one activity greater than the maximum plutonium-238 activity in the soil background data set (0.037 pCi/g). Plutonium-238 was also detected (0.04 pCi/g) in an outfall sample (location 21-04072) at a depth where the FV does not apply. Therefore, plutonium-238 is a COPC.
- Plutonium-239 was detected in seven surface soil samples ranging from 2.3 to 41.49 pCi/g (the maximum was from location 21-01341, 0- to 0.5-ft depth interval), activities greater than the soil FV (0.054 pCi/g) and the maximum plutonium-239 activity in the soil background data set

(0.055 pCi/g). Plutonium-239 was also detected in subsurface samples at 3.66 and 13.52 pCi/g (locations 21-01341 and 21-04072), at depths where the FV does not apply. Therefore, plutonium-239 is a COPC.

- Tritium was detected in all borehole samples ranging from 0.12 to 0.14 pCi/g (location 21-01671), at depths where the FV does not apply. Therefore, tritium is a COPC.

Radionuclides not Included in Background Data. Europium-152 was detected in one sample (location 21-04075, 0- to 0.5-ft depth interval) at 0.71 pCi/g. Therefore, europium-152 is a COPC.

Naturally Occurring Radionuclides. Uranium-234 and uranium-235 were detected above BVs in each sample collected from the outfall area (Figure 5.9-2). Uranium-238 was also detected above background in the outfall area.

- Uranium-234 was detected in two outfall soil samples at 4.66 and 5.75 pCi/g (the maximum was from location 21-04066, 0- to 0.5-ft depth interval), activities greater than the soil BV (2.59 pCi/g) and the maximum uranium-234 activity in the soil background data set (2.5 pCi/g). Therefore, uranium-234 is a COPC.
- Uranium-235 was detected in one soil and one fill sample at 0.25 and 0.3 pCi/g (the maximum was from location 21-0671, 5.0- to 10.0-ft depth interval), activities greater than the soil BV (0.2 pCi/g) and the maximum uranium-235 activity in the soil background data set (0.16 pCi/g). Therefore, uranium-235 is a COPC.
- Uranium-238 was detected in two outfall soil samples at 3.69 and 4.32 pCi/g (the maximum was from location 21-04066, 0- to 0.5-ft depth interval), activities greater than the soil BV (2.29 pCi/g) and the maximum uranium-238 activity in the soil background data set (2.1 pCi/g). Therefore, uranium-238 is a COPC.

Radionuclide Summary. Americium-241, cesium-137, europium-152, plutonium-238, plutonium-239, tritium, uranium-234, uranium-235, and uranium-238 are radionuclide COPCs.

5.9.3 Scope of Activities for SWMU 21-024(e)

Sampling and Excavation Activities

The proposed sample locations at SWMU 21-024(e) are shown in Figure 5.9-3. Table 5.9-3 provides a summary of the proposed sample locations, depths, objectives each sample addresses, and proposed analytical suites.

Samples will be analyzed for TAL metals, cyanide, nitrates, perchlorates, organic chemicals (VOCs and SVOCs [VOCs only in samples deeper than 0.5 ft bgs]), radionuclides (gamma spectroscopy, americium-241, isotopic plutonium, isotopic uranium, strontium-90, and tritium), moisture, and pH. If field screening indicates the presence of VOCs, a deeper sample will be collected and analyzed for full suite. Field screening will determine the sample(s) with the highest radionuclide and/or organic contamination. If field-screening instruments cannot determine which sample(s) contain(s) the highest levels of radionuclides or organic compounds, samples collected from the location where contamination would most likely be present as indicated by site history (i.e., sump, outfall, etc.) will be selected. The selected sample(s) will be sent to an off-site fixed laboratory for quick turn-around analysis of PCBs, HE, dioxins, and furans (NMED 2005, 89314). The sample results will be transmitted to NMED, via fax, for review. Within 1 week of receipt of the results, we anticipate that NMED will contact the LANL project leader to discuss the results. If analytes from the four additional analyses are not detected, or detected at low levels reflective of anthropogenic

activity, the remaining samples will not be analyzed for the four additional analyses per agreement with NMED. If the additional analytes are detected at levels attributable to the site, the remaining stored aliquots will be submitted to the analytical laboratory for the additional analyses. Prior to demobilization, laboratory results will be reviewed to assess if the nature and extent of contamination have been determined. If nature and extent have not been determined, then step-out samples will be collected.

During structure removal activities, excavation of soil and/or rock (including all visibly stained areas) will proceed until the radionuclide and organic vapor field-screening results indicate all contaminated material has been removed. Confirmation samples will be collected as these activities are completed. Analytical laboratory results will be reviewed to determine if additional removal activities and associated confirmation sampling are required due to the presence of areas with contaminant concentrations greater than industrial SSLs or SALs. Sampling at SWMU 21-024(e) will consist of the following activities:

- *Septic tank 21-123 excavation and sampling*. The 11.33 × 6.33 × 8 ft steel septic tank will be carefully excavated and inspected for evidence of leaks (e.g., field screening stained soil, holes in the tank). One borehole will be advanced in the center of the excavation to determine the vertical extent of contamination (Figure 5.9-3, location BH-1). Borehole samples will be collected from the 0- to 1.0-ft, 5.0- to 6.0-ft, and 10.0- to 11.0-ft depth intervals. Samples will be collected immediately beneath the septic tank inlet and outlet connections to the pipeline (Figure 5.9-3, locations 1 and 2) at the 0- to 1.0-ft and 2.0- to 3.0-ft depth intervals.
- *Pipeline excavation and sampling*. The following pipelines will be excavated and sampled:
    - The main pipeline from former Building 21-020 to the septic tank will be carefully excavated and inspected for evidence of leaks. Where elevated levels of VOCs and/or radionuclides are present, as determined by field screening or where visible evidence of a leak is found (e.g., stained soil, break in the pipe), samples will be collected immediately beneath the pipe to define vertical extent. If no field-screening evidence or visible evidence of a leak is found, samples will be collected from locations beneath the pipelines (or where evidence of a former pipeline exists) at the edge of the former location of Building 21-020 (beneath a pipeline joint, if present) (Figure 5.9-3, location 3), approximately every 50 ft southeast to the septic tank (Figure 5.9-3, locations 4, 5, 6, and 7), at the additional line connection to the main line (Figure 5.9-3, location 8). At each location, a sample will be collected at the 0- to 1.0-ft and 2.0- to 3.0-ft depth intervals. The zero depth is defined as immediately beneath the pipe or at the bottom of the pipe bed for pipelines that no longer exist.
    - The two additional pipelines that connect to the main line will be carefully excavated and inspected for evidence of leaks. Where elevated levels of VOCs and/or radionuclides are present, as determined by field screening or where visible evidence of a leak is found (e.g., stained soil, break in the pipe), samples will be collected immediately beneath the pipe (or where evidence of a former pipeline exists) to define vertical extent. If no field-screening evidence or visible evidence of a leak is found, samples will be collected at the intersection of the two additional lines (Figure 5.9-3, location 9), and at the ends of the additional lines (Figure 5.9-3, locations 10 and 11) and at the edge of Buildings 21-014 and 21-046 (Figure 5.9-3, locations 12 and 13). Samples will be collected at depths of 0–1.0 ft and 2.0–3.0 ft.
    - The outfall line from the septic tank to the cliff edge was not located and portions of the septic tank inlet and outlet pipelines were found by the 2004 geophysical survey. If the outfall pipeline or evidence of the former pipeline is not found by visual inspection or field screening during excavation activities, exploratory trenching will be conducted to identify

their location. Trenching will be conducted with a backhoe and will progress from the surface to approximately 5 ft bgs. The trench will be visually logged for evidence of non-native materials, disturbed bedding horizons and areas of visible staining. Elevated radiological or organic vapor field-screening results will be documented. Trenching will continue in the historically identified area until the pipeline is located, evidence of a former pipeline is found, or the absence of a pipeline at that location has been verified. If a pipe or evidence of a former pipe is not identified during field activities, confirmation samples will be collected from location(s) where the pipe was most likely located using the proposed sampling map as a guide.

- *Outfall investigation*. The outfall was not identified by the 2004 geophysical survey. If the outfall is located by visual inspection or exploratory trenching, one borehole will be advanced in the center of the outfall 0.5 ft downslope from the mouth of the outfall pipe (location BH-2). If not identified, the borehole will be located approximately 17 ft downslope of the tank. Samples will be collected from the 0- to 0.5-ft, 2.0- to 3.0-ft, and 5.0- to 6.0-ft depth intervals. Samples will be collected 5 ft to the west and east of the borehole (Figure 5.9-3, locations 14 and 15). Two additional sample locations will be established downslope from the mouth of the pipe, in the center of a distinguishable drainage, or in a catchment basin aligned with the mouth of the pipe 10 ft and 30 ft (or as close to the mesa cliff edge as possible) downslope from BH-2 (Figure 5.9-3, locations 17 and 20). Location 17 will be flanked by sample locations 10 ft to the west and east (Figure 5.9-3, locations 16 and 18). Location 20 will be flanked by sample locations 20 ft to the west and east (Figure 5.9-3, locations 19 and 21). Samples will be collected at depths of 0–0.5 ft and 2.0–3.0 ft.
- *Bench investigation.* On the topographical bench beneath the mesa cliff edge, two sample locations will be established downslope from the mouth of the pipe in the center of a distinguishable drainage, or in a catchment basin aligned with the mouth of the pipe at the north and south ends of the bench (Figure 5.9-3, locations 23 and 26). These sample locations will each be flanked by one sample location 20 ft to the west and one sample location 20 ft to the east (Figure 5.9-3, locations 22, 24, 25, and 27). Samples will be collected at depths of 0–0.5 ft and 2.0–3.0 ft.

5.10 SWMU 21-024(g), Septic System

SWMU 21-024(g) consists of a septic tank, pipelines, drainage ditches, and associated outfall (Figure 5.10-1).

The septic system originally routed sewage from Building 21-031 (cold work shop/electronics) through pipelines and septic tank (Structure 21-125) into two drainage ditches (LASL 1947, 87576; LASL 1948, 87577). Engineering drawings from the 1950s (LASL 1950, 24437; LASL 1956, 00406) indicate sewage from Building 21-007 (warehouse) being tied into the system. Subsequently, the drainage ditches were no longer used and the septic tank was moved further north outside of the fenced area to discharge on the surface of the north rim of DP Mesa. Additionally, a cut pipe visibly exits Building 21-031 directing flow into the 2 x 2 x 1 ft concrete storm drain now present in the paved parking area.

5.10.1 Operational History

- 1948—Building 21-031 was constructed. The septic system consisted of a concrete 4 x 8.25 x 7.2 ft deep septic tank (Structure 21-125; septic tank 1). It routed sewage via a 4-in. VCP pipeline and another 2-in. pipeline, which converged from an electronics shop/cold workshop (Building 21-031) to a 4-in. VCP pipeline into two drainage ditches, each approximately 90 ft long, 9 ft wide, and 5 ft deep (LASL 1947, 87576; LASL 1948, 87577). The bottom four ft of the drainage

ditches were 2 to 8 in. rock with a 4-in. perforated fiber pipe running through the center. Also present at the northeast end of Building 21-031 was a 2-in. drainpipe ending with a splash block (LASL 1948, 87577). This was connected to a funnel type drain in the building for spot welder water.

- 1953—A new septic system, consisting of a 18 x 9.5 x 5 ft deep reinforced concrete septic tank (Structure 21-125; septic tank 2), (LANL 1991, 07529, p. 15-18), replaced the former septic system described above. It routed sewage via 4-in. VCP pipelines from a warehouse (Building 21-007) and the electronics shop/cold workshop (Building 21-031) to the surface on the north rim of DP Mesa above DP Canyon (LASL 1956, 00406; LANL 1991, 07529, p. 15-18).
- 1966—Septic tank 2 was no longer used and left in place (LANL 1991, 07529, p. 15-18).

5.10.2 Summary of Previous Investigations

Summarized below are previous investigations conducted at this site.

- 1966—Septic tank 2 was no longer used and left in place (LANL 1991, 07529, p. 15-18).
- 1992—RFI activities were performed as outlined in 1994 “Phase Report 1C, TA-21 Operable Unit RCRA Facility Investigation, Outfalls Investigation” (LANL 1994, 31591). Radiological field survey was completed, as well as collection of twelve soil samples from six locations (21-01425, -01426, -01427, -01428, -01429, and -01430) in the outfall area from the 0- to 0.5-ft and 0.5- to 1.0-ft depths. Samples were analyzed at an off-site fixed laboratory for inorganic chemicals, VOCs and SVOCs, and radionuclides (americium-241, isotopic plutonium, and strontium-90).
- 1993—RFI activities were performed as outlined in 1995 TA-21 OU Addendum to Phase Reports 1B and 1C (LANL 1994, 26073 and LANL 1994, 31591, respectively). Land survey was performed to locate the septic tank (Structure 21-125, septic tank 2) and installation of a 20-ft deep borehole (21-01667) downslope side adjacent to the outlet pipe of septic tank 2. Samples were collected from each 5-ft interval for a total of four samples and analyzed for inorganic chemicals, SVOCs, and radionuclides (americium-241, tritium, isotopic plutonium, isotopic thorium, and strontium-90) (LANL 1995, 52350).
- 2004—Radiological and geophysical surveys were completed (results are presented in Appendixes D and E, respectively). The geophysical survey was unable to locate septic tank 1. Additionally, associated piping and the splash block were also not identified. However, a small amount of pipe was identified coming out of the building that stopped where the retaining wall began. It appears that septic tank 1 was removed and a parking lot was constructed immediately north of the building, and a retaining wall placed in the area of the former piping exiting Building 21-031. However, this has not been confirmed. Septic tank 2 was located, but the inlet and outlet pipes could not be located. A storm drain and associated piping were identified in the parking area. The pipeline running between former Building 21-007 and Building 21-031 was also identified.

SWMU 21-024(g) Data

The SWMU 21-024(g) site data from 1992 and 1993 were collected from soil and tuff and compared with their respective BVs/FVs (LANL 1998, 59730). Table 5.10-1 and Figure 5.10-1 present SWMU 21-024(g) inorganic chemical concentrations greater than BVs. Table 5.10-2 and Figure 5.10-1 present SWMU 21-024(g) detected VOC concentrations. Table 5.10-3 and Figure 5.10-2 present SWMU 21-024(g) radionuclide activities greater than FVs and/or at depths where the FV does not apply. Sample results for inorganic chemicals and radionuclides were also compared to the maximum of the range of their

respective background data sets. Those analytes with detections and/or detection limits greater than their respective BVs/FVs and the maximum of the background data set were designated as COPCs. Detected VOCs were designated as COPCs.

Inorganic Chemicals

Inorganic Chemicals Detected at Concentrations Greater Than BVs. Arsenic, cadmium, chromium, copper, lead, nickel, silver, vanadium, and zinc were detected at concentrations greater than their respective BVs (Figure 5.10-1).

- Arsenic was detected in three soil samples ranging from 8.7 to 10 mg/kg (the maximum was from location 21-01428, 0- to 5.0-ft depth interval). All concentrations were greater than the soil BV (8.17 mg/kg), and two of the three concentrations were greater than the maximum arsenic concentration in the soil background data set (9.3 mg/kg). Therefore, arsenic is a COPC.
- Cadmium was detected in 12 soil samples ranging from 0.69 to 5.6 mg/kg (the maximum was from location 21-01428, 0.0- to 0.5-ft depth interval), concentrations greater than the soil BV (0.4 mg/kg), and two of those concentrations were greater than the maximum cadmium concentration in the soil background data set (2.6 mg/kg). Therefore, cadmium is a COPC.
- Chromium was detected in three soil samples ranging from 21.7 to 25 mg/kg (the maximum was from location 21-01428, 0- to 0.5-ft depth interval), concentrations greater than the soil BV (19.3 mg/kg), but less than the maximum chromium concentration in the soil background data set (36.5 mg/kg). Therefore, chromium is not a COPC.
- Copper was detected in five soil samples ranging from 15 to 59.3 mg/kg (the maximum was from location 21-01430, 0- to 0.5-ft depth interval), concentrations greater than the soil BV (14.7 mg/kg), and three were also greater than the maximum copper concentration in the soil background data set (16 mg/kg). Therefore, copper is a COPC.
- Lead was detected in three soil samples ranging from 26.4 to 67.7 mg/kg (the maximum was from location 21-01430, 0- to 0.5-ft depth interval), concentrations greater than the soil BV (22.3 mg/kg), and two of the three were greater than the maximum lead concentration in the soil background data set (28.0 mg/kg). Therefore, lead is a COPC.
- Nickel was detected in one soil sample at 19.5 mg/kg (location 21-01427, 0- to 0.5-ft depth interval), a concentration greater than the soil BV (15.4 mg/kg) but less than the maximum nickel concentration in the soil background data set (29 mg/kg). Therefore, nickel is not a COPC.
- Silver was detected in two soil samples at 1.6 and 1.8 mg/kg (the maximum was from location 21-01430, 0- to 0.5-ft depth interval), concentrations greater than the soil BV (1.0 mg/kg, the maximum is not available). Therefore, silver is a COPC.
- Vanadium was detected in two soil samples at 47.3 and 52.1 mg/kg (the maximum was from location 21-1428, 0- to 0.5-ft depth interval), concentrations greater than the soil BV (39.6 mg/kg) but less than the maximum vanadium concentration in the soil background data set (56.5 mg/kg). Therefore, vanadium is not a COPC.
- Zinc was detected in six soil samples ranging from 84.5 to 399 mg/kg (the maximum was from location 21-01428, 0- to 0.5-ft depth interval), concentrations greater than the soil BV (48.8 mg/kg) and the maximum zinc concentration in the soil background data set (75.5 mg/kg). Therefore, zinc is a COPC.

Inorganic Chemicals not Included in Background Data. Lithium and strontium do not have background data and, therefore, have no BVs for comparison.

- Lithium was detected in 12 samples ranging from 4.1 to 6.3 mg/kg (the maximum was from location 21-01430, 0- to 0.5-ft depth interval). No established background levels are available for lithium. The lithium concentrations at this site are similar to the concentrations found at most of the corrective action sites (most are below 11 mg/kg), indicating that the lithium levels are not elevated as a result of releases. Therefore, lithium is not a COPC.
- Strontium was detected in 12 samples ranging from 3.1 to 35 mg/kg (the maximum was from location 21-01430, 0- to 0.5-ft depth interval). No established background levels are available for strontium. The strontium concentrations at this site are similar to the concentrations found at most of the corrective action sites (most are below 36 mg/kg), indicating that the strontium levels are not elevated as a result of releases. Therefore, strontium is not a COPC.

Inorganic Chemicals with Detection Limits Greater Than BVs. Antimony, cadmium, selenium, and silver detection limits were greater than their respective BVs in some samples.

- Antimony detection limits, ranging from 4.8 to 6.5 mg/kg (the maximum detection limit was from location 21-01430), were greater than the soil BV (0.83 mg/kg) and the maximum antimony concentration in the soil background data set (1.0 mg/kg) in 12 soil samples. Therefore, antimony is a COPC due to elevated detection limits.
- The cadmium detection limit of 0.64 mg/kg (location 21-01667) was greater than the soil BV (0.4 mg/kg), but less than the maximum cadmium concentration in the soil background data set (2.6 mg/kg) in one sample. Therefore, cadmium is not a COPC due to elevated detection limits. However, cadmium was already determined to be a COPC due to detected concentrations above BVs.
- Selenium detection limits, ranging from 0.41 mg/kg to 0.42 mg/kg (the maximum detection limit was from location 21-01667), were greater than the tuff BV (0.3 mg/kg) and the maximum selenium concentration in the tuff background data set (0.105 mg/kg) in three borehole samples. Therefore, selenium is a COPC due to elevated detection limits.
- The silver detection limit of 1.1 mg/kg (location 21-01667) was greater than the soil BV (1.0 mg/kg, the maximum is not available) and the tuff BV (1.0 mg/kg) but less than maximum of the tuff background data set (1.9 mg/kg) in one soil and one tuff sample. Silver was already determined to be a COPC due to detected concentrations greater than BVs. Therefore, silver is a COPC due to detected concentrations and detection limits greater than BVs.

Inorganic Chemical Summary. Antimony, arsenic, cadmium, copper, lead, selenium, silver, and zinc are inorganic COPCs.

Organic Chemicals

VOCs. VOCs were detected in three samples (Figure 5.10-1).

- Acetone was detected in three samples ranging from 0.02 to 0.04 mg/kg (the maximum was from location 21-01429, 0.5- to 1.0-ft depth interval). Therefore, acetone is a COPC.

SVOCs. SVOCs were not detected.

Organic Chemical Summary. Acetone is an organic COPC.

Radionuclides

Fallout Radionuclides. Americium-241, plutonium-238, and plutonium-239 were detected above FVs at SWMU 21-024(g) (Figure 5.10-2). Since FVs are only applicable within the first 0.5 ft of surface soils, all fallout radionuclides detected in the samples deeper than the first 0.5 ft of surface soils are COPCs.

- Americium-241 was detected in four surface soil samples ranging from 0.02 to 0.55 pCi/g (the maximum was from location 21-01430, 0- to 0.5-ft depth interval), activities greater than the soil FV and the maximum americium-241 activity in the soil background data set (both are 0.013 pCi/g). Americium-241 was also detected in four samples at depths where the FV does not apply, ranging from 0.01 to 0.03 pCi/g (the maximum was from location 21-01428, 0.5- to 1.0-ft depth interval). Therefore, americium-241 is a COPC.
- Plutonium-238 was detected in one surface soil sample at 0.03 pCi/g (location 21-01428, 0- to 0.5-ft interval), greater than the soil FV (0.023 pCi/g) but less than the maximum plutonium-238 activity in the soil background data set (0.037 pCi/g). Therefore, plutonium-238 is not a COPC.
- Plutonium-239 was detected in six surface soil samples ranging from 0.20 to 19.4 pCi/g (the maximum was from location 21-01430, 0- to 0.5-ft depth interval), activities greater than the soil FV (0.054 pCi/g) and the maximum plutonium-239 activity in the soil background data set (0.055 pCi/g). Plutonium-239 was also detected in five samples at depths where the FV does not apply, ranging from 0.03 to 0.46 pCi/g (the maximum was from location 21-01428, 0.5- to 1.0-ft depth interval). Therefore, plutonium-239 is a COPC.
- Tritium was detected in all depth intervals of the borehole (21-01667) ranging from 0.03 to 0.04 pCi/g (the maximum was in the 10.0- to 15.0-ft and 15.0-ft to 20.0-ft depth intervals) in tuff and/or at depths where the FV does not apply. Therefore, tritium is a COPC.

Radionuclide Summary. Americium-241, plutonium-239, and tritium are radionuclide COPCs.

5.10.3 Scope of Activities for SWMU 21-024(g)

Sampling and Excavation Activities

The proposed sample locations at SWMU 21-024(g) are shown in Figure 5.10-3. Table 5.10-4 provides a summary of the proposed sample locations, depths, objectives each sample addresses, and proposed analytical suites.

Samples will be analyzed for TAL metals, cyanide, nitrates, perchlorates, organic chemicals (VOCs and SVOCs [VOCs only in samples deeper than 0.5 ft bgs]), radionuclides (gamma spectroscopy, americium-241, isotopic plutonium, isotopic uranium, strontium-90, and tritium), moisture, and pH. If field screening indicates the presence of VOCs, a deeper sample will be collected and analyzed for full suite. Field screening will determine the sample(s) with the highest radionuclide and/or organic contamination. If field-screening instruments cannot determine which sample(s) contain(s) the highest levels of radionuclides or organic compounds, samples collected from the location where contamination would most likely be present as indicated by site history (i.e., sump, outfall, etc.) will be selected. The selected sample(s) will be sent to an off-site fixed laboratory for quick turn-around analysis of PCBs, HE, dioxins, and furans (NMED 2005, 89314). The sample results will be transmitted to NMED, via fax, for review. Within 1 week of receipt of the results, we anticipate that NMED will contact the LANL project leader to discuss the results. If analytes from the four additional analyses are not detected, or detected at low levels reflective of anthropogenic activity, the remaining samples will not be analyzed for the four additional analyses per agreement with NMED. If the additional analytes are detected at levels attributable to the site, the remaining stored aliquots

will be submitted to the analytical laboratory for the additional analyses. Prior to demobilization, laboratory results will be reviewed to assess if the nature and extent of contamination have been determined. If nature and extent have not been determined, then step-out samples will be collected.

During structure removal activities, excavation of soil and/or rock (including all visibly stained areas) will proceed until the radionuclide and organic vapor field-screening results indicate all contaminated material has been removed. Confirmation samples will be collected as these activities are completed. Analytical laboratory results will be reviewed to determine if additional removal activities and associated confirmation sampling are required due to the presence of areas with contaminant concentrations greater than industrial SSLs or SALs. Sampling at SWMU 21-024(g) will consist of the following activities:

- *Septic tank 21-125 excavation and sampling*. There are potentially two septic tanks to be excavated. The septic tanks (4 x 8.25 x 7.2 ft [tank 1] and 18 × 9.5 × 5 ft [tank 2]) will be carefully excavated and inspected for evidence of leaks (e.g., field screening stained soil, holes in each tank). One borehole will be advanced in the center of each excavation to determine vertical extent of contamination (Figure 5.10-3, locations BH-1 and BH-2). Borehole samples will be collected from the 0- to 1.0-ft, 5.0- to 6.0-ft and 10.0- to 11.0-ft depth intervals. Samples will be collected immediately beneath each septic tank inlet (Figure 5.10-3, locations 1 and 3) and outlet (Figure 5.10-3, locations 2 and 4) connections to the pipeline at the 0- to 1.0-ft and 2.0- to 3.0-ft depth intervals.
    - Septic tank 1 was not located by the 2004 geophysical survey; therefore, exploratory trenching will be conducted to identify the location. Trenching will be conducted with a backhoe and will progress from the surface to approximately 5 ft bgs. The trench will be visually logged for evidence of non-native materials, disturbed bedding horizons and areas of visible staining. Elevated radiological or organic vapor field-screening results will be documented. Trenching will continue in the historically identified area until the tank is located, evidence of a former tank is found, or the absence of a tank at that location has been verified. If a tank or evidence of a former tank is not identified during field activities, confirmation samples will be collected from location(s) where the tank was most likely located using the proposed sampling map as a guide.
- *Pipeline excavation and sampling for septic system 1.* Any pipelines and backfilled former pipeline beds that are found to run from Building 21-031 and join together to run to septic tank 1, exit this septic tank to the drainage ditches, as well as the pipeline from the spot welding room, will be carefully excavated and inspected for evidence of leaks. Where elevated levels of VOCs and/or radionuclides are present, as determined by field screening or where visible evidence of a leak is found (e.g., stained soil, break in the pipe), samples will be collected immediately beneath the pipe to define vertical extent. If no field-screening evidence or visible evidence of a leak is found, samples will be collected from locations beneath both pipelines (or where evidence of a former pipeline exists) immediately north of Building 21-031 (beneath a pipeline joint, if present) (Figure 5.10-3, locations 5, 6, 7, and 8). At each location, a sample will be collected at the 0- to 1.0-ft and 2.0- to 3.0-ft depth intervals. The zero depth is defined as immediately beneath the pipe or at the bottom of the pipe bed for pipelines that no longer exist.
    - This septic system piping was not located by the 2004 geophysical survey; therefore, exploratory trenching will be conducted to identify the pipe location. Trenching will be conducted with a backhoe and will progress from the surface to approximately 5 ft bgs. The trench will be visually logged for evidence of non-native materials, disturbed bedding horizons and areas of visible staining. Elevated radiological or organic vapor field-screening results will be documented. Trenching will continue in the historically identified

area until the pipeline is located, evidence of a former pipeline is found, or the absence of a pipeline at that location has been verified. If a pipe or evidence of a former pipe is not identified during field activities, confirmation samples will be collected from location(s) where the pipe was most likely located using the proposed sampling map as a guide.

- *Pipeline excavation and sampling for septic system 2*. The pipeline that runs from former Building 21-07 to Building 21-031, the pipelines that run from Building 21-031 to septic tank 2 and from this septic tank to the outfall, and backfilled former pipeline beds will be carefully excavated and inspected for evidence of leaks. Where elevated levels of VOCs and/or radionuclides are present, as determined by field screening or where visible evidence of a leak is found (e.g., stained soil, break in the pipe), samples will be collected immediately beneath the pipe to define vertical extent. If no field-screening evidence or visible evidence of a leak is found, samples will be collected under the pipe (or where evidence of a former pipeline exists) from locations at the entrance to and exit from each building (former Building 21-007 and Building 21-031), beneath a pipeline joint, if present, at approximately half the distance between Building 21-031 and former Building 21-007, at approximately half the distance between Building 21-031 and the septic tank, and at approximately half the distance between the septic tank and where the outfall daylights (Figure 5.10-3, locations 9, 10, 11, and 12). At each location, a sample will be collected at the 0- to 1.0-ft and 2.0- to 3.0-ft depth intervals. The zero depth is defined as immediately beneath the pipe.
    - The pipeline from Building 21-031 to tank 2 and from the tank to the outfall was not located by the 2004 geophysical survey. If the pipelines or evidence of former pipelines are not found by visual inspection or field screening during excavation activities, exploratory trenching will be conducted to identify their location. Trenching will be conducted with a backhoe and will progress from the surface to approximately 5 ft bgs. The trench will be visually logged for evidence of non-native materials, disturbed bedding horizons and areas of visible staining. Elevated radiological or organic vapor field-screening results will be documented. Trenching will continue in the historically identified area until the pipeline is located, evidence of a former pipeline is found, or the absence of a pipeline at that location has been verified. If a pipe or evidence of a former pipe is not identified during field activities, confirmation samples will be collected from location(s) where the pipe was most likely located using the proposed sampling map as a guide.
- *Drainage ditch excavation and sampling.* The drainage ditches, approximately 9 ft wide and 90 ft long and 5 ft deep, will be excavated. After excavation, one borehole will be advanced in the approximate center of the western ditch (Figure 5.10-3, BH-3). Borehole samples will be collected from the 0- to 1.0-ft, 5.0- to 6.0-ft, and 10.0- to 11.0-ft depth intervals. One borehole (Figure 5.10-3, location BH-4) will also be advanced to the south of the road within the excavated area in the center of the eastern ditch, and samples collected from the same intervals. An additional borehole will be drilled 5 ft north of boreholes BH-3 and samples collected at the 0- to 0.5-ft, 5.0- to 6.0-ft, and 10.0- to 11.0-ft depth intervals (Figure 5.10-3, location BH-5). The borehole location for drainage ditch 2 will be located just north of the road, downslope from the center of the ditch (Figure 5.10-3, location BH-6). Samples will be collected 5 ft to the west and south of the drainage ditches (Figure 5.10-3, locations 13, 14, and 15) at 0- to 0.5-ft and 2.0- to 3.0-ft depth intervals.
    - The drainage ditches were not located by the 2004 geophysical survey; therefore, exploratory trenching will be conducted to identify their location. Trenching will be conducted with a backhoe and will progress from the surface to approximately 5 ft bgs. The trench will be visually logged for evidence of non-native materials, disturbed bedding horizons and areas of visible staining. Elevated radiological or organic vapor field-screening results will be documented. Trenching will continue in the historically identified area until the ditches are located and the boundary has been determined, evidence of

former ditches is found, or the absence of ditches at that location has been verified. If the drainage ditches or evidence of the former drainage ditches are not identified during field activities, confirmation samples will be collected from location(s) where the ditches were most likely located using the proposed sampling map as a guide.

- *Outfall investigation*. If the outfall pipe is located, a borehole will be advanced in the center of the outfall 0.5 ft downslope from the mouth of the outfall pipe (Figure 5.10-3, location BH-7). If the piping is not located, the borehole location will be moved approximately 20 ft downslope of the northern edge of the septic tank. Borehole samples will be collected from the 0- to 0.5-ft, 2.0- to 3.0-ft, and 5.0- to 6.0-ft depth intervals. Samples will be collected 5 ft to the west and east of this location (Figure 5.10-3, locations 16 and 17). Two additional sample locations will be established downslope from the mouth of the pipe, in the center of a distinguishable drainage, or in a catchment basin aligned with the mouth of the pipe 10 ft and 30 ft downslope from BH-7 (Figure 5.10-3, locations 19 and 22). Location 19 will be flanked by sample locations 10 ft to the west and east (Figure 5.10-3, locations 18 and 20). Location 22 will be flanked by sample locations 20 ft to the west and east (Figure 5.10-3, locations 21 and 23). Samples will be collected at depths of 0–0.5 ft and 2.0–3.0 ft.
- *Splash block excavation and sampling*. Samples will be collected under the former splash block piping at its exit from Building 21-031 (Figure 5.10-3, location 24) and at approximately 20 ft north of location 24 in the apparent area of the removed splash block (Figure 5.10-3, location 25). Samples will be collected at depths of 0–1.0 ft and 2.0–3.0 ft. The zero depth is defined as immediately beneath the pipe.
    - The splash block was not located by the 2004 geophysical survey. It appears to have been removed when the parking lot was constructed. No trenching is necessary in this area.
- *Storm drain sampling.* Samples will be collected in association with the 2 x 2 x 1 ft concrete storm drain located in the center of the parking area on the north side of Building 21-031. There is a visible cut pipe directing flow from inside the building into this storm drain. The storm drain also has associated underground piping. One location will be sampled south of the storm drain near the pipe exiting the building at the 0- to 0.5-ft and 2.0- to 3.0-ft depth intervals (Figure 5.10-3, location 26). A borehole will also be drilled 0.5 ft downslope of the storm drain (avoiding the pipe exiting the storm drain), and samples collected from 0- to 0.5-ft, 5.0- to 6.0-ft, and 10.0- to 11.0-ft depth intervals (Figure 5.10-3, location BH-8). The zero depth is defined as immediately beneath the pipe.
- *Storm drain outfall investigation*. One borehole will be advanced in the center of the storm drain outfall 0.5 ft downslope from the mouth of the outfall pipe (Figure 5.10-3, location BH-9). Borehole samples will be collected from 0- to 0.5-ft, 2.0- to 3.0-ft, and 5.0- to 6.0-ft depth intervals. Samples will be collected 5 ft to the west and east of this location (Figure 5.10-3, locations 27 and 28) at the 0- to 0.5-ft and 2.0- to 3.0-ft depth intervals. Six additional locations will be sampled on the north side of the road. Samples will be collected north of BH-9 immediately north of the road (Figure 5.10-3, location 30), 10 ft west and east of location 30 (Figure 5.10-3, locations 29 and 31), 20 ft north of location 30 (Figure 5.10-3, location 33), and 20 ft west and east of location 33 (Figure 5.10-3, locations 32 and 34) at the 0- to 0.5-ft and 2.0- to 3.0-ft depth intervals.

5.11 SWMU 21-024(h), Septic System

SWMU 21-024(h) consists of a septic tank, pipelines, and associated outfall (Figure 5.11-1).

5.11.1 Operational History

- 1945—Building 21-151 was constructed as a plutonium processing facility and the sanitary sewer system routed sewage through a 6-in. VCP (LASL 1946, 71281) and a reinforced concrete 11.33 × 6.33 × 8.67-ft deep septic tank (Structure 21-163) to the surface on the north rim of DP Mesa above DP Canyon (LASL 1945, 24459; LANL 1991, 07529, p. 15-94).
- 1945—Building 21-152 was constructed as a laboratory that worked on Project Rover serving as a polonium-processing and a high temperature laboratory (LASL 1946, 24460).
- Early 1960s—Building 21-151 was removed.
- 1965—Building 21-152 septic system was tied into the existing septic tank (Structure 21-163).
- 1966—The septic tank was no longer used and left in place (LANL 1991, 07529, p. 15-94).

5.11.2 Previous Investigations

Summarized below are previous investigations conducted at this site.

- 1992—Radiological field survey and soil sampling were conducted (LANL 1994, 31591, p. 8-63). Eight samples were collected from three locations downslope form the septic tank. Samples were collected from locations 21-01413, 21-01414, and 21-01415 at the 0- to 0.5-ft, 0.5- to 1.0-ft depth intervals. Samples were also collected from the 1.0- to 1.5-ft depth interval at locations 21-01413 and 21-01415. Samples were analyzed at an off-site fixed laboratory for inorganic chemicals, VOCs, SVOCs, and radionuclides (americium-241, isotopic plutonium, isotopic thorium, and strontium-90).
- 1993—A 20-ft borehole (location 21-01679) was drilled adjacent to the downslope side of the septic tank. One sample was collected for each 5-ft interval of the borehole for a total of four samples. Samples were analyzed at an off-site fixed laboratory for inorganic chemicals, SVOCs, and radionuclides (americium-241, gamma spectroscopy, tritium, isotopic plutonium, isotopic thorium, isotopic uranium, and strontium-90).
- 1996—Septic tank contents were removed and the tank was filled with pea gravel. The inlet and outlet lines were grouted with concrete. The area was regraded, reseeded, and restored to the original site conditions (LANL 1996, 54921, p. 2).
- 2004—Radiological and geophysical surveys were completed (results are presented in Appendixes D and E, respectively). The geophysical survey indicated that the septic tank was still present. Additionally, the two pipelines that had previously connected the tank to Buildings 21-151 and 21-152 were identified. The outlet pipe and outfall were not identified.

SWMU 21-024(h) Data

The site data from 1992, 1993, and 1996 were collected from soil and tuff and compared with their respective BVs/FVs (LANL 1998, 59730). Table 5.11-1 and Figure 5.11-1 present SWMU 21-024(h) inorganic chemical concentrations greater than BVs. Table 5.11-2 and Figure 5.11-1 present SWMU 21-024(h) detected VOC and SVOC concentrations. Table 5.11-3 and Figure 5.11-2 present SWMU 21-024(h) radionuclide activities greater than BVs/FVs and/or at depths where the FV does not apply. Sample results for inorganic chemicals and radionuclides were also compared to the maximum of the range of their respective background data sets. Those analytes with detections and/or detection limits greater than their respective BVs/FVs and the maximum of the background data set were designated as COPCs. Detected organic chemicals were designated as COPCs.

Inorganic Chemicals

Inorganic Chemicals Detected at Concentrations Greater Than BVs. Cadmium and zinc were detected at concentrations greater than their respective BVs (Figure 5.11-1).

- Cadmium was detected in eight soil samples ranging from 0.53 to 2.1 mg/kg (the maximum was from location 21-01414, 0.5- to 1.0-ft depth interval), concentrations greater than the soil BV (0.4 mg/kg) but less than the maximum cadmium concentration in the soil background data set (2.6 mg/kg). Therefore, cadmium is not a COPC.

- Zinc was detected in one surface soil sample (location 21-01413, 0- to 0.5-ft depth interval) at 51.8 mg/kg, a concentration greater than the soil BV (48.8 mg/kg), but less than the maximum zinc concentration in the soil background data set (75.5 mg/kg). Therefore, zinc is not a COPC.

Inorganic Chemicals not Included in Background Data. Lithium and strontium do not have background data and, therefore, have no BVs for comparison.

- Lithium was detected in eight samples ranging from 3.9 to 8.7 mg/kg (the maximum was from location 21-01414, 0.5- to 1.0-ft depth interval). No established background levels are available for lithium. The lithium concentrations for at this site are similar to the concentrations found at most of the corrective action sites (most are below 11 mg/kg), indicating that the lithium levels are not elevated as a result of releases. Therefore, lithium is not a COPC.

- Strontium was detected in eight samples ranging from 4.4 to 14.9 mg/kg (the maximum was from location 21-01414, 0- to 0.5-ft depth interval). No established background levels are available for strontium. The strontium concentrations at this site are similar to the concentrations found at most of the corrective action sites (most are below 36 mg/kg), indicating that the strontium levels are not elevated as a result of releases. Therefore, strontium is not a COPC.

Inorganic Chemicals with Detection Limits Greater Than BVs. Antimony, cadmium, selenium, and silver detection limits were greater than their respective BVs in some samples.

- Antimony detection limits, ranging from 6.1 to 7.0 mg/kg (the maximum detection limit was from location 21-01413), were greater than the soil BV (0.83 mg/kg) and the maximum antimony concentration in the soil background data set (1.0 mg/kg) in eight soil samples. Therefore, antimony is a COPC due to elevated detection limits.

- The cadmium detection limit of 0.63 mg/kg (location 21-01679) was greater than the soil BV (0.4 mg/kg), but less than the maximum cadmium concentration in the soil background data set (2.6 mg/kg), in one sample. Therefore, cadmium is not a COPC due to elevated detection limits.

- Selenium detection limits, ranging from 0.42 to 0.46 mg/kg (location 21-01679), were greater than the tuff background (0.3 mg/kg) and the maximum selenium concentration in the tuff background data set (0.105 mg/kg) in three borehole samples. Therefore, selenium is a COPC due to elevated detection limits.

- The silver detection limit at 1.1 mg/kg (location 21-1679) was greater than the soil BV (1.0 mg/kg and the maximum is not available) in one soil sample. The silver detection limit at 1.1 mg/kg (location 21-1679) was greater than the tuff BV (1.0 mg/kg), but less than the maximum silver concentration in the tuff background data set (1.9 mg/kg) in two tuff samples. Therefore, silver is a COPC for soil due to elevated detection limits.

Inorganic Chemical Summary. COPCs. Antimony, selenium, and silver are all inorganic COPCs due to detection limits greater than BVs during previous investigation sample analyses.

Organic Chemicals

VOCs. VOCs were detected at three locations (Figure 5.11-1).

- Acetone was detected in seven samples ranging from 0.01 to 0.03 mg/kg (the maximum was from location 21-01413, 1.0- to 1.5-ft depth interval). Therefore, acetone is a COPC.
- Methylene chloride was detected at 0.02 mg/kg in one sample in the 1.0- to 1.5-ft depth interval (21-01415). Therefore, methylene chloride is a COPC.

SVOCs. Bis(2-ethylhexyl)phthalate was detected in two samples from the borehole (Figure 5.11-1).

- Bis(2-ethylhexyl)phthalate was detected in two samples from the borehole at the 0- to 2.5-ft and 5.0- to 10.0-ft depth intervals at 2.9 and 5.5 mg/kg, respectively. Therefore, bis(2-ethylhexyl)phthalate is a COPC.

Organic Chemical Summary. Acetone, bis(2-ethylhexyl)phthalate, and methylene chloride are organic COPCs.

Radionuclides

Fallout Radionuclides. Plutonium-239 was detected above its FV (Figure 5.11-2). Since FVs are only applicable within the first 0.5 ft of surface soils, all fallout radionuclides detected in the samples deeper than the first 0.5 ft of surface soils are COPCs.

- Americium-241 was detected ranging from 0.3 to 0.68 pCi/g in two locations in the outfall (soil) and one depth interval of the borehole (tuff) (the maximum was from location 21-01414, 0.5-to 1.0-ft interval), at depths where the FV does not apply. Therefore, americium-241 is a COPC.
- Plutonium-238 was detected at 0.91 pCi/g in one soil outfall sample (location 21-01413, 0.5-to 1.0-ft depth interval), at a depth where the FV does not apply. Therefore, plutonium-238 is a COPC.
- Plutonium-239 was detected at 1.74 pCi/g in one soil outfall surface sample (location 21-01414, 0- to 0.5-ft depth interval), an activity greater than the soil FV (0.054 pCi/g) and the maximum plutonium-239 activity in the soil background data set (0.055 pCi/g). Plutonium-239 was also detected in soil samples at depths where the FV does not apply, ranging from 0.04 to 33 pCi/g (the maximum was from location 21-01414, 0.5- to 1.0-ft depth interval). Therefore, plutonium-239 is a COPC.
- Tritium was detected in all four depths of the borehole (location 21-1667, one soil and three tuff samples) at a maximum activity of 0.79 pCi/g (15.0- to 20.0-ft depth interval) at depths where the FV does not apply. Therefore, tritium is a COPC.

Naturally Occurring Radionuclides. Uranium-235 was detected at the borehole location above background (Figure 5.11-2).

- Uranium-235 was detected in one tuff sample at 0.28 pCi/g (location 21-1679, 10.0- to 15.0-ft depth interval) an activity greater than the tuff BV (0.09 pCi/g, the maximum tuff background activity is not available). Therefore, uranium-235 is a COPC.

Radionuclide Summary. Americium-241, plutonium-238, plutonium-239, tritium, and uranium-235 are radionuclide COPCs.

5.11.3 Scope of Activities for SWMU 21-024(h)

Sampling and Excavation Activities

The proposed sample locations at SWMU 21-024(h) are shown in Figure 5.11-3. Table 5.11-4 provides a summary of the proposed sample locations, depths, objectives each sample addresses, and proposed analytical suites.

Samples will be analyzed for TAL metals, cyanide, nitrates, perchlorates, organic chemicals (VOCs and SVOCs [VOCs only in samples deeper than 0.5 ft bgs]), radionuclides (gamma spectroscopy, americium-241, isotopic plutonium, isotopic uranium, strontium-90, and tritium), moisture, and pH. If field screening indicates the presence of VOCs, a deeper sample will be collected and analyzed for full suite. Field screening will determine the sample(s) with the highest radionuclide and/or organic contamination. If field-screening instruments cannot determine which sample(s) contain(s) the highest levels of radionuclides or organic compounds, samples collected from the location where contamination would most likely be present as indicated by site history (i.e., sump, outfall, etc.) will be selected. The selected sample(s) will be sent to an off-site fixed laboratory for quick turn-around analysis of PCBs, HE, dioxins, and furans (NMED 2005, 89314). The sample results will be transmitted to NMED, via fax, for review. Within 1 week of receipt of the results, we anticipate that NMED will contact the LANL project leader to discuss the results. If analytes from the four additional analyses are not detected, or detected at low levels reflective of anthropogenic activity, the remaining samples will not be analyzed for the four additional analyses per agreement with NMED. If the additional analytes are detected at levels attributable to the site, the remaining stored aliquots will be submitted to the analytical laboratory for the additional analyses. Prior to demobilization, laboratory results will be reviewed to assess if the nature and extent of contamination have been determined. If nature and extent have not been determined, then step-out samples will be collected.

During structure removal activities, excavation of soil and/or rock (including all visibly stained areas) will proceed until the radionuclide and organic vapor field-screening results indicate all contaminated material has been removed. Confirmation samples will be collected as these activities are completed. Analytical laboratory results will be reviewed to determine if additional removal activities and associated confirmation sampling are required due to the presence of areas with contaminant concentrations greater than industrial SSLs or SALs. Sampling at SWMU 21-024(h) will consist of the following activities:

- *Septic tank 21-163 excavation and sampling.* The 11.33 x 6.33 x 8.67 ft septic tank will be carefully excavated and inspected for evidence of leaks (e.g., field screening stained soil, holes in the tank). One borehole will be advanced in the center of the floor of the excavation to determine vertical extent of contamination (Figure 5.11-3, location BH-1). Borehole samples will be collected from the 0- to 1.0-ft, 5.0- to 6.0-ft, and 10.0- to 11.0-ft depth intervals. Samples will be collected immediately beneath the septic tank inlet and outlet connections to the pipeline (Figure 5.11-3, locations 1 and 2) at the 0- to 1.0-ft and 2.0- to 3.0-ft depth intervals.
- *Pipeline excavation and sampling.* Any pipelines and backfilled former pipeline beds be carefully excavated and inspected for visible signs of leakage. Where elevated levels of VOCs and/or radionuclides are present, as determined by field screening or where visible evidence of a leak is found (e.g., stained soil, break in the pipe), samples will be collected immediately beneath the pipe to define vertical extent. The inlet pipelines will be followed back to their source (removed Building 21-151 and the east side of Building 21-152) and carefully excavated. Where elevated levels of VOCs and/or radionuclides are present as determined by field-screening or where visible evidence

of a leak is found, samples will be collected immediately beneath the pipes to define vertical extent. If no field-screening evidence or visible evidence of a leak is found, samples will be collected from locations beneath the pipelines (or where evidence of a former pipeline exists) at approximately every 50 ft to the source (under a pipeline joint or where the pipe makes a 45 degree turn) (Figure 5.11-3, locations 3 through 7) and at the connection of the pipeline to the buildings (Figure 5.11-3, locations 8 and 9). At each location, a sample will be collected at the 0- to 1.0-ft and 2.0- to 3.0-ft depth intervals. The zero depth is defined as immediately beneath the pipe or at the bottom of the pipe bed for pipelines that no longer exist.

- The pipeline that runs from the outfall to the septic tank was not located by the 2004 geophysical survey. If the outfall piping or evidence of outfall piping is not found by visual inspection or field screening during the septic tank removal, exploratory trenching will be conducted to identify the outfall pipeline location. Trenching will be conducted with a backhoe and will progress from the surface to approximately 5 ft bgs. The trench will be visually logged for evidence of non-native materials, disturbed bedding horizons and areas of visible staining. Elevated radiological or organic vapor field-screening results will be documented. Trenching will continue in the historically identified area until the pipeline is located, evidence of a former pipeline is found, or the absence of a pipeline at that location has been verified. If a pipe or evidence of a former pipe is not identified during field activities, confirmation samples will be collected from location(s) where the pipe was most likely located using the proposed sampling map as a guide.

- *Outfall investigation.* The outfall was not located by the 2004 geophysical survey. If not found by visual inspection or field screening one borehole will be advanced in the center of the outfall area 20 ft downslope from the septic tank (location BH-2) in the area of previous outfall sampling. Samples will be collected from the 0- to 0.5-ft, 2.0- to 3.0-ft, and 5.0- to 6.0-ft depth intervals. Samples will be collected 5 ft to the west and east of the borehole (Figure 5.11-3, locations 10 and 11). Two additional sample locations will be established downslope from the mouth of the pipe, in the center of a distinguishable drainage, or in a catchment basin aligned with the mouth of the pipe 10 ft and 30 ft downslope from BH-2 (Figure 5.11-3, locations 13 and 16). Location 13 will be flanked by sample locations 10 ft to the west and east (Figure 5.11-3, locations 12 and 14). Location 16 will be flanked by sample locations 20 ft to the west and east (Figure 5.11-3, locations 15 and 17). One sample location north of Structure 21-346 will also be located in the middle of the drainage (Figure 5.11-3, location 19) and flanked by sample locations 20 ft to the west and east (Figure 5.11-3, locations 18 and 20). Samples will be collected at the 0- to 0.5-ft and 2.0- to 3.0-ft depth intervals.

5.12 SWMU 21-024(i), Septic System Inlet Line

SWMU 21-024(i) consists of a septic tank, pipelines, and associated outfall (Figure 5.12-1). The only portion of the septic system remaining at the site is the inlet line from Building 21-209 to the fence line. Building 21-209 currently overlays part of the pipeline that used to connect to sump Structure 21-175. The portion of the inlet line from the fence to the septic tank, the septic tank, the outlet line and the outfall were removed in 2001 in an interim action (LANL 2003, 76053).

5.12.1 Operational History

- 1945—Building 21-152 was constructed to serve as a polonium-processing and a high temperature laboratory and the septic system that served Building 21-152 was constructed at the same time. The septic system routed sewage from the laboratory via 6-in. VCP inlet line to the

reinforced concrete and is 6 x 10 x 8-ft deep septic tank (Structure 21-181) through sump Structure 21-175 (LASL 1946, 24460). Blowdown pipelines from cooling tower Structures 21-166 and 21-167 were also connected to this sump. Effluent was then routed via 6-in. VCP outlet line to the surface in a broad open area with a gentle slope extending about 30 ft to the south edge of DP Mesa above Los Alamos Canyon. The sump and portions of the pipe currently lie under Building 21-209 (LASL 1964, 71281).

- 1964 to 1965—Building 21-209 was built to serve as a high-temperature chemistry building and was located on top of the existing inlet lines from Building 21-152, Structure 21-166, and Structure 21-167 (LASL 1964, 71281). New blowdown pipelines from Structures 21-166 and 21-167 were connected into the SWMU 21-024(k) septic system. These newer lines will be addressed under the SWMU 21-024(k) investigation (Section 5.14).
- 1965—Septic system was no longer used and left in place.

5.12.2 Previous Investigations

No previous sampling investigations have been conducted on the inlet line from Building 21-152 to the fence line. However, the septic tank and outlet line have been removed and their previous locations were sampled.

- 2001/2002—Septic tank, 15 ft of inlet line between the septic tank and the fence line, outlet line, and contaminated mesa top soil in the outfall were removed in an interim action. Samples were collected to determine nature and extent from these areas, and then the area was reseeded (LANL 2003, 76053).
- 2004—Radiological and geophysical surveys were completed (results are presented in Appendixes D and E, respectively). The geophysical survey identified a portion of the inlet pipeline from the fence line up to Building 21-209. No pipeline could be located on the west side of Building 21-209 connecting to Building 21-152.

SWMU 21-024(i) Data

No sampling has been conducted at the area where inlet line remains in the ground; therefore, there are no sample results to discuss.

5.12.3 Scope of Activities for SWMU 21-024(i)

Sampling and Excavation Activities

The proposed sample locations at SWMU 21-024(i) are shown in Figure 5.12-2. Table 5.12-1 provides a summary of the proposed sample locations, depths, objectives each sample addresses, and proposed analytical suites.

Samples will be analyzed for TAL metals, cyanide, nitrates, perchlorates, organic chemicals (VOCs and SVOCs [VOCs only in samples deeper than 0.5 ft bgs]), radionuclides (gamma spectroscopy, americium-241, isotopic plutonium, isotopic uranium, strontium-90, and tritium), moisture, and pH. If field screening indicates the presence of VOCs, a deeper sample will be collected and analyzed for full suite. Field screening will determine the sample(s) with the highest radionuclide and/or organic contamination. If field-screening instruments cannot determine which sample(s) contain(s) the highest levels of radionuclides or organic compounds, samples collected from the location where contamination would most likely be present as indicated by site history (i.e., sump, outfall, etc.) will be selected. The selected sample(s) will be sent to

an off-site fixed laboratory for quick turn-around analysis of PCBs, HE, dioxins, and furans (NMED 2005, 89314). The sample results will be transmitted to NMED, via fax, for review. Within 1 week of receipt of the results, we anticipate that NMED will contact the LANL project leader to discuss the results. If analytes from the four additional analyses are not detected, or detected at low levels reflective of anthropogenic activity, the remaining samples will not be analyzed for the four additional analyses per agreement with NMED. If the additional analytes are detected at levels attributable to the site, the remaining stored aliquots will be submitted to the analytical laboratory for the additional analyses. Prior to demobilization, laboratory results will be reviewed to assess if the nature and extent of contamination have been determined. If nature and extent have not been determined, then step-out samples will be collected.

During structure removal activities, excavation of soil and/or rock (including all visibly stained areas) will proceed until the radionuclide and organic vapor field-screening results indicate all contaminated material has been removed. Confirmation samples will be collected as these activities are completed. Analytical laboratory results will be reviewed to determine if additional removal activities and associated confirmation sampling are required due to the presence of areas with contaminant concentrations greater than industrial SSLs or SALs. Sampling at SWMU 21-024(i) will consist of the following activities:

- *Pipeline excavation and sampling.* The remaining pipeline that runs from the fence to Building 21-209 will be carefully excavated and inspected for evidence of leaks. Where elevated levels of VOCs and/or radionuclides are present, as determined by field screening or where visible evidence of a leak is found (e.g., stained soil, break in the pipe), samples will be collected immediately beneath the pipe to define vertical extent. If no field-screening evidence or visible evidence of a leak is found, samples will be collected from locations beneath the pipeline as close as possible to Building 21-209 and approximately every 50 ft to the fence (Figure 5.12-2, locations 1 through 4). At each location, a sample will be collected at the 0- to 1.0-ft and 2.0- to 3.0-ft depth intervals. The zero depth is defined as immediately beneath the pipe or at the bottom of the pipe bed for pipelines that no longer exist.

Portions of the original blowdown lines from Structure 21-166 and 21-167 as well as sump Structure 21-175 are located under Building 21-209. These areas will be investigated when the area becomes accessible. Newer accessible portions of pipe are addressed in SWMU 21-024(k) (Section 5.14).

5.13 SWMU 21-024(j), Septic System

SWMU 21-024(j) consists of a septic tank, pipelines and associated outfall (Figure 5.13-1).

5.13.1 Operational History

- 1949—Building 21-155 (combined with Buildings 21-206 and 21-207 from 1963 to 1965 to become Building 21-155) was constructed for initiator research and production.
- 1961—A septic system was constructed to route sewage from a warehouse/laboratory (Building 21-155) to a reinforced concrete 5 × 3 × 6 ft deep septic tank (Structure 21-194) and associated 4-in. VCP pipelines (LANL 1991, 07529, p. 15-83). The tank is located off the southwest corner of Building 21-155 near the south edge of the perimeter road (LANL 1991, 07529, p. 15-83).
- 1966—The septic tank was no longer used and left in place (LANL 1991, 07529, p. 15-83).

5.13.2 Summary of Previous Investigations

Summarized below are previous investigations conducted at this site.

- 1966—Septic tank Structure 21-194 was no longer used and left in place by filling it with earth in 1966 (LANL 1991, 07529).
- 1993—RFI activities were performed as outlined in the 1995 Addendum to Phase Reports 1B and 1C (LANL 1995, 52350). Geophysical and land surveys were completed. A 20-ft borehole (21-01675) was drilled 2- to 3-ft downslope of where the outlet pipe was presumed to exit the septic tank. A total of four samples were collected at 5-ft intervals to a total of 20 ft deep. Samples were analyzed at an off-site fixed laboratory for inorganic chemicals, SVOCs, and radionuclides (americium-241, tritium, isotopic plutonium, isotopic thorium, isotopic uranium, and strontium-90) (LANL 1995, 52350).
- 2004—Radiological and geophysical surveys were completed (results are presented in Appendixes D and E, respectively). The geophysical survey did not locate the septic tank. However, new utilities (water and electric) lines pass through the approximate location. Pipelines from Building 21-155 were located and the outlet line from the septic tank was located.

SWMU 21-024(j) Data

The SWMU 21-024(j) borehole data (21-01675) from 1993 were collected from tuff and compared with tuff BVs/FVs (LANL 1998, 59730). Table 5.13-1 and Figure 5.13-1 present SWMU 21-024(j) inorganic chemical concentrations greater than BVs. Table 5.13-2 and Figure 5.13-2 present SWMU 21-024(j) radionuclide activities detected at depths where the FV does not apply. Sample results for inorganic chemicals and radionuclides were also compared to the maximum of the range of their respective background data sets. Those analytes with detections and/or detection limits greater than their respective BVs/FVs and the maximum of the background data set were designated as COPCs.

Inorganic Chemicals

Inorganic Chemicals Detected at Concentrations Greater Than BVs. Aluminum, barium, calcium, chromium, copper, lead, magnesium, nickel, and vanadium were detected at concentrations greater than their respective BVs (Figure 5.13-1).

- Aluminum was detected in one tuff sample at 10,800 mg/kg (location 21-01675, 0- to 5.0-ft depth interval), a concentration greater than the tuff BV (7,340 mg/kg) and the maximum aluminum concentration in the tuff background data set (8,370mg/kg). Therefore, aluminum is a COPC.
- Barium was detected in one tuff sample at 123 mg/kg (location 21-01675, 0- to 5.0-ft depth interval), a concentration greater than the tuff BV (46 mg/kg) and the maximum barium concentration in the tuff background data set (51.6 mg/kg). Therefore, barium is a COPC.
- Calcium was detected in one tuff sample at 4190 mg/kg (location 21-01675, 0- to 5.0-ft depth interval), a concentration greater than the tuff BV (2200 mg/kg) and the maximum calcium concentration in the tuff background data set (2230 mg/kg). Therefore, calcium is a COPC.
- Chromium was detected in one tuff sample at 8.3 mg/kg (location 21-01675, 0- to 5.0-ft depth interval), a concentration greater than the tuff BV (7.14 mg/kg) but less than the maximum chromium concentration in the tuff background data set (13 mg/kg). Therefore, chromium is not a COPC.

- Copper was detected in one tuff sample at 6.8 mg/kg (location 21-01675, 0- to 5.0-ft depth interval), a concentration greater than the tuff BV (4.66 mg/kg) and the maximum copper concentration in the tuff background data set (6.2 mg/kg). Therefore, copper is a COPC.
- Lead was detected in one tuff sample at 14.8 mg/kg (location 21-01675, 0- to 5.0-ft depth interval), a concentration greater than the tuff BV (11.2 mg/kg) but less than the maximum lead concentration in the tuff background data set (15.5 mg/kg). Therefore, lead is not a COPC.
- Magnesium was detected in one tuff sample at 1970 mg/kg (location 21-01675, 0- to 5.0-ft depth interval), a concentration greater than the tuff BV (1690 mg/kg) but less than the maximum magnesium concentration in the tuff background data set (2820 mg/kg). Therefore, magnesium is not a COPC.
- Nickel was detected in one tuff sample at 9.6 mg/kg (location 21-01675, 0- to 5.0-ft depth interval), a concentration greater than the tuff BV (6.58 mg/kg) and the maximum nickel concentration in the tuff background data set (7.0 mg/kg). Therefore, nickel is a COPC.
- Vanadium was detected in one tuff sample at 18.7 mg/kg (location 21-01675, 0- to 5.0-ft depth interval), a concentration greater than the tuff BV (17 mg/kg) but less than the maximum vanadium concentration in the tuff background data set (21 mg/kg). Therefore, vanadium is not a COPC.

Inorganic Chemicals not Included in Background Data. Strontium was not included in the background data and, therefore, have no BVs for comparison.

- Strontium was detected in one tuff sample at 24.5 mg/kg (location 21-01675, 0- to 5.0-ft depth interval). The strontium concentrations at this site are similar to the concentrations found at most of the corrective action sites (most are below 36 mg/kg), indicating that the strontium levels are not elevated as a result of releases. Therefore, strontium is not a COPC.

Inorganic Chemicals with Detection Limits Greater Than BVs. Cobalt, selenium, and silver were not detected at concentrations greater than their respective BVs. However, their detection limits were greater than their respective BVs in some samples.

- The cobalt detection limit of 5.2 mg/kg (location 21-01675) was greater than the tuff BV (3.14 mg/kg; the maximum cobalt concentration in the tuff background data set for cobalt is not available) in one tuff sample. Therefore, cobalt is a COPC due to elevated detection limits.
- Selenium detection limits, ranging from 0.42 mg/kg to 0.55 mg/kg (the maximum detection limit was from location 21-01675), were greater than the tuff BV (0.3 mg/kg) and the maximum selenium concentration in the tuff background data set (0.105 mg/kg) in four borehole samples. Therefore, selenium is a COPC due to elevated detection limits.
- The silver detection limit of 1.1 (location 21-01675) was greater than the tuff BV (1.0 mg/kg) and less than the maximum silver concentration in the tuff background data set (1.9 mg/kg) in four samples. Therefore, silver is not a COPC due to elevated detection limits.

Inorganic Chemical Summary. Aluminum, barium, calcium, cobalt, copper, nickel, and selenium are inorganic COPCs.

Organic Chemicals

VOCs. VOCs were not analyzed at an off-site fixed laboratory.

SVOCs. SVOCs were not detected.

Organic Chemical Summary. Although SVOCs were not detected, VOCs were not analyzed at an off-site fixed laboratory; therefore, the potential for organic chemical contamination was not addressed.

Radionuclides

Fallout Radionuclides. Americium-241, plutonium-239, and tritium were detected in tuff borehole samples at 21-024(j) (Figure 5.13-2). Since FVs are only applicable within the first 0.5 ft of surface soils, all fallout radionuclides detected in the samples deeper than the first 0.5 ft of surface soils are COPCs.

- Americium-241 was detected in one depth interval of the borehole at 0.02 pCi/g (the maximum was from location 21-01675, 0- to 5.0-ft interval), at a depth where the FV does not apply. Therefore, americium-241 is a COPC.
- Plutonium-239 was detected in two depth intervals of the borehole at 0.02 and 0.1 pCi/g (the maximum was from location 21-01675, 0- to 5.0-ft depth interval), at depths where the FV does not apply. Therefore, plutonium-239 is a COPC.
- Tritium was detected in all four depths of the borehole ranging from 0.14 to 0.22 pCi/g (15.0- to 20.0-ft depth interval), at depths where the FV does not apply. Therefore, tritium is a COPC.

Radionuclide Summary. Americium-241, plutonium-239, and tritium are radionuclide COPCs.

5.13.3 Scope of Activities for SWMU 21-024(j)

Sampling and Excavation Activities

The proposed sample locations at SWMU 21-024(j) are shown in Figure 5.13-3. Table 5.13-3 provides a summary of the proposed sample locations, depths, objectives each sample addresses, and proposed analytical suites.

Samples will be analyzed for TAL metals, cyanide, nitrates, perchlorates, organic chemicals (VOCs and SVOCs [VOCs only in samples deeper than 0.5 ft bgs]), radionuclides (gamma spectroscopy, americium-241, isotopic plutonium, isotopic uranium, strontium-90, and tritium), moisture, and pH. If field screening indicates the presence of VOCs, a deeper sample will be collected and analyzed for full suite. Field screening will determine the sample(s) with the highest radionuclide and/or organic contamination. If field-screening instruments cannot determine which sample(s) contain(s) the highest levels of radionuclides or organic compounds, samples collected from the location where contamination would most likely be present as indicated by site history (i.e., sump, outfall, etc.) will be selected. The selected sample(s) will be sent to an off-site fixed laboratory for quick turn-around analysis of PCBs, HE, dioxins, and furans (NMED 2005, 89314). The sample results will be transmitted to NMED, via fax, for review. Within 1 week of receipt of the results, we anticipate that NMED will contact the LANL project leader to discuss the results. If analytes from the four additional analyses are not detected, or detected at low levels reflective of anthropogenic activity, the remaining samples will not be analyzed for the four additional analyses per agreement with NMED. If the additional analytes are detected at levels attributable to the site, the remaining stored aliquots will be submitted to the analytical laboratory for the additional analyses. Prior to demobilization, laboratory results will be reviewed to assess if the nature and extent of contamination have been determined. If nature and extent have not been determined, then step-out samples will be collected.

During structure removal activities, excavation of soil and/or rock (including all visibly stained areas) will proceed until the radionuclide and organic vapor field-screening results indicate all contaminated material has been removed. Confirmation samples will be collected as these activities are completed. Analytical laboratory results will be reviewed to determine if additional removal activities and associated confirmation

sampling are required due to the presence of areas with contaminant concentrations greater than industrial SSLs or SALs. Sampling at SWMU 21-024(j) will consist of the following activities:

- *Septic tank 21-194 excavation and sampling.* If the tank or evidence of a former tank is found, the 5 × 3 × 6 ft septic tank or backfilled area will be carefully excavated and inspected for evidence of leaks (e.g., field screening stained soil, holes in the tank). One borehole will be advanced in the center of the excavation to determine the vertical extent of contamination (Figure 5.13-3, location BH-1. Borehole samples will be collected from the 0- to 1.0-ft, 5.0- to 6.0-ft, and 10.0- to 11.0-ft depth intervals. Samples will be collected immediately beneath the septic tank inlet and outlet connections to the pipeline (Figure 5.13-3, locations 1 and 2) at the 0- to 1.0-ft and 2.0- to 3.0-ft depth intervals.
    - The septic tank was not located by the 2004 geophysical survey; therefore, exploratory trenching will be conducted to identify the location. Trenching will be conducted with a backhoe and will progress from the surface to approximately 5 ft bgs. The trench will be visually logged for evidence of non-native materials, disturbed bedding horizons and areas of visible staining. Elevated radiological or organic vapor field-screening results will be documented. Trenching will continue in the historically identified area until the tank is located, evidence of a former tank is found, or the absence of a tank at that location has been verified. If a tank or evidence of a former tank is not identified during field activities, confirmation samples will be collected from location(s) where the tank was most likely located using the proposed sampling map as a guide.
- *Pipeline excavation and sampling.* A portion of the pipelines was found during the 2004 geophysical survey. The pipelines and any backfilled former pipeline beds that run from Building 21-155 to the septic tank and from the septic tank to the outfall will be carefully excavated and inspected for evidence of leaks. Where elevated levels of VOCs and/or radionuclides are present, as determined by field screening or where visible evidence of a leak is found (e.g., stained soil, break in the pipe), samples will be collected immediately beneath the pipe to define vertical extent. If no field-screening evidence or visible evidence of a leak is found, samples will be collected from locations beneath the pipeline (beneath a pipeline joint, if present) at the connection to Building 21-155 (Figure 5.13-3, locations 3 and 5), at bends in the lines (Figure 5.13-3, locations 4 and 7), line intersections (Figure 5.13-3, locations 6 and 8), and at approximately every 50 ft between the septic tank and outfall area (Figure 5.13-3, locations 9 through 11). At each location, a sample will be collected at the 0- to 1.0-ft and 2.0- to 3.0-ft depth intervals. The zero depth is defined as immediately beneath the pipe or at the bottom of the pipe bed for pipelines that no longer exist.
- *Outfall investigation.* One borehole will be advanced in the center of the outfall 0.5 ft downslope from the mouth of the outfall pipe (Figure 5.13-3, location BH-2). Samples will be collected from the 0- to 0.5-ft, 2.0- to 3.0-ft, and 5.0- to 6.0-ft depth intervals. Samples will be collected 5 ft to the west and east of BH-2 (Figure 5.13-3, locations 12 and 13) at the 0- to 0.5-ft and 2.0- to 3.0-ft depth intervals.
- *Bench investigation.* On the topographical bench beneath the mesa cliff edge, two sample locations will be established downslope from the mouth of the pipe in the center of a distinguishable drainage, or in a catchment basin aligned with the mouth of the pipe at the north and south ends of the bench (Figure 5.13-3, locations 15 and 18). These sample locations will each be flanked by one sample location 20 ft to the west and one sample location 20 ft to the east (Figure 5.13-3, locations 14, 16, 17, and 19). Samples will be collected at depths of 0–0.5 ft and 2.0–3.0 ft.

5.14 SWMU 21-024(k), Septic System

SWMU 21-024(k) consists of a septic tank, tile leach field, pipelines, and associated outfall (Figure 5.14-1).

5.14.1 Operational History

- 1964 to 1965—Building 21-209 was built to serve as a high-temperature chemistry building and the septic system routed sewage through a 6-in. cast iron line to a manhole (Structure 21-217), then through a 6-in. VCP to a second manhole (Structure 21-218) and finally to a two-chamber, reinforced concrete, 18.5 × 6.33 × 8.83 ft septic tank (Structure 21-219) (LASL 1964, 71281). Blowdown lines from Structures 21-166 and 21-167 were connected into the inlet line around the same time as the construction of Building 21-209. Overflow from the tank went through a 4-in. cast-iron line into three 4-in. VCP lines to a tile leach field that was 30 × 20 × 5.5 ft (LASL 1964, 71281). Two 4-in. VCP lines extend from the downslope edge of the leach field (LASL 1964, 71281).
- 1966—The septic system was no longer used and left in place (LANL 1991, 07529, p. 15-83).

5.14.2 Summary of Previous Investigations

Summarized below are previous investigations conducted at this site.

- 1966—Septic system was no longer used and left in place by pumping out the tank contents and filling the tank with earth (LANL 1991, 07529, p. 15-83).
- 1993—RFI activities were performed as outlined in the 1995 Addendum to Phase Reports 1B and 1C (LANL 1995, 52350). Three 20-ft deep boreholes were drilled and sampled. One borehole was located near the septic tank (21-01676 [0-5.0, 5.0-10.0, 10.0-15.0, 15.0-20.0 ft depths]), the other two boreholes were in the leach field area (21-01677 [0-5.0, 5.0-8.0, 10.0-15.0, 15.0-20.0 ft depths]; 21-01678 [0-5.0, 5.0-10.0, 10.0-15.0, 15.0-20.0 ft depths]). Samples were collected at 5-ft depth intervals resulting in a total of 12 samples, and were analyzed for inorganic chemicals, SVOCs, and radionuclides (americium-241, gamma spectroscopy, tritium, isotopic plutonium, isotopic thorium, isotopic uranium, and strontium-90). The report stated that vertical extent had been adequately characterized (LANL 1995, 52350, p. 3-20).
- 2004—Radiological and geophysical surveys were completed (results are presented in Appendixes D and E, respectively). The geophysical survey located the septic tank, tile field, and pipeline connecting the tank to Building 21-209. The eastern outlet line from the tile field was located, but the western line was not identified.

SWMU 21-024(k) Data

The SWMU 21-024(k) borehole data from 1993 were collected from soil, fill, and tuff and compared with their respective BVs/FVs (LANL 1998, 59730). Table 5.14-1 and Figure 5.14-1 present SWMU 21-024(k) inorganic chemical concentrations greater than BVs. Table 5.14-2 and Figure 5.14-1 present SWMU 21-024(k) detected SVOC concentrations. Table 5.14-3 and Figure 5.14-2 present SWMU 21-024(k) radionuclide activities greater than BVs or detected at depths where the FV does not apply. Sample results for inorganic chemicals and radionuclides were also compared to the maximum of the range of their respective background data sets. Those analytes with detections and/or detection limits greater than their respective BVs/FVs and the maximum of the background data set were designated as COPCs. Detected organic chemical were designated as COPCs.

Inorganic Chemicals

Inorganic Chemicals Detected at Concentrations Greater Than BVs. Aluminum, barium, beryllium, cadmium, calcium, copper, iron, magnesium, nickel, and zinc were detected at concentrations greater than their respective BVs (Figure 5.14-1).

- Aluminum was detected in one fill sample and one tuff sample at 9000 and 29,700 mg/kg (the maximum was from fill location 21-01676, 5.0- to 10.0-ft depth interval). The fill sample concentration (29,700 mg/kg) was greater than the soil BV (29,200 mg/kg) but less than the maximum aluminum concentration in the soil BV data set (61,500 mg/kg). Aluminum was detected in a tuff sample at 9000 mg/kg (location 21-01678 15.0- to 20.0-ft depth interval), a concentration greater than the tuff BV (7340 mg/kg) and the maximum aluminum concentration in the tuff background data set (8370 mg/kg). Therefore, aluminum is a COPC.
- Barium was detected in one tuff sample at 61.6 mg/kg (location 21-01678, 15.0- to 20.0-ft depth interval), a concentration greater than the tuff BV (46 mg/kg) and the maximum barium concentration in the tuff background data set (51.6 mg/kg). Therefore, barium is a COPC.
- Beryllium was detected in one fill sample at 3.3 mg/kg (location 21-01676, 5.0- to 10.0-ft depth interval), a concentration greater than the soil BV (1.83 mg/kg) but less than the maximum beryllium concentration in the soil background data set (3.95 mg/kg). Therefore, beryllium is not a COPC.
- Cadmium was detected in four fill samples and one soil sample ranging from 0.75 to 2.2 mg/kg (the maximum was from location 21-01676, 5.0- to 10.0-ft depth interval), concentrations greater than the soil BV (0.4 mg/kg) and less than the maximum cadmium concentration in the soil background data set (2.6 mg/kg). Therefore, cadmium is not a COPC.
- Calcium was detected in two fill samples at 6540 and 20,090 mg/kg (the maximum was from location 21-01678, 5.0- to 10.0-ft depth interval), concentrations greater than the soil BV (6120 mg/kg) with only the maximum greater than the maximum calcium concentration in the soil background data set (14,000 mg/kg). Therefore, calcium is a COPC.
- Copper was detected in one fill sample at 14.9 mg/kg (location 21-01676, 5.0- to 10.0-ft depth interval), a concentration greater than the soil BV (14.7 mg/kg) but less than the maximum copper concentration in the soil background data set (16 mg/kg). Therefore, copper is not a COPC.
- Iron was detected in one fill sample at 21,700 mg/kg (location 21-01676, 5.0- to 10.0-ft depth interval), a concentration greater than the soil BV (21,500 mg/kg) but less than the maximum iron concentration in the soil background data set (36,000 mg/kg). Therefore, iron is not a COPC.
- Magnesium was detected in one tuff sample at 1,910 mg/kg (location 21-01678, 15.0- to 20.0-ft depth interval), a concentration greater than the tuff BV (1,690 mg/kg) but less than the maximum magnesium concentration in the tuff background data set (2,820mg/kg). Therefore, magnesium is not a COPC.
- Nickel was detected in one fill sample at 20.2 mg/kg (location 21-01676, 5.0- to 10.0-ft depth interval), a concentration greater than the soil BV (15.4 mg/kg), but less than the maximum nickel concentration in the soil background data set (29.0 mg/kg). Therefore, nickel is not a COPC.
- Zinc was detected above background in one fill sample at 50.4 mg/kg (location 21-01676, 5.0- to 10.0-ft depth interval), a concentration greater than the soil BV (48.8 mg/kg) but less than the maximum zinc concentration in the soil background data set (75.5 mg/kg). Therefore, zinc is not a COPC.

Inorganic Chemicals not Included in Background Data. Lithium and strontium do not have background data and, therefore, have no BVs for comparison.

- Lithium was detected in nine samples ranging from 2.1 to 22.5 mg/kg maximum concentration was from location 21-01676, 5.0- to 10.0-ft depth interval). No established background levels are available for lithium. The lithium concentrations at this site are not similar to the concentrations found at most of the corrective action sites (most are below 11 mg/kg), indicating that the lithium levels are elevated as a result of releases. Therefore, lithium is a COPC.
- Strontium was detected in nine samples ranging from 1.0 to 51.9 mg/kg (the maximum was from location 21-01678, 5.0- to 10.0-ft depth interval). No established background levels are available for strontium. The strontium concentrations at this site are not similar to the concentrations found at most of the corrective action sites (most are below 36 mg/kg), indicating that the strontium levels are elevated as a result of releases. Therefore, strontium is a COPC.

Inorganic Chemicals with Detection Limits Greater Than BVs. Cadmium, selenium and silver detection limits were greater than its respective BVs in some samples.

- The cadmium detection limit of 0.64 mg/kg (location 21-01676) was greater than the soil BV (0.4) but less than the maximum cadmium concentration in the soil background data set (2.6 mg/kg) in one sample. Therefore, cadmium is not a COPC due to elevated detection limits.
- Selenium detection limits, ranging from 0.40 to 0.53 mg/kg (the maximum detection limit was from location 21-01676), were greater than the tuff BV (0.3 mg/kg) and the maximum selenium concentration in the tuff background data set (0.105 mg/kg) in six tuff samples. Therefore, selenium is a COPC due to elevated detection limits.
- Silver detection limits, ranging from 1.1 to 1.2 mg/kg (the maximum detection limit was from location 21-01676), were greater than the tuff BV (1.0 mg/kg) and less than the tuff background data set (1.9 mg/kg) in nine samples. Therefore, silver is not a COPC due to elevated detection limits.

Inorganic Chemical Summary. Aluminum, barium, calcium, lithium, selenium, and strontium are inorganic COPCs.

Organic Chemicals

VOCs. VOCs were not analyzed for at an off-site fixed laboratory.

SVOCs. Bis(2-ethylhexyl)phthalate was detected in one sample at 1.65 mg/kg (location 21-01678, 15.0- to 20.0-ft depth interval) (Figure 5.14-1). Therefore, bis(2-ethylhexyl)phthalate is a COPC.

Organic Chemical Summary. Bis(2-ethylhexyl)phthalate is an organic COPC.

Radionuclides

Fallout Radionuclides. Americium-241, plutonium-238, plutonium-239, and tritium were detected in all three borehole samples (Figure 5.14-2). Since FVs are only applicable within the first 0.5 ft of surface soils, all fallout radionuclides detected in the samples deeper than the first 0.5 ft of surface soils are COPCs.

- Americium-241 was detected in two samples (one soil and one fill) at 0.01 and 0.02 pCi/g (the maximum was from location 21-01678, 0- to 5.0-ft depth interval), at depths where the FV does not apply. Therefore, americium-241 is a COPC.

- Plutonium-238 was detected in one fill sample at 0.01 pCi/g (location 21-01678, 0 -to 5.0-ft depth interval), at a depth where the FV does not apply. Therefore, plutonium-238 is a COPC.
- Plutonium-239 was detected in seven samples ranging from 0.02 to 0.19 pCi/g (the maximum was from location 21-01678, 0- to 5.0-ft depth interval), at depths where the FV does not apply. Therefore, plutonium-239 is a COPC.
- Tritium was detected in 12 samples ranging from 0.03 to 0.88 pCi/g (the maximum was from location 21-01678, 5.0- to 10.0-ft depth interval), at depths where the FV does not apply. Therefore, tritium is a COPC.

Naturally Occurring Radionuclides. Uranium-234 was detected in one borehole sample (21-01677) in the 0- to 5.0-ft soil depth interval (Figure 5.14-2) at 4.17 pCi/g, above the soil BV (2.59 pCi/g) and maximum of the soil background data set (2.5 pCi/g). Therefore, uranium-234 is a COPC.

Radionuclide Summary. Americium-241, plutonium-238, plutonium-239, tritium, and uranium-234 are radionuclide COPCs.

5.14.3 Scope of Activities for SWMU 21-024(k)

Sampling and Excavation Activities

The proposed sample locations at SWMU 21-024(k) are shown in Figure 5.14-3. Table 5.14-4 provides a summary of the proposed sample locations, depths, objectives each sample addresses, and proposed analytical suites.

Samples will be analyzed for TAL metals, cyanide, nitrates, perchlorates, organic chemicals (VOCs and SVOCs [VOCs only in samples deeper than 0.5 ft bgs]), radionuclides (gamma spectroscopy, americium-241, isotopic plutonium, isotopic uranium, strontium-90, and tritium), moisture, and pH. If field screening indicates the presence of VOCs, a deeper sample will be collected and analyzed for full suite. Field screening will determine the sample(s) with the highest radionuclide and/or organic contamination. If field-screening instruments cannot determine which sample(s) contain(s) the highest levels of radionuclides or organic compounds, samples collected from the location where contamination would most likely be present as indicated by site history (i.e., sump, outfall, etc.) will be selected. The selected sample(s) will be sent to an off-site fixed laboratory for quick turn-around analysis of PCBs, HE, dioxins, and furans (NMED 2005, 89314). The sample results will be transmitted to NMED, via fax, for review. Within 1 week of receipt of the results, we anticipate that NMED will contact the LANL project leader to discuss the results. If analytes from the four additional analyses are not detected, or detected at low levels reflective of anthropogenic activity, the remaining samples will not be analyzed for the four additional analyses per agreement with NMED. If the additional analytes are detected at levels attributable to the site, the remaining stored aliquots will be submitted to the analytical laboratory for the additional analyses. Prior to demobilization, laboratory results will be reviewed to assess if the nature and extent of contamination have been determined. If nature and extent have not been determined, then step-out samples will be collected.

During structure removal activities, excavation of soil and/or rock (including all visibly stained areas) will proceed until the radionuclide and organic vapor field-screening results indicate all contaminated material has been removed. Confirmation samples will be collected as these activities are completed. Analytical laboratory results will be reviewed to determine if additional removal activities and associated confirmation sampling are required due to the presence of areas with contaminant concentrations greater than industrial SSLs or SALs. Sampling at SWMU 21-024(k) will consist of the following activities:

- *Septic tank 21-219 excavation and sampling*. The 18.5 × 6.33 × 8.83 ft septic tank will be carefully excavated and inspected for evidence of leaks (e.g., field screening stained soil, holes in the tank). One borehole will be advanced in the center of the floor of the excavation to determine vertical extent of contamination (Figure 5.14-3, location BH-1). Borehole samples will be collected from the 0- to 1.0-ft, 5.0- to 6.0-ft, and 10.0- to 11.0-ft depth intervals. Samples will be collected immediately beneath the septic tank inlet and outlet connections to the pipeline (Figure 5.14-3, locations 1 and 2) at the 0- to 1.0-ft and 2.0- to 3.0-ft depth intervals.
- *Pipeline excavation and sampling*. The pipeline segments that run from Buildings 21-209, 21-166, and 21-167 to the septic tank, from the septic tank to the leach field, from the leach field to the outfall area, and any backfilled former pipe beds will be carefully excavated and inspected for evidence of leaks. Where elevated levels of VOCs and/or radionuclides are present, as determined by field screening or where visible evidence of a leak is found (e.g., stained soil, break in the pipe), samples will be collected immediately beneath the pipe to define vertical extent. If no field-screening evidence or visible evidence of a leak is found, samples will be collected from locations beneath pipeline (preferably beneath a pipeline joint) south of Building 21-167 (Figure 5.14-3, locations A and B), immediately south of the Building 21-209, half the distance between manhole 218 and the tank, and at each manhole location under the manhole floor (Figure 5.14-3, locations 3 through 8). The manholes will also be excavated. The one cast iron pipe exiting the septic tank then diverging into three VCP pipelines exiting the septic tank will be sampled at their divergence (Figure 5.14-3, location 9). At each location, a sample will be collected at the 0- to 1.0-ft and 2.0- to 3.0-ft depth intervals. The zero depth is defined as immediately beneath the pipe or at the bottom of the pipe bed for pipelines that no longer exist.
    - The piping connecting the septic tank to the leach field was not found by the 2004 geophysical survey. If these pipelines or evidence of former pipelines are not found by visual inspection or field screening during excavation activities, exploratory trenching will be conducted to identify their location. Trenching will be conducted with a backhoe and will progress from the surface to approximately 5 ft bgs. The trench will be visually logged for evidence of non-native materials, disturbed bedding horizons and areas of visible staining. Elevated radiological or organic vapor field-screening results will be documented. Trenching will continue in the historically identified area until the pipeline is located, evidence of a former pipeline is found, or the absence of a pipeline at that location has been verified. If a pipe or evidence of a former pipe is not identified during field activities, confirmation samples will be collected from location(s) where the pipe was most likely located using the proposed sampling map as a guide.
- *Tile leach field excavation and sampling*. The tile leach field and associated open joint tile will be excavated (approximately 5-ft deep) until native soil is reached. After excavation, a borehole will be advanced in the center of the leach field (Figure 5.14-3, location BH-2). Samples will be collected from the 0- to 1.0-ft, 5.0- to 6.0-ft, 10.0- to 11.0-ft, 15.0 to 16.0-ft, and 20.0 to 21.0-ft depth intervals. Samples will be collected from locations 10 ft north of the center of the tile leach field northern boundary (Figure 5.14-3, location 10), 10 ft west of the center of the tile leach field western boundary (Figure 5.14-3, location 11), 10 ft south of the tile leach field southwest corner

then 10 ft west (Figure 5.14-3, location 12), and 10 ft south of the center of the septic tank southern boundary (Figure 5.14-3, location 13). Samples will be collected from the 0- to 0.5-ft and 2.0- to 3.0-ft depth intervals.

- *Outfall investigation*. Only the eastern outfall was located by the 2004 geophysical survey. One borehole will be advanced in the center of each outfall 0.5 ft downslope from the mouth of the outfall pipes (Figure 5.14-3, location BH-3 and BH-4) and sampled at three depth intervals (0–0.5, 2.0–3.0 and 5.0–6.0 ft). If the western outfall pipeline is not located, location BH-3 will be collected parallel to BH-4 (eastern pipe location) approximately 15 ft to the west. Samples will be collected 5 ft to the west and east of BH-3 and BH-4 (Figure 5.14-3, locations 14 through 17) at the 0- to 0.5-ft and 2.0- to 3.0-ft depth intervals. Samples will be collected 10 ft downslope from locations BH-3 and BH-4 (Figure 5.14-3, locations 19 and 20), 10 ft west and east of location 19 (Figure 5.14-3, locations 18 and C), and 10 ft east and west of location 20 (Figure 5.14-3, location 21 and D) at depths of 0–0.5 ft and 2.0–3.0 ft.
- *Bench investigation.* On the topographical bench beneath the mesa cliff edge, two sample locations will be established downslope from the mouth of the outfall pipes in the center of a distinguishable drainage, or in a catchment basin aligned with the mouth of the pipe at the north and south ends of the bench (Figure 5.14-3, locations 23, 24, 27, and 28). These sample locations will each be flanked by one sample location 20 ft to the west and one sample location 20 ft to the east (Figure 5.14-3, locations 22, 25, 26, and 29). Samples will be collected at depths of 0–0.5 ft and 2.0–3.0 ft.

5.15 Consolidated Unit 21-024(l)-99, Sump, Aboveground Storage Tank, Outfall, and Lines

Consolidated Unit 21-024(l)-99 consists of SWMU 21-022(a), a sump and associated lines, SWMU 21-024(l), an aboveground storage tank and associated lines, and AOC 21-004(a), an outfall (Figure 5.15-1).

5.15.1 Operational History

SWMU 21-022(a) consists of a 5-ft-diameter brick sump of unknown depth located north of Building 21-021 with a 4-in. inlet line from the building, but documentation is not available indicating if an outlet line exists or the type of line.

- 1946—Building 21-021 and sump were constructed. Building 21-021 was used as a secure vault to store special fissile material including uranium and plutonium metal. The inside of the sump contains a metal catch basin approximately 5 ft in depth.

SWMU 21-024(l) consists of an outfall that received liquid waste from the floor drain of Building 21-021 machine room via a 3-in. cast-iron pipeline (LASL 1960, 01611).

AOC 21-004(a) consists of a 6,000-gal. aboveground steel tank (Structure 21-335), which is 8 ft in diameter and 16 ft long, and a 6-in. cast-iron pipeline from Building 21-021.

- 1974—The tank was installed to receive liquid waste from floor drains in Building 21-021.

5.15.2 Summary of Previous Investigations

Summarized below are previous investigations conducted at this site.

- 1992—Geophysical field survey, radiological field survey, and collection of surface (0- to 0.5-ft depth interval) samples from six locations (21-01419, -01420, -01421, -01422, -01423, -01424) in

the outfall area was completed as outlined in the 1994 "Phase Report 1C, TA-21 Operable Unit RCRA Facility Investigation, Outfalls Investigation" (LANL 1994, 31591, p. 8-85). The samples were analyzed at an off-site fixed laboratory for inorganic chemicals, VOCs, SVOCs, and radionuclides (americium-241, isotopic plutonium, and strontium-90). Geophysical surveys identified the drainline, but not the precise location of the discharge point.

- 1994—As described in the 1996 RFI Report for SWMU 21-004(a-c), 21-028(d,e) (LANL 1996, 54828), a radiological field survey was conducted around the tank (AOC 21-004[a]), on the concrete pad, along the inlet line, and at the valve (LANL 1996, 54828, p. 28). Collection of filter paper samples from inside the tank was performed (LANL 1996, 54828, p. 32). The tank was dry and empty during collection of samples (LANL 1996, 54828 p. 32). It was determined that the tank did not receive any waste (LANL 1996, 54828, p. 23).
- 2004—Radiological and geophysical surveys were completed (results are presented in Appendixes D and E, respectively). The geophysical survey located the sump, one of the two inlet/outlet lines to the sump, and two pipelines running to the north.

Consolidated Unit 21-024(l)-99 Data

The Consolidated Unit 21-024(l)-99 site data from 1992 were collected from soil and compared with soil BVs/FVs (LANL 1998, 59730). Table 5.15-1 and Figure 5.15-1 present Consolidated Unit 21-024(l)-99 inorganic chemical concentrations greater than BVs. Table 5.15-2 and Figure 5.15-1 present Consolidated Unit 21-024(l)-99 detected VOC concentrations. Table 5.15-3 and Figure 5.15-2 present Consolidated Unit 21-024(l)-99 and radionuclide activities greater than FVs. Sample results for inorganic chemicals and radionuclides were also compared to the maximum of the range of their respective background data sets. Those analytes with detections and/or detection limits greater than their respective BVs/FVs and the maximum of the background data set were designated as COPCs. Detected organic chemical were designated as COPCs.

Inorganic Chemicals

Inorganic Chemicals Detected at Concentrations Greater Than BVs. Cadmium, calcium, and zinc were detected at concentrations greater than their respective BVs (Figure 5.15-1).

- Cadmium was detected in six soil samples ranging from 0.78 to 2.0 m/kg (the maximum was from location 21-01424, 0- to 0.5-ft depth interval), concentrations greater than the soil BV (0.4 mg/kg), but less than the maximum cadmium concentration in the soil background data set (2.6 mg/kg). Therefore, cadmium is not a COPC.
- Calcium was detected in one soil sample at 7120 mg/kg (location 21-01420, 0- to 0.5-ft depth interval), a concentration greater than the soil BV (6120 mg/kg) but less than the maximum calcium concentration in the soil background data set (14,000 mg/kg). Therefore, calcium is not a COPC.
- Zinc was detected above background in one soil sample at 50.1 mg/kg (location 21-01424, 0- to 0.5-ft depth interval), a concentration greater than the soil BV (48.8 mg/kg) but less than the maximum zinc concentration in the soil background data set (75.5 mg/kg). Therefore, zinc is not a COPC.

Inorganic Chemicals not Included in Background Data. Lithium and strontium do not have background data and, therefore, have no BVs for comparison.

- Lithium was detected in six samples ranging from 4.2 to 27.7 mg/kg (the maximum was from location 21-01424, 0- to 0.5-ft depth interval). No established background levels are available for lithium. The lithium concentrations at this site are not similar to the concentrations found at most of the corrective action sites (most are below 11 mg/kg), indicating that the lithium levels are elevated as a result of releases. Therefore, lithium is a COPC.
- Strontium was detected in six samples ranging from 10.9 mg/kg to 20.4 mg/kg (the maximum was from location 21-01420, 0- to 0.5-ft depth interval). No established background levels are available for strontium. The strontium concentrations at this site are similar to the concentrations found at most of the corrective action sites (most are below 36 mg/kg), indicating that the strontium levels are not elevated as a result of releases. Therefore, strontium is not a COPC.

Inorganic Chemicals with Detection Limits Greater Than BVs. Antimony was not detected at concentrations greater than its respective BVs. However, its detection limits was greater than its respective BVs in some samples.

- Antimony detection limits, ranging from 6.0 to 6.3 mg/kg (the maximum detection limit was from location 21-01422), were greater than the soil BV (0.83 mg/kg) and the maximum antimony concentration in the soil background data set (1.0 mg/kg) in six soil samples. Therefore, antimony is a COPC due to elevated detection limits.

Inorganic Chemical Summary. Antimony and lithium are inorganic COPCs.

Organic Chemicals

VOCs. VOCs were detected at location 21-01421 in the 0- to 0.5-ft depth interval (Figure 5.15-1).

- Acetone was detected at 0.02 mg/kg (location 21-01421, 0- to 0.5-ft depth interval). Therefore, acetone is a COPC.
- Methylene chloride was detected at 0.01 mg/kg (location 21-01421, 0- to 0.5-ft depth interval). Therefore, methylene chloride is a COPC.

SVOCs. SVOCs were not detected.

Organic Chemical Summary. Acetone and methylene chloride are organic COPCs.

Radionuclides

Fallout Radionuclides. Americium-241, plutonium-238, and plutonium-239 (Figure 5.15-2) were detected at activities greater than their respective FVs in soil samples collected from the former discharge area of Consolidated Unit 21-024(l)-99. Since FVs are only applicable within the first 0.5 ft of surface soils, all fallout radionuclides detected in the samples deeper than the first 0.5 ft of surface soils are COPCs.

- Americium-241 was detected in two surface soil samples at 0.19 and 0.42 pCi/g (the maximum was from location 21-01422, 0- to 0.5-ft depth interval), activities greater than the soil FV and the maximum americium-241 activity in the soil background data set (both are 0.013 pCi/g). Therefore, americium-241 is a COPC.

- Plutonium-238 was detected in one surface soil sample at 12.1 pCi/g (location 21-01422, 0- to 0.5-ft depth interval), an activity greater than the soil FV (0.023 pCi/g), and the maximum plutonium-238 activity in the soil background data set (0.037 pCi/g). Therefore, plutonium-239 is a COPC.
- Plutonium-239 was detected in three surface soil samples ranging from 0.93 to 1.71 pCi/g (the maximum was from location 21-01423, 0- to 0.5-ft depth interval), activities greater than the soil FV (0.054 pCi/g) and the maximum plutonium-239 activity in the soil background data set (0.055 pCi/g). Therefore, plutonium-239 is a COPC.

Radionuclide Summary. Americium-241, plutonium-238, and plutonium-239 are radionuclide COPCs.

5.15.3 Scope of Activities for Consolidated Unit 21-024(l)-99

Sampling and Excavation Activities

The proposed sample locations at Consolidated Unit 21-024(l)-99 are shown in Figure 5.15-3. Table 5.15-4 provides a summary of the proposed sample locations, depths, objectives each sample addresses, and proposed analytical suites.

Samples will be analyzed for TAL metals, cyanide, nitrates, perchlorates, organic chemicals (VOCs and SVOCs [VOCs only in samples deeper than 0.5 ft bgs]), radionuclides (gamma spectroscopy, americium-241, isotopic plutonium, isotopic uranium, strontium-90, and tritium), moisture, and pH. If field screening indicates the presence of VOCs, a deeper sample will be collected and analyzed for full suite. Field screening will determine the sample(s) with the highest radionuclide and/or organic contamination. If field-screening instruments cannot determine which sample(s) contain(s) the highest levels of radionuclides or organic compounds, samples collected from the location where contamination would most likely be present as indicated by site history (i.e., sump, outfall, etc.) will be selected. The selected sample(s) will be analyzed for four additional analyses: PCBs, high explosives, dioxins, and furans. Quick turn around analysis on the selected sample will be requested for PCBs, dioxins, furans, and explosive compounds. This data will be transmitted to NMED, via fax, for their review. Within 1 week of receipt of the results, we anticipate that NMED will contact the LANL project leader to discuss the results. If the additional analytes are not detected, or detected at low levels reflective of anthropogenic activity, the remaining samples will not have to be analyzed for the full analytical suite. If the additional analytes are detected at levels attributable to the site, the remaining stored aliquots will be submitted to the analytical laboratory for the additional analyses. Prior to demobilization laboratory results will be reviewed to assure that the nature and extent of contamination has been determined at each SWMU.

During structure removal activities, excavation of soil and/or rock (including all visibly stained areas) will proceed until the radionuclide and organic vapor field-screening results indicate all contaminated material has been removed. Confirmation samples will be collected as these activities are completed. Analytical laboratory results will be reviewed to determine if additional removal activities and associated confirmation sampling are required due to the presence of areas with contaminant concentrations greater than industrial SSLs or SALs. Sampling at Consolidated Unit 21-024(l)-99 will consist of the following activities:

- *Aboveground tank Structure 21-335 removal and sampling.* Before removing and disposing of the tank for reuse or recycling, samples will be collected directly downslope of the drain valve on the aboveground tank (and/or where field screening indicates elevated VOCs and/or radionuclides) at the 0- to 0.5-ft and 2.0- to 3.0-ft depth intervals (Figure 5.15-3, location 19).
- *Sump excavation and sampling.* The sump contains a circular metal catch basin approximately 5 ft in depth. After this is removed and disposed of properly, the sump will be carefully excavated and inspected for evidence of leaks (e.g., field screening stained soil, holes in the floor). One borehole

will be advanced in the center of the excavation to determine the vertical extent of contamination (Figure 5.15-3, location BH-1). A second borehole (Figure 5.15-3, location BH-2) will be advanced 10 ft to the north of the sump location to provide lateral and vertical extent information. Borehole samples will be collected from the 0- 1.0-ft, 5.0- to 6.0-ft and 10.0- to 11.0-ft depth intervals below the sump (Figure 5.15-3, locations BH-1 and BH-2). BH-1 and BH-2 sample collection will start at the sump bottom depth (i.e., if sump is 15 ft deep, the 0 to 1.0 depth will be collected starting at 15 ft bgs). Samples will be collected beneath the pipeline connections to the sump (Figure 5.15-3, locations 5 and 6) at the 0- to 1.0-ft and 2.0- to 3.0-ft depth intervals.

- *Pipeline excavation and sampling.* Any pipelines and backfilled former pipeline beds will be carefully excavated and inspected for visible signs of leakage. Where elevated levels of VOCs and/or radionuclides are present, as determined by field screening or where visible evidence of a leak is found (e.g., stained soil, break in the pipe), samples will be collected immediately beneath the pipe to define vertical extent. If no field-screening evidence or visible evidence of a leak is found, samples will be collected from locations beneath the pipeline (or where evidence of a former pipeline exists) at the connection to Building 21-021 and any bends in the pipe (Figure 5.15-3, locations 1, 2, and 4). Additionally, the aboveground pipe will be sampled at its exit from Building 21-021 (Figure 5.15-3, location 7), halfway between the building and the tank (Figure 5.15-3, location 17), and at the tank connection (Figure 5.15-3, location 18). The outfall pipe that extends past the fence will be sampled at its connection to Building 21-021 (Figure 5.15-3, location 3) and under the outlet pipe approximately halfway between Building 21-021 and where it daylights (Figure 5.15-3, location 8). At each location, a sample will be collected at the 0- to 1.0-ft and 2.0- to 3.0-ft depth intervals. The zero depth is defined as immediately beneath the pipe or at the bottom of the pipe bed for pipelines that no longer exist.
    - Only one of the two pipelines that run from Building 21-021 to the sump was found by the 2004 geophysical survey. If the pipeline or evidence of a former pipeline is not located during the sump removal, exploratory trenching will be conducted to identify the second pipe location. Trenching will be conducted with a backhoe and will progress from the surface to approximately 5 ft bgs. The trench will be visually logged for evidence of non-native materials, disturbed bedding horizons and areas of visible staining. Elevated radiological or organic vapor field-screening results will be documented. Trenching will continue in the historically identified area until the pipeline is located, evidence of a former pipeline is found, or the absence of a pipeline at that location has been verified. If a pipe or evidence of a former pipe is not identified during field activities, confirmation samples will be collected from location(s) where the pipe was most likely located using the proposed sampling map as a guide.
- *Discharge/outfall area investigation.* Boreholes will be advanced in the center of the outfalls 0.5 ft downslope from the mouth of both outfall pipes (Figure 5.15-3, locations BH-3 and BH-4). Samples will be collected from the 0- to 0.5-ft, 2.0- to 3.0-ft, and 5.0- to 6.0-ft depth intervals. Samples will be collected 5 ft to the west and east of BH-3 (Figure 5.15-3, locations 9 and 10) and 5 ft east of BH-4 (Figure 5.15-3, location 20). These samples will be collected at the 0- to 0.5-ft and 2.0- to 3.0-ft depth intervals. Two additional sample locations will be established downslope from the mouth of the pipes, in the center of a distinguishable drainage, or in a catchment basin aligned with the mouth of the pipes 10 ft and 30 ft downslope from BH-3 and BH-4 (Figure 5.15-3, locations 12, 15, 22, and 25). Locations 12 and 22 will be flanked by sample locations 10 ft to the west and east (Figure 5.15-3, locations 11, 13, 21, and 23). Locations 15 and 25 and will be flanked by sample locations 20 ft to the west and east (Figure 5.15-3, locations 14, 16, 24, and 26). Samples will be collected at depths of 0–0.5 ft and 2.0–3.0 ft.

5.16 SWMU 21-024(n), Pipelines and outfalls

SWMU 21-024(n) originally consisted of a corrugated metal pipe and an outfall (Figure 5.16-1). Three additional pipelines and outfalls were identified in the same vicinity during the 2004 geophysical survey and/or from as built engineering drawings. Therefore, these have all been included in this SWMU.

5.16.1 Operational History

- 1949—Building 21-155 was constructed as a warehouse and laboratory with a corrugated metal pipe that exited a concrete bulkhead and discharged onto a gravel road adjacent to MDA U [Consolidated Unit 21-017(a)-99] (LANL 1991, 07529, p. 15-56). The effluent flowed north to the ditch paralleling the north perimeter road. From there, it flowed east to a culvert that passes under the north perimeter road and into DP Canyon (LANL 1991, 07529, p. 15-56).

Engineering drawings (LASL 1968, 24612; LASL 1977, 87575) and field observation indicate three additional lines originating from Building 21-155 (or next to Building 21-155) that follow a parallel path to, and west of, the pipeline from SWMU 21-024(n) (Figure 5.16-1). Each of these parallel pipelines (referred to as western [4-in. cast iron], storm grate [12-in. corrugated metal pipe (CMP)], middle [4-in. cast iron], and eastern [4 or 6-in. cast iron] below) has an outfall on the same hillside as the SWMU 21-024(n) outfall. The effluent from all the outfalls flows downslope to the ditch on the south side of the perimeter road. From the ditch, the path of the effluent leads to one of two culverts (one to the east and one to the west) that cross under the perimeter road and from there the effluent empties onto surface that slopes toward DP canyon.

5.16.2 Summary of Previous Investigations

Summarized below are previous investigations conducted at this site.

- 1992—RFI activities consisted of a radiological field survey and collection of nine samples from three locations (21-01402, -01403, and -01404) at the discharge point and along the ditch that carries discharges into DP Canyon (LANL 1994, 31591, p. 8-98). Samples were collected from the 0- to 0.5-ft, 0.5 to 1.0-ft, and 1.0- to 1.5-ft depth intervals. The nine samples were analyzed at an off-site fixed laboratory for inorganic chemicals, VOCs, SVOCs, and radionuclides (americium-241, isotopic plutonium, strontium-90).
- 2004—Radiological and geophysical surveys were completed (results are presented in Appendixes D and E, respectively). The geophysical survey located a metal pipe exiting the northwest corner of Building 21-155 (not clearly depicted on reviewed engineering drawings), and two pipelines exiting the northeast corner of Building 21-155. A large cast iron drain was also located that originates from a storm grate just north of Building 21-155.

SWMU 21-024(n) Data

The site data from 1992 were collected from soil and compared with soil BVs/FVs (LANL 1998, 59730). Table 5.16-1 and Figure 5.16-1 present SWMU 21-024(n) inorganic chemical concentrations greater than BVs. Table 5.16-2 and Figure 5.16-1 present SWMU 21-024(n) detected VOC and SVOC concentrations. Table 5.16-3 and Figure 5.16-2 present SWMU 21-024(n) radionuclide activities at depths where the FV does not apply. Sample results for inorganic chemicals and radionuclides were also compared to the maximum of the range of their respective background data sets. Those analytes with detections and/or detection limits greater than their respective BVs/FVs and the maximum of the background data set were designated as COPCs. Detected organic chemical were designated as COPCs.

Inorganic Chemicals

Inorganic Chemicals Detected at Concentrations Greater Than BVs. Cadmium, chromium, copper, and zinc were detected at concentrations greater than their respective BVs (Figure 5.16-1).

- Cadmium was detected in eight soil samples ranging from 0.48 to 0.97 mg/kg (the maximum was from location 21-01402, 0.5- to 1.0-ft depth interval), concentrations greater than the soil BV (0.4 mg/kg) and but less than the maximum cadmium concentration in the soil background data set (2.6 mg/kg). Therefore, cadmium is not a COPC.
- Chromium was detected in two soil samples at 34.2 and 37.2 mg/kg (the maximum was from location 21-01404, 0.5- to 1.0-ft depth interval), concentrations greater than the soil BV (19.3 mg/kg) and the maximum concentration detected was slightly greater than the maximum chromium concentration in the soil background data set (36.5 mg/kg). Therefore, chromium is a COPC.
- Copper was detected in one soil sample at 32.7 mg/kg (location 21-01402, 0.5- to 1.0-ft depth interval), a concentration greater than the soil BV (14.7 mg/kg) and the maximum copper concentration in the soil background data set (16 mg/kg). Therefore, copper is a COPC.
- Zinc was detected in three samples ranging from 49.7 to 158 mg/kg (the maximum was from location 21-01402, 0.5- to 1.0-ft depth interval), concentrations greater than the soil BV (48.8 mg/kg), and two concentrations greater than the maximum zinc concentration in the soil background data set (75.5 mg/kg). Therefore, zinc is a COPC.

Inorganic Chemicals not Included in Background Data. Lithium and strontium do not have background data and, therefore, have no BVs for comparison.

- Lithium was detected in nine samples ranging from 3.0 to 9.2 mg/kg (the maximum was from location 21-01402, 0- to 0.5-ft depth interval). No established background levels are available for lithium. The lithium concentrations at this site are similar to the concentrations found at most of the corrective action sites (most are below 11 mg/kg), indicating that the lithium levels are not elevated as a result of releases. Therefore, lithium is not a COPC.
- Strontium was detected in nine samples ranging from 1.8 to 28.0 mg/kg (the maximum was from location 21-01402, 0- to 0.5-ft depth interval). No established background levels are available for strontium. The strontium concentrations at this site are similar to the concentrations found at most of the corrective action sites (most are below 36 mg/kg), indicating that the strontium levels are not elevated as a result of releases. Therefore, strontium is not a COPC.

Inorganic Chemicals with Detection Limits Greater Than BVs. Antimony and cadmium were not detected at concentrations greater than their respective BVs. However, their detection limits were greater than their respective BVs in some samples.

- Antimony detection limits, ranging from 6.0 to 6.4 mg/kg (the maximum detection limit was from location 21-01402), were greater than the soil BV (0.83 mg/kg) and the maximum antimony concentration in the soil background data set (1.0 mg/kg) in all nine soil samples. Therefore, antimony is a COPC due to elevated detection limits.
- The cadmium detection limit of 0.43 mg/kg (location 21-01403) was greater than the soil BV (0.4 mg/kg), but less than the maximum cadmium concentration in the soil background data set (2.6 mg/kg), in one soil sample. Therefore, cadmium is not a COPC due to elevated detection limits.

Inorganic Chemical Summary. Antimony, chromium, copper, and zinc are inorganic COPCs.

Organic Chemicals

VOCs. One VOC was detected in seven samples (Figure 5.16-1).

- Acetone was detected in seven soil samples ranging from 0.02 to 0.03 mg/kg (the maximum was from locations 21-01403 and 21-01404). Therefore, acetone is a COPC.

SVOCs. One SVOC was detected in two samples (Figure 5.16-1).

- Diethylphthalate was detected in two soil samples at 0.51 and 0.95 mg/kg (the maximum was from location 21-01402). Therefore, diethylphthalate is a COPC.

Organic Chemical Summary. Acetone and diethylphthalate are organic COPCs.

Radionuclides

Fallout Radionuclides. Americium-241 was detected (Figure 5.16-2) in one soil sample at a depth not applicable to FVs. Since FVs are only applicable within the first 0.5 ft of surface soils, all fallout radionuclides detected in the samples deeper than the first 0.5 ft of surface soils are COPCs.

- Americium-241 was detected at 0.26 pCi/g (location 21-01402, 0.5- to 1.0-ft depth interval), at a depth where the FV does not apply. Therefore, americium-241 is a COPC.

Radionuclide Summary. Americium-241 is a radionuclide COPC.

5.16.3 Scope of Activities for SWMU 21-024(n)

Sampling and Excavation Activities

The proposed sample locations at SWMU 21-024(n) are shown in Figure 5.16-3. Table 5.16-4 provides a summary of the proposed sample locations, depths, objectives each sample addresses, and proposed analytical suites.

Samples will be analyzed for TAL metals, cyanide, nitrates, perchlorates, organic chemicals (VOCs and SVOCs [VOCs only in samples deeper than 0.5 ft bgs]), radionuclides (gamma spectroscopy, americium-241, isotopic plutonium, isotopic uranium, strontium-90, and tritium), moisture, and pH. If field screening indicates the presence of VOCs, a deeper sample will be collected and analyzed for full suite. Field screening will determine the sample(s) with the highest radionuclide and/or organic contamination. If field-screening instruments cannot determine which sample(s) contain(s) the highest levels of radionuclides or organic compounds, samples collected from the location where contamination would most likely be present as indicated by site history (i.e., sump, outfall, etc.) will be selected. The selected sample(s) will be analyzed for four additional analyses: PCBs, high explosives, dioxins, and furans. Quick turn around analysis on the selected sample will be requested for PCBs, dioxins, furans, and explosive compounds. This data will be transmitted to NMED, via fax, for their review. Within 1 week of receipt of the results, we anticipate that NMED will contact the LANL project leader to discuss the results. If the additional analytes are not detected, or detected at low levels reflective of anthropogenic activity, the remaining samples will not have to be analyzed for the full analytical suite. If the additional analytes are detected at levels attributable to the site, the remaining stored aliquots will be submitted to the analytical laboratory for the additional analyses. Prior to demobilization laboratory results will be reviewed to assure that the nature and extent of contamination has been determined at each SWMU.

During structure removal activities, excavation of soil and/or rock (including all visibly stained areas) will proceed until the radionuclide and organic vapor field-screening results indicate all contaminated material has been removed. Confirmation samples will be collected as these activities are completed. Analytical laboratory results will be reviewed to determine if additional removal activities and associated confirmation sampling are required due to the presence of areas with contaminant concentrations greater than industrial SSLs or SALs. Sampling at SWMU 21-024(n) will consist of the following activities:

- *Western pipeline excavation and sampling*. The pipeline will be carefully excavated and inspected for evidence of leaks. Where elevated levels of VOCs and/or radionuclides are present, as determined by field screening or where visible evidence of a leak is found (e.g., stained soil, break in the pipe), samples will be collected immediately beneath the pipe to define vertical extent. If no field-screening evidence or visible evidence of a leak is found, samples will be collected from locations beneath the pipeline at the point of origin (immediately north of the former Building 21-155, Figure 5.16-3, location 1). At this location, samples will be collected at the 0- to 1.0-ft and 2.0- to 3.0-ft depth intervals. The zero depth is defined as immediately beneath the pipe.
- *Western pipeline outfall investigation*. One borehole will be advanced in the center of the outfall 0.5 ft downslope from the mouth of the outfall pipe (Figure 5.16-3, BH-1) and samples will be collected from the 0- to 0.5-ft, 2.0- to 3.0-ft, and 5.0- to 6.0-ft depth intervals. Samples will be collected 5 ft to the west and east of the borehole (Figure 5.16-3, locations 2 and 3) at the 0- to 0.5-ft and 2.0- to 3.0-ft depth intervals. Two additional sample locations will be established downslope from the mouth of the pipe, in the center of a distinguishable drainage, or in a catchment basin aligned with the mouth of the pipe 10 ft and 30 ft downslope from BH-1 (Figure 5.16-3, locations 5 and 8). Location 5 will be flanked by sample locations 10 ft to the west and east (Figure 5.16-3, locations 4 and 6). Location 8 will be flanked by sample locations 20 ft to the west and east (Figure 5.16-3, locations 7 and 9). Samples will be collected at depths of 0–0.5 ft and 2.0–3.0 ft.
- *Middle pipeline excavation and sampling*. The pipeline will be carefully excavated and inspected for evidence of leaks. Where elevated levels of VOCs and/or radionuclides are present, as determined by field screening or where visible evidence of a leak is found (e.g., stained soil, break in the pipe), samples will be collected immediately beneath the pipe to define vertical extent. If no field-screening evidence or visible evidence of a leak is found, samples will be collected from locations beneath the pipeline at the point of origin (immediately north of the former Building 21-155, Figure 5.16-3, location 10) and at the bend in the pipe (Figure 5.16-3, location 11). Samples will be collected immediately south of Building 21-213 (Figure 5.16-3, location 12) and immediately north of Building 21-213 (Figure 5.16-3, location 13). At each location, a sample will be collected at the 0- to 1.0-ft and 2.0- to 3.0-ft depth intervals. The zero depth is defined as immediately beneath the pipe.
- *Middle pipeline outfall investigation*. One borehole will be advanced in the center of the outfall 0.5 ft downslope from the mouth of the outfall pipe (Figure 5.16-3, BH-2) and samples will be collected from the 0- to 0.5-ft, 2.0- to 3.0-ft, and 5.0- to 6.0-ft depth intervals. Samples will be collected 5 ft to the west of BH-2 (Figure 5.16-3, location 14). Two additional sample locations will be established downslope from the mouth of the pipe, in the center of a distinguishable drainage, or in a catchment basin aligned with the mouth of the pipe 10 ft and 30 ft downslope from BH-2 (Figure 5.16-3, locations 17 and 21). Location 17 will be flanked by one location 10 ft to the west (Figure 5.16-3, location 16). Location 21 will be flanked by one location 20 ft to the west (Figure 5.16-3, location 20). Samples will be collected at depths of 0–0.5 ft and 2.0–3.0 ft.
- *Storm grate and pipeline excavation and sampling*. The storm grate will be carefully excavated. One borehole will be advanced in the center of the floor of the excavation to determine the vertical extent of contamination (Figure 5.16-3, location BH-3). Borehole samples will be collected from the

0- to 1.0-ft, 5.0- to 6.0-ft, and 10.0- to 11.0-ft depth intervals. All pipelines entering the grate will be followed back to their origin. The pipelines will be carefully excavated and inspected for evidence of leaks. Where elevated levels of VOCs and/or radionuclides are present, as determined by field screening or where visible evidence of a leak is found (e.g., stained soil, break in the pipe), samples will be collected immediately beneath the pipe to define vertical extent. At each location, a sample will be collected at the 0- to 1.0-ft and 2.0- to 3.0-ft depth intervals. The zero depth is defined as immediately beneath the pipe.

- *Storm grate outfall investigation*. One borehole will be advanced in the center of the storm grate outfall 0.5 ft downslope from the mouth of the outfall pipe (Figure 5.16-3, BH-4) and samples will be collected from the 0- to 0.5-ft, 2.0- to 3.0-ft, and 5.0- to 6.0-ft depth intervals. Samples will be collected 5 ft to the east of BH-4 (Figure 5.16-3, location 15). Two additional sample locations will be established downslope from the mouth of the pipe, in the center of a distinguishable drainage, or in a catchment basin aligned with the mouth of the pipe 10 ft and 30 ft downslope from BH-4 (Figure 5.16-3, locations 18 and 22). Location 18 will be flanked by one location 10 ft to the east (Figure 5.16-3, location 19). Location 22 will be flanked by one location 20 ft to the east (Figure 5.16-3, locations 23). Samples will be collected at depths of 0–0.5 ft and 2.0–3.0 ft.
- *Eastern pipeline excavation and sampling.* The pipelines will be carefully excavated and inspected for evidence of leaks. Where elevated levels of VOCs and/or radionuclides are present, as determined by field screening or where visible evidence of a leak is found (e.g., stained soil, break in the pipe), samples will be collected immediately beneath the pipe to define vertical extent. If no field-screening evidence or visible evidence of a leak is found, samples will be collected from locations beneath the pipelines at the point of origin (immediately north of the former Building 21-155, Figure 5.16-3, location 24). Samples will be collected at the two bends in the path of the pipeline (Figure 5.16-3, locations 25 and 26) and just south of the headwall (Figure 5.16-3, location 27). At each location, a sample will be collected at the 0- to 1.0-ft and 2.0- to 3.0-ft depth intervals. The zero depth is defined as immediately beneath the pipe.
- *Eastern pipeline outfall investigation.* One location will be sampled at the connection of the pipeline with the headwall. One borehole will be advanced in the center of the outfall 0.5 ft downslope from the mouth of the headwall (Figure 5.16-3, location BH-5) and samples will be collected from the 0- to 0.5-ft, 2.0- to 3.0-ft, and 5.0- to 6.0-ft depth intervals. Samples will be collected 5 ft to the west and east of BH-5 (Figure 5.16-3, locations 28 and 29). Two additional sample locations will be established downslope from the mouth of the pipe, in the center of a distinguishable drainage, or in a catchment basin aligned with the mouth of the pipe 10 ft and 30 ft downslope from BH-5 (Figure 5.16-3, locations 31 and 34). Location 31 will be flanked by sample locations 10 ft to the west and east (Figure 5.16-3, locations 30 and 32). Location 34 will be flanked by sample locations 20 ft to the west and east (Figure 5.16-3, locations 33 and 35). Samples will be collected at depths of 0–0.5 ft and 2.0–3.0 ft.
- *Ditch investigation.* Samples will be collected from the ditch on the south side of the perimeter road at the mouth of the western culvert (Figure 5.16-3, location 36), directly downslope from the headwall of the eastern pipeline (Figure 5.16-3, location 37), and at the mouth of the eastern culvert (Figure 5.16-3, location 38). Samples will be collected at depths of 0–0.5 ft and 2.0–3.0 ft.
- *Western culvert investigation*. On the north side of the road, a borehole will be advanced 0.5 ft north of the mouth of the western culvert where effluent discharges (Figure 5.16-3, location BH-6) and samples will be collected from the 0- to 0.5-ft, 2.0- to 3.0-ft, and 5.0- to 6.0-ft depth intervals. Samples will be collected 5 ft to the west and east of BH-6 (Figure 5.16-3, locations 39 and 40) at the 0- to 0.5-ft and 2.0- to 3.0-ft. Two additional sample locations will be established downslope from the mouth of the culvert, in the center of a distinguishable drainage, or in a catchment basin

aligned with the mouth of the culvert 10 ft and 30 ft downslope from BH-6 (Figure 5.16-3, locations 42 and 45). Location 42 will be flanked by sample locations 10 ft to the west and east (Figure 5.16-3, locations 41 and 43). Location 45 will be flanked by sample locations 20 ft to the west and east (Figure 5.16-3, locations 44 and 46). Samples will be collected at depths of 0–0.5 ft and 2.0–3.0 ft.

- *Eastern culvert investigation*. On the north side of the road, a borehole will be advanced 0.5 ft north of the mouth of the culvert where effluent discharges (Figure 5.16-3, location BH-7) and samples will be collected from the 0- to 0.5-ft, 2.0- to 3.0-ft, and 5.0- to 6.0-ft depth intervals. Samples will be collected 5 ft to the west and east of BH-7 (Figure 5.16-3, locations 47 and 48) at the 0- to 0.5-ft and 2.0- to 3.0-ft depth intervals. Two additional sample locations will be established downslope from the mouth of the culvert, in the center of a distinguishable drainage, or in a catchment basin aligned with the mouth of the culvert 10 ft and 30 ft downslope from BH-7 (Figure 5.16-3, locations 50 and 53). Location 50 will be flanked by sample locations 10 ft to the west and east (Figure 5.16-3, locations 49 and 51). Location 53 will be flanked by sample locations 20 ft to the west and east (Figure 5.16-3, locations 52 and 54). Samples will be collected at depths of 0–0.5 ft and 2.0–3.0 ft.

5.17 SWMU 21-024(o), Pipeline and Outfall

SWMU 21-024(o) consists of a pipeline and associated outfall (Figure 5.17-1).

5.17.1 Operational History

- 1947/1948—Building 21-046, a diesel power plant and warehouse, was constructed as an addition to the existing power plant (Building 21-014), and SWMU 21-024(o) is a 4-in. VCP pipeline serving it (LANL 1991, 07529, p. 15-56, LANL 1999, 87442, p. 174). The pipe discharged south into Los Alamos Canyon (LASL 1958, 71281).
- 1957—Building 21-046 was converted to a warehouse/maintenance shop (LANL 1991, 07529, p. 15-56).
- 1985—An engineering drawing depicts Building 21-046 as a machine shop (LASL 1985, 87578).

5.17.2 Summary of Previous Investigations

Summarized below are previous investigations conducted at this site.

- 1992—RFI activities included a radiological field survey and collection of three samples (0- to 0.5-ft, 0.5- to 1.0-ft, and 1.0- to 1.5-ft depth intervals) from two locations (21-01343 and 21-01344), for a total of six samples. These samples were analyzed at an off-site fixed laboratory for inorganic chemicals and radionuclides (americium-241, isotopic plutonium, and strontium-90) (LANL 1994, 31591).
- 2004—Radiological and geophysical surveys were completed (results are presented in Appendixes D and E, respectively). The geophysical survey did not locate the pipeline exiting Building 21-046, but did locate a pipe that tied into the septic tank 21-123 inlet line at SWMU 21-024(e), which is addressed in Section 5.9.

SWMU 21-024(o) Data

The site data from 1992 were collected from soil and compared with soil BVs/FVs (LANL 1998, 59730). Table 5.17-1 and Figure 5.17-1 present SWMU 21-024(o) inorganic chemical concentrations greater than

BVs. Table 5.17-2 and Figure 5.17-2 present SWMU 21-024(o) radionuclide activities greater than FVs and at depths where the FV does not apply. Sample results for inorganic chemicals and radionuclides were also compared to the maximum of the range of their respective background data sets. Those analytes with detections and/or detection limits greater than their respective BVs/FVs and the maximum of the background data set were designated as COPCs.

Inorganic Chemicals

Inorganic Chemicals Detected at Concentrations Greater Than BVs. Cadmium, lead, and zinc were detected at concentrations greater than their respective BVs (Figure 5.17-1).

- Cadmium was detected in five soil samples ranging from 1.0 to 1.8 mg/kg (the maximum was from location 21-01344, 0- to 0.5-ft depth interval), concentrations greater than the soil BV (0.4 mg/kg) but less than the maximum cadmium concentration in the soil background data set (2.6 mg/kg). Therefore, cadmium is not a COPC.
- Lead was detected in three soil samples ranging from 35.9 to 45 mg/kg (the maximum was from location 21-01344, 0.5 to 1.0-ft depth interval), concentrations greater than the soil BV (22.3 mg/kg) and the maximum lead concentration in the soil background data set (28.0 mg/kg). Therefore, lead is a COPC.
- Zinc was detected in three soil samples ranging from 75.9 to 115 mg/kg (the maximum was from location 21-01343, 0- to 0.5-ft depth interval), concentrations greater than the soil BV (48.8 mg/kg), and the maximum zinc concentration in the soil background data set (75.5 mg/kg). Therefore, zinc is a COPC.

Inorganic Chemicals not Included in Background Data. Lithium and strontium do not have background data and, therefore, have no BVs for comparison.

- Lithium was detected in all six samples ranging from 3.0 to 10.5 mg/kg (the maximum was from locations 21-01343 and 21-01344, 0- to 0.5-ft depth interval). No established background levels are available for lithium. The lithium concentrations at this site are similar to the concentrations found at most of the corrective action sites (most are below 11 mg/kg), indicating that the lithium levels are not elevated as a result of releases. Therefore, lithium is not a COPC.
- Strontium was detected in all six samples ranging from 1.0 to 21.2 mg/kg (the maximum was from location 21-01343, 0- to 0.5-ft depth interval). No established background levels are available for strontium. The strontium concentrations at this site are similar to the concentrations found at most of the corrective action sites (most are below 36 mg/kg), indicating that the strontium levels are not elevated as a result of releases. Therefore, strontium is not a COPC.

Inorganic Chemicals with Detection Limits Greater Than BVs. Antimony and cadmium detection limits were greater than their respective BVs in some samples.

- Antimony detection limits, ranging from 4.8 to 5.9 mg/kg (the maximum detection limit was from location 21-01344), were greater than the soil BV (0.83 mg/kg) and the maximum antimony concentration in the soil background data set (1.0 mg/kg) in all six soil samples. Therefore, antimony is a COPC due to elevated detection limits.
- The cadmium detection limit of 0.48 mg/kg (location 21-01343) was greater than the soil BV (0.4 mg/kg) but less than the maximum cadmium concentration in the soil background data set (2.6 mg/kg) in one soil sample. Therefore, cadmium is not a COPC due to elevated detection limits.

Inorganic Chemical Summary. Antimony, lead, and zinc are inorganic COPCs.

Organic Chemicals

VOCs. VOCs were not analyzed for at an off-site fixed laboratory.

SVOCs. SVOCs were not analyzed for at an off-site fixed laboratory.

Organic Chemical Summary. Organic chemicals were not analyzed for at an off-site fixed laboratory; therefore, the potential for organic chemical contamination was not addressed.

Radionuclides

Fallout Radionuclides. Americium-241 and plutonium-239 (Figure 5.17-2) were detected at activities greater than their respective FVs in soil samples collected from the discharge point of Building 21-046. Since FVs are only applicable within the first 0.5 ft of surface soils, all fallout radionuclides detected in the samples deeper than the first 0.5 ft of surface soils are COPCs.

- Americium-241 was detected in the two surface soil samples in the outfall at 0.03 and 0.07 pCi/g (the maximum was from location 21-01343, 0- to 0.5-ft depth interval), activities greater than the soil FV and the maximum americium-241 activity in the soil background data set (both are 0.013 pCi/g). Americium-241 was also detected at 0.03 pCi/g in an outfall sample at the 0.5- to 1.0-ft depth interval, at a depth where the FV does not apply. Therefore, americium 241 is a COPC.
- Plutonium-239 was detected in the two surface soil samples in the outfall at 0.3 and 1.66 pCi/g (the maximum was from location 21-01343, 0- to 0.5-ft depth interval), activities greater than the soil FV (0.054 pCi/g) and the maximum plutonium-239 activity in the soil background data set (0.055 pCi/g). Plutonium-239 was also detected in the outfall samples at depths where the FV does not apply, ranging from 0.14 to 0.56 pCi/g. Therefore, plutonium-239 is a COPC.

Radionuclide Summary. Americium-241 and plutonium-239 are radionuclide COPCs.

5.17.3 Scope of Activities for SWMU 21-024(o)

Sampling and Excavation Activities

The proposed sample locations at SWMU 21-024(o) are shown in Figure 5.17-3. Table 5.17-3 provides a summary of the proposed sample locations, depths, objectives each sample addresses, and proposed analytical suites.

Samples will be analyzed for TAL metals, cyanide, nitrates, perchlorates, organic chemicals (VOCs and SVOCs [VOCs only in samples deeper than 0.5 ft bgs]), radionuclides (gamma spectroscopy, americium-241, isotopic plutonium, isotopic uranium, strontium-90, and tritium), moisture, and pH. If field screening indicates the presence of VOCs, a deeper sample will be collected and analyzed for full suite. Field screening will determine the sample(s) with the highest radionuclide and/or organic contamination. If field-screening instruments cannot determine which sample(s) contain(s) the highest levels of radionuclides or organic compounds, samples collected from the location where contamination would most likely be present as indicated by site history (i.e., sump, outfall, etc.) will be selected. The selected sample(s) will be sent to an off-site fixed laboratory for quick turn-around analysis of PCBs, HE, dioxins, and furans (NMED 2005, 89314). The sample results will be transmitted to NMED, via fax, for review. Within 1 week of receipt of the

results, we anticipate that NMED will contact the LANL project leader to discuss the results. If analytes from the four additional analyses are not detected, or detected at low levels reflective of anthropogenic activity, the remaining samples will not be analyzed for the four additional analyses per agreement with NMED. If the additional analytes are detected at levels attributable to the site, the remaining stored aliquots will be submitted to the analytical laboratory for the additional analyses. Prior to demobilization, laboratory results will be reviewed to assess if the nature and extent of contamination have been determined. If nature and extent have not been determined, then step-out samples will be collected.

During structure removal activities, excavation of soil and/or rock (including all visibly stained areas) will proceed until the radionuclide and organic vapor field-screening results indicate all contaminated material has been removed. Confirmation samples will be collected as these activities are completed. Analytical laboratory results will be reviewed to determine if additional removal activities and associated confirmation sampling are required due to the presence of areas with contaminant concentrations greater than industrial SSLs or SALs. Sampling at SWMU 21-024(o) will consist of the following activities:

- *Pipeline excavation and sampling*. Any pipelines and backfilled former pipeline beds will be carefully excavated and inspected for visible signs of leakage. Where elevated levels of VOCs and/or radionuclides are present, as determined by field screening or where visible evidence of a leak is found (e.g., stained soil, break in the pipe), samples will be collected immediately beneath the pipe to define vertical extent. If no field-screening evidence or visible evidence of a leak is found, samples will be collected from locations beneath the pipeline (or where evidence of a former pipeline exists) immediately south of Building 21-046 (beneath a pipeline joint, if present) and every 50 ft from the Building 21-046 (Figure 5.17-3, locations 1, 2, and 3). At each location, a sample will be collected at the 0- to 1.0-ft and 2.0- to 3.0-ft depth intervals. The zero depth is defined as immediately beneath the pipe or at the bottom of the pipe bed for pipelines that no longer exist.
    - The pipeline that runs from Building 21-046 to the outfall was not located by the 2004 geophysical survey; therefore, exploratory trenching will be conducted to identify the pipe location. Trenching will be conducted with a backhoe and will progress from the surface to approximately 5 ft bgs. The trench will be visually logged for evidence of non-native materials, disturbed bedding horizons and areas of visible staining. Elevated radiological or organic vapor field-screening results will be documented. Trenching will continue in the historically identified area until the pipeline is located, evidence of a former pipeline is found, or the absence of a pipeline at that location has been verified. If a pipe or evidence of a former pipe is not identified during field activities, confirmation samples will be collected from location(s) where the pipe was most likely located using the proposed sampling map as a guide.
- *Outfall investigation*. The outfall was not located during the geophysical survey. If the outfall is located by visual inspection or field screening one borehole will be advanced in the center of the outfall 0.5 ft downslope from the mouth of the outfall pipe (Figure 5.17-3, location BH-1). If not located, the borehole location will be estimated based on previous outfall sampling locations. Samples will be collected from the 0- to 0.5-ft, 2.0- to 3.0-ft, and 5.0- to 6.0-ft depth intervals. Samples will be collected 5 ft to the west and east of the borehole (Figure 5.17-3, locations 4 and 5). One additional location will be sampled as close to the mesa edge as possible (Figure 5.17-3, location 7). Location 7 will be flanked by two sample locations 10 ft to the west and east (Figure 5.17-3, locations 6 and 8). Samples will be collected at the 0- to 0.5-ft and 2.0- to 3.0-ft depth intervals.

- *Bench investigation.* On the topographical bench beneath the mesa cliff edge, two sample locations will be established downslope from the mouth of the pipe, in the center of a distinguishable drainage, or in a catchment basin aligned with the mouth of the pipe at the north and south ends of the bench (Figure 5.17-3, locations 10 and 13). These sample locations will each be flanked by one sample location 20 ft to the west and one sample location 20 ft to the east (Figure 5.17-3, locations 9, 11, 12, and 14). Samples will be collected at depths of 0-0.5 ft and 2.0-3.0 ft.

5.18 Consolidated Unit 21-026(a)-99, Sewage Treatment Plant

Consolidated Unit 21-026(a)-99 is a sewage treatment plant that consists of SWMUs 21-013(a) (surface disposal area), 21-026(a) (sewage treatment plant), and 21-026(b) (four sludge drying/sand filter beds) and AOCs 21-026(c) (dosing siphon chamber) and 21-026(d) (an outfall) (Figure 5.18-1).

5.18.1 Operational History

SWMU 21-026(a) consists of an inactive sewage treatment plant housed in Building 21-227. The plant is located at the eastern end of DP Mesa. The treatment plant replaced the original septic tank/filter fields and septic tank/surface discharge systems throughout TA-21. The treatment plant was an extended aeration sanitary waste treatment plant with a grit chamber, comminuter, digester, aeration tank, and clarifier. The plant treated sanitary wastes and cooling water from TA-21 facilities and received water from decontamination activities, janitor's scrub water, and waste from other TA-21 operations. Originally, treated effluent leaving Building 21-227 was released at a concrete spill pad located on the southern edge of DP Canyon [outfall AOC 21-026(d)]. Later, effluent was discharged via a dosing siphon chamber to sand filter/sludge drying beds.

- 1966—Sewage treatment plant built.
- 1992—Traditional treatment operations ended.
- 1992 to present—All waste received is stored until pumped out by truck for transport TA-46 facility for treatment/disposal.

SWMU 21-026(b) consists of four sludge drying/sand filter beds; each is 14.5 ft x 23 ft with 4-ft-deep concrete walls.

- 1966 to 1990—Sludge drying beds were operational.
- 1990—The tile drainlines were removed and connections were plugged w/concrete.
- 1990 to ~1992—The two westernmost sand filters received effluent from the dosing siphon chamber. Effluent was piped to a gauging station then to the outfall at edge of mesa.
- 1992—Beds were filled with clean sand when treatment operations ceased.

AOC 21-026(c) consists of a dosing siphon chamber that was a concrete tank; 5 ft wide, 7 ft long, 8 ft deep. The dosing siphon chamber received effluent until the chamber was full, and then the effluent was pumped to the two westernmost sand filter beds.

- 1996—A chlorine contact chamber was built with outfall [AOC 21-026(d)] to mesa edge.
- 1990—The contact chamber was converted to dosing siphon chamber; manhole and outfall lines plugged with concrete.

- 1990 to 1992—Effluent from dosing siphon chamber was pumped to the sand filter beds.
- 1992—The chamber was left in place when treatment operations ceased.

AOC 21-026(d) consists of an outfall. Discharge from the sewage treatment plant flowed through an 8-in. VCP into a concrete channel on the north edge of DP Mesa and ran down a natural drainage to a tributary of DP Canyon. Prior surveys of the effluent indicated the presence of gross-alpha, -beta, and -gamma radiation and tritium.

- 1966 to 1992—The outfall received treated liquid wastes from Building 21-227.
- 1998, March 10—The outfall (NPDES outfall 05S) was deleted from Laboratory's NPDES permit.

SWMU 21-013(a) consists of a surface disposal area, approximately 45 ft^2, included periodic disposal of top layers of sand from filter beds at SWMU 21-026(b).

- 1966 to 1992—Surface disposal area was used for periodic disposal of top layers of sand from filter beds.
- 1994—Sand pile no longer visible.

5.18.2 Summary of Previous Investigations

Summarized below are previous investigations conducted at this site.

- 1992—RFI sampling at AOC 21-026(d); radiological field survey, collection of samples from four locations (21-01398, -01399, -01400, and -01401) in the outfall area (0- to 0.5-ft depth interval at all four locations, and 0.5- to 1.0-ft, 1.0- to 1.5-ft depth intervals at one location). Samples were analyzed at an off-site fixed laboratory for inorganic chemicals and radionuclides (americium-241, isotopic plutonium, and strontium-90).
- 1994—RFI sampling at SWMUs 21-013(a) and 21-026(a,b) and AOC 21-026(c); radiological survey and collection of samples:
    - SWMU 21-013(a)—Samples were collected from four locations (21-02113, -02118, -02119, and -02120) from the 0- to 0.5-ft and 0.5 to 1.0-ft depth intervals. Samples were analyzed at an off-site fixed laboratory for inorganic chemicals including total uranium, VOCs, SVOCs, and radionuclides (gamma spectroscopy, tritium, and isotopic plutonium).
    - SWMUs 21-026(a,b) and AOC 21-026(c)—Four boreholes were drilled, specifically two angled holes beneath the sand filter beds, one angle hole beneath Building 21-227, and one vertical hole near the dosing siphon chamber (locations 21-02550, -02551, -02552, and -02565). Samples were collected to a maximum depth of 52 ft. Sixteen samples were selected, on the basis of chlorate and nitrate concentrations, for submission to fixed off-site laboratories for analysis of inorganic chemicals including total uranium, VOCs, SVOCs, and radionuclides (gamma spectroscopy, tritium, isotopic plutonium, and isotopic uranium).
- 2004—Radiological and geophysical surveys were completed (results are presented in Appendixes D and E, respectively). The geophysical survey located the pipeline exiting the treatment plant and the associated outfall.

Consolidated Unit 21-026(a)-99 Data

The Consolidated Unit 21-026(a)-99 site data from 1992 and 1994 were collected from soil and tuff and compared with their respective BVs/FVs (LANL 1998, 59730). Table 5.18-1 and Figure 5.18-1 present Consolidated Unit 21-026(a)-99 inorganic chemical concentrations greater than BVs. Table 5.18-2 and Figure 5.18-1 present Consolidated Unit 21-026(a)-99 detected VOC concentrations. Table 5.18-3 and Figure 5.18-2 present Consolidated Unit 21-026(a)-99 radionuclide activities greater than BVs/FVs and/or at depths where the FV does not apply. Sample results for inorganic chemicals and radionuclides were also compared to the maximum of the range of their respective background data sets. Those analytes with detections and/or detection limits greater than their respective BVs/FVs and the maximum of the background data set were designated as COPCs. Detected organic chemical were designated as COPCs.

Inorganic Chemicals

Inorganic Chemicals Detected at Concentrations Greater Than BVs: Aluminum, beryllium, cadmium, calcium, chromium, copper, lead, magnesium, manganese, mercury, nickel, silver, uranium, vanadium, and zinc were detected at concentrations above their respective BVs (Figure 5.18-1).

- Aluminum was detected in one tuff sample with a concentration of 10,300 mg/kg (location 21-02550, 35.0- to 40.0-ft depth interval), a concentration greater than the tuff BV (7340 mg/kg) and the maximum aluminum concentration in the tuff background data set (8370 mg/kg). Therefore, aluminum is a COPC.
- Beryllium was detected in one tuff sample with a concentration of 1.4 mg/kg (location 21-02550, 35.0- to 40-ft depth interval), a concentration greater than the tuff BV (1.21 mg/kg) but less than the maximum beryllium concentration in the tuff background data set (1.8 mg/kg). Therefore, beryllium is not a COPC.
- Cadmium was detected in four surface soil samples ranging from 0.9 to 1.4 mg/kg (the maximum was from location 21-01399, 0- to 0.5-ft depth interval), concentrations greater than the soil BV (0.4 mg/kg), but less than the maximum cadmium concentration in the soil background data set (2.6 mg/kg). Therefore, cadmium is not a COPC.
- Calcium was detected in one soil sample at 15,300 mg/kg, (location 21-02113, 0- to 0.5-ft depth interval), a concentration greater than both the soil BV (6120 mg/kg) and the maximum calcium concentration in the soil background data set (14,000 mg/kg). Calcium was detected in seven tuff samples ranging from 2650 to 11,100 mg/kg, concentrations greater than both the tuff BV (2200 mg/kg) and the maximum calcium concentration in the tuff background data set (2230 mg/kg). Therefore, calcium is a COPC.
- Chromium was detected in four surface soil samples ranging from 20.7 to 182 mg/kg, (the maximum was from location 21-01398, 0- to 0.5-ft depth interval), concentrations greater than the soil BV (19.3 mg/kg), but only the maximum sample concentration was greater than the maximum chromium concentration in the soil background data set (36.5 mg/kg). Chromium was detected in the five tuff samples ranging from 7.9 to 12.8 mg/kg (the maximum was from location 21-02565, 20.0- to 25.0-ft depth interval), concentrations greater then the tuff BV (7.14 mg/kg), but less than the maximum chromium concentration in the tuff background data set (13 mg/kg). Since one sample had a concentration greater than the maximum soil background data concentration, chromium is a COPC.
- Copper was detected in four surface soil samples ranging from 14.8 to 41.1 mg/kg (the maximum was from location 21-01401, 0- to 0.5-ft depth interval), concentrations greater than the soil BV

(14.7 mg/kg), and three of the four concentrations were greater than the maximum copper concentration in the soil background data set (16 mg/kg). Therefore, copper is a COPC.

- Lead was detected in two soil samples at 27.3 and 46.1 mg/kg, (the maximum was from location 21-02113, 0- to 0.5-ft depth interval), concentrations greater than the soil BV (22.3 mg/kg) and the maximum concentration was greater than the maximum lead concentration in the soil background data set (28.0 mg/kg). Lead was detected in the three tuff samples ranging from 11.6 to 85.5 mg/kg (the maximum was from location 21-02565, 20.0- to 25.0-ft depth interval), concentrations greater than the tuff BV (11.2 mg/kg); the highest concentration was greater than the maximum lead concentration in the tuff background data set (15.5 mg/kg). Therefore, lead is a COPC.
- Magnesium was detected in one tuff sample with a concentration of 2330 mg/kg (location 21-02550, 35.0- to 40.0-ft depth interval), a concentration greater than the tuff BV (1690 mg/kg) but less than the maximum magnesium concentration in the tuff background data set (2820 mg/kg). Therefore, magnesium is not a COPC.
- Manganese was detected in one surface soil sample at 679 mg/kg (location 21-02113, 0- to 0.5-ft depth interval), a concentration greater than the soil BV (671 mg/kg) but less than the maximum manganese concentration in the soil background data set (1100 mg/kg). Therefore, manganese is not a COPC.
- Mercury was detected in one surface soil sample at 0.29 mg/kg (location 21-02119, 0- to 0.5-ft depth interval), a concentration greater than the soil BV and the maximum mercury concentration in the soil background data set (both are 0.1 mg/kg). Therefore, mercury is a COPC.
- Nickel was detected in one surface soil sample at 127 mg/kg (location 21-01398, 0- to 0.5-ft depth interval), a concentration greater than the soil BV (15.4 mg/kg) and the maximum nickel concentration in the soil background data set (29 mg/kg). Therefore, nickel is a COPC.
- Silver was detected in two soil samples at 2.6 and 3.5 mg/kg (the maximum was from location 21-01400, 0- to 0.5-ft depth interval), concentrations greater than the soil BV (1.0 mg/kg, the maximum is not available). Silver was detected in one tuff sample at 4.2 mg/kg (location 21-02550, 5.0- to 10.0-ft depth interval), a concentration greater than the tuff BV (1.0 mg/kg) and the maximum silver concentration in the tuff background data set (1.9 mg/kg). Therefore, silver is a COPC.
- Uranium was detected in two soil samples at 1.96 and 2.56 mg/kg (the maximum was from location 21-02119, 0.5- to 1.0-ft depth interval), concentrations greater than the soil BV (1.82 mg/kg), but less than the maximum uranium concentration in the soil background data set (3.6 mg/kg). Therefore, uranium is not a COPC.
- Vanadium was detected in one soil sample at 40.8 mg/kg (location 21-02113, 0- to 0.5-ft depth interval), a concentration greater than the soil BV (39.6 mg/kg) but less than the maximum vanadium concentration in the soil background data set (56.5 mg/kg). Therefore, vanadium is not a COPC.
- Zinc was detected in six soil samples ranging from 52.4 to 148 mg/kg (the maximum was from location 21-01401, 0- to 0.5-ft depth interval), concentrations greater than the soil BV (48.8 mg/kg) and five of the six sample concentrations were greater than the maximum zinc concentration in the soil background data set (75.5 mg/kg). Zinc was detected in one tuff sample at 66 mg/kg (location 21-02565, 20.0- to 25.0-ft depth interval), a concentration slightly greater than the tuff BV (63.5 mg/kg) and the maximum zinc concentration in the tuff background data set for tuff (65.6 mg/kg). Therefore, zinc is a COPC.

Inorganic Chemicals not Included in Background Study: Lithium and strontium do not have background data and, therefore, have no BVs for comparison.

- Lithium was detected in six samples ranging from 3.5 to 8.9 mg/kg (the maximum was from location 21-01399, 0- to 0.5-ft depth interval). No established background levels are available for lithium. The lithium concentrations at this site are similar to the concentrations found at most of the corrective action sites (most are below 11 mg/kg), indicating that the lithium levels are not elevated as a result of releases. Therefore, lithium is not a COPC.
- Strontium was detected in six samples ranging from 4.2 to 17.3 mg/kg (the maximum was from location 21-01399, 0- to 0.5-ft depth interval). No established background levels are available for strontium. The strontium concentrations at this site are similar to the concentrations found at most of the corrective action sites (most are below 36 mg/kg), indicating that the strontium levels are not elevated as a result of releases. Therefore, strontium is not a COPC.

Inorganic Chemicals Reported with Detection Limits Greater Than BVs: Antimony, barium, cadmium, copper, mercury, selenium, silver, and thallium had detection limits greater than their respective BVs in some samples.

- Antimony detection limits were greater than the BV in six soil samples and 15 tuff samples. Antimony detection limits, ranging from 5.3 to 6.8 mg/kg (the maximum detection limit was from location 21-01401), were greater than the soil BV (0.83 mg/kg) and the maximum antimony concentration in the soil background data set (1.0 mg/kg) in six soil samples. Antimony detection limits, ranging from 5 to 10.3 mg/kg (the maximum detection limit was from location 21-02552), were greater than the tuff BV (0.5 mg/kg) and the maximum antimony concentration in the tuff background data set (0.4 mg/kg) in 15 samples. Therefore, antimony is a COPC due to elevated detection limits.
- The barium detection limit of 55 mg/kg (location 21-02550) was greater than the tuff BV (46 mg/kg) and the maximum barium concentration in the tuff background data set (51.6 mg/kg) in one tuff sample. Therefore, barium is a COPC based on elevated detection limits.
- Cadmium detection limits of 0.47 and 0.48 mg/kg (the maximum detection limit was from location 21-01401) were greater than the soil BV (0.4 mg/kg) but less than the maximum cadmium concentration in the soil background data set (2.6 mg/kg) in two soil samples. Therefore, cadmium is not a COPC due to elevated detection limits.
- The copper detection limit of 5.3 mg/kg (location 21-02550) was greater than the tuff BV (4.66 mg/kg) but less than the maximum copper concentration in the tuff background data set (6.2 mg/kg) in one tuff sample. Therefore, copper is not a COPC due to elevated detection limits. However, copper was already determined to be a COPC due to detected concentrations above BVs.
- Mercury detection limits, ranging from 0.11 to 0.36 mg/kg (the maximum detection limit was from location 21-02118), were greater than the soil BV and the maximum mercury concentration in the soil background data set (both are 0.1 mg/kg) in three soil samples. Mercury was already determined to be a COPC due to detected concentrations greater than BVs. Therefore, mercury is a COPC due to detected concentrations and detection limits greater than BVs.
- Selenium detection limits, ranging from 0.42 to 0.84 mg/kg (the maximum detection limit was from location 21-02552), were greater than the tuff BV (0.3 mg/kg) and the maximum selenium concentration in the tuff background data set (0.105 mg/kg) in 15 tuff samples. Therefore, selenium is a COPC based on elevated detection limits.

- The silver detection limit of 3.2 mg/kg (location 21-02113) was greater than the soil BV (1.0 mg/kg, the maximum is not available) in one soil sample. The silver detection limit of 1.3 mg/kg (location 21-02552) was greater than the tuff BV (1.0 mg/kg) but less than the maximum silver concentration (1.9 mg/kg) in the tuff background data set in one tuff sample. Silver was already determined to be a COPC due to detected concentrations greater than BVs. Therefore, silver is a COPC due to detected concentrations and detection limits greater than BVs.
- Thallium detection limits of 0.76 and 1.7 mg/kg (the maximum detection limit was from location 21-02113) were greater than the soil BV (0.73 mg/kg) in two soil samples and the maximum detection limit was greater than the maximum thallium concentration in the soil background data set (1.0 mg/kg). Therefore, thallium is a COPC based on elevated detection limits.

Inorganic Chemical Summary. Aluminum, antimony, barium, calcium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, and zinc are inorganic COPCs.

Organic Chemicals

VOCs: Acetone and dichlorofluoromethane were detected (Figure 5.18-1).

- Acetone was detected in one tuff sample at 0.08 mg/kg (location 21-02551, 2.5- to 5.0-ft depth interval). Therefore, acetone is a COPC.
- Dichlorodifluoromethane was detected in three soil samples ranging from 0.03 to 0.11 mg/kg (the maximum was from location 21-02119, 0.5- to 1.0-ft depth interval). Therefore, dichlorodifluoromethane is a COPC.

SVOCs: No SVOCs were detected.

Organic Compound Summary. Acetone and dichlorodifluoromethane are organic COPCs.

Radionuclides

Fallout Radionuclides. Americium-241, plutonium-238, plutonium-239, and tritium were detected (Figure 5.18-2) at activities greater than their respective FVs in one or more surface samples. These radionuclides, plus cesium-137 and strontium-90, were also detected in subsurface samples. Since FVs are only applicable within the first 0.5 ft of surface soils, all fallout radionuclides detected in the samples deeper than the first 0.5 ft of surface soils are COPCs.

- Americium-241 was detected in four surface soil samples ranging from 0.32 to 1.39 pCi/g (the maximum was from location 21-01401, 0- to 0.5-ft depth interval), activities greater than both the soil FV and the maximum activity in the soil background data set (both are 0.013 pCi/g). Americium-241 was also detected in two subsurface samples, at 0.01 and 0.33 pCi/g, at depths where the FV does not apply. Therefore, americium-241 is a COPC.
- Cesium-137 was detected in two subsurface soil samples (both 0.5- to 1.0-ft depth interval) at 0.14 and 1.11 pCi/g (the maximum was from location 21-02119, 0.5- to 1.0-ft depth interval), at depths where the FV does not apply. Therefore, cesium-137 is a COPC.
- Plutonium-238 was detected in four surface soil samples ranging from 0.03 to 0.13 pCi/g (the maximum was from location 21-01401, 0- to 0.5-ft depth interval), activities greater than the soil FV (0.023 pCi/g) and two of the four are greater than the maximum activity in the soil background data set (0.037 pCi/g). Plutonium-238 was also detected in 14 subsurface samples ranging from 0.01 to

0.12 pCi/g (the maximum was from locations 21-02550 and 21-02251), at depths where the FV does not apply. Therefore, plutonium-238 is a COPC.

- Plutonium-239 was detected in six surface soil samples ranging from 0.07 to 2.48 pCi/g (the maximum was from location 21-01401, 0- to 0.5-ft depth interval), activities greater than the soil FV (0.054 pCi/g) and the maximum plutonium-239 activity in the soil background data set (0.055 pCi/g). Plutonium-239 was also detected in 11 subsurface samples ranging from 0.01 to 0.61 pCi/g (the maximum was from 21-01401, 0.5- to 1.0-ft depth interval), at depths where the FV does not apply. Therefore, plutonium-239 is a COPC.
- Strontium-90 was detected in six subsurface samples (one soil, five tuff) ranging from 0.07 to 1.54 pCi/g (the maximum was from location 21-02551, 50.0- to 52.0-ft depth interval), at depths where the FV does not apply. Therefore, strontium-90 is a COPC.
- Tritium was detected in four surface soil samples ranging from 0.03 to 0.17 pCi/g (the maximum was from location 21-02113, 0- to 0.5-ft depth interval). Tritium was also detected in 16 subsurface samples ranging from 0.05 to 0.86 pCi/g. Therefore, tritium is a COPC.

Naturally-Occurring Radionuclides. Uranium-235 was detected at location 21-02551 above background (Figure 5.18-2).

- Uranium-235 was detected in three subsurface tuff samples ranging from 0.19 to 0.27 pCi/g (the maximum was from locations 21-02551 and 21-02552). These activities are greater than both the tuff BV (0.09 pCi/g) and the maximum uranium-235 activity in the tuff background data set (0.16 pCi/g). Therefore, uranium-235 is a COPC.

Radionuclide Summary. Americium-241, cesium-137, plutonium-238, plutonium-239, strontium-90, tritium, and uranium-235 are radionuclide COPCs.

5.18.3 Scope of Activities for Consolidated Unit 21-026(a)-99

Sampling and Excavation Activities

The proposed sample locations at Consolidated Unit 21-026(a)-99 are shown in Figure 5.18-3. Table 5.18-4 provides a summary of the proposed sample locations, depths, objectives each sample addresses, and proposed analytical suites.

Samples will be analyzed for TAL metals, cyanide, nitrates, perchlorates, organic chemicals (VOCs and SVOCs [VOCs only in samples deeper than 0.5 ft bgs]), radionuclides (gamma spectroscopy, americium-241, isotopic plutonium, isotopic uranium, strontium-90, and tritium), moisture, and pH. If field screening indicates the presence of VOCs, a deeper sample will be collected and analyzed for full suite. Field screening will determine the sample(s) with the highest radionuclide and/or organic contamination. If field-screening instruments cannot determine which sample(s) contain(s) the highest levels of radionuclides or organic compounds, samples collected from the location where contamination would most likely be present as indicated by site history (i.e., sump, outfall, etc.) will be selected. The selected sample(s) will be sent to an off-site fixed laboratory for quick turn-around analysis of PCBs, HE, dioxins, and furans (NMED 2005, 89314). The sample results will be transmitted to NMED, via fax, for review. Within 1 week of receipt of the results, we anticipate that NMED will contact the LANL project leader to discuss the results. If analytes from the four additional analyses are not detected, or detected at low levels reflective of anthropogenic activity, the remaining samples will not be analyzed for the four additional analyses per agreement with NMED. If the additional analytes are detected at levels attributable to the site, the remaining stored aliquots will be submitted to the analytical laboratory for the additional analyses. Prior to demobilization, laboratory

results will be reviewed to assess if the nature and extent of contamination have been determined. If nature and extent have not been determined, then step-out samples will be collected.

During structure removal activities, excavation of soil and/or rock (including all visibly stained areas) will proceed until the radionuclide and organic vapor field-screening results indicate all contaminated material has been removed. Confirmation samples will be collected as these activities are completed. Analytical laboratory results will be reviewed to determine if additional removal activities and associated confirmation sampling are required due to the presence of areas with contaminant concentrations greater than industrial SSLs or SALs. Sampling at Consolidated Unit 21-026(a)-99 will consist of the following activities:

- *21-026(b) Sludge drying beds excavation and sampling.* The sludge drying beds were filled with clean sand after operations ceased. One borehole will be advanced in the center of the floor of the bed area (Figure 5.18-3, BH-1). For the borehole samples, the depth of the clean sand fill will be measured and a sample collected from the middle of that depth, a sample will be collected from the underlying soil at the interface of the sand and the underlying soil, and from 2.0- to 3.0-ft, and 5.0- to 6.0-ft beneath the interface. An additional borehole will be located 5 ft downslope outside of the drying beds, aligned with BH-1, (Figure 5.18-3, BH-2), with samples collected from the 0- to 0.5-ft, 2.0- to 3.0-ft, and 5.0- to 6.0-ft depth intervals. Four additional sample locations will be situated at the corners of the bed area (Figure 5.18-3, locations 1 through 4). At each location, a sample will be collected from the middle depth of the clean sand fill, the underlying soil at the interface of the sand and the underlying soil, and from the 2.0- to 3.0-ft depth interval.
- *21-013(a) Surface disposal area excavation and sampling.* If evidence of the surface disposal area is observed (sand piles or other visible signs of disposal), any remaining material will be removed, and confirmation samples will be collected under the floor of the excavated area. One borehole will be advanced in the center of the floor of the excavated surface disposal area and samples will be collected at the 0- to 1.0-ft, 2.0- to 3.0-ft, and 5.0- to 6.0-ft depth intervals (Figure 5.18-3, BH-3). Four additional sample locations will be situated along the edges of the excavated area (Figure 5.18-3, locations 5 through 8). Two additional sample locations will be established downslope from northeast corner of the excavated area, in the center of a distinguishable drainage, or in a catchment basin aligned with the excavated area 10 ft and 30 ft downslope (Figure 5.18-3, locations 9 and 11). Location 9 will be flanked by a sample location 10 ft to the east (Figure 5.18-3, location 10). Location 11 will be flanked by a sample location 20 ft to the east (Figure 5.18-3, location 12). Samples will be collected at depths of 0–0.5 ft and 2.0–3.0 ft.
- *21-026(c) Dosing siphon chamber tank excavation and sampling.* The dosing siphon chamber tank will be carefully excavated and inspected for evidence of leaks (e.g., field screening stained soil, holes in the tank). One borehole will be advanced in the center of the excavation to determine the vertical extent of contamination (Figure 5.18-3, location BH-4). Borehole samples will be collected from the 0- to 1.0-ft, 5.0- to 6.0-ft, and 10.0- to 11.0-ft depth intervals. Samples will be collected immediately beneath the siphon chamber tank inlet and outlet connections to the pipeline (Figure 5.18-3, locations 13 and 14) at the 0- to 1.0-ft and 2.0- to 3.0-ft depth intervals.
- *Pipeline excavation and sampling.* The pipeline running from the dosing siphon chamber tank to the outfall will be carefully excavated and inspected for evidence of leaks. Where elevated levels of VOCs and/or radionuclides are present, as determined by field screening or where visible evidence of a leak is found (e.g., stained soil, break in the pipe), samples will be collected immediately beneath the pipes to define vertical extent of contamination. If no field-screening evidence or visible evidence of a leak is found, samples will be collected from locations beneath the pipeline at manholes (Figure 5.18-3, locations 15 and 17), every 50 ft from the tank to the outfall (Figure 5.18-3, location 16) (beneath a pipeline joint, if present). At each location, a sample will be collected at

the 0- to 1.0-ft and 2.0- to 3.0-ft depth intervals. The zero depth is defined as immediately beneath the pipe.

- *Outfall investigation.* One borehole will be advanced in the center of the outfall, 0.5 ft downslope from the mouth of the outfall pipe (Figure 5.18-3, location BH-5), and samples will be collected from the 0- to 0.5-ft, 2.0- to 3.0-ft, and 5.0- to 6.0-ft depth intervals. Samples will be collected 5 ft to the west and east of BH-5 (Figure 5.18-3, locations 18 and 19). Two additional sample locations will be established downslope from the mouth of the pipe, in the center of a distinguishable drainage, or in a catchment basin aligned with the mouth of the pipe 10 ft and 30 ft downslope from BH-5 (Figure 5.18-3, locations 21 and 24). Location 21 will be flanked by sample locations 10 ft to the west and east (Figure 5.18-3, locations 20 and 22). Location 24 will be flanked by sample locations 20 ft to the west and east (Figure 5.18-3, locations 23 and 25). Samples will be collected at depths of 0–0.5 ft and 2.0–3.0 ft.

5.19 SWMU 21-027(a), Pipeline, Surface Drainage and Outfall

SWMU 21-027(a) consists of drainlines, a surface drainage system, and an outfall (Figure 5.19-1).

5.19.1 Operational History

- 1945—Building 21-003 was built as part of original DP West plutonium facilities. A 4-in. VCP ran beneath a paved area south of the building for about 30 ft, and emptied into a storm drain. A 12-in. culvert runs from the storm drain underground for about 50 ft, emptying onto the ground at a ponding area on the southwest corner of the footprint of former cooling tower (Structure 21-143, which was designated as AOC C-21-027). From the cooling tower footprint, runoff flowed in an unlined ditch to a 24-in. CMP culvert that carried runoff beneath the south perimeter road to the mesa edge. The CMP extends about 3 ft over the mesa edge (LANL 1991, 07529, p. 15-69).
- 1994—Outfall was permitted as outfall EPA03A031 under NPDES Permit No. NM0028355 (EPA 1994, 65280).
- 1994-1995—Building 21-003, its drains and the pipes beneath, and the cooling tower were removed during D&D activities. The 4-in. pipe beneath the paved area was left in place, as was the storm drain, which collects runoff from nearby parking lots.
- 1995—Outfall removed from Laboratory's NPDES permit, effective July 11, 1995.

5.19.2 Summary of Previous Investigations

Summarized below are previous investigations conducted at this site.

- 1992—An RFI was conducted that included a radiological survey, and surface samples (0- to 0.5-ft depth interval) were collected at 12 locations (locations 21-01361 through 21-01364; 21-01366 through 21-01369; 21-01371 through 21-01374). Samples were analyzed at an off-site fixed laboratory for inorganic chemicals, VOCs, SVOCs, and radionuclides (americium-241, gamma spectroscopy, isotopic plutonium, isotopic thorium, and strontium-90). The "Phase Report 1C, TA-21 Operable Unit RCRA Facility Investigation, Outfalls Investigation" recommended further investigation at SWMU 21-027(a) (LANL 1994, 31591).
- 1993—Additional sampling included two 20-ft boreholes (locations 21-01673 and 21-01674) south of the cooling tower; these were sampled at 5-ft intervals (LANL 1994, 31591, p. 10-1 through 10-15). These samples were analyzed at an off-site fixed laboratory for inorganic chemicals, SVOCs,

and radionuclides (americium-241, gamma spectroscopy, isotopic plutonium, isotopic uranium, isotopic thorium, and tritium).

- 2004—Radiological and geophysical surveys were completed (results are presented in Appendixes D and E, respectively). The geophysical survey located a pipe beneath the paved area, corresponding to the expected path of the 12-in. storm drain.

SWMU 21-027(a) Data

The site data from 1992 and 1993 were collected from soil and tuff and compared with their respective BVs/FVs (LANL 1998, 59730). Table 5.19-1 and Figure 5.19-1 present SWMU 21-027(a) inorganic chemical concentrations greater than BVs. Table 5.19-2 and Figure 5.19-1 present SWMU 21-027(a) detected VOC and SVOC concentrations. Table 5.19-3 and Figure 5.19-2 present SWMU 21-027(a) radionuclide activities greater than BVs/FVs and/or at depths where the FV does not apply. Sample results for inorganic chemicals and radionuclides were also compared to the maximum of the range of their respective background data sets. Those analytes with detections and/or detection limits greater than their respective BVs/FVs and the maximum of the background data set were designated as COPCs. Detected organic chemical were designated as COPCs.

Inorganic Chemicals

Inorganic Chemicals Detected at Concentrations Greater Than BVs: Cadmium, calcium, chromium, copper, lead, nickel, and zinc were detected at concentrations greater than their respective BVs (Figure 5.19-1).

- Cadmium was detected in 13 soil samples ranging from 1.3 to 4.2 mg/kg (the maximum was from location 21-01364, 0- to 0.5-ft depth interval) concentrations greater than the soil BV (0.4 mg/kg), seven of twelve concentrations are greater than the maximum cadmium concentration in the soil background data set (2.6 mg/kg). Therefore, cadmium is a COPC.
- Calcium was detected in one soil sample at 13,700 mg/kg (location 21-01364, 0- to 0.5-ft depth interval) greater than the soil BV (6120 mg/kg) but less than the maximum calcium concentration in the soil background data set (14,000 mg/kg). Therefore, calcium is not a COPC.
- Chromium was detected in 11 soil samples ranging from 36.6 to 461 mg/kg (the maximum was from location 21-01368, 0- to 0.5-ft depth interval), concentrations greater than the soil BV (19.3 mg/kg) the maximum chromium concentration in the soil background data set (36.5 mg/kg). Therefore, chromium is a COPC.
- Copper was detected in 13 soil samples ranging from 15 to 198 mg/kg (the maximum was from location 21-01364, 0- to 0.5-ft depth interval), concentrations greater than the soil BV (14.7 mg/kg), twelve concentrations were greater than the maximum copper in the soil background data set (16 mg/kg). Therefore, copper is a COPC.
- Lead was detected in 11 soil samples ranging from 32.7 to 79.8 mg/kg (the maximum was from location 21-01371, 0- to 0.5-ft depth interval), greater than the soil BV (22.3 mg/kg), all eleven concentrations were greater than the maximum lead concentration in the soil background data set (28.0 mg/kg). Lead was detected in one tuff sample at 11.4 mg/kg (location 21-01673, 5.0- to 10.0-ft depth interval), a concentration greater than the tuff BV (11.2 mg/kg) but less than the maximum lead concentration in the tuff background data set (15.5 mg/kg). Therefore, lead is a COPC.

- Nickel was detected in one soil sample at 42.3 mg/kg (location 21-01364, 0- to 0.5-ft depth interval), greater than the soil BV (15.4 mg/kg) and the maximum nickel concentration in the soil background data set (29 mg/kg). Therefore, nickel is a COPC.
- Zinc was detected in 13 soil samples ranging from 89.5 to 512 mg/kg (the maximum was from location 21-01364, 0- to 0.5-ft depth interval), concentrations greater than the soil BV (48.8 mg/kg) and greater than the maximum zinc concentration in the soil background data set (75.5 mg/kg). Therefore, zinc is a COPC.

Inorganic Chemicals not Included In Background Data Set: Lithium and strontium do not have background data and, therefore, have no BVs for comparison.

- Lithium was detected in 14 samples ranging from 4.4 to 14.6 mg/kg (the maximum was from location 21-01673). No established background levels are available for lithium. The lithium concentrations at this site are not similar to the concentrations found at most of the corrective action sites (most are below 11 mg/kg), indicating that the lithium levels are elevated as a result of releases. Therefore, lithium is a COPC.
- Strontium was detected in 13 samples ranging from 10.5 to 102 mg/kg (the maximum was from location 21-01364). No established background levels are available for strontium. The strontium concentrations at this site are not similar to the concentrations found at most of the corrective action sites (most are below 36 mg/kg), indicating that the strontium levels are elevated as a result of releases. Therefore, strontium is a COPC.

Inorganic Chemicals Reported with Detection Limits Greater Than BVs: Antimony, cadmium, selenium, and silver detection limits were greater than their respective BVs in some samples.

- Antimony detection limits ranged from 4.8 to 6.9 mg/kg (the maximum detection limit was from location 21-01364) in 12 soil samples. These concentrations were greater than the soil BV (0.83 mg/kg) and the maximum antimony concentration (1.0 mg/kg). Therefore, antimony is a COPC due to elevated detection limits.
- The cadmium detection limit of 0.74 mg/kg (location 21-01674) was greater than the soil BV (0.4 mg/kg) but less than the maximum cadmium concentration (2.6 mg/kg) in one soil sample. Therefore, cadmium is not a COPC based on elevated detection limits. However, cadmium was already determined to be a COPC based on detected concentrations above BVs.
- Selenium detection limits of 3.4 and 33 mg/kg (the maximum detection limit was from location 21-01371) were greater than the BV (1.52 mg/kg) and the maximum selenium concentration in the soil background data set (1.7 mg/kg) in two surface soil samples. Selenium detection limits, ranging from 0.44 to 0.71 mg/kg (the maximum detection limit was from location 21-01674), were greater than the tuff BV (0.3 mg/kg) and the maximum selenium concentration in the tuff background data set (0.105 mg/kg) in six tuff samples. Therefore, selenium is a COPC based on elevated detection limits.
- Silver detection limits of 1.2 and 1.3 mg/kg (the maximum detection limit was from location 21-01673), were greater than the soil BV (1.0 mg/kg, the maximum is not available) in three soil samples. Silver detection limits, ranging from 1.1 to 1.2 mg/kg (the maximum detection limit was from location 21-01674), were greater than the tuff BV (1.0 mg/kg) but less than the maximum silver concentration in the tuff background data set (1.9 mg/kg) in six tuff samples. Therefore, silver is a COPC based on elevated detection limits.

Inorganic Chemical Summary. Antimony, cadmium, chromium, copper, lead, lithium, nickel, selenium, silver, strontium, and zinc are inorganic COPCs.

Organic Chemicals

VOCs. VOCs were detected in samples from two locations (Figure 5.19-1).

- Acetone was detected in four surface soil samples ranging from 0.02 to 0.04 mg/kg (the maximum was from location 21-01361, 0- to 0.5-ft depth interval). Therefore, acetone is a COPC.
- Methylene chloride was detected in two surface soil samples, at 0.01 mg/kg in both samples (locations 21-01361 and 21-01364, 0- to 0.5-ft depth interval). Therefore, methylene chloride is a COPC.
- Tetrachloroethene was detected in one surface soil sample at 0.06 mg/kg (location 21-01361, 0- to 0.5-ft depth interval). Therefore, tetrachloroethene is a COPC.

SVOCs. Ten SVOCs were detected in samples from two locations (Figure 5.19-1).

- Benzo(a)anthracene was detected in two soil samples, at 0.82 and 1.1 mg/kg (the maximum was from location 21-01674, 0- to 5.0-ft depth interval). Therefore, benzo(a)anthracene is a COPC.
- Benzo(a)pyrene was detected in three soil samples ranging from 0.52 to 0.92 mg/kg (the maximum was from location 21-01361, 0- to 0.5-ft depth interval). Therefore, benzo(a)pyrene is a COPC.
- Benzo(b)fluoranthene was detected in four soil samples ranging from 0.46 to 1.6 mg/kg (the maximum was from location 21-01674, 0- to 5.0-ft depth interval). Therefore, benzo(b)fluoranthene is a COPC.
- Benzo(k)fluoranthene was detected at 0.49 mg/kg in one surface soil sample (location 21-01361, 0- to 0.5-ft depth interval). Therefore, benzo(k)fluoranthene is a COPC.
- Bis(2-ethylhexyl)phthalate was detected in one surface soil sample at 0.49 mg/kg (location 21-01361, 0- to 0.5-ft depth interval). Therefore, bis(2-ethylhexylphthalate is a COPC.
- Chrysene was detected in three soil samples ranging from 0.54 to 1.1 mg/kg (the maximum was from location 21-01674, 0- to 5.0-ft depth interval). Therefore, chrysene is a COPC.
- Fluoranthene was detected in four soil samples ranging from 0.49 to 2.9 mg/kg (the maximum was from location 21-01674, 0- to 5.0-ft depth interval). Therefore, fluoranthene is a COPC.
- Indeno(1,2,3-cd)pyrene was detected in two soil samples at 0.46 and 0.47 mg/kg (the maximum was from location 21-01361, 0- to 0.5-ft depth interval). Therefore, indeno(1,2,3-cd)pyrene is a COPC.
- Phenanthrene was detected in three soil samples ranging from 0.58 to 1.7 mg/kg (the maximum was from location 21-01674, 0- to 5.0-ft depth interval). Therefore, phenanthrene is a COPC.
- Pyrene was detected in four soil samples ranging from 0.81 to 3.3 mg/kg (the maximum was from location 21-01361, 0- to 0.5-ft depth interval). Therefore, pyrene is a COPC.

Organic Chemical Summary. Acetone, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, bis(2-ethylhexyl)phthalate, chrysene, fluoranthene, indeno(1,2,3-cd)pyrene, methylene chloride, phenanthrene, pyrene, and tetrachloroethene are organic COPCs.

Radionuclides

Fallout Radionuclides. Americium-241, plutonium-238, and plutonium-239 were detected at activities greater than their respective FVs (Figure 5.19-2). Since FVs are only applicable within the first 0.5 ft of surface soils, all fallout radionuclides detected in the samples deeper than the first 0.5 ft of surface soils are COPCs.

- Americium-241 was detected in 11 surface soil samples ranging from 0.78 to 34.0 pCi/g (the maximum was from location 21-01362, 0- to 0.5-ft depth interval), activities greater that the soil FV and the maximum americium-241 activity in the soil background data set for soil (both are 0.013 pCi/g). Americium-241 was also detected in three samples at depths where the FV does not apply, ranging from 0.01 to 0.73 pCi/g (the maximum was from 21-01674, 0- to 5.0-ft depth interval). Therefore, americium-241 is a COPC.
- Plutonium-238 was detected in 12 surface soil samples ranging from 1.24 to 25.23 pCi/g (the maximum was from location 21-01371, 0- to 0.5-ft depth interval), activities greater than the soil FV (0.023 pCi/g) and the maximum plutonium-238 activity in the soil background data set (0.037 pCi/g). Plutonium-238 was also detected in two soil samples at depths where the FV does not apply, at 0.05 and 0.27 pCi/g (the maximum was from location 21-01674, 0- to 5.0-ft depth interval). Therefore, plutonium-238 is a COPC.
- Plutonium-239 was detected in 12 surface soil samples ranging from 16.8 to 193 pCi/g (the maximum was from location 21-01362, 0- to 0.5-ft depth interval), activities greater than the soil FV (0.054 pCi/g) and the maximum plutonium-239 activity in the soil background data set (0.055 pCi/g). Plutonium-239 was also detected in three samples at an activities ranging from 0.04 to 9.35 pCi/g (the maximum was from location 21-01674, 0- to 5.0-ft depth interval), at depths where the FV does not apply. Therefore, plutonium-239 is a COPC.
- Tritium was detected in three soil samples ranging from 0.04 to 2.42 pCi/g (the maximum was from location 21-01673, 0- to 5.0-ft depth interval), at depths where the FV does not apply. Therefore, tritium is a COPC.

Naturally-Occurring Radionuclides. Uranium-234, -235, and -238 were detected at two locations above BVs (Figure 5.19-2).

- Uranium-234 was detected in one soil sample at 21.37 pCi/g (location 21-01674, 0- to 5.0-ft depth interval), an activity greater than the soil BV (2.59 pCi/g) and the maximum uranium-234 activity (2.5 pCi/g) in the soil background data set. Uranium-234 was also detected in one tuff sample at 2.65 pCi/g (location 21-01673, 10.0- to 15.0-ft depth interval) greater than the soil BV (1.98 pCi/g) and the maximum uranium-234 activity in the tuff background data set (2.5 pCi/g). Therefore, uranium-234 is a COPC.
- Uranium-235 was detected in one soil sample at 0.87 pCi/g (location 21-01674, 0- to 5.0-ft depth interval), an activity greater than the soil BV (0.2 pCi/g) and the maximum uranium-235 activity of in the soil background data set (0.16 pCi/g). Therefore, uranium-235 is a COPC.
- Uranium-238 was detected in one tuff sample at 2.17 pCi/g (location 21-01673, 10.0- to 15.0-ft depth interval), an activity greater than the tuff BV (1.93 pCi/g) and the maximum uranium-238 activity in the tuff background data set (2.1 pCi/g). Therefore, uranium-238 is a COPC.

Radionuclide Summary. Americium-241, plutonium-238, plutonium-239, tritium, uranium-234, uranium-235, and uranium-238 are radionuclide COPCs.

5.19.3 Scope of Activities for SWMU 21-027(a)

Sampling and Excavation Activities

The proposed sample locations at SWMU 21-027(a) are shown in Figure 5.19-3. Table 5.19-4 provides a summary of the proposed sample locations, depths, objectives each sample addresses, and proposed analytical suites.

Samples will be analyzed for TAL metals, cyanide, nitrates, perchlorates, organic chemicals (VOCs and SVOCs [VOCs only in samples deeper than 0.5 ft bgs]), radionuclides (gamma spectroscopy, americium-241, isotopic plutonium, isotopic uranium, strontium-90, and tritium), moisture, and pH. If field screening indicates the presence of VOCs, a deeper sample will be collected and analyzed for full suite. Field screening will determine the sample(s) with the highest radionuclide and/or organic contamination. If field-screening instruments cannot determine which sample(s) contain(s) the highest levels of radionuclides or organic compounds, samples collected from the location where contamination would most likely be present as indicated by site history (i.e., sump, outfall, etc.) will be selected. The selected sample(s) will be sent to an off-site fixed laboratory for quick turn-around analysis of PCBs, HE, dioxins, and furans (NMED 2005, 89314). The sample results will be transmitted to NMED, via fax, for review. Within 1 week of receipt of the results, we anticipate that NMED will contact the LANL project leader to discuss the results. If analytes from the four additional analyses are not detected, or detected at low levels reflective of anthropogenic activity, the remaining samples will not be analyzed for the four additional analyses per agreement with NMED. If the additional analytes are detected at levels attributable to the site, the remaining stored aliquots will be submitted to the analytical laboratory for the additional analyses. Prior to demobilization, laboratory results will be reviewed to assess if the nature and extent of contamination have been determined. If nature and extent have not been determined, then step-out samples will be collected.

During structure removal activities, excavation of soil and/or rock (including all visibly stained areas) will proceed until the radionuclide and organic vapor field-screening results indicate all contaminated material has been removed. Confirmation samples will be collected as these activities are completed. Analytical laboratory results will be reviewed to determine if additional removal activities and associated confirmation sampling are required due to the presence of areas with contaminant concentrations greater than industrial SSLs or SALs. Sampling at SWMU 21-027(a) will consist of the following activities:

- *Pipeline excavation and sampling.* Any pipelines and backfilled former pipeline beds will be carefully excavated and inspected for visible signs of leakage. Where elevated levels of VOCs and/or radionuclides are present, as determined by field screening or where visible evidence of a leak is found (e.g., stained soil, break in the pipe), samples will be collected immediately beneath the pipe to define vertical extent. If no field-screening evidence or visible evidence of a leak is found, samples will be collected from locations beneath the pipelines (or where evidence of a former pipeline exists) immediately south of former Building 21-003 (beneath a pipeline joint, if present) (Figure 5.19-3, location 1). Samples will be collected where the 4-in. pipe connects to the 12-in. pipe (Figure 5.19-3, location 2). Samples will be collected at approximately 50-ft intervals along the 24-in. CMP (Figure 5.19-3, location 5). At each location, a sample will be collected at the 0- to 1.0-ft and 2.0- to 3.0-ft depth intervals. The zero depth is defined as immediately beneath the pipe or at the bottom of the pipe bed for pipelines that no longer exist.
    - The 4-in. pipeline that runs from Building 21-003 to the 12-in. concrete storm grate inlet and the 24-in. CMP from the ponding area to the outfall were not found by the 2004 geophysical survey; therefore, exploratory trenching will be conducted to identify the pipe location. Trenching will be conducted with a backhoe and will progress from the surface to approximately 5 ft bgs. The trench will be visually logged for evidence of non-native

materials, disturbed bedding horizons and areas of visible staining. Elevated radiological or organic vapor field-screening results will be documented. Trenching will continue in the historically identified area until the pipeline is located, evidence of a former pipeline is found, or the absence of a pipeline at that location has been verified. If a pipe or evidence of a former pipe is not identified during field activities, confirmation samples will be collected from location(s) where the pipe was most likely located using the proposed sampling map as a guide.

- *Unlined drainage/ponding area excavation and sampling.* The first top foot of this area will be excavated and samples will be collected at the connection to the 12-in. concrete storm drain (Figure 5.19-3, location 3) and at the connection to the 24-in. CMP (Figure 5.19-3, location 4). At each location, a sample will be collected at the 0- to 1.0-ft and 2.0- to 3.0-ft depth intervals. A borehole (Figure 5.19-3, location BH-1) will be drilled in the center of the drainage area, near location 21-01364, and samples will be collected from the 0- to 1.0-ft, 5.0- to 6.0-ft, 10.0- to 11.0-ft, 15.0- to 16.0-ft, and 20.0- to 21.0-ft depth intervals.
- *Outfall investigation.* The outfall was not identified by the 2004 geophysical survey. If identified by visual inspection, field screening or exploratory trenching, one borehole will be advanced in the center of the outfall 0.5 ft downslope from the mouth of the outfall pipe (Figure 5.19-3, location BH-2) and samples will be collected from the 0- to 0.5-ft, 2.0- to 3.0-ft, and 5.0- to 6.0-ft depth intervals. If the outfall is not identified, the borehole location will be estimated based on previous outfall sampling locations. The borehole will be flanked by sample locations 5 ft to the west and east (Figure 5.19-3, locations 6 and 7). Samples will be collected at depths of 0–0.5 ft and 2.0–3.0 ft. An additional sample location will be chosen on the south side of location 21-01373, and samples collected at depths of 0–0.5 ft and 2.0–3.0 ft (Figure 5.19-3, location 8).
- *Bench investigation.* On the topographical bench beneath the mesa cliff edge, two sample locations will be established downslope from the mouth of the pipe, in the center of a distinguishable drainage, or in a catchment basin aligned with the mouth of the pipe at the north and south ends of the bench (Figure 5.19-3, locations 10 and 13). These sample locations will each be flanked by one sample location 20 ft to the west and one sample location 20 ft to the east (Figure 5.19-3, locations 9, 11, 12, and 14). Samples will be collected at depths of 0–0.5 ft and 2.0–3.0 ft.

5.20 SWMU 21-027(c), Pipeline and Outfall

SWMU 21-027(c) consists of a pipe and an outfall (Figure 5.20-1).

5.20.1 Operational History

- 1945—Building 21-006 was constructed as a cafeteria and machine shop (LANL 1945, 24459). A 4-in. VCP line exited the southeast corner of the building and discharged to the south on DP Mesa (LANL 1991, 07529, p. 15-18).
- 1966—Building 21-006 was removed and the pipe was left in place (LANL 1991, 07529, p. 15-18).

5.20.2 Summary of Previous Investigations

Summarized below are previous investigations conducted at this site.

- 1992—A radiological field survey and six surface (0- to 0.5-ft depth interval) samples were collected (locations 21-01349, -01350, -01351, -01352, -01353, and -01354). Samples were

analyzed for inorganic chemicals, VOCs, SVOCs, and radionuclides (americium-241, gamma spectroscopy, isotopic plutonium, and strontium-90). The "Phase Report 1C, TA-21 Operable Unit RCRA Facility Investigation, Outfalls Investigation" recommended to defer disposition of the SWMU until characterization of other SWMUs in the same area were completed (LANL 1994, 31591, p. 10-14).

- 2004—Radiological and geophysical surveys were completed (results are presented in Appendixes D and E, respectively). The geophysical survey located a portion of the outlet pipe. The outfall was not identified.

SWMU 21-027(c) Data

The site data from 1992 were collected from soil and compared with soil BVs/FVs (LANL 1998, 59730). Table 5.20-1 and Figure 5.20-1 present SWMU 21-027(c) inorganic chemical concentrations greater than BVs. Table 5.20-2 and Figure 5.20-1 present SWMU 21-027(c) detected VOC and SVOC concentrations. Table 5.20-3 and Figure 5.20-2 present SWMU 21-027(c) radionuclide activities greater than FVs and at depths where the FV does not apply. Sample results for inorganic chemicals and radionuclides were also compared to the maximum of the range of their respective background data sets. Those analytes with detections and/or detection limits greater than their respective BVs/FVs and the maximum of the background data set were designated as COPCs. Detected organic chemical were designated as COPCs.

Inorganic Chemicals

Inorganic Chemicals Detected at Concentrations Greater Than BVs. Cadmium, calcium, copper, lead, and zinc were detected at concentrations greater than their respective BVs (Figure 5.20-1).

- Cadmium was detected in all six surface soil samples ranging from 1.0 to 1.6 mg/kg (the maximum concentrations were from locations 21-01349, 01350, and -01351, 0- to 0.5-ft depth interval), concentrations greater than the soil BV (0.4 mg/kg) and but less than the maximum cadmium concentration in the soil background data set (2.6 mg/kg). Therefore, cadmium is not a COPC.
- Calcium was detected in one surface soil sample at 14,800 mg/kg (the maximum was from location 21-01350, 0- to 0.5-ft depth interval), a concentration greater than the soil BV (6120 mg/kg) and the maximum calcium concentration in the soil background data set (14,000 mg/kg). Therefore, calcium is a COPC.
- Copper was detected in two surface soil samples at 15.9 and 19.1 mg/kg (the maximum was from location 21-01350, 0- to 0.5-ft depth interval), concentrations greater than the soil BV (14.7 m/kg), and only the maximum concentration was greater than the maximum copper concentration in the soil background data set (16.0 mg/kg). Therefore, copper is a COPC.
- Lead was detected in five soil samples ranging from 26.5 to 103 mg/kg (the maximum was from location 21-01350, 0- to 0.5-ft depth interval), concentrations greater than the soil BV (22.3 mg/kg) and only the maximum concentration was greater than the maximum lead concentration in the soil background data set (28.0 mg/kg). Therefore, lead is a COPC.
- Zinc was detected in all six soil samples ranging from 52.8 to 188 mg/kg (the maximum was from location 21-01354, 0- to 0.5-ft depth interval), and four concentrations were greater than the soil BV (48.8 mg/kg), and the maximum zinc concentration in the soil background data set (75.5 mg/kg). Therefore, zinc is a COPC.

Inorganic Chemicals not Included in Background Data. Lithium and strontium do not have background data and, therefore, have no BVs for comparison.

- Lithium was detected in all six soil samples ranging from 3.2 to 9.8 mg/kg (the maximum was from location 21-01350, 0- to 0.5-ft depth interval). No established background levels are available for lithium. The lithium concentrations at this site are similar to the concentrations found at most of the corrective action sites (most are below 11 mg/kg), indicating that the lithium levels are not elevated as a result of releases. Therefore, lithium is not a COPC.
- Strontium was detected in all six soil samples ranging from 6.7 to 27.6 mg/kg (the maximum was from location 21-01350, 0- to 0.5-ft depth interval). No established background levels are available for strontium. The strontium concentrations at this site are similar to the concentrations found at most of the corrective action sites (most are below 36 mg/kg), indicating that the strontium levels are not elevated as a result of releases. Therefore, strontium is not a COPC.

Inorganic Chemicals with Detection Limits Greater Than BVs. Antimony was not detected at concentrations greater than its respective BV. However, its detection limits were greater than its respective BV in some samples.

- Antimony detection limits, ranging from 4.9 to 7.0 mg/kg (the maximum detection limits were from locations 21-01349, -01350, and -01351), were greater than the soil BV (0.83 mg/kg) and the maximum antimony concentration in the soil background data set (1.0 mg/kg) in all six soil samples. Therefore, antimony is a COPC due to elevated detection limits.

Inorganic Chemical Summary. Antimony, calcium, copper, lead, and zinc are inorganic COPCs.

Organic Chemicals

VOCs. VOCs were detected in two samples (Figure 5.20-1).

Acetone was detected in two samples ranging from 0.017 to 0.025 mg/kg (the maximum was from location 21-01351, 0- to 0.5-ft depth interval). Therefore, acetone is a COPC.

SVOCs. No SVOCs were detected.

Organic Chemical Summary. Acetone is a COPC.

Radionuclides

Fallout Radionuclides. Americium-241, plutonium-238, and plutonium-239 (Figure 5.20-2) were detected at activities greater than their respective FVs in soil samples collected from the discharge point of Building 21-006. Since FVs are only applicable within the first 0.5 ft of surface soils, all fallout radionuclides detected in the samples deeper than the first 0.5 ft of surface soils are COPCs.

- Americium-241 was detected in all six surface soil samples in the outfall ranging from of 0.26 to 2.86 pCi/g (the maximum was from location 21-01351, 0- to 0.5-ft depth interval), activities greater than the soil FV and the maximum americium-241 activity in the soil background data set (both are 0.013 pCi/g). Therefore, americium 241 is a COPC.
- Plutonium-238 was detected in five surface soil samples in the outfall ranging from 0.04 to 0.63 pCi/g (the maximum was from location 21-01351, 0- to 0.5-ft depth interval), activities greater

than the soil FV (0.023 pCi/g), and four activities greater than the maximum plutonium-238 activity in the soil background data set (0.037 pCi/g). Therefore, plutonium-238 is a COPC.

- Plutonium-239 was detected in all six surface soil samples in the outfall ranging from 1.96 to 84.5 pCi/g (the maximum was from location 21-01351, 0- to 0.5-ft depth interval), activities greater than the soil FV (0.054 pCi/g) and the maximum plutonium-239 activity in the soil background data set (0.055 pCi/g). Plutonium-239 was also detected in the outfall samples at depths where the FV does not apply. Therefore, plutonium-239 is a COPC.

Radionuclide Summary. Americium-241, plutonium-238, and plutonium-239 are radionuclide COPCs.

5.20.3 Scope of Activities for SWMU 21-027(c)

Sampling and Excavation Activities

The proposed sample locations at SWMU 21-027(c) are shown in Figure 5.20-3. Table 5.20-4 provides a summary of the proposed sample locations, depths, objectives each sample addresses, and proposed analytical suites.

Samples will be analyzed for TAL metals, cyanide, nitrates, perchlorates, organic chemicals (VOCs and SVOCs [VOCs only in samples deeper than 0.5 ft bgs]), radionuclides (gamma spectroscopy, americium-241, isotopic plutonium, isotopic uranium, strontium-90, and tritium), moisture, and pH. If field screening indicates the presence of VOCs, a deeper sample will be collected and analyzed for full suite. Field screening will determine the sample(s) with the highest radionuclide and/or organic contamination. If field-screening instruments cannot determine which sample(s) contain(s) the highest levels of radionuclides or organic compounds, samples collected from the location where contamination would most likely be present as indicated by site history (i.e., sump, outfall, etc.) will be selected. The selected sample(s) will be sent to an off-site fixed laboratory for quick turn-around analysis of PCBs, HE, dioxins, and furans (NMED 2005, 89314). The sample results will be transmitted to NMED, via fax, for review. Within 1 week of receipt of the results, we anticipate that NMED will contact the LANL project leader to discuss the results. If analytes from the four additional analyses are not detected, or detected at low levels reflective of anthropogenic activity, the remaining samples will not be analyzed for the four additional analyses per agreement with NMED. If the additional analytes are detected at levels attributable to the site, the remaining stored aliquots will be submitted to the analytical laboratory for the additional analyses. Prior to demobilization, laboratory results will be reviewed to assess if the nature and extent of contamination have been determined. If nature and extent have not been determined, then step-out samples will be collected.

During structure removal activities, excavation of soil and/or rock (including all visibly stained areas) will proceed until the radionuclide and organic vapor field-screening results indicate all contaminated material has been removed. Confirmation samples will be collected as these activities are completed. Analytical laboratory results will be reviewed to determine if additional removal activities and associated confirmation sampling are required due to the presence of areas with contaminant concentrations greater than industrial SSLs or SALs. Sampling at SWMU 21-027(c) will consist of the following activities:

- *Pipeline excavation and sampling.* Any pipelines and backfilled former pipeline beds will be carefully excavated and inspected for visible signs of leakage. Where elevated levels of VOCs and/or radionuclides are present, as determined by field screening or where visible evidence of a leak is found (e.g., stained soil, break in the pipe), samples will be collected immediately beneath the pipe to define vertical extent. If no field-screening evidence or visible evidence of a leak is found, samples will be collected from locations beneath the line immediately south of Building 21-006 (beneath a pipeline joint, if present; Figure 5.20-3, location 1). Samples will be collected at

the 0- to 1.0-ft and 2.0- to 3.0-ft depth intervals. The zero depth is defined as immediately beneath the pipe or at the bottom of the pipe bed for pipelines that no longer exist.

- ♦ A small portion of the pipeline that runs from former Building 21-006 was found by the 2004 geophysical survey, however, the location coordinates were not recorded by GPS. Therefore, exploratory trenching will be conducted to identify the pipe location. Trenching will be conducted with a backhoe and will progress from the surface to approximately 5 ft bgs. The trench will be visually logged for evidence of non-native materials, disturbed bedding horizons and areas of visible staining. Elevated radiological or organic vapor field-screening results will be documented. Trenching will continue in the historically identified area until the pipeline is located, evidence of a former pipeline is found, or the absence of a pipeline at that location has been verified. If a pipe or evidence of a former pipe is not identified during field activities, confirmation samples will be collected from location(s) where the pipe was most likely located using the proposed sampling map as a guide.

- *Outfall investigation.* The outfall was not identified by the 2004 geophysical survey. If identified by visual inspection, field screening or exploratory trenching, one borehole will be advanced in the center of the outfall 0.5 ft downslope from the mouth of the outfall pipe (Figure 5.20-3, location BH-1). If not located, the borehole location will be estimated based on previous outfall sampling locations. The borehole samples will be collected from the 0- to 0.5-ft, 2.0- to 3.0-ft, and 5.0- to 6.0-ft depth intervals. Samples will be collected 5 ft to the west and east of the borehole (Figure 5.20-3, locations 2 and 3) at the 0- to 0.5-ft and 2.0- to 3.0-ft depth intervals. Two additional sample locations will be established downslope from the mouth of the pipe, in the center of a distinguishable drainage, or in a catchment basin aligned with the mouth of the pipe 10 ft and 30 ft downslope from BH-1 (Figure 5.20-3, locations 5 and 8). Location 5 will be flanked by sample locations 10 ft to the west and east (Figure 5.20-3, locations 4 and 6). Location 8 will be flanked by sample locations 20 ft to the west and east (Figure 5.20-3, locations 7 and 9). Samples will be collected at depths of 0–0.5 ft and 2.0–3.0 ft.
- *Bench investigation.* On the topological bench beneath the mesa cliff edge, two sample locations will be established downslope from the mouth of the pipe, in the center of a distinguishable drainage, or in a catchment basin aligned with the mouth of the pipe at the north and south ends of the bench (Figure 5.20-3, locations 11 and 14). These sample locations will each be flanked by one sample location 20 ft to the west and one sample location 20 ft to the east (Figure 5.20-3, locations 10, 12, 13, and 15). Samples will be collected at depths of 0–0.5 ft and 2.0–3.0 ft.

5.21 Radiological and Geophysical Surveys

Radiological Survey

A radiological survey of the TA-21 mesa top was conducted during September and October 2004 using two different types of radiological detectors; a 3 x 3 sodium iodide (NaI) detector and an array of three FIDLER detectors. The results of the surveys are presented in Figure D-1, Appendix D. Survey results did not indicate surface radiological activities above local background at any of the corrective action SWMUs/AOCs. Activities appear elevated near the bench area compared to the mesa top (Figure D-2, Appendix D). This is most likely attributable to naturally higher local background activities in the various geological strata that outcrop on the south side of the mesa top.

Geophysical Surveys

Personnel from the ARM Group, Inc. and Washington Group performed a geophysical survey of the TA-21 mesa top during September, October, and November 2004 using four different types of geophysical instruments; electromagnetic (EM)31, EM61, radiodetection, and ground penetrating radar (GPR) to locate the pipelines and structures associated with SWMUs/AOCs. The results of these surveys, which are presented in Appendix E, were used to determine structure dimensions and locations. The following sections describe the equipment used and the principles behind each type of survey.

EM31 Survey

EM measurements are responsive to changes in the electrical conductivity of subsurface materials and the occurrence of buried metal objects. The EM31 operates in accordance with the theory of operation at low induction numbers. An alternating current is passed through a transmitter coil to induce eddy currents into the ground below the instrument. These eddy currents generate a secondary magnetic field. The quadrature-phase component of the induced secondary magnetic field is detected by a receiver coil and measured by the instrument. The measured response is linearly related to the terrain conductivity. Commonly, significant contrasts in the electrical properties between non-indigenous materials and surrounding soil enable accurate delineation of former waste burial sites. The EM31 results are presented in Figure E-1 in Appendix E.

EM61 Survey

Buried metal objects such as storage drums, tanks, and utilities can be effectively located using a Geonics EM61 High-Sensitivity Metal Detector. The EM61 is a time domain system that can discriminate between conductive soils and metal objects. It has numerous advantages over other commonly used metal detection devices. The EM61 generates rapid electromagnetic pulses and measures the response of the subsurface between pulses. Secondary EM fields are generated in the ground after each pulse. These fields dissipate rapidly in earth materials but remain for a longer time in buried metal objects. The EM61 measures the prolonged metal response only after the earth response has dissipated. The EM61 uses a portable time-domain transmitter and two receiver coils. The data received from second receiver coil can be used to reduce the unwanted effects from interference and near-surface objects that can mask deeper and more significant objects. The EM61 results are presented as Figure E-2 in Appendix E.

Radio-Frequency Locator Survey

Some of the pipelines were located using a Radiodetection RD400/PDL2 radio-frequency (RF) pipe locator. The Radiodetection RD400/PDL2 multi-frequency RF utility locating system consists of a receiver/tracer and a remote transmitter that operates at frequencies ranging between 8 kHz and 65 kHz. It operates by detecting passive or active electromagnetic signals associated with buried pipes or cables. Audible and visual feedback is activated when a utility that is coupled with the transmitted signal is crossed. In the passive mode, the transmitter produces a radio-frequency signal in the utility by either induction coupling or direct hook-up. The receiver output provides measured field strength and varies an audible pitch depending upon how far the utility is from the receiver. By carefully adjusting the gain of the receiver and measuring current direction, it is possible to determine the location of the utility and identify it in the presence of adjacent utilities.

The pipe locator method was used to map structures where the GPR method was inconclusive by itself.

GPR Survey

The GPR survey was completed by using a digital SIR System-2 Subsurface Interface Radar System, manufactured by Geophysical Survey Systems, Inc. Radar responds to electrical contrasts in soil and rock. An interface between soil and rock layers will often show up on a radar profile. Disturbed subsurface conditions, such as former excavations, as well as buried pipes and other discrete objects can also be detected. GPR works best in low conductivity environments such as sandy soil and most bedrock types. The target must exhibit a contrast in electrical properties in order to be detected. The GPR technique uses the transmission and reflection of radio waves to image objects beneath the ground surface. The technique responds to changes in the electrical properties of the earth or buried materials. A GPR target must possess electrical characteristics that are different from the surrounding media. When the transmitted wave encounters an anomalous object or layer, the wave is reflected back to the surface where it is recorded and analyzed. The waves are transmitted rapidly such that a continuous subsurface image is generated as the transmitter is pulled along the ground surface.

During the GPR survey, very high-resolution data were automatically recorded as the sensors were pulled along the ground surface. Survey wheels attached to the sensors facilitated data collection by allowing direct measurement of the distance traveled. The lateral position of each measurement was automatically recorded using a data logger. This method allowed data to be recorded virtually as fast as the operator could walk. This method was used to locate subsurface structures that could not be identified using the radio-frequency pipe locator. Profiles showing representative subsurface structures are presented as Figures E-4 through E-16 in Appendix E. The title of each Figure corresponds to a transect name on Figure E-3. SWMU structures without a representative profile are those that were identified by using the radio-frequency locator.

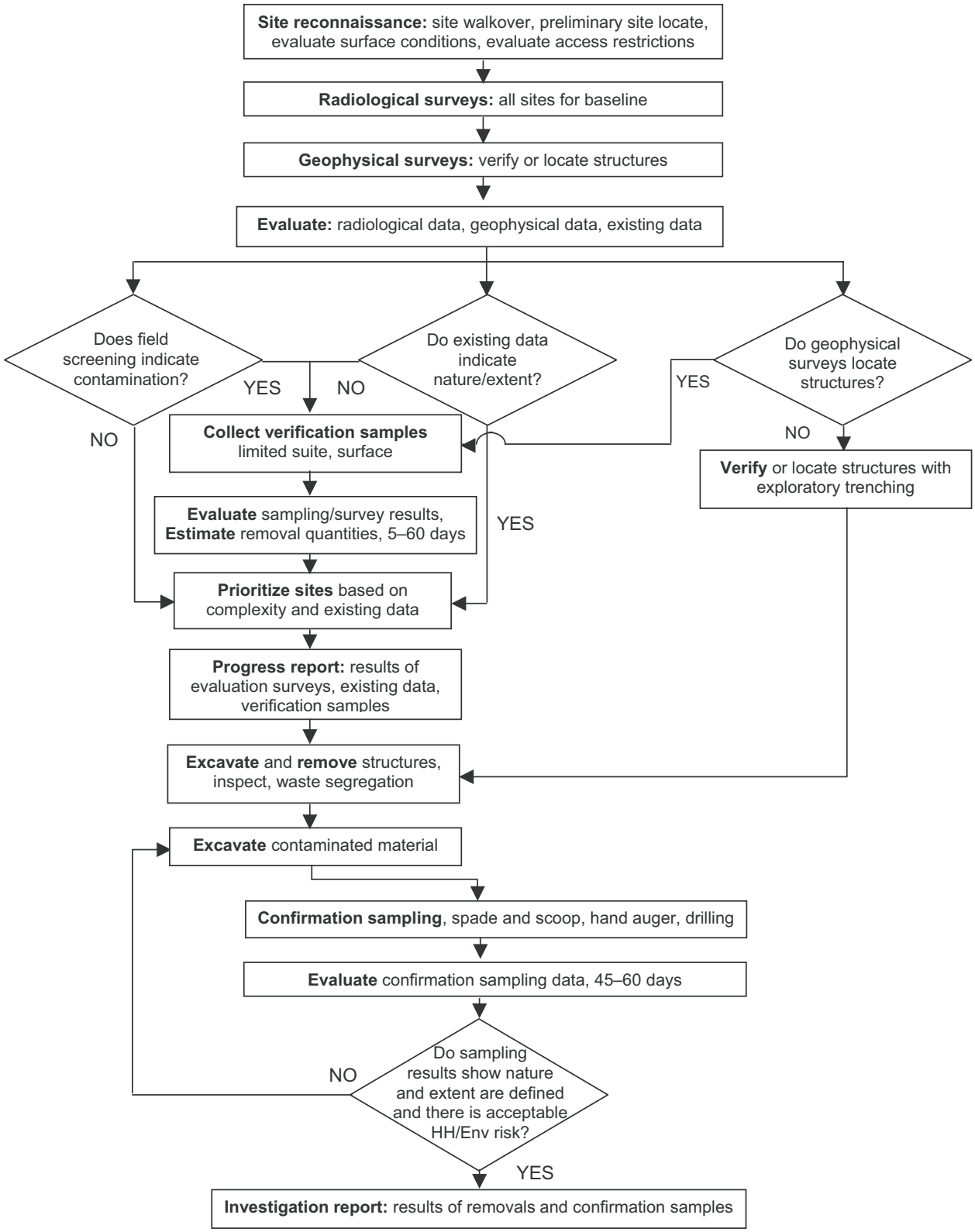
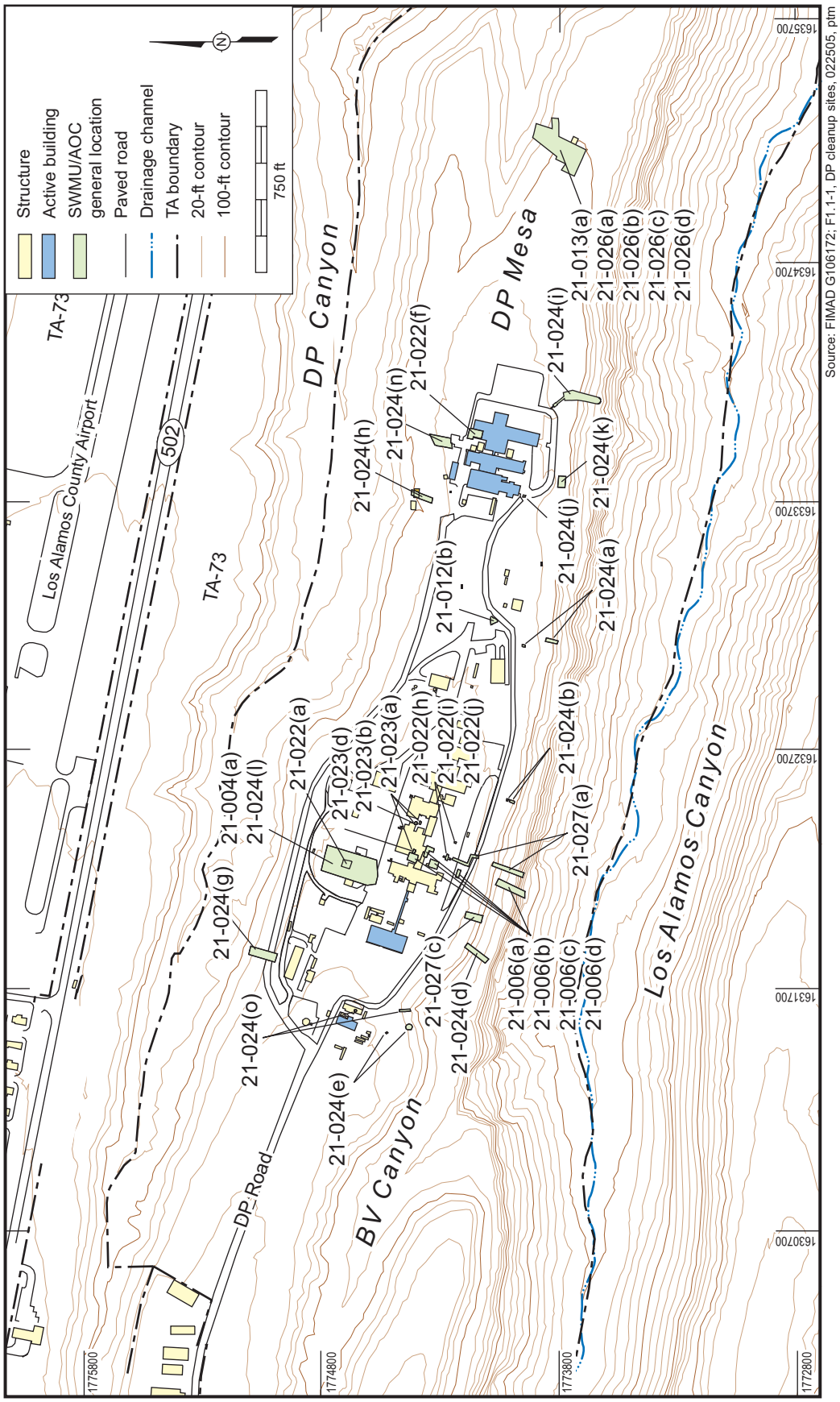


Figure 5.0-1. Decision flowchart for DP Site corrective actions



Source: FIMAD G106172; F1.1-1, DP cleanup sites, 022505, ptm

Figure 5.0-2. Locations of corrective action sites in TA-21

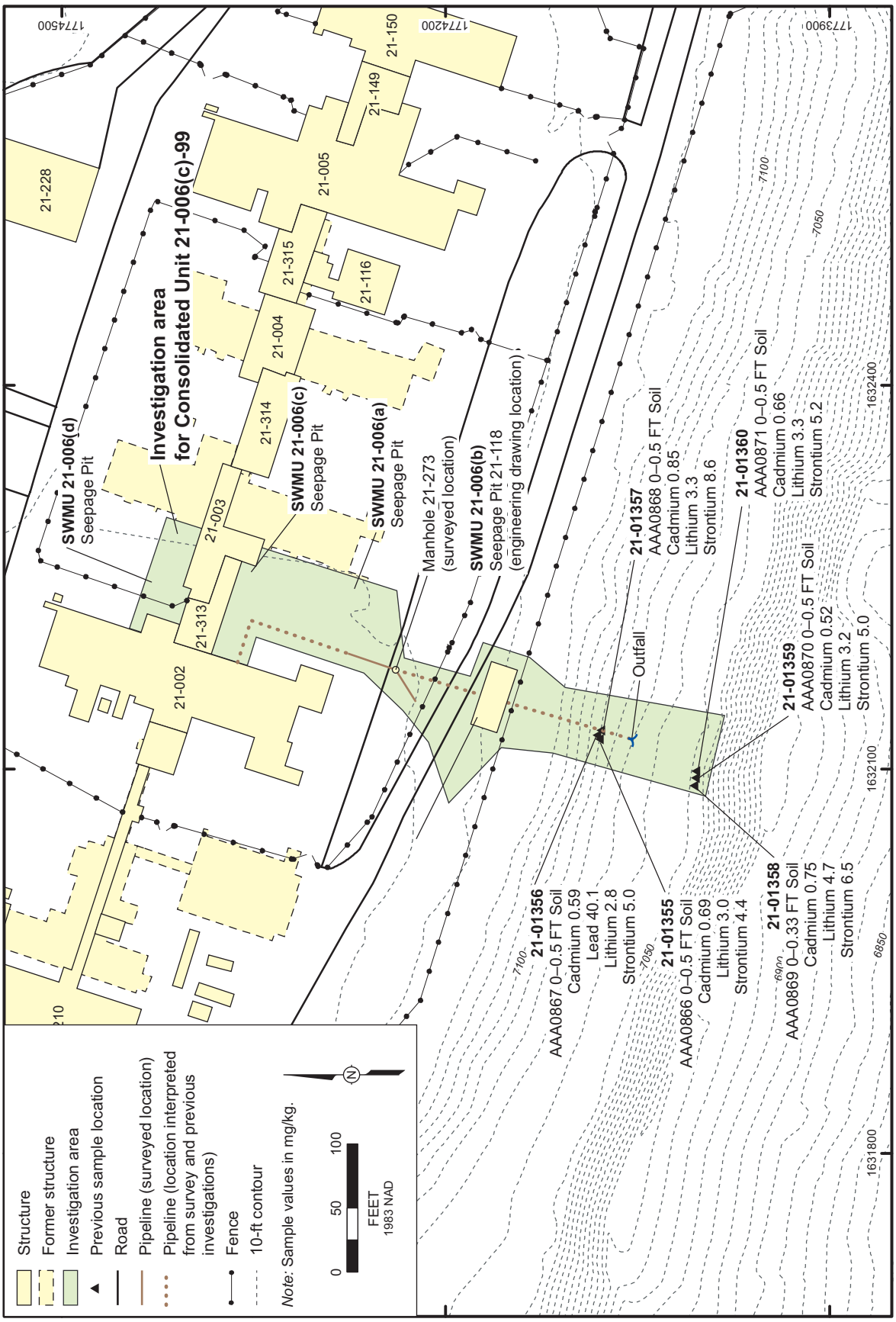


Figure 5.1-1. Consolidated Unit 21-006(c)-99 sample locations with inorganic chemicals detected greater than background values

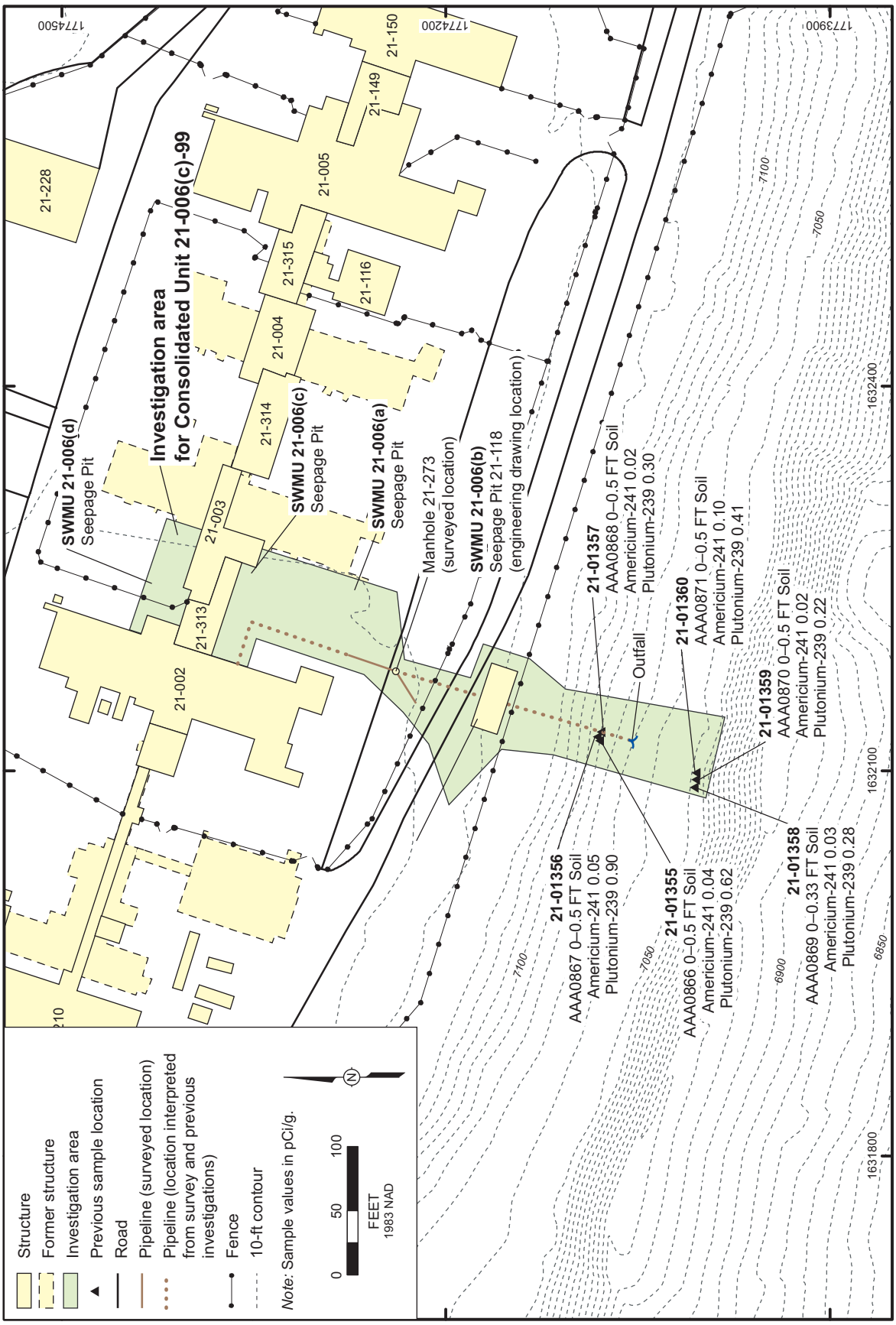


Figure 5.1-2. Consolidated Unit 21-006(c)-99 sample locations with radionuclides detected greater than fallout values

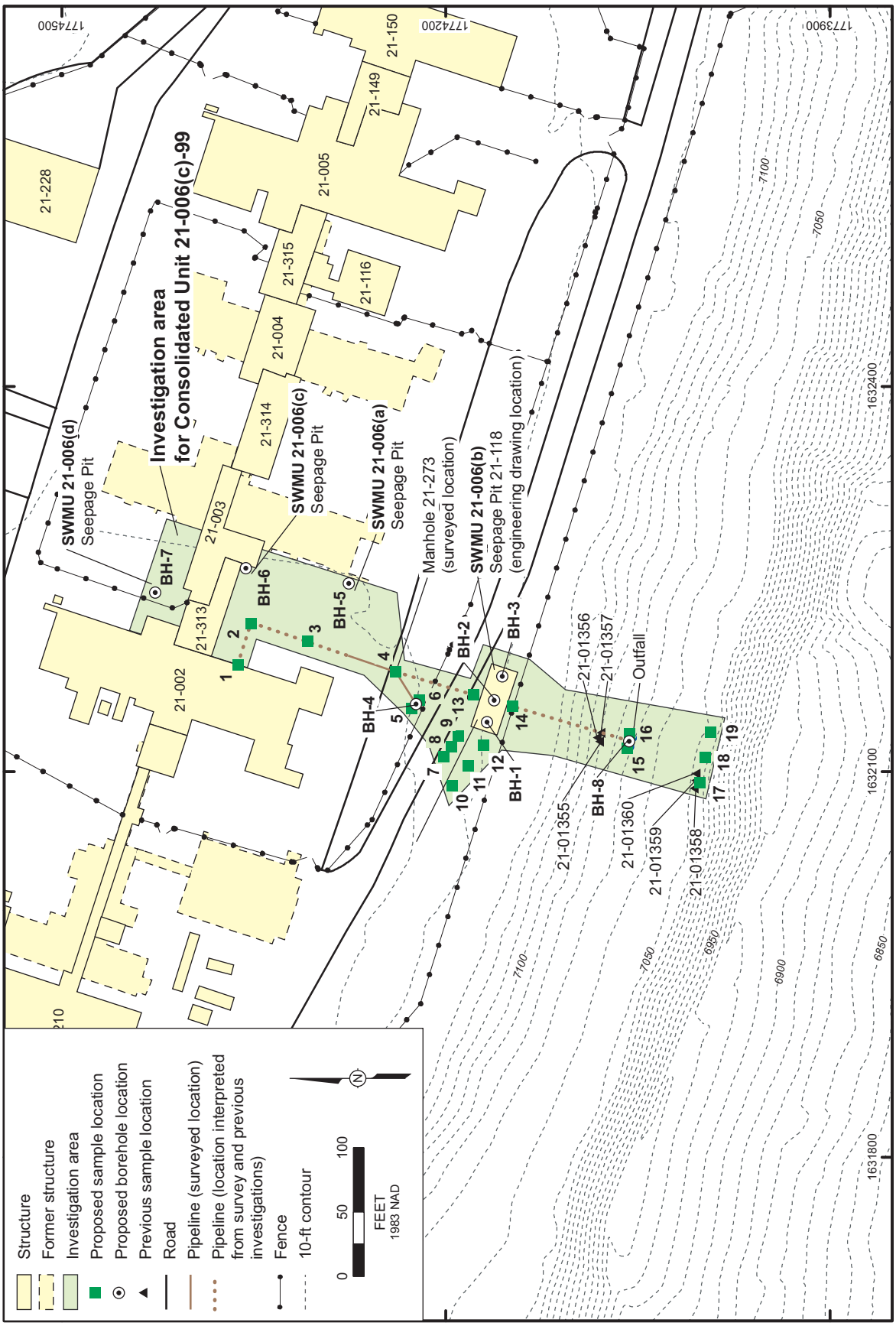
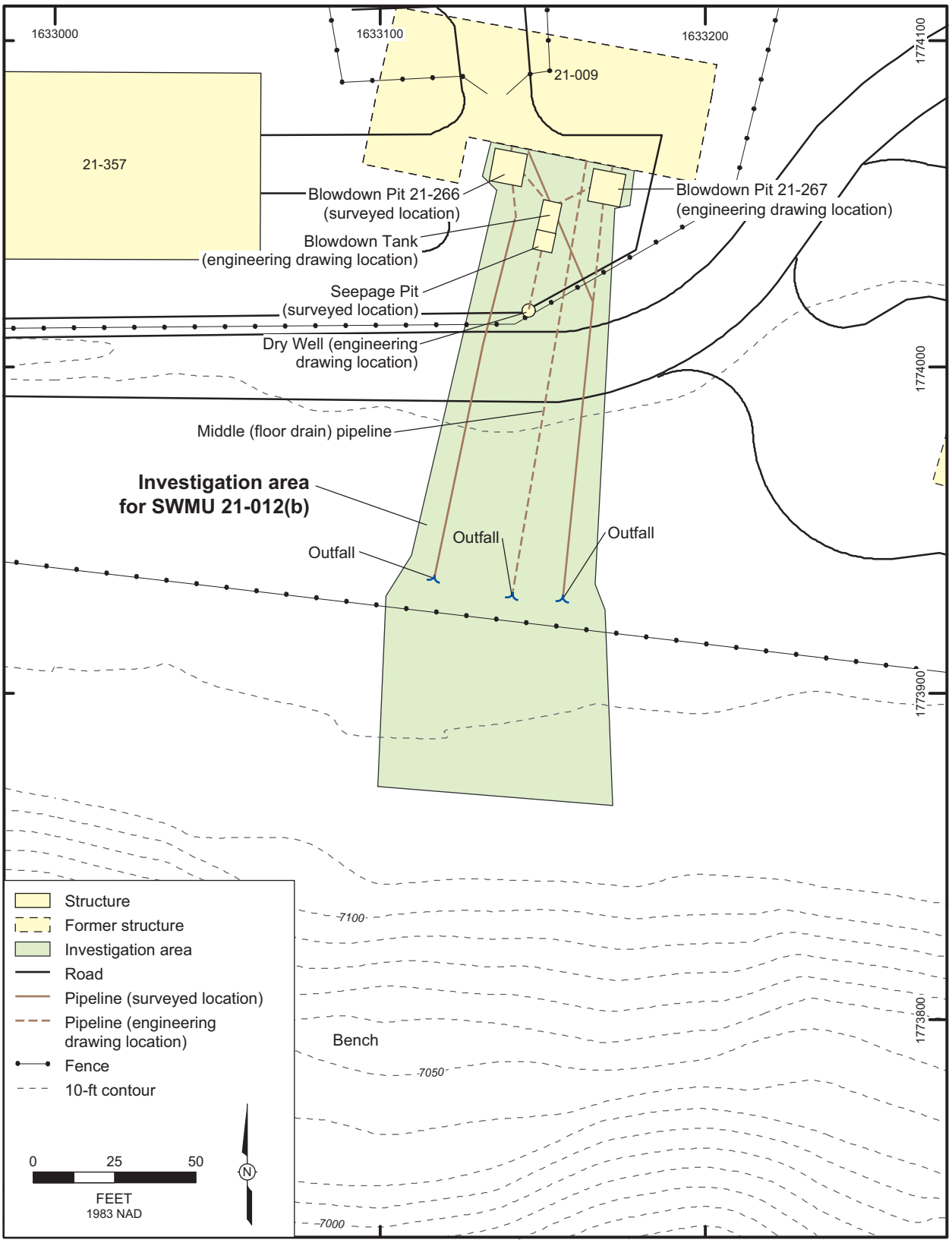
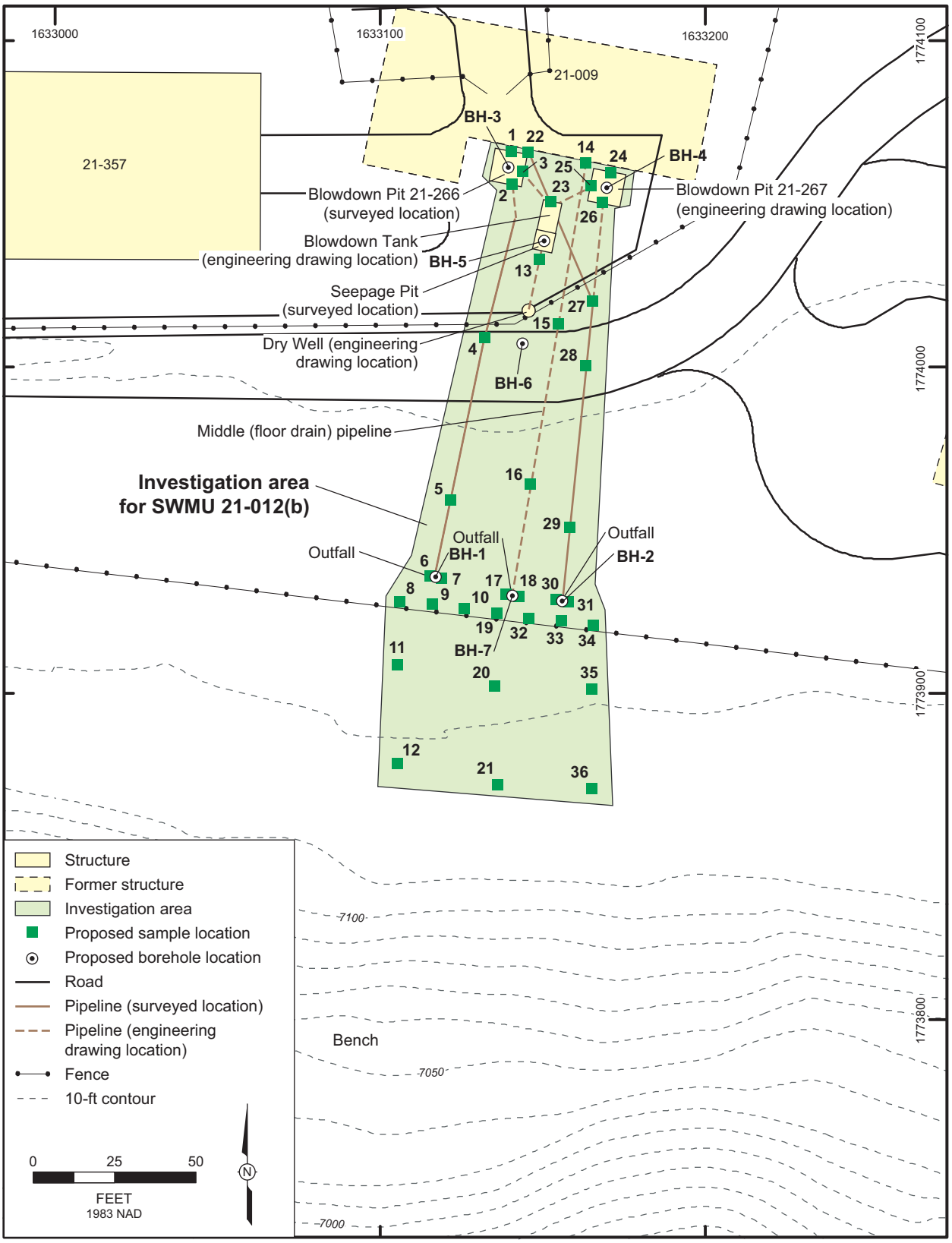


Figure 5.1-3. Consolidated Unit 21-006(c)-99 proposed sample locations



Source: GISLab M201198, 060904; modified for F5.2-1, DP cleanup sites, 020405, ptm

Figure 5.2-1. SWMU 21-012(b), inactive dry well and system



Source: GISLab M201198, 060904; modified for F5.2-2, DP cleanup sites, 022505, ptm

Figure 5.2-2. SWMU 21-012(b) proposed sample locations

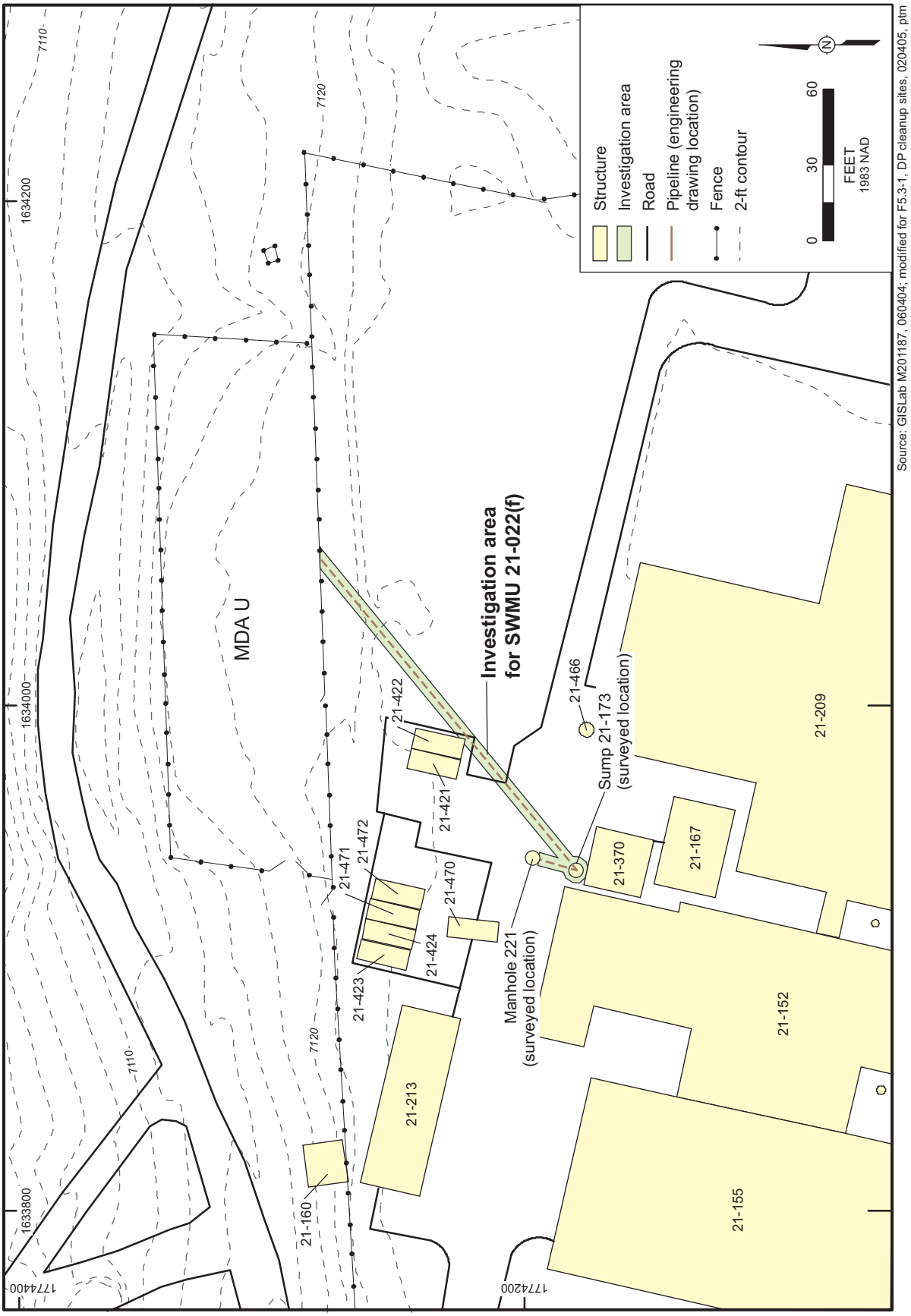


Figure 5.3-1. SWMU 21-022(f), sump and pipeline

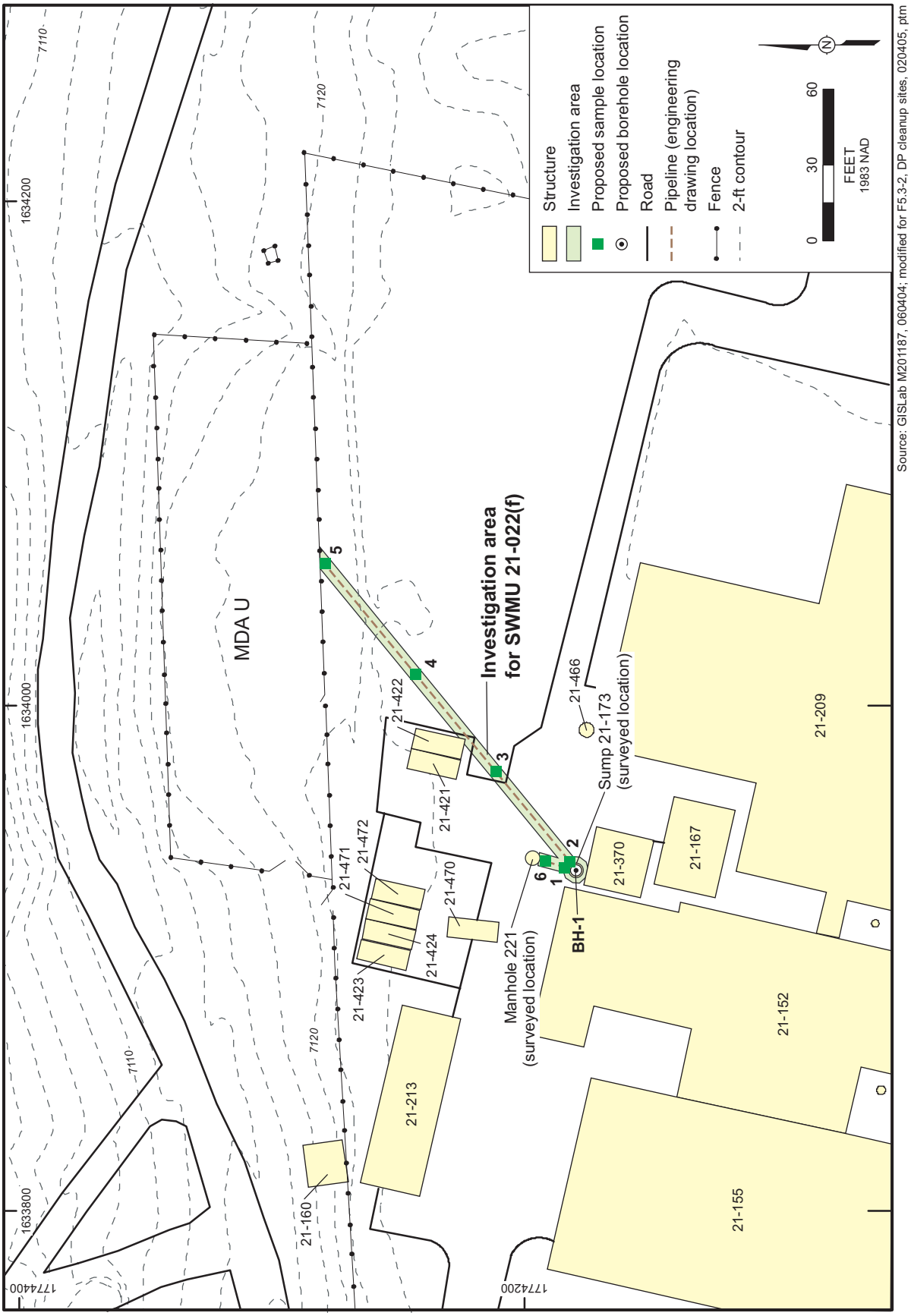


Figure 5.3-2. SWMU 21-022(f) proposed sample locations

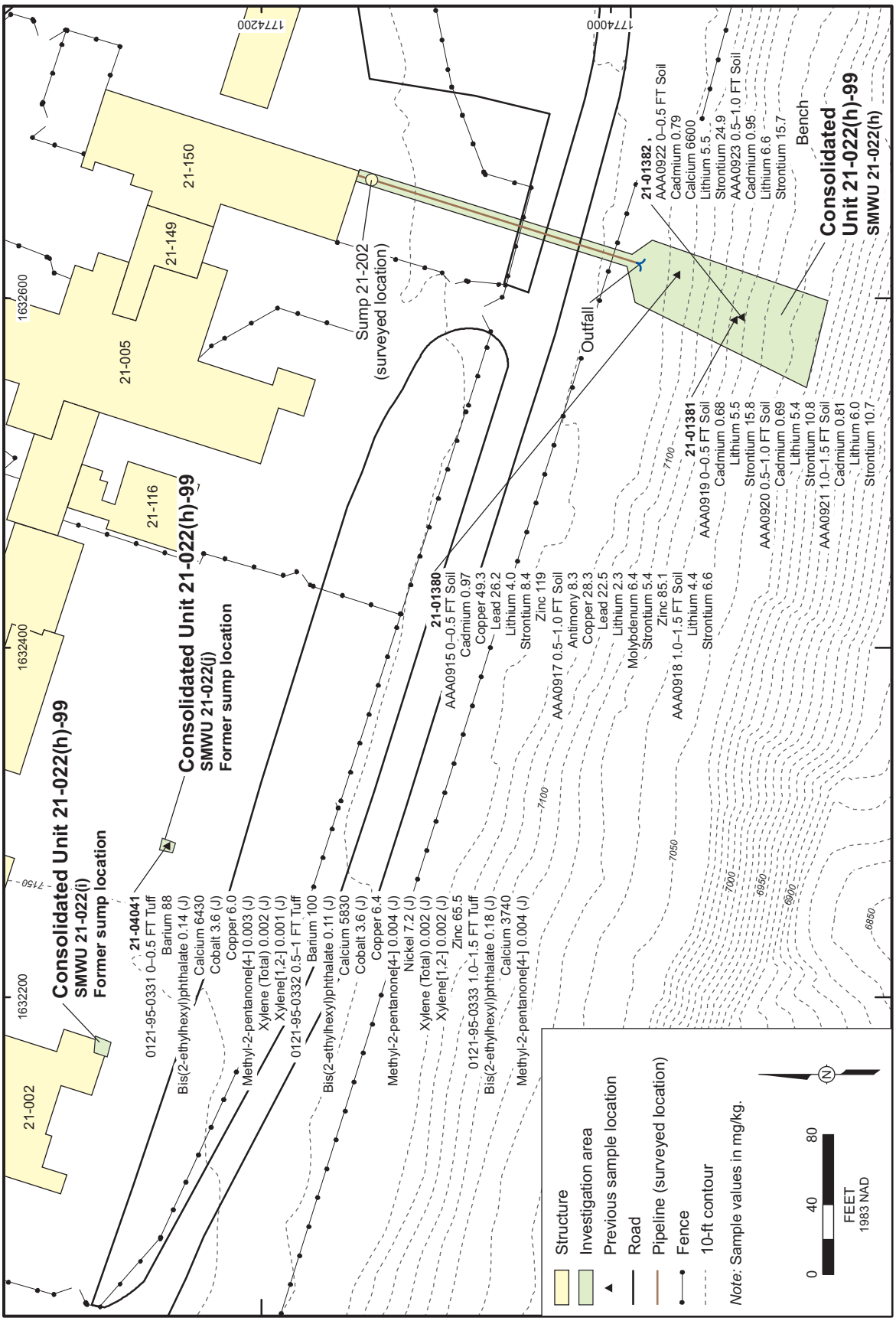


Figure 5.4-1. Consolidated Unit 21-022(h)-99 sample locations with inorganic chemicals detected greater than background values and detected organic chemicals

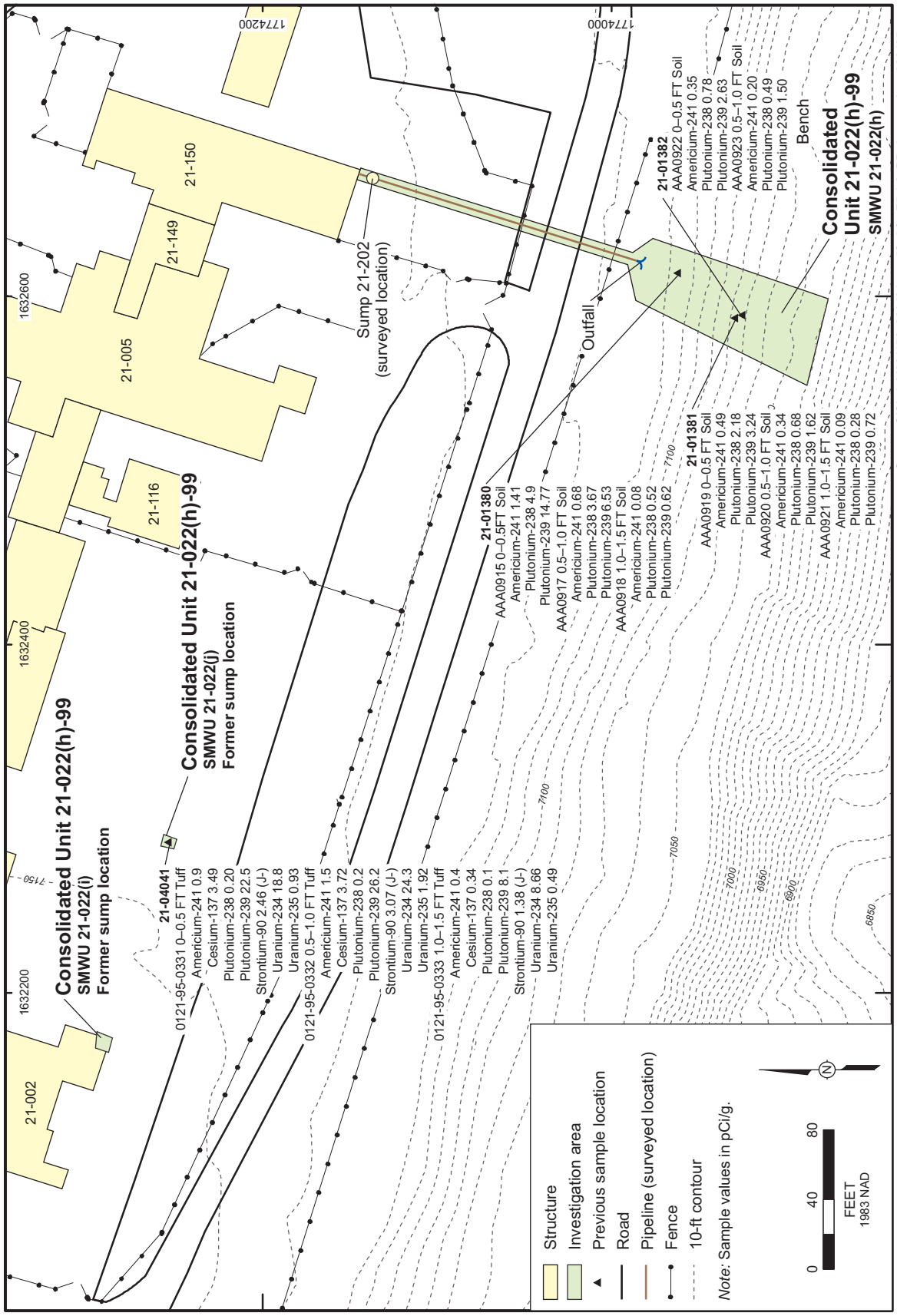


Figure 5.4-2. Consolidated Unit 21-022(h)-99 sample locations with radionuclides detected greater than background or fallout values

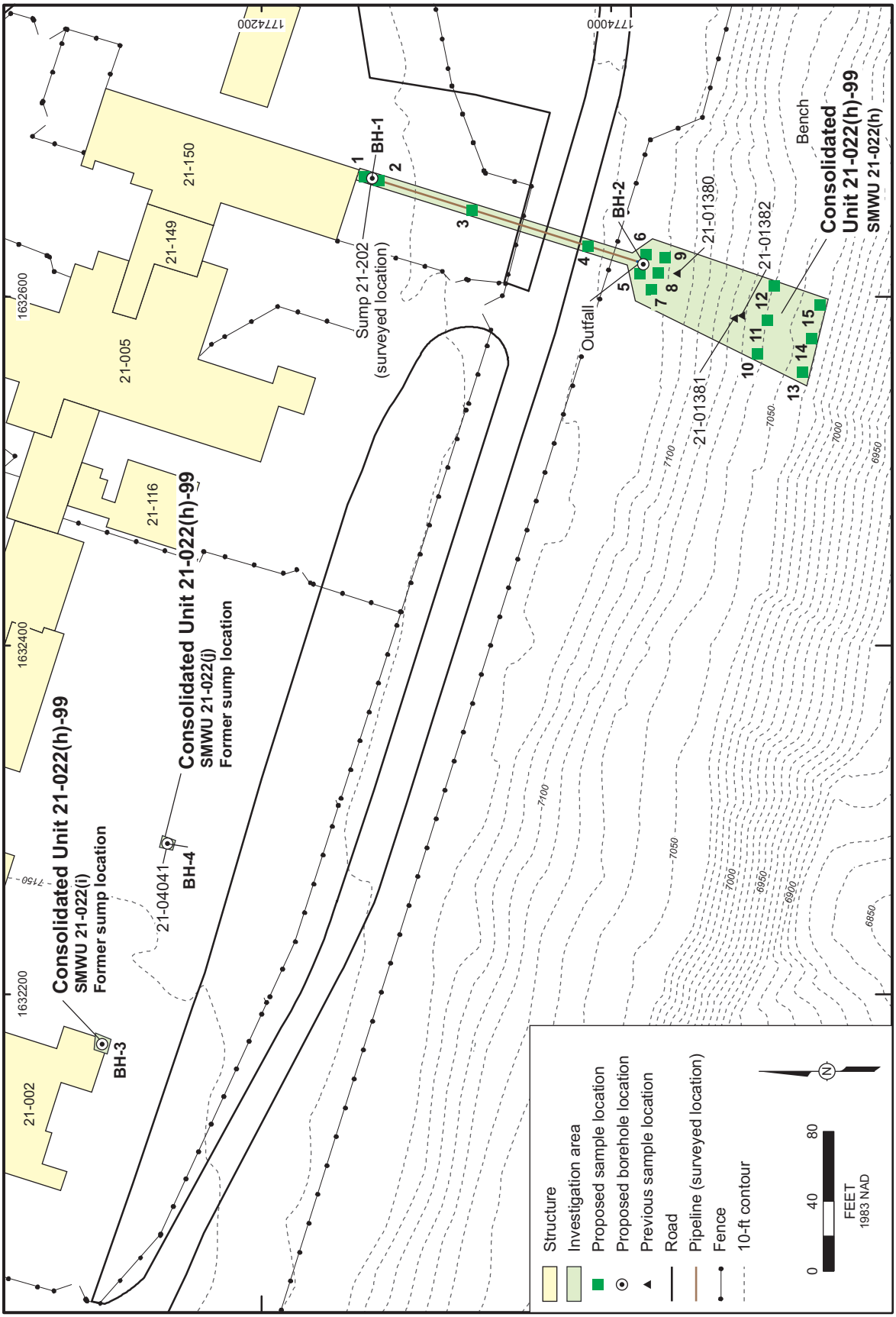


Figure 5.4-3. Consolidated Unit 21-022(h)-99 proposed sample locations

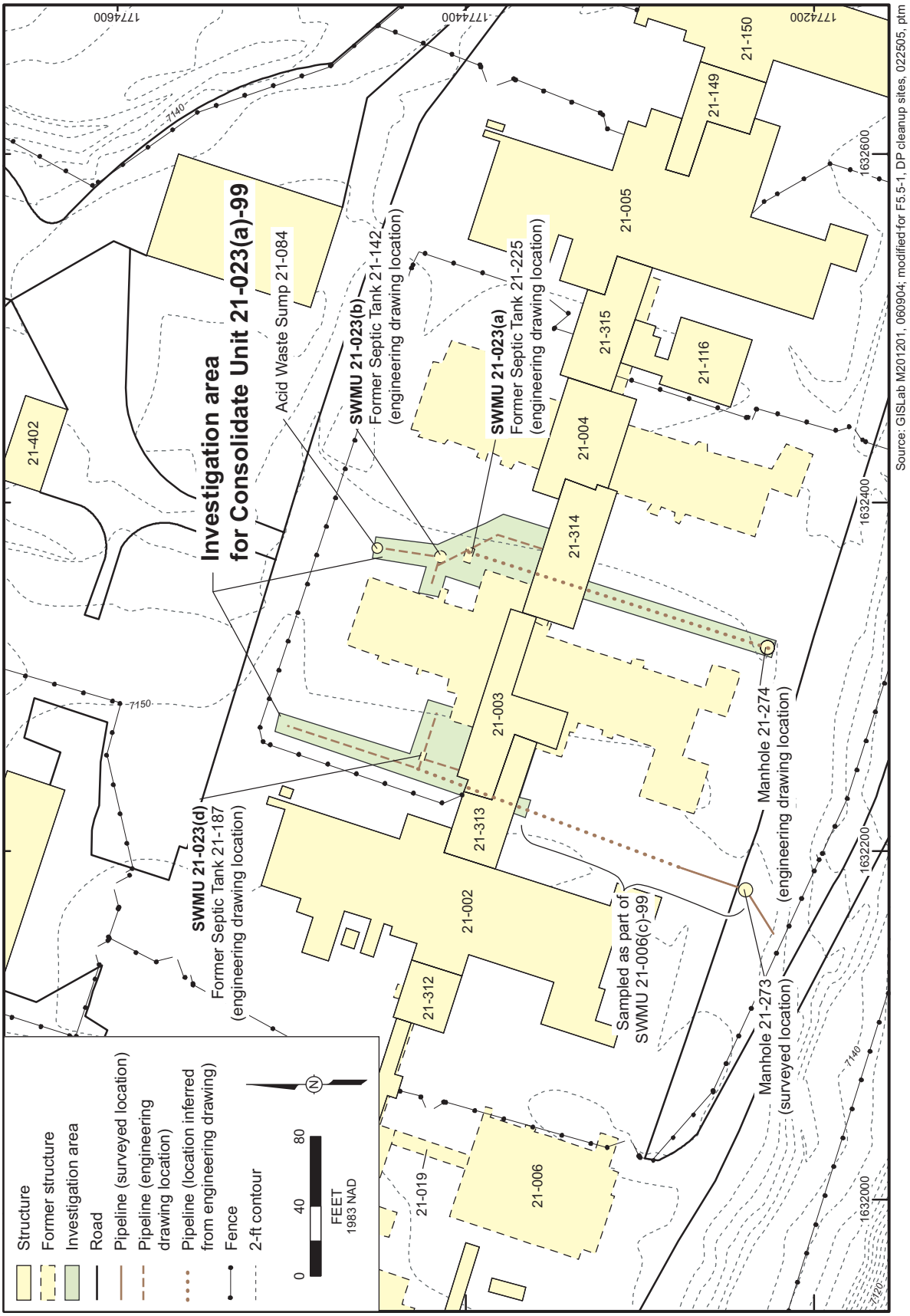


Figure 5.5-1. Consolidated Unit 21-023(a)-99 inactive septic systems

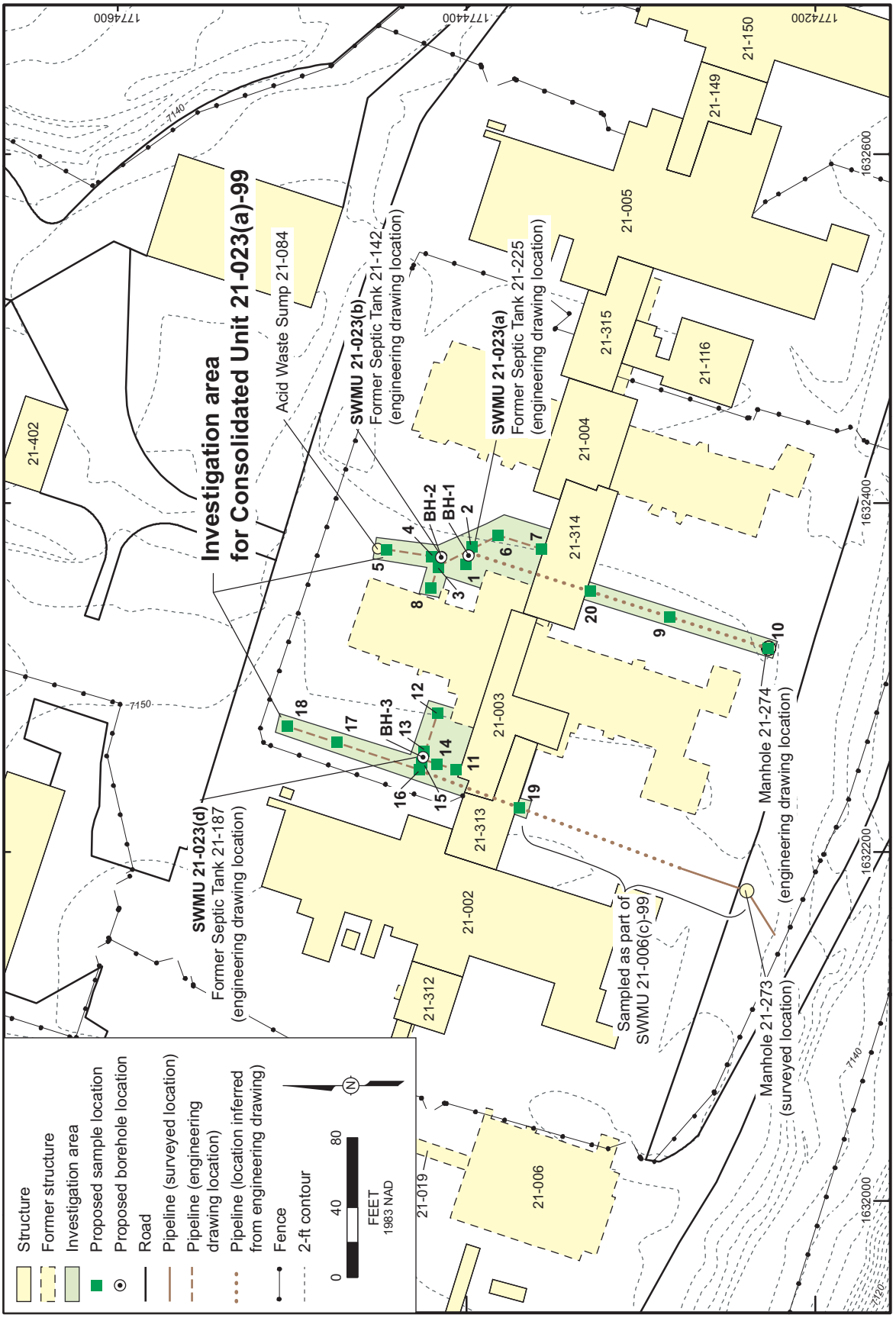


Figure 5.5-2. Consolidated Unit 21-023(a)-99 proposed sample locations

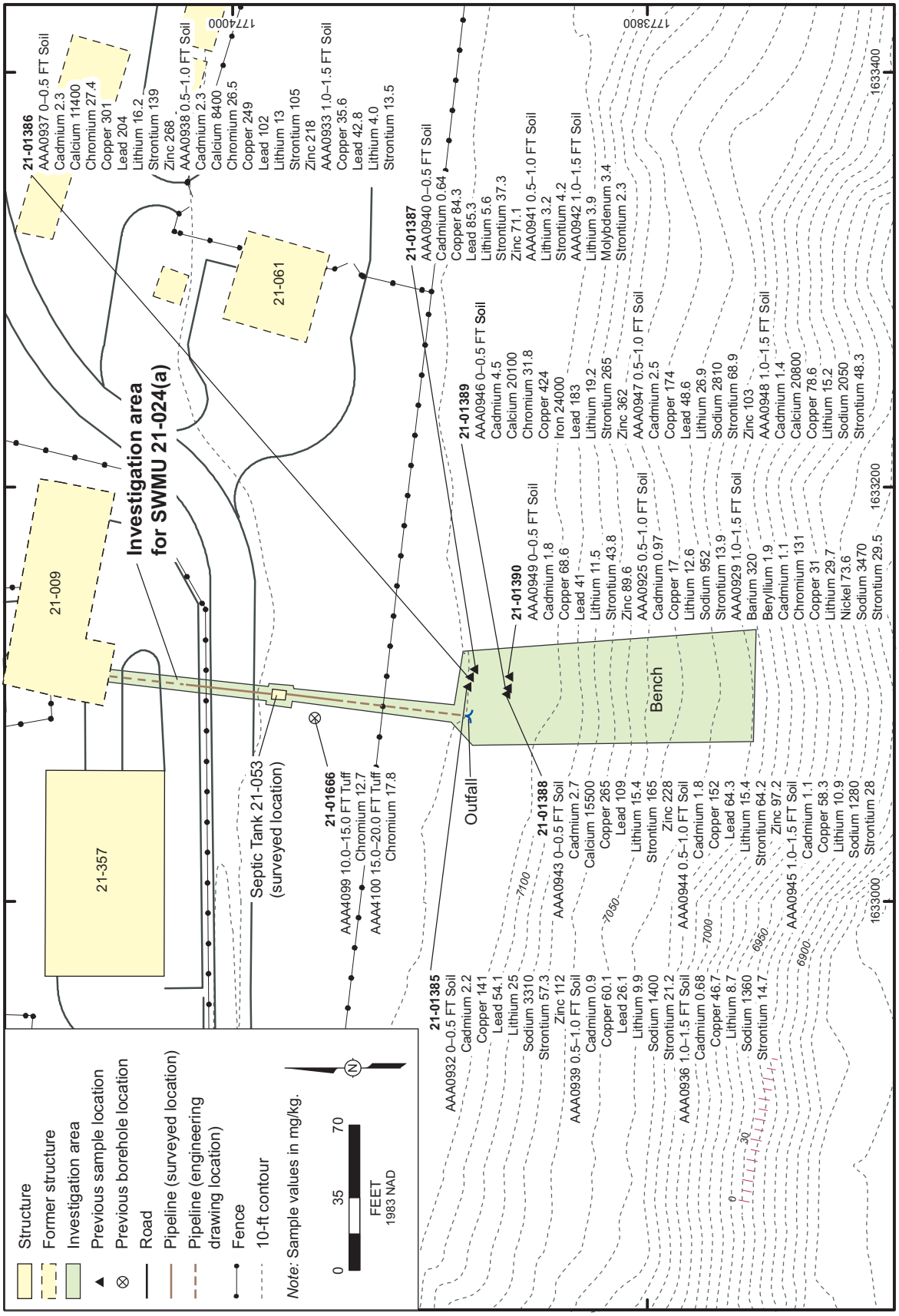


Figure 5.6-1. SWMU 21-024(a) sample locations with inorganic chemicals detected greater than background values

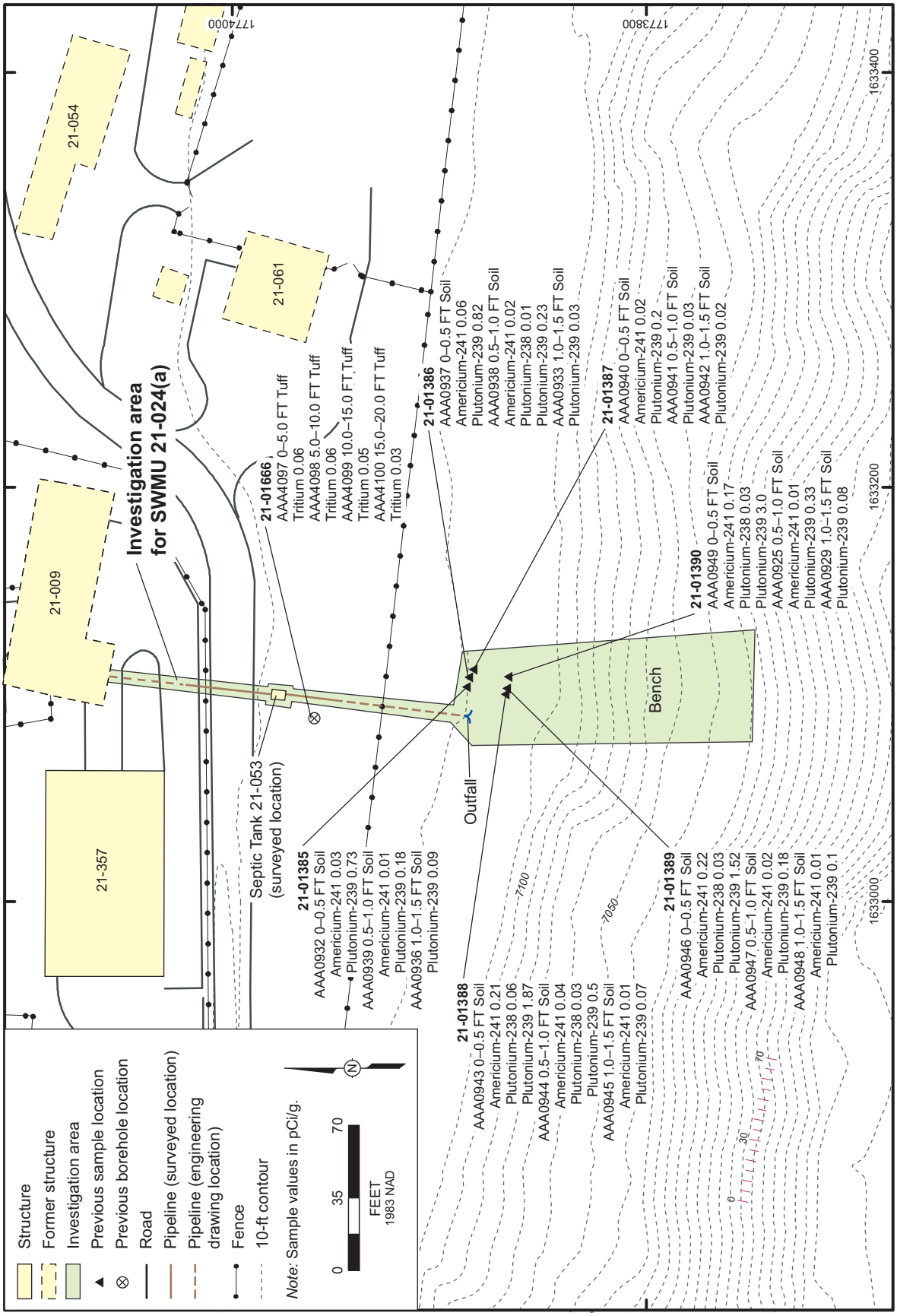


Figure 5.6-2. SWMU 21-024(a) sample locations with radionuclides detected greater than fallout values

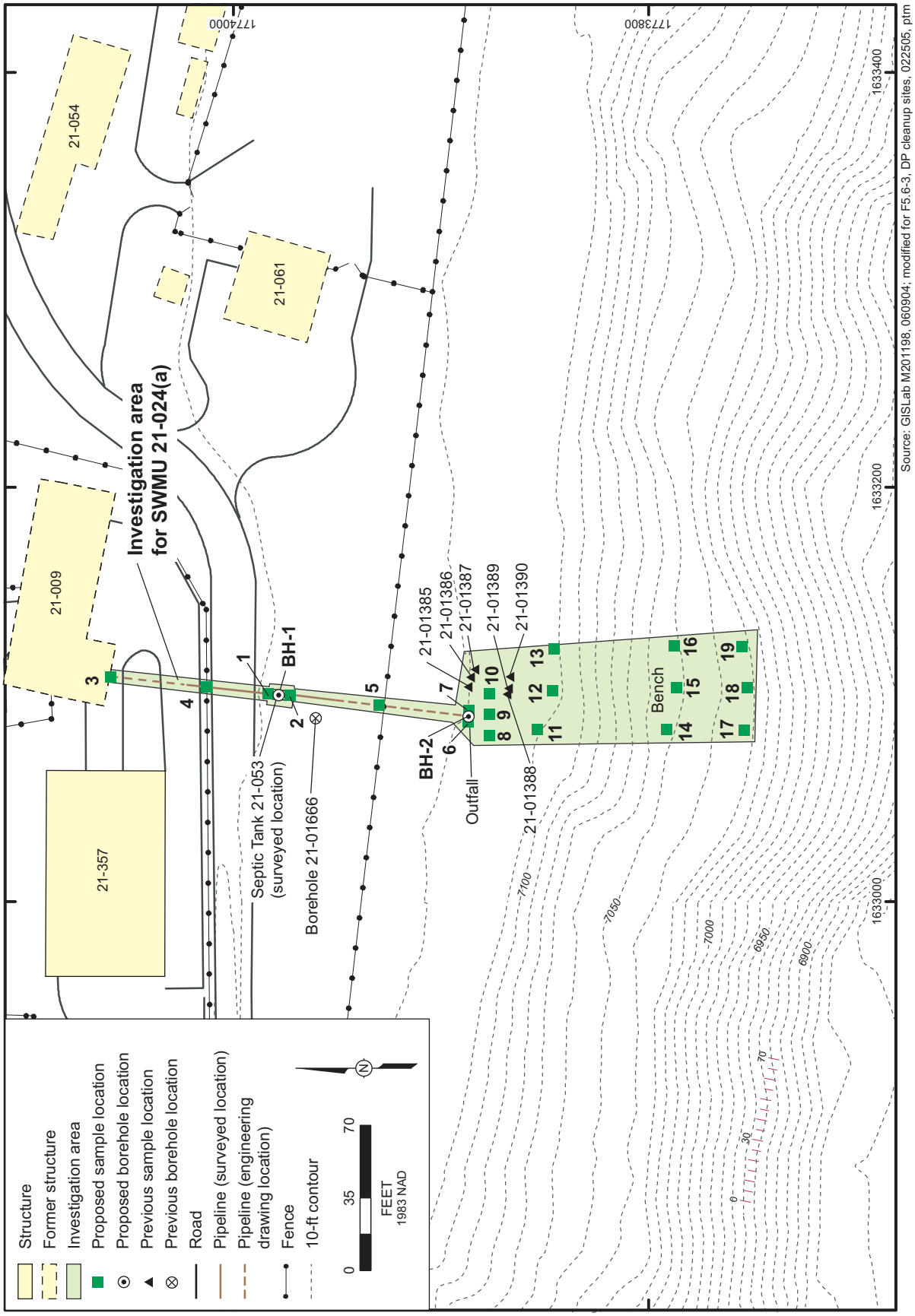
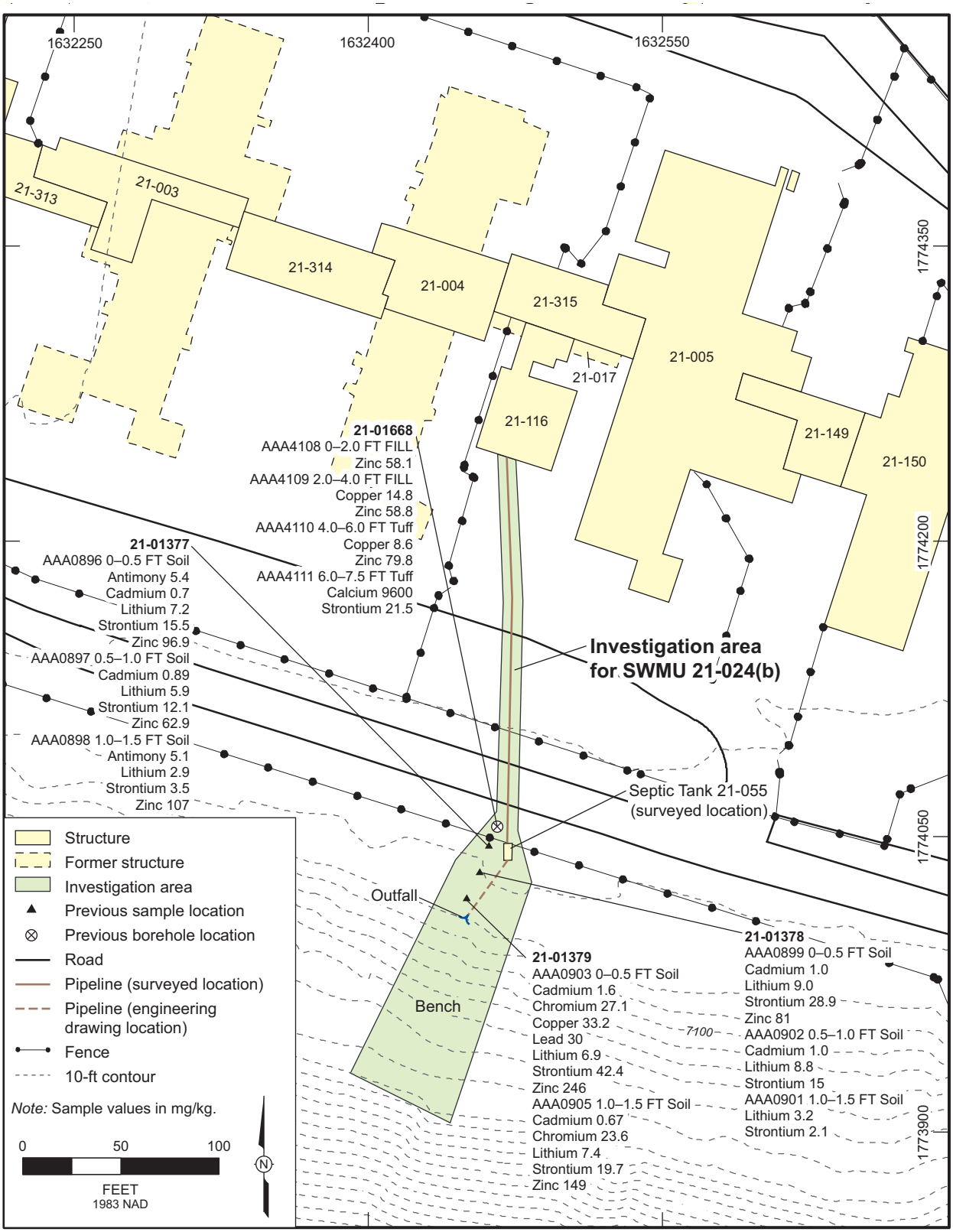
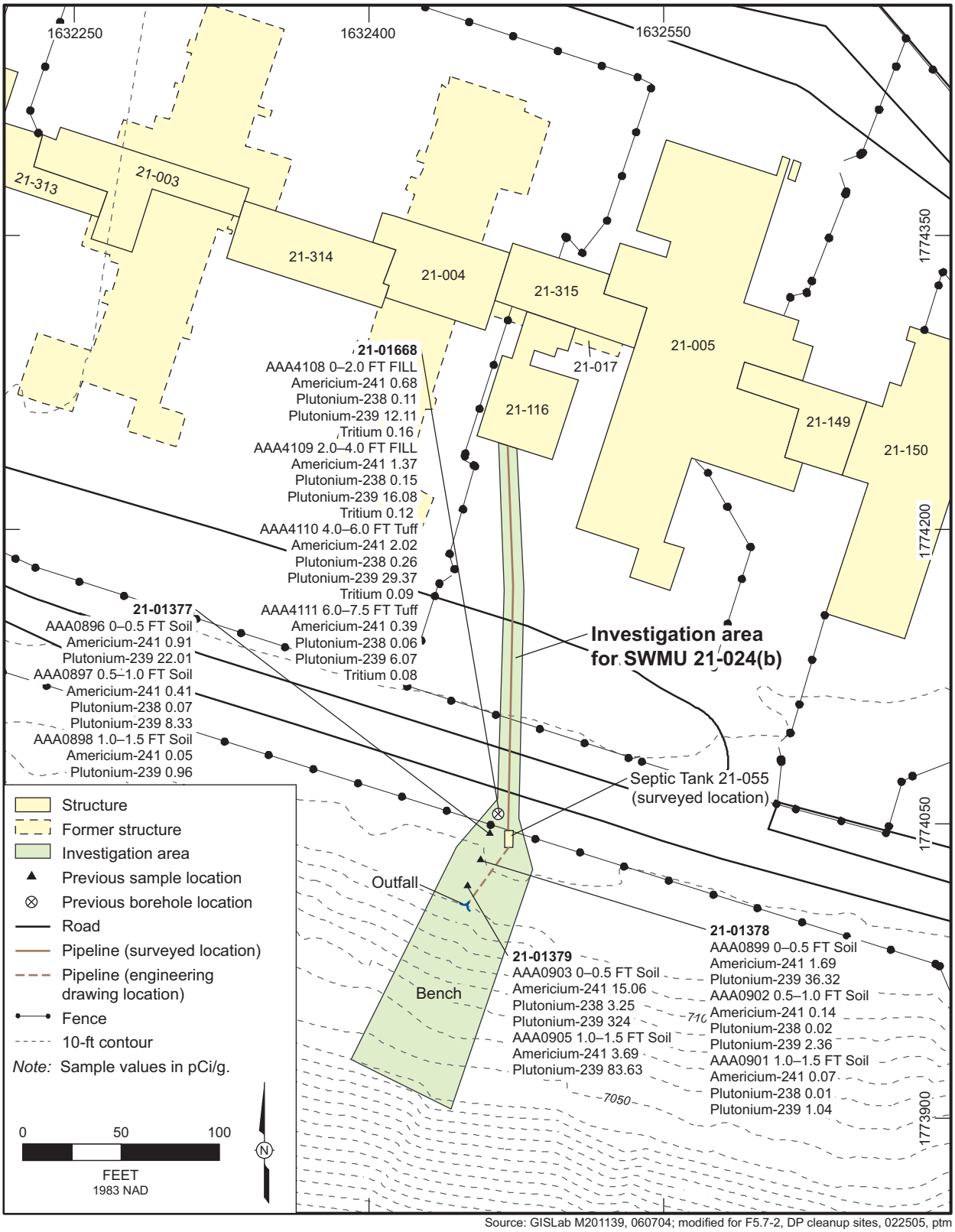


Figure 5.6-3. SWMU 21-024(a) proposed sample locations



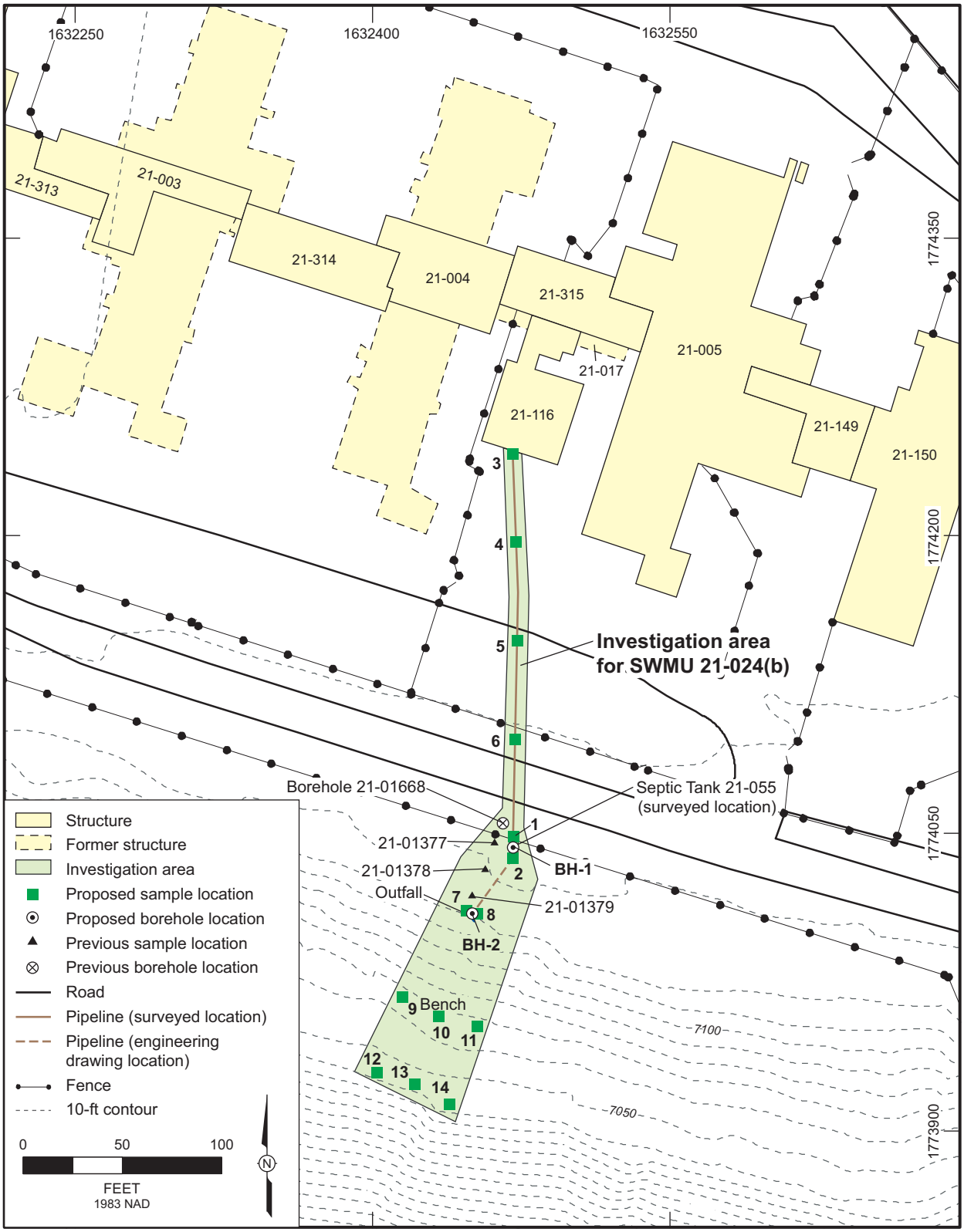
Source: GISLab M201139, 060704; modified for F5.7-1, DP cleanup sites, 022505, ptm

Figure 5.7-1. SWMU 21-024(b) sample locations with inorganic chemicals detected greater than background values



Source: GISLab M201139, 060704; modified for F5.7-2, DP cleanup sites, 022505, ptm

Figure 5.7-2. SWMU 21-024(b) sample locations with radionuclides detected greater than fallout values



Source: GISLab M201139, 060704; modified for F5.7-3, DP cleanup sites, 022505, ptm

Figure 5.7-3. SWMU 21-024(b) proposed sample locations

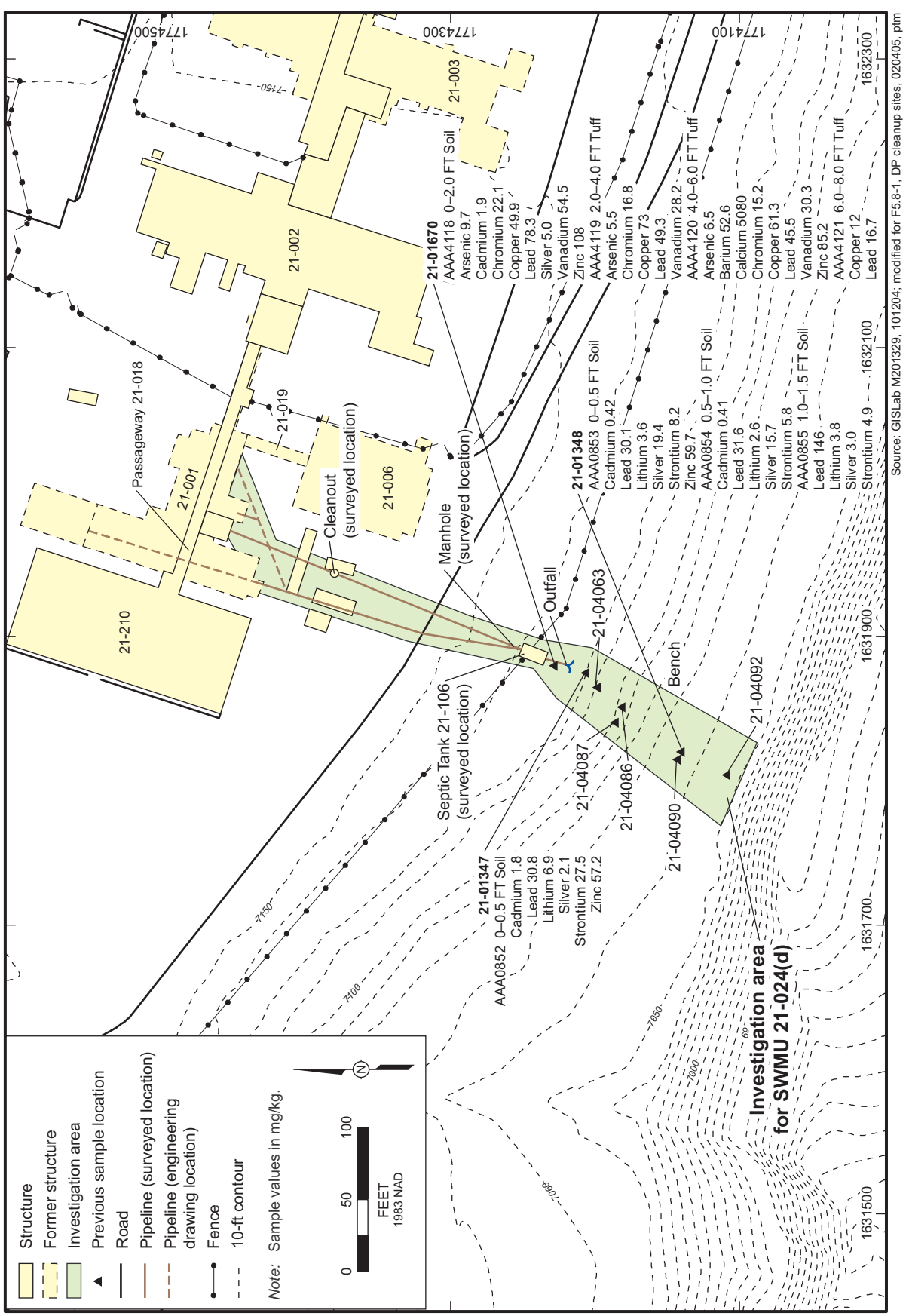


Figure 5.8-1. SWMU 21-024(d) sample locations with inorganic chemicals detected greater than background values

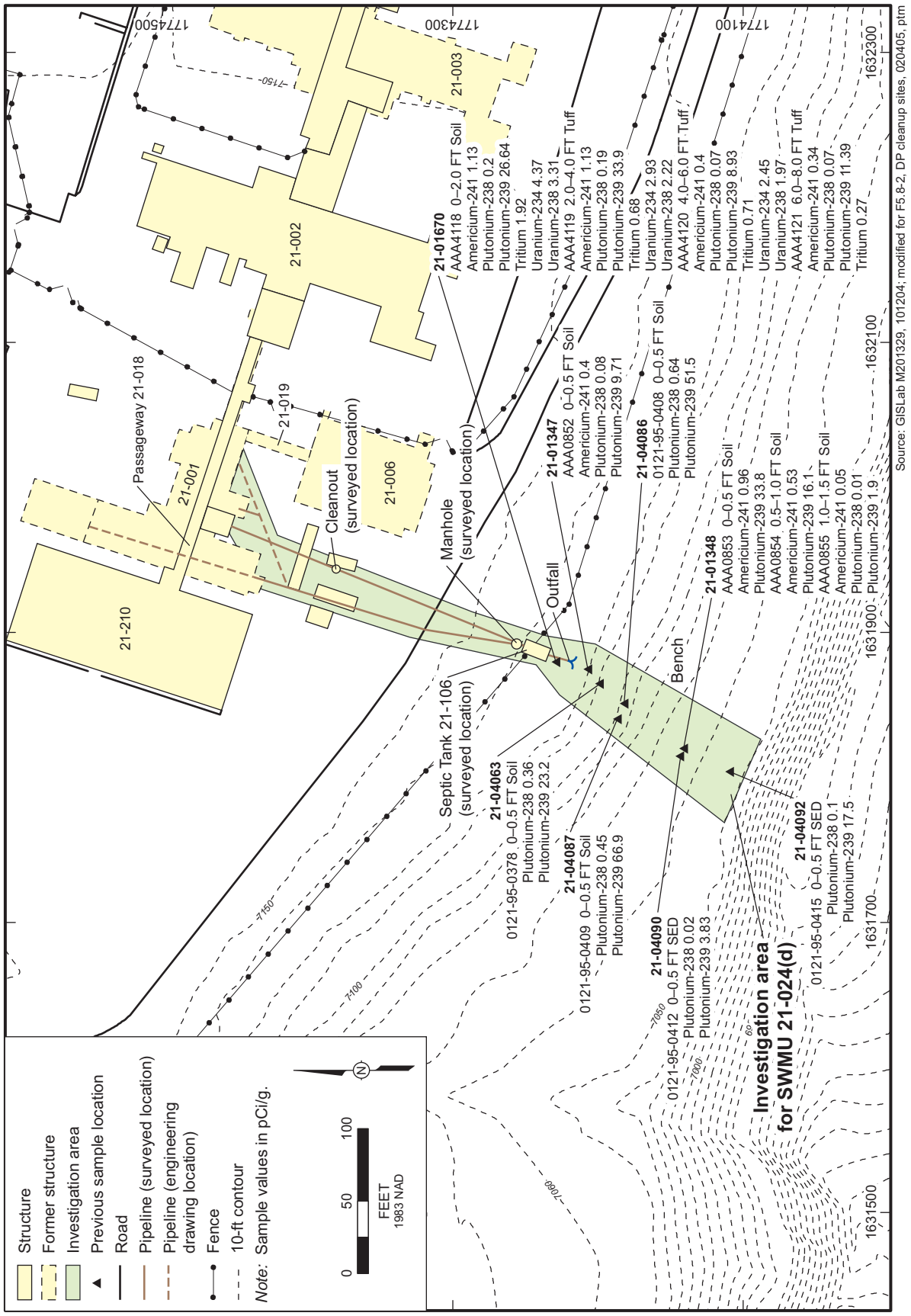


Figure 5.8-2. SWMU 21-024(d) sample locations with radionuclides detected greater than background or fallout values

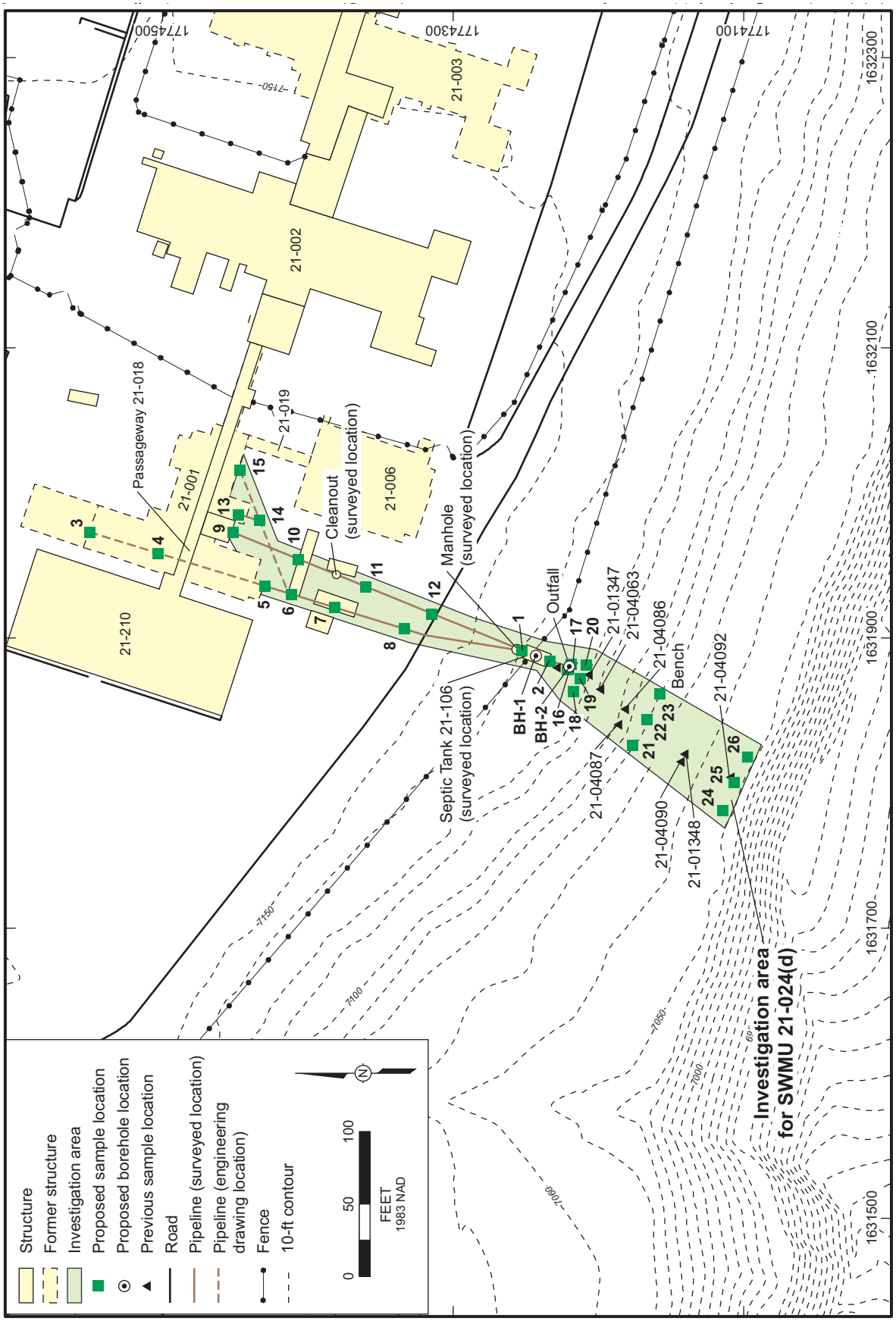
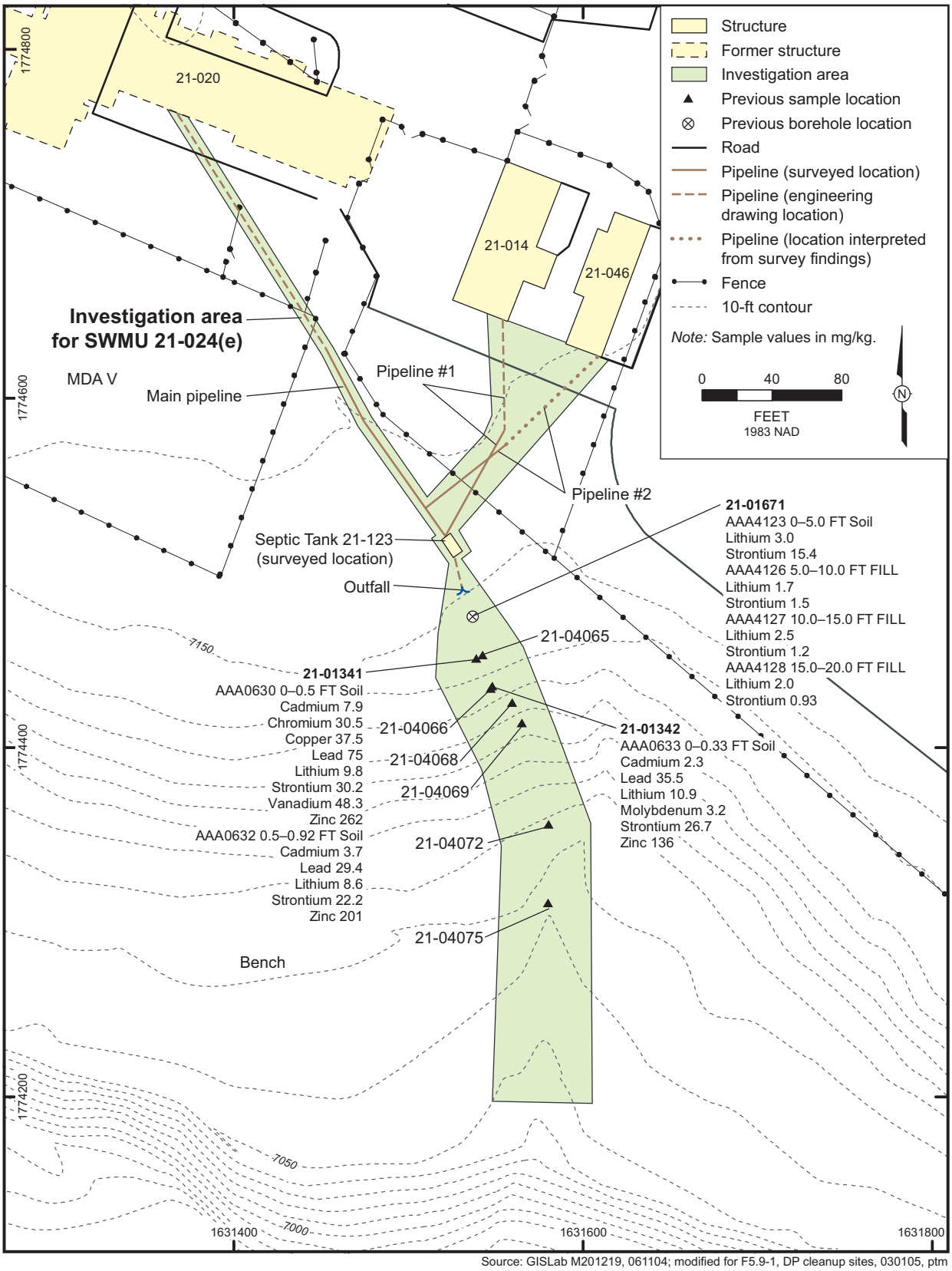
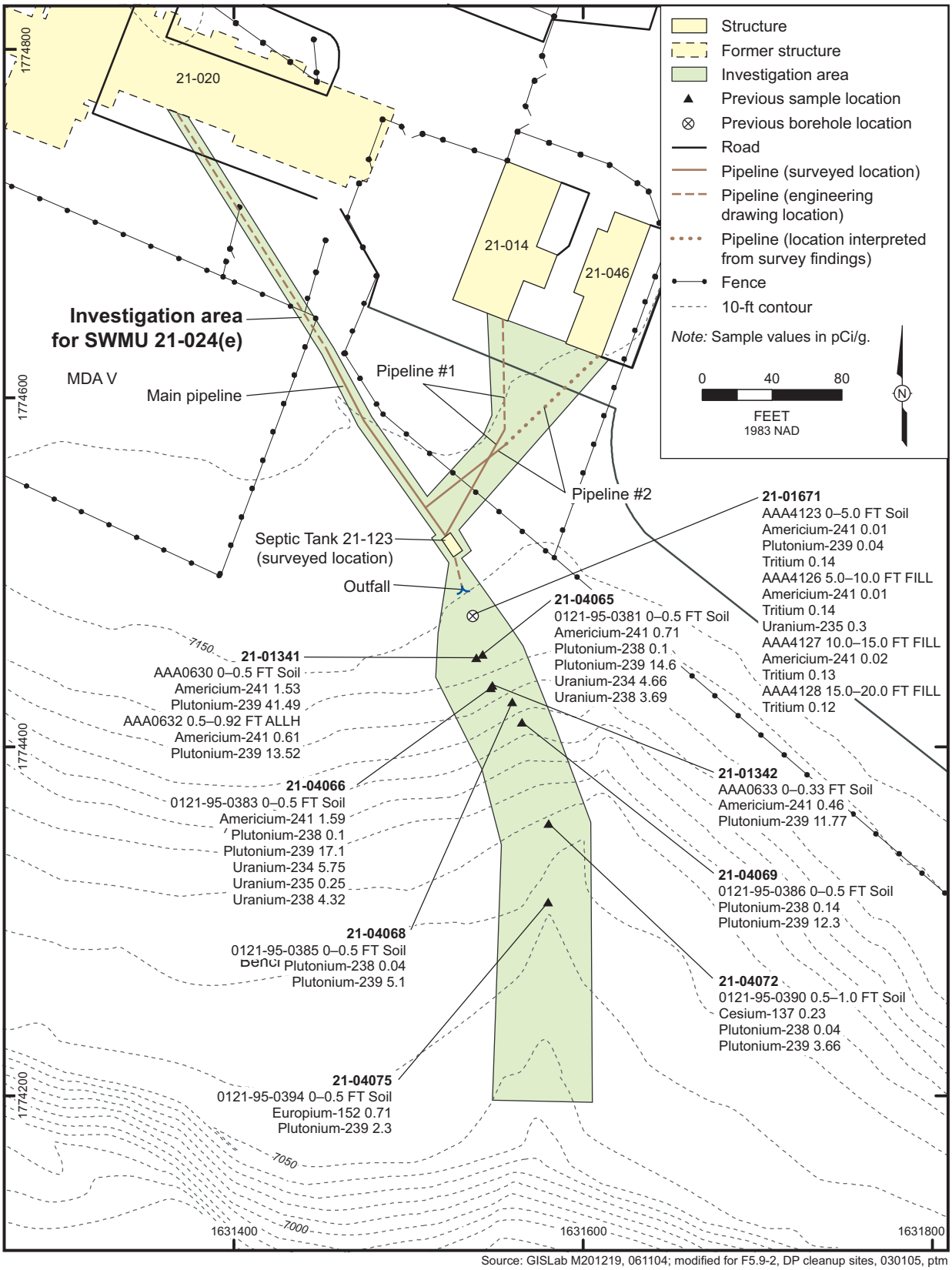


Figure 5.8-3. SWMU 21-024(d) proposed sample locations



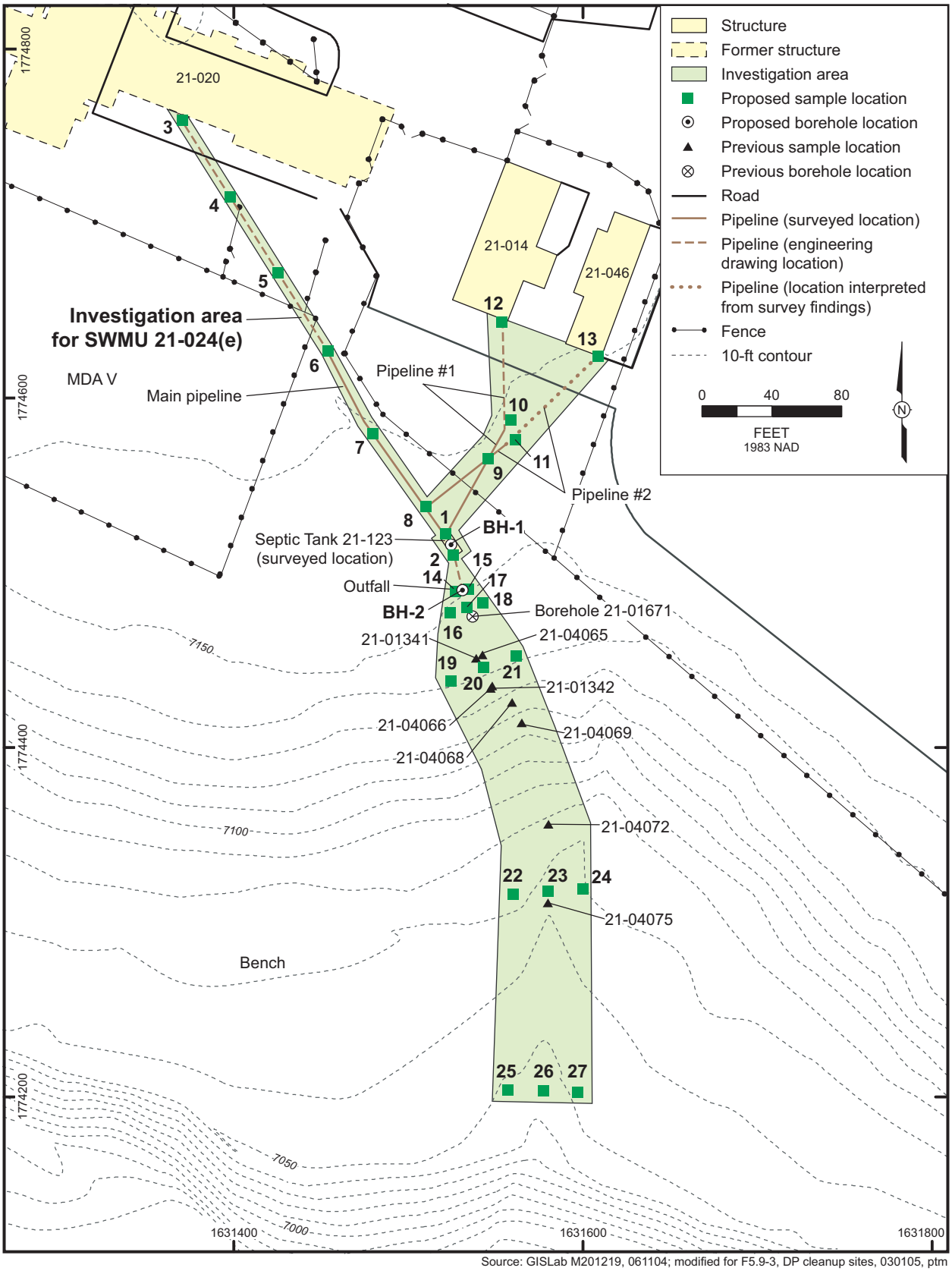
Source: GISLab M201219, 061104; modified for F5.9-1, DP cleanup sites, 030105, ptm

Figure 5.9-1. SWMU 21-024(e) sample locations with inorganic chemicals detected greater than background values



Source: GISLab M201219, 061104; modified for F5.9-2, DP cleanup sites, 030105, ptm

Figure 5.9-2. SWMU 21-024(e) sample locations with radionuclides detected greater than background or fallout values



Source: GISLab M201219, 061104; modified for F5.9-3, DP cleanup sites, 030105, ptm

Figure 5.9-3. SWMU 21-024(e) proposed sample locations

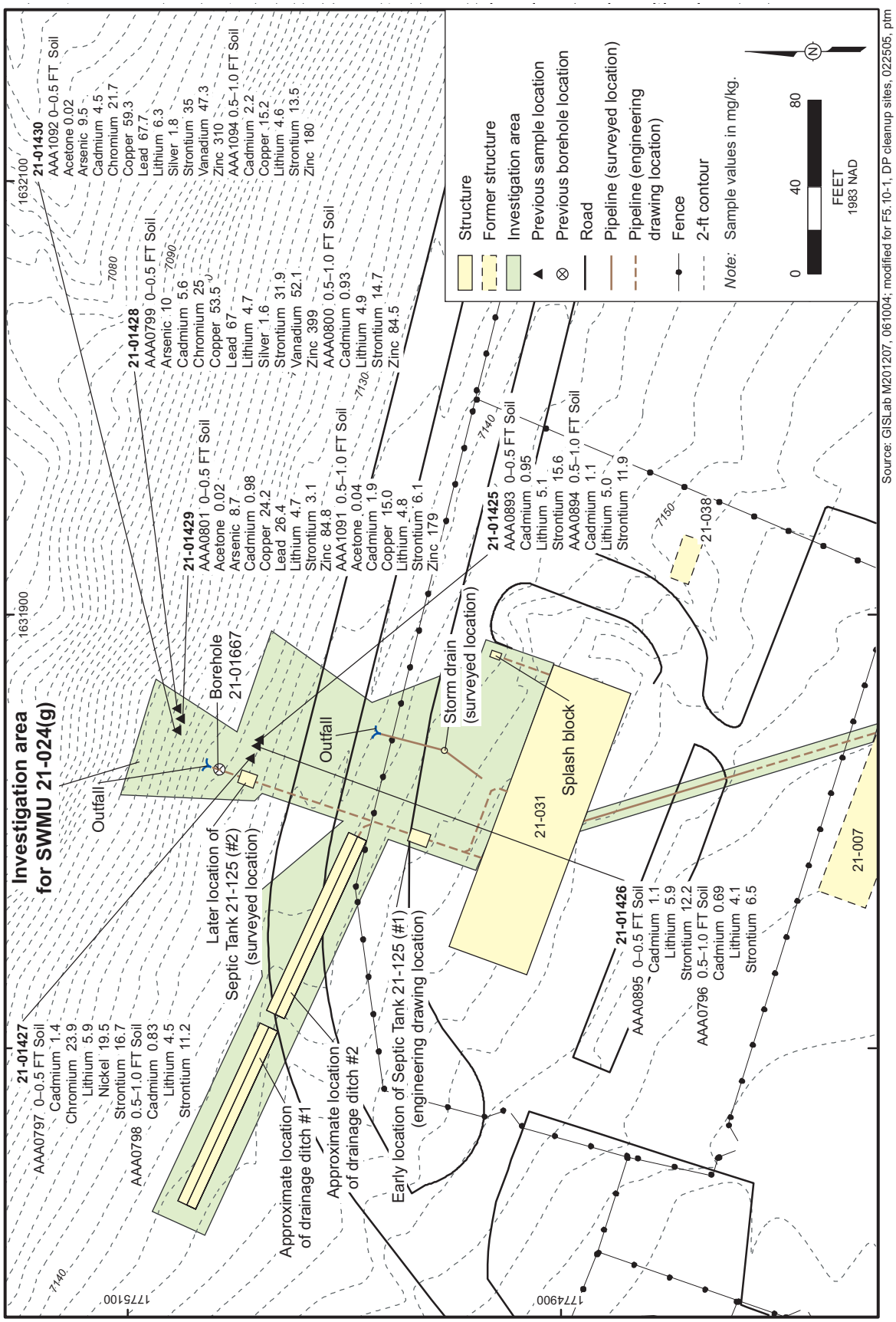


Figure 5.10-1. SWMU 21-024(g) sample locations with inorganic chemicals detected greater than background values and detected organic chemicals

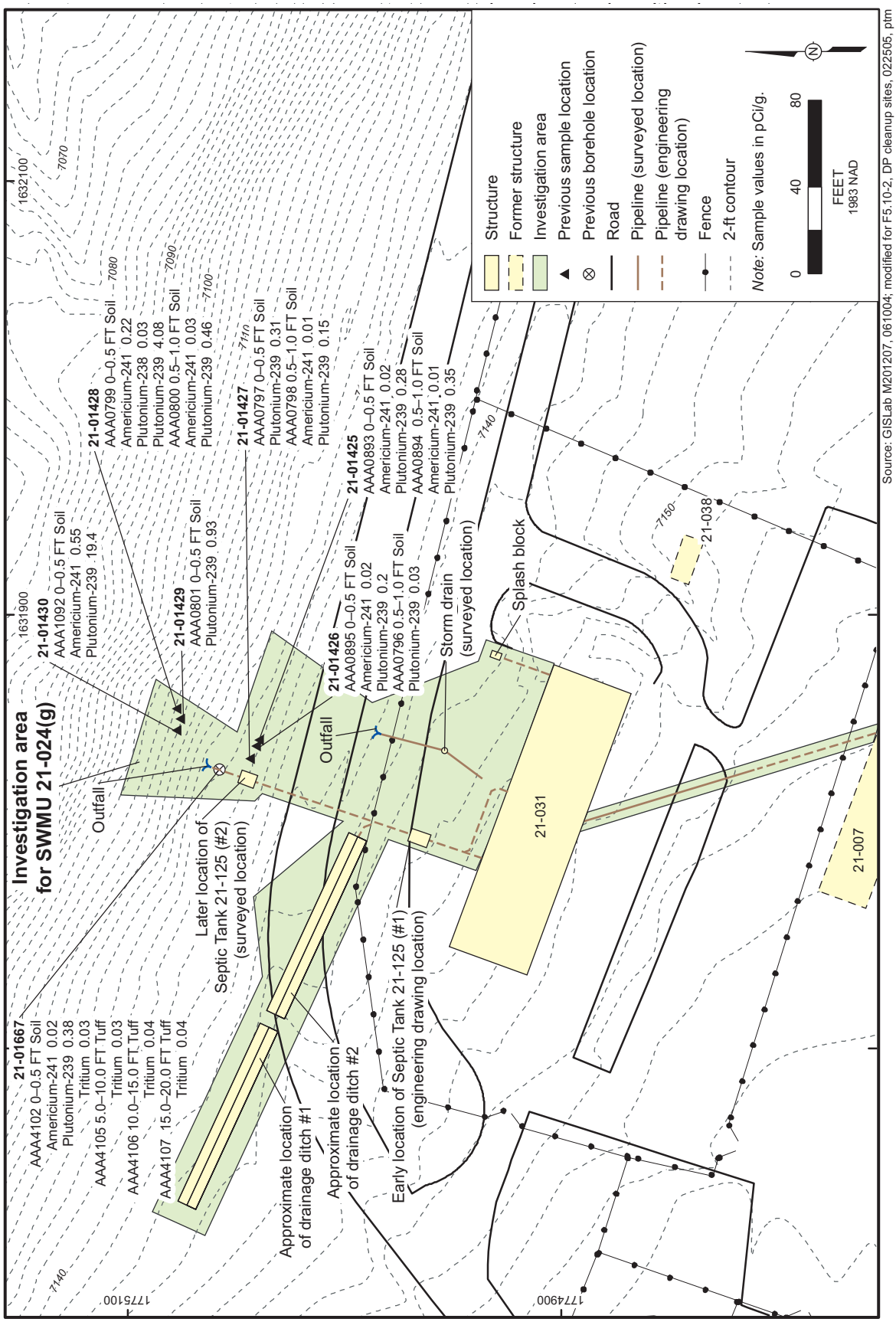


Figure 5.10-2. SWMU 21-024(g) sample locations with radionuclides detected greater than fallout values

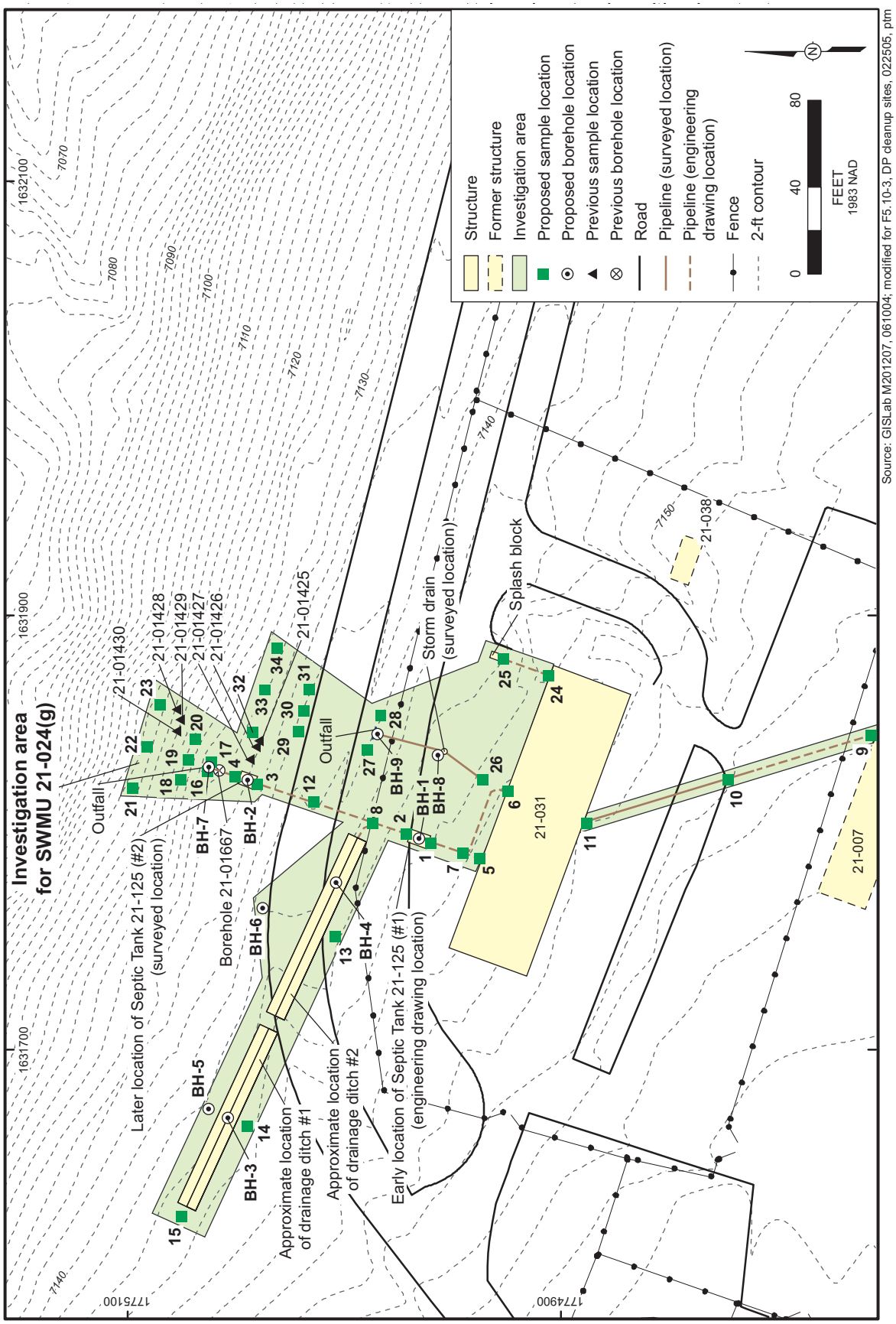


Figure 5.10-3. SWMU 21-024(g) proposed sample locations

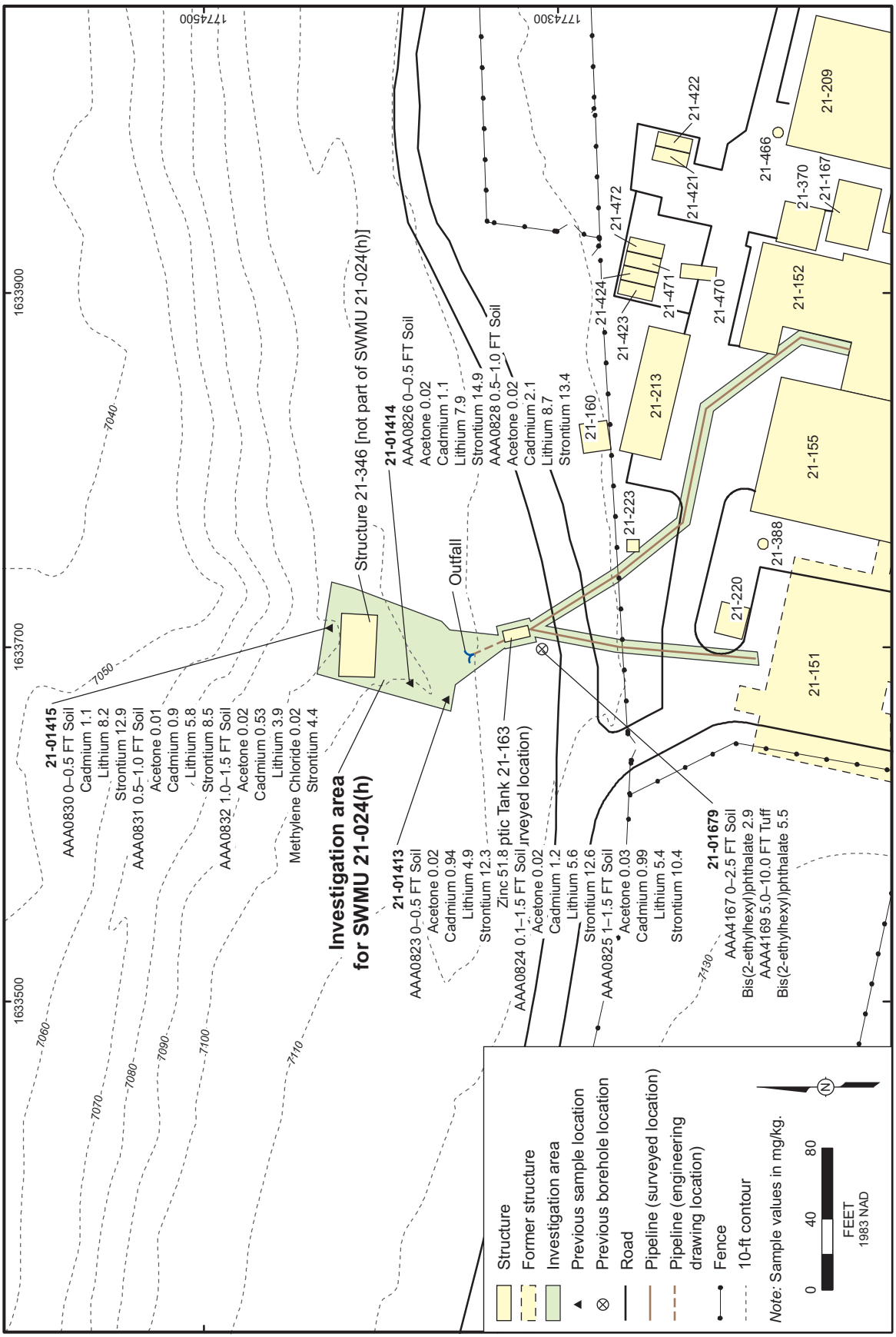


Figure 5.11-1. SWMU 21-024(h) sample locations with inorganic chemicals detected greater than background values and detected organic chemicals

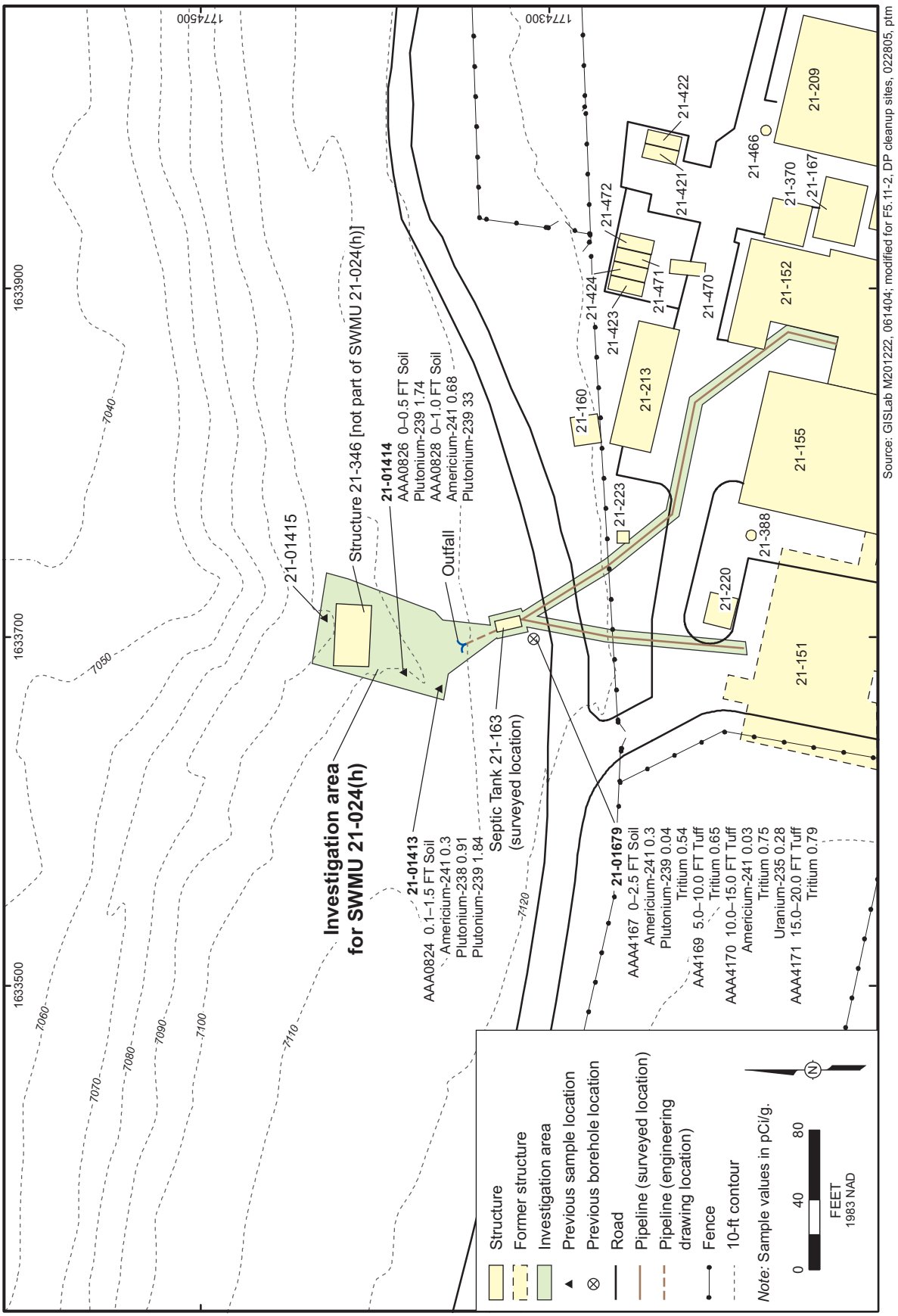
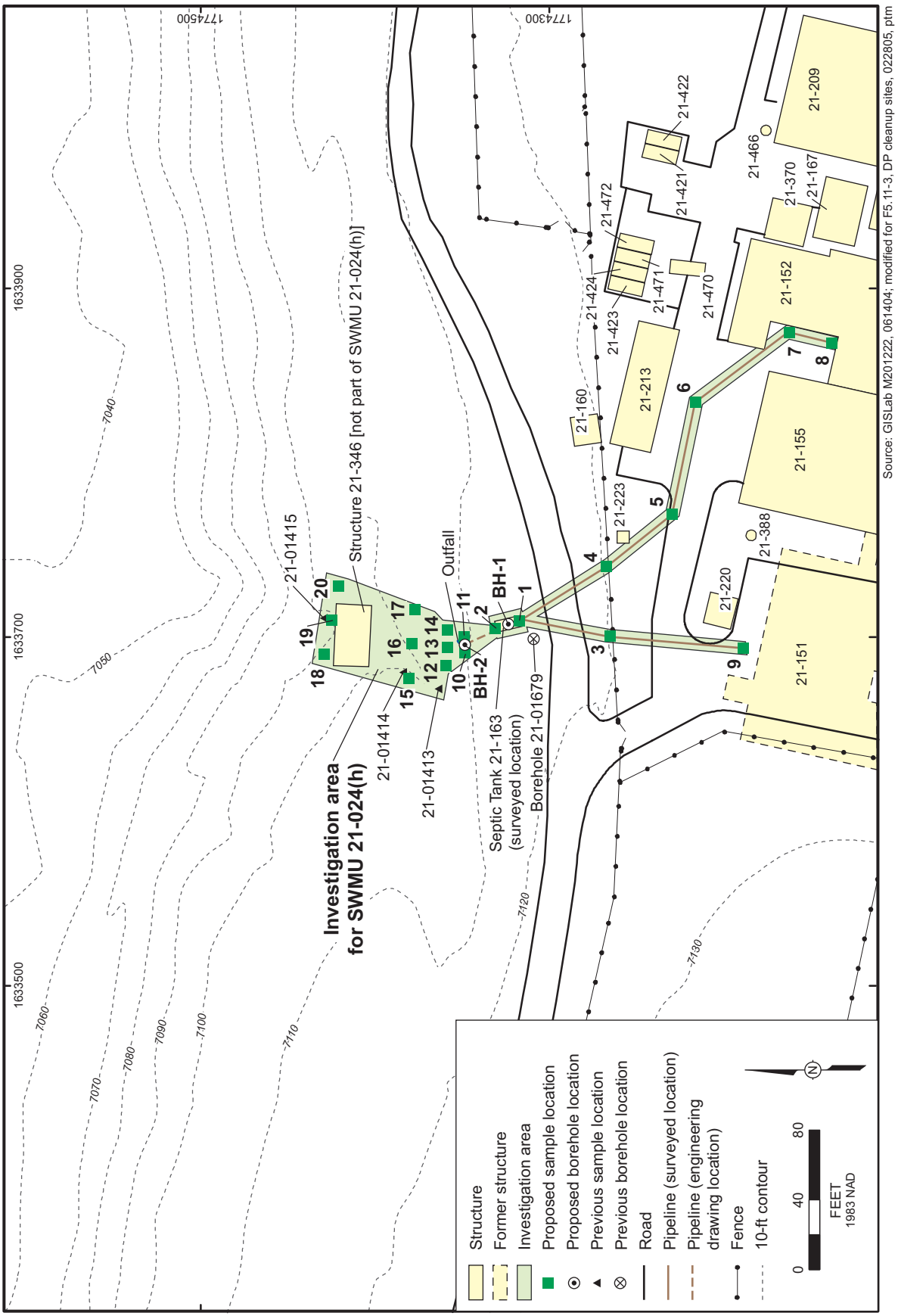
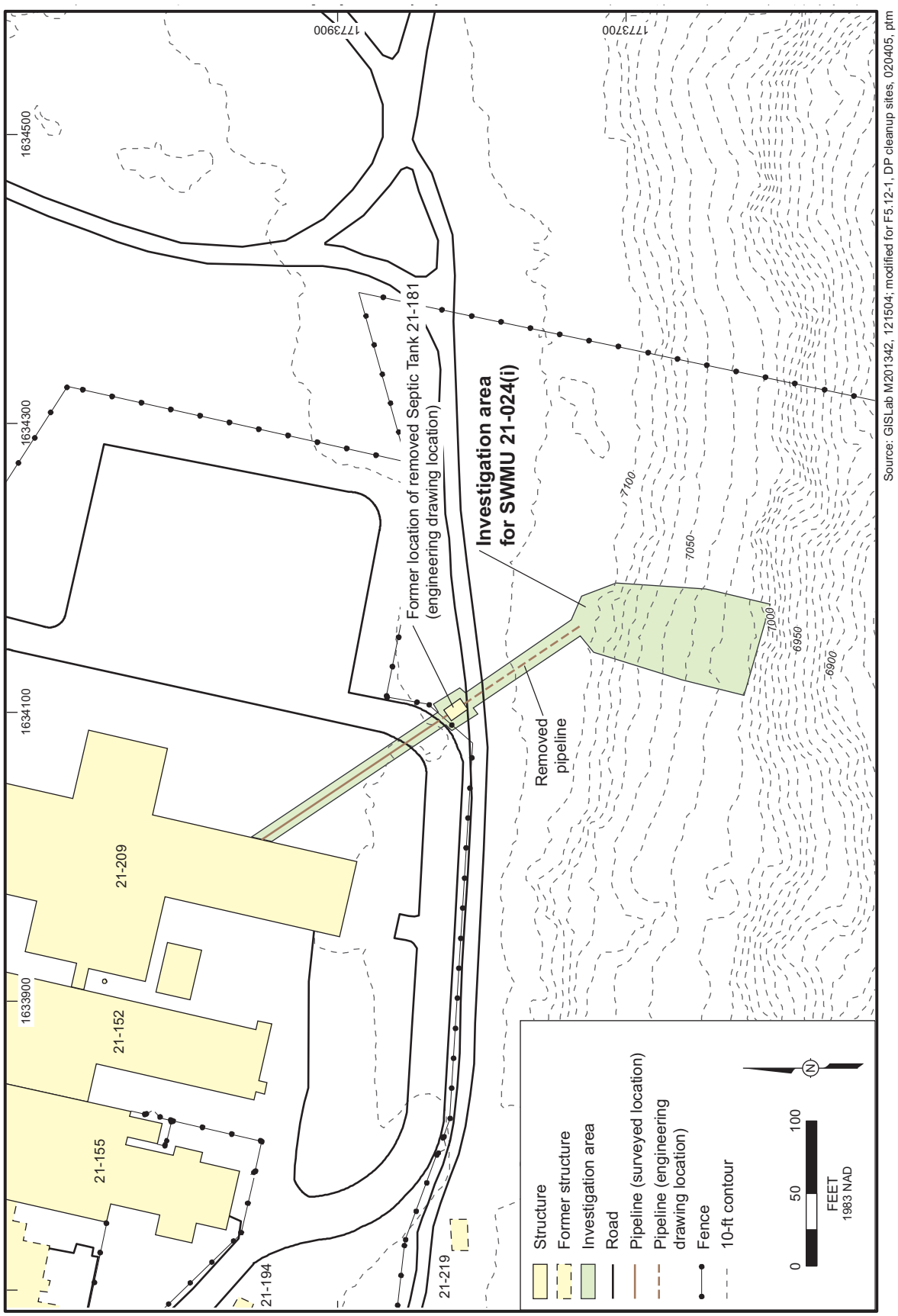


Figure 5.11-2. SWMU 21-024(h) sample locations with radionuclides detected greater than background or fallout values



Source: GISLab M201222, 061404; modified for F5.11-3, DP cleanup sites, 022805, ptm

Figure 5.11-3. SWMU 21-024(h) proposed sample locations



Source: GISLab M201342, 121504; modified for F5.12-1, DP cleanup sites, 020405, ptm

Figure 5.12-1. SWMU 21-024(i) inlet line

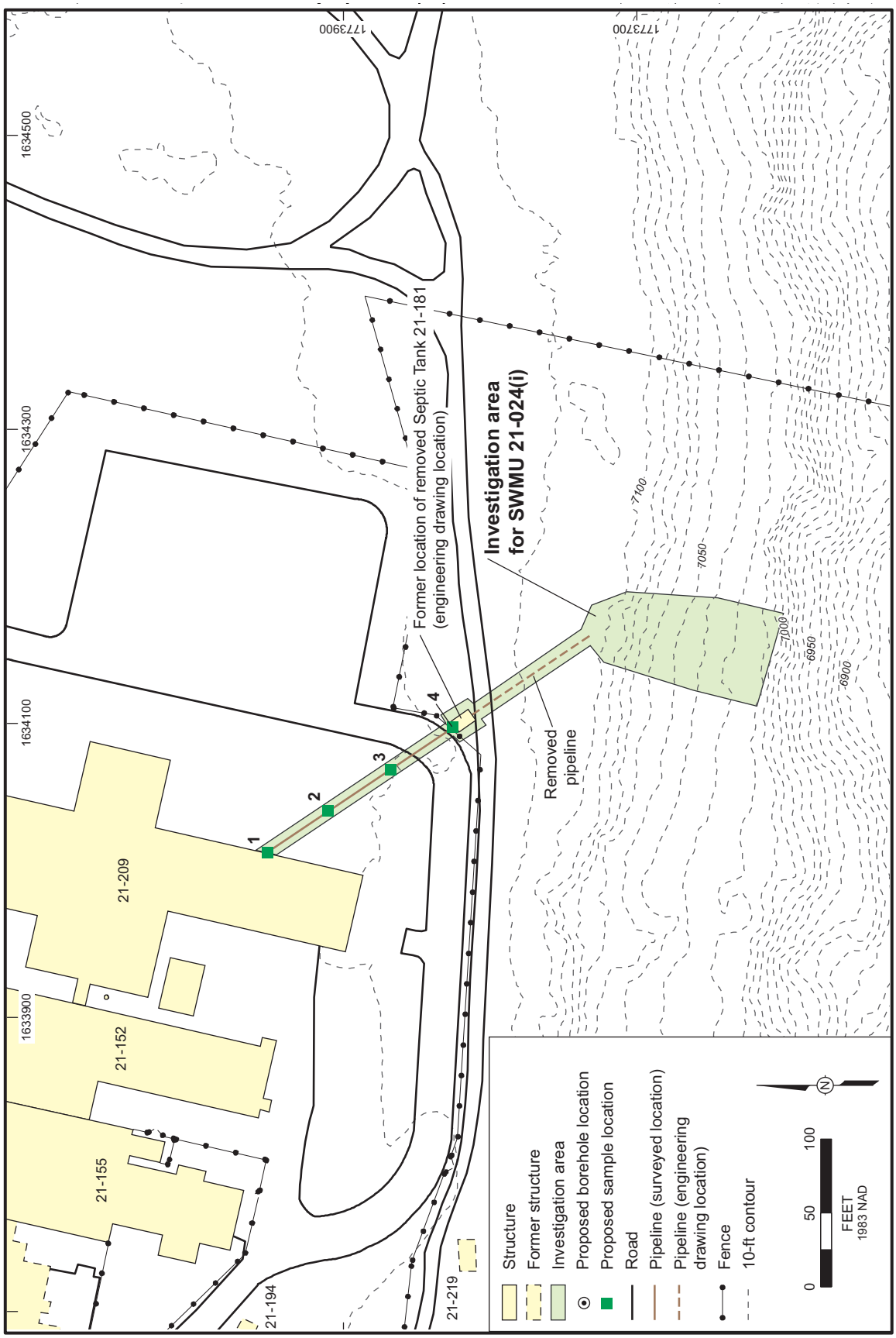
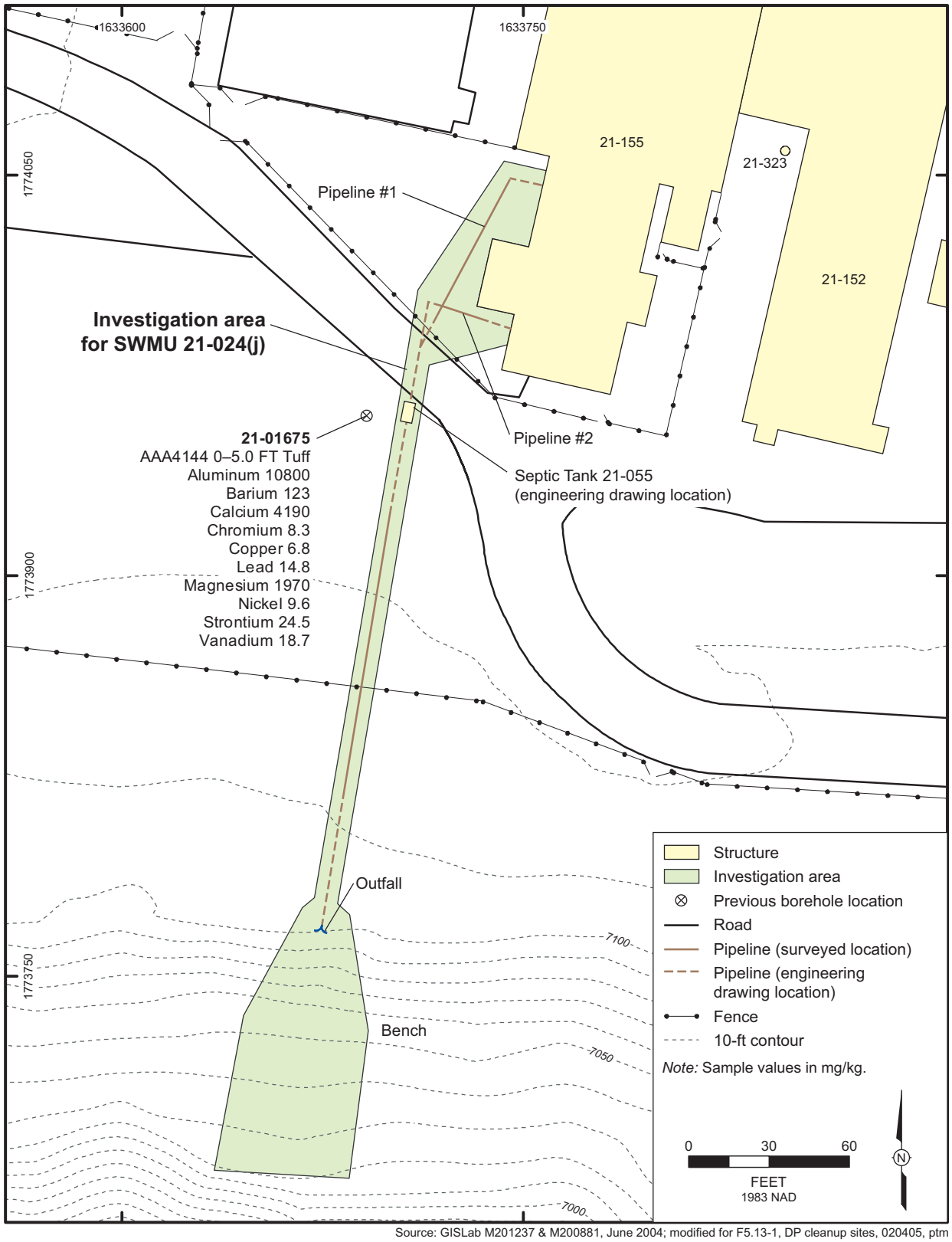
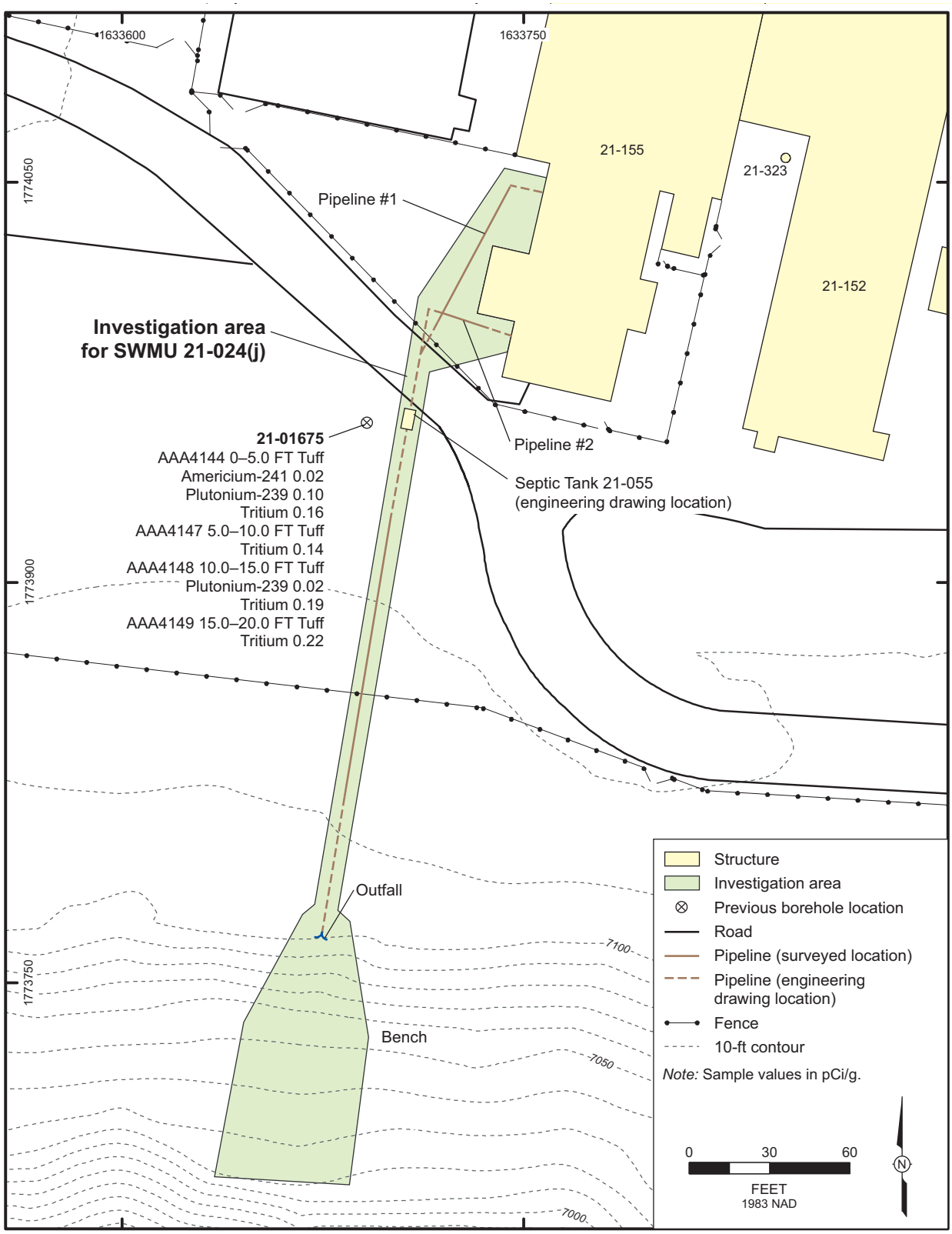


Figure 5.12-2. SWMU 21-024(i) proposed sample locations



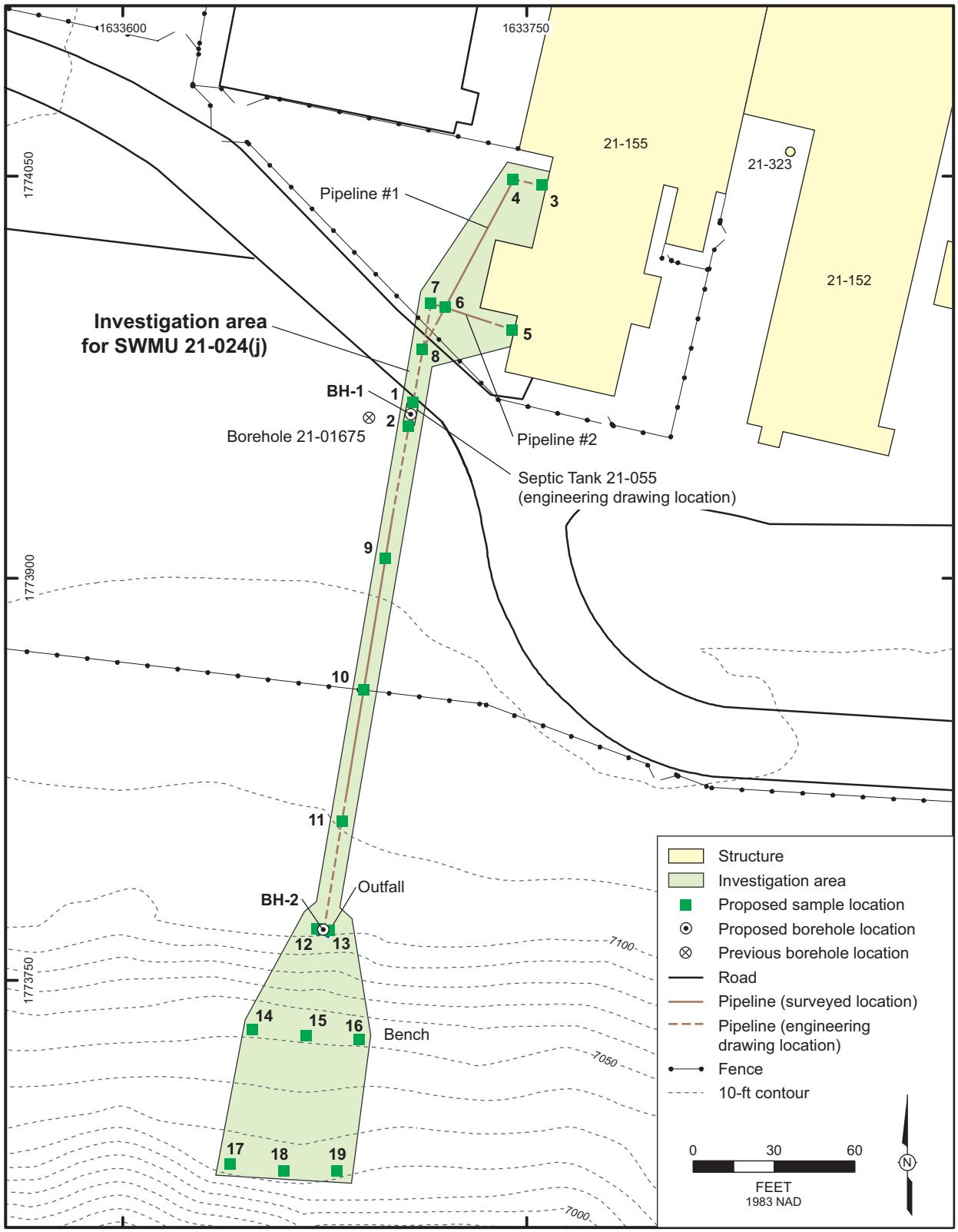
Source: GISLab M201237 & M200881, June 2004; modified for F5.13-1, DP cleanup sites, 020405, ptm

Figure 5.13-1. SWMU 21-024(j) sample locations with inorganic chemicals detected greater than background values



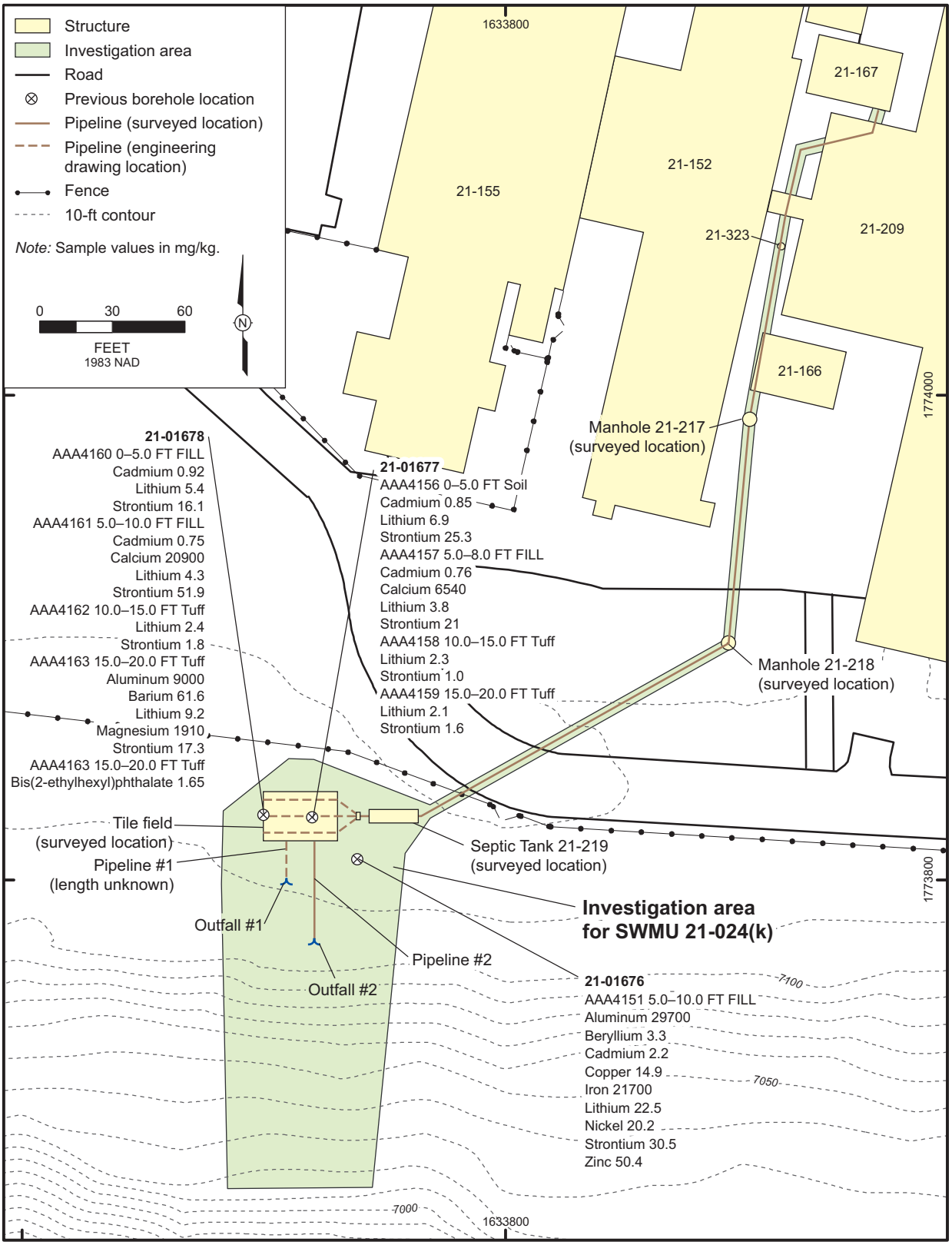
Source: GISLab M201237 & M200881, June 2004; modified for F5.13-2, DP cleanup sites, 020405, ptm

Figure 5.13-2. SWMU 21-024(j) sample locations with radionuclides detected greater than fallout values



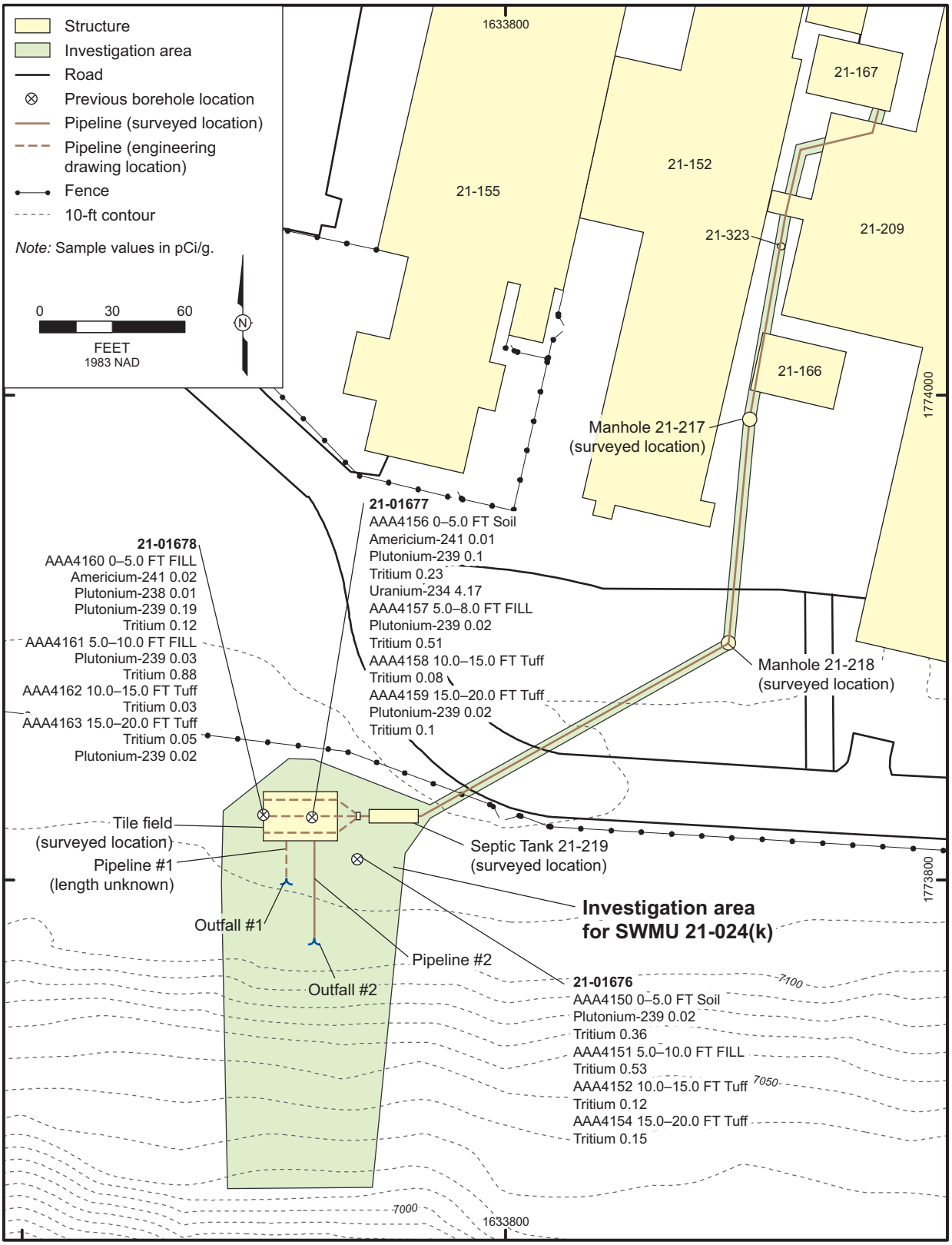
Source: GISLab M201237 & M200881, June 2004; modified for F5.13-3, DP cleanup sites, 020405, ptm

Figure 5.13-3. SWMU 21-024(j) proposed sample locations



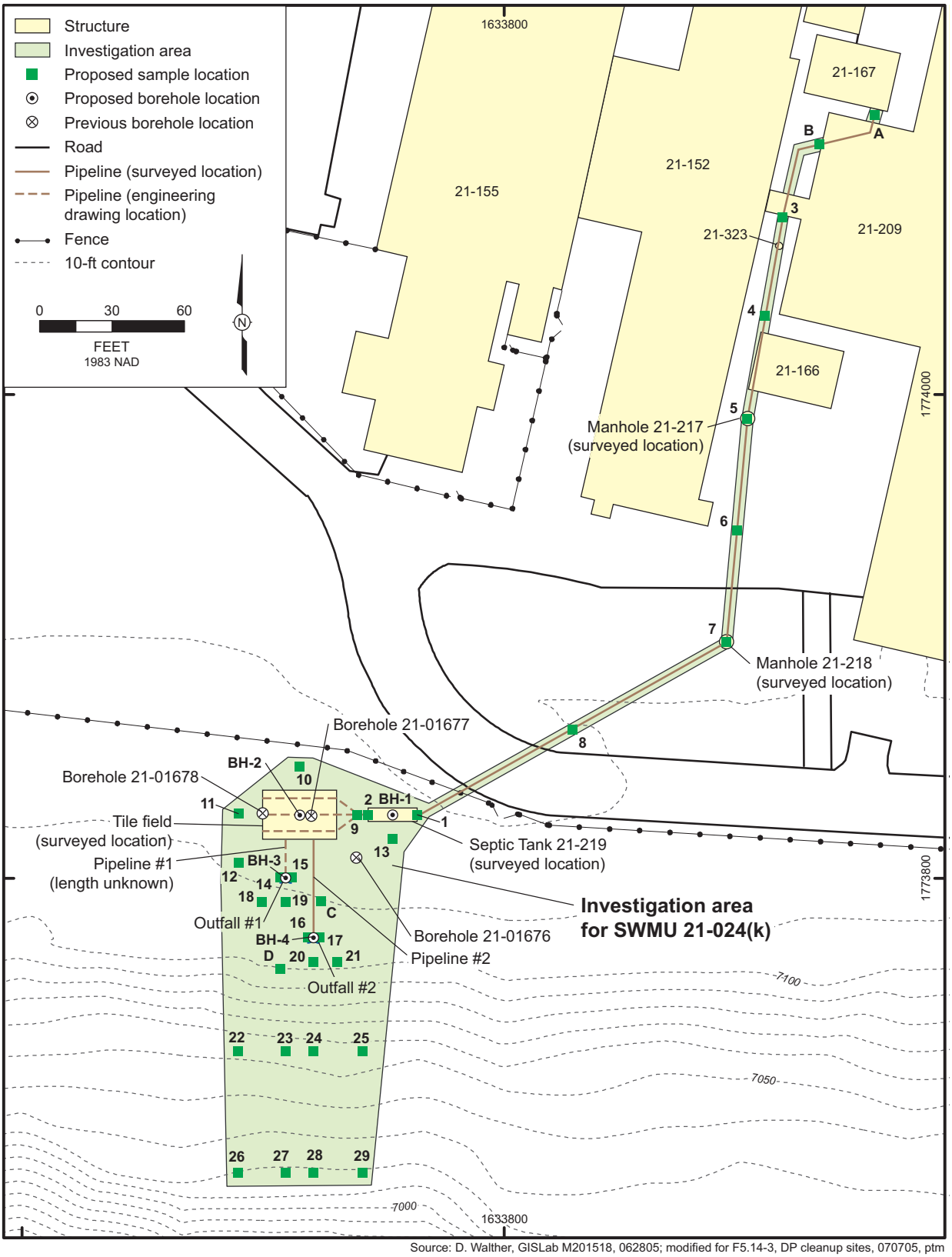
Source: D. Walther, GISLab M201518, 062805; modified for F5.14-1, DP cleanup sites, 070705, ptm

Figure 5.14-1. SWMU 21-024(k) sample locations with inorganic chemicals detected greater than background values and detected organic chemicals



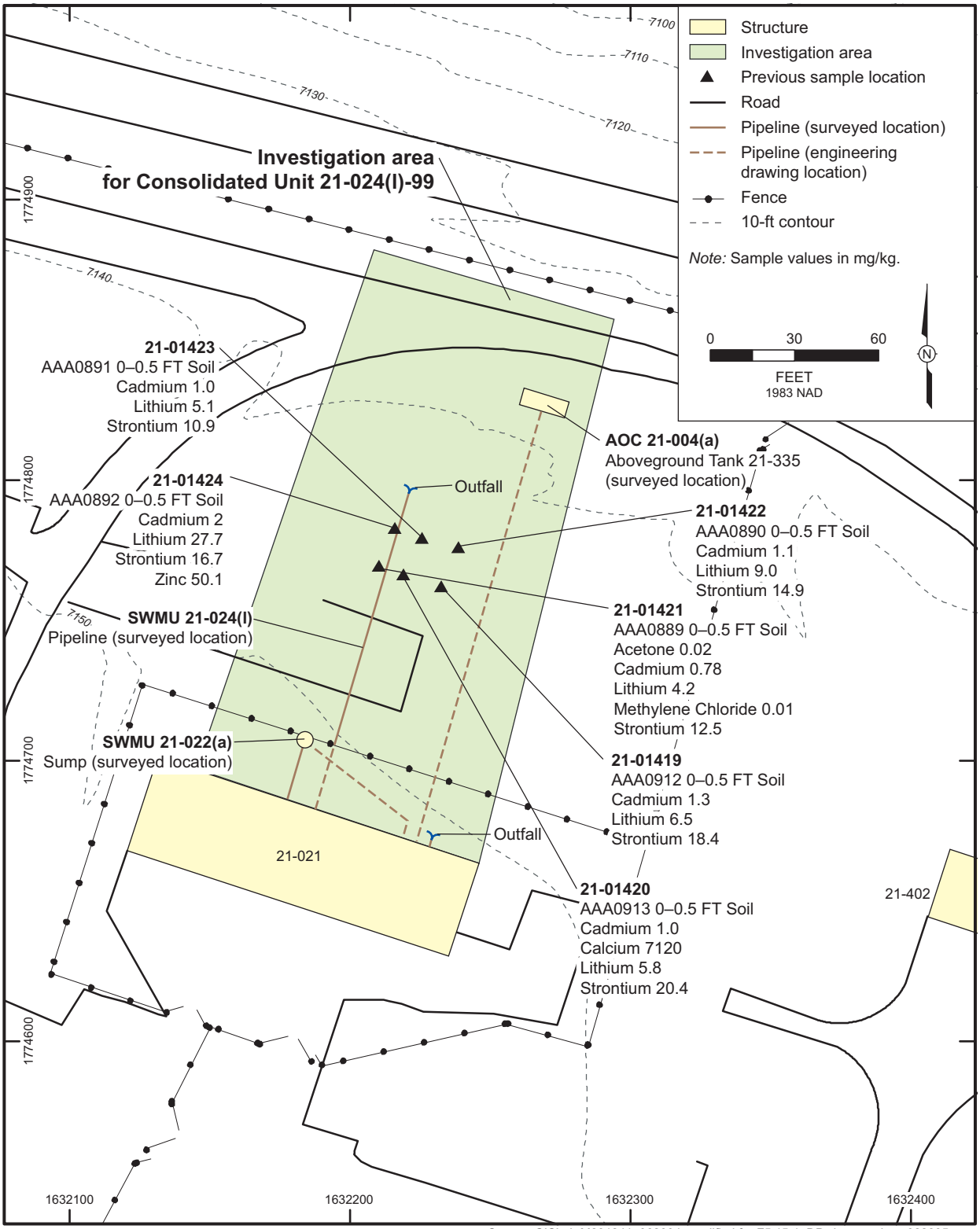
Source: D. Walther, GISLab M201518, 062805; modified for F5.14-2, DP cleanup sites, 070705, ptm

Figure 5.14-2. SWMU 21-024(k) sample locations with radionuclides detected greater than background or fallout values



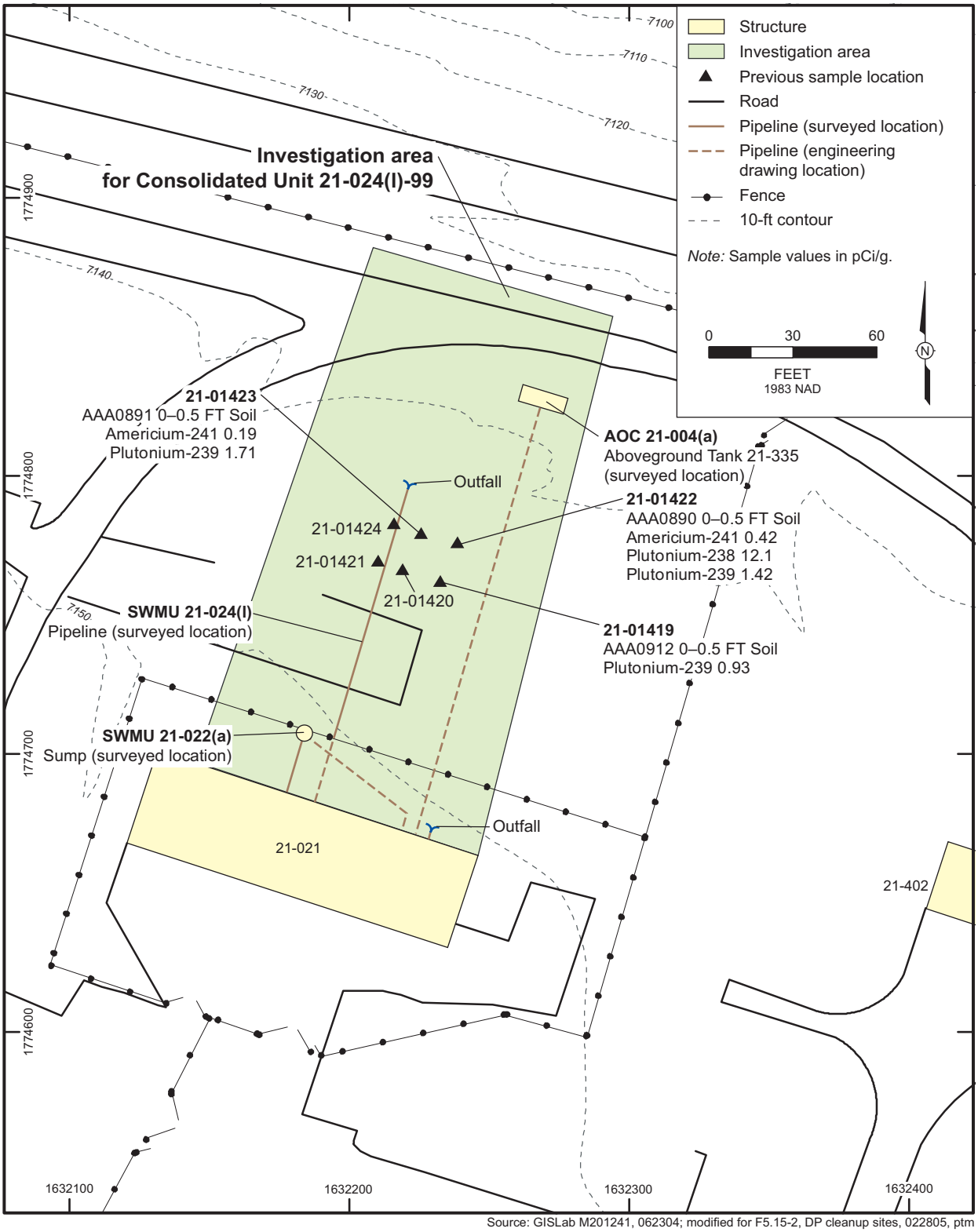
Source: D. Walther, GISLab M201518, 062805; modified for F5.14-3, DP cleanup sites, 070705, ptm

Figure 5.14-3. SWMU 21-024(k) proposed sample locations



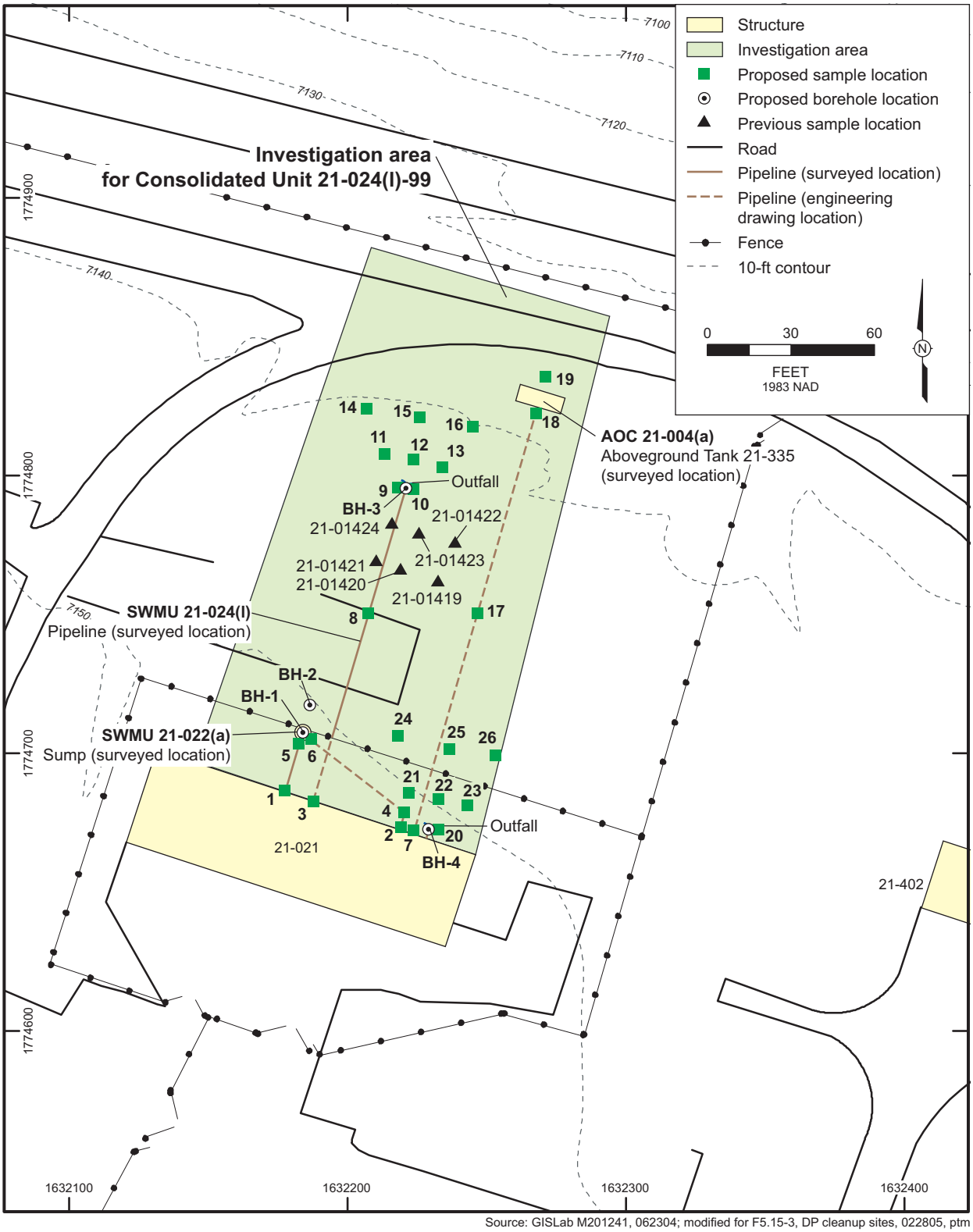
Source: GISLab M201241, 062304; modified for F5.15-1, DP cleanup sites, 022805, ptm

Figure 5.15-1. Consolidated Unit 21-024(l)-99 sample locations with inorganic chemicals detected greater than background values and detected organic chemicals



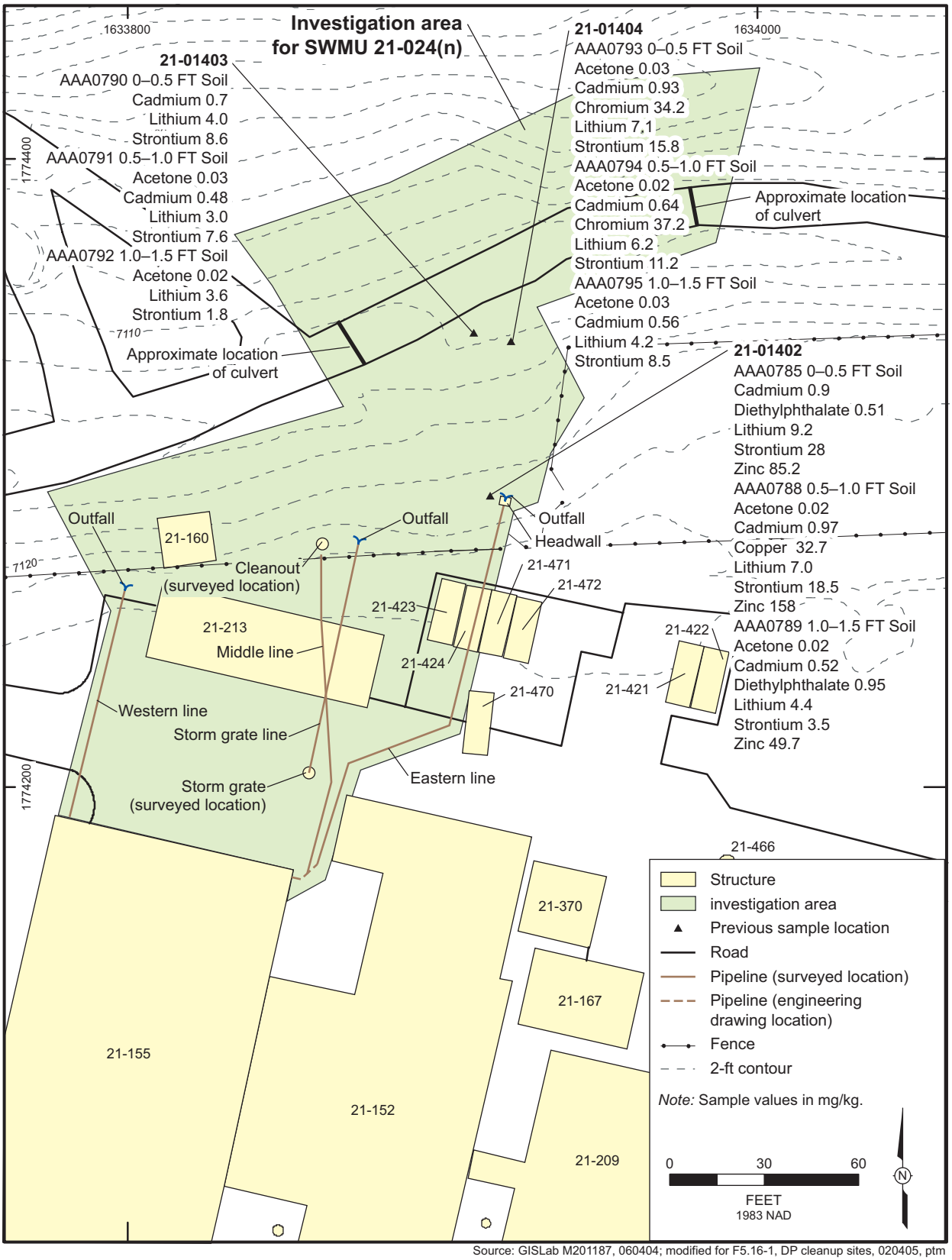
Source: GISLab M201241, 062304; modified for F5.15-2, DP cleanup sites, 022805, ptm

Figure 5.15-2. Consolidated Unit 21-024(I)-99 sample locations with radionuclides detected greater than fallout values



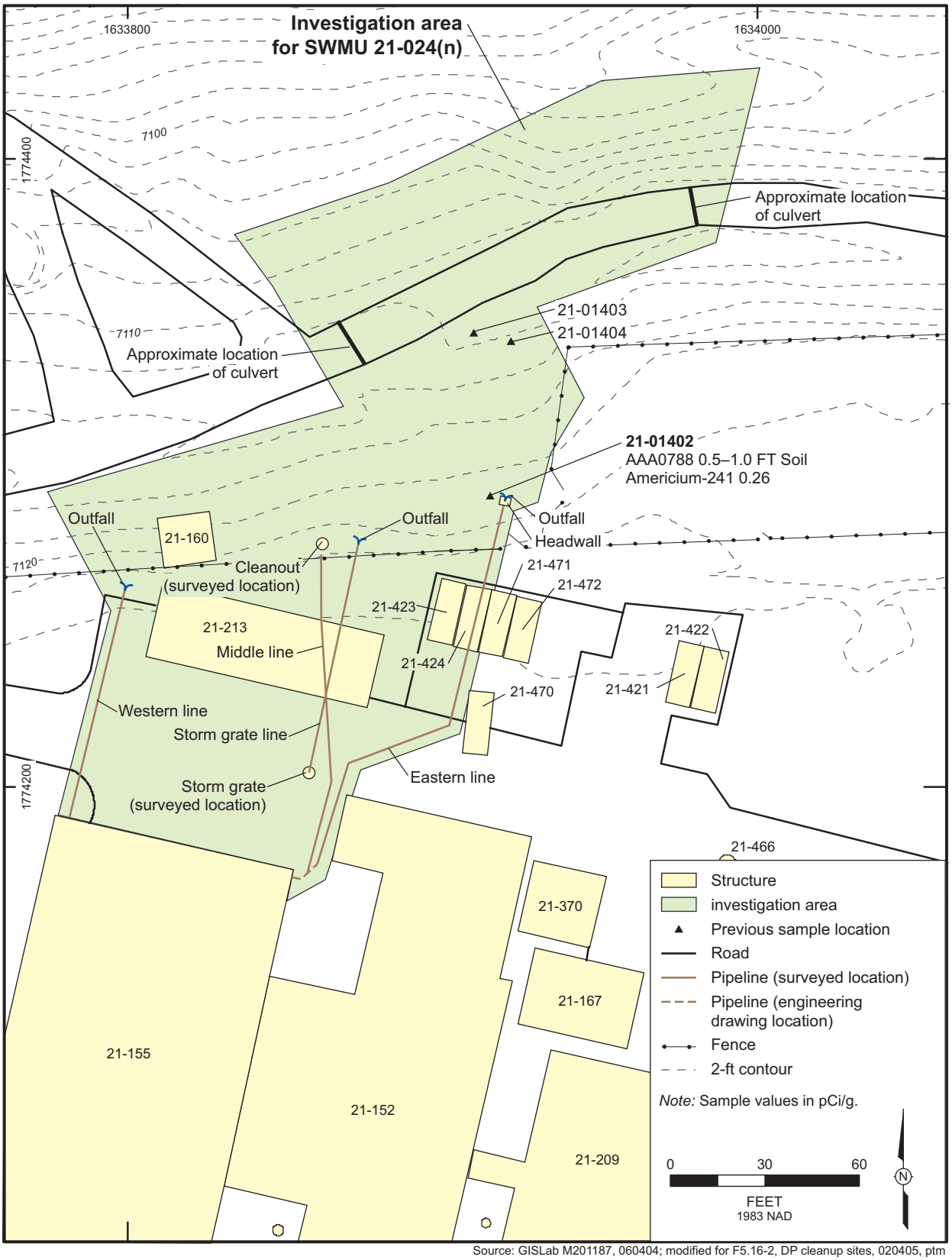
Source: GISLab M201241, 062304; modified for F5.15-3, DP cleanup sites, 022805, ptm

Figure 5.15-3. Consolidated Unit 21-024(I)-99 proposed sample locations



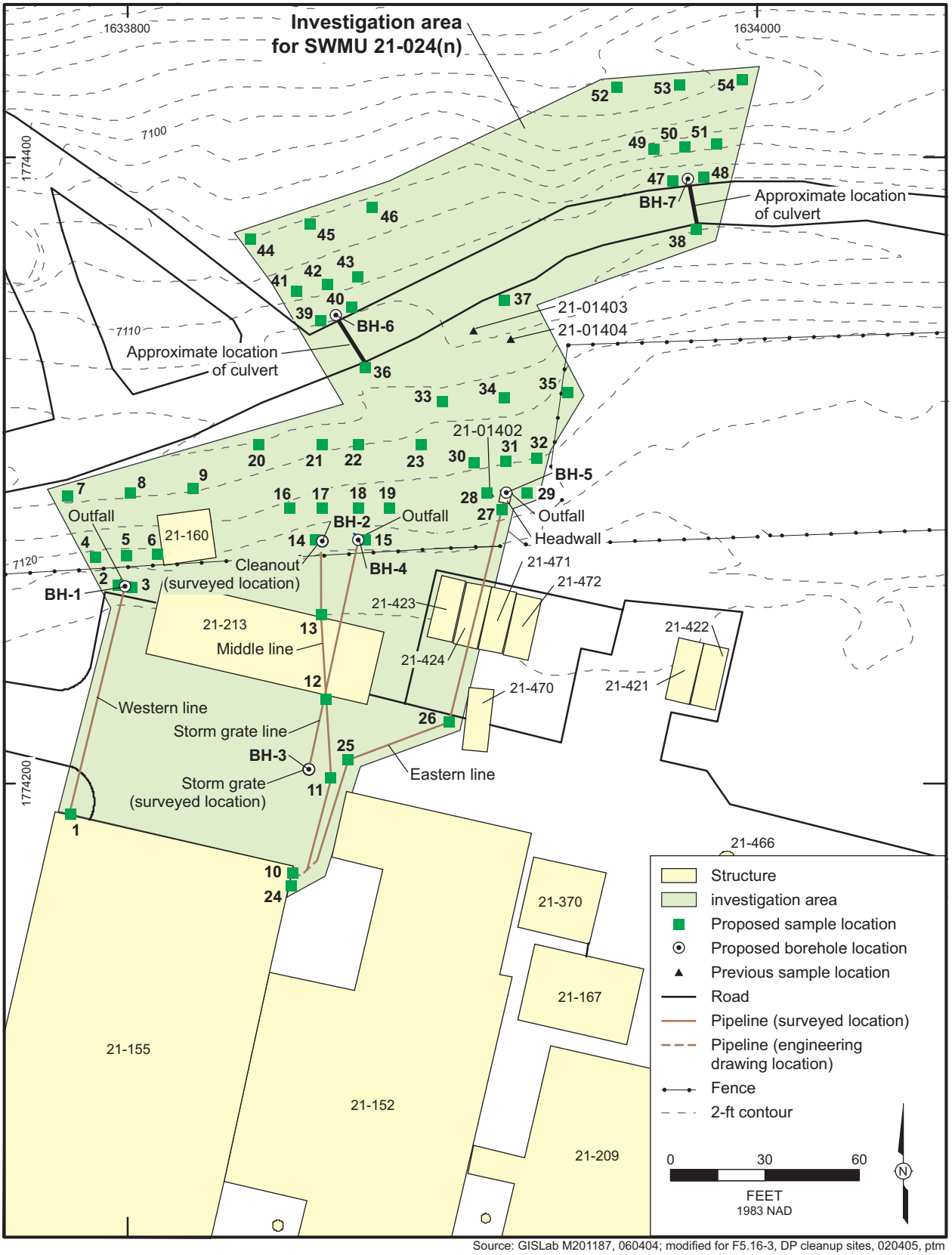
Source: GISLab M201187, 060404; modified for F5.16-1, DP cleanup sites, 020405, ptm

Figure 5.16-1. SWMU 21-024(n) sample locations with inorganic chemicals detected greater than background values and detected organic chemicals



Source: GISLab M201187, 060404; modified for F5.16-2, DP cleanup sites, 020405, ptm

Figure 5.16-2. SWMU 21-024(n) sample locations with radionuclides detected greater than fallout values



Source: GISLab M201187, 060404; modified for F5.16-3, DP cleanup sites, 020405, ptm

Figure 5.16-3. SWMU 21-024(n) proposed sample locations

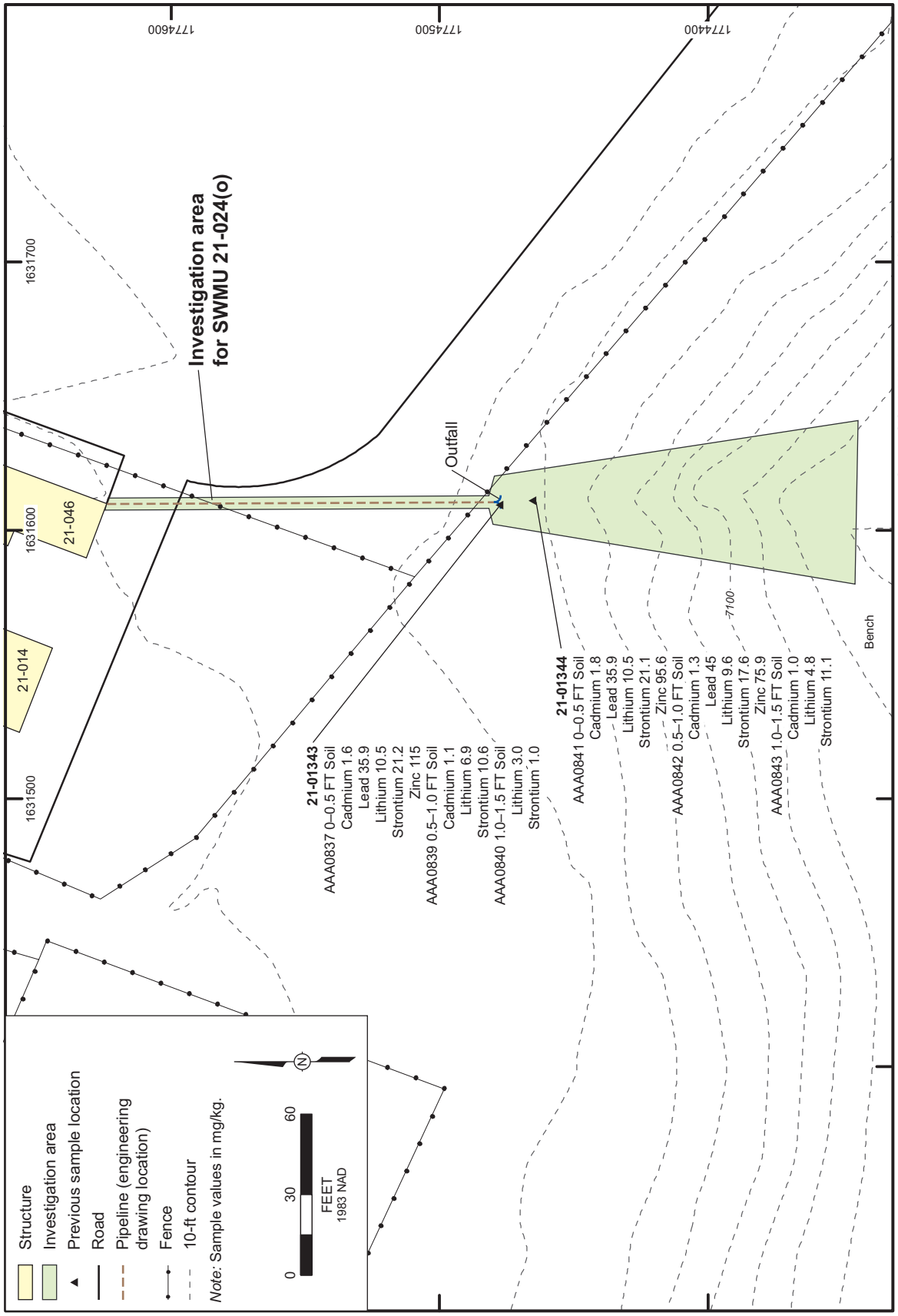


Figure 5.17-1. SWMU 21-024(o) sample locations with inorganic chemicals detected greater than background values

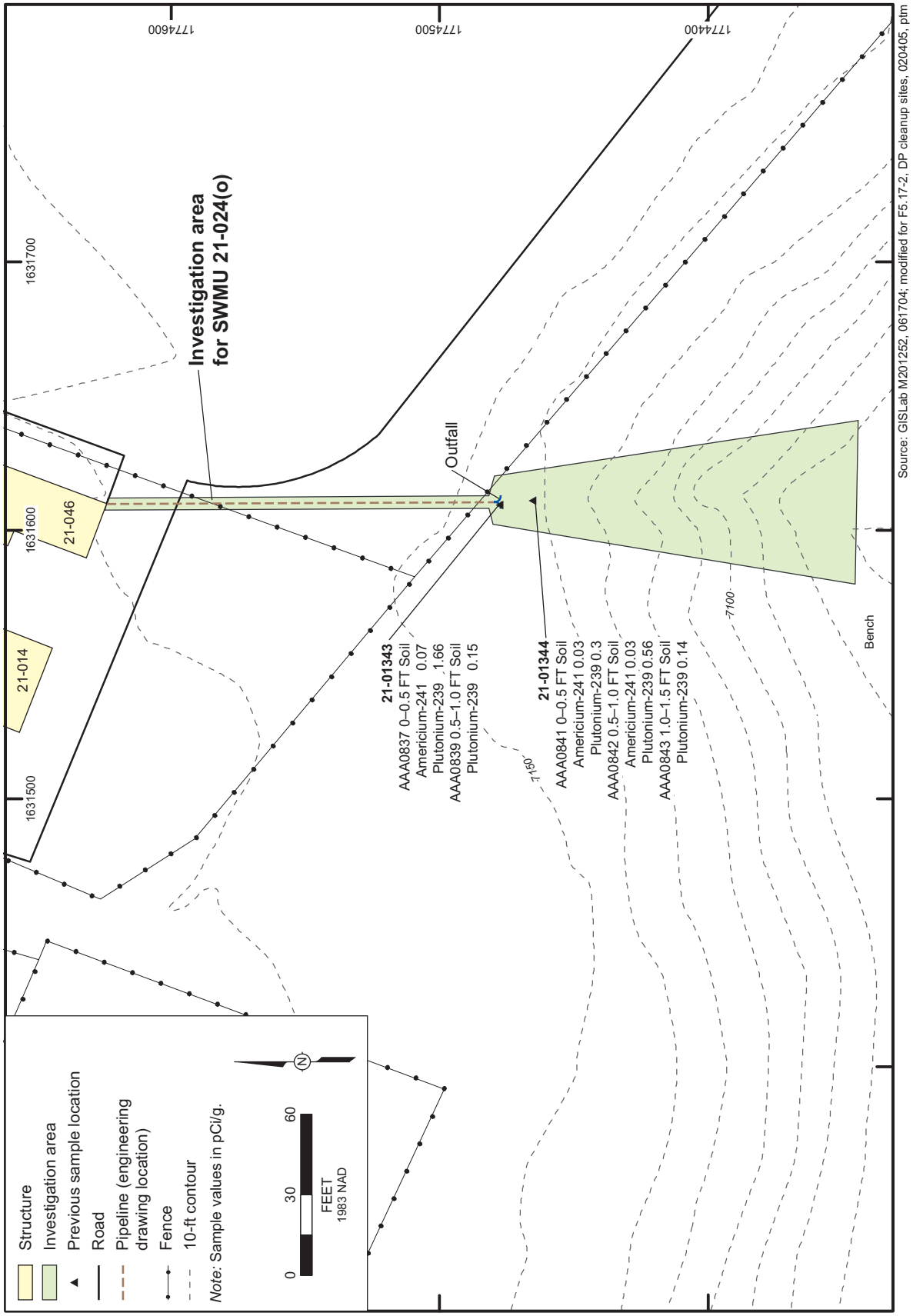


Figure 5.17-2. SWMU 21-024(o) sample locations with radionuclides detected greater than fallout values

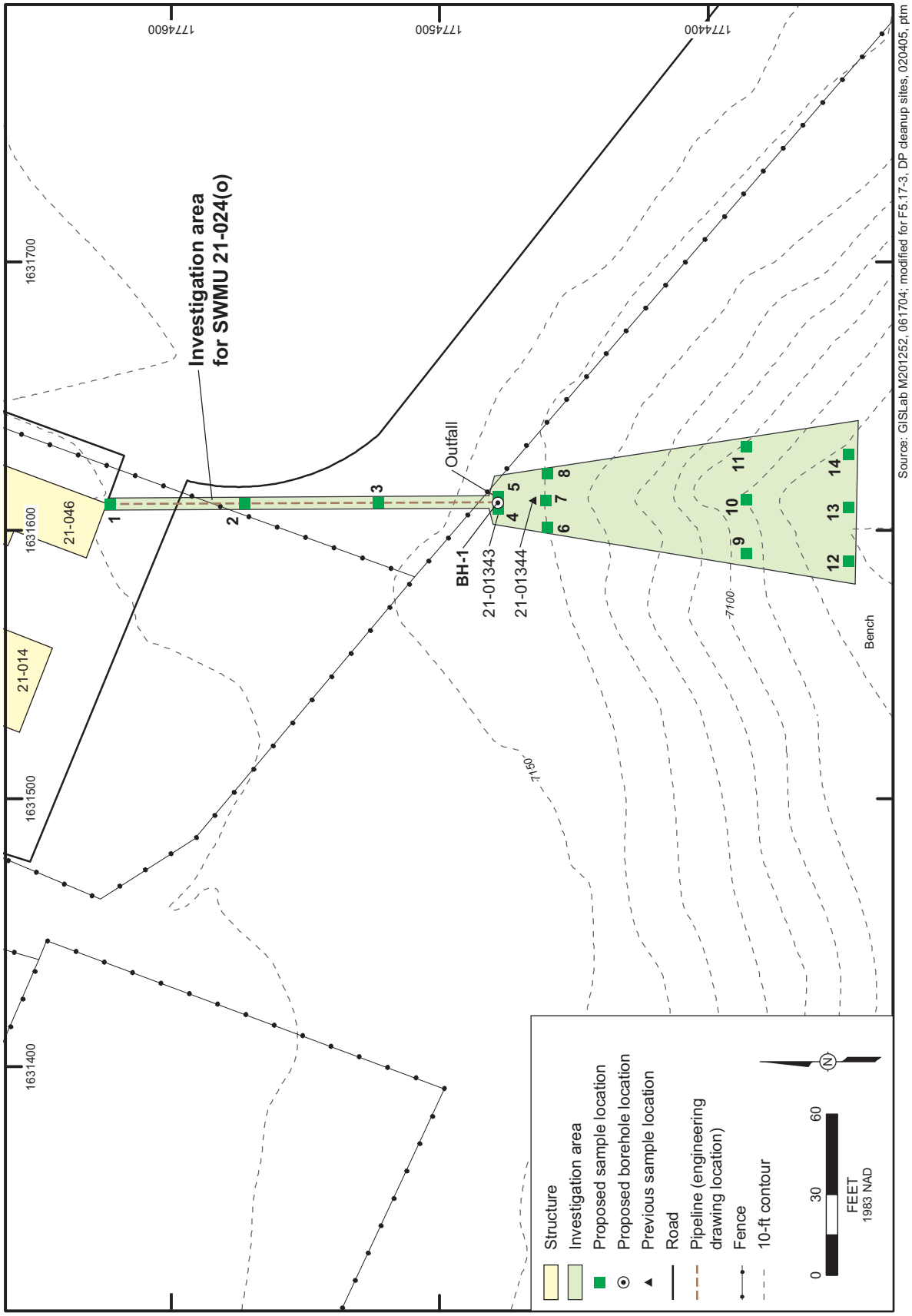


Figure 5.17-3. SWMU 21-024(o) proposed sample locations

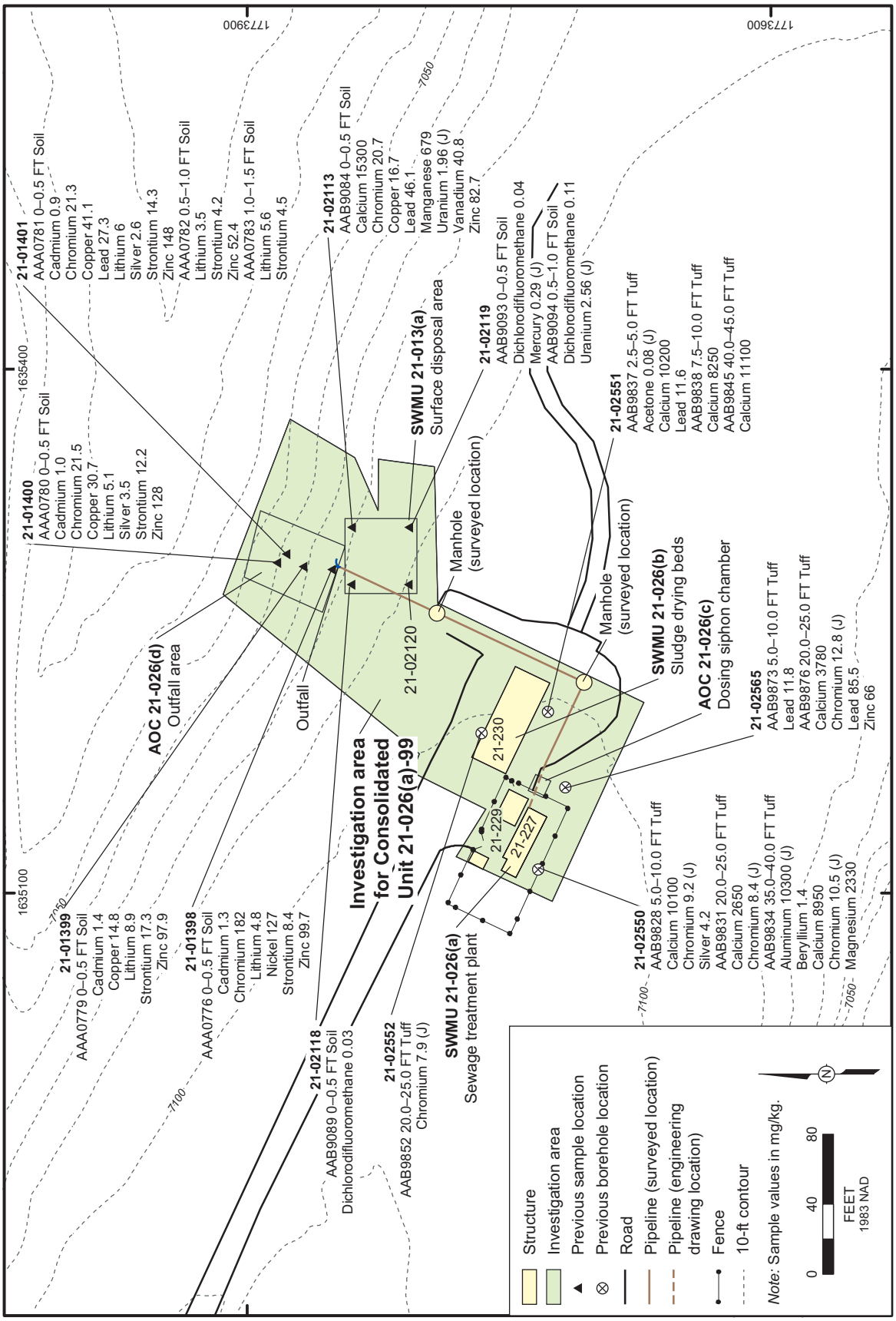


Figure 5.18-1. Consolidated Unit 21-026(a)-99 sample locations with inorganic chemicals detected greater than background values and detected organic chemicals

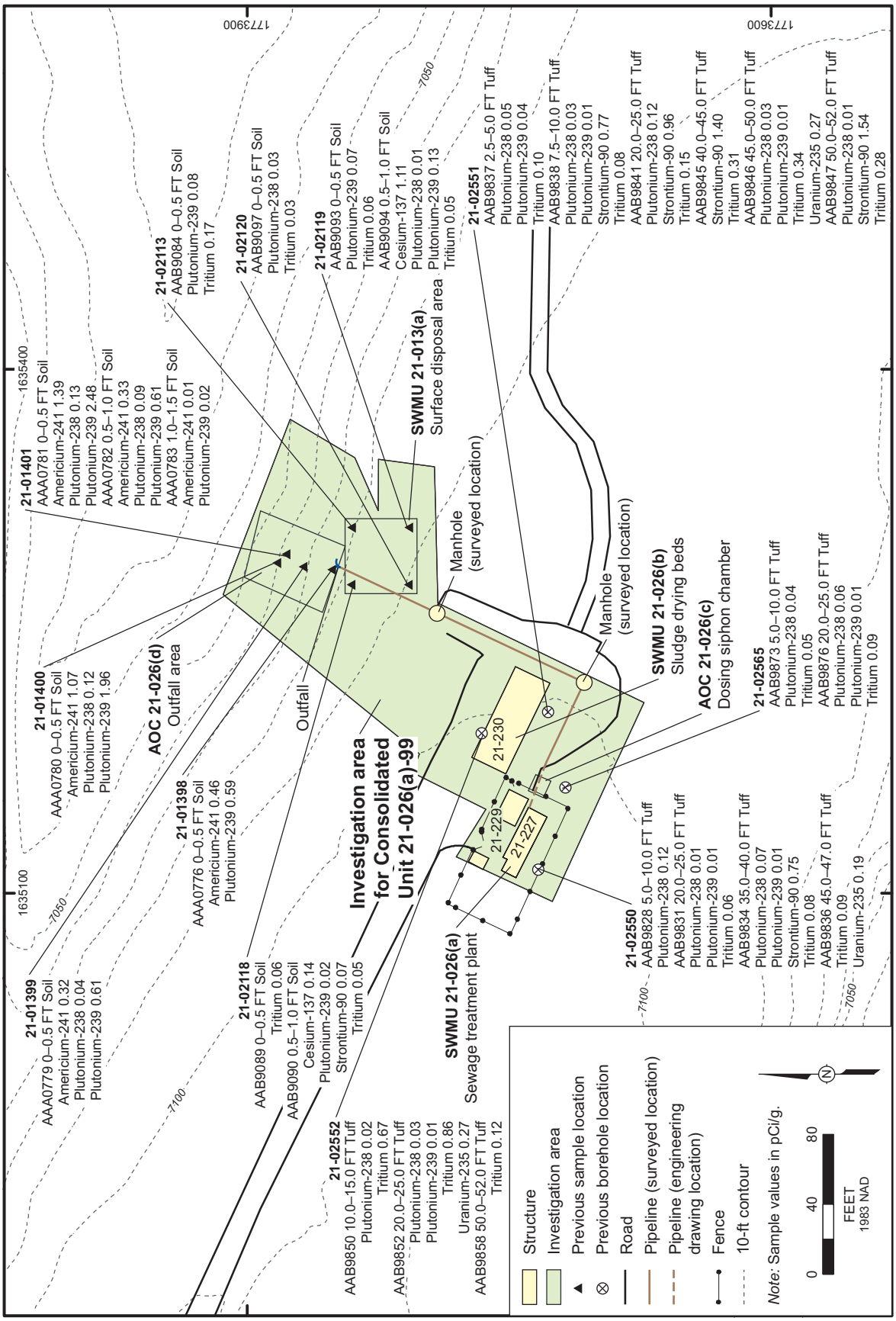


Figure 5.18-2. Consolidated Unit 21-026(a)-99 sample locations with radionuclides detected greater than background or fallout values

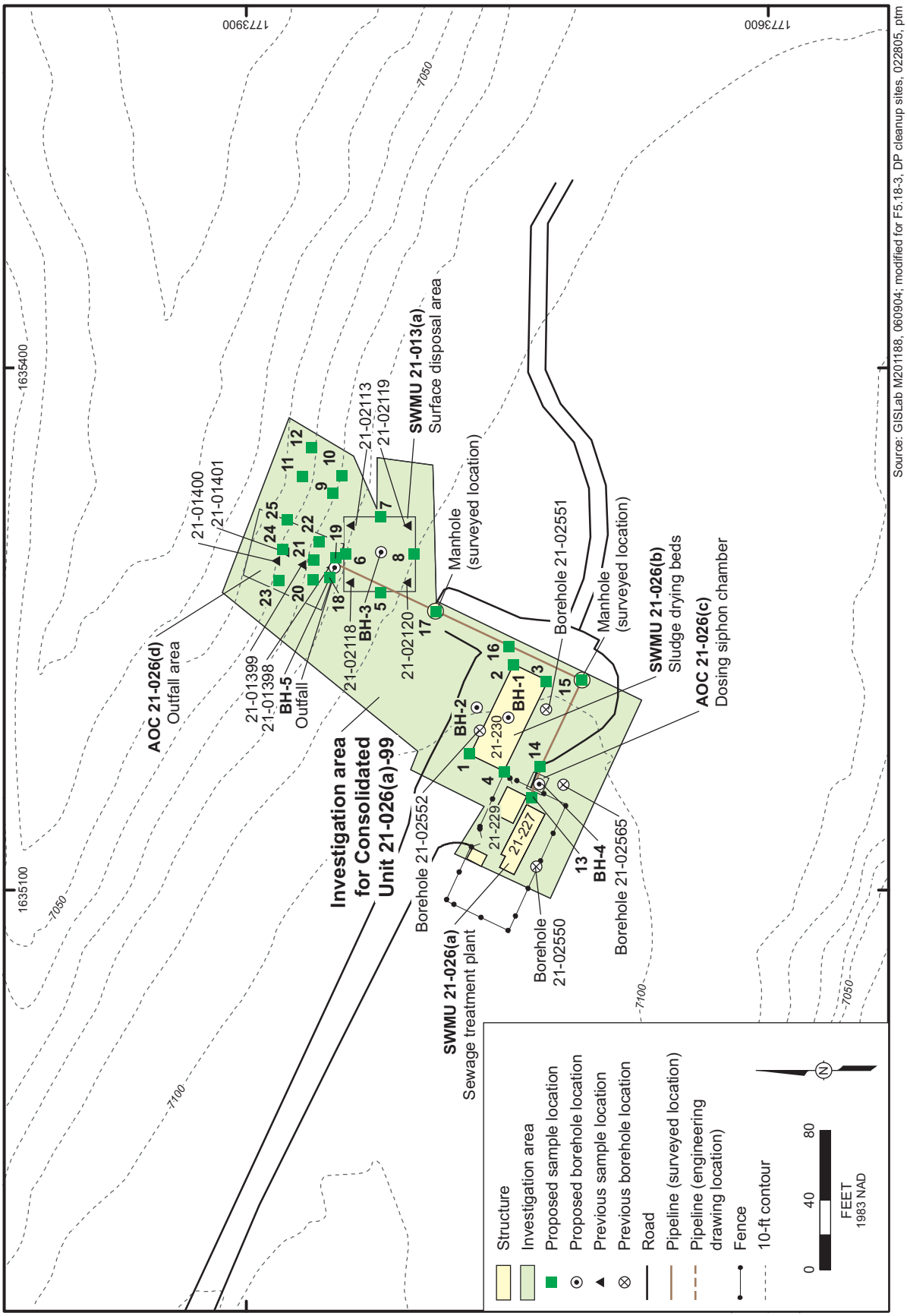


Figure 5.18-3. Consolidated Unit 21-026(a)-99 proposed sample locations

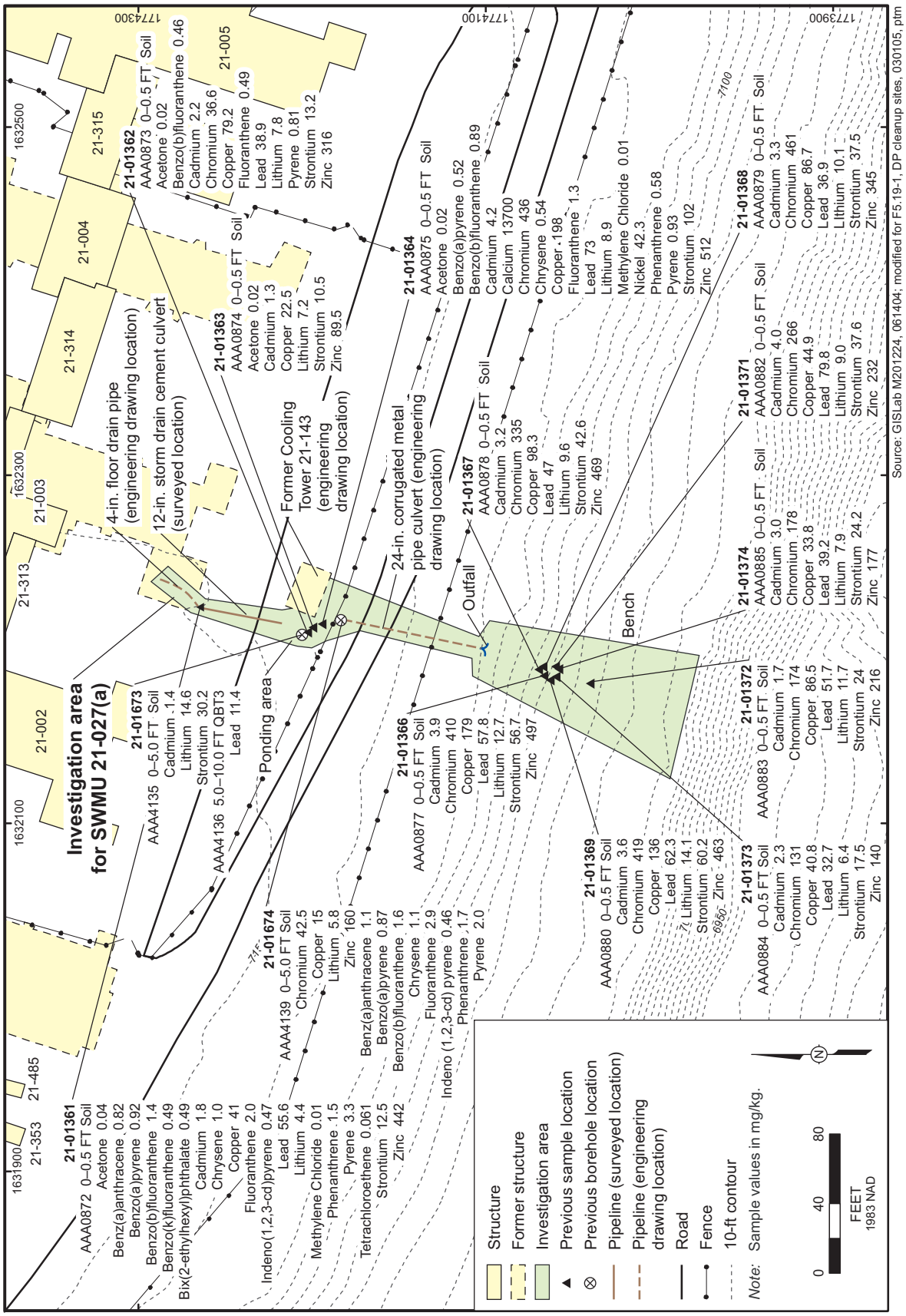


Figure 5.19-1. SWMU 21-027(a) sample locations with inorganic chemicals detected greater than background values or detected organic chemicals

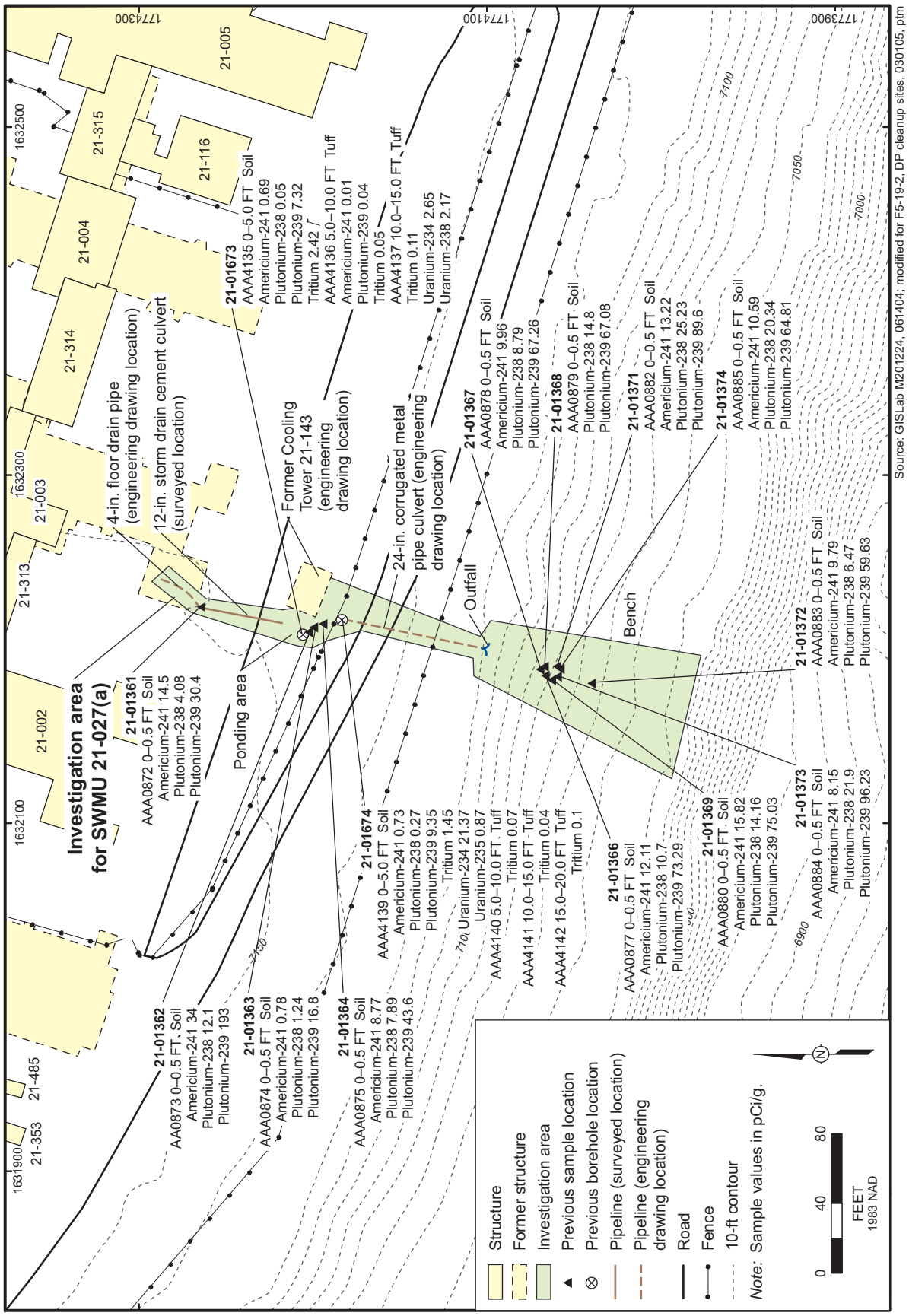


Figure 5-19-2. SWMU 21-027(a) sample locations with radionuclides detected greater than background or fallout values

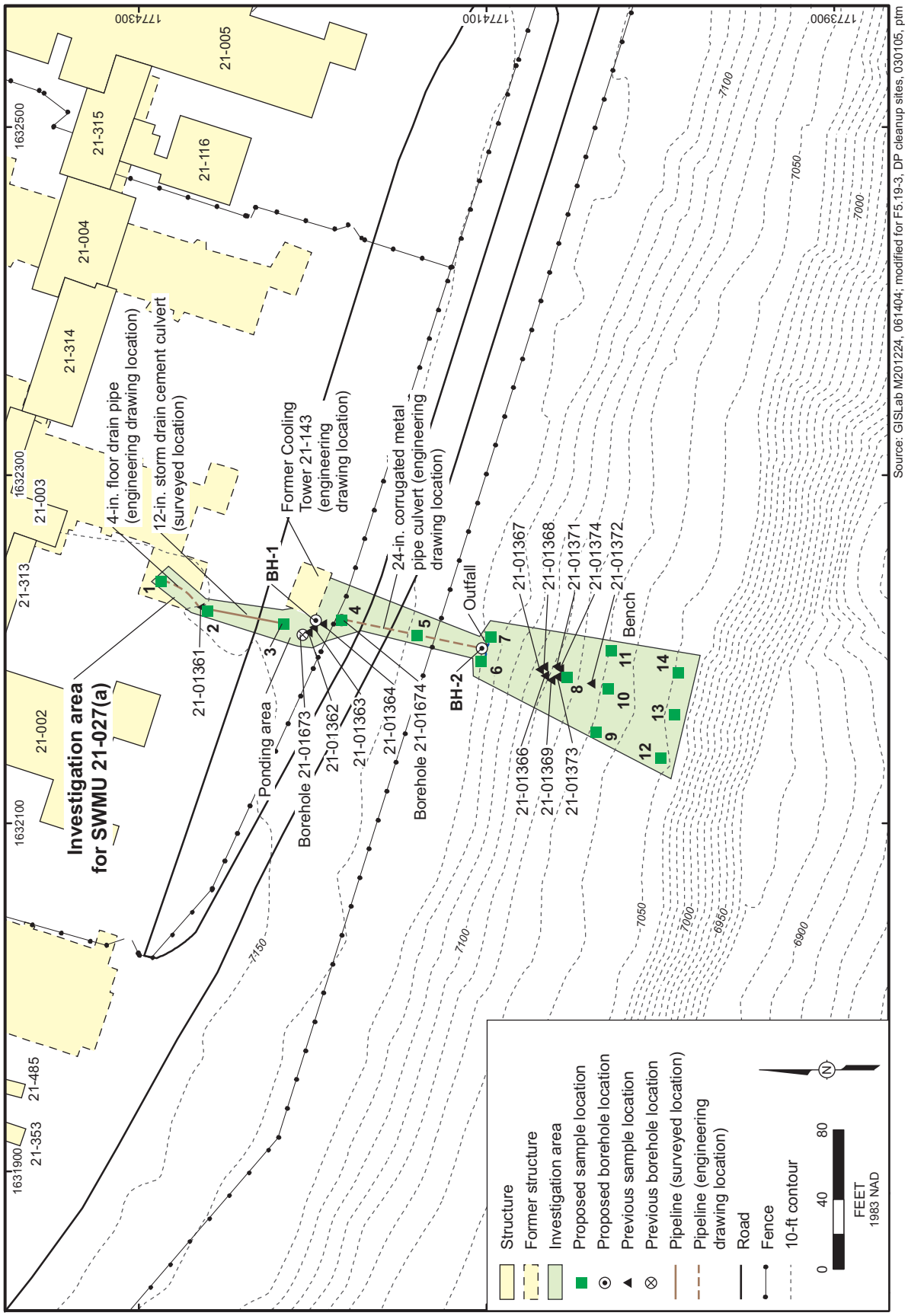


Figure 5.19-3. SWMU 21-027(a) proposed sample locations

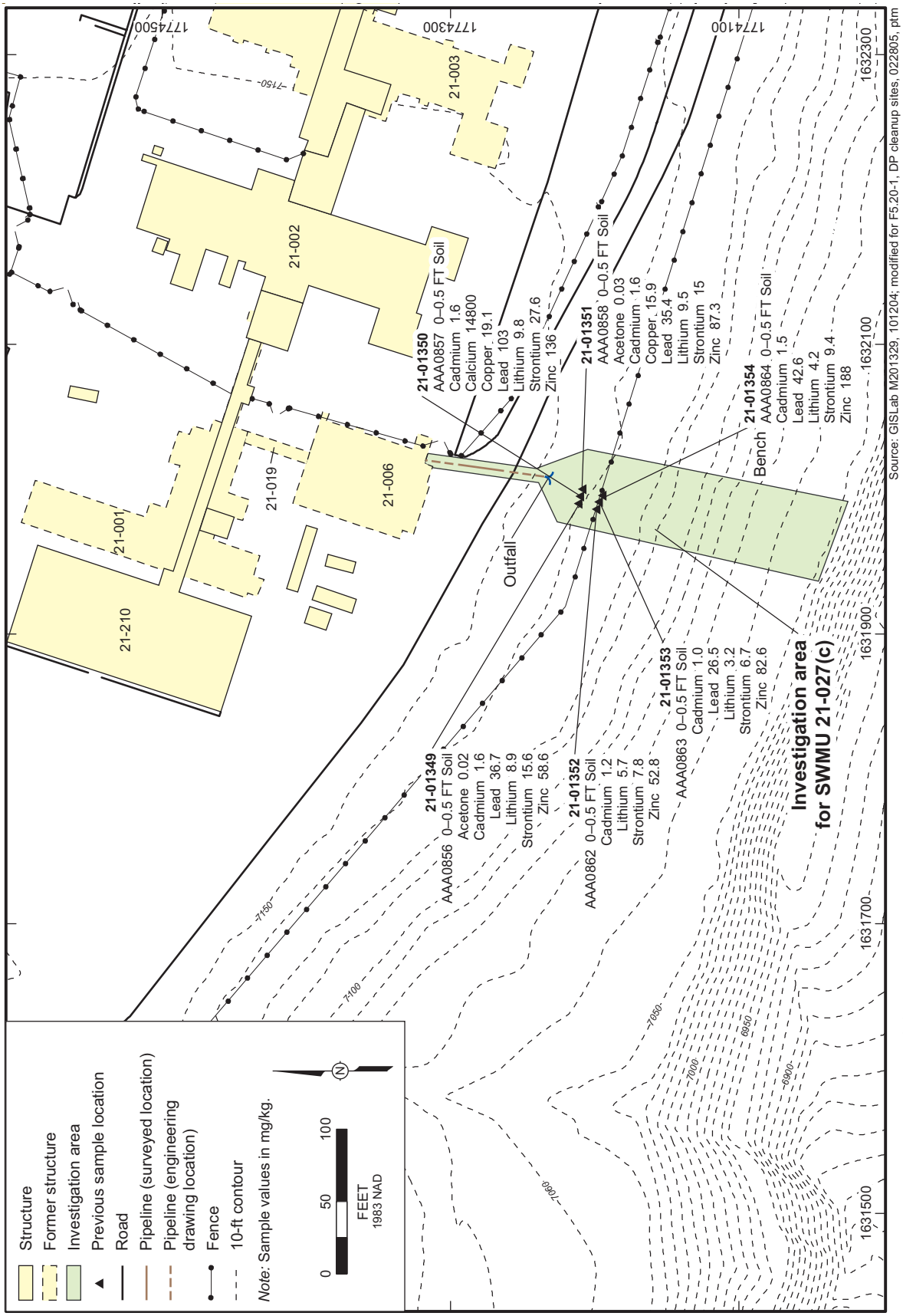


Figure 5.20-1. SWMU 21-027(c) sample locations with inorganic chemicals detected greater than background values and detected organic chemicals

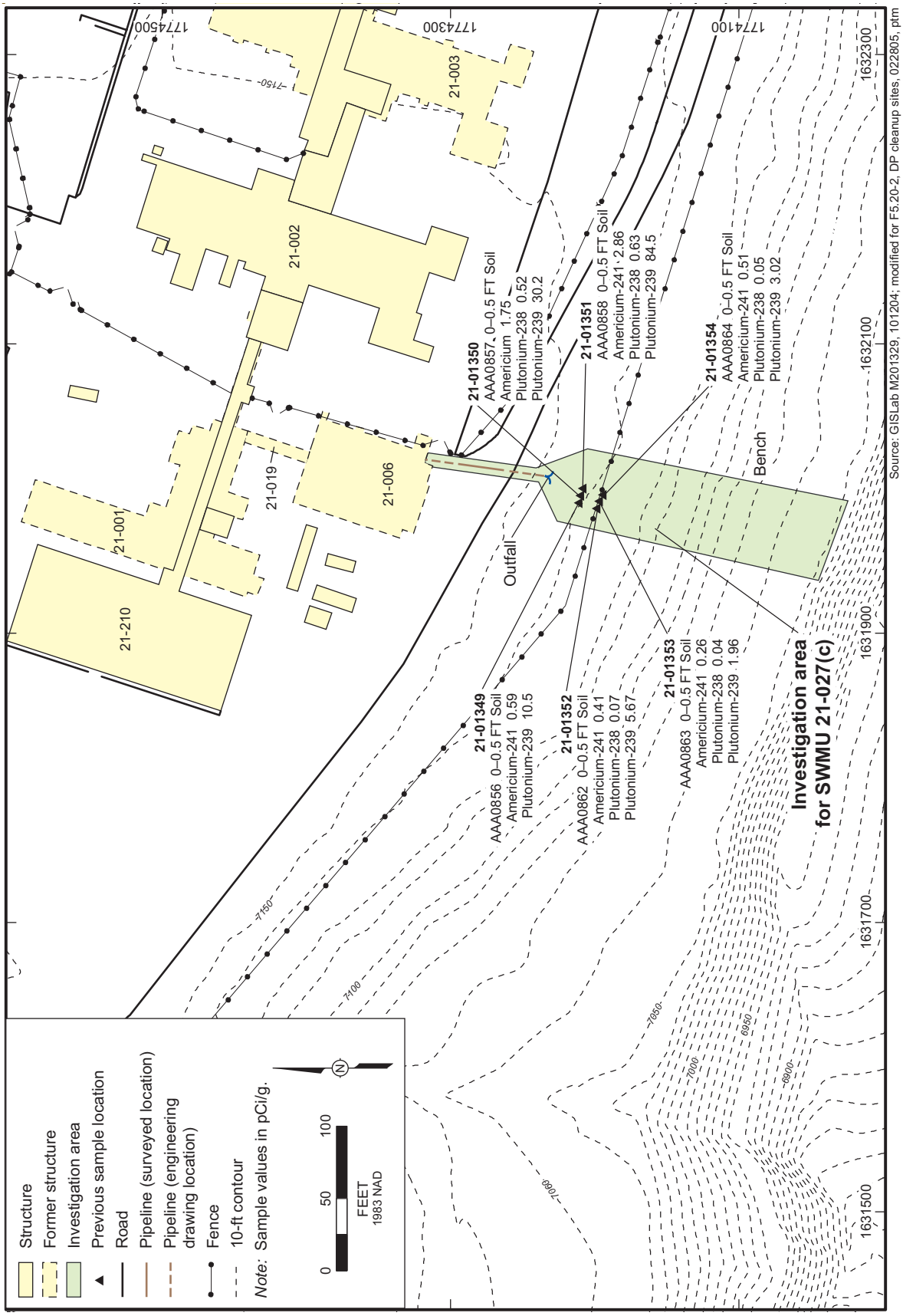


Figure 5.20-2. SWMU 21-027(c) sample locations with radionuclides detected greater than fallout values

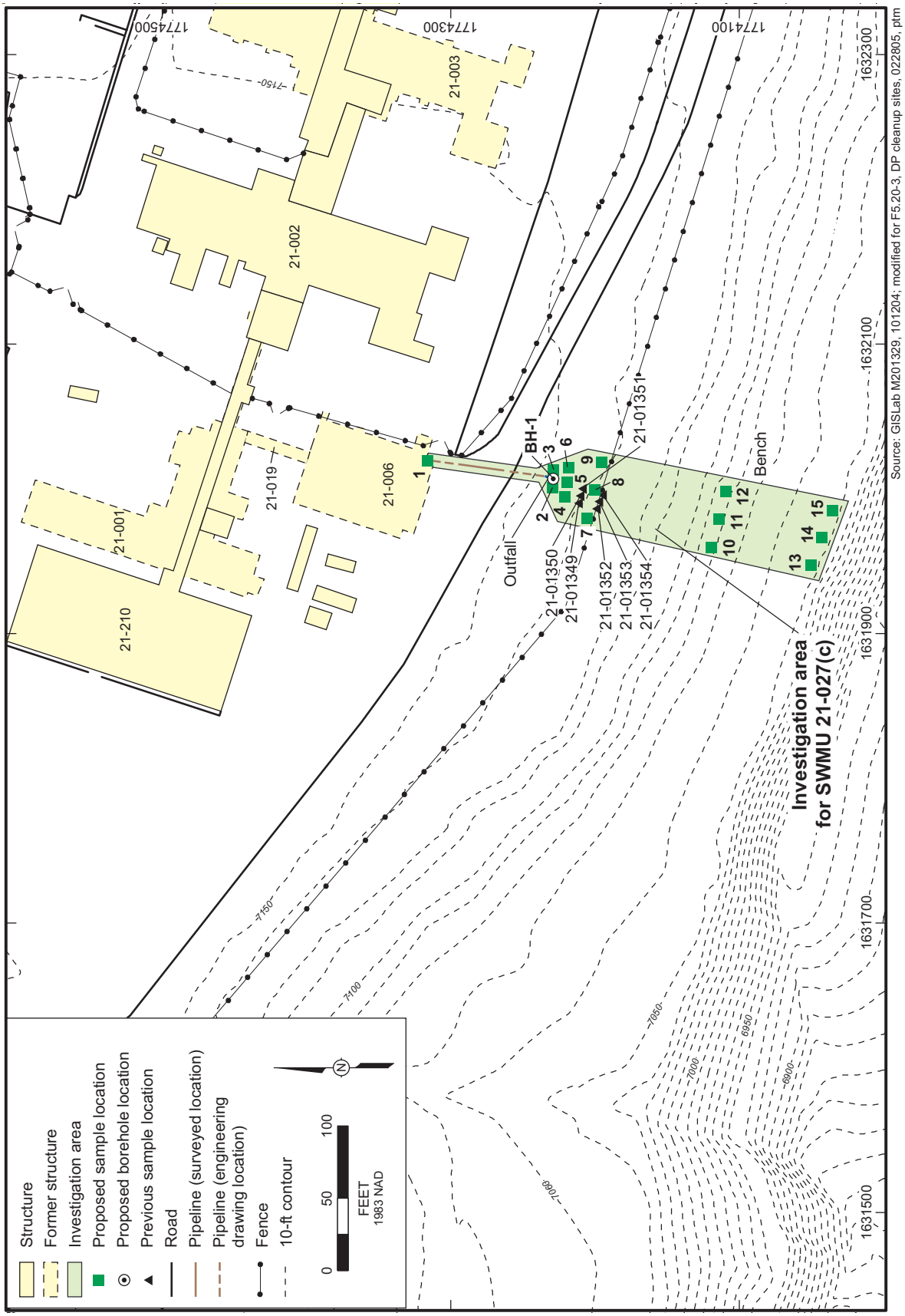


Figure 5.20-3. SWMU 21-027(c) proposed sample locations

Table 5.1-1
Consolidated Unit 21-006(c)-99 Inorganic Chemicals Greater Than BVs[1]

Sample ID	Location ID	Depth (ft)	Media	Antimony	Cadmium	Lead	Lithium	Strontium
Soil Background Value[2]				0.83	0.4	22.3	na[3]	na
AAA0866	21-01355	0.00-0.50	Soil	4.7 (U)[4]	0.69	-[5]	3	4.4
AAA0867	21-01356	0.00-0.50	Soil	4.7 (U)	0.59	40.1	2.8	5
AAA0868	21-01357	0.00-0.50	Soil	4.7 (U)	0.85	-	3.3	8.6
AAA0869	21-01358	0.00-0.33	Soil	4.8 (U)	0.75	-	4.7	6.5
AAA0870	21-01359	0.00-0.50	Soil	4.7 (U)	0.52	-	3.2	5
AAA0871	21-01360	0.00-0.50	Soil	4.7 (U)	0.66	-	3.3	5.2

1 Values are in units of mg/kg.

2 "Inorganic and Radionuclide Background Data for Soils, Sediments, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-98-4847, Los Alamos, New Mexico. (LANL 1998, 59730).

3 na = not available.

4 (U) denotes "undetected."

5 "—" denotes that no value greater than the background value was detected or the analyte was undetected.

Table 5.1-2
Consolidated Unit 21-006(c)-99 Radionuclides Greater Than FVs [1]

Sample ID	Location ID	Depth (ft)	Media	Americium-241	Plutonium-239
Soil Fallout Values[2]				0.013	0.054
AAA0866	21-01355	0.00-0.50	Soil	0.04	0.62
AAA0867	21-01356	0.00-0.50	Soil	0.05	0.9
AAA0868	21-01357	0.00-0.50	Soil	0.02	0.3
AAA0869	21-01358	0.00-0.33	Soil	0.03	0.28
AAA0870	21-01359	0.00-0.50	Soil	0.02	0.22
AAA0871	21-01360	0.00-0.50	Soil	0.1	0.41

[1] Values are in units of pCi/g.

[2] "Inorganic and Radionuclide Background Data for Soils, Sediments, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-98-4847, Los Alamos, New Mexico. (LANL 1998, 59730). Fallout values apply to the 0 to 0.5 ft depth interval only.

Table 5.1-3
Summary of Proposed Soil Sampling at Consolidated Unit 21-006(c)-99

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
21-006(b) Seepage Pit																		
Determine nature and extent beneath ends of the seepage pit	BH-1	West end of seepage pit 21-006(b), below pit floor	0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			10 to 11	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			15 to 16	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			20 to 21	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine nature and extent beneath the center (including brick manhole) of the seepage pit	BH-2	Center (under brick manhole) of seepage pit 21-006(b), below pit floor	0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			10 to 11	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			15 to 16	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			20 to 21	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine nature and extent beneath ends of seepage pit	BH-3	East end of seepage pit 21-006(b), below pit floor	0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			10 to 11	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			15 to 16	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			20 to 21	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

Table 5.1-3 (continued)

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs	SVOCs	TAL Metals	Perchlorates	Cyanide	Nitrates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
21-006(a, c, d) Seepage Pits																		
Determine nature and extent beneath seepage pit, if existence and location of pit can be confirmed.	BH-5	Center of seepage pit 21-006(a) floor	0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			10 to 11	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			15 to 16	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			20 to 21	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine nature and extent beneath seepage pit, if existence and location of pit can be confirmed.	BH-6	Center of seepage pit 21-006(c) floor	0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			10 to 11	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			15 to 16	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			20 to 21	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine nature and extent beneath seepage pit, if existence and location of pit can be confirmed.	BH-7	Center of seepage pit 21-006(d) floor	0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			10 to 11	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			15 to 16	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			20 to 21	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Pipelines																		
Determine if releases have occurred from the pipeline	1	Beneath the connection to Building 21-002	Beneath connection															
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the pipeline	2	At the 90 degree turn in the pipe	Beneath pipe															
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the pipeline	3	Halfway between location 2 and the seepage pit	Beneath pipe															
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

Table 5.1-3 (continued)

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs	SVOCs	TAL Metals	Perchlorates	Cyanide	Nitrates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
21-006(a, c, d) Seepage Pits																		
Determine nature and extent beneath seepage pit, if existence and location of pit can be confirmed.	BH-5	Center of seepage pit 21-006(a) floor	0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			10 to 11	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			15 to 16	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			20 to 21	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine nature and extent beneath seepage pit, if existence and location of pit can be confirmed.	BH-6	Center of seepage pit 21-006(c) floor	0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			10 to 11	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			15 to 16	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			20 to 21	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine nature and extent beneath seepage pit, if existence and location of pit can be confirmed.	BH-7	Center of seepage pit 21-006(d) floor	0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			10 to 11	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			15 to 16	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			20 to 21	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Pipelines																		
Determine if releases have occurred from the pipeline	1	Beneath the connection to Building 21-002	Beneath connection															
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the pipeline	2	At the 90 degree turn in the pipe	Beneath pipe															
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the pipeline	3	Halfway between location 2 and the seepage pit	Beneath pipe															
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

Table 5.1-3 (continued)

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs	SVOCs	TAL Metals	Perchlorates	Cyanide	Nitrates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Pipeline																		
Determine if releases have occurred from the pipeline	4	Beneath the manhole 21-273 floor	Beneath manhole floor															
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the pipeline	13	Beneath the inlet line to the seepage pit	Beneath pipe															
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the pipeline	14	Beneath the outlet line from the seepage pit	Beneath pipe															
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Outfalls																		
Determine vertical extent at the manhole 21-273 outfall	BH-4	0.5 ft downslope of the outfall pipe mouth	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent at the manhole 21-273 outfall	5	5 ft west of BH-4	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent at the manhole 21-273 outfall	6	5 ft east of BH-4	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine downslope extent at the manhole 21-273 outfall	8	Downslope of BH-4, south of road	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

Table 5.1-3 (continued)

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Outfall																		
Determine lateral extent at the manhole 21-273 outfall	7	10 ft west of location 8	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent at the manhole 21-273 outfall	9	10 ft east of location 8	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine downslope extent at the manhole 21-273 outfall	11	20 ft downslope of location 8, south of road	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent at the manhole 21-273 outfall	10	20 ft west of location 11	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent at the manhole 21-273 outfall	12	20 ft east of location 11	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine vertical extent at the seepage pit 21-118 outfall	BH-8	Downslope of the outfall pipe mouth, beside mesa cliff	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent at the seepage pit 21-118 outfall	15	5 ft west of BH-8	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent at the seepage pit 21-118 outfall	16	5 ft east of BH-8	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

Table 5.1-3 (continued)

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Bench																		
Determine downslope extent (on the topographical bench)	18	On the topo bench, directly downslope of seepage pit outfall pipe mouth, along bench edge	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	17	20 ft west of location 18	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	19	20 ft east of location 18	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

[1] Based on field screening results the most contaminated sample will also be analyzed for dioxins, furans, HE, and PCBs.

Table 5.2-1
Summary of Proposed Soil Sampling at SWMU 21-012(b)

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Seepage Pit																		
Determine extent of release from the seepage pit	BH-5	Center of the floor of the seepage pit	0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			10 to 11	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			15 to 16	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			20 to 21	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Pit Structure 21-266																		
Determine the extent of release from pit Structure 21-266	BH-3	Center of the floor of the pit	0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			10 to 11	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			15 to 16	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			20 to 21	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Pit Structure 21-267																		
Determine the extent of release from pit Structure 21-267	BH-4	Center of the floor of the pit	0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			10 to 11	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			15 to 16	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			20 to 21	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Drywell																		
Determine the extent of release from the drywell	BH-6	5 ft south of the drywell location, at depths below the bottom of the drywell	55 to 56	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			60 to 61	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			65 to 66	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			70 to 71	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			75 to 76	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Pipelines																		
Determine if releases have occurred from the Structure 21-266 pipeline	1	At connection to Structure 21-266	Beneath connection															
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

Table 5.2-1 (continued)

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Pipelines																		
Determine if releases have occurred from the Structure 21-266 pipeline	2	At connection to Structure 21-266	Beneath connection															
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the Structure 21-266 pipeline	3	At connection to Structure 21-266	Beneath connection															
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the Structure 21-266 pipeline	4	50 ft downslope of Structure 21-266	Beneath pipe															
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the Structure 21-266 pipeline	5	100 ft downslope of Structure 21-266	Beneath pipe															
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the pipeline connecting the seepage pit to the drywell	13	At south connection to seepage pit	Beneath connection															
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the middle (floor drain) pipeline	14	At connection to former Building 21-009	Beneath connection															
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the middle (floor drain) pipeline	15	50 ft downslope of former Building 21-009	Beneath pipe															
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the middle (floor drain) pipeline	16	100 ft downslope of former Building 21-009	Beneath pipe															
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

Table 5.2-1 (continued)

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Pipelines																		
Determine if releases have occurred from the Structure 21-267 pipeline	22	Angle pipe connection to former Building 21-009	Beneath connection 0 to 1 2 to 3	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	
Determine if releases have occurred from the intersection of pipelines from Structures 21-266 and 21-267	23	Intersection of pipelines from Structures 21-266 and 21-267 north of blowdown tank	Beneath pipe 0 to 1 2 to 3	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	
Determine if releases have occurred from the Structure 21-267 pipeline	24	At connection to Structure 21-267	Beneath connection 0 to 1 2 to 3	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	
Determine if releases have occurred from the Structure 21-267 pipeline	25	At connection to Structure 21-267	Beneath connection 0 to 1 2 to 3	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	
Determine if releases have occurred from the Structure 21-267 pipeline	26	At connection to Structure 21-267	Beneath connection 0 to 1 2 to 3	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	
Determine if releases have occurred from the Structure 21-267 pipeline	27	Angle pipe intersection downslope of Structure 21-267	Beneath pipe 0 to 1 2 to 3	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	

Table 5.2-1 (continued)

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Pipelines																		
Determine if releases have occurred from the Structure 21-267 pipeline	28	50 ft downslope of angle pipe intersection	Beneath pipe															
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the Structure 21-267 pipeline	29	100 ft downslope of location 28	Beneath pipe															
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Structure 21-266 Outfall																		
Determine vertical extent at the outfall from Structure 21-266 pipeline	BH-1	0.5 ft downslope of the outfall pipe mouth	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	6	5 ft west of BH-1	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	7	5 ft east of BH-1	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine downslope extent	9	Downslope of the mouth of the outlet pipe north of the fence	0 to 0.5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3		X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	8	10 ft west of 9	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	10	10 ft east of 9	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine downslope extent	11	20 downslope of location 8	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine downslope extent	12	30 downslope of location 11	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

Table 5.2-1 (continued)

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Middle (floor drain) Pipeline Outfall																		
Determine vertical extent at the outfall from the middle (floor drain) pipeline	BH-7	0.5 ft downslope of the outfall pipe mouth	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	17	5 ft west of BH-7	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	18	5 ft east of BH-7	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine downslope extent	19	10 ft east of location 10	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	20	20 ft downslope of location 19	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	21	30 ft downslope of location 20	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Structure 21-267 Outfall																		
Determine vertical extent at the outfall from Structure 21-267 pipeline	BH-2	0.5 ft downslope of the outfall pipe mouth	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	30	5 ft west of BH-1	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	31	5 ft east of BH-1	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

Table 5.2-1 (continued)

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	Ph	Dioxins, Furans, HE, PCBs[1]
Structure 21-267 Outfall																		
Determine downslope extent	33	Downslope of the mouth of the outlet pipe north of the fence	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	32	10 ft west of location 33	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	34	10 ft east of location 33	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine downslope extent	35	20 ft downslope of location 34	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	36	30 ft downslope of location 35	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

[1] Based on field screening results the most contaminated sample will also be analyzed for dioxins, furans, HE, and PCBs.

Table 5.3-1
Summary of Proposed Soil Sampling at SWMU 21-022(f)

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Sump Structure 21-173																		
Determine if releases have occurred from sump Structure 21-173	BH-1	Center of the floor of the sump	0 to 1 5 to 6 10 to 11	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	
Pipeline																		
Determine if releases have occurred from the pipeline connecting the sump to MDA U	1	Beneath connection to the sump	Beneath connection 0 to 1 2 to 3	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	
Determine if releases have occurred from the pipeline connecting the sump to MDA U	2	Beneath connection to the sump	Beneath connection 0 to 1 2 to 3	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	
Determine if releases have occurred from the pipeline connecting the sump to MDA U	3	50 ft northeast of sump	Beneath pipe 0 to 1 2 to 3	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	
Determine if releases have occurred from the pipeline connecting the sump to MDA U	4	100 ft northeast of sump	Beneath pipe 0 to 1 2 to 3	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	
Determine if releases have occurred from the pipeline connecting the sump to MDA U	5	Northeast end of the pipe, just south of MDA U fence	Beneath pipe 0 to 1 2 to 3	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	
Determine if releases have occurred from the pipeline connecting the sump to manhole 21-221	6	North of sump, at the connection to manhole 21-221	Beneath connection 0 to 1 2 to 3	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	

[1] Based on field screening results the most contaminated sample will also be analyzed for dioxins, furans, HE, and PCBs.

Table 5.4-1
SWMU 21-022(h) Inorganic Chemicals Greater Than BVs[1]

Sample ID	Location ID	Depth (ft)	Media	Antimony	Cadmium	Calcium	Copper	Lead	Lithium	Molybdenum	Strontium	Zinc
Soil Background Value[2]				0.83	0.4	6120	14.7	22.3	na[3]	na	na	48.8
AAA0915	21-01380	0.00-0.50	Soil	6 (U)[4]	0.97	-[5]	49.3	26.2	4	-	8.4	119
AAA0917	21-01380	0.50-1.00	Soil	8.3	0.55 (U)	-	28.3	22.5	2.3	6.4	5.4	85.1
AAA0918	21-01380	1.00-1.50	Soil	7.1 (U)	0.62 (U)	-	-	-	4.4	-	6.6	-
AAA0919	21-01381	0.00-0.50	Soil	4.7 (U)	0.68	-	-	-	5.5	-	15.8	-
AAA0920	21-01381	0.50-1.00	Soil	4.7 (U)	0.69	-	-	-	5.4	-	10.8	-
AAA0921	21-01381	1.00-1.50	Soil	4.7 (U)	0.81	-	-	-	6	-	10.7	-
AAA0922	21-01382	0.00-0.50	Soil	4.6 (U)	0.79	6600	-	-	5.5	-	24.9	-
AAA0923	21-01382	0.50-1.00	Soil	4.7 (U)	0.95	-	-	-	6.6	-	15.7	-

1 Values are in units of mg/kg.

2 "Inorganic and Radionuclide Background Data for Soils, Sediments, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-98-4847, Los Alamos, New Mexico. (LANL 1998, 59730).

3 na = not available.

4 (U) denotes "undetected."

5 "—" denotes that no value greater than the background value was detected or the analyte was undetected.

Table 5.4-2
SWMU 21-022(h) Radionuclides Greater Than FVs[1]

Sample ID	Location ID	Depth (ft)	Media	Americium-241	Plutonium-238	Plutonium-239
Soil Fallout Values[2]				0.013	0.023	0.054
AAA0915	21-01380	0.00-0.50	Soil	1.41	4.9	14.77
AAA0917	21-01380	0.50-1.00	Soil	0.68	3.67	6.53
AAA0918	21-01380	1.00-1.50	Soil	0.08	0.52	0.62
AAA0919	21-01381	0.00-0.50	Soil	0.49	2.18	3.24
AAA0920	21-01381	0.50-1.00	Soil	0.34	0.68	1.62
AAA0921	21-01381	1.00-1.50	Soil	0.09	0.28	0.72
AAA0922	21-01382	0.00-0.50	Soil	0.35	0.78	2.63
AAA0923	21-01382	0.50-1.00	Soil	0.20	0.49	1.5

1 Values are in units of pCi/g.

2 "Inorganic and Radionuclide Background Data for Soils, Sediments, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-98-4847, Los Alamos, New Mexico. (LANL 1998, 59730). Fallout values apply to the 0 to 0.5 ft depth interval only.

Table 5.4-3
Summary of Proposed Soil Sampling at Consolidated Unit 21-022(h)-99

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs	SVOCs	TAL Metals	Molybdenum	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
21-022(h) Sump																			
Determine if releases have occurred from sump Structure 21-202	BH-1	Center of the floor of the sump excavation	0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			10 to 11	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the pipeline	1	Beneath connection to the sump Structure 21-202	Beneath connection																
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the pipeline	2	Beneath connection to the sump Structure 21-202	Beneath connection																
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
21-022(h) Pipeline																			
Determine if releases have occurred from the pipeline	3	50 ft south of Building 21-150	Beneath pipe																
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the pipeline	4	100 ft south of Building 21-150	Beneath pipe																
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
21-022(h) Outfall																			
Determine vertical extent at the outfall from the sump Structure 21-202 pipeline	BH-2	0.5 ft downslope of the outfall pipe mouth	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	5	5 ft west of BH-2	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	6	5 ft east of BH-2	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine downslope extent	8	10 ft downslope of BH-2	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

Table 5.4-3 (continued)

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	D ioxins, Furans, HE, PCBs[1]
21-022(h) Outfall																		
Determine lateral extent	7	10 ft west of location 8	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	9	10 ft east of location 8	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
21-022(h) Bench																		
Determine downslope extent (on the topographical bench)	11	On the topo bench, directly downslope of outfall pipe mouth, beside mesa cliff	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	10	20 ft west of location 11	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	12	20 ft east of location 11	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine downslope extent (on the topographical bench)	14	On the topo bench, directly downslope of outfall pipe mouth, along bench edge	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	13	20 ft west of location 14	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	15	20 ft east of location 14	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

Table 5.4-3 (continued)

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
21-022(i) Sump																		
Determine the if releases have occurred from the sump	BH-3	Center of the floor of the sump excavation area	0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			10 to 11	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
21-022(j) Sump																		
Determine if releases have occurred from the sump	BH-4	Center of the floor of the sump excavation area	0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			10 to 11	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

[1] Based on field screening results the most contaminated sample will also be analyzed for dioxins, furans, HE, and PCBs.

Table 5.4-4
SWMU 21-022(j) Inorganic Chemicals Greater Than BVs[1]

Sample ID	Location ID	Depth (ft)	Media	Antimony	Barium	Calcium	Cobalt	Copper	Nickel	Zinc
Tuff Background Value[2]				0.5	46	2200	3.14	4.66	6.58	63.5
0121-95-0331	21-04041	0.00-0.50	Tuff	6.2 (U)[3]	88	6430	3.6 (J)[4]	6	-[5]	-
0121-95-0332	21-04041	0.50-1.00	Tuff	6.2 (U)	100	5830	3.6 (J)	6.4	7.2 (J)	65.5
0121-95-0333	21-04041	1.00-1.50	Tuff	6.1 (U)	-	3740	-	-	-	-

1 Values are in units of mg/kg.

2 "Inorganic and Radionuclide Background Data for Soils, Sediments, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-98-4847, Los Alamos, New Mexico. (LANL 1998, 59730).

3 (U) denotes "undetected."

4 (J) denotes "estimated value."

5 "—" denotes that no value greater than the background value was detected or the analyte was undetected.

Table 5.4-5
SWMU 21-022(j) Organic Chemicals Detected[1]

Sample ID	Location ID	Depth (ft)	Media	Bis(2-ethylhexyl)phthalate	Methyl-2-pentanone[4-][2]	1,2-Xylene	Xylene (Total)
0121-95-0331	21-04041	0.00-0.50	Tuff	0.14 (J)[3]	0.003 (J)	0.001 (J)	0.002 (J)
0121-95-0332	21-04041	0.50-1.00	Tuff	0.11 (J)	0.004 (J)	0.002 (J)	0.002 (J)
0121-95-0333	21-04041	1.00-1.50	Tuff	0.18 (J)	0.004 (J)	-[4]	-

1 Values are in units of mg/kg.
2 This chemical is commonly known as methyl isobutyl ketone (MIBK) which is used to extract plutonium from uranium.
3 (J) denotes “estimated value.”
4 “—“ denotes that no value greater than the estimated quantitation limit was detected.

Table 5.4-6
SWMU 21-022(j) Radionuclides Greater Than BVs or FVs [1]

Sample ID	Location ID	Depth (ft)	Media	Americium-241	Cesium-137	Plutonium-238	Plutonium-239	Strontium-90	Uranium-234	Uranium-235
Tuff Background Values/Fallout Values[2]				na[2]	na	na	na	na	1.98	0.09
0121-95-0331	21-04041	0.00-0.50	Tuff	0.9	3.49	0.2	22.5	2.46 (J-)[3]	18.8	0.93
0121-95-0332	21-04041	0.50-1.00	Tuff	1.5	3.72	0.2	26.2	3.07 (J-)	24.3	1.92
0121-95-0333	21-04041	1.00-1.50	Tuff	0.4	0.34	0.1	8.1	1.38 (J-)	8.66	0.49

[1] Values are in units of pCi/g.

[2] "Inorganic and Radionuclide Background Data for Soils, Sediments, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-98-4847, Los Alamos, New Mexico. (LANL 1998, 59730). Fallout values apply to the 0 to 0.5 ft depth interval only. na = Not available.

[3] (J-) denotes "estimated value biased low."

Table 5.5-1
Summary of Proposed Soil Sampling at Consolidated Unit 21-023(a)-99

Objective Addressed	Location Number	Location	Sample Depth (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
SWMU 21-023(a) Septic Tank Structure 21-225 (former location)																		
Determine if evidence of a leak from the tank is present	BH-1	Center of the septic tank footprint	Tank bottom 0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			10 to 11	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the pipeline	1	Beneath the inlet line connection to the tank	Beneath connection															
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the pipeline	2	Beneath the outlet line connection to the tank	Beneath connection															
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
SWMU 21-023(a) Pipelines (former location)																		
Determine if releases have occurred from the pipeline	6	At a 45 degree change in direction	Beneath pipe															
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the pipeline	7	Beneath the connection to Building 21-314	Beneath connection															
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the pipeline	20	Beneath the connection to Building 21-314	Beneath connection															
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the pipeline	9	50 ft from Building 21-314	Beneath pipe															
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the pipeline	10	Beneath manhole 21-274 floor	Beneath manhole floor	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3															

Table 5.5-1 (continued)

Objective Addressed	Location Number	Location	Sample Depth (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
SWMU 21-023(b) Septic Tank Structure 21-142 (former location)																		
Determine if evidence of a leak from the tank is present	BH-2	Center of the septic tank footprint	Tank bottom 0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			10 to 11	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the pipeline	3	Beneath the inlet line connection to the tank	Beneath connection															
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the pipeline	4	Beneath the outlet line connection to the tank	Beneath connection															
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
SWMU 21-023(b) Pipelines (former location)																		
Determine if releases have occurred from the pipeline	5	Beneath the pipeline connection to other structures	Beneath connection															
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the pipeline	8	Beneath the pipeline connection to other structures	Beneath connection															
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
SWMU 21-023(d) Septic Tank Structure 21-187 (former location)																		
Determine if evidence of a leak from the tank is present	BH-3	Center of the septic tank footprint	Tank bottom 0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			10 to 11	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the pipeline	13	Beneath the inlet line connection to the tank	Beneath connection															
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the pipeline	14	Beneath the outlet line connection to the tank	Beneath connection															
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

Table 5.5-1 (continued)

Objective Addressed	Location Number	Location	Sample Depth (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
SWMU 21-023(d) Pipelines (former location)																		
Determine if releases have occurred from the pipeline	11	Beneath connection to Building 21-003	Beneath connection 0 to 1 2 to 3	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	
Determine if releases have occurred from the pipeline	12	Beneath the inlet line	Beneath pipe 0 to 1 2 to 3	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	
Determine if releases have occurred from the pipeline	15	Beneath the outlet line connection to the tank at the cleanout	Beneath pipe 0 to 1 2 to 3	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	
Determine if releases have occurred from the pipeline	16	Beneath the outlet line where it makes a 90 degree turn north	Beneath pipe 0 to 1 2 to 3	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	
Determine if releases have occurred from the pipeline	17	Beneath the outlet line 50 ft from sample 16	Beneath pipe 0 to 1 2 to 3	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	
Determine if releases have occurred from the pipeline	18	Beneath the outlet line at the end of the line	Beneath pipe 0 to 1 2 to 3	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	
Determine if releases have occurred from the pipeline	19	Beneath the connection to Building 21-313	Beneath connection 0 to 1 2 to 3	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	

[1] *Based on field screening results the most contaminated sample will also be analyzed for dioxins, furans, HE, and PCBs.*

Table 5.6-1
SWMU 21-024(a) Inorganic Chemicals Greater Than BVs[1]

Sample ID	Location ID	Depth (ft)	Media	Antimony	Barium	Beryllium	Cadmium	Calcium	Chromium	Copper	Iron	Lead	Lithium
Soil Background Value[2]				0.83	295	1.83	0.4	6120	19.3	14.7	21500	22.3	na[3]
Tuff Background Value[2]				0.5	46	1.21	1.63	2200	7.14	4.66	14500	11.2	na
AAA0932	21-01385	0.00-0.50	Soil	4.9 (U)[4]	-[5]	-	2.2	-	-	141	-	54.1	25
AAA0939	21-01385	0.50-1.00	Soil	5 (U)	-	-	0.9	-	-	60.1	-	26.1	9.9
AAA0936	21-01385	1.00-1.50	Soil	4.9 (U)	-	-	0.68	-	-	46.7	-	-	8.7
AAA0937	21-01386	0.00-0.50	Soil	4.7 (U)	-	-	2.3	11400	27.4	301	-	204	16.2
AAA0938	21-01386	0.50-1.00	Soil	4.8 (U)	-	-	2.3	8400	26.5	249	-	102	13
AAA0933	21-01386	1.00-1.50	Soil	4.9 (U)	-	-	0.42 (U)	-	-	35.6	-	42.8	4
AAA0940	21-01387	0.00-0.50	Soil	5 (U)	-	-	0.64	-	-	84.3	-	85.3	5.6
AAA0941	21-01387	0.50-1.00	Soil	5 (U)	-	-	0.43 (U)	-	-	-	-	-	3.2
AAA0942	21-01387	1.00-1.50	Soil	5 (U)	-	-	0.43 (U)	-	-	-	-	-	3.9
AAA0943	21-01388	0.00-0.50	Soil	5.3 (U)	-	-	2.7	15500	-	265	-	109	15.4
AAA0944	21-01388	0.50-1.00	Soil	4.9 (U)	-	-	1.8	-	-	152	-	64.3	15.4
AAA0945	21-01388	1.00-1.50	Soil	4.9 (U)	-	-	1.1	-	-	58.3	-	-	10.9
AAA0946	21-01389	0.00-0.50	Soil	5 (U)	-	-	4.5	20100	31.8	424	24000	183	19.2
AAA0947	21-01389	0.50-1.00	Soil	5.3 (U)	-	-	2.5	-	-	174	-	48.6	26.9
AAA0948	21-01389	1.00-1.50	Soil	5.1 (U)	-	-	1.4	20800	-	78.6	-	-	15.2

1 Values are in units of mg/kg.

2 "Inorganic and Radionuclide Background Data for Soils, Sediments, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-98-4847, Los Alamos, New Mexico. (LANL 1998, 59730).

3 na = not available.

4 (U) denotes "undetected."

5 "—" denotes that no value greater than the background value was detected or the analyte was undetected.

Table 5.6-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Molybdenum	Nickel	Selenium	Silver	Sodium	Strontium	Zinc
Soil Background Value[2]				na[3]	15.4	1.52	1	915	na	48.8
Tuff Background Value[2]				na	6.58	0.3	1	2770	na	63.5
AAA0932	21-01385	0.00-0.50	Soil	-	-[4]	-	-	3310	57.3	112
AAA0939	21-01385	0.50-1.00	Soil	-	-	-	-	1400	21.2	-
AAA0936	21-01385	1.00-1.50	Soil	-	-	-	-	1360	14.7	-
AAA0937	21-01386	0.00-0.50	Soil	-	-	-	-	-	139	268
AAA0938	21-01386	0.50-1.00	Soil	-	-	-	-	-	105	218
AAA0933	21-01386	1.00-1.50	Soil	-	-	-	-	-	13.5	-
AAA0940	21-01387	0.00-0.50	Soil	-	-	-	-	-	37.3	71.1
AAA0941	21-01387	0.50-1.00	Soil	-	-	-	-	-	4.2	-
AAA0942	21-01387	1.00-1.50	Soil	3.4	-	-	-	-	2.3	-
AAA0943	21-01388	0.00-0.50	Soil	-	-	-	-	-	165	228
AAA0944	21-01388	0.50-1.00	Soil	-	-	-	-	-	64.2	97.2
AAA0945	21-01388	1.00-1.50	Soil	-	-	-	-	1280	28	-
AAA0946	21-01389	0.00-0.50	Soil	-	-	-	-	-	265	362
AAA0947	21-01389	0.50-1.00	Soil	-	-	-	-	2810	68.9	103
AAA0948	21-01389	1.00-1.50	Soil	-	-	-	-	2050	48.3	-

1 Values are in units of mg/kg.

2 "Inorganic and Radionuclide Background Data for Soils, Sediments, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-98-4847, Los Alamos, New Mexico. (LANL 1998, 59730).

3 na = not available.

4 "—" denotes that no value greater than the background value was detected or the analyte was undetected.

Table 5.6-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Antimony	Barium	Beryllium	Cadmium	Calcium	Chromium	Copper	Iron	Lead	Lithium
Soil Background Value[2]				0.83	295	1.83	0.4	6120	19.3	14.7	21500	22.3	na[3]
Tuff Background Value[2]				0.5	46	1.21	1.63	2200	7.14	4.66	14500	11.2	na
AAA0949	21-01390	0.00-0.50	Soil	6.8 (U)[4]	-[5]	-	1.8	-	-	68.6	-	41	11.5
AAA0925	21-01390	0.50-1.00	Soil	6.2 (U)	-	-	0.97	-	-	17	-	-	12.6
AAA0929	21-01390	1.00-1.50	Soil	6.7 (U)	320	1.9	1.1	-	131	31	-	-	29.7
AAA4097	21-01666	0.00-5.00	Tuff	-	-	-	-	-	-	-	-	-	-
AAA4098	21-01666	5.00-10.00	Tuff	-	-	-	-	-	-	-	-	-	-
AAA4099	21-01666	10.00-15.00	Tuff	-	-	-	-	-	12.7	-	-	-	-
AAA4100	21-01666	15.00-20.00	Tuff	-	-	-	-	-	17.8	-	-	-	-

1 Values are in units of mg/kg.

2 "Inorganic and Radionuclide Background Data for Soils, Sediments, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-98-4847, Los Alamos, New Mexico. (LANL 1998, 59730).

3 na = not available.

4 (U) denotes "undetected."

5 "—" denotes that no value greater than the background value was detected or the analyte was undetected.

Table 5.6-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Molybdenum	Nickel	Selenium	Silver	Sodium	Strontium	Zinc
Soil Background Value[2]				na	15.4	1.52	1	915	na[3]	48.8
Tuff Background Value[2]				na	6.58	0.3	1	2770	na	63.5
AAA0949	21-01390	0.00-0.50	Soil	-[4]	-	-	-	-	43.8	89.6
AAA0925	21-01390	0.50-1.00	Soil	-	-	-	-	952	13.9	-
AAA0929	21-01390	1.00-1.50	Soil	-	73.6	-	-	3470	29.5	-
AAA4097	21-01666	0.00-5.00	Tuff	-	-	0.44 (U)[5]	1.1 (U)	-	-	-
AAA4098	21-01666	5.00-10.00	Tuff	-	-	0.44 (U)	1.1 (U)	-	-	-
AAA4099	21-01666	10.00-15.00	Tuff	-	-	0.44 (U)	1.1 (U)	-	-	-
AAA4100	21-01666	15.00-20.00	Tuff	-	8.4 (U)	0.44 (U)	1.1 (U)	-	-	-

1 Values are in units of mg/kg.

2 "Inorganic and Radionuclide Background Data for Soils, Sediments, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-98-4847, Los Alamos, New Mexico. (LANL 1998, 59730).

3 na = not available.

4 (U) denotes "undetected."

5 "—" denotes that no value greater than the background value was detected or the analyte was undetected.

Table 5.6-2
SWMU 21-024(a) Radionuclide Greater Than FVs[1]

Sample ID	Location ID	Depth (ft)	Media	Americium-241	Plutonium-238	Plutonium-239	Tritium
Soil Fallout Values[2]				0.013	0.023	0.054	na[3]
Tuff Fallout Values[2]				na	na	na	na
AAA0932	21-01385	0.00-0.50	Soil	0.03	-[4]	0.73	-
AAA0939	21-01385	0.50-1.00	Soil	0.01	-	0.18	-
AAA0936	21-01385	1.00-1.50	Soil	-	-	0.09	-
AAA0937	21-01386	0.00-0.50	Soil	0.06	-	0.82	-
AAA0938	21-01386	0.50-1.00	Soil	0.02	0.01	0.23	-
AAA0933	21-01386	1.00-1.50	Soil	-	-	0.03	-
AAA0940	21-01387	0.00-0.50	Soil	0.02	-	0.2	-
AAA0941	21-01387	0.50-1.00	Soil	-	-	0.03	-
AAA0942	21-01387	1.00-1.50	Soil	-	-	0.02	-
AAA0943	21-01388	0.00-0.50	Soil	0.21	0.06	1.87	-
AAA0944	21-01388	0.50-1.00	Soil	0.04	0.03	0.5	-
AAA0945	21-01388	1.00-1.50	Soil	0.01	-	0.07	-
AAA0946	21-01389	0.00-0.50	Soil	0.22	0.03	1.52	-
AAA0947	21-01389	0.50-1.00	Soil	0.02	-	0.18	-
AAA0948	21-01389	1.00-1.50	Soil	0.01	-	0.1	-
AAA0949	21-01390	0.00-0.50	Soil	0.17	0.03	3	-
AAA0925	21-01390	0.50-1.00	Soil	0.01	-	0.33	-
AAA0929	21-01390	1.00-1.50	Soil	-	-	0.08	-
AAA4097	21-01666	0.00-5.00	Tuff	-	-	-	0.06
AAA4098	21-01666	5.00-10.00	Tuff	-	-	-	0.06
AAA4099	21-01666	10.00-15.00	Tuff	-	-	-	0.05
AAA4100	21-01666	15.00-20.00	Tuff	-	-	-	0.03

1 Values are in units of pCi/g.

2 "Inorganic and Radionuclide Background Data for Soils, Sediments, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-98-4847, Los Alamos, New Mexico. (LANL 1998, 59730). Fallout values apply to the 0 to 0.5 ft depth interval only, and fallout values are not applicable to tuff.

3 na = not available.

4 "—" denotes either not detected in tuff or no value greater than the soil fallout value was detected.

Table 5.6-3
Summary of Proposed Soil Sampling at SWMU 21-024(a)

Objective Addressed	Location Number	Location	Sample Depth (ft)	VOCs	SVOCs	TAL Metals	Lithium	Molybdenum	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Septic Tank Structure 21-053																				
Determine if evidence of a leak from the tank is present	BH-1	Center of the septic tank footprint	Tank bottom 0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			10 to 11	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the pipeline	1	Beneath the inlet line connection to the tank	Beneath connection																	
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the pipeline	2	Beneath the outlet line connection to the tank	Beneath connection																	
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Pipelines																				
Determine if releases have occurred from the pipeline	3	Immediately south of former Building 21-009	Beneath pipe 0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the pipeline	4	50 ft south of former Building 21-009	Beneath pipe 0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the pipeline	5	Halfway between the septic tank and outfall	Beneath pipe 0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Outfall																				
Determine vertical extent at the outfall	BH-2	0.5 ft downslope of the outfall pipe mouth	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	6	5 ft west of BH-2	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	7	5 ft east of BH-2	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine downslope extent of release	9	10 ft downslope of location BH-2	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

Table 5.6-3 (continued)

Objective Addressed	Location Number	Location	Sample Depth (ft)	VOCs	SVOCs	TAL Metals	Lithium, Molybdenum, Strontium	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Outfall																			
Determine lateral extent	8	10 ft west of location 9	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	10	10 ft east of location 9	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine downslope extent of release	12	30 ft downslope of outfall pipe mouth along mesa edge	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	11	20 ft west of location 12	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	13	20 ft east of location 12	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Bench																			
Determine downslope extent (on the topographical bench)	15	On the topo bench, directly downslope of outfall pipe mouth, beside mesa cliff	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	14	20 ft west of location 15	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	16	20 ft east of location 15	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine downslope extent (on the topographical bench)	18	On the topo bench, directly downslope of outfall pipe mouth, along bench edge	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	17	20 ft west of location 18	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	19	20 ft east of location 18	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

[1] Based on field screening results the most contaminated sample will also be analyzed for dioxins, furans, HE, and PCBs.

Table 5.7-1
SWMU 21-024(b) Inorganic Chemicals Greater Than BVs[1]

Sample ID	Location ID	Depth (ft)	Media	Date Collected	Antimony	Cadmium	Calcium	Chromium	Copper	Lead	Lithium	Selenium	Silver	Strontium	Zinc
Soil Background Value[2]					0.83	0.4	6120	19.3	14.7	22.3	na[3]	1.52	1	na	48.8
Tuff Background Value[2]					0.5	1.63	2200	7.14	4.66	11.2	na	0.3	1	na	63.5
Fill Background Value[2]					0.83	0.4	6120	19.3	14.7	22.3	na	1.52	1	na	48.8
AAA0896	21-01377	0.00-0.50	Soil	7/16/1992	5.4	0.7	-[4]	-	-	-	7.2	-	-	15.5	96.9
AAA0897	21-01377	0.50-1.00	Soil	7/16/1992	4.7 (U)[5]	0.89	-	-	-	-	5.9	-	-	12.1	62.9
AAA0898	21-01377	1.00-1.50	Soil	7/16/1992	5.1	0.41 (U)	-	-	-	-	2.9	-	-	3.5	107
AAA0899	21-01378	0.00-0.50	Soil	7/16/1992	4.8 (U)	1	-	-	-	-	9	-	-	28.9	81
AAA0902	21-01378	0.50-1.00	Soil	7/16/1992	5 (U)	1	-	-	-	-	8.8	-	-	15	-
AAA0901	21-01378	1.00-1.50	Soil	7/16/1992	4.7 (U)	0.41 (U)	-	-	-	-	3.2	-	-	2.1	-
AAA0903	21-01379	0.00-0.50	Soil	7/17/1992	5 (U)	1.6	-	27.1	33.2	30	6.9	-	-	42.4	246
AAA0905	21-01379	1.00-1.50	Soil	7/17/1992	4.8 (U)	0.67	-	23.6	-	-	7.4	-	-	19.7	149
AAA4108	21-01668	0.00-2.00	Fill	8/18/1993	-	0.63 (U)	-	-	-	-	-	-	-	-	58.1
AAA4109	21-01668	2.00-4.00	Fill	8/18/1993	-	0.62 (U)	-	-	14.8	-	-	-	-	-	58.8
AAA4110	21-01668	4.00-6.00	Tuff	8/18/1993	-	-	-	-	8.6	-	-	0.42 (U)	-	-	79.8
AAA4111	21-01668	6.00-7.50	Tuff	8/18/1993	-	-	9600	-	-	-	-	0.42 (U)	1.1 (U)	21.5	-

1 Values are in units of mg/kg.

2 "Inorganic and Radionuclide Background Data for Soils, Sediments, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-98-4847, Los Alamos, New Mexico. (LANL 1998, 59730).

3 na = not available.

4 "—" denotes that no value greater than the background value was detected or the analyte was undetected.

5 (U) denotes "undetected."

Table 5.7-2
SWMU 21-024(b) Radionuclides Greater Than FVs [1]

Sample ID	Location ID	Depth (ft)	Media	Americium-241	Plutonium-238	Plutonium-239	Tritium
Soil Fallout Values[2]				0.013	0.023	0.054	na[3]
Tuff Fallout Values[2]				na	na	na	na
Fill Fallout Values[2]				0.013	0.023	0.054	na
AAA0896	21-01377	0.00-0.50	Soil	0.91	-[4]	22.01	-
AAA0897	21-01377	0.50-1.00	Soil	0.41	0.07	8.33	-
AAA0898	21-01377	1.00-1.50	Soil	0.05	-	0.96	-
AAA0899	21-01378	0.00-0.50	Soil	1.69	-	36.32	-
AAA0902	21-01378	0.50-1.00	Soil	0.14	0.02	2.36	-
AAA0901	21-01378	1.00-1.50	Soil	0.07	0.01	1.04	-
AAA0903	21-01379	0.00-0.50	Soil	15.06	3.25	324	-
AAA0905	21-01379	1.00-1.50	Soil	3.69	-	83.63	-
AAA4108	21-01668	0.00-2.00	Fill	0.68	0.11	12.11	0.16
AAA4109	21-01668	2.00-4.00	Fill	1.37	0.15	16.08	0.12
AAA4110	21-01668	4.00-6.00	Tuff	2.02	0.26	29.37	0.09
AAA4111	21-01668	6.00-7.50	Tuff	0.39	0.06	6.07	0.08

1 Values are in units of pCi/g.

2 "Inorganic and Radionuclide Background Data for Soils, Sediments, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-98-4847, Los Alamos, New Mexico. (LANL 1998, 59730). Fallout values apply to the 0 to 0.5 ft depth interval only, and fallout values are not applicable to tuff.

3 na = not available.

4 "—" denotes either not detected in tuff or no value greater than the soil fallout value was detected.

Table 5.7-3
Summary of Proposed Soil Sampling at SWMU 21-024(b)

Objective Addressed	Location Number	Location	Sample Depth (ft)	VOCs	SVOCs	TAL Metals	Strontium	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Septic Tank Structure 21-55																			
Determine if evidence of a leak from the tank is present	BH-1	Center of the septic tank footprint	Tank bottom 0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			10 to 11	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the pipeline	1	Beneath the inlet line connection to the tank	Beneath connection																
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the pipeline	2	Beneath the outlet line connection to the tank	Beneath connection																
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Pipelines																			
Determine if releases have occurred from the pipeline	3	Beneath the connection to Building 21-116	Beneath connection																
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the pipeline	4	50 ft from Building 21-116	Beneath pipe 0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the pipeline	5	100 ft from Building 21-116	Beneath pipe 0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the pipeline	6	150 ft from Building 21-116	Beneath pipe 0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Outfall																			
Determine vertical extent at the outfall	BH-2	0.5 ft downslope of the outfall pipe mouth	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	7	5 ft west of BH-2	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	8	5 ft east of BH-2	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

Table 5.7-3 (continued)

Objective Addressed	Location Number	Location	Sample Depth (ft)	VOCs	SVOCs	TAL Metals	Strontium	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Bench																			
Determine downslope extent (on the topographical bench)	10	On the topo bench, directly downslope of outfall pipe mouth, beside mesa cliff	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	9	20 ft west of location 10	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	11	20 ft east of location 10	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine downslope extent (on the topographical bench)	13	On the topo bench, directly downslope of outfall pipe mouth, along edge of bench	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	12	20 ft west of location 13	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	14	20 ft east of location 13	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

[1] Based on field screening results the most contaminated sample will also be analyzed for dioxins, furans, HE, and PCBs.

Table 5.8-1
SWMU 21-024(d) Inorganic Chemicals Greater Than BVs[1]

Sample ID	Location ID	Depth (ft)	Media	Date Collected	Antimony	Arsenic	Barium	Cadmium	Calcium	Chromium	Copper	Lead	Lithium	Selenium	Silver	Strontium	Vanadium	Zinc
Soil Background Value[2]					0.83	8.17	295	0.4	6120	19.3	14.7	22.3	na[3]	1.52	1	na	39.6	48.8
Tuff Background Value[2]					0.5	2.79	46	1.63	2200	7.14	4.66	11.2	na	0.3	1	na	17	63.5
AAA0852	21-01347	0.00-0.50	Soil	7/15/1992	4.8 (U)[4]	-[5]	-	1.8	-	-	-	30.8	6.9	-	2.1	27.5	-	57.2
AAA0853	21-01348	0.00-0.50	Soil	7/15/1992	4.7 (U)	-	-	0.42	-	-	-	30.1	3.6	-	19.4	8.2	-	59.7
AAA0854	21-01348	0.50-1.00	Soil	7/15/1992	4.7 (U)	-	-	0.41	-	-	-	31.6	2.6	-	15.7	5.8	-	-
AAA0855	21-01348	1.00-1.50	Soil	7/15/1992	4.7 (U)	-	-	0.41 (U)	-	-	-	146	3.8	-	3	4.9	-	-
AAA4118	21-01670	0.00-2.00	Soil	8/16/1993	-	9.7	-	1.9	-	22.1	49.9	78.3	-	-	5	-	54.5	108
AAA4119	21-01670	2.00-4.00	Tuff	8/17/1993	-	5.5	46.1 (U)	-	-	16.8	73	49.3	-	0.46 (U)	2.1 (U)	-	28.2	-
AAA4120	21-01670	4.00-6.00	Tuff	8/17/1993	-	6.5	52.6	-	5080	15.2	61.3	45.5	-	0.45 (U)	1.9 (U)	-	30.3	85.2
AAA4121	21-01670	6.00-8.00	Tuff	8/17/1993	-	-	-	-	-	-	12	16.7	-	0.46 (U)	1.1 (U)	-	-	-

1 Values are in units of mg/kg.

2 "Inorganic and Radionuclide Background Data for Soils, Sediments, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-98-4847, Los Alamos, New Mexico. (LANL 1998, 59730).

3 na = not available.

4 (U) denotes "undetected."

5 "—" denotes that no value greater than the background value was detected or the analyte was undetected.

Table 5.8-2
SWMU 21-024(d) Radionuclides Greater Than BVs or FVs [1]

Sample ID	Location ID	Depth (ft)	Media	Americium-241	Plutonium-238	Plutonium-239	Tritium	Uranium-234	Uranium-238
Soil Background Values/Fallout Values[2]				0.013	0.023	0.054	na[3]	2.59	2.29
Tuff Background Values/Fallout Values[2]				na	na	na	na	1.98	1.93
Sediment Background Values/Fallout Values[2]				0.04	0.006	0.068	na	2.59	2.29
AAA0852	21-01347	0.00-0.50	Soil	0.4	0.08	9.71	-[4]	-	-
AAA0853	21-01348	0.00-0.50	Soil	0.96	-	33.8	-	-	-
AAA0854	21-01348	0.50-1.00	Soil	0.53	-	16.1	-	-	-
AAA0855	21-01348	1.00-1.50	Soil	0.05	0.01	1.9	-	-	-
AAA4118	21-01670	0.00-2.00	Soil	1.13	0.2	26.64	1.92	4.37	3.31
AAA4119	21-01670	2.00-4.00	Tuff	1.13	0.19	33.9	0.68	2.93	2.22
AAA4120	21-01670	4.00-6.00	Tuff	0.4	0.07	8.93	0.71	2.45	1.97
AAA4121	21-01670	6.00-8.00	Tuff	0.34	0.07	11.39	0.27	-	-
0121-95-0378	21-04063	0.00-0.50	Soil	-	0.36	23.2	-	-	-
0121-95-0408	21-04086	0.00-0.50	Soil	-	0.64	51.5	-	-	-
0121-95-0409	21-04087	0.00-0.50	Soil	-	0.45	66.9	-	-	-
0121-95-0412	21-04090	0.00-0.50	Sediment	-	0.02	3.83	-	-	-
0121-95-0415	21-04092	0.00-0.50	Sediment	-	0.1	17.5	-	-	-

1 Values are in units of pCi/g.

2 "Inorganic and Radionuclide Background Data for Soils, Sediments, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-98-4847, Los Alamos, New Mexico. (LANL 1998, 59730). Fallout values apply to the 0 to 0.5 ft depth interval only, and fallout values are not applicable to tuff.

3 na = not available.

4 "—" denotes either not detected in tuff or no value greater than the soil fallout value was detected, or the analyte was not detected.

Table 5.8-3
Summary of Proposed Soil Sampling at SWMU 21-024(d)

Objective Addressed	Location Number	Location	Sample Depth (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Septic Tank Structure 21-106																		
Determine if evidence of a leak from the tank is present	BH-1	Center of the septic tank footprint	Tank bottom 0 to 1 5 to 6 10 to 11	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	
Determine if releases have occurred from the pipeline	1	Beneath the inlet line connection to the tank	Beneath connection 0 to 1 2 to 3	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	
Determine if releases have occurred from the pipeline	2	Beneath the outlet line connection to the tank	Beneath connection 0 to 1 2 to 3	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	
Pipelines																		
Determine if releases have occurred from the western pipelines	3	Beneath the connection to former Building 21-001	Beneath pipe 0 to 1 2 to 3	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine if releases have occurred from the western pipelines	4	50 ft from former Building 21-001	Beneath pipe 0 to 1 2 to 3	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine if releases have occurred from the western pipelines	5	Beneath the connection to the former Building 21-001	Beneath pipe 0 to 1 2 to 3	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine if releases have occurred from the western pipelines	6	Beneath the connection to the eastern pipelines	Beneath pipe 0 to 1 2 to 3	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine if releases have occurred from the western pipelines	7	50 ft from the former Building 21-001	Beneath pipe 0 to 1 2 to 3	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine if releases have occurred from the western pipelines	8	100 ft from the former Building 21-001	Beneath pipe 0 to 1 2 to 3	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	

Table 5.8-3 (continued)

Objective Addressed	Location Number	Location	Sample Depth (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Pipelines																		
Determine if releases have occurred from the eastern pipelines	9	Next to Building 21-018 currently present	Beneath pipe 0 to 1 2 to 3	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine if releases have occurred from the eastern pipelines	10	50 ft from Building 21-018	Beneath pipe 0 to 1 2 to 3	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine if releases have occurred from the eastern pipelines	11	100 ft from Building 21-018	Beneath pipe 0 to 1 2 to 3	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine if releases have occurred from the eastern pipelines	12	150 ft from Building 21-018	Beneath pipe 0 to 1 2 to 3	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine if releases have occurred from the eastern pipelines	13	Beneath the connection to former Building 21-001	Beneath connection 0 to 1 2 to 3	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	
Determine if releases have occurred from the eastern pipelines	14	Beneath the connection to the diagonal pipe	Beneath connection 0 to 1 2 to 3	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	
Determine if releases have occurred from the eastern pipelines	15	Beneath the connection to current passageway	Beneath connection 0 to 1 2 to 3	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	
Outfall																		
Determine vertical extent at the outfall	BH-2	0.5 ft downslope of the outfall pipe mouth	0 to 0.5 2 to 3 5 to 6	 X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	

Table 5.8-3 (continued)

Objective Addressed	Location Number	Location	Sample Depth (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Outfall																		
Determine lateral extent	16	5 ft west of BH-2	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	17	5 ft east of BH-2	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine downslope extent	19	10 ft downslope of BH-2 or as close to the mesa edge as possible	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	18	10 ft west of location 19	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	20	10 ft east of location 19	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Bench																		
Determine downslope extent (on the topographical bench)	22	On the topo bench, directly downslope of outfall pipe mouth, beside mesa cliff	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	21	20 ft west of location 22	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	23	20 ft east of location 22	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine downslope extent (on the topographical bench)	25	On the topo bench, directly downslope of outfall pipe mouth, along bench cliff	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

Table 5.8-3 (continued)

Objective Addressed	Location Number	Location	Sample Depth (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Bench																		
Determine lateral extent	24	20 ft west of location 25	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	26	20 ft east of location 25	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

[1] Based on field screening results the most contaminated sample will also be analyzed for dioxins, furans, HE, and PCBs.

Table 5.9-1
SWMU 21-024(e) Inorganic Chemicals Greater Than BVs[1]

Sample ID	Location ID	Depth (ft)	Media	Antimony	Cadmium	Chromium	Copper	Lead	Lithium	Molybdenum	Strontium	Vanadium	Zinc
Soil Background Value[2]				0.83	0.4	19.3	14.7	22.3	na[3]	na	na	39.6	48.8
Fill Background Value[2]				0.83	0.4	19.3	14.7	22.3	na	na	na	39.6	48.8
AAA0630	21-01341	0.00-0.50	Soil	4.8 (U)[4]	7.9	30.5	37.5	75	9.8	-	30.2	48.3	262
AAA0632	21-01341	0.50-0.92	Soil	4.8 (U)	3.7	-[5]	-	29.4	8.6	-	22.2	-	201
AAA0633	21-01342	0.00-0.33	Soil	5.1 (U)	2.3	-	-	35.5	10.9	3.2	26.7	-	136
AAA4123	21-01671	0.00-5.00	Soil	-	0.62 (U)	-	-	-	3	-	15.4	-	-
AAA4126	21-01671	5.00-10.00	Fill	-	0.61 (U)	-	-	-	1.7	-	1.5	-	-
AAA4127	21-01671	10.00-15.00	Fill	-	0.62 (U)	-	-	-	2.5	-	1.2	-	-
AAA4128	21-01671	15.00-20.00	Fill	-	0.63 (U)	-	-	-	2	-	0.93	-	-

1 Values are in units of mg/kg.

2 "Inorganic and Radionuclide Background Data for Soils, Sediments, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-98-4847, Los Alamos, New Mexico. (LANL 1998, 59730).

3 na = not available.

4 (U) denotes "undetected."

5 "—" denotes that no value greater than the background value was detected or the analyte was undetected.

Table 5.9-2
SWMU 21-024(e) Radionuclides Greater Than BVs or FVs [1]

Sample ID	Location ID	Depth (ft)	Media	Americium-241	Cesium-137	Europium-152	Plutonium-238	Plutonium-239	Tritium	Uranium-234	Uranium-235	Uranium-238
Soil Background Values/Fallout Values[2]				0.013	1.65	na[3]	0.023	0.054	na	2.59	0.2	2.29
Fill Background Values/Fallout Values[2]				0.013	1.65	na	0.023	0.054	na	2.59	0.2	2.29
AAA0630	21-01341	0.00-0.50	Soil	1.53	-[4]	-	-	41.49	-	-	-	-
AAA0632	21-01341	0.50-0.92	Soil	0.61	-	-	-	13.52	-	-	-	-
AAA0633	21-01342	0.00-0.33	Soil	0.46	-	-	-	11.77	-	-	-	-
AAA4123	21-01671	0.00-5.00	Soil	0.01	-	-	-	0.04	0.14	-	-	-
AAA4126	21-01671	5.00-10.00	Fill	0.01	-	-	-	-	0.14	-	0.3	-
AAA4127	21-01671	10.00-15.00	Fill	0.02	-	-	-	-	0.13	-	-	-
AAA4128	21-01671	15.00-20.00	Fill	-	-	-	-	-	0.12	-	-	-
0121-95-0381	21-04065	0.00-0.50	Soil	0.71	-	-	0.1	14.6	-	4.66	-	3.69
0121-95-0383	21-04066	0.00-0.50	Soil	1.59	-	-	0.1	17.1	-	5.75	0.25	4.32
0121-95-0385	21-04068	0.00-0.50	Soil	-	-	-	0.04	5.1	-	-	-	-
0121-95-0386	21-04069	0.00-0.50	Soil	-	-	-	0.14	12.3	-	-	-	-
0121-95-0390	21-04072	0.50-1.00	Soil	-	0.23	-	0.04	3.66	-	-	-	-
0121-95-0394	21-04075	0.00-0.50	Soil	-	-	0.71	-	2.3	-	-	-	-

1 Values are in units of pCi/g.

2 "Inorganic and Radionuclide Background Data for Soils, Sediments, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-98-4847, Los Alamos, New Mexico. (LANL 1998, 59730). Fallout values apply to the 0 to 0.5 ft depth interval only.

3 na = not available.

4 "—" denotes that no value greater than the fallout value was detected or the analyte was undetected.

Table 5.9-3
Summary of Proposed Soil Sampling at SWMU 21-024(e)

Objective Addressed	Location Number	Location	Sample Depth (ft)	VOCs	SVOCs	TAL Metals	Molybdenum	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Septic Tank Structure 21-123																			
Determine if evidence of a leak in the tank is present	BH-1	Center of the septic tank footprint	Tank bottom 0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			10 to 11	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if a release occurred at the connection of the pipeline and the inlet to the septic tank	1	Beneath the inlet line connection to the tank	Beneath connection																
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if a release occurred at the connection of the pipeline and the outlet to the septic tank	2	Beneath the outlet line connection to the tank	Beneath connection																
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Pipelines																			
Determine if releases have occurred from the main pipeline	3	At main pipeline connection to former Building 21-020	Beneath connection																
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the main pipeline	4	50 ft southeast of former Building 21-020	Beneath pipe 0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the main pipeline	5	100 ft southeast of former Building 21-020	Beneath pipe 0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the main pipeline	6	150 ft southeast of former Building 21-020	Beneath pipe 0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the main pipeline	7	200 ft southeast of former Building 21-020	Beneath pipe 0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the main pipeline	8	Beneath the main pipeline's connection to the additional pipeline	Beneath connection																
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

Table 5.9-3 (continued)

Objective Addressed	Location Number	Location	Sample Depth (ft)	VOCs	SVOCs	TAL Metals	Molybdenum	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Pipeline																			
Determine if releases have occurred from the additional pipelines	9	Beneath the intersection of the two additional pipelines	Beneath pipe 0 to 1 2 to 3	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine if releases have occurred from the additional pipeline 1	10	Beneath the end of additional pipeline 1 or halfway between Building 21-014 and the main pipeline	Beneath pipe 0 to 1 2 to 3	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine if releases have occurred from the additional pipeline 2	11	Beneath the end of additional pipeline 2 or halfway between Building 21-046 and the main pipeline	Beneath pipe 0 to 1 2 to 3	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine if releases have occurred from the additional pipeline 1	12	At pipeline 1 connection to Building 21-014	Beneath connection 0 to 1 2 to 3	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	
Determine if releases have occurred from the additional pipeline 2	13	At pipeline 2 connection to Building 21-046	Beneath connection 0 to 1 2 to 3	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	
Outfall																			
Determine vertical extent	BH-2	0.5 ft downslope of the outfall pipe mouth	0 to 0.5 2 to 3 5 to 6	 X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	
Determine lateral extent	14	5 ft west of BH-2	0 to 0.5 2 to 3	 X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine lateral extent	15	5 ft east of BH-2	0 to 0.5 2 to 3	 X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine downslope extent	17	10 ft downslope of BH-2	0 to 0.5 2 to 3 5 to 6	 X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	

Table 5.9-3 (continued)

Objective Addressed	Location Number	Location	Sample Depth (ft)	VOCs	SVOCs	TAL Metals	Molybdenum	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Outfall																			
Determine lateral extent	16	10 ft west of location 17	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	18	10 ft east of location 17	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine downslope extent	20	Along the mesa edge, downslope of the outfall pipe mouth	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	19	20 ft west of location 20	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	21	20 ft east of location 20	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Bench																			
Determine downslope extent (on the topographical bench)	23	On the topo bench, directly downslope of outfall pipe mouth, beside mesa cliff	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	22	20 ft west of location 23	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	24	20 ft east of location 23	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine downslope extent	26	On the topo bench, directly downslope of outfall pipe mouth, along bench edge	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	25	20 ft west of location 26	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	27	20 ft east of location 26	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

1 Based on field screening results the most contaminated sample will also be analyzed for dioxins, furans, HE, and PCBs.

Table 5.10-1
SWMU 21-024(g) Inorganic Chemicals Greater Than BVs[1]

Sample ID	Location ID	Depth (ft)	Media	Date Collected	Antimony	Arsenic	Cadmium	Chromium	Copper	Lead	Lithium	Nickel	Selenium	Silver	Strontium	Vanadium	Zinc
Soil Background Value[2]					0.83	8.17	0.4	19.3	14.7	22.3	na[3]	15.4	1.52	1	na	39.6	48.8
Tuff Background Value[2]					0.5	2.79	1.63	7.14	4.66	11.2	na	6.58	0.3	1	na	17	63.5
AAA0893	21-01425	0.00-0.50	Soil	7/14/1992	5.1 (U)[4]	-[5]	0.95	-	-	-	5.1	-	-	-	15.6	-	-
AAA0894	21-01425	0.50-1.00	Soil	7/14/1992	4.9 (U)	-	1.1	-	-	-	5	-	-	-	11.9	-	-
AAA0895	21-01426	0.00-0.50	Soil	7/14/1992	5 (U)	-	1.1	-	-	-	5.9	-	-	-	12.2	-	-
AAA0796	21-01426	0.50-1.00	Soil	7/14/1992	4.9 (U)	-	0.69	-	-	-	4.1	-	-	-	6.5	-	-
AAA0797	21-01427	0.00-0.50	Soil	7/14/1992	5.1 (U)	-	1.4	23.9	-	-	5.9	19.5	-	-	16.7	-	-
AAA0798	21-01427	0.50-1.00	Soil	7/14/1992	5.2 (U)	-	0.83	-	-	-	4.5	-	-	-	11.2	-	-
AAA0799	21-01428	0.00-0.50	Soil	7/14/1992	5.1 (U)	10	5.6	25	53.5	67	4.7	-	-	1.6	31.9	52.1	399
AAA0800	21-01428	0.50-1.00	Soil	7/14/1992	4.8 (U)	-	0.93	-	-	-	4.9	-	-	-	14.7	-	84.5
AAA0801	21-01429	0.00-0.50	Soil	7/22/1992	6.2 (U)	8.7	0.98	-	24.2	26.4	4.7	-	-	-	3.1	-	84.8
AAA1091	21-01429	0.50-1.00	Soil	7/22/1992	6.1 (U)	-	1.9	-	15	-	4.8	-	-	-	6.1	-	179
AAA1092	21-01430	0.00-0.50	Soil	7/22/1992	6.5 (U)	9.5	4.5	21.7	59.3	67.7	6.3	-	-	1.8	35	47.3	310
AAA1094	21-01430	0.50-1.00	Soil	7/22/1992	6 (U)	-	2.2	-	15.2	-	4.6	-	-	-	13.5	-	180
AAA4102	21-01667	0.00-5.00	Soil	8/11/1993	-	-	0.64 (U)	-	-	-	-	-	-	1.1 (U)	-	-	-
AAA4105	21-01667	5.00-10.00	Tuff	8/11/1993	-	-	-	-	-	-	-	-	0.41 (U)	-	-	-	-
AAA4106	21-01667	10.00-15.00	Tuff	8/11/1993	-	-	-	-	-	-	-	-	0.42 (U)	-	-	-	-
AAA4107	21-01667	15.00-20.00	Tuff	8/11/1993	-	-	-	-	-	-	-	-	0.42 (U)	1.1 (U)	-	-	-

1 Values are in units of mg/kg.
2 "Inorganic and Radionuclide Background Data for Soils, Sediments, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-98-4847, Los Alamos, New Mexico. (LANL 1998, 59730).
3 na = not available.
4 (U) denotes "undetected."
5 "—" denotes that no value greater than the background value was detected or the anlyte was undetected.

Table 5.10-2
SWMU 21-024(g) Organic Chemicals Detected[1]

Sample ID	Location ID	Depth (ft)	Media	Date Collected	Acetone
AAA0801	21-01429	0.00-0.50	Soil	7/22/1992	0.02
AAA1091	21-01429	0.50-1.00	Soil	7/22/1992	0.04
AAA1092	21-01430	0.00-0.50	Soil	7/22/1992	0.02

[1] Values are in units of mg/kg.

Table 5.10-3
SWMU 21-024(g) Radionuclides Greater Than FVs[1]

Sample ID	Location ID	Depth (ft)	Media	Date Collected	Americium-241	Plutonium-238	Plutonium-239	Tritium
Soil Fallout Values[2]					0.013	0.023	0.054	na[3]
Tuff Fallout Values[2]					na	na	na	na
AAA0893	21-01425	0.00-0.50	Soil	7/14/1992	0.02	-[4]	0.28	-
AAA0894	21-01425	0.50-1.00	Soil	7/14/1992	0.01	-	0.35	-
AAA0895	21-01426	0.00-0.50	Soil	7/14/1992	0.02	-	0.2	-
AAA0796	21-01426	0.50-1.00	Soil	7/14/1992	-	-	0.03	-
AAA0797	21-01427	0.00-0.50	Soil	7/14/1992	-	-	0.31	-
AAA0798	21-01427	0.50-1.00	Soil	7/14/1992	0.01	-	0.15	-
AAA0799	21-01428	0.00-0.50	Soil	7/14/1992	0.22	0.03	4.08	-
AAA0800	21-01428	0.50-1.00	Soil	7/14/1992	0.03	-	0.46	-
AAA0801	21-01429	0.00-0.50	Soil	7/22/1992	-	-	0.93	-
AAA1092	21-01430	0.00-0.50	Soil	7/22/1992	0.55	-	19.4	-
AAA4102	21-01667	0.00-5.00	Soil	8/11/1993	0.02	-	0.38	0.03
AAA4105	21-01667	5.00-10.00	Tuff	8/11/1993	-	-	-	0.03
AAA4106	21-01667	10.00-15.00	Tuff	8/11/1993	-	-	-	0.04
AAA4107	21-01667	15.00-20.00	Tuff	8/11/1993	-	-	-	0.04

1 Values are in units of pCi/g.

2 "Inorganic and Radionuclide Background Data for Soils, Sediments, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-98-4847, Los Alamos, New Mexico. (LANL 1998, 59730). Fallout values apply to the 0 to 0.5 ft depth interval only, and fallout values are not applicable to tuff.

3 na = not available.

4 "—" denotes either not detected in tuff or no value greater than the soil fallout value was detected.

Table 5.10-4
Summary of Proposed Soil Sampling at SWMU 21-024(g)

Objective Addressed	Location Number	Location	Sample Depth (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Septic Tank(s) Structure 21-125																		
Determine if evidence of a leak from the tank is present	BH-1	Center of the septic tank 1 footprint	Tank bottom 0 to 1 5 to 6 10 to 11	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	
Determine if evidence of a leak from the tank is present	BH-2	Center of the septic tank 2 footprint	Tank bottom 0 to 1 5 to 6 10 to 11	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	
Determine if releases have occurred from the pipeline	1	Beneath the inlet line connection to tank 1	Beneath connection 0 to 1 2 to 3	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	
Determine if releases have occurred from the pipeline	2	Beneath the outlet line connection to tank 1	Beneath connection 0 to 1 2 to 3	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	
Determine if releases have occurred from the pipeline	3	Beneath the inlet line connection to tank 2	Beneath connection 0 to 1 2 to 3	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	
Determine if releases have occurred from the pipeline	4	Beneath the outlet line connection to tank 2	Beneath connection 0 to 1 2 to 3	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	
Pipelines for Tank 1																		
Determine if releases have occurred from the pipeline	5	Beneath the connections to Building 21-031	Beneath pipe 0 to 1 2 to 3	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine if releases have occurred from the pipeline	6	Beneath the connections to Building 21-031	Beneath pipe 0 to 1 2 to 3	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine if releases have occurred from the pipeline	7	Beneath the joint connecting the two pipelines from Building 21-031	Beneath pipe 0 to 1 2 to 3	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	

Table 5.10-4 (continued)

Objective Addressed	Location Number	Location	Sample Depth (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Pipelines for Tank 1																		
Determine if releases have occurred from the pipeline	8	Beneath the elbow joint connecting the pipeline to the drainage ditches	Beneath pipe 0 to 1 2 to 3	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Pipelines for Tank 2																		
Determine if releases have occurred from the pipeline	9	Beneath the connections to former Building 21-007	Beneath pipe 0 to 1 2 to 3	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine if releases have occurred from the pipeline	10	Beneath the pipe halfway between locations 9 and 11	Beneath pipe 0 to 1 2 to 3	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine if releases have occurred from the pipeline	11	Beneath the entrance to Building 21-031	Beneath pipe 0 to 1 2 to 3	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine if releases have occurred from the pipeline	12	Beneath the pipe halfway between locations 3 and 8	Beneath pipe 0 to 1 2 to 3	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Drainage Ditches																		
Determine extent of release from drainage ditch 1	BH-3	In the center of drainage ditch 1 excavated area	0 to 1 5 to 6 10 to 11	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	
Determine extent of release from drainage ditch 2	BH-4	In the center of drainage ditch 2 excavated area just south of the road	0 to 1 5 to 6 10 to 11	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	
Determine downslope extent of release from drainage ditch 1	BH-5	5 ft downslope of the northern edge of the ditch aligned with BH-3	0 to 0.5 5 to 6 10 to 11	 X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	
Determine downslope extent of release from drainage ditch 2	BH-6	Downslope of the center of the drainage ditch just north of the road	0 to 0.5 5 to 6 10 to 11	 X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	

Table 5.10-4 (continued)

Objective Addressed	Location Number	Location	Sample Depth (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Determine lateral extent	13	5 ft south of southern edge of drainage ditch 2 aligned with BH-6	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine extent of release from drainage ditches as a whole	14	5 ft south of southern edge of drainage ditch 1 aligned with BH-5	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine extent of release from drainage ditches as a whole	15	5 ft west of western edge of drainage ditch 1, aligned with BH-3	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Septic System Outfall																		
Determine vertical extent at the outfall	BH-7	0.5 ft downslope of the outfall pipe mouth	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	16	5 ft west of BH-5	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	17	5 ft east of BH-5	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

Table 5.10-4 (continued)

Objective Addressed	Location Number	Location	Sample Depth (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Outfall																		
Determine downslope extent	19	10 ft downslope BH-5	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	18	10 ft west of location 19	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	20	10 ft east of location 19	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine downslope extent	22	30 ft downslope of BH-5	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	21	20 ft west of location 22	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	23	20 ft east of location 22	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Splash block (former location) and piping																		
Determine vertical and lateral extent	24	Beneath pipe at connection to Building 21-031	Beneath connection															
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine vertical and lateral extent	25	20 ft from location 24 at former splash block location	0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Storm drain																		
Determine vertical and lateral extent	26	Downslope of inlet pipe exiting the building	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine the vertical extent at the storm drain	BH-8	0.5 ft downslope of the storm drain	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			10 to 11	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

Table 5.10-4 (continued)

Objective Addressed	Location Number	Location	Sample Depth (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Storm Drain Outfall																		
Determine the vertical extent at the storm drain outfall	BH-9	0.5 ft downslope of the outfall pipe mouth	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	27	5 ft west of BH-9	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	28	5 ft east of BH-9	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine downslope extent	30	Downslope of BH-7, north side of road	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	29	10 ft west of location 30	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	31	10 ft east of location 30	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine downslope extent	33	20 ft downslope of location 30	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	32	20 ft west of location 33	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	34	20 ft east of location 33	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

[1] Based on field screening results the most contaminated sample will also be analyzed for dioxins, furans, HE, and PCBs.

Table 5.11-1
SWMU 21-024(h) Inorganic Chemicals Greater Than BVs [1]

Sample ID	Location ID	Depth (ft)	Media	Date Collected	Antimony	Cadmium	Lithium	Selenium	Silver	Strontium	Zinc
Soil Background Value[2]					0.83	0.4	na[3]	1.52	1	na	48.5
Tuff Background Value[2]					0.5	1.63	na	0.3	1	na	63.5
AAA0823	21-01413	0.00-0.50	Soil	7/21/1992	6.7 (U)[4]	0.94	4.9	-[5]	-	12.3	51.8
AAA0824	21-01413	0.50-1.00	Soil	7/21/1992	7 (U)	1.2	5.6	-	-	12.6	-
AAA0825	21-01413	1.00-1.50	Soil	7/21/1992	6.6 (U)	0.99	5.4	-	-	10.4	-
AAA0826	21-01414	0.00-0.50	Soil	7/21/1992	6.5 (U)	1.1	7.9	-	-	14.9	-
AAA0828	21-01414	0.50-1.00	Soil	7/21/1992	6.3 (U)	2.1	8.7	-	-	13.4	-
AAA0830	21-01415	0.00-0.50	Soil	7/21/1992	6.2 (U)	1.1	8.2	-	-	12.9	-
AAA0831	21-01415	0.50-1.00	Soil	7/21/1992	6.2 (U)	0.9	5.8	-	-	8.5	-
AAA0832	21-01415	1.00-1.50	Soil	7/21/1992	6.1 (U)	0.53	3.9	-	-	4.4	-
AAA4167	21-01679	0.00-2.50	Soil	8/10/1993	-	0.63 (U)	-	-	1.1 (U)	-	-
AAA4169	21-01679	5.00-10.00	Tuff	8/10/1993	-	-	-	0.46 (U)	1.1 (U)	-	-
AAA4170	21-01679	10.00-15.00	Tuff	8/10/1993	-	-	-	0.44 (U)	1.1 (U)	-	-
AAA4171	21-01679	15.00-20.00	Tuff	8/10/1993	-	-	-	0.42 (U)	-	-	-

1 Values are in units of mg/kg.

2 "Inorganic and Radionuclide Background Data for Soils, Sediments, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-98-4847, Los Alamos, New Mexico. (LANL 1998, 59730).

3 na = not available.

4 (U) denotes "undetected."

5 "—" denotes that no value greater than the background value was detected or the analyte was undetected.

Table 5.11-2
SWMU 21-024(h) Organic Chemicals Detected[1]

Sample ID	Location ID	Depth (ft)	Media	Acetone	Bis(2-ethylhexyl)phthalate	Methylene Chloride
AAA0823	21-01413	0.00-0.50	Soil	0.02	-[2]	-
AAA0824	21-01413	0.50-1.00	Soil	0.02	-	-
AAA0825	21-01413	1.00-1.50	Soil	0.03	-	-
AAA0826	21-01414	0.00-0.50	Soil	0.02	-	-
AAA0828	21-01414	0.50-1.00	Soil	0.02	-	-
AAA0831	21-01415	0.50-1.00	Soil	0.01	-	-
AAA0832	21-01415	1.00-1.50	Soil	0.02	-	0.02
AAA4167	21-01679	0.00-2.50	Soil	-	2.9	-
AAA4169	21-01679	5.00-10.00	Tuff	-	5.5	-

1 Values are in units of mg/kg.

2 "—" denotes that no value greater than the estimated quantitation limit was detected.

Table 5.11-3
SWMU 21-024(h) Radionuclides Greater Than BVs or FVs[1]

Sample ID	Location ID	Depth (ft)	Media	Date Collected	Americium-241	Plutonium-238	Plutonium-239	Tritium	Uranium-235
Soil Background Values/Fallout Values[2]					0.013	0.023	0.054	na[3]	0.2
Tuff Background Values/Fallout Values[2]					na	na	na	na	0.09
AAA0824	21-01413	0.50-1.00	Soil	7/21/1992	0.3	0.91	1.84	-[4]	-
AAA0826	21-01414	0.00-0.50	Soil	7/21/1992	-	-	1.74	-	-
AAA0828	21-01414	0.50-1.00	Soil	7/21/1992	0.68	-	33	-	-
AAA4167	21-01679	0.00-2.50	Soil	8/10/1993	-	-	0.04	0.54	-
AAA4169	21-01679	5.00-10.00	Tuff	8/10/1993	-	-	-	0.65	-
AAA4170	21-01679	10.00-15.00	Tuff	8/10/1993	0.03	-	-	0.75	0.28
AAA4171	21-01679	15.00-20.00	Tuff	8/10/1993	-	-	-	0.79	-

1 Values are in units of pCi/g.

2 "Inorganic and Radionuclide Background Data for Soils, Sediments, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-98-4847, Los Alamos, New Mexico. (LANL 1998, 59730). Fallout values apply to the 0 to 0.5 ft depth interval only, and fallout values are not applicable to tuff.

3 na = not available.

4 "—" denotes either not detected in tuff or no value greater than the soil fallout/background value was detected or the analyte was undetected.

Table 5.11-4
Summary of Proposed Soil Sampling at SWMU 21-024(h)

Objective Addressed	Location Number	Location	Sample Depth (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Septic Tank Structure 21-163																		
Determine if evidence of a leak in the tank is present	BH-1	Center of the septic tank footprint	Tank bottom 0 to 1 5 to 6 10 to 11	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	
Determine if a release occurred at the connection of the pipeline and the inlet to the septic tank	1	Beneath the connection of the pipeline and the inlet of the septic tank	Beneath connection 0 to 1 2 to 3	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine if a release occurred at the connection of the pipeline and the outlet to the septic tank	2	Beneath the connection of the pipeline and the outlet of the septic tank	Beneath connection 0 to 1 2 to 3	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Pipelines																		
Determine if releases have occurred from the pipeline	3	50 ft south of the septic tank	Beneath pipe 0 to 1 2 to 3	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine if releases have occurred from the pipeline	4	50 ft southeast of the septic tank	Beneath pipe 0 to 1 2 to 3	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine if releases have occurred from the pipeline	5	100 ft southeast of the septic tank at a bend in the line	Beneath pipe 0 to 1 2 to 3	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine if releases have occurred from the pipeline	6	East of location 5 at a bend in the line	Beneath pipe 0 to 1 2 to 3	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine if releases have occurred from the pipeline	7	Southeast of location 6 at a bend in the line	Beneath pipe 0 to 1 2 to 3	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine if releases have occurred from the pipeline	8	Beneath the connection to Building 21-152	Beneath connection 0 to 1 2 to 3	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine if releases have occurred from the pipeline	9	Beneath the connection to former Building 21-151	Beneath connection 0 to 1 2 to 3	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	

Table 5.11-4 (continued)

Objective Addressed	Location Number	Location	Sample Depth (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Outfall																		
Determine vertical extent at the outfall	BH-2	0.5 ft downslope of the outfall pipe mouth	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	10	5 ft west of the outfall pipe mouth	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	11	5 ft east of the outfall pipe mouth	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine downslope extent	13	10 ft downslope of BH-2	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	12	10 ft west of location 13	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	14	10 ft east of location 13	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine downslope extent	16	30 ft downslope of location BH-2	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	15	20 ft west of location 16	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	17	20 ft east of location 16	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine downslope extent	19	North side of Structure 21-346 middle of drainage area	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	18	20 ft west of location 19	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	20	20 ft east of location 19	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

[1] Based on field screening results the most contaminated sample will also be analyzed for dioxins, furans, HE, and PCBs.

Table 5.12-1
Summary of Proposed Soil Sampling at SWMU 21-024(i)

Objective Addressed	Location Number	Location	Sample Depth (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Pipeline																		
Determine if a release occurred at the connection of the pipeline to Building 21-152	1	Beneath the intersection of the pipeline and Building 21-209	Beneath connection 0 to 1 2 to 3	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine if releases have occurred from the pipeline	2	50 ft from Building 21-209	Beneath pipe 0 to 1 2 to 3	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine if releases have occurred from the pipeline	3	100 ft from Building 21-209	Beneath pipe 0 to 1 2 to 3	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine if releases have occurred from the pipeline	4	150 ft from Building 21-209 or at the end of the pipe	Beneath pipe 0 to 1 2 to 3	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	

[1] Based on field screening results the most contaminated sample will also be analyzed for dioxins, furans, HE, and PCBs.

Table 5.13-1
SWMU 21-024(j) Inorganic Chemicals Greater Than BVs [1]

Sample ID	Location ID	Depth (ft)	Media	Date Collected	Aluminum	Barium	Calcium	Chromium	Cobalt	Copper	Lead	Magnesium	Nickel	Selenium	Silver	Strontium	Vanadium
Tuff Background Value[2]					7340	46	2200	7.14	3.14	4.66	11.2	1690	6.58	0.3	1	na[3]	17
AAA4144	21-01675	0.00-5.00	Tuff	8/13/1993	10800	123	4190	8.3	5.2 (U)[4]	6.8	14.8	1970	9.6	0.43 (U)	1.1 (U)	24.5	18.7
AAA4147	21-01675	5.00-10.00	Tuff	8/13/1993	-[5]	-	-	-	-	-	-	-	-	0.55 (U)	1.1 (U)	-	-
AAA4148	21-01675	10.00-15.00	Tuff	8/13/1993	-	-	-	-	-	-	-	-	-	0.42 (U)	1.1 (U)	-	-
AAA4149	21-01675	15.00-20.00	Tuff	8/13/1993	-	-	-	-	-	-	-	-	-	0.43 (U)	1.1 (U)	-	-

1 Values are in units of mg/kg.

2 "Inorganic and Radionuclide Background Data for Soils, Sediments, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-98-4847, Los Alamos, New Mexico. (LANL 1998, 59730).

3 na = not available.

4 (U) denotes "undetected."

5 "—" denotes that no value greater than the background value was detected or the analyte was undetected.

Table 5.13-2
SWMU 21-024(j) Radionuclides Greater Than FVs[1]

Sample ID	Location ID	Depth (ft)	Media	Americium-241	Plutonium-239	Tritium
Tuff Fallout Values[2]				na[3]	na	na
AAA4144	21-01675	0.00-5.00	Tuff	0.02	0.1	0.16
AAA4147	21-01675	5.00-10.00	Tuff	-[4]	-	0.14
AAA4148	21-01675	10.00-15.00	Tuff	-	0.02	0.19
AAA4149	21-01675	15.00-20.00	Tuff	-	-	0.22

1 Values are in units of pCi/g.

2 "Inorganic and Radionuclide Background Data for Soils, Sediments, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-98-4847, Los Alamos, New Mexico. (LANL 1998, 59730). Fallout values apply to the 0 to 0.5 ft depth interval only, and fallout values are not applicable to tuff.

3 na = not available.

4 "—" denotes either not detected or no value greater than the soil fallout value was detected.

Table 5.13-3
Summary of Proposed Soil Sampling at SWMU 21-024(j)

Objective Addressed	Location Number	Location	Sample Depth (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Septic Tank Structure 21-194																		
Determine if evidence of a leak from the tank is present	BH-1	Center of the septic tank footprint	Tank bottom 0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			10 to 11	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the pipeline	1	Beneath the inlet line connection to tank	Beneath connection															
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the pipeline	2	Beneath the outlet line connection to tank	Beneath connection															
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Pipelines																		
Determine if a release occurred at the connection of the pipeline to Building 21-155	3	Beneath the connection to Building 21-155	Beneath pipe 0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from pipeline 1	4	Beneath the elbow joint	Beneath pipe 0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from pipelines 1 and 2	6	Beneath the intersection of pipelines 1 and 2	Beneath pipe 0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from pipeline 2	5	Beneath the connection to Building 21-155	Beneath pipe 0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from pipeline 2	7	Beneath the elbow joint	Beneath pipe 0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from pipelines 1 and 2	8	Beneath the joining of pipelines 1 and 2	Beneath pipe 0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

Table 5.13-3 (continued)

Objective Addressed	Location Number	Location	Sample Depth (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Pipelines																		
Determine if releases have occurred from outlet pipeline	9	50 ft from the septic tank	Beneath pipe 0 to 1 2 to 3	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine if releases have occurred from outlet pipeline	10	100 ft from the septic tank	Beneath pipe 0 to 1 2 to 3	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine if releases have occurred from outlet pipeline	11	150 ft from the septic tank	Beneath pipe 0 to 1 2 to 3	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Outfall																		
Determine vertical extent at the outfall	BH-2	0.5 ft downslope of the outfall pipe mouth	0 to 0.5 2 to 3 5 to 6	 X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	
Determine lateral extent	12	5 ft west of BH-2	0 to 0.5 2 to 3	 X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine lateral extent	13	5 ft east of BH-2	0 to 0.5 2 to 3	 X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	

Table 5.13-3 (continued)

Objective Addressed	Location Number	Location	Sample Depth (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Bench																		
Determine downslope extent (on the topographical bench)	15	On the topo bench, directly downslope of outfall pipe mouth, beside mesa cliff	0 to 0.5 2 to 3	 X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine lateral extent	14	20 ft west of location 15	0 to 0.5 2 to 3	 X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine lateral extent	16	20 ft east of location 15	0 to 0.5 2 to 3	 X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine downslope extent (on the topographical bench)	18	On the topo bench, directly downslope of outfall pipe mouth, along bench edge	0 to 0.5 2 to 3	 X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine lateral extent	17	20 ft west of location 18	0 to 0.5 2 to 3	 X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine lateral extent	19	20 ft east of location 18	0 to 0.5 2 to 3	 X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	

[1] *Based on field screening results the most contaminated sample will also be analyzed for dioxins, furans, HE, and PCBs.*

Table 5.14-1
SWMU 21-024(k) Inorganic Chemicals Greater Than BVs[1]

Sample ID	Location ID	Depth (ft)	Media	Date Collected	Aluminum	Barium	Beryllium	Cadmium	Calcium	Copper	Iron	Lithium	Magnesium	Nickel	Selenium	Silver	Strontium	Zinc
Soil Background Value[2]					29200	295	1.83	0.4	6120	14.7	21500	na[3]	4610	15.4	1.52	1	na	48.8
Tuff Background Value[2]					7340	46	1.21	1.63	2200	4.66	14500	na	1690	6.58	0.3	1	na	63.5
Fill Background Value[2]					29200	295	1.83	0.4	6120	14.7	21500	na	4610	15.4	1.52	1	na	48.8
AAA4150	21-01676	0.00-5.00	Soil	8/10/1993	-[4]	-	-	0.64 (U)[5]	-	-	-	-)	-	-	-	1.1 (U)	-	-
AAA4151	21-01676	5.00-10.00	Fill	8/10/1993	29700	-	3.3	2.2	-	14.9	21700	22.5	-	20.2	-	1.2 (U)	30.5	50.4
AAA4152	21-01676	10.00-15.00	Tuff	8/10/1993	-	-	-	-	-	-	-	-	-	-	0.53 (U)	-	-	-
AAA4154	21-01676	15.00-20.00	Tuff	8/10/1993	-	-	-	-	-	-	-	-	-	-	0.4 (U)	-	-	-
AAA4156	21-01677	0.00-5.00	Soil	8/10/1993	-	-	-	0.85	-	-	-	6.9	-	-	-	1.1 (U)	25.3	-
AAA4157	21-01677	5.00-8.00	Fill	8/10/1993	-	-	-	0.76	6540	-	-	3.8	-	-	-	1.1 (U)	21	-
AAA4158	21-01677	10.00-15.00	Tuff	8/10/1993	-	-	-	-	-	-	-	2.3	-	-	0.42 (U)	1.1 (U)	1	-
AAA4159	21-01677	15.00-20.00	Tuff	8/10/1993	-	-	-	-	-	-	-	2.1	-	-	0.43 (U)	1.1 (U)	1.6	-
AAA4160	21-01678	0.00-5.00	Fill	8/11/1993	-	-	-	0.92	-	-	-	5.4	-	-	-	1.1 (U)	16.1	-
AAA4161	21-01678	5.00-10.00	Fill	8/11/1993	-	-	-	0.75	20900	-	-	4.3	-	-	-	1.1 (U)	51.9	-
AAA4162	21-01678	10.00-15.00	Tuff	8/11/1993	-	-	-	-	-	-	-	2.4	-	-	0.4 (U)	-	1.8	-
AAA4163	21-01678	15.00-20.00	Tuff	8/11/1993	9000	61.6	-	-	-	-	-	9.2	1910	-	0.43 (U)	1.1 (U)	17.3	-

1 Values are in units of mg/kg.

2 "Inorganic and Radionuclide Background Data for Soils, Sediments, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-98-4847, Los Alamos, New Mexico. (LANL 1998, 59730).

3 na = not available.

4 "—" denotes that no value greater than the background value was detected or the analyte was undetected.

5 (U) denotes "undetected."

Table 5.14-2
SWMU 21-024(k) Organic Chemicals Detected[1]

Sample ID	Location ID	Depth (ft)	Media	Date Collected	Bis(2-ethylhexyl)phthalate
AAA4163	21-01678	15.00-20.00	Tuff	8/11/1993	1.65

[1] Values are in units of mg/kg.

Table 5.14-3
SWMU 21-024(k) Radionuclides Greater Than BVs or FVs[1]

Sample ID	Location ID	Depth (ft)	Media	Date Collected	Americium-241	Plutonium-238	Plutonium-239	Tritium	Uranium-234
Soil Background Values/Fallout Values[2]					0.013	0.023	0.054	na[3]	2.59
Tuff Background Values/Fallout Values[2]					na	na	na	na	1.98
Fill Background Values/Fallout Values[2]					0.013	0.023	0.054	na	2.59
AAA4150	21-01676	0.00-5.00	Soil	8/10/1993	-[4]	-	0.02	0.36	-
AAA4151	21-01676	5.00-10.00	Fill	8/10/1993	-	-	-	0.53	-
AAA4152	21-01676	10.00-15.00	Tuff	8/10/1993	-	-	-	0.12	-
AAA4154	21-01676	15.00-20.00	Tuff	8/10/1993	-	-	-	0.15	-
AAA4156	21-01677	0.00-5.00	Soil	8/10/1993	0.01	-	0.1	0.23	4.17
AAA4157	21-01677	5.00-8.00	Fill	8/10/1993	-	-	0.02	0.51	-
AAA4158	21-01677	10.00-15.00	Tuff	8/10/1993	-	-	-	0.08	-
AAA4159	21-01677	15.00-20.00	Tuff	8/10/1993	-	-	0.02	0.10	-
AAA4160	21-01678	0.00-5.00	Fill	8/11/1993	0.02	0.01	0.19	0.12	-
AAA4161	21-01678	5.00-10.00	Fill	8/11/1993	-	-	0.03	0.88	-
AAA4162	21-01678	10.00-15.00	Tuff	8/11/1993	-	-	-	0.03	-
AAA4163	21-01678	15.00-20.00	Tuff	8/11/1993	-	-	0.02	0.05	-

[1] Values are in units of pCi/g.

[2] "Inorganic and Radionuclide Background Data for Soils, Sediments, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-98-4847, Los Alamos, New Mexico. (LANL 1998, 59730). Fallout values apply to the 0 to 0.5 ft depth interval only, and fallout values are not applicable to tuff.

[3] na = not available.

[4] "—" denotes either not detected in tuff or no value greater than soil fallout/background value was detected or the analyte was undetected.

Table 5.14-4
Summary of Proposed Soil Sampling at SWMU 21-024(k)

Objective Addressed	Location Number	Location	Sample Depth (ft)	VOCs	SVOCs	TAL Metals	Lithium, Strontium	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Septic Tank Structure 21-219																			
Determine if evidence of a leak from the tank is present	BH-1	Center of the septic tank footprint	Tank bottom 0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			10 to 11	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the pipeline	1	Beneath the inlet line connection to the tank	Beneath connection																
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the pipeline	2	Beneath the outlet line connection to the tank	Beneath connection																
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Pipelines																			
Determine if releases have occurred from the pipeline	A	Beneath the pipe south of Building 21-167	Beneath pipe 0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the pipeline	B	Beneath the pipe south of Building 21-167	Beneath pipe 0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if a release occurred at the connection of the pipeline to Building 21-209	3	Beneath the connection to Building 21-209	Beneath pipe 0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the pipeline	4	Beneath the pipe halfway between locations 3 and 5	Beneath pipe 0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the pipeline	5	Beneath the manhole 21-217 floor	Beneath manhole floor																
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the pipeline	6	Beneath the pipe halfway between locations 5 and 7	Beneath pipe 0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

Table 5.14-4 (continued)

Objective Addressed	Location Number	Location	Sample Depth (ft)	VOCs	SVOCs	TAL Metals	Lithium, Strontium	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Determine if releases have occurred from the pipeline	7	Beneath the manhole 21-218 floor	Beneath manhole floor																
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the pipeline	8	Beneath the pipe halfway between locations 7 and 1	Beneath pipe 0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the pipeline	9	Beneath the pipe convergence	Beneath pipe 0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Tile Leach Field																			
Determine extent of release from the tile leach field	BH-2	In the center of the tile field floor	Tile field bottom																
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			10 to 11	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			15 to 16	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			20 to 21	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine extent of release from the tile leach field	10	10 ft north of center of northern boundary of tile leach field	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine extent of release from the tile leach field	11	10 ft west of the center of the western boundary of tile leach field	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine extent of release from the tile leach field	12	10 ft south and west of southwest corner of tile leach field	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine extent of release from the tile leach field	13	10 ft south of center of septic tank southern boundary	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Outfalls 1 and 2																			
Determine the vertical extent at outfall 1	BH-3	0.5 ft downslope of the outfall 1 pipe mouth	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

Table 5.14-4 (continued)

Objective Addressed	Location Number	Location	Sample Depth (ft)	VOCs	SVOCs	TAL Metals	Lithium, Strontium	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Determine lateral extent at outfall 1	14	5 ft west of BH-3	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent at outfall 1	15	5 ft east of BH-3	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine vertical of release extent at outfall 2	BH-4	0.5 ft downslope of the outfall 2 pipe mouth	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent at outfall 2	16	5 ft west of BH-4	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Outfalls 1 and 2																			
Determine lateral extent at outfall 2	17	5 ft east of BH-4	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine downslope extent	19	10 ft downslope of BH-3	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	18	10 ft west of location 19	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	C	10 ft east of location 19	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine downslope extent	20	10 ft downslope of BH-4	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	21	10 ft east of location 20	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	D	10 ft west of location 20	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

Table 5.14-4 (continued)

Objective Addressed	Location Number	Location	Sample Depth (ft)	VOCs	SVOCs	TAL Metals	Lithium, Strontium	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Bench																			
Determine downslope extent (on the topographical bench) from outfall 1	23	On the topo bench, directly downslope of outfall 1, beside cliff	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	22	20 ft west of location 23	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine downslope extent (on the topographical bench) from outfall 2	24	On the topo bench, directly downslope of outfall 2, beside cliff	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	25	20 ft east of location 24	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine downslope extent (on the topographical bench) from outfall 1	27	On the topo bench, directly downslope of outfall 1, along bench edge	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	26	20 ft west of location 27	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine downslope extent (on the topographical bench) from outfall 2	28	On the topo bench, directly downslope of outfall 2, along bench edge	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	29	20 ft east of location 28	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X		
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X		

[1] *Based on field screening results the most contaminated sample will also be analyzed for dioxins, furans, HE, and PCBs.*

Table 5.15-1
Consolidated Unit 21-024(l)-99 Inorganic Chemicals Greater Than BVs[1]

Sample ID	Location ID	Depth (ft)	Media	Date Collected	Antimony	Cadmium	Calcium	Lithium	Strontium	Zinc
Soil Background Value[2]					0.83	0.4	6120	na[3]	na	48.8
AAA0912	21-01419	0.00-0.50	Soil	7/22/1992	6.1 (U)[4]	1.3	-[5]	6.5	18.4	-
AAA0913	21-01420	0.00-0.50	Soil	7/22/1992	6.1 (U)	1	7120	5.8	20.4	-
AAA0889	21-01421	0.00-0.50	Soil	7/22/1992	6 (U)	0.78	-	4.2	12.5	-
AAA0890	21-01422	0.00-0.50	Soil	7/22/1992	6.3 (U)	1.1	-	9	14.9	-
AAA0891	21-01423	0.00-0.50	Soil	7/22/1992	6.1 (U)	1	-	5.1	10.9	-
AAA0892	21-01424	0.00-0.50	Soil	7/22/1992	6.2 (U)	2	-	27.7	16.7	50.1

1 Values are in units of mg/kg.

2 "Inorganic and Radionuclide Background Data for Soils, Sediments, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-98-4847, Los Alamos, New Mexico. (LANL 1998, 59730).

3 na = not available.

4 (U) denotes "undetected."

5 "—" denotes that no value greater than the background value was detected or the analyte was undetected.

Table 5.15-2
Consolidated Unit 21-024(l)-99 Organic Chemicals Detected[1]

Sample ID	Location ID	Depth (ft)	Media	Date Collected	Acetone	Methylene Chloride
AAA0889	21-01421	0.00-0.50	Soil	7/22/1992	0.02	0.01

[1] Values are in units of mg/kg.

Table 5.15-3
Consolidated Unit 21-024(l)-99 Radionuclides Greater Than FVs[1]

Sample ID	Location ID	Depth (ft)	Media	Date Collected	Americium-241	Plutonium-238	Plutonium-239
Soil Fallout Values[2]					0.013	0.023	0.054
AAA0912	21-01419	0.00-0.50	Soil	7/22/1992	-[3]	-	0.93
AAA0890	21-01422	0.00-0.50	Soil	7/22/1992	0.42	12.1	1.42
AAA0891	21-01423	0.00-0.50	Soil	7/22/1992	0.19	-	1.71

[1] Values are in units of pCi/g.

[2] "Inorganic and Radionuclide Background Data for Soils, Sediments, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-98-4847, Los Alamos, New Mexico. (LANL 1998, 59730). Fallout values apply to the 0 to 0.5 ft depth interval only.

[3] "—" denotes that no value greater than the fallout value was detected or the analyte was undetected.

Table 5.15-4
Summary of Proposed Soil Sampling at Consolidated Unit 21-024(l)-99

Objective Addressed	Location Number	Location	Sample Depth (ft)	VOCs	SVOCs	TAL Metals	Lithium	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Aboveground Tank 21-335																			
Determine downslope extent	19	Directly downslope of drain valve on aboveground tank Structure 21-335	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Sump Structure 21-74																			
Determine the presence from sump Structure 21-74	BH-1	Center of the floor of the sump	0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			10 to 11	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine the presence from sump Structure 21-74	BH-2	10 ft north of sump, start at sump bottom depth	0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			10 to 11	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the sump pipeline	5	Beneath pipeline connection to sump (south pipeline)	Beneath connection																
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the sump pipeline	6	Beneath pipeline connection to sump (east pipeline)	Beneath connection																
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Pipelines																			
Determine if releases have occurred from the sump pipeline connection to Building 21-021	1	Beneath the sump pipeline connection to Building 21-21	Beneath connection																
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the sump pipeline connection to Building 21-021	2	Beneath the sump pipeline connection to Building 21-021	Beneath connection																
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

Table 5.15-4 (continued)

Objective Addressed	Location Number	Location	Sample Depth (ft)	VOCs	SVOCs	TAL Metals	Lithium	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Pipelines																			
Determine if releases have occurred from the long pipeline connection to Building 21-021	3	Beneath the long outfall pipeline connection to Building 21-021	Beneath connection 0 to 1 2 to 3	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	
Determine if releases have occurred from the sump pipeline	4	Beneath the sump pipeline elbow	Beneath pipe 0 to 1 2 to 3	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine if releases have occurred from the aboveground tank pipeline	7	Beneath semi-aboveground pipeline connection to Building 21-021	Beneath connection 0 to 1 2 to 3	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	
Determine if releases have occurred from the aboveground tank pipeline	17	Beneath semi-aboveground pipeline halfway between the tank and Building 21-021	Beneath pipe 0 to 1 2 to 3	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	
Determine if releases have occurred from the aboveground tank pipeline	18	Beneath semi-aboveground pipeline at its connection to the tank	Beneath connection 0 to 1 2 to 3	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	
Determine if releases have occurred from the long pipeline	8	Beneath the long outfall pipeline halfway between Building 21-021 and the outfall	Beneath pipe 0 to 1 2 to 3	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Outfalls																			
Determine vertical extent at the outfall	BH-3	0.5 ft downslope of the longer outfall pipe mouth	0 to 0.5 2 to 3 5 to 6	 X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	
Determine vertical extent at the outfall	BH-4	0.5 ft downslope of the mouth of the shorter outfall pipe	0 to 0.5 2 to 3 5 to 6	 X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	
Determine lateral extent	9	5 ft west of BH-3	0 to 0.5 2 to 3	 X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	

Table 5.15-4 (continued)

Objective Addressed	Location Number	Location	Sample Depth (ft)	VOCs	SVOCs	TAL Metals	Lithium	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Outfalls																			
Determine lateral extent	10	5 ft east of BH-3	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine downslope extent	12	10 ft downslope of BH-3	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	11	10 ft west of location 12	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	13	10 ft east of location 12	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine downslope extent	15	30 ft downslope of BH-3	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	14	20 ft west of location 15	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	16	20 ft east of location 15	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	20	5 ft east of BH-4	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine downslope extent	22	10 ft downslope of BH-4	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	21	10 ft west of location 22	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	23	10 ft east of location 22	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine downslope extent	25	30 ft downslope of BH-4	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

Table 5.15-4 (continued)

Objective Addressed	Location Number	Location	Sample Depth (ft)	VOCs	SVOCs	TAL Metals	Lithium	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Outfalls																			
Determine lateral extent	24	20 ft west of location 25	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	26	20 ft east of location 25	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

[1] Based on field screening results the most contaminated sample will also be analyzed for dioxins, furans, HE, and PCBs.

Table 5.16-1
SWMU 21-024(n) Inorganic Chemicals Greater Than BVs[1]

Sample ID	Location ID	Depth (ft)	Media	Date Collected	Antimony	Cadmium	Chromium	Copper	Lithium	Strontium	Zinc
Soil Background Value[2]					0.83	0.4	19.3	14.7	na[3]	na	48.8
AAA0785	21-01402	0.00-0.50	Soil	7/21/1992	6.3 (U)[4]	0.9	-[5]	-	9.2	28	85.2
AAA0788	21-01402	0.50-1.00	Soil	7/21/1992	6.3 (U)	0.97	-	32.7	7	18.5	158
AAA0789	21-01402	1.00-1.50	Soil	7/21/1992	6.4 (U)	0.52	-	-	4.4	3.5	49.7
AAA0790	21-01403	0.00-0.50	Soil	7/21/1992	6 (U)	0.7	-	-	4	8.6	-
AAA0791	21-01403	0.50-1.00	Soil	7/21/1992	6.1 (U)	0.48	-	-	3	7.6	-
AAA0792	21-01403	1.00-1.50	Soil	7/21/1992	6.1 (U)	0.43 (U)	-	-	3.6	1.8	-
AAA0793	21-01404	0.00-0.50	Soil	7/21/1992	6.2 (U)	0.93	34.2	-	7.1	15.8	-
AAA0794	21-01404	0.50-1.00	Soil	7/21/1992	6 (U)	0.64	37.2	-	6.2	11.2	-
AAA0795	21-01404	1.00-1.50	Soil	7/21/1992	6.3 (U)	0.56	-	-	4.2	8.5	-

1 Values are in units of mg/kg.

2 "Inorganic and Radionuclide Background Data for Soils, Sediments, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-98-4847, Los Alamos, New Mexico. (LANL 1998, 59730).

3 na = not available.

4 (U) denotes "undetected."

5 "—" denotes that no value greater than the background value was detected or the analyte was undetected.

Table 5.16-2
SWMU 21-024(n) Organic Chemicals Detected[1]

Sample ID	Location ID	Depth (ft)	Media	Acetone	Diethylphthalate
AAA0785	21-01402	0.00-0.50	Soil	-[2]	0.51
AAA0788	21-01402	0.50-1.00	Soil	0.02	-
AAA0789	21-01402	1.00-1.50	Soil	0.02	0.95
AAA0791	21-01403	0.50-1.00	Soil	0.03	-
AAA0792	21-01403	1.00-1.50	Soil	0.02	-
AAA0793	21-01404	0.00-0.50	Soil	0.03	-
AAA0794	21-01404	0.50-1.00	Soil	0.02	-
AAA0795	21-01404	1.00-1.50	Soil	0.03	-

1 Values are in units of mg/kg.

2 "—" denotes that no value greater than the estimated quantitation limit was detected.

Table 5.16-3
SWMU 21-024(n) Radionuclides Greater Than FVs[1]

Sample ID	Location ID	Depth (ft)	Media	Americium-241
Soil Fallout Values[2]				0.013
AAA0788	21-01402	0.50-1.00	Soil	0.26

1 Values are in units of pCi/g.

2 "Inorganic and Radionuclide Background Data for Soils, Sediments, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-98-4847, Los Alamos, New Mexico. (LANL 1998, 59730). Fallout values apply to the 0 to 0.5 ft depth interval only.

Table 5.16-4
Summary of Proposed Soil Sampling at SWMU 21-024(n)

Objective Addressed	Location Number	Location	Sample Depth (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Western Pipeline																		
Determine if releases have occurred from the pipeline	1	Beneath the connection of the western pipeline and Building 21-155	Beneath connection															
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Western Pipeline Outfall																		
Determine vertical extents at the western outfall	BH-1	0.5 ft downslope of the outfall pipe mouth	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	2	5 ft west of BH-1	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	3	5 ft east of BH-1	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine downslope extent	5	10 ft downslope of BH-1	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	4	10 ft west of location 5	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	6	10 ft east of location 5	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine downslope extent	8	30 ft downslope of BH-1	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	7	20 ft west of location 8	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	9	20 ft east of location 8	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Middle Pipeline																		
Determine if releases have occurred from the pipeline	10	Beneath the connection of the middle pipeline and Building 21-155	Beneath connection															
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

Table 5.16-4 (continued)

Objective Addressed	Location Number	Location	Sample Depth (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Middle Pipeline																		
Determine if releases have occurred from the pipeline	11	Beneath the pipeline immediately south of Building 21-213 at bend	Beneath pipe 0 to 1 2 to 3	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine if releases have occurred from the pipeline	12	Beneath the pipeline immediately south of Building 21-213	Beneath pipe 0 to 1 2 to 3	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine if releases have occurred from the pipeline	13	Beneath the pipeline immediately north of Building 21-213 and south of the fence	Beneath pipe 0 to 1 2 to 3	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Middle Pipeline Outfall																		
Determine vertical extent at the middle pipeline outfall	BH-2	0.5 ft downslope of the outfall pipe mouth	0 to 0.5 2 to 3 5 to 6	 X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	
Determine lateral extent	14	5 ft west of BH-2	0 to 0.5 2 to 3	 X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	

Table 5.16-4 (continued)

Objective Addressed	Location Number	Location	Sample Depth (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Middle Pipeline Outfall																		
Determine downslope extent	17	10 ft downslope of BH-2	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	16	10 ft west of location 17	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine downslope extent	21	30 ft downslope of BH-2	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	20	20 ft west of location 21	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Storm Grate Pipeline																		
Determine the extent at the storm grate	BH-3	In the center of the storm grate excavation area	0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			10 to 11	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Storm Grate Pipeline Outfall																		
Determine vertical extent at the storm grate pipeline outfall	BH-4	0.5 ft downslope of the outfall pipe mouth	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	15	5 ft east of BH-4	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine downslope extent	18	10 ft downslope of BH-4	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	19	10 ft east of location 18	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine downslope extent	22	30 ft downslope of BH-4	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	23	20 ft east of location 22	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

Table 5.16-4 (continued)

Objective Addressed	Location Number	Location	Sample Depth (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Eastern Pipeline																		
Determine if releases have occurred from the pipeline	24	Beneath the connection of the eastern pipeline and Building 21-155	Beneath connection 0 to 1 2 to 3	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	
Determine if releases have occurred from the pipeline	25	Beneath the pipeline bend	Beneath pipe 0 to 1 2 to 3	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine if releases have occurred from the pipeline	26	Beneath the pipeline bend	Beneath pipe 0 to 1 2 to 3	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine if releases have occurred from the pipeline	27	Beneath the pipeline at the connection to the headwall	Beneath connection 0 to 1 2 to 3	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	
Eastern Pipeline Outfall																		
Determine vertical extent at the eastern outfall	BH-5	0.5 ft downslope of the outfall pipe mouth in the middle of the drainage area	0 to 0.5 2 to 3 5 to 6	 X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	
Determine lateral extent	28	5 ft west of BH-5	0 to 0.5 2 to 3	 X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine lateral extent	29	5 ft east of BH-5	0 to 0.5 2 to 3	 X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine downslope extent	31	10 ft downslope of BH-5	0 to 0.5 2 to 3	 X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine lateral extent	30	10 ft west of location 31	0 to 0.5 2 to 3	 X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine lateral extent	32	10 ft east of location 31	0 to 0.5 2 to 3	 X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine downslope extent	34	30 ft downslope of BH-5	0 to 0.5 2 to 3	 X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	

Table 5.16-4 (continued)

Objective Addressed	Location Number	Location	Sample Depth (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Eastern Pipeline Outfall																		
Determine lateral extent	33	20 ft west of location 34	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	35	20 ft east of location 34	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Ditch																		
Determine downslope extent	36	In the ditch, at the mouth of the western culvert	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	37	In the ditch, directly downslope of the headwall of the eastern pipeline outfall	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	38	In the ditch, at the mouth of the eastern culvert	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Western Culvert Outfall																		
Determine vertical extent at the western culvert outfall	BH-6	0.5 ft downslope of the western culvert outfall pipe mouth	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	39	5 ft west of BH-6	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	40	5 ft east of BH-6	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine downslope extent	42	10 ft downslope of BH-6	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	41	10 ft west of location 42	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	43	10 ft east of location 42	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

Table 5.16-4 (continued)

Objective Addressed	Location Number	Location	Sample Depth (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Western Culvert Outfall																		
Determine downslope extent	45	30 ft downslope of BH-6	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	44	20 ft west of location 45	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	46	20 ft east of location 45	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Eastern Culvert Outfall																		
Determine vertical extent at the eastern culvert outfall	BH-7	0.5 ft downslope of the eastern culvert outfall pipe mouth	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	47	5 ft west of BH-7	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	48	5 ft east of BH-7	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine downslope extent	50	10 ft downslope of BH-7	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	49	10 ft west of location 50	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	51	10 ft east of location 50	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine downslope extent	53	30 ft downslope of BH-7	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	52	20 ft west of location 53	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	54	20 ft east of location 53	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

[1] Based on field screening results the most contaminated sample will also be analyzed for dioxins, furans, HE, and PCBs.

Table 5.17-1
SWMU 21-024(o) Inorganic Chemicals Greater Than BVs[1]

Sample ID	Location ID	Depth (ft)	Media	Date Collected	Antimony	Cadmium	Lead	Lithium	Strontium	Zinc
Soil Background Value[2]					0.83	0.4	22.3	na[3]	na	48.8
AAA0837	21-01343	0.00-0.50	Soil	6/30/1992	4.8 (U)[4]	1.6	35.9	10.5	21.2	115
AAA0839	21-01343	0.50-1.00	Soil	6/30/1992	5.2 (U)	1.1	-[5]	6.9	10.6	-
AAA0840	21-01343	1.00-1.50	Soil	6/30/1992	5.5 (U)	0.48 (U)	-	3	1	-
AAA0841	21-01344	0.00-0.50	Soil	6/30/1992	4.9 (U)	1.8	35.9	10.5	21.1	95.6
AAA0842	21-01344	0.50-1.00	Soil	6/30/1992	5.1 (U)	1.3	45	9.6	17.6	75.9
AAA0843	21-01344	1.00-1.50	Soil	6/30/1992	5.9 (U)	1	-	4.8	11.1	-

1 Values are in units of mg/kg.

2 "Inorganic and Radionuclide Background Data for Soils, Sediments, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-98-4847, Los Alamos, New Mexico. (LANL 1998, 59730).

3 na = not available.

4 (U) denotes "undetected."

5 "—" denotes that no value greater than the background value was detected or the analyte was undetected.

Table 5.17-2
SWMU 21-024(o) Radionuclides Greater Than FVs[1]

Sample ID	Location ID	Depth (ft)	Media	Americium-241	Plutonium-239
Soil Fallout Values[2]				0.013	0.054
AAA0837	21-01343	0.00-0.50	Soil	0.07	1.66
AAA0839	21-01343	0.50-1.00	Soil	-[3]	0.15
AAA0841	21-01344	0.00-0.50	Soil	0.03	0.3
AAA0842	21-01344	0.50-1.00	Soil	0.03	0.56
AAA0843	21-01344	1.00-1.50	Soil	-	0.14

1 Values are in units of pCi/g.

2 "Inorganic and Radionuclide Background Data for Soils, Sediments, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-98-4847, Los Alamos, New Mexico. (LANL 1998, 59730). Fallout values apply to the 0 to 0.5 ft depth interval only.

3 "—" denotes that no value greater than the fallout value was detected.

Table 5.17-3
Summary of Proposed Soil Sampling at SWMU 21-024(o)

Objective Addressed	Location Number	Location	Sample Depth (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Pipeline																		
Determine if a release occurred at the connection of the pipeline to Building 21-046	1	Beneath the connection of the pipeline and Building 21-46	Beneath connection 0 to 1 2 to 3	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	 X X	
Determine if releases have occurred from the pipeline	2	Beneath the pipeline 50 ft from Building 21-046	Beneath pipe 0 to 1 2 to 3	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine if releases have occurred from the pipeline	3	Beneath the pipeline 100 ft from Building 21-046	Beneath pipe 0 to 1 2 to 3	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Outfall																		
Determine vertical extent at the middle outfall	BH-1	0.5 ft downslope of the outfall pipe mouth	0 to 0.5 2 to 3 5 to 6	 X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	
Determine lateral extent	4	5 ft west of the outfall pipe mouth	0 to 0.5 2 to 3	 X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine lateral extent	5	5 ft east of the outfall pipe mouth	0 to 0.5 2 to 3	 X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine downslope extent	7	Downslope of BH-2, as close to the mesa edge as possible	0 to 0.5 2 to 3	 X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine lateral extent	6	10 ft west of location 7	0 to 0.5 2 to 3	 X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	
Determine lateral extent	8	10 ft east of location 7	0 to 0.5 2 to 3	 X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	

Table 5.17-3 (continued)

Objective Addressed	Location Number	Location	Sample Depth (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Bench																		
Determine downslope extent (on the topographical bench)	10	On the topo bench, directly downslope of outfall pipe mouth, along mesa cliff edge	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	9	20 ft west of location 10	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	11	20 ft east of location 10	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine downslope extent (on the topographical bench)	13	On the topo bench, directly downslope of outfall pipe mouth, along bench edge	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	12	20 ft west of location 13	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	14	20 ft east of location 13	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

[1] Based on field screening results the most contaminated sample will also be analyzed for dioxins, furans, HE, and PCBs.

Table 5.18-1
Consolidated Unit 21-026(a)-99 Inorganic Chemicals Greater Than BVs[1]

Sample ID	Location ID	Depth (ft)	Media	Date Collected	Aluminum	Antimony	Barium	Beryllium	Cadmium	Calcium	Chromium	Copper	Lead	Lithium
Soil Background Value[2]					29200	0.83	295	1.83	0.4	6120	19.3	14.7	22.3	na[3]
Tuff Background Value[2]					7340	0.5	46	1.21	1.63	2200	7.14	4.66	11.2	na
AAA0776	21-01398	0.00-0.50	Soil	7/13/1992	-[4]	5.3 (U)[5]	-	-	1.3	-	182	-	-	4.8
AAA0779	21-01399	0.00-0.50	Soil	7/13/1992	-	5.8 (U)	-	-	1.4	-	-	14.8	-	8.9
AAA0780	21-01400	0.00-0.50	Soil	7/13/1992	-	5.3 (U)	-	-	1	-	21.5	30.7	-	5.1
AAA0781	21-01401	0.00-0.50	Soil	7/20/1992	-	6.6 (U)	-	-	0.9	-	21.3	41.1	27.3	6
AAA0782	21-01401	0.50-1.00	Soil	7/20/1992	-	6.7 (U)	-	-	0.47 (U)	-	-	-	-	3.5
AAA0783	21-01401	1.00-1.50	Soil	7/20/1992	-	6.8 (U)	-	-	0.48 (U)	-	-	-	-	5.6
AAB9084	21-02113	0.00-0.50	Soil	8/29/1994	-	-	-	-	-	15300	20.7	16.7	46.1	-
AAB9089	21-02118	0.00-0.50	Soil	8/26/1994	-	-	-	-	-	-	-	-	-	-
AAB9093	21-02119	0.00-0.50	Soil	8/26/1994	-	-	-	-	-	-	-	-	-	-
AAB9094	21-02119	0.50-1.00	Soil	8/26/1994	-	-	-	-	-	-	-	-	-	-
AAB9097	21-02120	0.00-0.50	Soil	8/26/1994	-	-	-	-	-	-	-	-	-	-
AAB9828	21-02550	5.00-10.00	Tuff	9/16/1994	-	5.8 (U)	-	-	-	10100	9.2 (J)[6]	-	-	-
AAB9831	21-02550	20.00-25.00	Tuff	9/16/1994	-	6.1 (U)	-	-	-	2650	8.4 (J)	-	-	-
AAB9834	21-02550	35.00-40.00	Tuff	9/16/1994	10300 (J)	6.7 (U)	55 (U)	1.4	-	8950	10.5 (J)	5.3 (U)	-	-

1 Values are in units of mg/kg.

2 "Inorganic and Radionuclide Background Data for Soils, Sediments, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-98-4847, Los Alamos, New Mexico. (LANL 1998, 59730).

3 na = not available.

4 "—" denotes that no value greater than the background value was detected or the analyte was undetected.

5 (U) denotes "undetected."

6 (J) denotes "estimated value."

Table 5.18-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Date Collected	Magnesium	Manganese	Mercury	Nickel	Selenium	Silver	Strontium	Thallium	Uranium	Vanadium	Zinc
Soil Background Value[2]					4610	671	0.1	15.4	1.52	1	na	0.73	1.82	39.6	48.8
Tuff Background Value[2]					1690	482	0.1	6.58	0.3	1	na	1.1	2.4	17	63.5
AAA0776	21-01398	0.00-0.50	Soil	7/13/1992	-[4]	-	-	127	-	-	8.4	-	-	-	99.7
AAA0779	21-01399	0.00-0.50	Soil	7/13/1992	-	-	-	-	-	-	17.3	-	-	-	97.9
AAA0780	21-01400	0.00-0.50	Soil	7/13/1992	-	-	-	-	-	3.5	12.2	-	-	-	128
AAA0781	21-01401	0.00-0.50	Soil	7/20/1992	-	-	-	-	-	2.6	14.3	-	-	-	148
AAA0782	21-01401	0.50-1.00	Soil	7/20/1992	-	-	-	-	-	-	4.2	-	-	-	52.4
AAA0783	21-01401	1.00-1.50	Soil	7/20/1992	-	-	-	-	-	-	4.5	-	-	-	-
AAB9084	21-02113	0.00-0.50	Soil	8/29/1994	-	679	0.15 (U)[5]	-	-	3.2 (U)	-	1.7 (U)	1.96 (J)[6]	40.8	82.7
AAB9089	21-02118	0.00-0.50	Soil	8/26/1994	-	-	0.36 (U)	-	-	-	-	-	-	-	-
AAB9093	21-02119	0.00-0.50	Soil	8/26/1994	-	-	0.29 (J)	-	-	-	-	-	-	-	-
AAB9094	21-02119	0.50-1.00	Soil	8/26/1994	-	-	-	-	-	-	-	-	2.56 (J)	-	-
AAB9097	21-02120	0.00-0.50	Soil	8/26/1994	-	-	0.11 (U)	-	-	-	-	0.76 (U)	-	-	-
AAB9828	21-02550	5.00-10.00	Tuff	9/16/1994	-	-	-	-	0.49 (U)	4.2	-	-	-	-	-
AAB9831	21-02550	20.00-25.00	Tuff	9/16/1994	-	-	-	-	0.53 (U)	-	-	-	-	-	-
AAB9834	21-02550	35.00-40.00	Tuff	9/16/1994	2330	-	-	-	0.56 (U)	-	-	-	-	-	-

1 Values are in units of mg/kg.
2 "Inorganic and Radionuclide Background Data for Soils, Sediments, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-98-4847, Los Alamos, New Mexico. (LANL 1998, 59730).
3 na = not available.
4 "—" denotes that no value greater than the background value was detected or the analyte was undetected.
5 (U) denotes "undetected."
6 (J) denotes "estimated value."

Table 5.18-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Date Collected	Aluminum	Antimony	Barium	Beryllium	Cadmium	Calcium	Chromium	Copper	Lead	Lithium
Soil Background Value[2]					29200	0.83	295	1.83	0.4	6120	19.3	14.7	22.3	na[3]
Tuff Background Value[2]					7340	0.5	46	1.21	1.63	2200	7.14	4.66	11.2	na
AAB9836	21-02550	45.00-47.00	Tuff	9/16/1994	-[4]	6.8 (U)[5]	-	-	-	-	-	-	-	-
AAB9837	21-02551	2.50-5.00	Tuff	9/14/1994	-	6.2 (U)	-	-	-	10200	-	-	11.6	-
AAB9838	21-02551	7.50-10.00	Tuff	9/14/1994	-	6.4 (U)	-	-	-	8250	-	-	-	-
AAB9841	21-02551	20.00-25.00	Tuff	9/14/1994	-	7 (U)	-	-	-	-	-	-	-	-
AAB9845	21-02551	40.00-45.00	Tuff	9/14/1994	-	7 (U)	-	-	-	11100	-	-	-	-
AAB9846	21-02551	45.00-50.00	Tuff	9/14/1994	-	5.2 (U)	-	-	-	-	-	-	-	-
AAB9847	21-02551	50.00-52.00	Tuff	9/14/1994	-	6.9 (U)	-	-	-	-	-	-	-	-
AAB9850	21-02552	10.00-15.00	Tuff	9/15/1994	-	5 (U)	-	-	-	-	-	-	-	-
AAB9852	21-02552	20.00-25.00	Tuff	9/15/1994	-	10.3 (U)	-	-	-	-	7.9 (J)[6]	-	-	-
AAB9858	21-02552	50.00-52.00	Tuff	9/15/1994	-	6 (U)	-	-	-	-	-	-	-	-
AAB9873	21-02565	5.00-10.00	Tuff	9/15/1994	-	5 (U)	-	-	-	-	-	-	11.8	-
AAB9876	21-02565	20.00-25.00	Tuff	9/15/1994	-	5.1 (U)	-	-	-	3780	12.8 (J)	-	85.5	-

1 Values are in units of mg/kg.
2 "Inorganic and Radionuclide Background Data for Soils, Sediments, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-98-4847, Los Alamos, New Mexico. (LANL 1998, 59730).
3 na = not available.
4 "—" denotes that no value greater than the background value was detected or the analyte was undetected.
5 (U) denotes "undetected."
6 (J) denotes "estimated value."

Table 5.18-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Date Collected	Magnesium	Manganese	Mercury	Nickel	Selenium	Silver	Strontium	Thallium	Uranium	Vanadium	Zinc
Soil Background Value[2]					4610	671	0.1	15.4	1.52	1	na[3]	0.73	1.82	39.6	48.8
Tuff Background Value[2]					1690	482	0.1	6.58	0.3	1	na	1.1	2.4	17	63.5
AAB9836	21-02550	45.00-47.00	Tuff	9/16/1994	-[4]	-	-	-	0.53 (U)[5]	-	-	-	-	-	-
AAB9837	21-02551	2.50-5.00	Tuff	9/14/1994	-	-	-	-	0.53 (U)	-	-	-	-	-	-
AAB9838	21-02551	7.50-10.00	Tuff	9/14/1994	-	-	-	-	0.56 (U)	-	-	-	-	-	-
AAB9841	21-02551	20.00-25.00	Tuff	9/14/1994	-	-	-	-	0.58 (U)	-	-	-	-	-	-
AAB9845	21-02551	40.00-45.00	Tuff	9/14/1994	-	-	-	-	0.56 (U)	-	-	-	-	-	-
AAB9846	21-02551	45.00-50.00	Tuff	9/14/1994	-	-	-	-	0.43 (U)	-	-	-	-	-	-
AAB9847	21-02551	50.00-52.00	Tuff	9/14/1994	-	-	-	-	0.58 (U)	-	-	-	-	-	-
AAB9850	21-02552	10.00-15.00	Tuff	9/15/1994	-	-	-	-	0.43 (U)	-	-	-	-	-	-
AAB9852	21-02552	20.00-25.00	Tuff	9/15/1994	-	-	-	-	0.84 (U)	1.3 (U)	-	-	-	-	-
AAB9858	21-02552	50.00-52.00	Tuff	9/15/1994	-	-	-	-	0.45 (U)	-	-	-	-	-	-
AAB9873	21-02565	5.00-10.00	Tuff	9/15/1994	-	-	-	-	0.42 (U)	-	-	-	-	-	-
AAB9876	21-02565	20.00-25.00	Tuff	9/15/1994	-	-	-	-	0.42 (U)	-	-	-	-	-	66

1 Values are in units of mg/kg.

2 "Inorganic and Radionuclide Background Data for Soils, Sediments, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-98-4847, Los Alamos, New Mexico. (LANL 1998, 59730).

3 na = not available.

4 "—" denotes that no value greater than the background value was detected or the analyte was undetected.

5 (U) denotes "undetected."

Table 5.18-2
Consolidated Unit 21-026(a)-99 Organic Chemicals Detected[1]

Sample ID	Location ID	Depth (ft)	Media	Date Collected	Acetone	Dichlorodifluoromethane
AAB9089	21-02118	0.00-0.50	Soil	8/26/1994	-[2]	0.03
AAB9093	21-02119	0.00-0.50	Soil	8/26/1994	-	0.04
AAB9094	21-02119	0.50-1.00	Soil	8/26/1994	-	0.11
AAB9837	21-02551	2.50-5.00	Tuff	9/14/1994	0.08 (J)[3]	-

1 Values are in units of mg/kg.

2 "—" denotes that no value greater than the estimated quantitation limit was detected.

3 (J) denotes "estimated value."

Table 5.18-3
Consolidated Unit 21-026(a)-99 Radionuclides Greater Than BVs or FVs[1]

Sample ID	Location ID	Depth (ft)	Media	Date Collected	Americium-241	Cesium-137	Plutonium-238	Plutonium-239	Strontium-90	Tritium	Uranium-235
Soil Background Values/Fallout Values[2]					0.013	1.65	0.023	0.054	1.31	na[3]	0.2
Tuff Background Values/Fallout Values[2]					na	na	na	na	na	na	0.09
AAA0776	21-01398	0.00-0.50	Soil	7/13/1992	0.46	-[4]	-	0.59	-	-	-
AAA0779	21-01399	0.00-0.50	Soil	7/13/1992	0.32	-	0.04	0.61	-	-	-
AAA0780	21-01400	0.00-0.50	Soil	7/13/1992	1.07	-	0.12	1.96	-	-	-
AAA0781	21-01401	0.00-0.50	Soil	7/20/1992	1.39	-	0.13	2.48	-	-	-
AAA0782	21-01401	0.50-1.00	Soil	7/20/1992	0.33	-	0.09	0.61	-	-	-
AAA0783	21-01401	1.00-1.50	Soil	7/20/1992	0.01	-	-	0.02	-	-	-
AAB9084	21-02113	0.00-0.50	Soil	8/29/1994	-	-	-	0.08	-	0.17	-
AAB9089	21-02118	0.00-0.50	Soil	8/26/1994	-	-	-	-	-	0.06	-
AAB9090	21-02118	0.50-1.00	Soil	8/26/1994	-	0.14	-	0.02	0.07	0.05	-
AAB9093	21-02119	0.00-0.50	Soil	8/26/1994	-	-	-	0.07	-	0.06	-
AAB9094	21-02119	0.50-1.00	Soil	8/26/1994	-	1.11	0.01	0.13	-	0.05	-
AAB9097	21-02120	0.00-0.50	Soil	8/26/1994	-	-	0.03	-	-	0.03	-
AAB9828	21-02550	5.00-10.00	Tuff	9/16/1994	-	-	0.12	-	-	-	-
AAB9831	21-02550	20.00-25.00	Tuff	9/16/1994	-	-	0.01	0.01	-	0.06	-
AAB9834	21-02550	35.00-40.00	Tuff	9/16/1994	-	-	0.07	0.01	0.75	0.08	-
AAB9836	21-02550	45.00-47.00	Tuff	9/16/1994	-	-	-	-	-	0.09	0.19
AAB9837	21-02551	2.50-5.00	Tuff	9/14/1994	-	-	0.05	0.04	-	0.10	-
AAB9838	21-02551	7.50-10.00	Tuff	9/14/1994	-	-	0.03	0.01	0.77	0.08	-
AAB9841	21-02551	20.00-25.00	Tuff	9/14/1994	-	-	0.12	-	0.96	0.15	-
AAB9845	21-02551	40.00-45.00	Tuff	9/14/1994	-	-	-	-	1.40	0.31	-
AAB9846	21-02551	45.00-50.00	Tuff	9/14/1994	-	-	0.03	0.01	-	0.34	0.27
AAB9847	21-02551	50.00-52.00	Tuff	9/14/1994	-	-	0.01	-	1.54	0.28	-
AAB9850	21-02552	10.00-15.00	Tuff	9/15/1994	-	-	0.02	-	-	0.67	-
AAB9852	21-02552	20.00-25.00	Tuff	9/15/1994	-	-	0.03	0.01	-	0.86	0.27
AAB9858	21-02552	50.00-52.00	Tuff	9/15/1994	-	-	-	-	-	0.12	-
AAB9873	21-02565	5.00-10.00	Tuff	9/15/1994	-	-	0.04	-	-	0.05	-
AAB9876	21-02565	20.00-25.00	Tuff	9/15/1994	-	-	0.06	0.01	-	0.09	-

1 Values are in units of pCi/g.

2 "Inorganic and Radionuclide Background Data for Soils, Sediments, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-98-4847, Los Alamos, New Mexico. (LANL 1998, 59730). Fallout values apply to the 0 to 0.5 ft depth interval only, and fallout values are not applicable to tuff.

3 na = not available.

4 "—" denotes either not detected in tuff or no value greater than the soil fallout/background value was detected or the analyte was undetected.

Table 5.18-4
Summary of Proposed Soil Sampling at Consolidated Unit 21-026(a)-99

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
21-026(b) Sludge Drying Beds																		
Determine vertical extent	BH-1	Center of floor of bed area	Middle depth of clean sand fill	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			Sand and soil interface	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3 beneath the interface	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6 beneath the interface	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral and vertical extent	BH-2	5 ft downslope of bed area aligned with BH-1	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	1	Northwest corner of excavated bed area	Middle depth of clean sand fill	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			Sand and soil interface	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3 beneath the interface	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	2	Northeast corner of excavated bed area	Middle depth of clean sand fill	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			Sand and soil interface	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3 beneath the interface	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	3	Southeast corner of excavated bed area	Middle depth of clean sand fill	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			Sand and soil interface	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3 beneath the interface	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	4	Southwest corner of excavated bed area	Middle depth of clean sand fill	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			Sand and soil interface	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3 beneath the interface	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

Table 5.18-4 (continued)

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
21-026(a)-99 Surface Disposal Area																		
Determine vertical extent	BH-3	Center of floor of excavated area	0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine vertical and lateral extent	5	Western edge of excavated area	0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine vertical and lateral extent	6	Northern edge of excavated area	0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine vertical and lateral extent	7	Eastern edge of excavated area	0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine vertical and lateral extent	8	Southern edge of excavated area	0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine downslope extent	9	10 ft downslope of northeast corner of excavated area	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	10	10 ft east of location 9	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine downslope extent	11	20 ft downslope of location 9	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	12	20 ft east of location 11	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
21-026(c) Dosing Siphon Chamber Tank																		
Determine if evidence of a leak from the chamber tank is present	BH-4	Center of the chamber tank footprint	Chamber bottom															
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			10 to 11	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

Table 5.18-4 (continued)

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
21-026(c) Dosing Siphon Chamber Tank																		
Determine if releases have occurred from the pipeline	13	Beneath the inlet line connection to the chamber	Beneath connection															
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the pipeline	14	Beneath the outlet line connection to the chamber	Beneath connection															
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Pipeline																		
Determine if releases have occurred from the pipeline	15	Beneath the manhole floor	Beneath manhole floor															
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the pipeline	16	50 ft from location 15	Beneath pipe 0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the pipeline	17	Beneath the manhole floor	Beneath manhole floor															
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Outfall																		
Determine vertical extent at the outfall	BH-5	0.5 ft downslope of the outfall pipe mouth	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	18	5 ft west of BH-5	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	19	5 ft east of BH-5	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine downslope extent	21	10 ft downslope of BH-5	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	20	10 ft west of 21	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	22	10 ft east of 21	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

Table 5.18-4 (continued)

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Outfall																		
Determine downslope extent	24	30 ft downslope of BH-5	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	23	20 ft west of 24	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	25	20 ft east of 24	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

[1] Based on field screening results the most contaminated sample will also be analyzed for dioxins, furans, HE, and PCBs.

Table 5.19-1
SWMU 21-027(a) Inorganic Chemicals Greater Than BVs[1]

Sample ID	Location ID	Depth (ft)	Media	Date Collected	Antimony	Cadmium	Calcium	Chromium	Copper	Lead	Lithium	Nickel	Selenium	Silver	Strontium	Zinc
Soil Background Value[2]					0.83	0.4	6120	19.3	14.7	22.3	na[3]	15.4	1.52	1	na	48.8
Tuff Background Value[2]					0.5	1.63	2200	7.14	4.66	11.2	na	6.58	0.3	1	na	63.5
AAA0872	21-01361	0.00-0.50	Soil	7/23/1992	6.7 (U)[4]	1.8	-[5]	-	41	55.6	4.4	-	-	-	12.5	442
AAA0873	21-01362	0.00-0.50	Soil	7/23/1992	6.5 (U)	2.2	-	36.6	79.2	38.9	7.8	-	3.4 (U)	-	13.2	316
AAA0874	21-01363	0.00-0.50	Soil	7/23/1992	6.8 (U)	1.3	-	-	22.5	-	7.2	-	-	-	10.5	89.5
AAA0875	21-01364	0.00-0.50	Soil	7/23/1992	6.9 (U)	4.2	13700	436	198	73	8.9	42.3	-	-	102	512
AAA0877	21-01366	0.00-0.50	Soil	7/10/1992	5 (U)	3.9	-	410	179	57.8	12.7	-	-	-	56.7	497
AAA0878	21-01367	0.00-0.50	Soil	7/10/1992	5 (U)	3.2	-	335	98.3	47	9.6	-	-	-	42.6	469
AAA0879	21-01368	0.00-0.50	Soil	7/10/1992	4.9 (U)	3.3	-	461	86.7	36.9	10.1	-	-	-	37.5	345
AAA0880	21-01369	0.00-0.50	Soil	7/10/1992	5 (U)	3.6	-	419	136	62.3	14.1	-	-	-	60.2	463
AAA0882	21-01371	0.00-0.50	Soil	7/10/1992	5 (U)	4	-	266	44.9	79.8	9	-	33 (U)	-	37.6	232
AAA0883	21-01372	0.00-0.50	Soil	7/10/1992	4.8 (U)	1.7	-	174	86.5	51.7	11.7	-	-	-	24	216
AAA0884	21-01373	0.00-0.50	Soil	7/10/1992	4.8 (U)	2.3	-	131	40.8	32.7	6.4	-	-	-	17.5	140
AAA0885	21-01374	0.00-0.50	Soil	7/10/1992	4.8 (U)	3	-	178	33.8	39.2	7.9	-	-	-	24.2	177
AAA4135	21-01673	0.00-5.00	Soil	8/16/1993	-	1.4	-	-	-	-	14.6	-	-	1.3 (U)	30.2	-
AAA4136	21-01673	5.00-10.00	Tuff	8/16/1993	-	-	-	-	-	11.4	-	-	0.45 (U)	1.1 (U)	-	-

1 Values are in units of mg/kg.

2 "Inorganic and Radionuclide Background Data for Soils, Sediments, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-98-4847, Los Alamos, New Mexico. (LANL 1998, 59730).

3 na = not available.

4 (U) denotes "undetected."

5 "—" denotes that no value greater than the background value was detected or the analyte was undetected.

Table 5.19-1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Date Collected	Antimony	Cadmium	Calcium	Chromium	Copper	Lead	Lithium	Nickel	Selenium	Silver	Strontium	Zinc
Soil Background Value[2]					0.83	0.4	6120	19.3	14.7	22.3	na[3]	15.4	1.52	1	na	48.8
Tuff Background Value[2]					0.5	1.63	2200	7.14	4.66	11.2	na	6.58	0.3	1	na	63.5
AAA4138	21-01673	15.00-20.00	Tuff	8/16/1993	-[4]	-	-	-	-	-	-	-	0.44 (U)[5]	1.1 (U)	-	-
AAA4139	21-01674	0.00-5.00	Soil	8/16/1993	-	0.74 (U)	-	42.5	15	-	5.8	-	-	1.2 (U)	-	160
AAA4140	21-01674	5.00-10.00	Tuff	8/16/1993	-	-	-	-	-	-	-	-	0.46 (U)	1.2 (U)	-	-
AAA4141	21-01674	10.00-15.00	Tuff	8/16/1993	-	-	-	-	-	-	-	-	0.46 (U)	1.1 (U)	-	-
AAA4142	21-01674	15.00-20.00	Tuff	8/16/1993	-	-	-	-	-	-	-	-	0.71 (U)	1.1 (U)	-	-
AAA4137	21-01673	10.00-15.00	Tuff	8/16/1993	-	-	-	-	-	-	-	-	0.44 (U)	1.1 (U)	-	-

1 Values are in units of mg/kg.

2 "Inorganic and Radionuclide Background Data for Soils, Sediments, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-98-4847, Los Alamos, New Mexico. (LANL 1998, 59730).

3 na = not available.

4 "—" denotes that no value greater than the background value was detected or the analyte was undetected.

5 (U) denotes "undetected."

Table 5.19-2
SWMU 21-027(a) Organic Chemicals Detected[1]

Sample ID	Location ID	Depth (ft)	Media	Date Collected	Acetone	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Bis(2-ethylhexyl)phthalate	Chrysene	Fluoranthene	Indeno(1,2,3-cd)pyrene	Methylene Chloride	Phenanthrene	Pyrene	Tetrachloroethene
AAA0872	21-01361	0.00-0.50	Soil	7/23/1992	0.04	0.82	0.92	1.4	0.49	0.49	1	2	0.47	0.01	1.5	3.3	0.06
AAA0873	21-01362	0.00-0.50	Soil	7/23/1992	0.02	-[2]	-	0.46	-	-	-	0.49	-	-	-	0.81	-
AAA0874	21-01363	0.00-0.50	Soil	7/23/1992	0.02	-	-	-	-	-	-	-	-	-	-	-	-
AAA0875	21-01364	0.00-0.50	Soil	7/23/1992	0.02	-	0.52	0.89	-	-	0.54	1.3	-	0.01	0.58	0.93	-
AAA4139	21-01674	0.00-5.00	Soil	8/16/1993	-	1.1	0.87	1.6	-	-	1.1	2.9	0.46	-	1.7	2	-

1 Values are in units of mg/kg.

2 "—" denotes that no value greater than the estimated quantitation limit was detected.

Table 5.19-3
SWMU 21-027(a) Radionuclides Greater Than BVs or FVs[1]

Sample ID	Location ID	Depth (ft)	Media	Date Collected	Americium-241	Plutonium-238	Plutonium-239	Tritium	Uranium-234	Uranium-235	Uranium-238
Soil Background Values/Fallout Values[2]					0.013	0.023	0.054	na[3]	2.59	0.2	2.29
Tuff Background Values/Fallout Values[2]					na	na	na	na	1.98	0.09	1.93
AAA0872	21-01361	0.00-0.50	Soil	7/23/1992	14.5	4.08	30.4	-	-[4]	-	-
AAA0873	21-01362	0.00-0.50	Soil	7/23/1992	34	12.1	193	-	-	-	-
AAA0874	21-01363	0.00-0.50	Soil	7/23/1992	0.78	1.24	16.8	-	-	-	-
AAA0875	21-01364	0.00-0.50	Soil	7/23/1992	8.77	7.89	43.6	-	-	-	-
AAA0877	21-01366	0.00-0.50	Soil	7/10/1992	12.11	10.7	73.29	-	-	-	-
AAA0878	21-01367	0.00-0.50	Soil	7/10/1992	9.96	8.79	67.26	-	-	-	-
AAA0879	21-01368	0.00-0.50	Soil	7/10/1992	-	14.8	67.08	-	-	-	-
AAA0880	21-01369	0.00-0.50	Soil	7/10/1992	15.82	14.16	75.03	-	-	-	-
AAA0882	21-01371	0.00-0.50	Soil	7/10/1992	13.22	25.23	89.6	-	-	-	-
AAA0883	21-01372	0.00-0.50	Soil	7/10/1992	9.79	6.47	59.63	-	-	-	-
AAA0884	21-01373	0.00-0.50	Soil	7/10/1992	8.15	21.9	96.23	-	-	-	-
AAA0885	21-01374	0.00-0.50	Soil	7/10/1992	10.59	20.34	64.81	-	-	-	-
AAA4135	21-01673	0.00-5.00	Soil	8/16/1993	0.69	0.05	7.32	2.42	-	-	-
AAA4136	21-01673	5.00-10.00	Tuff	8/16/1993	0.01	-	0.04	0.05	-	-	-
AAA4137	21-01673	10.00-15.00	Tuff	8/16/1993	-	-	-	0.11	2.65	-	2.17
AAA4139	21-01674	0.00-5.00	Soil	8/16/1993	0.73	0.27	9.35	1.45	21.37	0.87	-
AAA4140	21-01674	5.00-10.00	Tuff	8/16/1993	-	-	-	0.07	-	-	-
AAA4141	21-01674	10.00-15.00	Tuff	8/16/1993	-	-	-	0.04	-	-	-
AAA4142	21-01674	15.00-20.00	Tuff	8/16/1993	-	-	-	0.10	-	-	-

1 Values are in units of pCi/g.

2 "Inorganic and Radionuclide Background Data for Soils, Sediments, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-98-4847, Los Alamos, New Mexico. (LANL 1998, 59730). Fallout values apply to the 0 to 0.5 ft depth interval only, and fallout values are not applicable to tuff.

3 na = not available.

4 "—" denotes either not detected in tuff or no value greater than the soil fallout/background value was detected or the analyte was undetected.

Table 5.19-4
Summary of Proposed Soil Sampling at SWMU 21-027(a)

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs	SVOCs	TAL Metals	Lithium, Strontium	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Pipelines																			
Determine if releases have occurred from the 4-in. drain line	1	North-northeast of location 21-01361, along path of excavated pipe	Beneath pipe																
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the 12-in. concrete storm drain line	2	South of location 21-01361, along path of excavated pipe; at connection of 4 in. to 12 in. pipe	Beneath pipe																
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
24-inch CMP																			
Determine if releases have occurred from the 24-in. CMP drain line	4	Inlet from ponding area into to CMP	0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine if releases have occurred from the 24-in. CMP drain line	5	50 ft from location 4	0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Ponding Area																			
Confirm cleanup of contaminated soil	3	Outlet of 12-in. concrete storm drain into ponding area	0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine vertical extent of contamination	BH-1	Center of ponding area, near location 21-01364	0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			10 to 11	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			15 to 16	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			20 to 21	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Outfall																			
Determine vertical extent at the outfall	BH-2	0.5 ft downslope of the outfall pipe mouth	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	6	5 ft west of location BH-2	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	7	5 ft east of location BH-2	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

Table 5.19-4 (continued)

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs	SVOCs	TAL Metals	Lithium, Strontium	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Bench																			
Determine vertical and lateral extent downslope of outfall	8	South of location 21-01373, center of drainage	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine downslope extent (on the topographical bench)	10	20 ft south of location 8, center of drainage	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	9	10 ft west of location 10	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	11	10 ft east of location 10	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine downslope extent (on the topographical bench)	13	On the topo bench, directly downslope of outfall pipe mouth, along bench edge	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	12	20 ft west of location 13	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	14	20 ft east of location 13	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

[1] Based on field screening results the most contaminated sample will also be analyzed for dioxins, furans, HE, and PCBs.

Table 5.20-1
SWMU 21-027(c) Inorganic Chemicals Greater Than BVs[1]

Sample ID	Location ID	Depth (ft)	Media	Date Collected	Antimony	Cadmium	Calcium	Copper	Lead	Lithium	Strontium	Zinc
Soil Background Value[2]					0.83	0.4	6120	14.7	22.3	na[3]	na	48.8
AAA0856	21-01349	0.00-0.50	Soil	7/23/1992	7 (U)[4]	1.6	-[5]	-	36.7	8.9	15.6	58.6
AAA0857	21-01350	0.00-0.50	Soil	7/23/1992	7 (U)	1.6	14800	19.1	103	9.8	27.6	136
AAA0858	21-01351	0.00-0.50	Soil	7/23/1992	7 (U)	1.6	-	15.9	35.4	9.5	15	87.3
AAA0862	21-01352	0.00-0.50	Soil	7/9/1992	4.9 (U)	1.2	-	-	-	5.7	7.8	52.8
AAA0863	21-01353	0.00-0.50	Soil	7/9/1992	5.5 (U)	1	-	-	26.5	3.2	6.7	82.6
AAA0864	21-01354	0.00-0.50	Soil	7/9/1992	5.5 (U)	1.5	-	-	42.6	4.2	9.4	188

1 Values are in units of mg/kg.

2 "Inorganic and Radionuclide Background Data for Soils, Sediments, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-98-4847, Los Alamos, New Mexico. (LANL 1998, 59730).

3 na = not available.

4 (U) denotes "undetected."

5 "—" denotes that no value greater than the background value was detected or the analyte was undetected.

Table 5.20-2
SWMU 21-027(c) Organic Chemicals Detected[1]

Sample ID	Location ID	Depth (ft)	Media	Date Collected	Acenaphthene	Acetone	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Naphthalene	Phenanthrene	Pyrene
AAA0856	21-01349	0.00-0.50	Soil	7/23/1992	-[2]	0.02	-	-	-	-	-	-	-	-	-	-	-	-	-
AAA0858	21-01351	0.00-0.50	Soil	7/23/1992	-	0.03	-	-	-	-	-	-	-	-	-	-	-	-	-

[1] Values are in units of mg/kg.
[2] "—" denotes that no value greater than the estimated quantitation limit was detected.

Table 5.20-3
SWMU 21-027(c) Radionuclides Greater Than FVs[1]

Sample ID	Location ID	Depth (ft)	Media	Date Collected	Americium-241	Plutonium-238	Plutonium-239
Soil Fallout Values[2]					0.013	0.023	0.054
AAA0856	21-01349	0.00-0.50	Soil	7/23/1992	0.59	-[3]	10.5
AAA0857	21-01350	0.00-0.50	Soil	7/23/1992	1.75	0.52	30.2
AAA0858	21-01351	0.00-0.50	Soil	7/23/1992	2.86	0.63	84.5
AAA0862	21-01352	0.00-0.50	Soil	7/9/1992	0.41	0.07	5.67
AAA0863	21-01353	0.00-0.50	Soil	7/9/1992	0.26	0.04	1.96
AAA0864	21-01354	0.00-0.50	Soil	7/9/1992	0.51	0.05	3.02

1 Values are in units of pCi/g.

2 "Inorganic and Radionuclide Background Data for Soils, Sediments, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-98-4847, Los Alamos, New Mexico. (LANL 1998, 59730). Fallout values apply to the 0 to 0.5 ft depth interval only.

3 "—" denotes that no value greater than the fallout value was detected or the analyte was undetected.

Table 5.20-4
Summary of Proposed Soil Sampling at SWMU 21-027(c)

Objective Addressed	Location Number	Location	Sample Depth (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Pipeline																		
Determine if releases have occurred from the pipeline connection to former Building 21-006	1	Beneath the connection to former Building 21-006	Beneath connection															
			0 to 1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Outfall																		
Determine vertical extent at the outfall	BH-1	0.5 ft downslope of the outfall pipe mouth	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
			5 to 6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	2	5 ft west of BH-1	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	3	5 ft east of BH-1	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine downslope extent	5	10 ft downslope of BH-1	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	4	10 ft west of location 5	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	6	10 ft east of location 5	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

Table 5.20-4 (continued)

Objective Addressed	Location Number	Location	Sample Depth (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrates	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, HE, PCBs[1]
Outfall																		
Determine downslope extent at outfall	8	30 ft downslope of BH-1	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	7	20 ft west of location 8	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	9	20 ft east of location 8	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Bench																		
Determine downslope extent (on the topographical bench)	11	On the topo bench, directly downslope of outfall pipe mouth, beside mesa cliff	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	10	20 ft west of location 11	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	12	20 ft east of location 11	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine downslope extent (on the topographical bench)	14	On the topo bench, directly downslope of outfall pipe mouth, along bench edge	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	13	20 ft west of location 14	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Determine lateral extent	15	20 ft east of location 14	0 to 0.5		X	X	X	X	X	X	X	X	X	X	X	X	X	
			2 to 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

[1] Based on field screening results the most contaminated sample will also be analyzed for dioxins, furans, HE, and PCBs.

Appendix A

Acronyms and Abbreviations, Glossary, and Metric Conversion Table

A-1.0 ACRONYMS AND ABBREVIATIONS

ALLH	all horizons
AOC	area of concern
bgs	below ground surface
BV	background value
CMP	corrugated metal pipe
COPC	chemical of potential concern
CST	Chemical Sciences and Technology
D&D	decontamination and decommissioning
DOE	Department of Energy (US)
DOT	Department of Transportation
DP	Delta Prime
ECR	Environmental Characterization and Remediation
EM	electromagnetic
ENV-RS	Risk Reduction and Environmental Stewardship-Remediation Services
EPA	Environmental Protection Agency (US)
EQL	estimated quantitation limit
ER	Environmental Restoration (as in *former ER Project*)
ESP	Eberline Smart Portable
FIDLER	field instrument for the detection of low-energy radiation
FV	fallout value
FY	fiscal year
GIS	geographic information system
GPR	ground-penetrating radar
GPS	global-positioning system
HSWA	Hazardous and Solid Waste Amendments
ID	identification
IDW	investigation-derived waste
LANL	Los Alamos National Laboratory
LASL	Los Alamos Scientific Laboratory
LIR	Laboratory Implementation Requirement
LLW	low-level waste
MCAL	mobile chemical analytic laboratory
MDA	material disposal area
MRAL	mobile radiological analytical laboratory

NaI	Sodium iodide
NFA	no further action
NMED	New Mexico Environment Department
NMHWA	New Mexico Hazardous Waste Act
NPDES	National Pollutant Discharge Elimination System
OU	operable unit
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PID	photoionization detector
PPE	personal protective equipment
QA/QC	quality assurance/quality control
QP	quality procedure
RCRA	Resource Conservation and Recovery Act
RCT	radiation control technician
RF	radio frequency
RFI	RCRA field investigation
RLWTF	Radioactive Liquid Waste Treatment Facility
RPF	Records Processing Facility
RRES-ECR	Risk Reduction and Environmental Stewardship–Environmental Characterization and Remediation
RRES-RS	Risk Reduction and Environmental Stewardship–Remediation Services
RSI	request for supplemental information
SAL	screening action level
SMO	Sample Management Office
SOP	standard operating procedure
SSL	soil screening level
SVOC	semivolatile organic compound
SWMU	solid waste management unit
TA	technical area
TBD	to be determined
TSCA	Toxic Substance Control Act
UC	University of California
VCA	voluntary corrective action
VCP	vitrified clay pipe
VOC	volatile organic compound
WCSF	waste characterization strategy form

A-2.0 GLOSSARY

administrative authority (AA)—The New Mexico Environment Department, the US Environmental Protection Agency, or the US Department of Energy, as appropriate.

analysis—Includes physical analysis, *chemical analysis*, and knowledge-of-process determinations. (Laboratory Hazardous Waste Facility Permit)

analyte—The element, nuclide, or ion a *chemical analysis* seeks to identify and/or quantify; the *chemical* constituent of interest.

aquifer—Body of permeable geologic material whose saturated portion is capable of readily yielding *groundwater* to wells.

area of concern (AOC)—Areas at the Laboratory that might warrant further investigation for *releases* based on past facility waste-management activities.

background level—Naturally occurring concentrations (levels) of an inorganic *chemical* and naturally occurring *radionuclides* in soil, *sediment*, and *tuff*.

background radiation—Amount of radioactivity naturally present in the environment, including cosmic rays from space and natural *radiation* from soils and rock.

background value (BV)—A threshold used to identify site *sample* results that may be greater than *background levels*.

chemical—Any naturally occurring or man-made substance characterized by a definite molecular composition, including molecules that contain *radionuclides*.

chemical analysis—Process used to measure one or more attributes of a *sample* in a clearly defined, controlled, systematic manner. Often requires treating a *sample* chemically or physically before measurement.

Code of Federal Regulation (CFR)—A codification of all regulations developed by federal government agencies and finalized by publication in the *Federal Register*.

collocated sample—One of two or more *samples* collected within close proximity of each other meant to represent the same immediate area.

contaminant—Any *chemical* (including *radionuclides*) present in environmental *media* or on structural debris.

decommissioning—Permanent removal from service of facilities and their components, after the discontinued use of structures or buildings deemed no longer useful, in accordance with regulatory requirements and environmental policies.

decontamination—Removal of unwanted material from the surface of or from within another material.

detection limit—Minimum concentration that can be determined by a single measurement by an instrument; implies a specified statistical confidence that the analytical concentration is greater than zero.

discharge—Accidental or intentional spilling, leaking, pumping, pouring, emitting, emptying, or dumping of *hazardous waste* into or on any land or water. (*RCRA*, 40 CFR 260.10)

disposal—The discharge, deposit, injection, dumping, spilling, leaking, or placing of any *solid waste* or *hazardous waste* into or on any land or water so that such *solid waste* or *hazardous waste* or any constituent thereof may enter the environment or be emitted into the air or *discharged* into any waters, including *groundwaters*. (40 CFR Part 260.10)

DOE—See *US Department of Energy*

duplicate analysis—*Analysis* performed on one of a pair of identically prepared *subsamples* taken from the same *sample*.

ecological screening level (ESL)—An organism's exposure-response threshold for a given *chemical* constituent. The concentration of a substance in a particular *medium* corresponds to a *hazard quotient* (HQ) of 1.0 for a given organism below which no *risk* is indicated.

EPA—See *US Environmental Protection Agency*

equipment blank (or *rinsate blank*)—A *blank sample* that is used to rinse the *sample* collection equipment and is then transferred to a sampling container. The equipment blank is collected after equipment *decontamination* is completed but before collection of another *field sample*.

ER data—Data derived as a result of *samples* that are collected and paid for by ER Project funding.

Estimated quantitation limit (EQL)—The lowest concentration that can be reliably achieved within specified limits of *precision* and *accuracy* during routine analytical laboratory operating conditions. The low point on the *calibration* curve should reflect this quantitation limit. The EQL is not used to establish detection status. *Sample* estimated quantitation limits are highly *matrix*-dependent, and the specified estimated quantitation limits might not always be achievable. See the statement of work for analytical services (RFP No. 9-Xs1-Q4257) for a more complete definition.

exposure pathway—Mode by which a *receptor* may be exposed to *contaminants* in environmental media (e.g., drinking water, ingesting food, or inhaling dust).

Federal Register—The official daily publication for Rules, Proposed Rules, and Notices of federal agencies and organizations, as well as Executive Orders and other Presidential Documents.

field blank (also known as *field reagent blank*)—A *blank sample* either prepared in the field or carried to the sampling site, exposed to sampling conditions (e.g., bottle caps removed, preservatives added), and returned to a laboratory for *analysis* in the same manner in which environmental *samples* are analyzed. Used to identify the presence of contamination potentially added during the sampling and *analysis* process.

field duplicate (replicate) **samples—**Two separate, independent *samples* taken from the same source that are collected in such a manner that they are *collocated samples*, equally representative of the *sample matrix* at a given location and time.

field reagent blank—See *field blank*.

field sample—See *sample*.

field split—A *field sample* that has been homogenized and divided in the field into equally representative portions that are submitted for *analysis* (see also *split sample*).

gamma radiation—A form of electromagnetic, high-energy *radiation* emitted from a nucleus. Gamma rays are essentially the same as x-rays and require heavy shielding, such as concrete or steel, to be blocked.

grab sample—A specimen collected by a single application of a field sampling

procedure to a target *population* (e.g., the surface soil from a single hole collected following the spade and scoop sampling procedure or a single air filter left in the field for three months).

groundwater—Water in a subsurface saturated zone; water beneath the regional *water table*.

Hazardous and Solid Waste Amendments (HSWA)—The Hazardous and Solid Waste Amendments of 1984 (Public Law No. 98-616, 98 Stat. 3221), which amended the *Resource Conservation and Recovery Act* of 1976, 42 U.S.C. § 6901 et seq.

hazardous constituent—Those constituents listed in Appendix VIII to 40 CFR Part 261.

hazardous waste—Any *solid waste* is generally a hazardous waste if it

- is not excluded from regulation as a hazardous waste,
- is listed in the regulations as a hazardous waste,
- exhibits any of the defined characteristics of hazardous waste (ignitability, corrosivity, reactivity, or toxicity), or
- is a mixture of *solid waste* and hazardous waste.

See 40 CFR 261.3 for a complete definition of hazardous waste.

HSWA module—Module VIII of the Laboratory's Hazardous Waste Facility Permit. This permit allows the Laboratory to operate as a *treatment, storage, and disposal facility*.

industrial-use scenario—Industrial use is the scenario in which current Laboratory operations continue. Any necessary *remediation* involves cleanup to standards designed to ensure a safe and healthy work environment for Laboratory workers.

laboratory duplicate sample—The portions of a *sample* taken from the same sample container, prepared for *analysis* and analyzed independently but under identical conditions; used to assess or demonstrate acceptable laboratory method precision at the time of analysis. Each duplicate *sample* is expected to be equally representative of the original material. Duplicate analyses also are performed to generate data, to determine the long-term precision of an analytical method on various matrices.

laboratory qualifier (or laboratory flag)—Codes applied to the data by the contract analytical laboratory to indicate, on a gross scale, a verifiable or potential data deficiency. These flags are applied using the *Environmental protection Agency (EPA)* contract laboratory program (CLP) guidelines.

LANL data validation qualifiers—The data qualifiers defined by the Laboratory (LANL) and used in the ER Project baseline-validation process. For a complete list of data qualifiers applicable to any particular analytical suite, consult the appropriate ER Project *standard operating procedure* (ER-SOPs 15.01–15.06).

method detection limit (MDL)—The minimum concentration of a substance that can be measured and reported with a known statistical confidence that the *analyte* concentration is greater than zero. The MDL is determined from *analysis* of *samples* of a given *matrix* type that contain the *analyte* after subjecting the *sample* to the usual preparation and analyses. The MDL is used to establish detection status.

migration—The movement of inorganic and organic species through unsaturated or saturated materials.

migration pathway—A route (e.g., a stream or subsurface flow path) that controls the potential movement of *contaminants* to environmental *receptors* (plants, animals, humans).

minimum detectable activity—For the *analysis* of *radionuclides*, the minimum detectable activity is the lowest detectable radioactivity for a given analytical technique. The following equation shall be used to calculate the MDA unless otherwise noted or approved by the Laboratory:

where

BKG=the total background counts,
EFF =the fraction detector efficiency,
V =the volume or unit weight,
T_S =the *sample* count duration, and
Y =the fractional *chemical* recovery obtained from the *tracer* recovery.

Depending on the type of *analysis*, other terms may also be required in the denominator (e.g., gamma abundance).

mixed waste—Waste that contains both *hazardous waste* (as defined by *RCRA*) and *radioactive waste* (as defined by the Atomic Energy Act [AEA] and its amendments).

no further action (NFA)—A recommendation that not further investigation or *remediation* is warranted based on specific criteria.

non-ER data—Data derived as a result of *samples* collected and paid for by sources other than the ER Project.

outfall—The vent or end of a drain, pipe, sewer, ditch, or other conduit that carries wastewater, sewage, storm runoff or other *effluent* into a stream.

perched groundwater—*Groundwater* that lies above the regional *water table* and is separated from it by one or more *unsaturated zones*.

polychlorinated biphenyls (PCBs)—Any *chemical* substance that is limited to the biphenyl molecule that has been chlorinated to varying degrees or any combination of substances which contains such substances. PCBs are colorless, odorless compounds that are chemically, electrically, and thermally stable and have proven to be toxic to both humans and animals.

quality assessment sample—A *sample* submitted for *analysis*, the data from which are used to assess the quality of performance of a sampling or *analysis* process. May include *performance-evaluation samples*, *field duplicates*, *field blanks*, etc.

quality assurance—All those planned and systematic actions necessary to provide adequate confidence that a facility, structure, system, or component will perform satisfactorily in service.

quality control (QC)—(1) All those actions necessary to control and verify the features and characteristics of a material, process, product, or service to specified requirements. QC is the process through which actual quality performance is measured and compared with standards. (2) All methods and procedures used to obtain accurate and reliable results from environmental sampling and *analysis*. Includes rules for when, where, and how *samples* are taken; *sample* storage, preservation and *transport*; and the use of *blanks*, *duplicates*, and *split samples* during the *analysis*.

quality control sample—A *sample* which, upon *analysis*, is intended to provide information useful for adjusting, controlling, or verifying continuing acceptability of sampling and/or *analysis* activities that are in progress.

radiation—Energy emitted in the form of rays or particles that are thrown off by disintegrating atoms. The rays or particles emitted may consist of neutrons, positrons, *alpha particles*, *beta particles*, or *gamma radiation*.

radionuclide—A nuclide (species of atom) that exhibits radioactivity.

RCRA facility assessment (RFA)—Usually the first step in the *RCRA corrective action* process, to identify potential and actual *releases* from *solid waste management units* and make preliminary determinations about *releases*, the need for *corrective action*, and *stabilization measures*.

RCRA facility investigation (RFI)—The investigation that determines if a *release* has occurred and the nature and extent of the contamination at a *hazardous waste* facility. The RFI is generally equivalent to the remedial investigation portion of the Comprehensive Environment Response, Compensation, and Liability Act (CERCLA) process.

receptor—A person, plant, animal, or geographical location that is exposed to a *chemical* or physical agent *released* to the environment by human activities**.**

regional aquifer—Geologic material(s) or unit(s) of regional extent whose saturated portion yields significant quantities of water to wells, contains the regional zone of saturation, and is characterized by the regional *water table* or *potentiometric surface*.

regulatory standard—Media-specific *contaminant* concentration levels of potential concern that are mandated by federal or state legislation or regulation (e.g., the Safe Drinking Water Act, New Mexico Water Quality Control Commission regulations).

release—Any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, *leaching*, dumping, or disposing of *hazardous waste* or *hazardous constituents* into the environment (including the abandonment or discarding of barrels, containers, and other closed receptacles that contain any *hazardous wastes* or *hazardous constituents*).

remediation—The process of reducing the concentration of a *contaminant* (or *contaminants*) in air, water, or soil media to a level that poses an acceptable *risk* to human health and the environment; the act of restoring a contaminated area to a usable condition based on specified standards.

request number—An identifying number assigned by the ER Project to a group of *samples* that are submitted for *analysis*.

Resource Conservation and Recovery Act (RCRA)—The Solid Waste Disposal Act as amended by the Resource Conservation and Recovery Act of 1976. (40 CFR 270.2)

routine analysis—The *analysis* categories of inorganics, metals, organics, radiochemistry, and high explosives as defined in the current contract laboratory statement of work.

routine data validation—Process of reviewing analytical data relative to quantitative routine acceptance criteria. The objective of routine data validation is two-fold:

- to estimate the technical quality of the data relative to minimum national standards adopted by the ER Project and
- to indicate to data users the technical data quality at a gross level by assigning *LANL qualifiers* to environmental data whose quality indicators do not meet acceptance criteria.

sample—A portion of a material (e.g., rock, soil, water, air), which, alone or in combination with other samples, is expected to be representative of the material or area from which it is taken. Samples are typically sent to a laboratory for *analysis* or inspection or are analyzed in the field. When referring to samples of environmental media, the term *field sample* may be used.

sample matrix—In *chemical analysis*, that portion of a *sample* which is exclusive of the *analytes* of interest. Together, the *matrix* and *analytes* of interest form the *sample*.

site characterization—Defining the pathways and methods of *migration* of the *hazardous waste* or *constituents*, including the *media* affected, the extent, direction and speed of the *contaminants*, complicating factors influencing movement, concentration profiles, etc. (US Environmental Protection

Agency, May 1994. "RCRA Corrective Action Plan, Final," Publication EPA-520/R-94/004, Office of Solid Waste and Emergency Response, Washington, DC)

solid waste—Any garbage; refuse; sludge from a waste *treatment* plant, water-supply *treatment* plant, or air-pollution-control facility; and other discarded material including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations and from community activities.

solid waste management unit (SWMU)—Any discernible unit at which *solid wastes* have been placed at any time, irrespective of whether the unit was intended for the management of *solid or hazardous waste*. Such units include any area at a facility at which *solid wastes* have been routinely and systematically *released*. This definition includes regulated units (i.e., landfills, surface impoundments, waste piles, and land *treatment* units) but does not include passive leakage or one-time spills from production areas and units in which wastes have not been managed (e.g., product storage areas).

split sample—A *sample* that has been subdivided into two or more portions which are expected to be of the same composition. Used to characterize within-sample heterogeneity, *sample* handling, and measurement variability.

standard operating procedure (SOP)—A document that details the method for an operation, *analysis*, or action with thoroughly prescribed techniques and steps, and is officially approved as the method for performing certain routine or repetitive tasks.

stratigraphy—The science dealing with the succession, age, composition, and history of strata.

trip blank—A *sample* of *analyte*-free media taken to the sampling site and returned to the analytical laboratory unopened along with *samples* taken in the field. Used to monitor cross contamination of *samples* during handling and storage both in the field and in the analytical laboratory.

tuff—A compacted deposit of volcanic ash and dust that contains rock and mineral fragments accumulated during an eruption.

US Department of Energy (DOE)—Federal agency that sponsors energy research and regulates nuclear materials for weapons production.

US Environmental Protection Agency (EPA)—Federal agency responsible for enforcing environmental laws. While state regulatory agencies may be authorized to administer some of this responsibility, the EPA retains oversight authority to ensure protection of human health and the environment.

water content—(Also *gravimetric moisture content*) The amount of water in an unsaturated *medium*, expressed as the ratio of the weight of water in a *sample* to the weight of the oven-dried *sample*; often expressed as a percent.

welded tuff—A volcanic deposit hardened by the action of heat, pressures from overlying material, and hot gases.

A-3.0 METRIC CONVERSION TABLE

Multiply SI (Metric) Unit	by	To Obtain US Customary Unit
kilometers (km)	0.622	miles (mi)
kilometers (km)	3281	feet (ft)
meters (m)	3.281	feet (ft)
meters (m)	39.37	inches (in.)
centimeters (cm)	0.03281	feet (ft)
centimeters (cm)	0.394	inches (in.)
millimeters (mm)	0.0394	inches (in.)
micrometers or microns (µm)	0.0000394	inches (in.)
square kilometers (km^2)	0.3861	square miles (mi^2)
hectares (ha)	2.5	acres
square meters (m^2)	10.764	square feet (ft^2)
cubic meters (m^3)	35.31	cubic feet (ft^3)
kilograms (kg)	2.2046	pounds (lb)
grams (g)	0.0353	ounces (oz)
grams per cubic centimeter (g/cm^3)	62.422	pounds per cubic foot (lb/ft^3)
milligrams per kilogram (mg/kg)	1	parts per million (ppm)
micrograms per gram (µg/g)	1	parts per million (ppm)
liters (L)	0.26	gallons (gal.)
milligrams per liter (mg/L)	1	parts per million (ppm)
degrees Celsius (°C)	9/5 + 32	degrees Fahrenheit (°F)

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Appendix B

DP Site Aggregate Area Analytical Data
(CD included with this report)

CASE	OBSQUENT_NUMB	SUBMISSION_ID	DEVICE_NUMB	DATAPRIME_TYPE_CODE	SUBMISSION_TYPE_CODE	SUBMISSION_CODE	SUBMISSION_TYPE	DATE_RECEIVED	DATE_REPORT_STATUS	DATE_CHANGED	DATE_ENTERED	DATE_EVALUATED	DATE_MANUFACTURED	DATE_EXPIRATION	DATE_REMEDIAL	DATE_REPAIRED	DATE_REPLACEMENT	DATE_DISTRIBUTED	DATE_IMPLANTED	DATE_EXPLANTED	DATE_REMOVED	DATE_RETURNED	DATE_RESTORED	DATE_DISCONTINUED	DATE_MANUFACTURER_RECEIVED	DATE_FOLLOW_UP	DATE_FOLLOW_UP_CODE	TYPE_OCCUPATION_CODE	TYPE_OCCUPATION_NAME	PROCESSING_CODE	PROCESSING_NAME	PROCESSING_TYPE_CODE	PROCESSING_TYPE_NAME	DATA_SOURCE	SOURCE_NAME	CREATE_TIME_STAMP	CHANGE_TIME_STAMP
1767857	19585	2019-0197	N	No	IND	DV	02/06/2019	01/10/2019	01/11/07	08	Not	09/05/2007	79.00	N														0	0-Other	0	2799	Oth	Oth	5000	510-FDA-MAUDE	2009-07-01	2017-12-01

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CDC	HHSURVEY	SCNC	SAMPLE_ID	SCCC	SCCC_CLASS	SCCMPTD_TYPE_CODE	SAMPLE_TYPE_CODE	SAMPLE_LOW_CODE	SAMPLE_HIGH_CODE	CDC_SEX	CDC_RACE	CDC_ETH	CDC_AGE	CDC_AGE_UNIT	CDC_SUPPRESS_CODE	SAMPLE_CODE	SCC_CLASS_CODE	SCC_TYPE_CODE	SCC_DESCRIPTION	SCC_DIMENSIONAL_QUANTITY	CDC_DIMENSIONAL_QUANTITY	CDC_CALC_DATA	SAMPLE_MEAS_LEV	CDC_TYPE_CODE	SAMPLE_TYPE_CODE	DATA_TYPE_CODE	DATA_SOURCE_CODE	DATA_QUALITY_CODE	LAB_NAME	LABORATORY_NAME	CDC_LABORATORY_CODE
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	001	1	Benzophenone-3	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	002	1	Ethyl-4-hydroxybenzoate	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	003	1	Methyl-4-hydroxybenzoate	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	004	1	Propyl-4-hydroxybenzoate	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	005	1	Triclosan	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	006	1	Triclocarban	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	007	1	Triclosan-O-glucuronide	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	008	1	2-Ethylhexyl-4-methoxycinnamate	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	009	1	4-Methylbenzylidene-3-bornan-2-one	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	010	1	Benzophenone-1	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	011	1	2,4-Dihydroxybenzophenone	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	012	1	2-Hydroxy-4-methoxybenzophenone	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	013	1	2-Hydroxy-4-methoxybenzophenone-5-sulfonate	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	014	1	2,2'-Dihydroxy-4-methoxybenzophenone	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	015	1	2,2',4,4'-Tetrahydroxybenzophenone	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	016	1	Benzophenone-8	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	017	1	4-Hydroxybenzophenone	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	018	1	4-Methylbenzylidene-3-bornan-2-one-1-sulfonic acid	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	019	1	3-Benzylidene-2-bornan-2-one	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	020	1	Benzophenone-2	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	021	1	2,2',4,4',6,6'-Hexahydroxybenzophenone	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	022	1	2,2',4,4'-Tetrahydroxy-6'-methoxybenzophenone	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	023	1	Benzophenone-9	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	024	1	2-Ethylhexyl-2-cyano-3,3-diphenylacrylate	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	025	1	2-Ethylhexyl-2-cyano-3-phenylcinnamate	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	026	1	3-(4-Methylphenylidene)-dl-camphor	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	027	1	3-(4-Methylphenylidene)-l-camphor	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	028	1	Benzophenone-10	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	029	1	2-Phenylbenzimidazole-5-sulfonic acid	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	030	1	Benzophenone-11	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	031	1	2-Hydroxy-4-methoxybenzophenone-5-sulfonic acid, sodium salt	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	032	1	Benzophenone-12	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	033	1	4-Methylbenzylidene-3-bornan-2-one-1-sulfonic acid, potassium salt	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	034	1	3-Benzylidene-2-bornan-2-one-1-sulfonic acid, potassium salt	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	035	1	Benzophenone-17	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	036	1	2-(4-Diethylamino-2-hydroxybenzoyl)-benzoic acid hexyl ester	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	037	1	Benzophenone-3	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	038	1	Ethyl-4-hydroxybenzoate	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	039	1	Methyl-4-hydroxybenzoate	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	040	1	Propyl-4-hydroxybenzoate	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	041	1	Triclosan	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	042	1	Triclocarban	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	043	1	Triclosan-O-glucuronide	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	044	1	2-Ethylhexyl-4-methoxycinnamate	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	045	1	4-Methylbenzylidene-3-bornan-2-one	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	046	1	Benzophenone-1	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	047	1	2,4-Dihydroxybenzophenone	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	048	1	2-Hydroxy-4-methoxybenzophenone	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	049	1	2-Hydroxy-4-methoxybenzophenone-5-sulfonate	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	050	1	2,2'-Dihydroxy-4-methoxybenzophenone	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	051	1	2,2',4,4'-Tetrahydroxybenzophenone	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	052	1	Benzophenone-8	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	053	1	4-Hydroxybenzophenone	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	054	1	4-Methylbenzylidene-3-bornan-2-one-1-sulfonic acid	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	055	1	3-Benzylidene-2-bornan-2-one	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	056	1	Benzophenone-2	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	057	1	2,2',4,4',6,6'-Hexahydroxybenzophenone	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	058	1	2,2',4,4'-Tetrahydroxy-6'-methoxybenzophenone	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	059	1	Benzophenone-9	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	060	1	2-Ethylhexyl-2-cyano-3,3-diphenylacrylate	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	061	1	2-Ethylhexyl-2-cyano-3-phenylcinnamate	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	062	1	3-(4-Methylphenylidene)-dl-camphor	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	063	1	3-(4-Methylphenylidene)-l-camphor	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	064	1	Benzophenone-10	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	065	1	2-Phenylbenzimidazole-5-sulfonic acid	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	066	1	Benzophenone-11	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	067	1	2-Hydroxy-4-methoxybenzophenone-5-sulfonic acid, sodium salt	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	068	1	Benzophenone-12	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	069	1	4-Methylbenzylidene-3-bornan-2-one-1-sulfonic acid, potassium salt	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	070	1	3-Benzylidene-2-bornan-2-one-1-sulfonic acid, potassium salt	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	071	1	Benzophenone-17	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	072	1	2-(4-Diethylamino-2-hydroxybenzoyl)-benzoic acid hexyl ester	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	073	1	Benzophenone-3	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	074	1	Ethyl-4-hydroxybenzoate	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	075	1	Methyl-4-hydroxybenzoate	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	076	1	Propyl-4-hydroxybenzoate	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	077	1	Triclosan	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	078	1	Triclocarban	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	079	1	Triclosan-O-glucuronide	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	080	1	2-Ethylhexyl-4-methoxycinnamate	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0
2006SCC1001A	2006	1	No	No	No	No	Nonhispanic	01-04 Yrs	01-04	1	01-07	5	00-00	Years	0	1NHANES	081	1	4-Methylbenzylidene-3-bornan-2-one	0.0100000000	0.0100000000	pmol/L	0	NA	CHL	BIOTA	5	NA-NHANES	Real Results; Issue Number: 0	0	0

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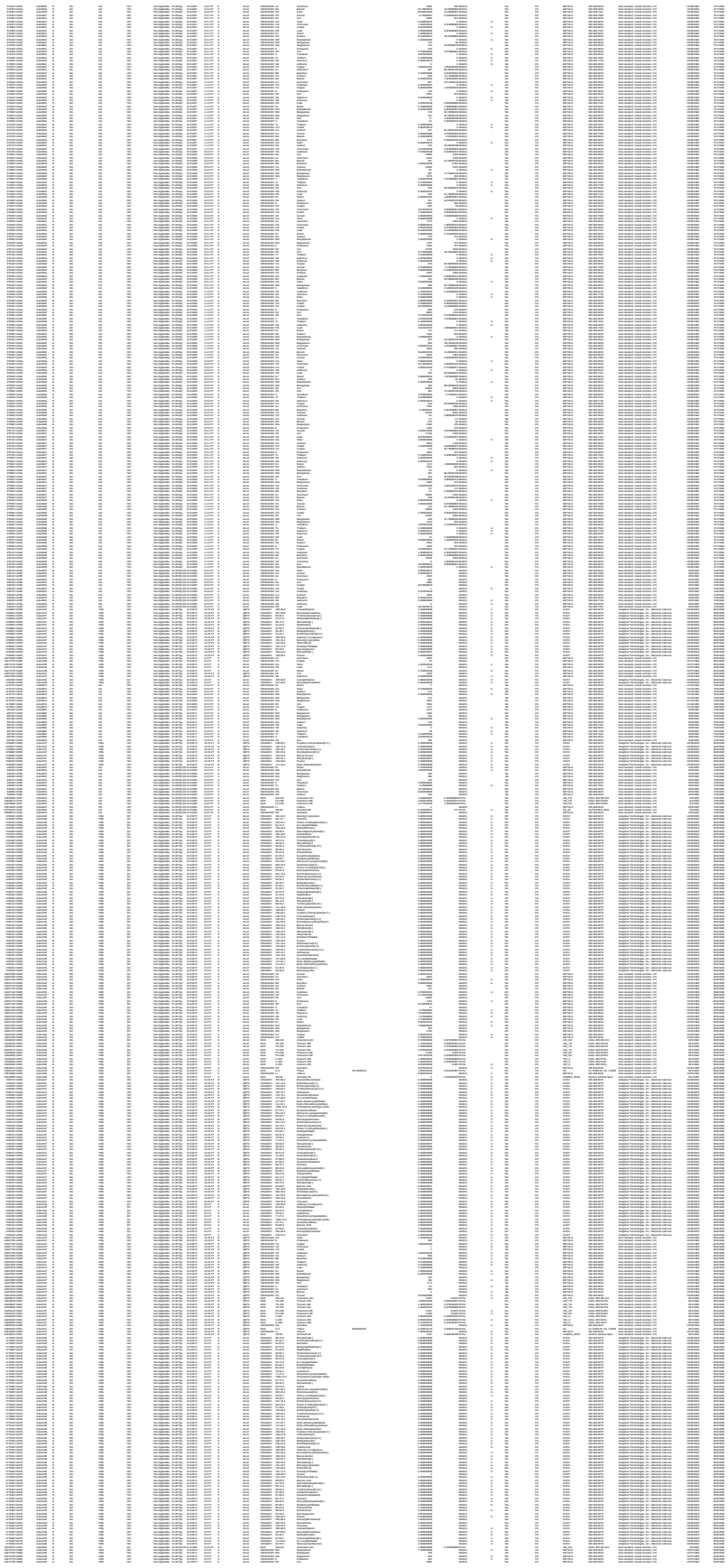

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UR	REQUEST_NUM	SAMPLE_ID	EICAV_FLAG	COMPOS_TYPE_CODE	SAMPLE_TECH_CODE	SAMPLE_URO_CODE	FIELD_PREP	PRS	LOCATION_ID	DEPTH	FLD_MATRIX_CODE	MEDIA_CODE	RPI_CLASS	ANALYTE_CODE	ANALYTE_NAME	PERCENT_MOISTURE	MDL	MDA	DILUTION_FACTOR	STD_SAMPLE_VALUE	STD_UNCERTAINTY	STD_REPORTING_UNITS	QUALIFIER	FIELD_QC_TYPE_CODE	SAMPLE_TYPE_CODE	ANALYTICAL_SUITE	ANYL_METH_CODE	LAB_NAME	ANALYSIS_DATE	COLLECTION_DATE
1408092	19389	AAA6139	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03671	16-30 FT	S	FILL	RAD	AC-227	Actinium-227					0.4230000076		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	6/12/1994	8/9/1993
1408092	19.615	AAA6264	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03676	16-20 FT	S	QRT3	RAD	AC-227	Actinium-227					0.2950000119		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	6/1/1994	8/10/1993
1408092	19.616	AAA6267	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03677	5-9 FT	S	FILL	RAD	AC-227	Actinium-227					2.960000086		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/13/1994	8/10/1993
1408092	19.617	AAA6270	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03677	16-20 FT	S	QRT3	RAD	AC-227	Actinium-227					0.3600000024		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/13/1994	8/10/1993
1408092	19.618	AAA6273	N	NA	CBS	QC	Not Applicable	21-024(s)	21-03678	10-18 FT	R	QRT3	RAD	AC-227	Actinium-227					0.9299999928		0 PCi/G	R	FD	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/1/1994	8/10/1993
1408092	19.619	AAA6276	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03677	16-20 FT	R	QRT3	RAD	AC-227	Actinium-227					2.609999895		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/13/1994	8/10/1993
1408092	19.620	AAA6279	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03677	16-20 FT	R	QRT3	RAD	CS-137	Cesium-137					5.5		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/13/1994	8/10/1993
1408092	19.621	AAA6282	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03678	16-20 FT	R	QRT3	RAD	AC-227	Actinium-227					0.3899999964		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/13/1994	8/11/1993
1408092	19.622	AAA6285	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03678	16-20 FT	R	QRT3	RAD	CS-137	Cesium-137					0.5999999964		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/13/1994	8/11/1993
1408092	19.623	AAA6288	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03679	0-5 FT	S	QRT3	RAD	Americium-241	Americium-241					0.5400000024		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/18/1994	8/13/1993
1408092	19.624	AAA6291	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03679	0-5 FT	S	QRT3	RAD	AC-227	Actinium-227					4.579999924		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/18/1994	8/13/1993
1408092	19.625	AAA6294	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03679	0-5 FT	S	ALLH	RAD	AC-227	Actinium-227					0.4899999928		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/18/1994	8/9/1993
1408092	19.626	AAA6297	N	NA	CBS	QC	Not Applicable	21-024(s)	21-03679	0-23 FT	S	ALLH	RAD	AC-227	Actinium-227					5.860000134		0 PCi/G	R	FD	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/1/1994	8/10/1993
1408092	19.627	AAA6300	N	NA	CBS	QC	Not Applicable	21-024(s)	21-03679	0-23 FT	S	ALLH	RAD	CS-137	Cesium-137					0.6000000024		0 PCi/G	R	FD	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/1/1994	8/10/1993
1408092	19.628	AAA6307	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03679	5-10 FT	S	QRT3	RAD	CS-137	Cesium-137					0.3100000024		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/18/1994	8/13/1993
1408092	19.632	AAA6310	N	NA	CBS	HA	Not Applicable	21-024(s)	21-01033	0-0.5 FT	S	ALLH	RAD	AM-241	Americium-241					0.2050000024		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	T. Oak Ridge, TN	10/5/1994	7/21/1992
1408092	19.633	AAA6313	N	NA	CBS	HA	Not Applicable	21-024(s)	21-01033	0-0.5 FT	S	ALLH	RAD	Americium-241	Americium-241					0.2050000024		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	T. Oak Ridge, TN	10/5/1994	7/21/1992
1408092	19.634	AAA6316	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03677	16-20 FT	R	QRT3	RAD	AC-227	Actinium-227					0.3299999976		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/13/1994	8/10/1993
1408092	19.635	AAA6319	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03677	16-20 FT	R	QRT3	RAD	CS-137	Cesium-137					0.2799999976		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/13/1994	8/10/1993
1408092	19.636	AAA6322	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03678	16-20 FT	R	QRT3	RAD	AC-227	Actinium-227					0.2899999976		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/18/1994	8/13/1993
1408092	19.637	AAA6325	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03678	16-20 FT	R	QRT3	RAD	CS-137	Cesium-137					0.3299999976		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/18/1994	8/13/1993
1408092	19.638	AAA6328	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03679	0-5 FT	S	FILL	RAD	AC-227	Actinium-227					0.2999999964		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/18/1994	8/9/1993
1408092	19.639	AAA6331	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03679	0-5 FT	S	FILL	RAD	CS-137	Cesium-137					0.3000000024		0 PCi/G	R	FD	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/18/1994	8/9/1993
1408092	19.640	AAA6334	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03679	0-23 FT	S	ALLH	RAD	AC-227	Actinium-227					2.159999895		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/18/1994	8/13/1993
1408092	19.641	AAA6337	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03679	0-23 FT	S	ALLH	RAD	CS-137	Cesium-137					0.3100000024		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/18/1994	8/13/1993
1408092	19.642	AAA6340	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03679	5-10 FT	S	QRT3	RAD	AC-227	Actinium-227					0.4699999976		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/18/1994	8/13/1993
1408092	19.643	AAA6343	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03679	5-10 FT	S	QRT3	RAD	CS-137	Cesium-137					0.4099999976		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/18/1994	8/13/1993
1408092	19.644	AAA6346	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03677	10-16 FT	R	QRT3	RAD	AC-227	Actinium-227					2.779999971		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/13/1994	8/10/1993
1408092	19.645	AAA6349	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03677	10-16 FT	R	QRT3	RAD	CS-137	Cesium-137					0.5299999976		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/13/1994	8/10/1993
1408092	19.646	AAA6352	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03678	5-10 FT	R	QRT3	RAD	AC-227	Actinium-227					4.719999886		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/1/1994	8/10/1993
1408092	19.647	AAA6355	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03678	5-10 FT	R	QRT3	RAD	CS-137	Cesium-137					0.5299999976		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/1/1994	8/10/1993
1408092	19.610	AAA6358	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03679	0-5 FT	S	ALLH	RAD	AC-227	Actinium-227					0.2100000024		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/18/1994	8/13/1993
1408092	19.611	AAA6361	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03679	0-5 FT	S	ALLH	RAD	CS-137	Cesium-137					0.2799999976		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/18/1994	8/13/1993
1408092	19.612	AAA6364	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03679	0-23 FT	S	QRT3	RAD	AC-227	Actinium-227					0.5299999976		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/18/1994	8/13/1993
1408092	19.613	AAA6367	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03679	0-23 FT	S	QRT3	RAD	CS-137	Cesium-137					0.4699999976		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/18/1994	8/13/1993
1408092	19.614	AAA6370	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03677	16-20 FT	R	QRT3	RAD	AC-227	Actinium-227					0.9300000024		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/18/1994	8/11/1993
1408092	19.615	AAA6373	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03677	16-20 FT	R	QRT3	RAD	CS-137	Cesium-137					0.6299999976		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/18/1994	8/11/1993
1408092	19.616	AAA6376	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03678	16-20 FT	R	QRT3	RAD	AC-227	Actinium-227					0.3299999964		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/18/1994	8/11/1993
1408092	19.617	AAA6379	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03678	16-20 FT	R	QRT3	RAD	CS-137	Cesium-137					0.3199999964		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/18/1994	8/11/1993
1408092	19.618	AAA6382	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03679	0-5 FT	S	FILL	RAD	AC-227	Actinium-227					0.2799999964		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/18/1994	8/9/1993
1408092	19.619	AAA6385	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03679	0-5 FT	S	FILL	RAD	CS-137	Cesium-137					0.3000000024		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/18/1994	8/9/1993
1408092	19.620	AAA6388	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03679	0-23 FT	S	ALLH	RAD	AC-227	Actinium-227					0.3100000024		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/18/1994	8/13/1993
1408092	19.621	AAA6391	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03679	0-23 FT	S	ALLH	RAD	CS-137	Cesium-137					0.3600000024		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/18/1994	8/13/1993
1408092	19.622	AAA6394	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03679	5-10 FT	S	QRT3	RAD	AC-227	Actinium-227					0.4699999976		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/18/1994	8/13/1993
1408092	19.623	AAA6397	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03679	5-10 FT	S	QRT3	RAD	CS-137	Cesium-137					0.4099999976		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/18/1994	8/13/1993
1408092	19.624	AAA6400	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03677	16-20 FT	R	QRT3	RAD	AC-227	Actinium-227					0.3299999964		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/18/1994	8/11/1993
1408092	19.625	AAA6403	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03677	16-20 FT	R	QRT3	RAD	CS-137	Cesium-137					0.3199999964		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/18/1994	8/11/1993
1408092	19.626	AAA6406	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03678	16-20 FT	R	QRT3	RAD	AC-227	Actinium-227					0.9400000024		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/18/1994	8/11/1993
1408092	19.627	AAA6409	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03678	16-20 FT	R	QRT3	RAD	CS-137	Cesium-137					0.3199999964		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/18/1994	8/11/1993
1408092	19.628	AAA6412	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03679	0-5 FT	S	FILL	RAD	AC-227	Actinium-227					0.2399999952		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/25/1994	8/18/1993
1408092	19.629	AAA6415	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03679	0-5 FT	S	FILL	RAD	CS-137	Cesium-137					0.2599999952		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/25/1994	8/18/1993
1408092	19.630	AAA6418	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03679	0-23 FT	S	ALLH	RAD	AC-227	Actinium-227					0.6000000024		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/29/1994	8/13/1993
1408092	19.631	AAA6421	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03679	0-23 FT	S	ALLH	RAD	CS-137	Cesium-137					0.7000000024		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/29/1994	8/13/1993
1408092	19.632	AAA6424	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03677	5-10 FT	R	QRT3	RAD	AC-227	Actinium-227					2.200000048		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/29/1994	8/13/1993
1408092	19.633	AAA6427	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03677	5-10 FT	R	QRT3	RAD	CS-137	Cesium-137					0.2600000024		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/29/1994	8/13/1993
1408092	19.634	AAA6430	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03678	5-10 FT	R	QRT3	RAD	AC-227	Actinium-227					0.9400000024		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/29/1994	8/13/1993
1408092	19.635	AAA6433	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03678	5-10 FT	R	QRT3	RAD	CS-137	Cesium-137					0.3600000024		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/29/1994	8/13/1993
1408092	19.636	AAA6436	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03677	16-20 FT	R	QRT3	RAD	AC-227	Actinium-227					0.4299999928		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/29/1994	8/18/1993
1408092	19.637	AAA6439	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03677	16-20 FT	R	QRT3	RAD	CS-137	Cesium-137					0.4699999928		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/29/1994	8/18/1993
1408092	19.638	AAA6442	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03678	16-20 FT	R	QRT3	RAD	AC-227	Actinium-227					0.2200000048		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/29/1994	8/13/1993
1408092	19.639	AAA6445	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03678	16-20 FT	R	QRT3	RAD	CS-137	Cesium-137					0.2600000024		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/29/1994	8/13/1993
1408092	19.640	AAA6448	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03679	0-5 FT	S	FILL	RAD	AC-227	Actinium-227					0.3999999964		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/12/1994	8/10/1993
1408092	19.641	AAA6451	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03679	0-5 FT	S	FILL	RAD	CS-137	Cesium-137					0.4300000024		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/12/1994	8/10/1993
1408092	19.642	AAA6454	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03679	0-23 FT	S	ALLH	RAD	AC-227	Actinium-227					2.200000048		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/12/1994	8/11/1993
1408092	19.643	AAA6457	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03679	0-23 FT	S	ALLH	RAD	CS-137	Cesium-137					0.5400000024		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/12/1994	8/11/1993
1408092	19.644	AAA6460	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03677	5-10 FT	R	QRT3	RAD	AC-227	Actinium-227					2.339999952		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/12/1994	8/11/1993
1408092	19.645	AAA6463	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03677	5-10 FT	R	QRT3	RAD	CS-137	Cesium-137					0.3299999952		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/12/1994	8/11/1993
1408092	19.646	AAA6466	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03678	0-23 FT	S	FILL	RAD	AC-227	Actinium-227					0.9299999928		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/25/1994	8/18/1993
1408092	19.647	AAA6469	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03678	0-23 FT	S	FILL	RAD	CS-137	Cesium-137					1.239999952		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/25/1994	8/18/1993
1408092	19.610	AAA6472	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-01123	0-0.5 FT	S	ALLH	RAD	AM-241	Americium-241					0.2950000024		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	T. Oak Ridge, TN	10/5/1994	7/21/1992
1408092	19.611	AAA6475	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-01123	0-0.5 FT	S	ALLH	RAD	Americium-241	Americium-241					0.2950000024		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	T. Oak Ridge, TN	10/5/1994	7/21/1992
1408092	19.612	AAA6478	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03678	0-23 FT	S	QRT3	RAD	AC-227	Actinium-227					0.4600000024		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/29/1994	8/11/1993
1408092	19.613	AAA6481	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03678	0-23 FT	S	QRT3	RAD	CS-137	Cesium-137					0.7300000024		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/29/1994	8/11/1993
1408092	19.614	AAA6484	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03677	10-16 FT	R	QRT3	RAD	AC-227	Actinium-227					0.9299999928		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/1/1994	8/10/1993
1408092	19.615	AAA6487	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03677	10-16 FT	R	QRT3	RAD	CS-137	Cesium-137					0.9400000024		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/1/1994	8/10/1993
1408092	19.616	AAA6490	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03678	5-10 FT	R	QRT3	RAD	AC-227	Actinium-227					2.769999952		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/13/1994	8/11/1993
1408092	19.617	AAA6493	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03678	5-10 FT	R	FILL	RAD	CS-137	Cesium-137					0.4399999964		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/13/1994	8/11/1993
1408092	19.618	AAA6496	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03679	0-5 FT	S	QRT3	RAD	AC-227	Actinium-227					0.3299999964		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/13/1994	8/9/1993
1408092	19.619	AAA6499	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03679	0-5 FT	S	QRT3	RAD	CS-137	Cesium-137					0.3600000024		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/13/1994	8/9/1993
1408092	19.620	AAA6502	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03679	0-23 FT	S	QRT3	RAD	AC-227	Actinium-227					0.3199999964		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/13/1994	8/13/1993
1408092	19.621	AAA6505	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03679	0-23 FT	S	QRT3	RAD	CS-137	Cesium-137					0.3900000024		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/13/1994	8/13/1993
1408092	19.622	AAA6508	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03679	5-10 FT	R	QRT3	RAD	AC-227	Actinium-227					0.9600000024		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/13/1994	8/11/1993
1408092	19.623	AAA6511	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03679	5-10 FT	R	QRT3	RAD	CS-137	Cesium-137					0.3900000024		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/13/1994	8/11/1993
1408092	19.624	AAA6514	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03677	16-20 FT	R	QRT3	RAD	AC-227	Actinium-227					0.3299999964		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/18/1994	8/11/1993
1408092	19.625	AAA6517	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03677	16-20 FT	R	QRT3	RAD	CS-137	Cesium-137					0.3199999964		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/18/1994	8/11/1993
1408092	19.626	AAA6520	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03678	16-20 FT	R	QRT3	RAD	AC-227	Actinium-227					0.9299999928		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gamma Spec.	Rust Geotech, Grand Junction, CO	4/18/1994	8/11/1993
1408092	19.627	AAA6523	N	NA	CBS	RIV	Not Applicable	21-024(s)	21-03678	16-20 FT	R	QRT3	RAD	CS-137	Cesium-137					0.9399999928		0 PCi/G	R	NA	CS	GAMMA_SPEC	Generic Gam

Appendix C

Management Plan for Investigation-Derived Waste

C-1.0 MANAGEMENT OF INVESTIGATION-DERIVED WASTE

This appendix to the progress report describes how investigation-derived waste (IDW) generated during the investigation of the DP Site aggregate area corrective action solid waste management units (SWMUs) will be managed. IDW is waste generated as a result of field-investigation activities and may include, but is not limited to, drill cuttings; excavated material; purge water; contaminated personal protective equipment (PPE), sampling supplies, and plastic; fluids from decontamination of PPE and sampling equipment; and all other wastes potentially contacting contaminants. Certain field investigation activities may also displace environmental media, which is defined as naturally occurring material indigenous to the environment, including groundwater, surface water, surface and subsurface soils, rocks, bedrock, and gravel. IDW generated during the investigation of the DP Site aggregate area corrective action SWMUs/area of concern (AOC) will be managed in a way that is protective of human health and the environment, compliant with applicable regulatory requirements, and consistent with the waste-minimization goals of Los Alamos National Laboratory (the Laboratory).

All IDW generated during field investigation activities will be managed in accordance with applicable Environmental Stewardship–Environmental Characterization and Remediation (ENV-ECR) standard operating procedures (SOPs). These SOPs incorporate the requirements of all applicable U.S. Environmental Protection Agency (EPA) and New Mexico Environment Department regulations, Department of Energy (DOE) orders, and Laboratory implementation requirements. ENV-ECR SOPs applicable to the characterization and management of IDW are

- LANL ENV-ECR SOP-01.06, Management of Environmental Restoration Project Waste, and
- LANL ENV-ECR SOP-01.10, Waste Characterization.

These SOPs are among the SOPs applicable to the investigation at the DP Site aggregate area corrective action SWMUs/AOC and are available at the following internet address: http://erproject.lanl.gov/documents/procedures.html.

Investigation activities will be conducted in a manner that minimizes the generation of waste. Waste minimization is accomplished by implementing the requirements of the Environmental Stewardship–Environmental Remediation and Surveillance (ENV-ERS) Program portion of the 2004 Pollution Prevention Roadmap (LANL 2004, 88465), which is updated annually as a requirement of Module VIII of the Laboratory's Hazardous Waste Permit, ID# NM0890010515-1, issued by the EPA on May 23, 1990, and modified on May 19, 1994 (EPA 1990, 01585; EPA 1994, 44146).

The waste streams that will be generated and managed during progress-report implementation at the DP Site aggregate area include the following:

- Drill cuttings
- Excavated soil, rock, gravel, and boulders
- Septic system pipe (inlet and outlet vitrified clay pipe[VCP])
- Concrete debris (septic tanks, sumps, manholes)
- Metal debris (inlet and outlet pipes, culverts)
- Miscellaneous construction and demolition (C&D) debris (building debris: asphalt, fence posts with footers)
- Mixed vegetation debris (tree stumps, slash, and wood debris)

- PPE, plastic, and other IDW
- Decontamination fluids

All wastes will be managed in accordance with applicable Federal, State, DOE, and Laboratory requirements. Waste streams, regulatory classification, estimated amounts, and disposal pathways are shown in Tables C-1 and C-2. The volumes are estimated from Table C-3.

The characterization of waste streams will be based on previously collected samples and additional samples, as necessary. A Waste Characterization Strategy Form (WCSF) will be prepared. Existing Waste Profile Forms (WPFs) will be used or referenced for new WPFs needed for implementation of the work plan.

Historically, cast iron pipe and VCP have contained lead collars. Lead collars will be segregated, decontaminated to below free-release criteria for radionuclides, and managed as hazardous waste to minimize waste volume. In the absence of lead collars the septic system inlet and outlet piping (VCP and cast iron) will be treated as suspect low-level waste (LLW), because of the suspected presence of radionuclides.

If field activities identify a need for soil removal, then excavated soil and other IDW from the remediation activities will be managed as LLW in a Radioactive Waste Storage Area, due to the presence of radionuclides (principally plutonium-239 and -238; uranium-234, -235, and -238; tritium; strontium-90; and americium-241) in the waste streams.

Before the start of field investigation activities, a WCSF will be prepared and approved according to the requirements of LANL ENV-ECR SOP-01.10. The WCSF will provide detailed information on IDW characterization, management, containerization, and potential volume generation. IDW characterization will be achieved through existing data and/or documentation and through direct sampling of the IDW, or sampling of the mediameter being investigated (i.e., surface soil, subsurface soil, concrete, etc.). If waste characterization sampling is necessary, it will be described in the WCSF.

The selection of waste containers will be based on the appropriate Department of Transportation (DOT) requirements and the type and amount of IDW that is planned to be generated. Each waste container will be individually labeled as to the waste classification, item identification number, radioactivity (if applicable), and date of generation, immediately following containerization. Waste containers will be managed in clearly marked and appropriately constructed waste-accumulation areas. Waste-accumulation area postings, regulated storage duration, and inspection requirements will be based on IDW type and classification. Container and storage requirements will be described in the WCSF, based on requirements outlined in the most recent versions of the LANL Waste Management Facilities Waste Acceptance Criteria and LANL LIRs 404-00-03, Hazardous and Mixed Waste Requirements; 404-00-04, Managing Solid Waste; 404-00-05, Managing Radioactive Waste; and 405-10-01, Packaging and Transportation. Before waste generation, the WCSF will be approved by the process detailed in LANL ENV-ECR SOP 01.10, Waste Characterization.

Transportation of IDW will comply with appropriate DOT requirements. Depending upon waste classification, disposal of solid IDW will take place either on-site at LANL TA-54, Area G, or at an approved off-site disposal facility. Liquid IDW may be processed at the TA-50 Radioactive Liquid Waste Treatment Facility (RLWTF) or the TA-46 Sanitary Wastewater Systems Plant. Hazardous and/or mixed waste may be transported and stored at TA-54, Area L, before off-site disposal, or will be shipped directly to an off-site disposal facility. Transportation and disposal requirements will be detailed in the WCSF and approved before the generation of waste.

Table C-1
Waste Streams from Implementation of the DP Site Aggregate Area Investigation SWMUs

Waste Stream	Waste Type	Volume	Shipped To
Drill cuttings	Solid, low-level waste (LLW)	TBD (to be determined)	LANL, Technical Area 54 (TA-54), Area G
Soil and rock	Solid, LLW	TBD	LANL, TA-54, Area G
Sewer line	Solid, LLW	TBD	LANL, TA-54, Area G
Septic tank	Solid, LLW	TBD	LANL, TA-54, Area G
PPE, plastic, and other IDW	Solid, LLW	TBD	LANL, TA-54, Area G
Decontamination fluids	Liquid, LLW	TBD	LANL, TA-50, Radioactive Liquid Waste Treatment Facility (RLWTF)

Table C-2
Waste Streams from Implementation of the DP Site Aggregate Area Corrective Action SWMUs

Waste Stream	Waste Type	Estimated Maximum Volume	Disposal Destination
Septic tank liquids	Liquid, mixed low-level waste (MLLW)	300 gal.	Off-site disposal via LANL, TA-54
Sludge and absorbed wash waters	Solid, MLLW	10 yd^3	Off-site disposal via LANL, TA-54
Mixed Debris (tank contents and contaminated items)	Solid, MLLW	10 yd^3	Off-site disposal via LANL, TA-54
Metal piping / metal debris	Solid, low-level waste (LLW)	10 yd^3	LANL, TA-54, Area G
Drill cuttings	Solid, LLW	10 yd^3	TBD (to be determined)
Excavated soil	Solid, LLW	1500 yd^3	LANL, TA-54, Area G
Rock and gravel	Solid, LLW	400 yd^3	TBD
Sand	Solid, LLW	5 yd^3	TBD
Sewer line	Solid, LLW	16 yd^3	LANL, TA-54, Area G
Concrete septic tanks / concrete debris / VCP sewer pipe	Solid, LLW	1,000 yd^3	LANL, TA-54, Area G
Lead collars	Solid, RCRA Hazardous	1 yd^3	Off-site disposal via LANL, TA-54
C&D debris	Solid, LLW	50 yd^3	LANL, TA-54, Area G
Wood debris	Solid, LLW	6 yd^3	LANL, TA-54, Area G
Vegetation	Solid	10 yd^3	LANL, TA-54, Area G
PPE, plastic, and other IDW	Solid, potential LLW	5 yd^3	LANL, TA-54, Area G
Decontamination fluids	Liquid, potential LLW	100 gal.	LANL, TA-50 RLWTF or TA-46 Sanitary Wastewater System

Table C-3
Waste Stream Volumes Listed by SWMU (yd^3)

SWMU Number:	21-006(c)-99	21-012(b)	21-022(f)	21-022(h)-99	21-023(a)-99	21-024(a)	21-024(b)	21-024(d)	21-024(e)	21-024(g)	21-024(h)	21-024(i)	21-024(j)	21-024(k)	21-024(l)-99	21-024(n)	21-024(o)	21-026(a)-99	21-027(a)	21-027(c)	Total
Concrete/VCP																					
Blowdown pits (concrete)[1]		14.8																			14.8
Filter Beds (concrete)[2]																		55.0			55.0
Fiber Pipe[3]										0.1											0.1
Headwall[4]																0.3					0.3
Inlet Line (2" VCP)[5]										0.01											0.0
Inlet Line (4" VCP)[6]										0.13			0.09		0.03						0.3
Inlet Line (6" VCP)[7]						0.2	0.5		1.4		1.0	0.4		0.9							4.4
Inlet Line (grouted 6" VCP)[8]								4.5													4.5
Outlet Line (8" VCP)[9]																		0.8			0.8
Manhole (concrete)[10]			1.5		3.0			1.5						3.0				3.0			12.0
Outlet Line (3" VCP)[11]		0.02																			0.0
Outlet Line (24" VCP)[12]				3.9																	3.9
Outlet Line (4" VCP)[13]										0.01			0.1	0.08			0.08		0.01	0.05	0.3
Pad (concrete)[14]																		117			117.0
Outlet Line (6" VCP)[15]		0.35				0.2	0.02	0.03	0.05		0.1										0.8
Septic Tank (concrete)[16]					9.8	5.4	5.4	19.4		11.4	10.9	9.9	2.2	16.7							91.2
Storm Drain Grate[17]										0.1						0.7					0.8
Storm Drain Culvert (12' concrete)[18]																			0.2		0.2
Sump (brick)[19]	4.9		0.6												1.3						6.8
Sump (concrete)[20]		2.7																			2.7
Total	4.90	17.87	2.10	3.90	12.80	5.80	5.92	25.43	1.45	11.78	12.05	10.29	2.41	20.67	1.33	1.00	0.08	175.80	0.21	0.05	**315.8**
Metal Debris/ Cast Iron Piping																					
Inlet Line (3" CI)[21]	0.1																				0.1
Inlet Line (4" CI)[22]					0.06																0.06
Inlet Line (6" CI)[23]														0.3	0.4						0.7
Metal Apparatus (cauldron)[24]															0.1						0.1
Outlet Line (12" CMP)[25]										0.3						0.4					0.7
Outlet Line (24" CMP)[26]																			0.9		0.9
Outlet Line (3" CI)[27]	0.02																				0.0
Outlet Line (4" CI)[28]		0.8												0.02	0.05	0.1					1.0
Outlet Line (6" CI)[29]			0.4		0.3											0.4					1.1
Septic Tank (steel)[30]									1.6												1.6
Sump[31]				0.1																	0.1
Above-Ground Steel Tank - recycle[32]																					0.0
Total	0.12	0.80	0.40	0.10	0.36	0.00	0.00	0.00	1.58	0.30	0.00	0.00	0.00	0.32	0.55	0.90	0.00	0.00	0.90	0.00	**6.3**

Table C-3 (continued)

SWMU Number:	21-006(c)-99	21-012(b)	21-022(f)	21-022(h)-99	21-023(a)-99	21-024(a)	21-024(b)	21-024(d)	21-024(e)	21-024(g)	21-024(h)	21-024(i)	21-024(j)	21-024(k)	21-024(l)-99	21-024(n)	21-024(o)	21-026(a)-99	21-027(a)	21-027(c)	Total
Gravel																					
Sand[33]																		5.0			5.0
Rock, gravel and boulders[34]	139.1									133											272.1
Tile Field (sand and gravel)[35]														122							122.2
Total	139.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	133.00	0.00	0.00	0.00	122.20	0.00	0.00	0.00	5.00	0.00	0.00	**399.3**
Soil[37]																					
Soil beneath septic tanks[36]					6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2							62.0
Drainage Ditches[38]										33.0											33.0
Inlet Lines[39]	39.2				17.5	13.0	32.0	102.5	91.0	60.3	65.3	25.0	26.8	56.7	3.3						532.6
Outlet Lines[40]	6.7	82.8	28.3	27.8	82.5	14.5	5.8	1.7	3.0	2.5	7.5		31.7	14.8	34.7	66.0	24.2	38.3	17.5	14.2	504.5
Total	45.90	82.80	28.30	27.80	106.20	33.70	44.00	110.40	100.20	102.00	79.00	31.20	64.70	77.70	38.00	66.00	24.20	38.30	17.50	14.20	**1132.1**

Assumptions for Table C-3:

1 Blowdown pit is 10′ x 10′ x 2′ deep = 200 ft^3 x 2 pits = 400 ft^3 = 14.8 yd^3

2 Filter beds are 14.5′ x 23′ x 4′ & 8″ thick (4 sides, bottom, no top)

3 Fiber pipe is 180′ long (L). Outside diameter (D) is 0.33′, inside diameter (d) is 0.30′
Volume calculation for wall of cylinder or pipe = Volume Formula = $(\pi L/4)(D^2–d^2)$ = 2.7 ft^3 = 0.1 yd^3
(Everywhere after this only VF, for the cylinder formula, will be used)

4 Headwall is 2′ x 2′ x 2′ = 8 ft^3 = 0.3 yd^3

5 2″ VCP: D = 0.17′ d = 0.15′ L = 63′
Vol. of pipe wall = VF = 0.3 ft^3 = 0.01 yd^3

6 4″ VCP: D = 0.33′ d = 0.30′
Volumes of pipe walls:

SWMU 21-024(g)	L = 250′	VF = 3.7 ft^3 = 0.13 yd^3
SWMU 21-024(j)	L = 161′	VF = 2.4 ft^3 = 0.09 yd^3
SWMU 21-024(l)	L = 50′	VF = 0.7 ft^3 = 0.10 yd^3

7 6″ VCP: D = 0.50′ d = 0.40′
Volumes of pipe walls:

SWMU 21-024(a)	L = 78′	VF = 5.5 ft^3 = 0.2 yd^3
SWMU 21-024(b)	L = 192′	VF = 13.6 ft^3 = 0.5 yd^3
SWMU 21-024(e)	L = 544′	VF = 38.4 ft^3 = 1.4 yd^3
SWMU 21-024(h)	L = 392′	VF = 27.7 ft^3 = 1.0 yd^3
SWMU 21-024(i)	L = 150′	VF = 10.6 ft^3 = 0.4 yd^3
SWMU 21-024(k)	L = 340′	VF = 24.0 ft^3 = 0.9 yd^3

8 Grouted 6″ VCP: radius = r = 0.25′ L = 615′
Volume of grout and pipe wall = $\pi r2L$ = 120.7 ft^3 = 4.5 yd^3

9 8″ VCP: D = 0.67′ d = 0.57′ L = 230′
Volume of pipe wall = VF = 22.4 ft^3 = 0.8 yd^3

10 Manholes: D = 4′ d = 2.7′ L = 6′
Volumes of pipe walls:

SWMU 21-022(f) =	VF = 40.9 ft^3 = 1.5 yd^3
SWMU 21-023(a) =	VF = 40.9 ft^3 x 2 manholes = 81.8 ft^3 = 3.0 yd^3
SWMU 21-024(d) =	VF = 40.9 ft^3 = 1.5 yd^3
SWMU 21-024(k) =	VF = 40.9 ft^3 x 2 manholes = 81.8 ft^3 = 3.0 yd^3
SWMU 21-026(a) =	VF = 40.9 ft^3 x 2 manholes = 81.8 ft^3 = 3.0 yd^3

11 3″ VCP: D = 0.25′ d = 0.22′ L = 50′
Volume of pipe wall = VF = 0.55 ft^3 = 0.02 yd^3

12 24″ VCP: D = 2.0′ d = 1.8′ L = 131′
Volume of pipe wall = VF = 104.8 ft^3 = 3.9 yd^3

13 4″ VCP: D = 0.33′ d = 0.30′
Volumes of pipe walls:

SWMU 21-024(g)	L = 15′	VF = 0.2 ft^3 = 0.01 yd^3
SWMU 21-024(j)	L = 190′	VF = 2.8 ft^3 = 0.1 yd^3
SWMU 21-024(k)	L = 145′	VF = 2.2 ft^3 = 0.08 yd^3
SWMU 21-024(o)	L = 145′	VF = 2.2 ft^3 = 0.08 yd^3
SWMU 21-027(a)	L = 25′	VF = 0.37 ft^3 = 0.01 yd^3
SWMU 21-027(c)	L = 85′	VF = 1.3 ft^3 = 0.05 yd^3

14 Concrete pad is approx. 35′ x 45′ x 2′ = 3,150 ft^3 = 117 yd^3

15 6″ VCP: D = 0.50′ d = 0.40′
Volumes of pipe walls:

SWMU 21-012(b)	L = 135′	VF = 9.54 ft^3 = 0.35 yd^3
SWMU 21-024(a)	L = 87′	VF = 6.1 ft^3 = 0.2 yd^3
SWMU 21-024(b)	L = 35′	VF = 0.52 ft^3 = 0.02 yd^3
SWMU 21-024(d)	L = 10′	VF = 0.7 ft^3 = 0.03 yd^3
SWMU 21-024(e)	L = 18′	VF = 1.3 ft^3 = 0.05 yd^3
SWMU 21-024(h)	L = 45′	VF = 3.2 ft^3 = 0.1 yd^3

16 Septic tanks: Volume calculations for ea SWMU septic tank are imbedded in the Excel formula in Table 5.22-4

17 Storm drain grates: SWMU 21-024(g) = 2′ x 2′ x 1′ = 4 ft^3 = 0.1 yd^3
SWMU 21-024(n) = 3′ x 3′ x 2′ = 18 ft^3 = 0.7 yd^3

18 Storm drain culvert: D = 1.0′ d = 0.8′ L = 45′
Vol. of pipe wall = VF = 6.4 ft^3 = 0.2 yd^3

19 Sump (brick): SWMU 21-006(c) – 99
Vol. of sump = (2 x (6′ x 12′ x 0.5′)) + (2 x (6′ x 5′ x 0.5′)) +(5′ x 12′ x 0.5′) = 132.0 ft^3 = 4.9 yd^3
SWMU 21-022(f) D = 5.3′ d = 5.0′ L = 6′
Vol. of sump = VF = 16.4 ft^3 = 0.6 yd^3
SWMU 21-024(l) D = 5.0′ d = 4.7′ L ≅ 15′
Vol. of sump = VF = 34.2 ft^3 = 1.3 yd^3

20 Sump (concrete): Vol. of sump = 6′ x 6′ x 2′ = 72 ft^3 = 2.7 yd^3

21 3″ CI: D = 0.25′ d = 0.22′ L = 235′
Vol. of pipe wall = VF = 2.6 ft^3 = 0.1 yd^3

22 4″ CI: D = 0.33′ d = 0.30′ L = 105′
Vol. of pipe wall = VF = 1.56 ft^3 = 0.06 yd^3

23 6″ CI: D = 0.50′ d = 0.40′
Volumes of pipe walls:
SWMU 21-024(k) L = 340′ VF = 7.4 ft^3 = 0.3 yd^3
SWMU 21-024(l)-99 L = 123′ above ground = VF = 8.7 ft^3 = 0.3 yd^3
L = 40′ underground = VF = 2.8 ft^3 = 0.1 yd^3
Total = 0.3 + 0.1 = 0.4 yd^3

24 Metal apparatus (cauldron?): Exact dimensions unknown
Assume 0.1 yd^3

25 12″ CMP: D = 1.0′ d = 0.9′
Volumes of pipe walls:
SWMU 21-024(g) L = 49′ VF = 7.3 ft^3 = 0.3 yd^3
SWMU 21-024(n) L = 75′ VF = 11.2 ft^3 = 0.4 yd^3

26 24″ CMP: D = 2.0′ d = 1.9′ L = 80′
Vol. of pipe wall = VF = 24.5 ft^3 = 0.9 yd^3

27 3″ CI: D = 0.25′ d = 0.22′ L = 40′
Vol. of pipe wall = VF = 0.44 ft^3 = 0.02 yd^3

28 4″ CI: D = 0.33′ d = 0.30′
Volumes of pipe walls:
SWMU 21-012(b) L = 312′ VF = 22.0 ft^3 = 0.8 yd^3
SWMU 21-024(k) L = 34′ VF = 0.5 ft^3 = 0.02 yd^3
SWMU 21-024(l)-99 L = 118′ VF = 1.3 ft^3 = 0.05 yd^3
SWMU 21-024(n) L = 178′ VF = 2.6 ft^3 = 0.1 yd^3

29 6″ CI: D = 0.50′ d = 0.40′
Volumes of pipe walls:
SWMU 21-022(f) L = 170′ VF = 12.0 ft^3 = 0.4 yd^3
SWMU 21-023(a)-99 L = 495′ VF = 7.3 ft^3 = 0.3 yd^3
SWMU 21-024(n) L = 143′ VF = 10.1 ft^3 = 0.4 yd^3

30 Septic tank (steel): Volume calculation is embedded in the Excel formula in Table 25.1-3.

31 Sump: D = 3.0′ d = 2.9′ L = 6.0′
Vol. of sump = VF = 2.8 ft^3 = 0.1 yd^3

32 The above-ground steel tank will be recycled.

33 Parts of the sand pile may still be on site. Assume 5 yd^3.

34 Rock and gravel and boulders
SWMU 21-006(c)-99
Vol. of gravel = 16′ x 70′ x 1′ = 1,120 ft^3
minus 360 ft^3 for the interior brick sump
1,120 ft^3 – 360 ft^3 = 760 ft^3 = 28 yd^3 gravel
Vol. of boulders = 16′ x 70′ x 3′ = 3,360 ft^3
minus 360 ft^3 for the interior brick sump
3,360 ft^3 – 360 ft^3 = 3,000 ft^3 = 111.1 yd^3 boulders
SWMU 21-024(g)

Vol. of rock in Drainage Ditches #1 and #2
= 180′ x 5′ x 4′ = 3,600 ft^3 = 133 yd^3 rock

35 Tile field (sand and gravel)
Volume = 20′ x 30′ x 5.5′ = 3,300 ft^3 = 122 yd^3

36 Soil beneath septic tanks:
Average tank footprint = 17.5′ x 9.5′ = 166.3 ft^3
Assume 1′ soil will need to be excavated:
166.3 ft^2 x 1′ = 166.3 ft^3 = 6.2 yd^3
Assume a total of 10 septic tanks:
6.2 yd^3 x 10 tanks = 62.0 yd^3

37 Soil: In most cases, assume excavated trenches are 1.5′ wide (approx. one backhoe bucket width) and 3′ deep (actual depths will vary from near surface to more than 5′).
All excavated soil is assumed to be low-level waste. Excavated soil volumes do not include the volumes of the pipelines buried within since they are relatively insignificant by comparison.

38 Drainage ditches: Vol. of excavated ditch = 90′ in length x 5′ wide x 1′ deep
= 450 ft^3 x 2 ditches = 900 ft^3 = 33 yd^3

39	Inlet lines:	SWMU 21-006(c)-99	235′ x 3′ x 1.5′ = 1,057.5 ft^3 = 39.2 yd^3
		SWMU 21-023(a)-99	105′ x 3′ x 1.5′ = 472.5 ft^3 = 17.5 yd^3
		SWMU 21-024(a)	78′ x 3′ x 1.5′ = 351 ft^3 = 13.0 yd^3
		SWMU 21-024(b)	192′ x 3′ x 1.5′ = 864 ft^3 = 32.0 yd^3
		SWMU 21-024(d)	615′ x 3′ x 1.5′ = 2,767.5 ft^3 = 102.5 yd^3
		SWMU 21-024(e)	544′ x 3′ x 1.5′ = 2,448 ft^3 = 91.0 yd^3
		SWMU 21-024(g)	(250′ x 63′ x 49′) = 362′ x 3′ x 1.5′ = 1,629 ft^3 = 60.3 yd^3
		SWMU 21-024(h)	392′ x 3′ x 1.5′ = 1,764 ft^3 = 65.3 yd^3
		SWMU 21-024(i)	150′ x 3′ x 1.5′ = 675 ft^3 = 25.0 yd^3
		SWMU 21-024(j)	161′ x 3′ x 1.5′ = 724.5 ft^3 = 26.8 yd^3
		SWMU 21-024(k)	340′ x 3′ x 1.5′ = 1,530 ft^3 = 56.7 yd^3
		SWMU 21-024(l)-99	20′ x 3′ x 1.5′ = 90.0 ft^3 = 3.3 yd^3
40	Outlet lines:	SWMU 21-006(c)-99	40′ x 3′ x 1.5′ = 180 ft^3 = 6.7 yd^3
		SWMU 21-012(b)	(50′ x 135′ x 312′) = 497′ x 3′ x 1.5′ = 2,236 ft^3 = 82.8 yd^3
		SWMU 21-022(f)	170′ x 3′ x 1.5′ = 765 ft^3 = 28.3 yd^3
		SWMU 21-022(h)-99	167′ x 3′ x 1.5′ = 751.5 ft^3 = 27.8 yd^3
		SWMU 21-023(a)-99	495′ x 3′ x 1.5′ = 2,227.5 ft^3 = 82.5 yd^3
		SWMU 21-024(a)	87′ x 3′ x 1.5′ = 391.5 ft^3 = 14.5 yd^3
		SWMU 21-024(b)	35′ x 3′ x 1.5′ = 157.5 ft^3 = 5.8 yd^3
		SWMU 21-024(d)	10′ x 3′ x 1.5′ = 45 ft^3 = 1.7 yd^3
		SWMU 21-024(e)	18′ x 3′ x 1.5′ = 81 ft^3 = 3.0 yd^3
		SWMU 21-024(g)	15′ x 3′ x 1.5′ = 67.5 ft^3 = 2.5 yd^3
		SWMU 21-024(h)	45′ x 3′ x 1.5′ = 202.5 ft^3 = 7.5 yd^3
		SWMU 21-024(j)	190′ x 3′ x 1.5′ = 855 ft^3 = 31.7 yd^3
		SWMU 21-024(k)	89′ x 3′ x 1.5′ = 400.5 ft^3 = 14.8 yd^3
		SWMU 21-024(l)-99	208′ x 3′ x 1.5′ = 936 ft^3 = 34.7 yd^3
		SWMU 21-024(n)	396′ x 3′ x 1.5′ = 1,782 ft^3 = 66.0 yd^3
		SWMU 21-024(o)	145′ x 3′ x 1.5′ = 652.5 ft^3 = 24.2 yd^3
		SWMU 21-026(a)-99	(155′ + 75′) = 230′ x 3′ x 1.5′ = 1,035 ft^3 = 38.3 yd^3
		SWMU 21-027(a)	(25′ + 80′) = 105′ x 3′ x 1.5′ = 472.5 ft^3 = 17.5 yd^3
		SWMU 21-027(c)	85′ x 3′ x 1.5′ = 382.5 ft^3 = 14.2 yd^3

Notes: Total waste volumes presented in Table C-2 assume the following excavation expansion factors (pers. comm. R. Rager, 1/27/05):
Soil = 30%
Concrete and VCP = 200%
Therefore, the soil and concrete/VCP volumes presented in Table C-2 have been increased as shown below and the new volumes are presented in Table C-2:
Soil: 1,132.1 yd^3 + 30% = 1, 472 yd^3 (rounded up to 1, 500 yd^3)
Concrete/VCP: 315.8 yd^3 + 200% = 947 yd^3 (rounded up to 1,000 yd^3)
VCP = vitrified clay pipe
CI = cast iron
CMP = corrugated metal pipe

REFERENCES

EPA (U.S. Environmental Protection Agency), April 1990. United States Environmental Protection Agency, Region 6 Hazardous Waste Permit (Hazardous and Solid Waste Amendments). (EPA 1990, 01585)

EPA (U.S. Environmental Protection Agency), April 1994. "Module VIII, Special Conditions Pursuant to the 1984 Hazardous and Solid Waste Amendments to RCRA for Los Alamos National Laboratory, EPA ID NM0890010515 38817," module of EPA Hazardous Waste Facility Permit issued to Los Alamos National Laboratory, Dallas, Texas. (EPA 1994, 44146)

EPA (U.S. Environmental Protection Agency), March 13, 1996. "Use of the Area of Contamination (AOC) Concept during RCRA Cleanups," U.S. Environmental Protection Agency memorandum from M. Shapiro and S. Luftig RCRA Chiefs. (EPA 1996, 82288)

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Appendix D

Radiological Survey Results

Figure D-1. GPS radiological survey (FIDLER) of TA-21

Figure D-2. GPS radiological survey (3 x 3 NaI) of TA-21

Appendix E

Geophysical Survey Results

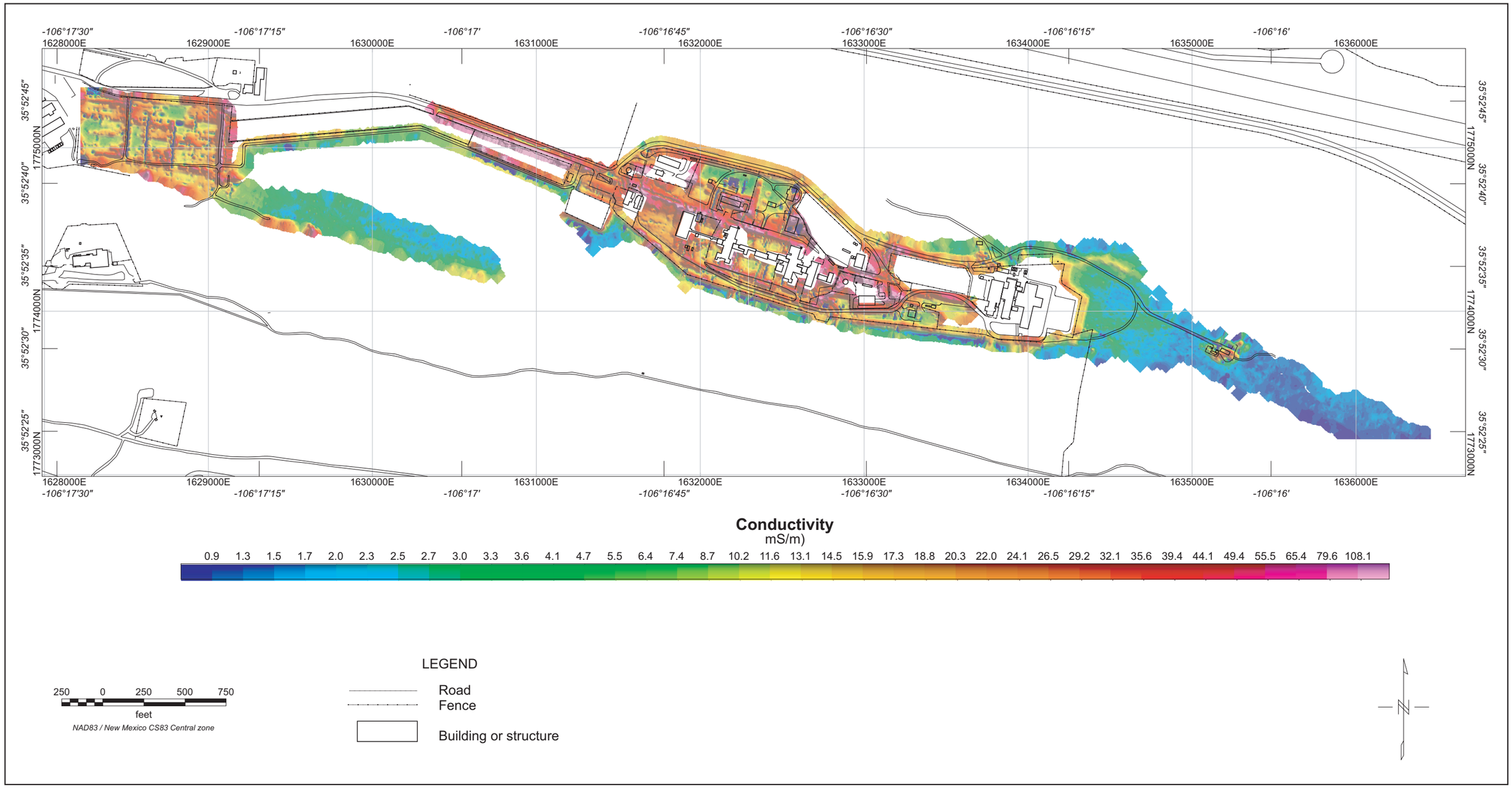


Figure E-1. EM31 survey results

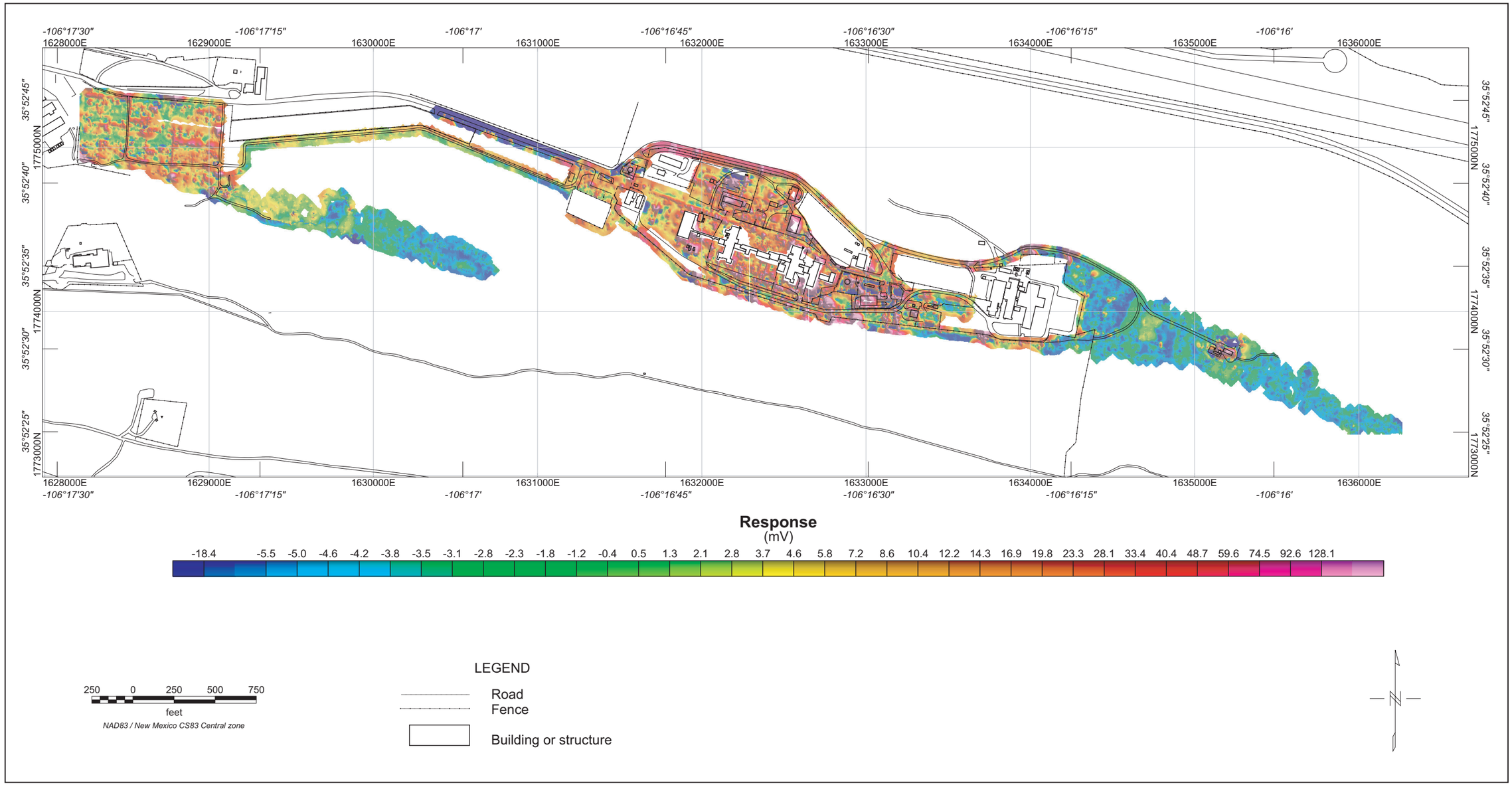


Figure E-2. EM61 survey results

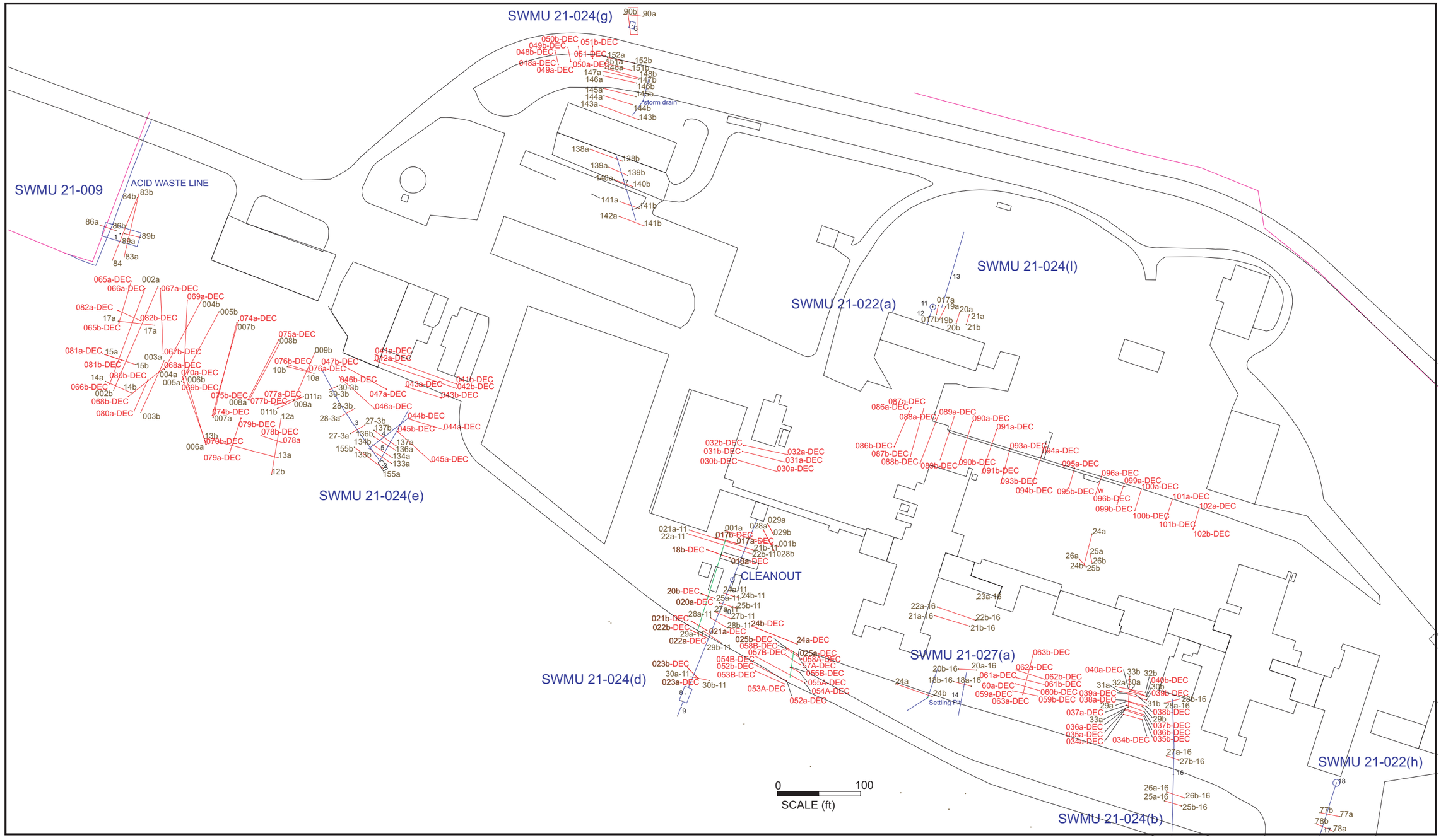


Figure E-3. GPR transect locations (page 1 of 3)

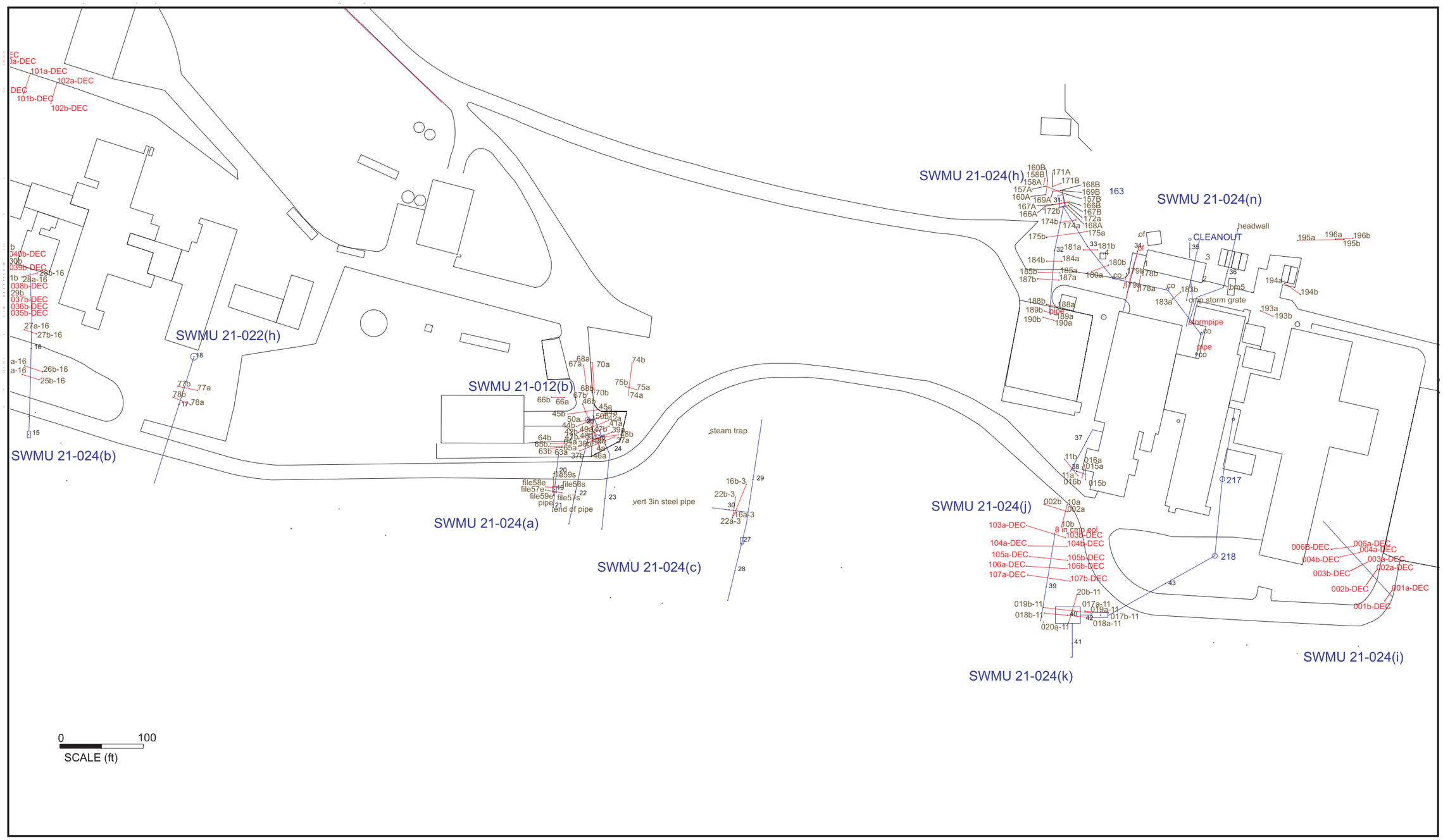


Figure E-3 (continued). GPR transect locations (page 2 of 3)

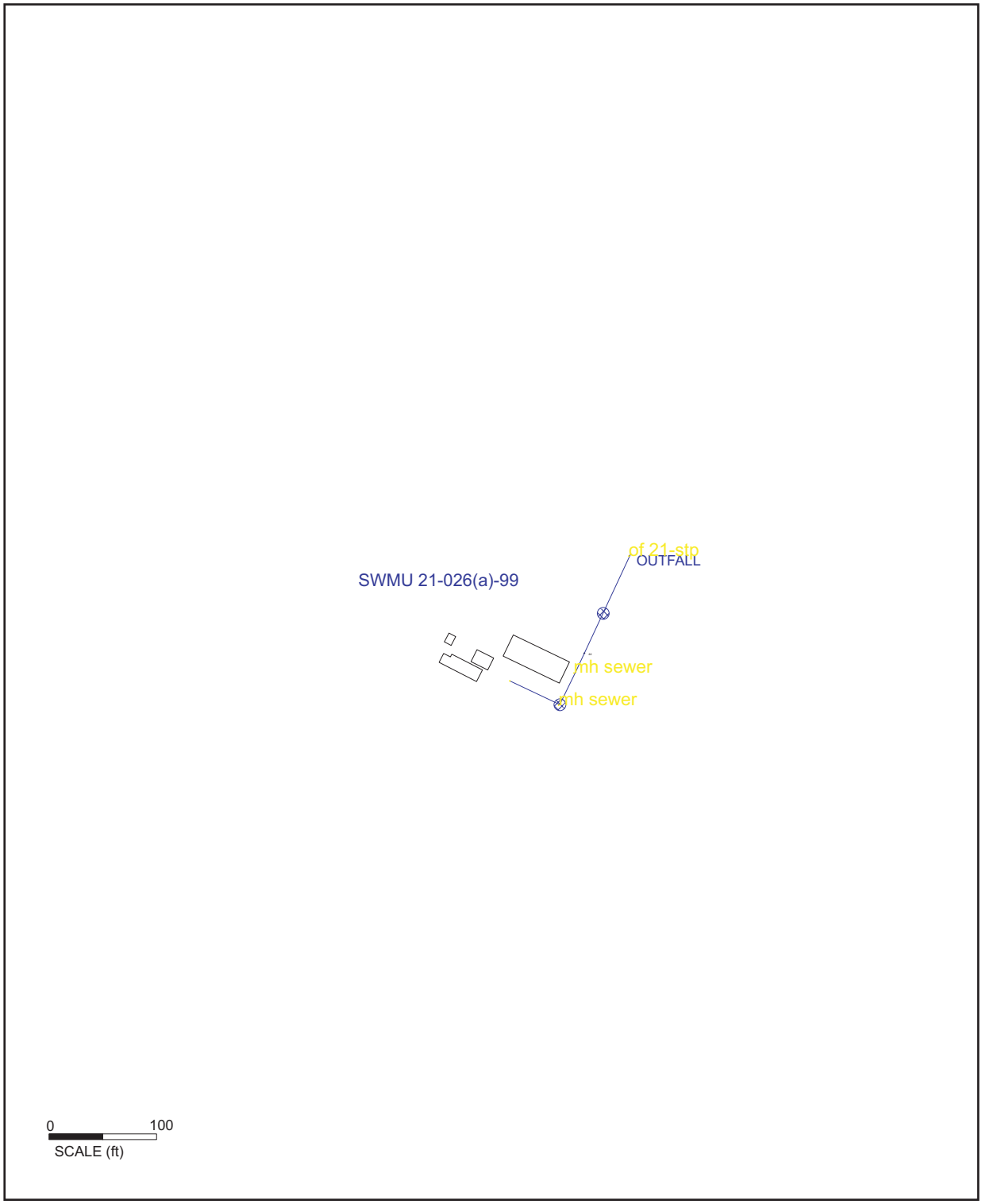


Figure E-3. GPR transect locations (page 3 of 3)

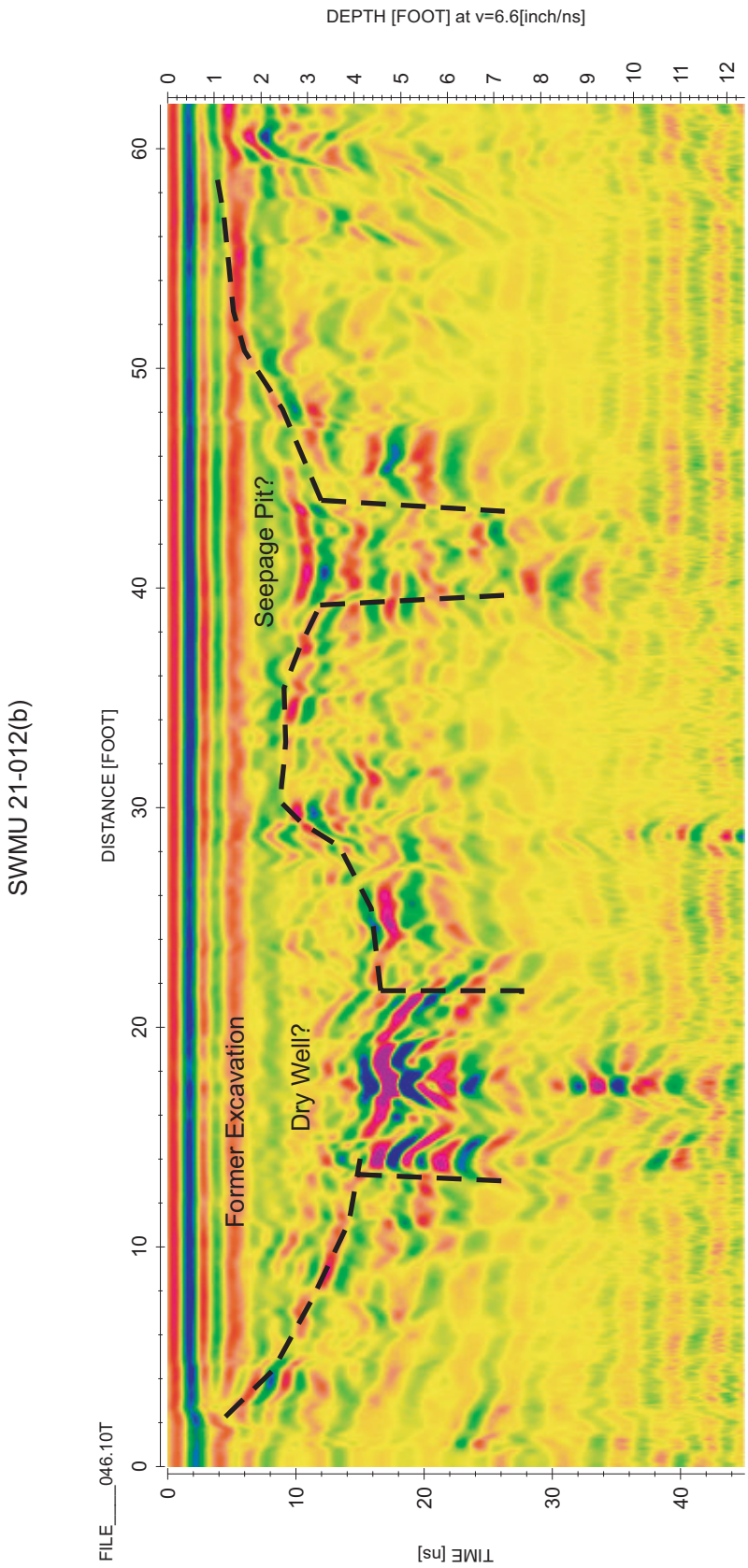


Figure E-4. SWMU 21-012(b) seepage pit and blowdown pit

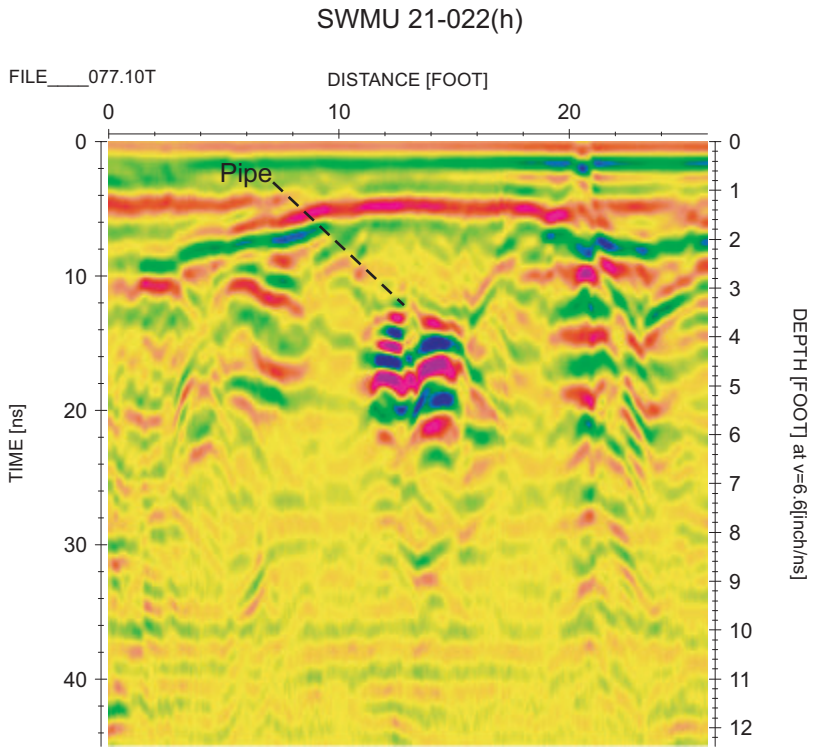


Figure E-5. SWMU 21-022(h) pipe

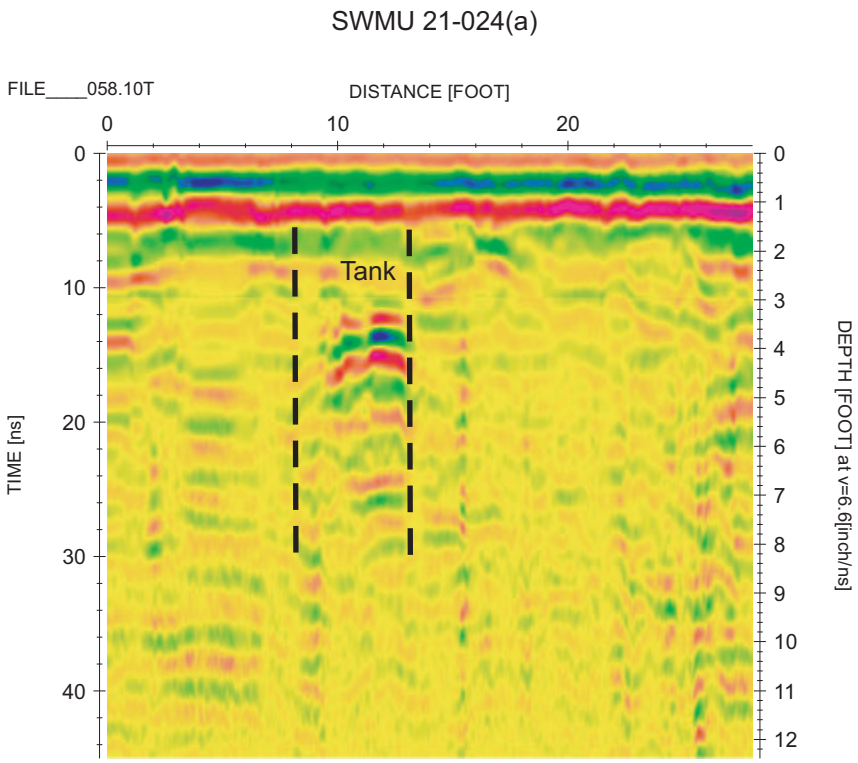


Figure E-6. SWMU 21-024(a) septic tank

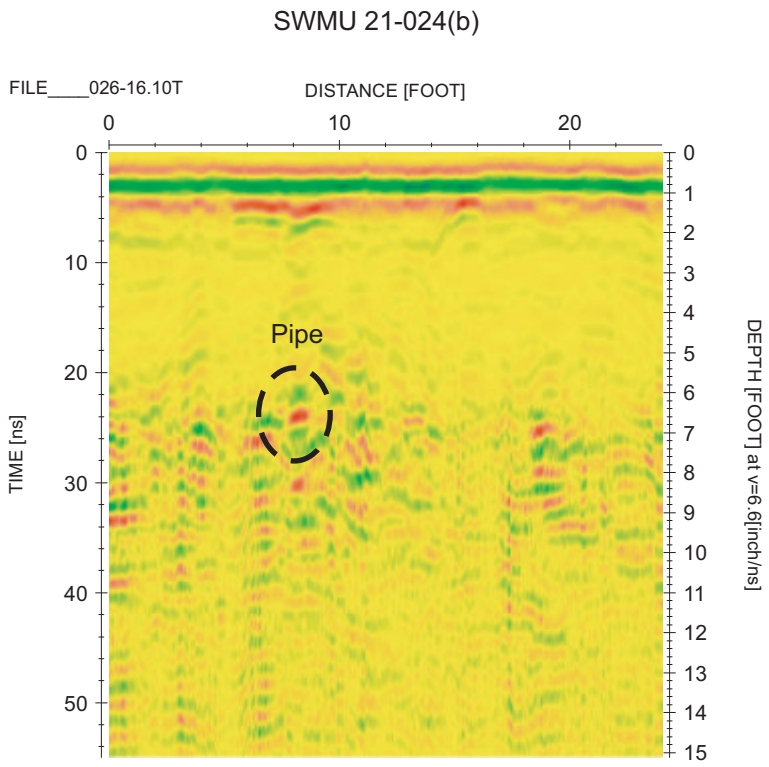


Figure E-7. SWMU 21-024(b) pipe

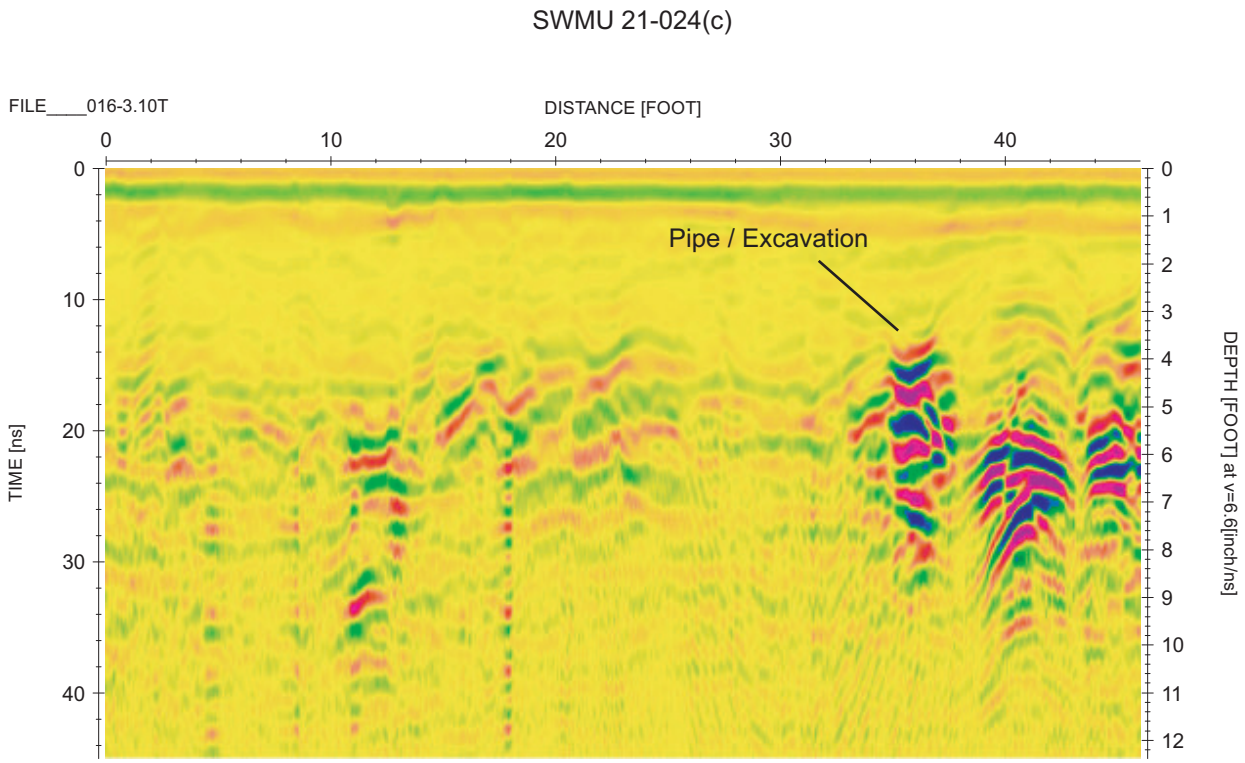
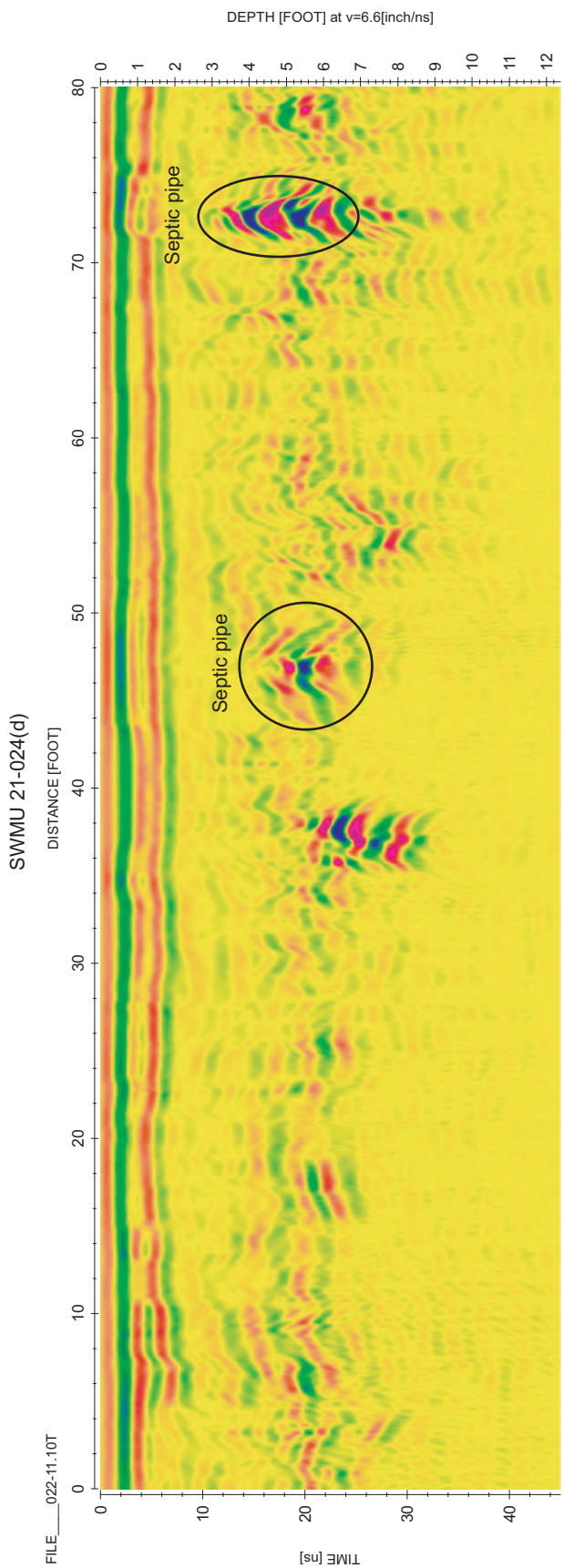


Figure E-8. SWMU 21-024(c) pipe and excavation



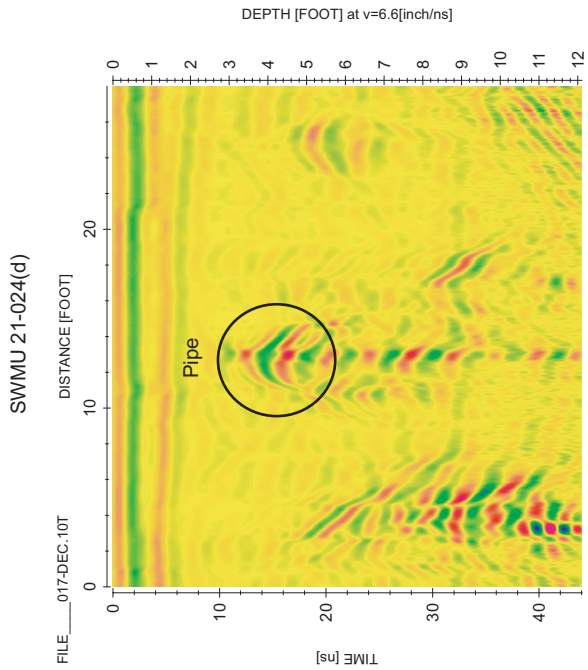


Figure E-9. SWMU 21-024(d) pipes

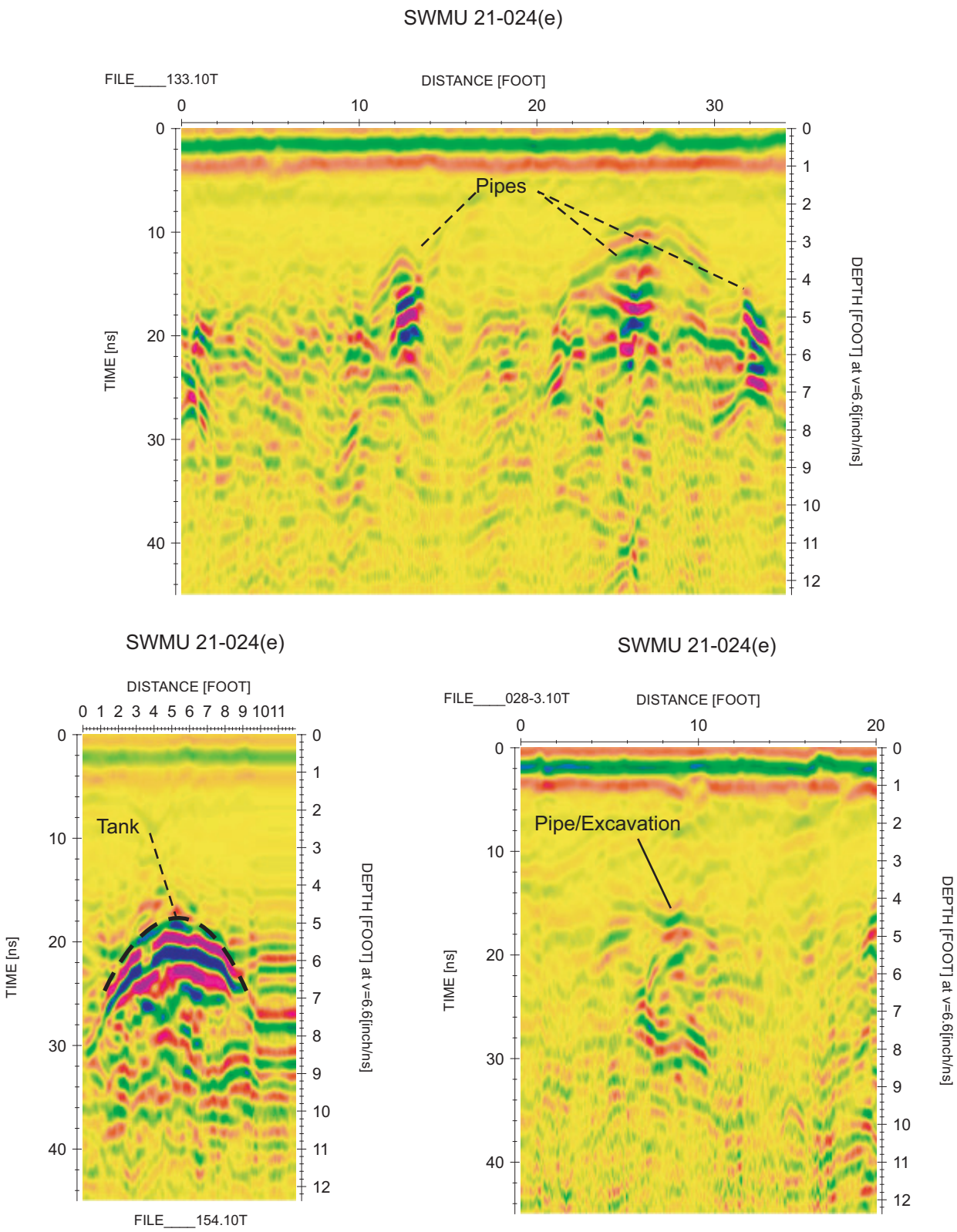
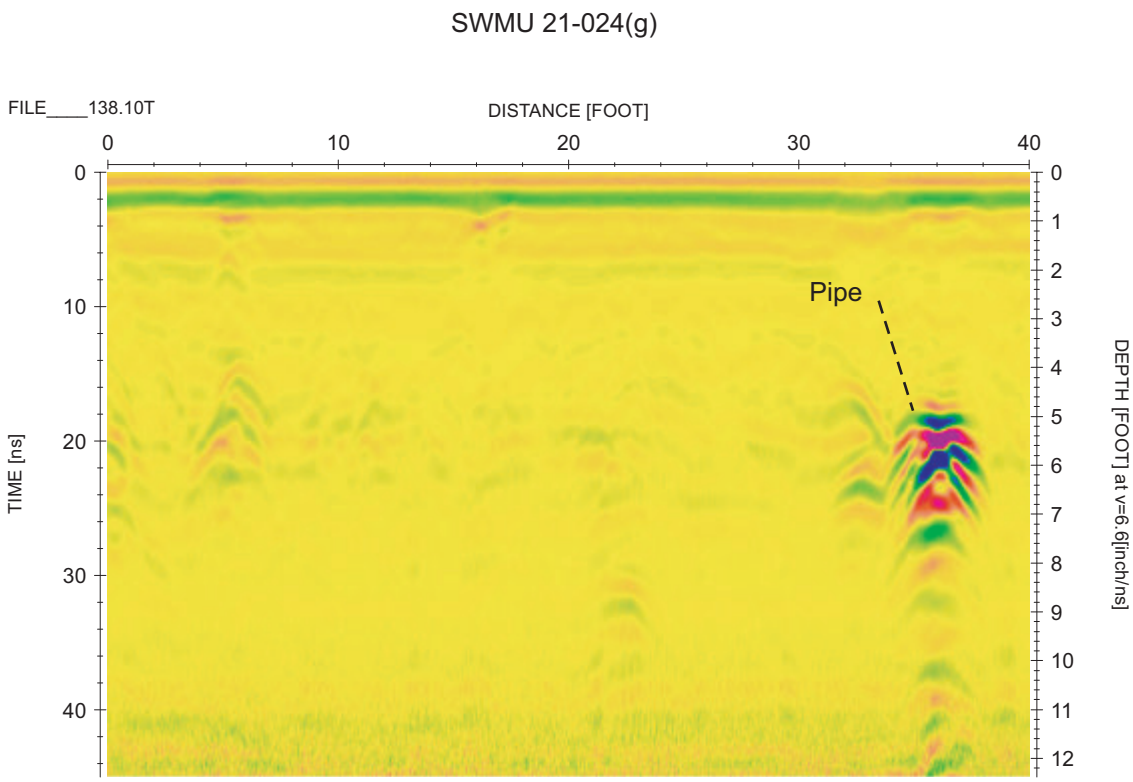


Figure E-10. SWMU 21-024(e) septic tank, pipes, and possible excavation



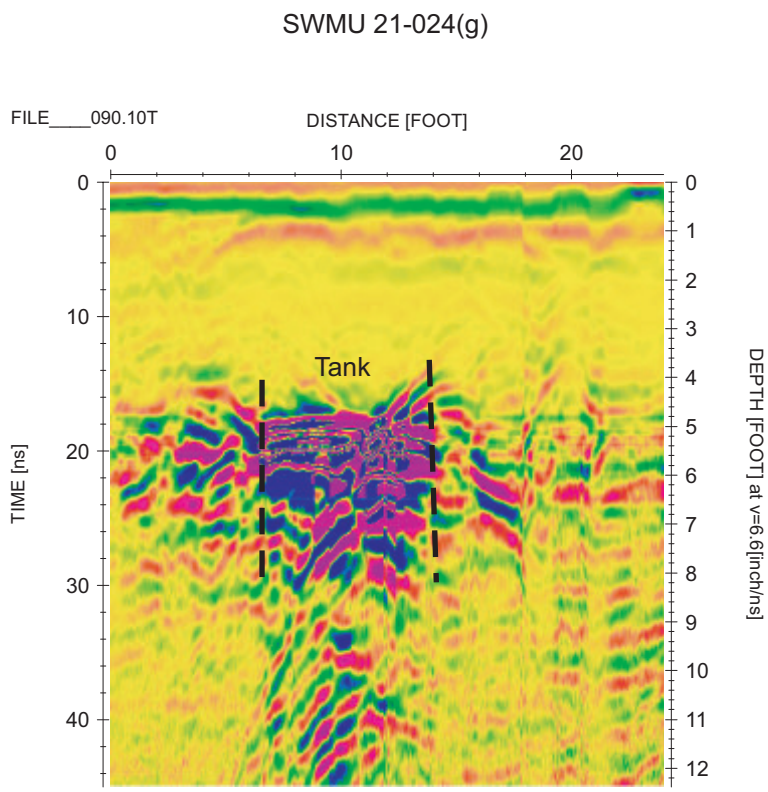


Figure E-11. SWMU 21-024(g) septic tank and pipe

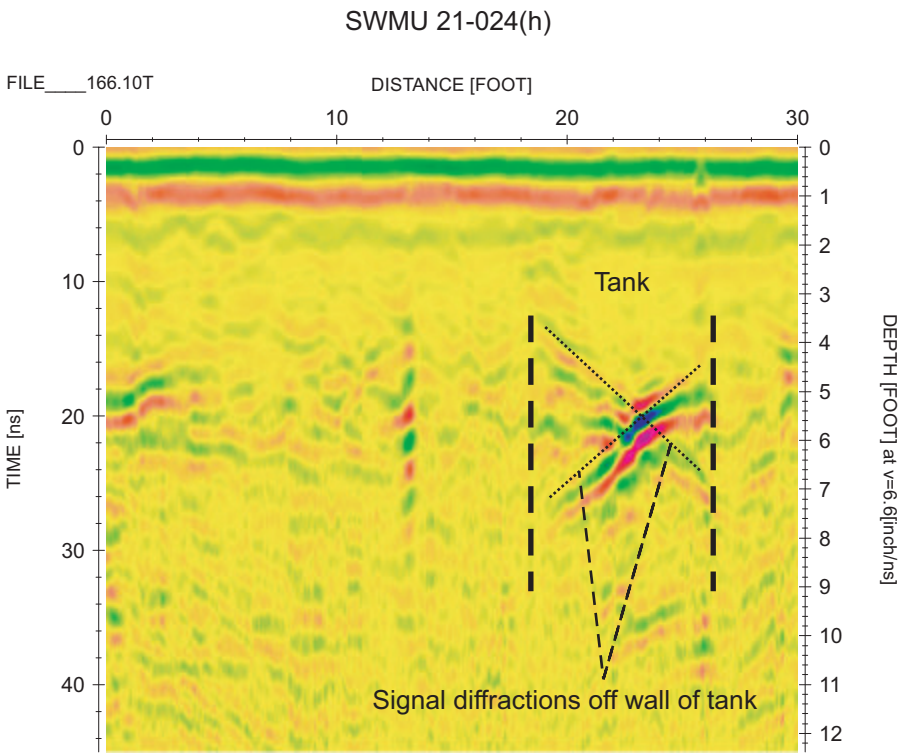


Figure E-12. SWMU 21-024(h) septic tank

SWMU 21-024(i)

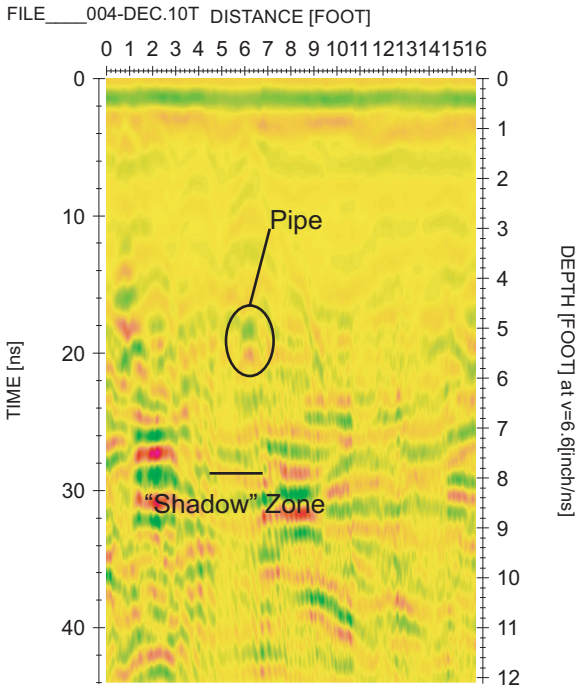


Figure E-13. SWMU 21-024(i) pipe

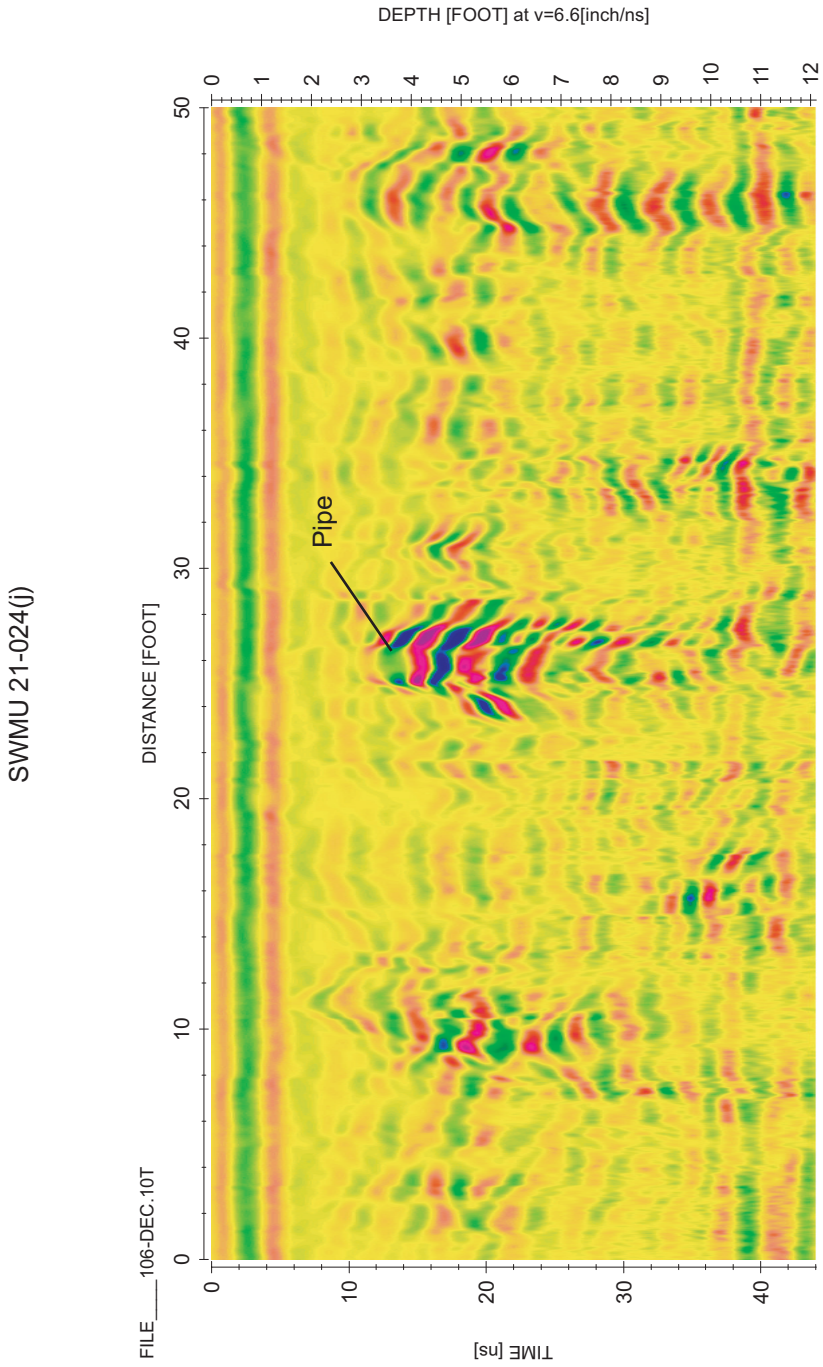


Figure E-14. SWMU 21-024(j) pipe

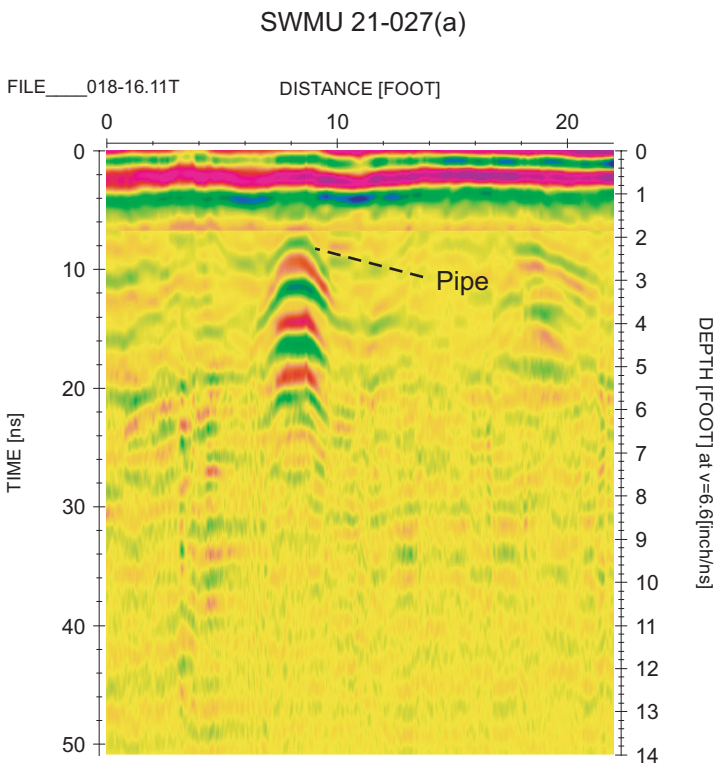


Figure E-15. SWMU 21-027(a) pipe

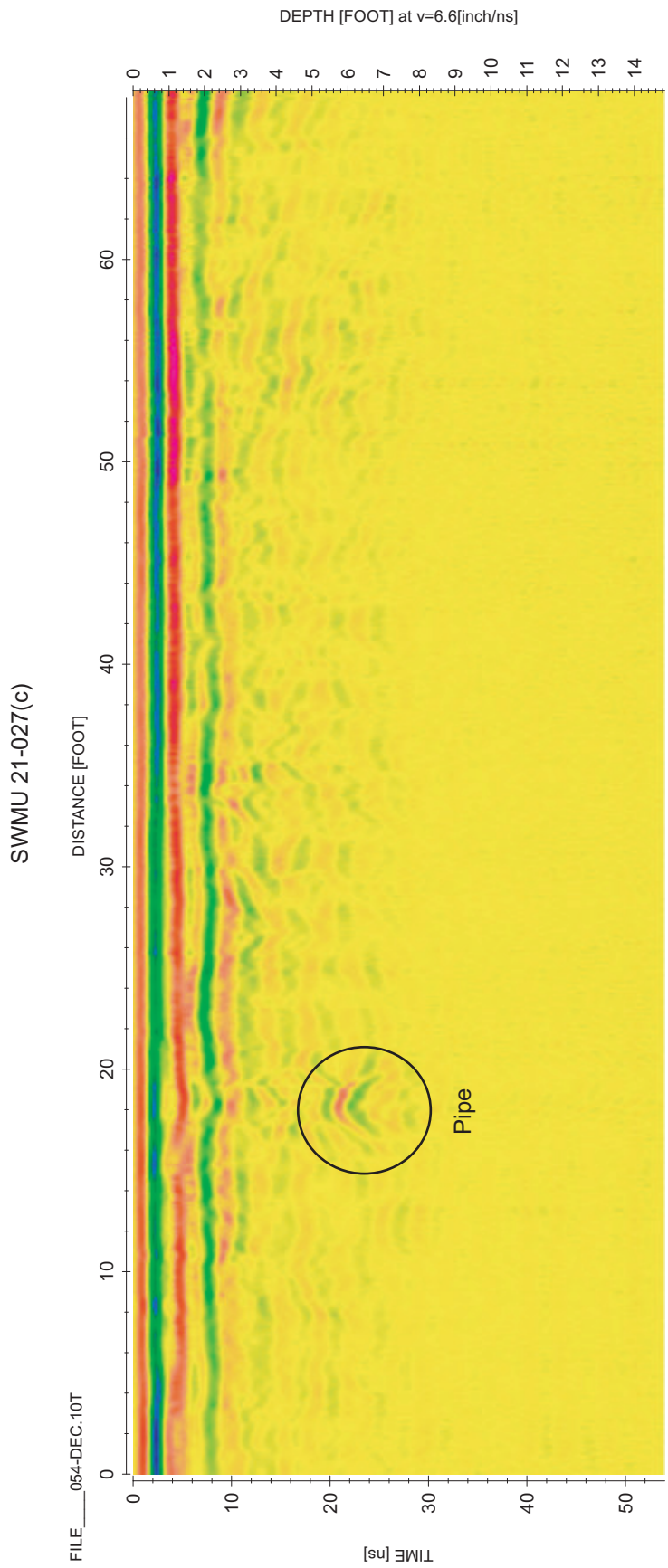


Figure E-16. SWMU 21-027(c) pipe