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Investigation Work Plan for Delta Prime Site Aggregate Area Delayed Sites

Los Alamos
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EXECUTIVE SUMMARY

The DP Site Aggregate Area is located near the eastern perimeter of the Los Alamos townsite within Technical Area 21 (TA-21) of the Los Alamos National Laboratory (the Laboratory).

In 2005, investigations of Consolidated Unit 21-004(b)-99, Solid Waste Management Unit (SWMU) 21-011(b), and Consolidated Unit 21-022(b)-99 were approved for deferred action until collocated active/occupied buildings, Laboratory processes, and/or utilities were removed and/or taken out of service. These sites consist of a former outfall area, aboveground storage tanks, sumps, and industrial waste lines that transferred DP West and DP East industrial/radioactive liquid wastes to Material Disposal Area (MDA) T or building 21-257 for treatment.

This Delayed Sites Investigation Work Plan describes the operational history, evaluates existing data, and describes the removal of the sumps, waste lines and aboveground storage tanks and sampling associated with accessible portions of Consolidated Unit 21-004(b)-99, SWMU 21-011(b), and Consolidated Unit 21-022(b)-99. The footprints of former DP West buildings 21-003 and 21-004, a pipeline that connected former building 21-012 to MDA T, and structures within MDA T but outside the nuclear environmental site (NES) area boundary will also be investigated.

DP West buildings 21-002, 21-005, 21-150, and their connecting hallways as well as all buildings at DP East are still in place, limiting access to fully investigate these areas. Therefore, complete investigations of these areas will be delayed until the buildings are removed. TA-21 building decontamination and demolition (D&D) campaigns are currently underway. Within 30 working days of D&D debris removal, letter work plans will be submitted for building footprint investigations following the sampling and analysis protocols outlined in this work plan.

The MDA T sites located outside of the NES area boundary include 12 areas of concern (AOCs) and 15 SWMUs previously investigated and documented with a New Mexico Environment Department approved investigation report. These sites are grouped by the waste treatment plant they were associated with: former building 21-035 or current building 21-257. This work plan describes the removal of the structures remaining at these sites, verification of previous structure removals, and additional soil sampling. Building 21-257 will be removed in a future D&D campaign, therefore, investigations within the building footprint, will be delayed until building 21-257 is removed.

A Phase II work plan will be developed upon completion of the activities outlined in this work plan, the D&D activities, and the activities outlined in the D&D building footprint letter work plans. The Phase II work plan will utilize data from this investigation and building footprint investigations to recommend additional investigations to define the nature and extent of contamination at Consolidated Unit 21-004(b)-99, SWMU 21-011(b), Consolidated Unit 21-022(b)-99, and sites at MDA T outside the NES area boundary.

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1.0 INTRODUCTION

Los Alamos National Laboratory (LANL or the Laboratory) is a multidisciplinary research facility owned by the U.S. Department of Energy (DOE) and managed by Los Alamos National Security, LLC. The Laboratory is located in north-central New Mexico, approximately 60 mi northeast of Albuquerque and 20 mi northwest of Santa Fe. The Laboratory site covers 40 mi^2 of the Pajarito Plateau, which consists of a series of fingerlike mesas separated by deep canyons containing perennial and intermittent streams running from west to east. Mesa tops range in elevation from approximately 6200 to 7800 ft. The location of Delta Prime (DP) Site Aggregate Area with respect to the Laboratory technical areas (TAs) and surrounding land holdings is shown in Figure 1.0-1. DP Site Aggregate Area is shown in Figure 1.0-2.

The solid waste management units (SWMUs), areas of concern (AOCs), and consolidated units addressed in this investigation work plan are potentially contaminated with both hazardous and radioactive components. The New Mexico Environment Department (NMED), pursuant to the New Mexico Hazardous Waste Act, regulates cleanup of hazardous wastes and hazardous constituents. DOE regulates cleanup of radioactive contamination, pursuant to DOE Order 5400.5, "Radiation Protection of the Public and the Environment," and DOE Order 435.1, "Radioactive Waste Management." Information on radioactive materials and radionuclides, including the results of sampling and analysis of radioactive constituents, is voluntarily provided to NMED in accordance with DOE policy.

Corrective actions at the Laboratory are subject to the March 1, 2005, Compliance Order on Consent (the Consent Order). This work plan describes work activities that will be executed and completed in accordance with the Consent Order.

1.1 Work Plan Overview

The DP Site Aggregate Area SWMUs, AOCs, and consolidated units addressed in this Delayed Sites investigation work plan are located in TA-21 of the Laboratory (Figure 1.0-2), described in Table 1.0-1, and listed below. These sites were previously referred to as deferred sites (LANL 2006, 092571.12), and are now referred to as delayed sites to avoid confusion with sites listed in the Consent Order as Deferred Sites. Consolidated Unit 21-004(b)-99, SWMU 21-011(b), and Consolidated Unit 21-022(b)-99 are part of the industrial waste lines, which served DP West and DP East. This work plan also addresses a former waste line that connected former building 21-012 to MDA T. The remaining SWMUs/AOCs listed below are located within Material Disposal Area (MDA) T, but outside the nuclear environmental site (NES) boundary (Figure 1.0-2).

Sites associated with the DP West and DP East industrial waste lines:

- Consolidated Unit 21-004(b)-99,
- SWMU 21-011(b), and
- Consolidated Unit 21-022(b)-99.

Sites within MDA T, but outside the NES area boundary and associated with former building 21-035:

- SWMU 21-010(a),
- SWMU 21-010(b),
- SWMU 21-010(c),
- SWMU 21-010(d),

- SWMU 21-010(e),
- SWMU 21-010(f),
- SWMU 21-010(g),
- SWMU 21-010(h),
- AOC C-21-002,
- AOC C-21-010,
- AOC C-21-028(a),
- AOC C-21-034,
- AOC C-21-035,
- AOC C-21-036, and
- AOC C-21-037.

Sites within MDA T, but outside the NES area boundary and associated with building 21-257:

- SWMU 21-011(a),
- SWMUs 21-011(d and e),
- SWMUs 21-011(f and g),
- AOC 21-011(h),
- SWMU 21-011(i),
- SWMU 21-011(j),
- AOC 21-001,
- AOC C-21-005,
- AOC C-21-007, and
- AOC C-21-033.

Details of previous investigations and historical data for the MDA T sites are provided in the historical investigation report (HIR) appendix of the investigation work plan for MDA T (LANL 2004, 085641), Appendix B) and the MDA T Investigation Report (LANL 2006, 094151). This work plan addresses the sites using the available information from previous field investigations or removal actions to evaluate current conditions.

Section 1 gives an overview of the sites addressed, the objectives of this work plan, the field activities approach, and data overview. Section 2 presents the surface and subsurface conditions of the DP Site Aggregate Area, as well as the conceptual site model. Section 3 provides a summary of the background of TA-21. Sections 4 through 7 include background information on operational history and summary of releases; current site usage and status of the sites; summaries of previous investigations and data; and presents the scope of activities for Consolidated Unit 21-004(b)-99, SWMU 21-011(b), and Consolidated Unit 21-022(b)-99 and sites at MDA T outside of the NES. Section 8 provides investigation methods for field activities. Section 9 addresses the monitoring and sampling program. Section 10 gives the schedule of the investigation report. Section 11 provides the references and map data sources. Appendix A of this work plan includes a list of acronyms and abbreviations, a metric conversion table, and data qualifier

definitions. Appendix B describes the management of investigation-derived waste (IDW) and includes waste-volume calculations.

1.2 Work Plan Objectives

The objective of the investigation is to remove inactive structures related to the sites, where appropriate, and to collect confirmatory sampling after removing the structures. At the MDA T sites, structures will be removed or verified to have been previously removed and then sampled underneath. The sites at MDA T have been previously investigated and the resulting investigation report has been approved by NMED (NMED 2007, 095411). At the DP East and DP West sites, after structure removal, the objective is to define the nature and extent of contamination associated with these sites.

To accomplish the objectives, this work plan

- presents background information,
- summarizes previous investigations of the sites or, if applicable, provides reference to where this information and data can be found,
- describes proposed sample collection and field activities, and
- identifies and proposes appropriate methods and protocols for collecting, analyzing, and evaluating data to finalize the characterization of these sites.

1.3 Phased Approach of Field Activities

The selection of sampling locations was dependent upon the availability and quality of documentation of past activities, operational history, the degree of prior characterization, and the accessibility of each site. Site conditions may indicate the need to refine the proposed sampling approach once field activities have begun. The individual site sampling approach is discussed in Sections 4 through 7.

Piping, tanks, and a sump will be removed in conjunction with the investigation activities at Consolidated Unit 21-004(b)-99, SWMU 21-011(b), and Consolidated Unit 21-022(b)-99. Former pipe tunnels and building footprints will be sampled at former buildings 21-003 and 21-004. Piping, tanks, and any remaining underground structures located within MDA T but outside the NES area boundary will be removed or verified to have been previously removed in conjunction with the investigation activities. A pipe that connected former building 21-012 and MDA T will also be investigated. Buried structures/pipes that are found will be removed and inspected for signs of leakage and to determine the optimum locations for sampling beneath them. Trenching will be used to verify buried structure/piping locations. Radiological surveys will be completed in trenches excavated to remove piping and subsurface structures at applicable sites around building 21-257, and at the former outfall area at Consolidated Unit 21-004(b)-99.

Decontamination and demolition (D&D) of DP West buildings 21-002, 21-005, 21-150, and their connecting hallways as well as all buildings at DP East will be conducted concurrently with the investigations and corrective actions outlined in this work plan. The D&D program and Waste and Environmental Services will coordinate their activities to meet both program objectives. During D&D, detailed field observations will be conducted to document the location and condition of subsurface piping, drains, sumps, tanks, and other structures, as well as areas that exhibit elevated field-screening results during the removal process. Radiological surveys will be conducted in the footprints of removed structures and the results will be used to plan investigations of the building's footprints. Letter work plans will be developed for building footprint investigations as soon as D&D is complete. The letter work plans will provide text, tables, and figures outlining the technical approach to the investigations and reference

protocols and methods outlined in this work plan. The letter work plans will be implemented as quickly as possible to allow incorporation of the information in the planning activities for future investigations.

Analytical data collected in accordance with this work plan and from additional structure footprint investigations will be evaluated and used in the planning of future focused investigations. The Phase II work plan will be submitted after the D&D of DP West buildings 21-002, 21-005, and 21-150 (including their connecting hallways); DP East buildings 21-152, 21-155, and 21-209; and building 21-257 [SWMU 21-011(a) and associated AOCs] at MDA T.

1.4 Data Overview

This work plan refers to the available data and proposes sampling activities and analyses to define the nature and extent of contamination at each site.

Samples from previous investigations were analyzed for inorganic chemicals, organic chemicals, and/or radionuclides either on-site by the Chemical Sciences and Technology (CST) Division at the Laboratory, by off-site fixed laboratories, or by both. Data obtained at on-site CST Division laboratories are screening level data and are used only to select sampling locations; these data are not reported. Only data obtained from off-site fixed laboratories (i.e., decision-level data) are used to aid in determining the nature and extent of contamination.

For Consolidated Unit 21-004(b)-99, SWMU 21-011(b), and Consolidated Unit 21-022(b)-99, there are no decision-level data available (see Sections 4.2.2, 5.2.2, and 6.2.2 for more information). For the MDA T sites located outside of the NES, decision-level data are presented in their entirety in the MDA T investigation work plan and investigation report (see Sections 7.2.2 and 7.3.2 for more information regarding data).

2.0 SITE CONDITIONS

2.1 Surface Conditions

Surface conditions for TA-21 are described in Section 3.2 of the Investigation Work Plan for the DP Site Aggregate Area (LANL 2004, 087461, pp. 32-33). It is important to note that boreholes drilled during the 1996-1997 investigation indicated backfill had been placed on the surface throughout MDA T near building 21-035 and in the NES area (LANL 2004, 085641, Appendix D). The area around building 21-257 was not covered with fill since it was in use during that time. This will be taken into account during sampling activities.

2.1.1 Land Use

Currently, land use of the DP Site Aggregate Area is industrial. It is anticipated that the area will remain industrial and will not change in the reasonably foreseeable future, even if transferred to Los Alamos County. Public access is currently limited at TA-21 through physical controls such as fencing.

2.2 Subsurface Conditions

Subsurface conditions for TA-21 are described in Section 3.3 of the investigation work plan for the DP Site Aggregate Area (LANL 2004, 087461, pp. 33–36).

2.3 Conceptual Site Model

The potential contaminant sources, transport mechanisms, and receptors associated with the conceptual site model are described below. The sampling proposed in this work plan uses a conceptual site model to predict areas of potential contamination and to allow for adequate characterization of these areas.

2.3.1 Potential Contaminant Sources

Releases at the sites addressed within this work plan may have occurred as a result of potential leaks from septic systems, storage tanks, waste lines and drains; discharges from outfalls, sumps, waste treatment processes; and spills.

Releases from the piping, aboveground storage tanks, and the sump north of the Tritium Systems Test Assembly (TSTA) [Consolidated Unit 21-004(b)-99 and SWMU 21-011(b)] may have occurred as a result of unintentional spills or leaks and may have resulted in surface and subsurface contamination.

Releases from the outfall north of the TSTA [Consolidated Unit 21-004(b)-99] were the result of Laboratory operations and may have resulted in surface and subsurface contamination.

Releases from the industrial waste lines [Consolidated Unit 21-022(b)-99] may have occurred as a result of leaks and may have resulted in subsurface contamination. Releases from the sumps that were connected to the lines are known to have occurred and resulted in subsurface contamination (LANL 1991, 007529).

Releases from the waste treatment plant buildings 21-035 and 21-257 and associated piping, buried structures, and tanks were a result of accidental spills, leaks, or releases.

Releases from the septic tank and leach field [SWMU 21-010(e)] may have occurred as a result of leaks resulting in subsurface contamination. Discharges to the leach field as a result of normal operations may have resulted in subsurface contamination.

2.3.2 Potential Contaminant Transport Mechanisms

Potential transport mechanisms that may lead to exposure include

- dissolution and/or particulate transport of surface contaminants during precipitation and runoff events;
- vaporization and gaseous diffusion and advection of volatile organic compounds (VOCs) and tritium in air;
- water line breaks resulting in sheet flow;
- preferential flow paths along buried utility lines;
- airborne transport of contaminated surface soil;
- continued dissolution and advective/dispersive transport of contaminants contained in subsurface soil and tuff;
- infiltration of water through the vadose zone;
- disturbance of contaminants in shallow soil and subsurface tuff by construction, D&D, or Laboratory operations;

- biotic perturbation and translocation in subsurface contaminated media including shallow soil; and
- disturbance and uptake of contaminants in shallow soil by plants and animals (bioturbation).

2.3.2.1 Surface Processes

Laboratory operations, construction/D&D of structures, bioturbation, surface water runoff, and wind can disturb contaminants present in shallow soil (0 to 1 ft below ground surface [bgs]). During summer thunderstorms and spring snowmelt, runoff from the mesa top may flow down the hillside and into the ephemeral stream channel in DP Canyon. Soil erosion can vary significantly depending on factors including soil properties, the amount of vegetative cover, the slope of the contaminated area, and the intensity and frequency of precipitation. At TA-21, surface transport of contaminants represents the most dominant transport pathway; however, SWMU 21-011(b) is partially covered by asphalt and Consolidated Unit 21-022(b)-99 is mostly covered by asphalt. The outfall at Consolidated Unit 21-004(b)-99, while it slopes down toward DP Canyon, is heavily vegetated, which impedes erosion and contaminant transport. MDA T, near former building 21-035, is covered with an undetermined amount of fill and most of the area is vegetated.

2.3.2.2 Subsurface Processes

Studies have shown that infiltration of natural precipitation is quite low across the mesa tops of the Pajarito Plateau. The average annual potential evapotranspiration rates far exceed precipitation rates. Under these conditions, infiltration events that propagate beneath the root zone are sporadic and occur only when the short-term infiltration rate exceeds the evapotranspiration rate, such as during summer thunderstorms and spring snowmelt. However, these events more commonly produce runoff into neighboring canyons resulting in infiltration rates below the root zone on the order of a few millimeters per year or less for mesa-top sites (Collins et al. 2005, 092028, pp. 2-84-2-88; Kwicklis et al. 2005, 090069). This slow infiltration rate generally leads to present-day subsurface contaminant migration of only a few meters. Geochemical interactions between the contaminants and the rocks generally act to retard migration further. Therefore, groundwater transport of contaminants through the unsaturated zone to the regional aquifer at a depth of approximately 1280 ft below the mesa top is not likely to represent a dominant pathway for contaminant transport (Koch and Schmeer 2009, 105181).

2.3.3 Potential Receptors

Potential receptors at one or more of the sites include on-site and nearby Laboratory workers, construction/D&D workers, hikers in DP Canyon, plants, and/or animals.

2.3.4 Cleanup Standards

As specified in section VIII.B.1 of the Consent Order, soil screening levels (SSLs) will be used as soil cleanup levels unless they are determined to be impracticable or unless values do not exist for the current and reasonably foreseeable future land uses. Human health SSLs for chemicals and screening action levels for radionuclides that may be detected at the sites are provided in Tables 2.3-1 and 2.3-2 for the industrial and construction worker scenarios.

3.0 DP SITE AGGREGATE AREA BACKGROUND

TA-21 is located on DP Mesa on the northern boundary of the Laboratory and is immediately east-southeast of the Los Alamos townsite. It extends from the mesa top to the stream channels in two adjacent canyons, DP Canyon to the north and Los Alamos Canyon to the south (Figure 1.0-2).

During World War II, the Laboratory was established for the research, development, and testing of the first deliverable nuclear weapon. In 1945, the operations for establishing the chemical and metallurgical properties of the nuclear material necessary to achieve and sustain the nuclear fission reaction were transferred to newly built facilities at TA-21.

DP West operations began in September 1945, primarily to produce metal and alloys of plutonium from the nitrate solution feedstock provided by other production facilities. This procedure involved several acid dissolution and chemical precipitation steps to separate the plutonium and other valuable actinides from the feedstock. A major research objective at DP West was the development of new purification techniques that would increase the efficiency of the separation processes (Christensen and Maraman 1969, 004779). Details of the purification techniques are discussed in the operable unit work plan for TA-21 (LANL 1991, 007529). Other operations performed at DP West included nuclear fuel reprocessing. In 1977, a transfer of work to the new plutonium facility at TA-55 began, and much of the DP West complex was vacated.

DP East operations also began in September 1945. These facilities were used to process polonium and actinium and to produce initiators (a nuclear weapons component). In 1964, building 21-209 was built to house research into high-temperature and actinide chemistry. Building 21-155 housed the TSTA for developing and demonstrating effective technology for handling and processing deuterium and tritium fuels used in fusion reactors.

TA-21 includes five MDAs: A, B, T, U, and V (Figure 1.0-1). Process wastes, transuranic (TRU) wastes, and liquid wastes were disposed of at the MDAs from the early 1940s until the late 1970s. Details of the disposal methods are presented in the TA-21 operable unit work plan (LANL 1991, 007529). The major contributors to waste streams at TA-21 were plutonium-processing activities. Numerous other chemicals were used for separation techniques and were present in the waste stream. Airborne emissions, including tritium, were released from some of the buildings at DP West and DP East; these releases are also discussed in the TA-21 operable unit work plan (LANL 1991, 007529).

4.0 CONSOLIDATED UNIT 21-004(b)-99, WASTE LINES, OUTFALL, AND OVERFLOW HOLDING TANKS

4.1 Background

4.1.1 Operational History

Consolidated Unit 21-004(b)-99 (Figure 4.1-1) consists of SWMU 21-004(b), SWMU 21-004(c), and AOC 21-004(d). SWMUs 21-004(b) and (c) are two aboveground stainless steel tanks (structure 21-346) that were installed in 1979. They were used as overflow holding tanks for liquid waste from cooling towers, and Laboratory and radionuclide experimental operations in the TSTA facility (building 21-155). Each tank is 9 ft high and 8 ft in diameter and has a capacity of 3000 gallons (LANL 1990, 007512). Both tanks are currently mounted on steel legs above the surface of an asphalt bermed area. The bermed area has a capacity of approximately 9600 gal. and measures 36 ft long by 18 ft wide. The drain line connected to these tanks, as well as an outfall area that was present in 1965 before the tanks were installed, comprises AOC 21-004(d). The tanks were connected to the existing vitrified clay outfall pipe and

concrete headwall (a small retaining wall placed at the outlet of a stormwater pipe or culvert) by an aboveground 6-in. galvanized pipe that connects to the top of the tanks. The former outfall discharge area was located where the concrete headwall is situated today (Figure 4.1-1).

4.1.2 Summary of Releases

Releases to the former outfall area before the aboveground tanks were installed were a result of Laboratory operations and may have resulted in surface and subsurface contamination. Releases from the piping associated with this consolidated unit may have occurred as a result of leaks and resulted in subsurface contamination. Releases from the tanks may have occurred from unintentional spills or leaks and resulted in surface and subsurface contamination.

4.1.3 Current Site Usage and Status

Currently, all operations have ceased at the buildings associated with this consolidated unit; therefore, the tanks and lines are not in use. The tanks, headwall, former outfall area, and lines are still present.

4.2 Summary of Previous Investigations, Site Data, and Scope of Activities for Consolidated Unit 21-004(b)-99

4.2.1 Summary of Previous Investigations

In 1988, a sample was collected 2 ft downslope of the headwall from beneath the outfall pipe (LANL 1991, 007529, p. 15-96). Two boreholes were drilled downslope of tanks 21-346 to a total depth of 5 ft bgs in the fall of 1994 (LANL 1996, 054828, pp. 32-33).

4.2.2 Site Data

The last samples collected at this consolidated unit were in the fall of 1994. There are no recent data for this consolidated unit.

The tanks are still present, as well as the pipe connected to the tanks [AOC 21-004(d)] and the former outfall area. Therefore, sampling after structure removal is necessary at this site.

4.2.3 Scope of Activities

The proposed sampling locations at Consolidated Unit 21-004(b)-99 are shown in Figure 4.1-1. On the figure, the red samples address this consolidated unit. Table 4.2-1 provides a summary of the proposed sampling objectives, number of samples proposed, sample locations and depths, and proposed analytical suites. Plate 1 shows the proposed sampling locations for this site in relation to the other sites addressed in this work plan.

Samples will be analyzed for target analyte list (TAL) metals, cyanide, nitrate, perchlorate, organic chemicals (VOCs and semi-volatile organic compounds [SVOCs]), radionuclides (americium-241, isotopic plutonium, isotopic uranium, strontium-90, tritium, and by gamma spectroscopy), moisture, and pH. VOCs will only be analyzed in samples deeper than 0.5 ft bgs. In addition, 20% of all samples will also be analyzed for extended suite consisting of dioxins/furans, explosive compounds, and polychlorinated biphenyls (PCBs) (Table 4.2-1). The locations selected for extended suite analysis are areas with the most potential for contamination; where contaminants had the most potential to be released to the environment (e.g., sumps, sharp bends or connections in piping) or were intentionally discharged

(e.g., outfalls). If field-screening results identify locations with higher readings than those already selected for extended suite analyses, these locations will be analyzed for the extended suite instead.

During structure removal activities, excavation of soil, fill, and/or tuff (including any stained areas) will proceed until media with elevated levels of radionuclides and organic vapors based on field screening has been removed to a maximum depth of 10 ft bgs. Excavating to 10 ft bgs is technically practicable for the excavation equipment. If elevated field-screening results are recorded in the deepest sampling depth proposed for a location, samples will be collected in 5-ft-depth intervals at that location until field-screening results indicate no contamination is present. Additional lateral extent samples may also be collected based on elevated field-screening results, staining, and increasing result trends.

Investigation at Consolidated Unit 21-004(b)-99 will consist of the following activities:

- *Waste line excavation and sampling.* The waste line [AOC 21-004(d)] connecting the acid waste sump [structure 21-223, SWMU 21-011(b)] and the aboveground storage tanks [structure 21-346, SWMUs 21-004(b) and (c)] will be carefully excavated and inspected for evidence of leaks (e.g., field screening; stained soil) prior to removal. Samples will be collected from locations immediately beneath the removed pipe where elevated field-screening results, staining, or breaks/cracks indicate potential releases. If field screening or visual observations do not indicate contamination, samples will be collected from locations beneath the removed pipe at the sump outlet connection to the pipe and 50 ft along the pipe (Figure 4.1-1, locations 1 and 2). At each location, samples will be collected from the depth intervals of 0 to 1.0 ft and 2.0 to 3.0 ft. The zero depth is defined as the ground surface immediately beneath the pipe.
- *Former outfall investigation.* One location will be sampled in the center of the former outfall, 0.5 ft downslope from the outlet of the pipe at the headwall (Figure 4.1-1, location 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 5 ft to the east of the outfall location (Figure 4.1-1, locations 3 and 5). One location will be sampled 10 ft directly downslope from the outfall location, one location will be sampled 10 ft to the west, and one location will be sampled 10 ft to the east of this center location (Figure 4.1-1, locations 7, 6, and 8, respectively). Sample locations will be adjusted in the field based on local topography in order to assure the optimal sampling locations. Samples will be collected from locations 3, 5, 6, 7, and 8 at the depth intervals of 0 to 0.5 ft and 2.0 to 3.0 ft.
- *Radiological survey at former outfall area*. To address the area between the northern-most row of outfall sampling locations and the aboveground tanks, alpha and gamma radiation surveys will be completed. In Figure 4.1-1, the east side of the map shows the survey area. Samples will be collected from two depths from a maximum of three elevated field-screening locations (locations to be determined) from depth intervals of 0 to 0.5 ft and 2.0 to 3.0 ft. If no elevated areas are found (i.e., greater than two times area background), no additional samples will be collected in this area.
- *Aboveground storage tanks [structure 21-346, SWMUs 21-004(b) and (c]).* The storage tanks will be removed and inspected for evidence of leaks (e.g., field screening; stained asphalt/soil). After removal of the tanks and asphalt, confirmation samples will be collected below the footprint of each tank (Figure 4.1-1, locations 9 and 10), as well as any apparent infiltration pathways (cracks in the asphalt). At these locations, samples will be collected from the depth intervals of 0 to 0.5 ft, 2.0 to 3.0 ft, and 5.0 to 6.0 ft. Under the tanks, zero depth is defined as immediately below the asphalt layer of the containment area.

5.0 SWMU 21-011(B), ACID WASTE SUMP AND LINES

5.1 Background

5.1.1 Operational History

SWMU 21-011(b) is an acid waste sump (structure 21-223) located approximately 760 ft east of the TA-21 waste treatment plant (building 21-257) and 70 ft northwest of the TSTA (building 21-155) (Figure 4.1-1). The sump is located inside a small metal building (no structure number assigned). In 1965, 4-in. piping was installed to transport acid waste from building 21-155 to the sump (structure 21-223). From the sump, a 3-in. waste line transported acid waste to the old waste treatment plant/laboratory (building 21-035) (LASL 1968, 089722; Francis 1997, 076126). The sump also connected to a 6-in. vitrified clay overflow pipe, which discharged to DP Canyon, eventually running into the same area as the discharge from the SWMU 21-024(h) septic system (LASL 1968, 089722). The SWMU 21-024(h) outfall was addressed in the DP Site Phase I and II investigations (LANL 2004, 087461; NMED 2005, 089314; LANL 2008, 104989).

In 1967/1968, the old waste treatment plant/laboratory (building 21-035) was removed and the sump outlet line was extended to the new waste treatment plant (building 21-257) (LASL 1968, 089723; LASL 1975, 089724). In 1979, the sump overflow pipe was connected to the aboveground stainless steel storage tanks [structure 21-346, Consolidated Unit 21-004(b)-99] (LASL 1979, 089721). In the mid- to late-1980s, two new 4-in. acid waste steel or iron lines (LANL 1988, 087575) were connected from building 21-155 to manhole structure 21-222 to be pumped by the sump (LASL 1977, 089726). The line continues to manhole 21-221.

5.1.2 Summary of Releases

Releases from the piping and sump associated with this SWMU may have occurred as a result of leaks and resulted in subsurface contamination.

5.1.3 Current Site Usage and Status

Currently, all operations have ceased at the buildings associated with this SWMU; therefore, the sump and lines are not in use. The sump and the lines are still present.

5.2 Summary of Previous Investigations, Site Data, and Scope of Activities for SWMU 21-011(b)

5.2.1 Summary of Previous Investigations

This SWMU has not been previously investigated.

5.2.2 Site Data

There are no data for this SWMU.

5.2.3 Scope of Activities

The proposed sampling locations at SWMU 21-011(b) are shown in Figure 4.1-1. On the figure, the black samples address this SWMU. Table 5.2-1 provides a summary of the proposed sampling objectives, number of samples proposed, sample locations and depths, and proposed analytical suites. Plate 1 shows the proposed sampling locations for this site in relation to the other sites addressed in this work plan.

Samples will be analyzed for TAL metals, cyanide, nitrate, perchlorate, organic chemicals (VOCs and SVOCs), radionuclides (americium-241, isotopic plutonium, isotopic uranium, strontium-90, tritium, and by gamma spectroscopy), moisture, and pH. In addition, 20% of all samples will also be analyzed for extended suite consisting of dioxins/furans, explosive compounds, and PCBs (Table 5.2-1). The locations selected for extended suite analysis are areas with the most potential for contamination; where contaminants had the most potential to be released to the environment (e.g., sumps, sharp bends or connections in piping) or were intentionally discharged (e.g., outfalls). If field-screening results identify locations with higher readings than those already selected for extended suite analyses, these locations will be analyzed for the extended suite instead.

During structure removal activities, excavation of soil, fill, and/or tuff (including any stained areas) will proceed until media with elevated levels of radionuclides and organic vapors based on field screening has been removed to a maximum depth of 10 ft bgs. Excavating to 10 ft bgs is technically practicable for the excavation equipment. If elevated field-screening results are recorded in the deepest sampling depth proposed for a location, samples will be collected in 5-ft-depth intervals at that location until field-screening results indicate no contamination is present. Additional lateral extent samples may also be collected based on elevated field-screening results, staining, and increasing result trends.

The investigation at SWMU 21-011(b) will consist of the following activities:

- *Acid waste sump structure 21-223 excavation and sampling.* The acid waste sump and associated building will be removed and the area inspected for evidence of leaks (e.g., field screening, stained soil). Samples will be collected from one location in the center of the excavation (Figure 4.1-1, location 14), from the depth intervals of 0 to 1.0 ft, 5.0 to 6.0 ft, and 10.0 to 11.0 ft, with zero depth defined as the floor of the excavation.
- *Pipeline excavation and sampling.* The following pipelines will be located by trenching, removed if found, and samples collected:
    - *The pipelines from buildings 21-155 and 21-152 to the sump structure 21-223.* The pipelines will be carefully excavated and inspected for evidence of leaks (e.g., field screening; stained soil) prior to removal. Samples will be collected from locations immediately beneath the removed pipe where elevated field-screening results, staining, or breaks/cracks indicate potential releases. If field screening or visual observations do not indicate contamination, samples will be collected from locations beneath the removed pipe at the sump inlet connection to the pipe, pipe bends, and/or every 50 ft along the pipe (Figure 4.1-1 locations 1–13). At each location, samples will be collected from the depth intervals of 0 to 1.0 ft and 2.0 to 3.0 ft. The zero depth is defined as the ground surface immediately beneath the pipe.
    - *The pipeline from the sump structure 21-223 to MDA T to former building 21-035 and building 21-257.* The pipeline will be carefully excavated and inspected for evidence of leaks (e.g., field screening; stained soil) prior to removal. Samples will be collected from locations immediately beneath the removed pipe where elevated field-screening results, staining, or breaks/cracks indicate potential releases. If field screening or visual observations do not indicate contamination, samples will be collected from locations beneath the removed pipe at the sump outlet connection to the pipe, pipe bends, and/or every 50 ft along the pipe (Figure 4.1-1, locations 15-43). At each location, samples will be collected from the depth intervals of 0 to 1.0 ft and 2.0 to 3.0 ft. The zero depth is defined as the ground surface immediately beneath the pipe.

6.0 CONSOLIDATED UNIT 21-022(B)-99, INDUSTRIAL WASTE LINES AND SUMPS

6.1 Background

6.1.1 Operational History

Consolidated Unit 21-022(b)-99 consists of SWMUs 21-022(b), 21-022(c), 21-022(d), 21-022(e), and 21-022(g) (Figure 6.1-1). These SWMUs are industrial waste lines and associated underground liquid waste sumps; structure 21-082 [SWMU 21-022(b)], structure 21-084 [SWMU 21-022(c)], structure 21-087 [SWMU 21-022(d)], structure 21-089 [SWMU 21-022(e)], and structure 21-189 [SWMU 21-022(g)].

Structures 21-082, 21-084, 21-087, and 21-089 [SWMUs 21-022(b)-(e)] were located adjacent to the northeast corners of buildings 21-002, 21-003, 21-004, and 21-005, respectively. These brick and concrete sumps were constructed in 1945 and were approximately 5 ft, 4 in. in diameter and 10 ft deep. Construction drawings show a 2-ft-diameter, 5-ft-deep steel catch basin within each sump (LASL 1946, 089727). The sumps received all of the liquid waste discharges, including the floor drains, janitor sinks, and chilled water overflows, from their respective buildings (Maraman and Christensen 1987, 001453. p. 5) and subsequently flowed through the industrial waste lines to MDA T for disposal (LASL 1946, 089727). The pipeline connecting the sumps to the buildings was constructed of 6-in. cast iron or steel (LASL 1957, 089733; LASL 1961, 106966; LASL 1975, 089724; LASL 1976, 089730).

In 1952, the waste treatment plant/laboratory (building 21-035) was constructed at MDA T. A 4-in. extra heavy cast iron (EHCI) waste line was installed north of the old 6-in. iron pipe (which was left in place) (LANL 1990, 007512). The sumps were connected to the new line through 4-in. EHCI pipes; the 6-in. connections were removed (LASL 1957, 089733). Buildings 21-002, 21-003, and 21-005 had additional 1.5-in. stainless steel raffinate waste (liquid remaining after extraction) lines or citrate waste lines that connected directly to the waste treatment plant/laboratory (building 21-035) (LASL 1957, 089733; LASL 1975, 089724; LASL 1975, 089729; LASL 1975, 089730; LASL 1975, 089731). In 1963, plastic liners were placed inside and grouted to the walls of structures 21-082, 21-084, 21-087, and 21-089 (LANL 1991, 007680, p. 18-37). In the late 1960s, building 21-035 was removed and all 4-in. and 1.5-in. waste lines were extended to the new waste treatment plant building 21-257 (LASL 1968, 089723).

In the early 1960s, a sump [structure 21-189, SWMU 21-022(g)] was constructed of concrete with dimensions of 5 ft, 4 in. in diameter and 12 ft deep (LASL 1960, 106768). It was located off the northwest corner of building 21-150, the plutonium fuel service and development building, which housed plutonium fuels development activities. The sump was connected to the plutonium fuel storage building and the waste treatment plant/laboratory (21-035) by 4-in. EHCI pipes (LASL 1962, 089732). This line was extended to building 21-257 when building 21-035 was removed in 1968.

In 1979 and 1980, all five sumps (structures 21-082, 21-084, 21-087, 21-089, and 21-189) were excavated and removed and disposed of at TA-54 (LANL 1991, 007680, p. 18–40; Blackwell 1980, 085470, p. 2). Contaminated soil was removed around the sumps until further excavation jeopardized the buildings. Some of the removed soil had retrievable levels of plutonium (Blackwell 1980, 085470, p. 2). The removal of additional soil was deferred to a later date when the buildings or waste lines were decommissioned. All excavated surfaces were sprayed with asphalt undercoating and backfilled with clean soil (LANL 1991, 007680, p. 18-40). The radioactive contamination remaining on the walls and bottoms of the excavation areas was monitored using a zinc sulfide (ZnS) alpha scintillator (Ahlquist 1977, 009080). The depths of the excavation at all five sump locations were approximately 14 to 16 ft bgs (LANL 1991, 007680, p. 18-40).

In the late 1980s, a work order was issued to replace the industrial waste lines in the utility tunnels around the inside perimeter of buildings 21-003 and 21-004. The work was started at building 21-004 in 1988 and ended in 1989. Sludge accounted for 50% of the volume of the pipe and was treated as TRU waste. The waste lines associated with building 21-003 were not replaced (Francis 1995, 076109). Around this same time, an asbestos survey was completed in the pipe tunnels of buildings 21-003 and 21-004 (LANL 2000, 104141). Asbestos covered some of the piping and was found to have fallen on the pipe tunnel floors.

In the early to mid 1990s, dye tests were performed to identify all drains from the buildings and structures at TA-21 and to determine where they terminated. A series of dye tests were performed in buildings 21-003 and 21-004. Dye testing at building 21-004 was successful; all dye reached the expected destination. Dye was not reaching building 21-257, the waste treatment plant, from building 21-003. Camera equipment was placed into the piping in building 21-003 at the northeast corner of the building; the piping contained standing water, which appeared to be from a leak or plug in the piping. NMED was notified of the situation on November 30, 1994. Following, NMED requested a Corrective Action Report. In response, the Laboratory submitted a National Pollutant Discharge Elimination System Permit Release Notification Form, stating a discharge had not been identified and was being reported as a potential concern. The release notification summarized the dye test findings and summarized that there was no indication that liquid had escaped into the environment. A critique of the findings was conducted on December 1, 1994. It was decided to report this incident as an off-normal potential concern pending further investigation (Francis 1995, 076109).

In the early to late 1990s, the north and south ends of buildings 21-003 and 21-004 were removed (Phillips 1993, 026468; LANL 1997, 056587). Buildings 21-002, 21-005, and 21-150 are still present, as well as the hallways connecting these buildings (Plate 1).

6.1.2 Summary of Releases

The sumps and associated waste lines transported liquid wastes generated by Laboratory operations at buildings 21-002, 21-003, 21-004, 21-005, and 21-150 to the waste treatment facility at MDA T.

The sumps were removed in the 1970s (Blackwell 1980, 085470, p. 2; LANL 1991, 007680, p. 18-40). Alpha-emitting radionuclide contamination was left in place at approximately 15 ft bgs after the sumps were removed (LANL 1991, 007680, p. 18-40; Blackwell 1980, 085470, p. 2).

Releases from the waste lines are likely to have occurred as a result of leaks and resulted in subsurface contamination.

6.1.3 Current Site Usage and Status

All operations have ceased at the buildings associated with this consolidated unit; therefore, the waste lines are not in use. All of the sumps have been removed but the waste lines are still present.

6.2 Summary of Previous Investigations, Site Data, and Scope of Activities for Consolidated Unit 21-022(b)-99

6.2.1 Summary of Previous Investigations

This site has not been previously investigated.

6.2.2 Site Data

There are no data for this consolidated unit.

6.2.3 Scope of Activities

The proposed sampling locations at Consolidated Unit 21-022(b)-99 are shown in Figure 6.1-1. Table 6.2-1 provides a summary of the proposed sampling objectives, numbers of samples proposed, sample locations and depths, and proposed analytical suites. Plate 1 shows the proposed sampling locations for this site in relation to the other sites addressed in this work plan.

Samples will be analyzed for TAL metals, cyanide, nitrate, perchlorate, organic chemicals (VOCs and SVOCs), radionuclides (americium-241, isotopic plutonium, isotopic uranium, strontium-90, tritium, and by gamma spectroscopy), moisture, and pH. The pipe trench samples will be analyzed for these analytes as well as asbestos (Table 6.2-1, locations 58–97). In addition, 20% of all samples will also be analyzed for extended suite consisting of dioxins/furans, explosive compounds, and PCBs (Table 6.2-1). The locations selected for extended suite analysis are areas with the most potential for contamination; where contaminants had the most potential to be released to the environment (e.g., sumps, sharp bends or connections in piping) or were intentionally discharged (e.g., outfalls). If field-screening results identify locations with higher readings than those already selected for extended suite analyses, these locations will be analyzed for the extended suite instead.

During pipe removal activities, excavation of soil, fill, and/or tuff (including any stained areas) will proceed until media with elevated levels of radionuclide and organic vapors based on field screening has been removed to a maximum depth of 10 ft bgs. Excavating to 10 ft bgs is technically practicable for the excavation equipment. If elevated field-screening results are recorded in the deepest sampling depth proposed for a location, samples will be collected at that location in 5-ft-depth intervals until field-screening results indicate no contamination is present. Additional lateral extent samples may also be collected based on elevated field-screening results, staining, and increasing result trends.

The investigation at Consolidated Unit 21-022(b)-99 will consist of the following activities:

- *Sump sampling (structures 21-082, 21-084, 21-087, 21-089, and 21-189).* A minimum of three samples will be collected from the bottom of the former sump excavated areas (previously excavated at 14 to 16 ft bgs) at 5-ft-depth intervals (Figure 6.1-1, locations 2, 12, 25, 34, and 47). The zero depth will be approximately 15.0 to 16.0 ft bgs or immediately beneath the asphalt lining the previously excavated area. Samples will be collected from the depth intervals of 0 to 1.0 ft, 5.0 to 6.0 ft, and 10.0 to 11.0 ft.
- *Industrial waste lines excavation and/or sampling.* The piping that connects buildings 21-002, 21-005, and 21-150 to their sumps is currently not accessible and cannot be removed at this time; these lines are situated within the 5 ft buffer area around the existing buildings and will be addressed during the D&D of these buildings. The following pipelines will be located by trenching, removed if found, and samples collected.
    - ❖ *The industrial waste lines from the sumps to MDA T.* The piping will be carefully excavated and inspected for evidence of leaks (e.g., field screening; stained soil) prior to removal. Samples will be collected from locations immediately beneath the removed pipe where elevated field-screening results, staining, or breaks/cracks indicate potential releases. Samples will also be collected from locations beneath the removed pipe at the sump inlet/outlet connections to the pipelines, connections to other pipes, pipeline bends and/or every 50 ft along the pipe (Figure 6.1-1, locations 1, 3–9, 11, 13–22, 24, 26–33,

35–42, 46, and 48–57). At each location, samples will be collected from the depth intervals of 0 to 1.0 ft and 2.0 to 3.0 ft. The zero depth is defined as the ground surface immediately beneath the pipe.

- *The industrial waste lines from former buildings 21-003 and 21-004 to their former sumps.* These small sections of piping will be carefully excavated and inspected for evidence of leaks (e.g., field screening; stained soil) before removal. Samples will be collected from locations immediately beneath the removed pipe where elevated field-screening results, staining, or breaks/cracks indicate potential releases. Samples will also be collected from beneath the removed pipes at the pipe connections with buildings 21-003 and 21-004 (Figure 6.1-1, locations 10 and 23). If piping is not found, samples will be collected from location(s) where the piping was most likely located (first depth where fill is no longer encountered) using field-screening results and the proposed sampling map as a guide. At each location, samples will be collected from the depth intervals of 0 to 1.0 ft and 2.0 to 3.0 ft. The zero depth is defined as the ground surface immediately beneath the pipe.

- *Under the former industrial waste lines that ran within the pipe tunnels around the perimeter of buildings 21-003 and 21-004 to their former sumps.* These pipes, which connected laboratory drains to their respective sumps, were suspended in 4 ft by 4 ft bgs pipe tunnels with a dirt floor. These pipes were removed during the D&D of buildings 21-003 and 21-004 north and south sections. Currently, there is approximately 1 ft of fill on top of the normal surface grade in the area of these former pipes. Therefore, the pipes were approximately 5 ft below current ground surface. A small trench will be excavated between removed sump areas for structures 21-084 and 21-087 and the pipe tunnels to confirm previous pipe removal. At the removed portions of building 21-003, samples will be collected from the former pipe tunnels at the north end corners and the south end corners and/or every 20 ft along the perimeter (Figure 6.1-1, locations 58–78). Samples will also be collected north and south of the remaining portion of building 21-003, along the center and perimeter in a 20 ft-based grid pattern (Figure 6.1-1, locations 98–125). At the removed portions of building 21-004, samples will be collected from the former pipe tunnels at the north end corners and the south end corners and every 20 ft along the perimeter (Figure 6.1-1, locations 79–97). Samples will also be collected north and south of the remaining portion of building 21-004, along the center and the perimeter in a 20 ft-based grid pattern (Figure 6.1-1, locations 126–138). At all locations, samples will be collected from depth intervals the 5.0 to 6.0 ft and 7.0 to 8.0 ft bgs (pipe floor tunnel currently approximately 5 ft bgs). The southeast addition to former building 21-003 is not being sampled. This is part of Consolidated Unit 21-022(h)-99, addressed in the DP Site Phase I and II investigations (LANL 2004, 087461; NMED 2005, 089314; LANL 2008, 104989).

- *The industrial waste lines near former building 21-035.* Two locations will be sampled from the northwest corner of former building 21-035 (Figure 6.1-1, locations 44 and 45), one location from near building 21-035 (Figure 6.1-1, location 43), and one location downslope of connections to underground structures 21-091, 21-093, 21-145, 21-147, and 21-271 (Figure 6.1-1, location 139). These pipes were likely removed when building 21-035 was removed. Exploratory trenching will be conducted to identify the former or current piping location. Trenching will be conducted with a backhoe and/or excavator and will progress from the surface to approximately 10 ft bgs, until fill is no longer encountered, or to a depth technically practicable. The trenches will be visually logged for evidence of non-native materials, disturbed bedding horizons, and areas of staining. Elevated radiological or organic vapor field-screening results will be documented.

Trenching will continue in the historically identified areas until evidence of piping is found or the absence of piping at the location has been verified. If piping is found, it will be removed and samples will be collected immediately beneath, from two depths, 0- to 1-ft and 2.0- to 3.0-ft intervals (Figure 6.1-1) as determined by field-screening results. If piping is not found, samples will be collected from location(s) where the piping was most likely located (first depth where fill is no longer encountered) using field-screening results and the proposed sampling map as a guide. If field-screening results or visual observations do not locate the piping or former location of the piping, samples will be collected from the bottom of the excavated area, at the depth intervals 0 to 1.0 ft and 2.0 to 3.0 ft.

7.0 SWMUs AND AOCs LOCATED WITHIN MDA T BUT OUTSIDE OF THE NES AREA BOUNDARY

7.1 Background

7.1.1 Operational History

The operational history for MDA T is presented in detail in Section 2.1 of the MDA T investigation work plan (LANL 2004, 085641, p. 2). Sites are shown on Figure 1.0-2.

7.1.2 Summary of Releases, Transport Mechanisms, and Potential Receptors

Summary of releases, transport mechanisms, and potential receptors determined previously for MDA T are presented in Sections 2.4 and 2.5 of the MDA T investigation work plan (LANL 2004, 085641, pp. 3–4).

7.1.3 Current Site Usage and Status

Currently, the MDA T area is undergoing further investigation and installation of vapor monitoring wells. The site is inactive.

7.2 Summary of Previous Investigations, Site Data, and Scope of Activities for Building 21-035 Area at MDA T

All of the structures associated with the following SWMUs/AOCs have been or are likely to have been removed; however, it is unknown if the piping has also been removed. These SWMUs/AOCs include former building 21-035 and other structures associated with this building:

- SWMU 21-010(a), building 21-035, was an industrial liquid waste treatment facility used for treating and disposing of contaminated liquid waste from plutonium and uranium-processing laboratories at DP Site beginning in 1952 and removed in 1968 (LANL 1983, 035510);
- SWMU 21-010(b), structure 21-093, was initially a water manhole that was changed to an acid valve pit manhole, located on the southwest corner of building 21-035, and likely removed in 1968 (LANL 1983, 035510);
- SWMU 21-010(c), structure 21-145, was a steel 500-gal. underground process tank located near the southwest corner of building 21-035 and likely removed in 1968 (LANL 1983, 035510);
- SWMU 21-010(d), structure 21-147, was a steel 500-gal. underground process tank located near the southwest corner of building 21-035 and likely removed in 1968 (LANL 1983, 035510);

- SWMU 21-010(e), structure 21-185, was a 390-gal. sanitary waste septic tank and leach field located on the northeast corner of building 21-035; the septic tank was likely removed in 1968 (LANL 1983, 035510); it is unknown if the leach field is still present;
- SWMU 21-010(f), structure 21-192, was a grit chamber located at the northeast corner of building 21-035 and removed in 1968 (LANL 1983, 035510);
- SWMU 21-010(g), structure 21-255, was a 2000-gal. aboveground process tank located at the southwest corner of building 21-035 and removed in 1968 (LANL 1983, 035510);
- SWMU 21-010(h), structure 21-271, was a process manhole located at the southwest corner of building 21-035 and likely removed in 1968 (LANL 1983, 035510);
- AOC C-21-002 was a radionuclide leak from a waste storage tank to the surrounding soil near building 21-035;
- AOC C-21-010 was a radiation leak at building 21-035;
- AOC C-21-028(a) was an inactive satellite storage area utilized for the storage of acetone and Freon. Location of the site is unknown. The SWMU report (LANL 1990, 007512) identifies this site as structure 21-121 near loading docks. The Rogers report (Rogers 1977, 005707) indicates 21-121 is the location of the distribution box between Absorption Beds 1 and 2 at MDA T;
- AOC C-21-034, structure 21-091, was a 1000-gal. raffinate holding tank with a manhole located at the southwest corner of building 21-035 and likely removed in 1961 (LANL 1983, 035510);
- AOC C-21-035, structure 21-110, was the former location of an aboveground process water holding tank on the south side of building 21-035 and now located near building 21-257;
- AOC C-21-036, structure 21-111, was the former location of an aboveground process water holding tank on the south side of building 21-035 and now located near building 21-257;
- AOC C-21-037, structure 21-256, was the former location of a 2000-gal. aboveground process tank located at the southwest corner of building 21-035 and now located near building 21-257; and
- A 6-in. cast-iron drain pipe from former building 21-012, which discharged into the west side of MDA T, and was removed in 1973 (Christensen et al. 1975, 005481).

These SWMUs/AOCs are described in the HIR appendix, Sections B-2.2 and B-2.3.3 of the MDA T investigation work plan (LANL 2004, 085641, Appendix B, pp. B-4 and B-7) and/or in Section 2.1.1 of the MDA T investigation report (LANL 2006, 094151, pp. 3-4). These SWMUs/AOCs are shown in Figure 7.2-1. In these MDA reports and plans, the former building 21-035 area was addressed as a whole, not by individual SWMU or AOC.

Building 21-012, the old plutonium filter facility, removed in 1973, was connected to the west side of MDA T through a 6-in. cast iron pipe used as a drain pipe from the precipitron and filter area of the building (Christensen et al. 1975, 005481). This former pipe area has not been previously addressed and will be sampled as described in Section 7.2.3 below.

7.2.1 Summary of Previous Investigations

Summaries of investigations conducted at or near these SWMUs/AOCs are presented in the HIR appendix, Sections B-3.12 and B-3.12.3 of the MDA T investigation work plan (LANL 2004, 085641, Appendix B, pp. B-22, B-23, and B-24). The locations sampled during these investigations are presented

in the HIR appendix, Figures B-38, B-40, and B-41 of the MDA T investigation work plan (LANL 2004, 085641, Appendix B, pp. B-78, B-80, and B-81).

These SWMUs/AOCs were further investigated in 2005-2006. This investigation is summarized in Section 3.1.4 of the MDA T investigation report (LANL 2006, 094151, p. 14). The locations sampled during this investigation and previous investigations are presented in Figure 3.1-1 of the MDA T investigation report (LANL 2006, 094151, p. 51).

7.2.2 Summary of Data

The radionuclide, organic chemical, and inorganic chemical analytical results from the 1990s investigations are presented in the HIR appendix, Tables B-23 through B-25, respectively, of the MDA T investigation work plan (LANL 2004, 085641, Appendix B, pp. B-116–B-160). The summary of data collected during these investigations is presented in Section 2.9.3 of the MDA T work plan (LANL 2004, 085641, pp. 15 and 16).

The inorganic chemical, organic chemical, and radionuclide analytical results from the 2005-2006 investigation are presented in Tables 6.2-4 through 6.2-6, respectively, of the MDA T investigation report (LANL 2006, 094151, pp. 174–186). Analytical results for location 21-25262, which was drilled near the southeast corner of building 21-035, are presented in Tables 4.3-3 through 4.3-6, Tables 6.2-1 through 6.2-6, and Tables 6.5-1 and 6.5-2 and summarized in Figures 6.5-1 and 6.5-4 of the MDA T investigation report (LANL 2006, 094151, pp. 95–101, pp. 112–186, pp. 205–215, pp. 69 and 72, respectively). Analytical results for location 21-25403 are presented in Tables 6.2-7 through 6.2-9 of the MDA T investigation report (LANL 2006, 094151, pp. 187–194). The analytical data for building 21-035 and soil vapor concentrations are presented in Sections 6.2.2, 6.4, and 6.5 of the MDA T investigation report (LANL 2006, 094151, pp. 37, 38, 40, and 41). The MDA T investigation report concluded that the nature and extent of all chemicals of potential concern (COPCs) for this area were defined (LANL 2006, 094151, p. 42). NMED approved the MDA T investigation report with direction (NMED 2007, 095411). Plate 1 shows sampling locations with decision-level data at MDA T. The analyses and depths for these locations are presented in Table 4.2-1 of the investigation report (LANL 2006, 094151).

7.2.3 Scope of Activities

Since removal of the piping and underground structures in this area has not been confirmed, this work plan proposes to trench for and, if found, remove the structures and associated piping. Removal will take place no closer than 5 ft to the NES. Confirmation samples will be collected as described below.

The proposed sampling locations near former building 21-035 are shown in Figure 7.2-1. Table 7.2-1 provides a summary of the proposed sampling objectives, numbers of samples proposed, sampling locations and depths, and proposed analytical suites. Plate 1 shows the proposed sampling locations for this area in relation to the other sites addressed in this work plan.

Samples will be analyzed for TAL metals, cyanide, nitrate, perchlorate, organic chemicals (VOCs and SVOCs), radionuclides (americium-241, isotopic plutonium, isotopic uranium, strontium-90, tritium, and by gamma spectroscopy), moisture, and pH. In addition, 20% of all samples will also be analyzed for extended suite consisting of dioxins/furans, explosive compounds, and PCBs (Table 7.2-1). The locations selected for extended suite analysis are areas with the most potential for contamination; where contaminants had the most potential to be released to the environment (e.g., sumps, sharp bends or connections in piping) or were intentionally discharged (e.g., outfalls). If field-screening results identify locations with higher readings than those already selected for extended suite analyses, these locations will be analyzed for the extended suite instead.

During structure removal activities, excavation of soil, fill, and/or tuff (including any stained areas) will proceed until media with elevated levels of radionuclide and organic vapors based on field screening has been removed to a maximum depth of 10 ft bgs. Excavating to 10 ft bgs is technically practicable for the excavation equipment. If piping or structures are not found within 10 ft bgs, trenching will continue until fill is no longer encountered or to a depth technically practicable to ensure excavations have made a thorough attempt to find possible structure locations. If elevated field-screening results are recorded in the deepest sampling depth proposed for a location, samples will be collected at that location in 5-ft-depth intervals until field-screening results indicate that no contamination is present. Additional lateral extent samples may also be collected based on elevated field-screening results, staining, and increasing result trends.

The investigations near former building 21-035 will consist of the following activities:

- *Former septic tank sampling [structure 21-185, SWMU 21-010(e)].* The septic tank was likely previously removed; however, no samples have been collected in this area. Exploratory trenching will be conducted to identify the former tank location. Trenching will be conducted with a backhoe and/or excavator and will progress from the surface to approximately 10 ft bgs, until fill is no longer encountered, or to a depth technically practicable. The trench will be visually logged for evidence of non-native materials, disturbed bedding horizons, and areas of 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 a tank at that location has been verified. If found, the tank will be removed and one borehole will be advanced in the center of the former tank location (Figure 7.2-1, location 2). 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 where native soil begins and fill ends. Additional borehole samples will be collected from depth intervals of 5.0 to 6.0 ft and 10.0 to 11.0 ft. Samples will be collected immediately beneath the septic tank inlet and outlet connections to the pipeline at the 0- to 1.0-ft and 2.0- to 3.0-ft-depth intervals (Figure 7.2-1, locations 1 and 3). If the area of the former tank location is not identified during field activities, confirmation samples will be collected from the area where the tank was most likely located (first depth where fill is no longer encountered) using the proposed sampling map as a guide as well as field-screening results.
- *Leach field sampling.* Exploratory trenching will be conducted to identify the leach field location; it is unknown if it was previously removed. If found, it will not be removed unless field-screening results are more than twice local background levels. Trenching will be conducted with a backhoe and/or excavator and will progress from the surface to approximately 10 ft bgs, until fill is no longer encountered, or to a depth technically practicable. The trench will be visually logged for evidence of non-native materials, disturbed bedding horizons, and areas of staining. Elevated radiological or organic vapor field-screening results will be documented. Trenching will continue in the historically identified area until evidence of a leach field (gravel) is found or the absence of a leach field at that location has been verified (first depth where fill is no longer encountered). Samples will be collected under the leach field gravel (dimensions 50 ft long, 2 ft wide, 1 ft 10-in. deep) connected to the former septic tank [structure 21-185, SWMU 21-010(e)]. There is at least 1 ft 4 in. of backfill on top of the leach field (LANL 2004, 085641, Appendix B). Samples will be collected from three locations beneath the leach field; the east side, center, and west side of the field. At each location, samples will be collected from the depth intervals of 0 to 1.0 ft, 2.0 to 3.0 ft, and 5.0 to 6.0 ft (Figure 7.2-1, locations 4–6). The zero depth is defined as the ground surface immediately beneath the leach field. If the leach field was previously removed, samples will be collected at the locations shown in Figure 7.2-1 and depths under the fill shown in Table 7.2-1. Field-screening results will also be used to guide sampling locations.

- *Piping throughout MDA T associated with building 21-035.* This piping will be carefully excavated and inspected for evidence of leaks (e.g., field screening; stained soil) prior to removal. It is unknown if piping is still in place north, east, and south of building 21-035. Piping is likely to have been removed in the southwest corner area as stated on engineering drawing index sheets (LANL 1983, 035510); the D&D report for former building 21-012 stated the 6-in. cast iron pipe connected to MDA T was also removed (Christensen et al. 1975, 005481). However, this has not been confirmed in the field. Exploratory trenching will be conducted to identify all the former pipe locations and confirm if piping has been removed. Trenching will be conducted with a backhoe and/or excavator and will progress from the surface to approximately 10 ft bgs, until fill is no longer encountered, or to a depth technically practicable. Piping was originally approximately 5.5 ft bgs (LANL 2004, 085641, Appendix B). It is unknown how much fill may have been placed over this area. The trench will be visually logged for evidence of non-native materials, disturbed bedding horizons, and areas of staining. Elevated radiological or organic vapor field-screening results will be documented. Trenching will continue in the historically identified area until evidence of former piping is found or the absence of piping at that location has been verified (native soil is encountered). Pipelines will be removed to within 5 ft of the NES area boundary. Samples will be collected from locations immediately beneath the removed pipe where elevated field-screening results, staining, or breaks/cracks indicate potential releases. If field screening or visual observations do not indicate contamination, samples will be collected from locations beneath the removed pipe at the connections to former tanks, pipe bends, and/or every 50 ft along the pipe (Figure 7.2-1, locations 7–16). At each location, samples will be collected from the depth intervals of 0 to 1.0 ft and 2.0 to 3.0 ft. The zero depth is defined as the ground surface immediately beneath the pipe. If piping is not found, samples will be collected from location(s) where the piping was most likely located (first depth where fill is no longer encountered) using field-screening results and the proposed sampling map as a guide, from depth intervals of 0 to 1.0 ft and 2.0 to 3.0 ft at the bottom of the excavation areas.
- *Verification of prior removal or removal of buried structures associated with building 21-035 (21-091, 21-093, 21-147, 21-192, and 21-271).* It has not been confirmed in the field that these structures have been previously removed. Therefore, exploratory trenching will be conducted to identify all the former structure locations and confirm if they have been removed. Trenching will be conducted with a backhoe and/or excavator and will progress from the surface to approximately 10 ft bgs, until fill is no longer encountered, or to a depth technically practicable. Structures were originally approximately 5.5-ft to 8-ft deep; manholes were most likely visible from the original surface grade (LANL 2004, 085641, Appendix B). It is unknown how much fill may have been placed over this area. The trench will be visually logged for evidence of non-native materials, disturbed bedding horizons, and areas of staining. Elevated radiological or organic vapor field-screening results will be documented. Trenching will continue in the historically identified areas until evidence of former structures is found or their absence at that location has been verified (native soil is encountered). Samples will be collected from locations immediately beneath the removed structures where elevated field-screening results, staining, or breaks/cracks indicate potential releases. If field screening or visual observations do not indicate contamination, samples will be collected from locations beneath the removed structures at the connections at the locations shown in Figure 7.2-1 (locations 17–20 and 23). At each location, three samples will be collected from under the former structures from depth intervals of 0 to 1.0 ft, 5.0 to 6.0 ft, and 10.0 to 11.0 ft (Table 7.2-1). The zero depth is defined as the ground surface immediately beneath the removed structures. If structures are not found, samples will be collected from location(s) where the structures were most likely located (first depth where fill is no longer encountered) using field-screening results and the proposed sampling map Figure 7.2-1 as a guide. Structures 21-110, 21-

111, and 21-145 were previously sampled during previous MDA T investigations of the former building 21-035 area (Plate 1).

- *Verification sampling under removed aboveground tanks at former building 21-035 area (structures 21-255 and 21-256).* Samples will be collected under former aboveground tanks from the depth intervals of 0 to 0.5 ft, 2.0 to 3.0 ft, and 5.0 to 6.0 ft (Figure 7.2-1, Table 7.2-1, locations 21 and 22). The zero depth is defined as the ground surface.

7.3 Summary of Previous Investigations, Site Data, and Scope of Activities for Building 21-257 Area at MDA T

All of the structures associated with building 21-257 are still present at MDA T, except for tank structure 21-256, which was removed in 1986 (LANL 2006, 094151, p. 4). The following SWMUs/AOCs structures are located outside of the NES area boundary and associated with building 21-257 waste treatment processes:

- SWMU 21-011(a), building 21-257, is the current industrial liquid waste treatment facility constructed to treat liquid waste from plutonium processing operations associated with DP Site Aggregate Area;
- SWMUs 21-011(d and e), structures 21-110 and 21-111, are two 13,500-gal. aboveground process water holding tanks located on the west side of building 21-257;
- SWMUs 21-011(f and g), structures 21-112 and 21-113, are two 12,700-gal. effluent holding tanks located on the northwest side of building 21-257;
- SWMU 21-011(h) structure 21-256, was a 2000-gal. aboveground process tank located at the southwest corner of building 21-257 and removed in 1986 (LANL 2006, 094151, p. 4);
- SWMU 21-011(i), structure 21-288, is a 1000-gal. tank storing 50% sodium hydroxide located on the west side of building 21-257;
- SWMU 21-011(j), structure 21-289, is a 1600-gal. americium raffinate storage tank located on the west side of building 21-257;
- AOC 21-001 is a containerized radioactive sludge storage area located at the southwest corner of building 21-257;
- AOC C-21-005 is an area associated with the release of americium-241 and plutonium-239 on the west side of building 21-257;
- AOC 21-007 is an area associated with a 1982 spill from a tank vent that released americium-241, plutonium-239, and uranium-233 to the surrounding area near building 21-257; and
- AOC C-21-033 is an area associated with a 1976 cement paste spill that occurred when radioactive cement was being pumped from building 21-257 to shafts located between Absorption Beds 1 and 3 at MDA T.

This group of SWMUs/AOCs is described in the HIR appendix, Sections B-2.2 and B-2.3.4 and B-2.3.5 of the MDA T investigation work plan (LANL 2004, 085641, Appendix B, pp. B-4, B-5, B-7, and B-8). Descriptions of this group of SWMUs/AOCs are also in Sections 2.1.1 and 2.1.2 of the MDA T investigation report (LANL 2006, 094151, pp. 4–6). These sites are shown in Figure 7.3-1.

Investigations of SWMU 21-011(a) (building 21-257), AOC 21-001, AOC C-21-005, AOC 21-007, and AOC C-21-033 will be completed after building 21-257 has been removed. A Phase II work plan will be submitted that addresses the building 21-257 area.

7.3.1 Summary of Previous Investigations

The area around building 21-257 was investigated in 2005-2006; this investigation is summarized in Section 3.1.5 of the MDA T investigation report (LANL 2006, 094151, p. 14). The locations sampled during this investigation and previous investigations are presented in Figure 3.1-1 of the MDA T investigation report (LANL 2006, 094151, p. 51). In these MDA reports and plans, the building 21-257 area was addressed as a whole, not by individual SWMU or AOC.

7.3.2 Summary of Data

The inorganic chemical, organic chemical, and radionuclide analytical results from the 2005-2006 investigation are presented in Tables 6.2-7 through 6.2-9 of the MDA T investigation report (LANL 2006, 094151, pp. 187-194). The summary of the analytical data collected during this investigation is presented in Section 6.2.3 of the MDA T investigation report (LANL 2006, 094151, pp. 38–39). The MDA T investigation report concluded that the nature and extent of all COPCs for this area were defined (LANL 2006, 094151, p. 42). NMED approved the MDA T investigation report with direction (NMED 2007, 095411). Plate 1 shows sampling locations with decision-level data at MDA T. The analyses and depths for these locations are presented in Table 4.2-1 of the investigation report (LANL 2006, 094151).

7.3.3 Scope of Activities

Most of the structures in this area are still present. This work plan proposes to remove the remaining structures and associated piping, with the exception of building 21-257 [SWMU 21-011(a)] and the piping within 5 ft of building 21-257. Building 21-257 and the remaining piping will be removed as part of TA-21 D&D activities at a later date as directed by a letter work plan. Since the area conditions will change after D&D, SWMUs/AOC located within or immediately adjacent to (within 5 ft of) building 21-257 [SWMU 21-011(a) and AOCs 21-001, C-21-005, C-21-007, and C-21-033] will be addressed in the Phase II work plan.

The proposed sampling locations at the structures addressed in this work plan are shown in Figure 7.3-1. Table 7.3-1 provides a summary of the proposed sampling objectives, numbers of samples proposed, sampling locations and depths, and proposed analytical suites. Plate 1 shows the proposed sampling locations for this area in relation to the other sites addressed in this work plan.

All samples will be analyzed for TAL metals, cyanide, nitrate, perchlorate, organic chemicals (VOCs and SVOCs), radionuclides (americium-241, isotopic plutonium, isotopic uranium, strontium-90, tritium, and by gamma spectroscopy), moisture, and pH. In addition, 20% of all samples will also be analyzed for extended suite consisting of dioxins/furans, explosive compounds, and PCBs (Table 7.3-1). The locations selected for extended suite analysis are areas with the most potential for contamination; where contaminants had the most potential to be released to the environment (e.g., sumps, sharp bends or connections in piping) or were intentionally discharged (e.g., outfalls). If field-screening results identify locations with higher readings than those already selected for extended suite analyses, these locations will be analyzed for the extended suite instead.

During structure removal activities, excavation of soil, fill, and/or tuff (including any stained areas) will proceed until media with elevated levels of radionuclides and organic vapors based on field screening has been removed to a maximum depth of 10 ft bgs. Excavating to 10 ft bgs is technically practicable for the excavation equipment. If piping is not found within 10 ft bgs, trenching will continue until fill is no longer encountered or to a depth technically practicable to ensure excavations have made a thorough attempt to find possible piping locations. If elevated field-screening results are recorded in the deepest sampling depth proposed for a location, samples will be collected in 5-ft-depth intervals at that location until field-

screening results indicate no contamination is present. Additional lateral extent samples may also be collected based on elevated field-screening results, staining, and increasing result trends.

The investigations at these sites will consist of the following activities:

- *Pipeline excavation and sampling.* The pipelines running throughout MDA T associated with building 21-257 will be carefully excavated and inspected for evidence of leaks (e.g., field screening; stained soil) prior to removal. Pipelines will be removed up to 5 ft from the building 21-257 structure to maintain the building integrity. Samples will be collected from locations immediately beneath the removed pipe where elevated field-screening results, staining, or breaks/cracks indicate potential releases. If field screening or visual observations do not indicate contamination, samples will be collected from locations beneath the removed pipe at the connections to former tanks, pipe bends, and/or every 50 ft along the pipe (Figure 7.3-1, locations 2–5, 8, 9, 13–18, 25–33, and 36–43). At each location, samples will be collected from the depth intervals of 0 to 1.0 ft and 2.0 to 3.0 ft. The zero depth is defined as the ground surface immediately beneath the pipe.
- *Floor drain outfall investigation.* One location will be sampled in the center of the floor drain outfall, 0.5 ft downslope from the outlet (Figure 7.3-1, location 20). Samples will be collected from the depth intervals of 0 to 0.5 ft, 2.0 to 3.0 ft, and 5.0 to 6.0. Samples will be collected 5 ft to the west and east of the outfall location (Figure 7.3-1, locations 19 and 21). One location will be sampled 10 ft directly downslope from the outfall location, as well as one location 10 ft to the east and west of the center location (Figure 7.3-1, locations 23, 22, and 24, respectively). These five outfall locations will have samples collected from the depth intervals 0 to 0.5 ft and 2.0 to 3.0 ft.
- *Aboveground storage tank structures 21-110, 21-111, 21-112, 21-113, 21-256 (removed), 21-288, and 21-289.* Tank 21-256 was removed in 1986. The remaining storage tanks will be removed and inspected for evidence of leaks (e.g., field screening; stained soil). All concrete and any piping under these tanks will also be removed. After removal, confirmation samples will be collected from the footprint under the center of each tank as well as any apparent infiltration pathways (cracks in the concrete under the tanks) or staining. At these locations, samples will be collected from the depth intervals of 0 to 0.5 ft, 2.0 to 3.0 ft, and 5.0 to 6.0 (Figure 7.3-1, locations 1, 6, 7, 10, 11, 12, 34, and 35). For tanks 21-110 through 21-113, 21-288, and 21-289, zero depth is defined as the ground surface immediately below the removed concrete layer of the underlying containment areas. For former tank 21-256, which was removed in the 1980s, zero depth is defined as the ground surface. Two boreholes will also be drilled to the west and east of tanks 21-112 and 21-113 to address the overflow which occurred in 2001 (LANL 2001, 072667) and is discussed in the HIR appendix of the MDA T investigation work plan (LANL 2004, 085641). At these locations, samples will be collected from the depth intervals of 0 to 0.5 ft, 2.0 to 3.0 ft, and 5.0 to 6.0 ft (Figure 7.3-1, locations 44 and 45). The zero depth is defined as the ground surface.
- *Radiological survey around building 21-*257. To address possible spills and AOCs around building 21-257, alpha and gamma surveys will be completed for health and safety purposes within a 25-ft radius of building 21-257. Figure 7.3-1 shows the survey area. No additional samples are planned to be collected at this time; this area will be disturbed by building 21-257 D&D activities as well as pipe removals within 5 ft of the building. If field-screening results identify areas with radionuclides greater than twice local background levels, NMED will be notified and a sampling approach will be determined.

8.0 INVESTIGATION METHODS

A summary of investigation methods to be implemented is presented in Table 8.0-1. The standard operating procedures (SOPs) used to implement these methods are available at http://www.lanl.gov/environment/all/qa/adep.shtml. Additional procedures may be added as necessary to describe and document investigation activities.

Chemical analyses will be performed in accordance with the analytical statement of work (LANL 2000, 071233). Accredited contract analytical laboratories will use the most recent U.S. Environmental Protection Agency– (EPA-) and/or industry-accepted extraction and analytical methods for analyses of samples. The analytical methods are presented in Table 8.0-2.

For health and safety purposes and to help determine sampling locations and depths, all samples will be field screened for organic vapors and radioactivity. These screening results will be recorded on the corresponding sample collection logs. If elevated readings are recorded, the field team may adjust the locations, depths, or collect additional samples. Additional lateral and vertical extent samples may be collected based on elevated field-screening results, staining, and increasing result trends.

8.1 Establish Sampling Locations

For piping or structures (i.e., sumps) that have been previously removed but that require additional sampling and/or verification of removal, engineering drawings may provide the best evidence of the locations and may guide the selection of sampling locations in conjunction with field-screening results and visual observations. Similarly, for structures believed to still be in place, aerial photos digitized into geographical information systems (GIS) figures in this work plan provide the best estimate for proposed sampling locations and may in some cases be confirmed by evidence in the field.

For removed structures, engineering drawings may be used with descriptions from previous reports regarding the depth below grade of the removed structures; the documented depth would be used as the assumed starting depth for proposed new samples unless otherwise indicated by field observations, encountering native soil, or field-screening results.

If the previously described methods fail to locate the structure of interest, trenching will be used to expose the structure or its former location.

8.2 Geodetic Surveys

Geodetic surveys will be conducted to locate historical structures and previous sampling locations, and to document field activities, such as sampling locations. The surveyors will use a Trimble GeoXT hand-held global positioning system (GPS) or equivalent for the surveys. The coordinate values will be expressed in the New Mexico State Plane Coordinate System (transverse mercator), Central Zone, North American Datum 1983. Elevations will be reported as per the National Geodetic Vertical Datum of 1929. Horizontal positions shall be measured to the nearest 0.1 ft. Vertical elevations shall be measured to the nearest 0.01 –ft. Coordinates will be transferred to the coordinate upload request spreadsheet and submitted to LANL data stewards to be uploaded into the Sample Management Database.

8.3 Surface Sampling

Soil and tuff samples will be collected by the most efficient and least invasive method practicable. The methods will be determined by the field team based on site conditions such as topography, the nature of the material to be sampled, the depth intervals required, and accessibility. Typically, samples will be

collected using spade and scoop, hand auger, or drill rig according to applicable SOPs. Drill rig operations are described in section 8.4.1 below.

Surface and shallow subsurface soil samples will be collected with stainless steel shovels, spades, scoops, and bowls for ease of decontamination. If the surface location is at bedrock, an axe or hammer and chisel may be used to collect samples. Samples collected for analyses will be placed in the appropriate sample containers per appropriate SOP depending on the analytical method requirement.

Quality assurance/quality control (QA/QC) samples will include field duplicate samples, equipment rinsate blanks, trip blanks, and reagent blanks. Trip blanks will be supplied by the Sample Management Office (SMO) and will remain with the samples when collected for VOC analysis. One trip blank will be collected per cooler.

8.4 Subsurface Sampling

Subsurface samples will be collected using a drill rig with a hollow-stem auger advanced with a split spoon sampler or by hand augering. Field documentation will include detailed borehole logs to document the matrix material in detail; fractures and matrix samples will be assigned unique identifiers.

8.4.1 Hollow-Stem Auger

A hollow-stem auger may be used to bore holes deeper than 15 ft. The hollow-stem auger consists of a hollow-steel shaft with a continuous spiraled steel flight welded onto the exterior of the stem. The stem is connected to an auger bit; when it is rotated, it transports cuttings to the surface. The hollow stem of the auger allows insertion of drill rods, split-spoon core barrels, Shelby tubes, and other samplers through the center of the auger so that samples may be retrieved during drilling operations.

8.4.2 Hand Auger

Hand augers may be used to bore shallow holes. The hand auger is advanced by turning the auger into the soil or tuff until the barrel is filled. The auger is removed and the sample is placed in a stainless steel bowl, homogenized, and then placed into the appropriate sample containers depending on the analytical method requirement.

8.4.3 Split-Spoon Sampling

Subsurface samples will be collected from core extracted in a split-spoon core barrel. Samples collected for analyses will be placed in the appropriate sample containers depending on the analytical method requirement.

8.4.4 Borehole Abandonment

Boreholes will be abandoned using one of the following methods:

- by filling the borehole with bentonite chips and hydrating with clean water, or
- if waste is encountered during borehole drilling, the tremie pipe method can be used.

8.5 Excavation

Excavations will be completed using a track excavator or backhoe at the selected site(s). After confirmatory sampling and any necessary over-excavation work are completed, the excavations and/or trenches will be backfilled with clean fill material or overburden (if it is not contaminated). Excavators may also be used to collect grab samples.

8.6 Chain of Custody for Samples

The collection, screening, and transport of samples will be documented on standard forms generated by the SMO. These include sample collection logs, chain-of-custody forms, and sample container labels. Sample collection logs will be completed at the time of sample collection and signed by the sampler and a reviewer who will verify the logs for completeness and accuracy. Corresponding labels will be initialed and applied to each sample container and custody seals will be placed around container lids or openings. Chain-of-custody forms will be completed and signed to verify that the samples are not left unattended. Site attributes (e.g., former and proposed sampling locations) will be located using a GPS and marked with pin flags or similar demarcation. Horizontal locations will be measured to the nearest 0.5 ft.

8.7 Field-Screening Methods

The primary field-screening methods to be used on samples include radiological screening and organic vapor screening.

8.7.1 Radiological Field Screening

Radiological screening of all collected sample material will target gross alpha-, beta-, and gamma-emitting radionuclides. Field screening will be conducted on the sample material by a radiation control technician. All radiological screening will be conducted using an Eberline E-600 radiation meter with an SHP-380AB alpha/beta scintillation detector or equivalent. The operational range of this equipment varies from trace emissions to 1 million disintegrations per minute.

Alpha and gamma radiological surface field surveys will be conducted at the bottom of the excavated pipe trenches, around building 21-257, and at the former outfall area at Consolidated Unit 21-004(b)-99 using a ZnS scintillator probe (for alpha) and a FIDLER detector (for gamma), or equivalent.

Local background levels will be recorded, at least once a day, when radiological screening is conducted.

If elevated field-screening results are recorded in the deepest sampling depth proposed for a location, samples will be collected in 5-ft-depth intervals at that location until field-screening results indicate no contamination is present. Additional lateral extent samples may also be collected based on elevated field-screening results, staining, and increasing result trends.

8.7.2 Organic Vapor Field Screening

Organic vapor screening of subsurface core will be conducted using a portable VOC photoionization detector (PID) equipped with an 11.7-electron volt lamp. Before each day's field work begins, the PID will be calibrated to the manufacturer's standard for instrument operation and daily calibration results will be documented on sample collection logs and field notebooks.

If elevated field-screening results are recorded in the deepest sampling depth proposed, samples will be collected in 5-ft-depth intervals until field-screening results indicate no contamination is present.

Additional lateral extent samples may also be collected based on elevated field-screening results, staining, and increasing result trends.

8.7.3 Quality Assurance/Quality Control Samples

QA/QC samples will include field duplicate samples, equipment rinsate, reagent blanks, and one trip blank per cooler. One field duplicate sample will be collected for every 10 regular samples according to the SOP.

8.8 Laboratory Analytical Methods

The analytical suites required for laboratory analyses are summarized in Table 8.0-2. All analytical suites are presented in the statement of work for analytical laboratories (LANL 2000, 071233). Sample collection and analysis will be coordinated with the SMO.

8.9 Health and Safety

The field investigations described in this work plan will comply with all applicable requirements pertaining to worker health and safety. An integrated work document and a site-specific health and safety plan will be in place before conducting fieldwork. It is anticipated that removal of the industrial waste lines [Consolidated Unit 21-022(b)-99] will be more hazardous than the other sites addressed in this work plan and will require additional personal protective equipment and barriers to ensure worker and environment safety.

8.10 Equipment Decontamination

Equipment for drilling and sampling will be decontaminated before and after sampling activities to minimize the potential for cross-contamination. Drilling/exploration equipment that may come in contact with the borehole will be decontaminated by steam cleaning, by hot water pressure washing, or by another method before each new borehole is drilled. The equipment will be decontaminated on a high-density polyethylene liner on a temporary decontamination pad. Cleaning solutions and wash water will be collected and contained for proper disposal. Decontamination solutions will be sampled and analyzed to determine the final disposition of the solutions. Rinsate blanks of the decontamination water will be collected between boreholes to analyze effectiveness of the decontamination procedures. After finishing sampling activities, the decontamination water will either be discharged on site or disposed of at an appropriate facility as determined by the analytical results obtained. Equipment/rinsate blanks are collected every 20 samples (5%) per SOP.

8.11 Investigation-Derived Waste

The IDW generated may include, but is not limited to, drill cuttings, excavated media, excavated man-made debris, contact waste, decontamination fluids, and all other waste that has potentially come into contact with contaminants.

All IDW generated during field-investigation activities will be managed in accordance with applicable EPA and NMED regulations, DOE orders, and Laboratory implementation requirements. Appendix B contains the IDW management plan.

8.12 Removal Activities

Removal of the overflow holding tanks and lines associated with Consolidated Unit 21-004(b)-99, the sump and lines associated with SWMU 21-011(b), and the industrial waste lines associated with Consolidated Unit 21-022(b)-99 are proposed under this investigation work plan. Removal of the aboveground tanks, the potentially buried underground structures, and the lines located outside of the NES area boundary associated with MDA T are also proposed under this investigation work plan. The list of known structures to be removed as part of this investigation is as follows:

- Tank 21-110
- Tank 21-111
- Tank 21-112
- Tank 21-113
- Septic tank 21-185
- Sump 21-223 and associated aboveground metal structure
- Tank 21-288
- Tank 21-289
- Tanks 21-346
- Polyethylene tank near tank 21-110
- Concrete and asphalt secondary containment areas
- All piping associated with the former and current structures addressed in this work plan to within 5 ft of present buildings

Building 21-257 will not be removed during this investigation; it will undergo D&D at a later date as outlined in a letter work plan. Excavation of potentially contaminated media, waste disposition, and confirmation sampling will be completed during implementation of the Phase II work plan.

9.0 MONITORING AND SAMPLING PROGRAM

9.1 Vapor Monitoring

Vapor monitoring for tritium and VOCs is ongoing at MDA T. The results are submitted to NMED quarterly.

9.2 Groundwater

Regional well R-6 is located in DP Canyon downgradient of the sites, approximately 2050 ft from SWMU 21-011(b)/Consolidated Unit 21-004(b)-99 and 4000 ft from Consolidated Unit 21-022(b)-99/MDA T. The groundwater level in this well was measured at 1280 ft bgs in December 2008 (Koch and Schmeer 2009, 105181). Piezometers are located north of MDA T in Reach 2 in DP Canyon (LANL 2008, 101897; LANL 2009, 106115). These wells are monitored as part of the annual Interim Facility-Wide Groundwater Monitoring Plan (LANL 2008, 101897).

9.3 Sediment and Surface Water

The Laboratory's Site Drainage Pollution Prevention Plan will address storm water monitoring and erosion controls at the sites listed in the Individual Permit for storm water discharges. The Los Alamos Canyon and Pueblo Canyon watershed conceptual site model contains details on surface water in DP Canyon (LANL 2009, 106115). Sediment samples have been collected in the DP Canyon Reaches, 2, 3, and 4 and are discussed in the Evaluation of Sediment and Alluvial Groundwater in DP Canyon (LANL 1999, 063915).

10.0 SCHEDULE

Table 10.0-1 presents the schedule for the Delayed sites investigation reports and building footprint letter work plans. The schedule assumes a 5-d work week and takes into account Laboratory holidays over the duration of the project. The Laboratory estimates NMED approval of the Delayed Sites investigation work plan and authorization from the DOE to proceed with the work will occur within 60 working days from the time of submittal. The Laboratory will procure a qualified subcontractor to implement the approved scope of the work plan. This effort will require approximately 120 working days to complete given the magnitude and complexity of the scope in the work plan. Upon award of the subcontract, readiness review and mobilization tasks will be completed within 100 working days.

The Laboratory proposes to complete field activities and reporting in two phases. The approved scope and associated reporting for Consolidated Unit 21-004(b)-99 and SWMU 21-011(b) will be completed first, followed by the approved scope and associated reporting for Consolidated Unit 21-022(b)-99 and the sites at MDA T outside of the NES area boundary. Given the close proximity of the work areas, this approach will allow D&D activities at DP West to be completed before work at Consolidated Unit 21-022(b)-99. As D&D progresses, letter work plans will be developed for the DP East (buildings 21-152, 21-155, 21-209) and DP West (Buildings 21-002, 21-005, 21-150, 21-257) footprints associated with industrial waste lines. The letter work plans will be submitted for NMED approval and the investigations added into ongoing field activities.

The letter work plan for DP East building footprints (buildings 21-152, 21-155, 21-209) will be submitted by May 11, 2010. Field activities for Consolidated Unit 21-004(b)-99, SWMU 21-011(b), and the DP East building footprints will require approximately 115 working days to complete. Validated data will be received approximately 40 working days after field activities are complete. The Laboratory will submit the Delayed Sites investigation report for Consolidated Unit 21-004(b)-99, SWMU 21-011(b), and the DP East building footprint investigations by October 3, 2011, 120 working days after all the validated data are received.

The letter work plans for DP West building footprints will be submitted by January 14, 2011 (building 21-002); May 15, 2012 (Buildings 21-005, 21-150); and October 1, 2012 (building 21-257). Field activities for Consolidated Unit 21-022(b)-99, the sites at MDA T, and the DP West building footprints are extensive and will require approximately 350 working days to complete. Validated data will be received approximately 40 working days after field activities are complete. The Laboratory will submit the Delayed Sites investigation report for Consolidated Unit 21-022(b)-99, the sites at MDA T, and the DP West building footprint investigations by June 19, 2014, 320 working days after all the data are received.

The two Delayed Sites investigation reports will present all the data collected from implementation of this work plan and the DP East and DP West building footprint investigations. The investigation reports will discuss the results of the sampling efforts but will not include risk-screening assessments. The investigation reports will include recommendations for additional nature and extent investigations, as required.

11.0 REFERENCES AND MAP DATA SOURCES

11.1 References

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Copies of the master reference set are maintained at the NMED Hazardous Waste Bureau and the Directorate. The set was developed to ensure that the administrative authority has all material needed to review this document, and it is updated with every document submitted to the administrative authority. Documents previously submitted to the administrative authority are not included.

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11.2 Map Data Sources

The following list includes all documents cited in this plan. Parenthetical information following each Feature Data Source Statements for Map Products

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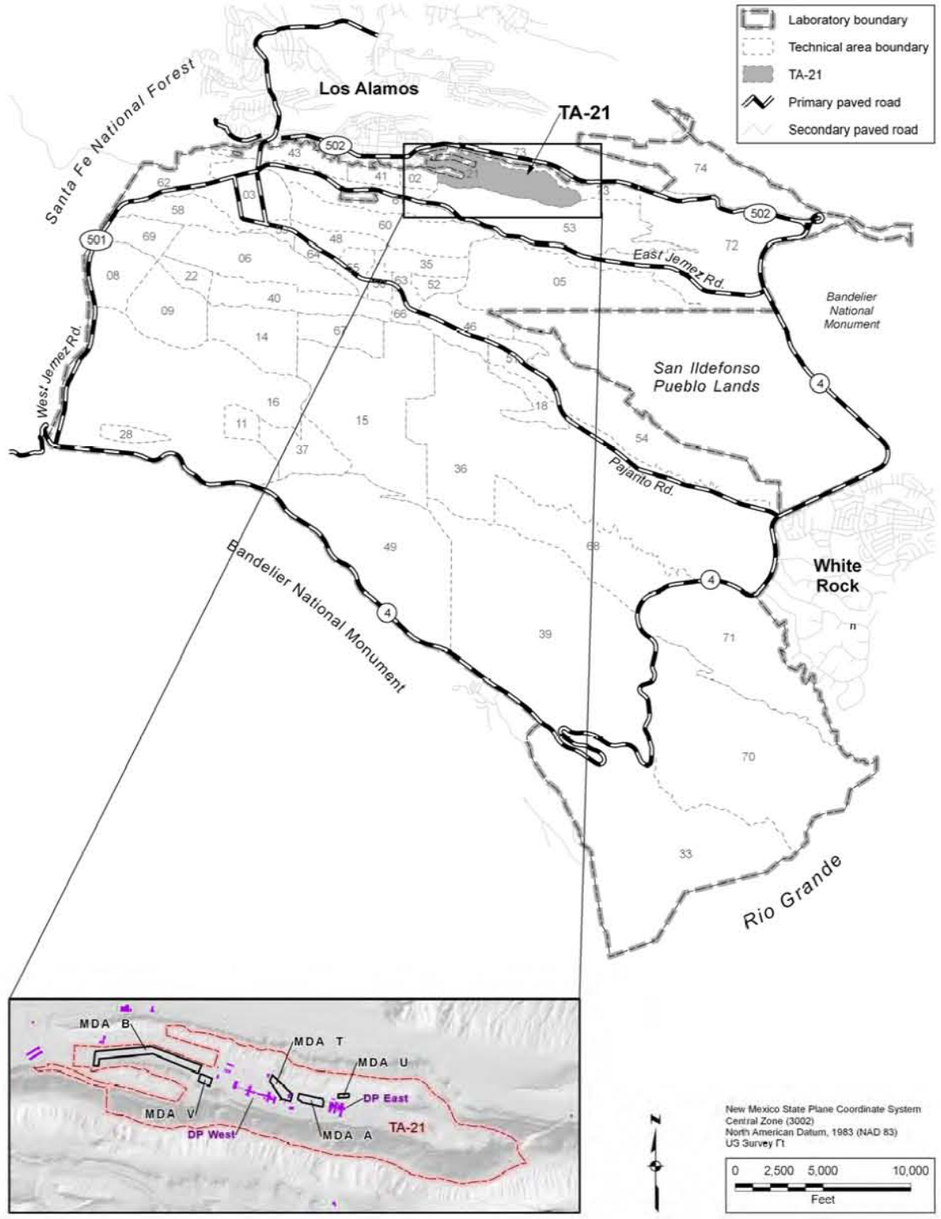

Figure 1.0-1 TA-21 and surrounding land holdings

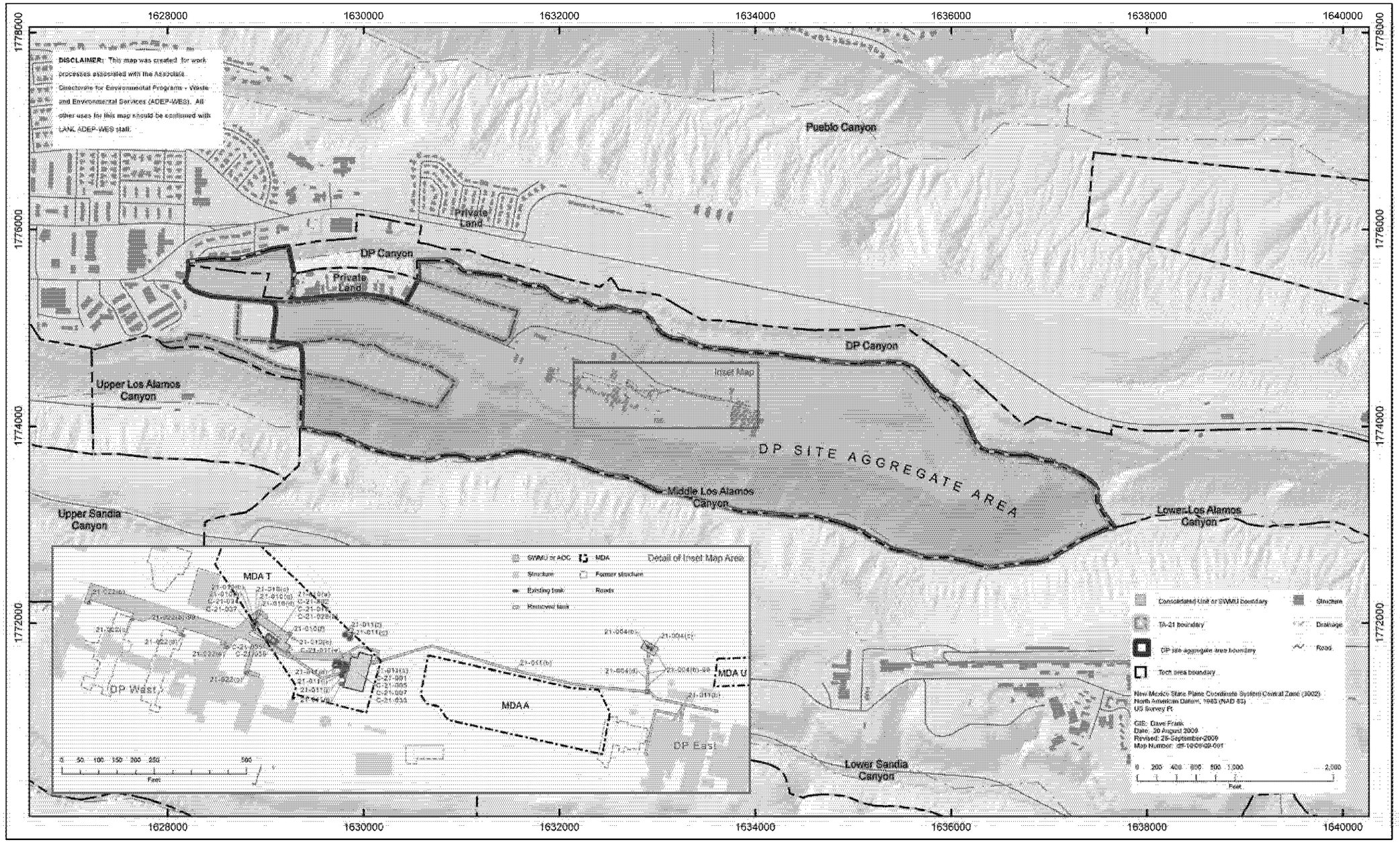

Figure 1.0-2 DP Site Aggregate Area and MDA T sites addressed in this work plan

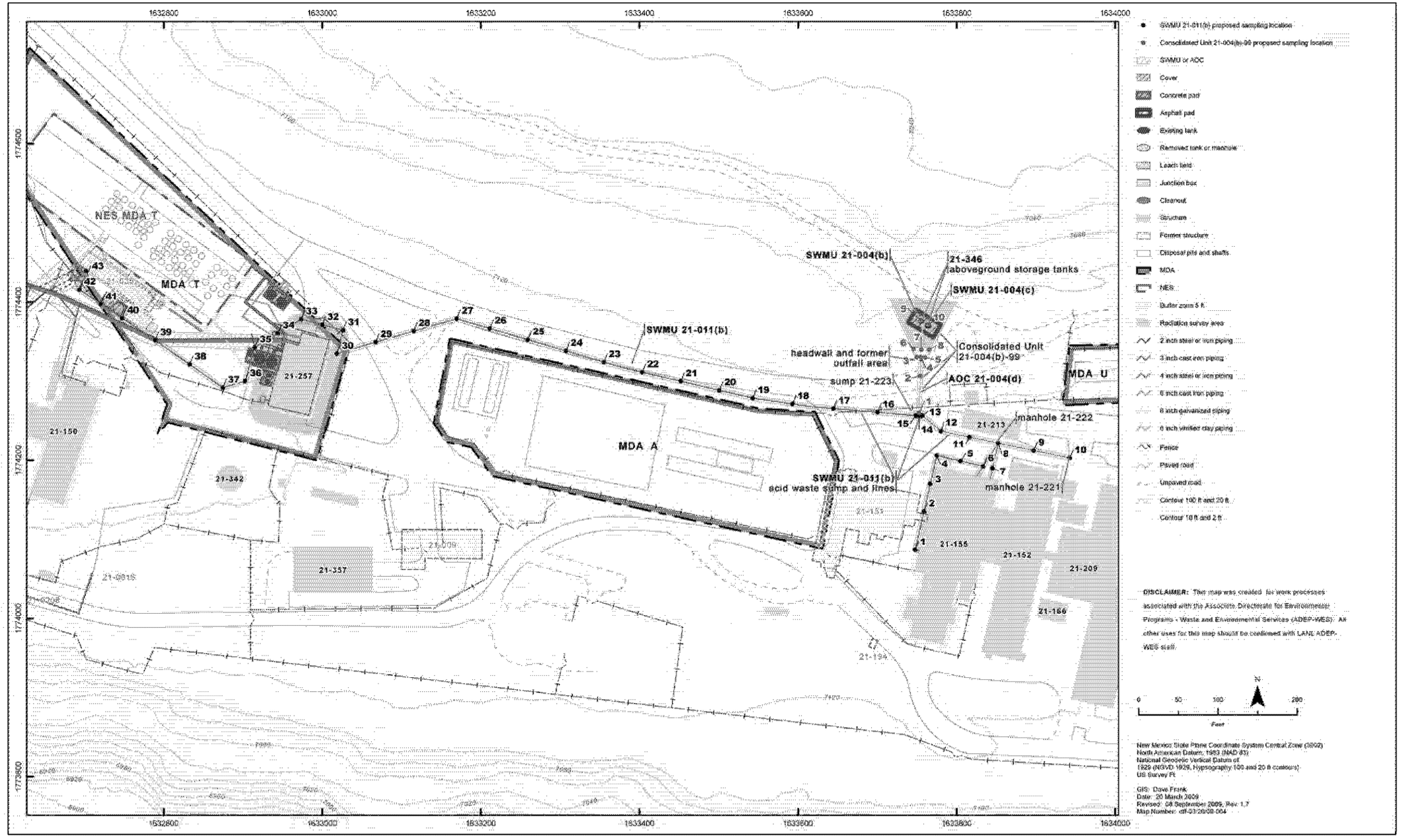

Figure 4.1-1 Proposed sampling at Consolidated Unit 21-004(b)-99 and SWMU 21-011(b) aboveground storage tanks, former outfall, sump, and piping

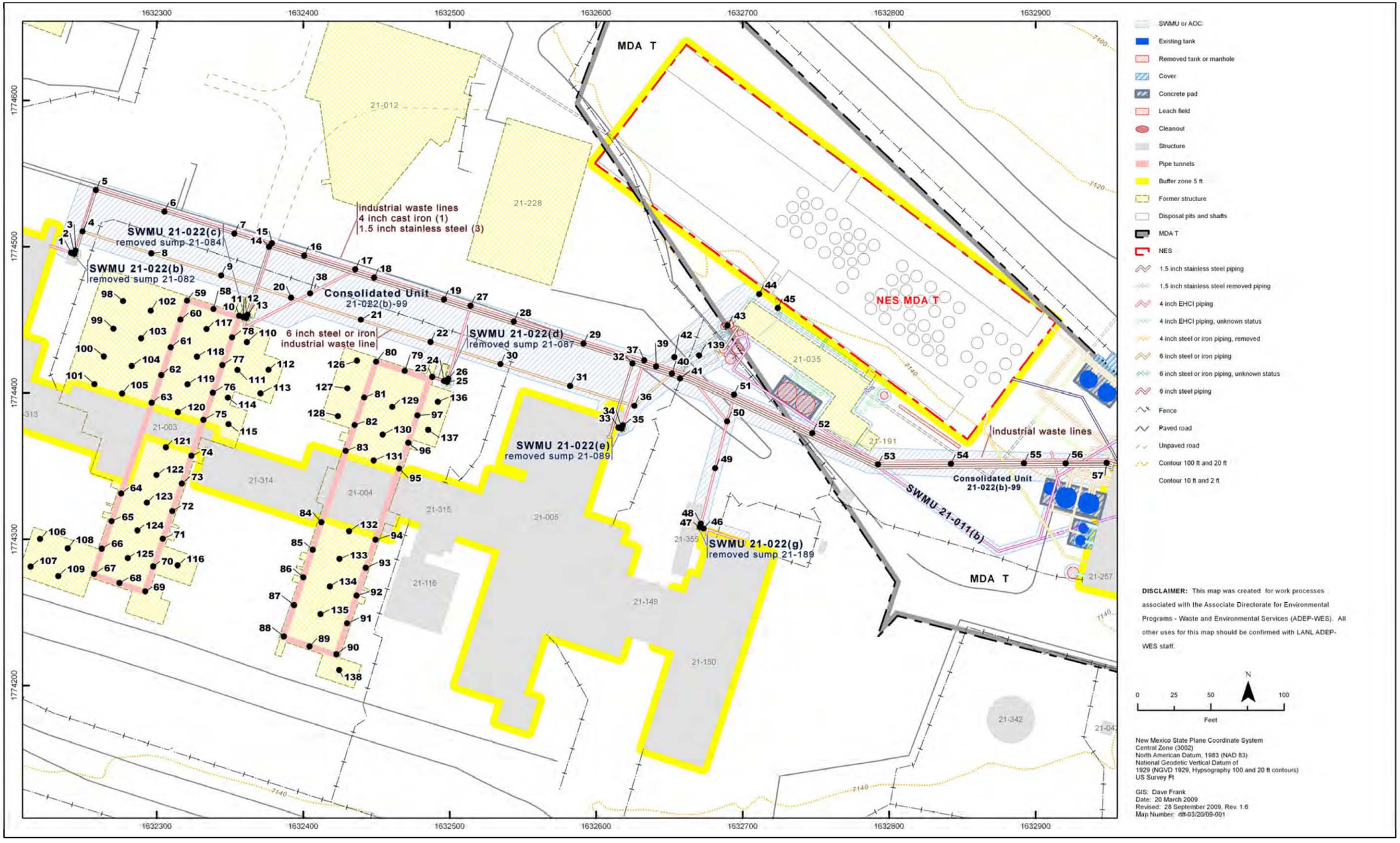

Figure 6.1-1 Proposed sampling at Consolidated Unit 21-002(b)-99, industrial waste lines and sumps

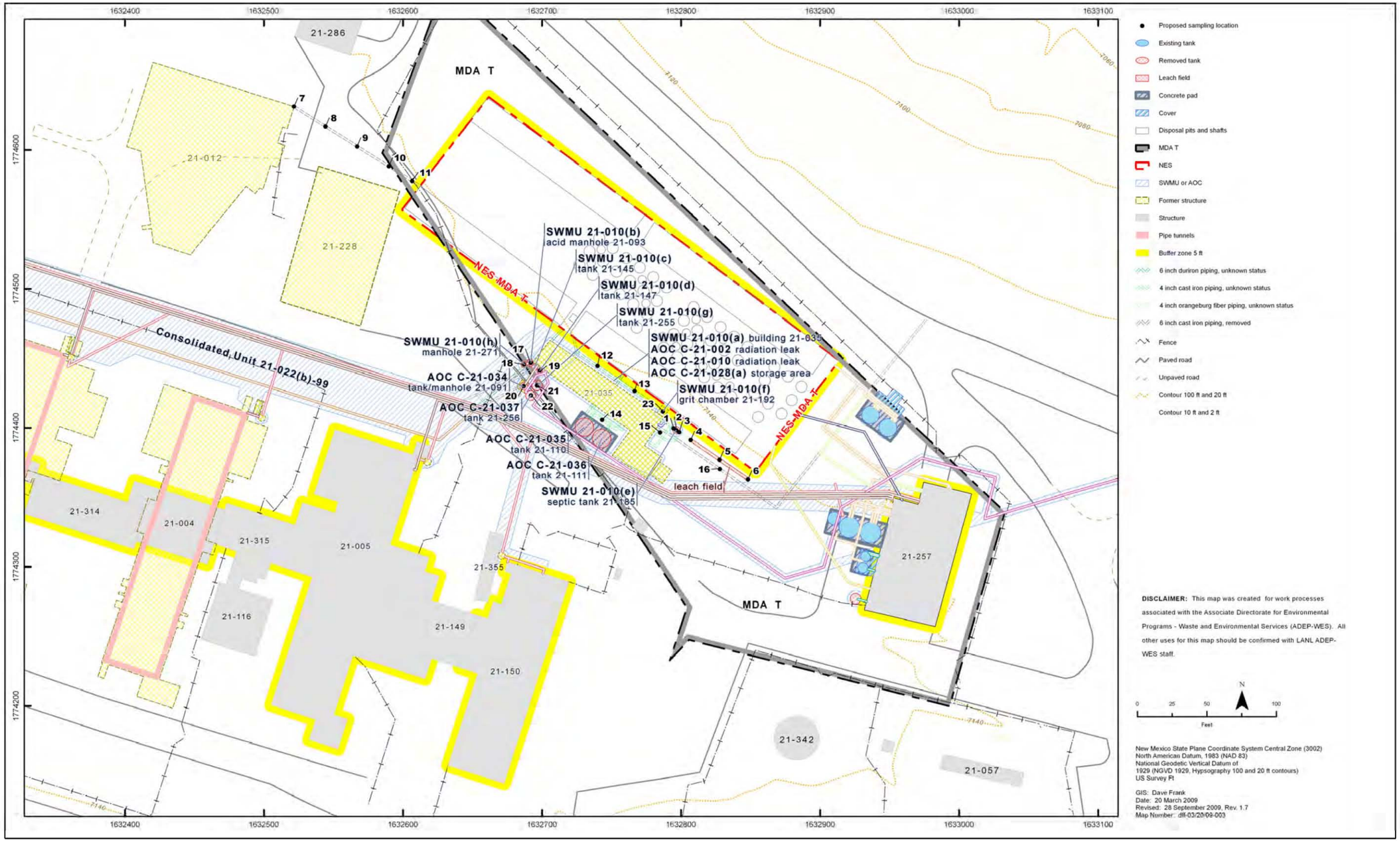

Figure 7.2-1 Proposed sampling at former building 21-035 area at MDA T

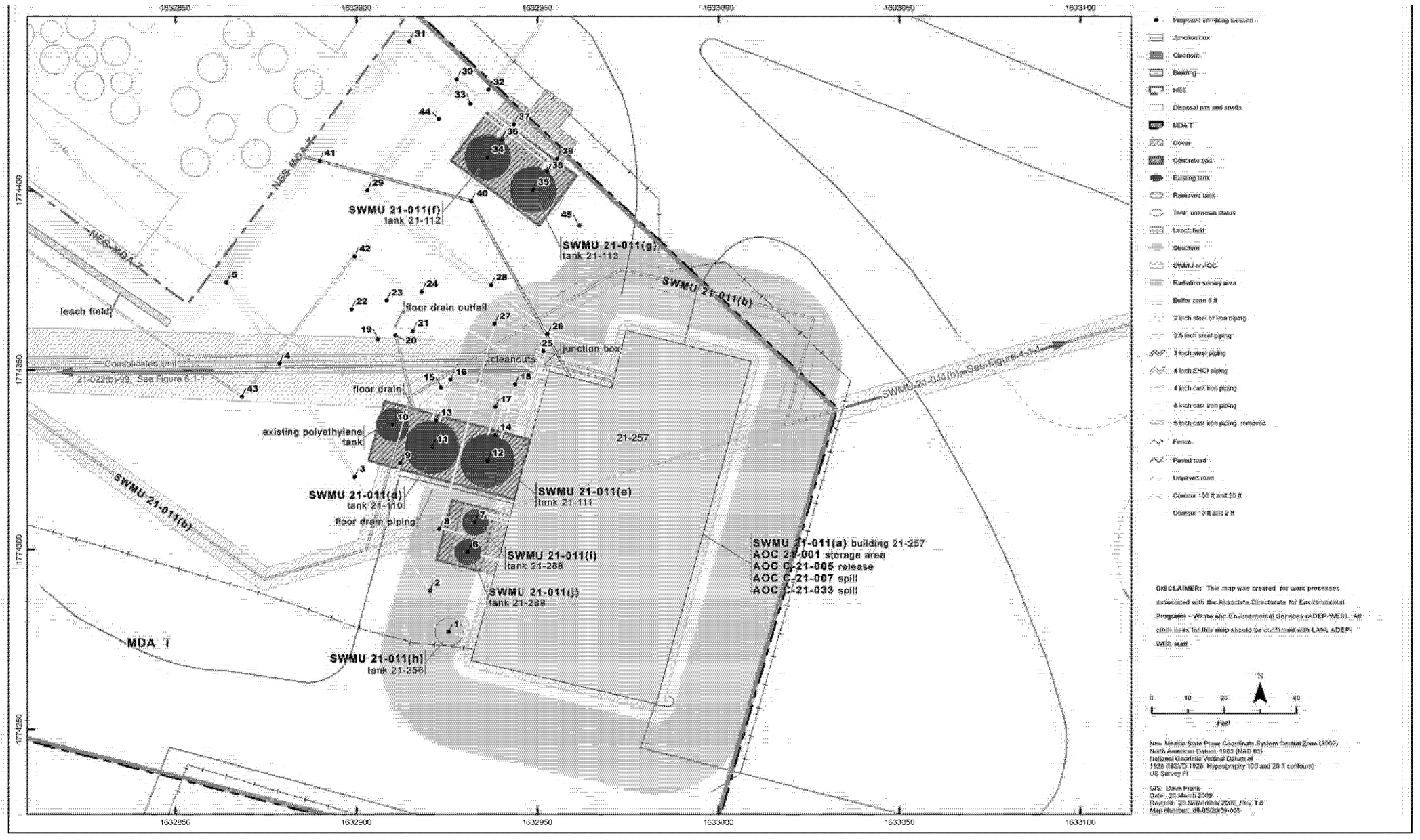

Figure 7.3-1 Proposed sampling at building 21-257 area at MDA T

Table 1.0-1
SWMUs, AOCs, and Consolidated Units Addressed in This Investigation Work Plan

SWMU, AOC, or Consolidated Unit	Site Description	Site Disposition	Site Status	Summary of Current Proposed Activities
DP East and DP West Sites				
Consolidated Unit 21-004(b)-99	Structure 21-346, aboveground overflow holding tanks [SWMU 21-004(b and c)], waste line, and outfall [(AOC 21-004(d)], at DP East.	Present	Site included in this investigation work plan	Tank and piping removal and sampling
SWMU 21-011(b)	Structure 21-223, acid waste sump and lines originating at DP East and terminating at MDA T.	Present	Site included in this investigation work plan	Sump and piping removal and sampling
Consolidated unit 21-022(b)-99	Structures 21-082, -084, -087, -089, and -189, waste sumps [SWMUs 21-022(b)-(e) & (g)] and industrial waste lines originating in DP West buildings 21-002, 21-003, 21-004, 21-005, and 21-150 and terminating at MDA T.	Sumps removed 1979-1980, lines present (LANL 1991, 007680, p. 18–40; Blackwell 1980, 085470, p. 2)	Site included in this investigation work plan	Piping removal and sampling
MDA T Sites Associated with Former Building 21-035 Area				
SWMU 21-010(a)	Former building 21-035, an industrial liquid waste treatment facility used for treating and disposing of contaminated liquid waste from plutonium and uranium-processing laboratories at DP Site since 1952.	Removed in 1968 (LANL 1983, 035510)	Investigation complete per NMED[a]	Pipe removal verification and sampling; if found, piping will be removed and sampled underneath
SWMU 21-010(b)	Structure 21-093, initially a water manhole that was changed to an acid valve pit manhole, located on the southwest corner of former building 21-035.	Likely[b] removed in 1968 (LANL 1983, 035510)	Investigation complete per NMED[a]	Structure removal verification and sampling; if found, structure will be removed and sampled underneath

Table 1.0-1 (continued)

SWMU, AOC, or Consolidated Unit	Site Description	Site Disposition	Site Status	Summary of Current Proposed Activities
SWMU 21-010(c)	Structure 21-145, a steel 500-gal. underground process tank located near the southwest corner of former building 21-035.	Likely removed in 1968 (LANL 1983, 035510)	Investigation complete per NMED[a]	No further investigation
SWMU 21-010(d)	Structure 21-147, a steel 500-gal. underground process tank located near the southwest corner of former building 21-035.	Likely removed in 1968 (LANL 1983, 035510)	Investigation complete per NMED[a]	Structure removal verification and sampling; if found, structure will be removed and sampled underneath
SWMU 21-010(e)	Structure 21-185, a 390-gal. sanitary waste septic tank and leach field located on the northeast corner of former building 21-035.	Likely removed in 1968 (LANL 1983, 035510)	Investigation complete per NMED[a]	Structure removal verification and sampling; if found, structure will be removed and sampled underneath
SWMU 21-010(f)	Structure 21-192, a grit chamber (8 ft long x 3 ft wide x 7 ft deep), constructed of reinforced concrete with an insulated built-up cover, located at the northeast corner of former building 21-035.	Likely removed in 1968 (LANL 1983, 035510)	Investigation complete per NMED[a]	Structure removal verification and sampling; if found, structure will be removed and sampled underneath
SWMU 21-010(g)	Structure 21-255, a 2000-gal. aboveground process tank located at the southwest corner of former building 21-035.	Removed in 1968 (LANL 1983, 035510)	Investigation complete per NMED[a]	Verification sampling
SWMU 21-010(h)	Structure 21-271, a process manhole located at the southwest corner of former building 21-035.	Likely removed in 1968 (LANL 1983, 035510)	Investigation complete per NMED[a]	Structure removal verification and sampling; if found, structure will be removed and sampled underneath
AOC C-21-002	Radionuclide leak from a waste storage tank to the surrounding soil near former building 21-035.	Exact location unknown (LANL 2004, 085641)	Investigation complete per NMED[a]	No further investigation
AOC C-21-010	Radiation leak at former building 21-035.	Exact location unknown (LANL 2004, 085641)	Investigation complete per NMED	No further investigation

Table 1.0-1 (continued)

SWMU, AOC, or Consolidated Unit	Site Description	Site Disposition	Site Status	Summary of Current Proposed Activities
AOC C-21-028(a)	An inactive satellite storage area utilized for the storage of acetone and Freon. Location of site is unknown. The Solid Waste Management Units report (LANL 1990, 007512) identifies this location as 21-121 near loading docks. The Rogers report (Rogers 1977, 005707) indicates 21-121 is the location of the distribution box between Absorption Beds 1 and 2.	Exact location unknown (LANL 2004, 085641)	Investigation complete per NMED[a]	No further investigation
AOC C-21-034	Structure 21-091, a 1000-gal. raffinate holding tank with manhole located at the southwest corner of former building 21-035.	Likely removed in 1961 (LANL 1983, 035510)	Investigation complete per NMED	Structure removal verification and sampling; if found, structure will be removed and sampled underneath
AOC C-21-035	Structure 21-110, an aboveground process water holding tank located on the south side of former building 21-035.	Removed from building 21-035, now located at building 21-257 [see SWMU 21-011(d and e)]	Investigation complete per NMED	No further investigation
AOC C-21-036	Structure 21-111, an aboveground process water holding tank located on the south side of former building 21-035.	Removed from building 21-035 location, now located at building 21-257 [see SWMU 21-011 (d and e)]	Investigation complete per NMED	No further investigation
AOC C-21-037	Structure 21-256, a 2,000 gal. aboveground process tank located at the southwest corner of former building 21-035.	Removed from building 21-035 location, moved to building 21-257 in the late 1960s [see AOC 21-011(h)]	Investigation complete per NMED	Verification sampling

Table 1.0-1 (continued)

SWMU, AOC, or Consolidated Unit	Site Description	Site Disposition	Site Status	Summary of Current Proposed Activities
MDA T Sites Associated with Building 21-257				
SWMU 21-011(a)	Building 21-257, the current industrial liquid waste treatment facility constructed to treat liquid waste from DP site plutonium processing operations.	Present	Investigation complete per NMED	Footprint investigation delayed until building 21-257 D&D; will be addressed in Phase II work plan
SWMU 21-011 (d and e)	Structures 21-110 and 21-111, two 13,500-gal. aboveground process water holding tanks located on the west side of building 21-257.	Present	Investigation complete per NMED	Piping, concrete, and tank removal and sampling
SWMU 21-011 (f and g)	Structures 21-112 and 21-113, two 12,700-gal. effluent holding tanks located to the northwest of building 21-257.	Present	Investigation complete per NMED	Piping, concrete, and tank removal and sampling
AOC 21-011(h)	Structure 21-256, a 2000-gal. aboveground process tank located at the southwest corner of building 21-257.	Removed in 1986 (LANL 2006, 094151, p. 4)	Investigation complete per NMED	Piping removal verification and sampling
SWMU 21-011(i)	Structure 21-288, a 1000-gal. tank storing 50% sodium hydroxide located on the west side of building 21-257.	Present	Investigation complete per NMED	Piping, concrete, and tank removal and sampling
SWMU 21-011(j)	Structure 21-289, a 1600-gal. americium raffinate storage tank located on the west side of building 21-257.	Present	Investigation complete per NMED	Piping, concrete, and tank removal and sampling
AOC 21-001	A containerized radioactive sludge storage area located at the southwest corner of building 21-257.	Present	Investigation complete per NMED	Footprint and area adjoining 21-257 investigation delayed until building 21-257 D&D; will be addressed in Phase II work plan

Table 1.0-1 (continued)

SWMU, AOC, or Consolidated Unit	Site Description	Site Disposition	Site Status	Summary of Current Proposed Activities
AOC C-21-005	A release of americium-241 and plutonium-239 on the west side of building 21-257.	Present	Investigation complete per NMED	Footprint and area adjoining 21-257 investigation delayed until building 21-257 D&D; will be addressed in Phase II work plan
AOC C-21-007	A 1982 spill from a tank vent that released americium-241, plutonium-239, and uranium-233 to the surrounding area near building 21-257.	Present	Investigation complete per NMED	Footprint and area adjoining 21-257 investigation delayed until building 21-257 D&D; will be addressed in Phase II work plan
AOC C-21-033	A 1976 cement paste spill that occurred when radioactive cement was being pumped from building 21-257 to shafts located between Absorption Beds 1 and 3.	Present	Investigation complete per NMED	Footprint and area adjoining 21-257 investigation delayed until building 21-257 D&D; will be addressed in Phase II work plan
Waste line connecting former building 21-012 to MDA T	A 6-in. cast iron pipe that discharged fluids from the precipitron and filter areas of former filter building 21-012 to MDA T.	Likely removed in 1973 (Christensen et al. 1975, 005481)	Pipe area included in this investigation work plan	Piping removal verification and sampling; if found, piping will be removed and sampled

[a] No further sampling or investigation required for this SWMU/AOC per the approved investigation report (LANL 2006, 094151; NMED 2007, 095411), approved Phase II investigation work plan (NMED 2007, 095725), and associated correspondence regarding MDA T (LANL 2007, 095131; LANL 2007, 098503; NMED 2007, 098450).

[b] Likely removed' refers to the only evidence of removal being the engineering drawing index sheet documentation cited; reports documenting removal activities are unavailable or may not exist.

Table 2.3-1
Soil Screening Levels for Chemicals

COPC	Industrial Scenario[a] (mg/kg)	Construction Worker Scenario[a] (mg/kg)
Inorganic Chemicals		
Aluminum	1,130,000	40700
Antimony	454	124
Arsenic	17.7	65.4
Barium	224,000	4350
Beryllium	2260	144
Cadmium	1120	309
Chromium	14000[b]	449[c]
Cobalt	300[b]	na[d]
Copper	45400	12400
Cyanide (total)	22700	6190
Iron	795000	217000
Lead	800	800
Manganese	145000	463
Mercury	310[b]	63.6[e]
Nickel	22700	6190
Nitrate	1820000	496000
Perchlorate	795	217
Selenium	5680	1550
Silver	5680	1550
Thallium	74.9	20.4
Uranium	3410	929
Vanadium	5680	1550
Zinc	341000	92900
Organic Chemicals		
Acenaphthene	36700	18600
Acetone	851000	263000
Anthracene	183000	66800
Aroclor-1254	8.26	4.36
Aroclor-1260	8.26	75.8
Benzo(a)anthracene	23.4	213
Benzo(a)pyrene	2.34	21.3
Benzo(b)fluoranthene	23.4	213

Table 2.3-1 (continued)

COPC	Industrial Scenario[a] (mg/kg)	Construction Worker Scenario[a] (mg/kg)
Benzo(g,h,i)perylene	18300[f]	6680[f]
Benzo(k)fluoranthene	234	2060
Benzoic acid	240000	na
Bis(2-ethylhexl)phthalate	1370	4760
Butanone[2-]	369000	148000
Butylbenzylphthalate	9100[b]	na
Carbon tetrachloride	24.3	199
Chrysene	2340	20600
Dibenz(a,h)anthracene	2.34	21.3
Diethylphthalate	547000	191000
Dimethylphenol[2,4-]	13700	4760
Di-n-butylphthalate	68400	23800
Fluoranthene	24400	8910
Fluorene	24400	8910
Indeno(1,2,3-cd)pyrene	23.4	213
Isopropyltoluene[4-]	14900[g]	10300[g]
Methylene chloride	1090	10600
Methylnaphthalene[2-]	4100[b]	na
Methyl-2-pentanone[4-]	73300	23100
Naphthalene	252	702
Phenanthrene	20500	7150
Pyrene	18300	6680
Toluene	57900	21100
Trichlorofluoromethane	6760	5820
Trimethylbenzene[1,2,4-]	280	na

[a] Values from NMED (2009, 106420).

[b] Values from EPA regional screening tables (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

[c] Construction worker SSL is for hexavalent chromium.

[d] na = Not available.

[e] Construction worker SSL is for elemental mercury.

[f] Isopropylbenzene used as a surrogate.

[g] Pyrene used as a surrogate.

Table 2.3-2
Screening Action Levels for Radionuclides

COPCs	Industrial Scenario* (pCi/g)	Construction Worker Scenario* (pCi/g)
Americium-241	180	34
Cesium-137	23	18
Cobalt-60	5.1	4.1
Europium-152	11	9.1
Plutonium-238	240	40
Plutonium-239/240	210	36
Sodium-22	6.5	5.2
Strontium-90	1900	800
Tritium	440000	320000
Uranium-234	1500	220
Uranium-235	87	43
Uranium-238	430	160

* Values from LANL (2005, 088493).

Table 4.2-1
Proposed Sampling at Consolidated Unit 21-004(b)-99, Aboveground Storage Tanks and Former Outfall

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, Explosive Compounds, PCBs[a]
Lateral and vertical extent of contamination under outlet connection of sump 21-223	1	Under outlet pipe connection to north side of sump 21-223	0.0-1.0	X[b]	X	X	X	X	X	X	X	X	X	X	X	X	X	—[c]
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
Lateral and vertical extent of contamination under piping	2	Under outlet pipeline 50 ft from location 1	0.0-1.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
Lateral and vertical extent of contamination laterally from the outfall	3	5 ft west of location 4	0.0-0.5	—	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
Lateral and vertical extent of contamination at the outfall	4	0.5 ft downslope from headwall	0.0-0.5	—	X	X	X	X	X	X	X	X	X	X	X	X	X	X
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
			5.0-6.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Lateral and vertical extent of contamination laterally from the outfall	5	5 ft east of location 4	0.0-0.5	—	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
Lateral and vertical extent of contamination laterally from the outfall	6	10 ft west of location 7	0.0-0.5	—	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
Lateral and vertical extent of contamination downslope of the outfall	7	10 ft downslope of outfall	0.0-0.5	—	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—

Table 4.2-1 (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, Explosive Compounds, PCBs[a]
Lateral and vertical extent of contamination from the outfall	8	10 ft east of location 7	0.0-0.5	—	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
Vertical extent of contamination under western tank 21-346	9	Under asphalt under western tank	0.0-0.5	—	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			5.0-6.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
Vertical extent of contamination under eastern tank 21-346	10	Under asphalt under eastern tank	0.0-0.5	—	X	X	X	X	X	X	X	X	X	X	X	X	X	X
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
			5.0-6.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Lateral and vertical extent of contamination from the former outfall area to the aboveground tanks	TBD[d]	Up to 3 locations with the highest field-screening results >2 times area background	0.0-0.5	—	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—

[a] At least 20% of the total samples will be analyzed for dioxins, furans, explosives compounds, and PCBs (extended suite). If field-screening results identify locations with higher readings than those already selected for extended suite analyses, these locations will be analyzed for the extended suite instead.

[b] X = Analyzed for.

[c] — = Not analyzed for.

[d] TBD = To be determined. 20% of these should also be analyzed for dioxins, furans, explosive compounds, and PCBs.

Table 5.2-1
Proposed Sampling at SWMU 21-011(b), Acid Waste Lines and Sump

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrate	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Dioxins, Furans, Explosive Compounds, PCBs[a]
Lateral and vertical extent of contamination under piping	1	Under 2-in. steel/iron pipe exiting west side of bldg 21-155 at the 90 degree bend to the north	0.0-1.0 2.0-3.0	X[b] X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	—[c] —
Lateral and vertical extent of contamination under piping	2	Under 2-in. steel/iron pipe 50 ft north of location 1	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under piping	3	Under 2-in. steel/iron pipe approximately 35 ft north of location 2 (halfway between locations 2 and 4)	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under piping	4	Under 2-in. steel/iron pipe at 90 degree bend to the east	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X
Lateral and vertical extent of contamination under piping	5	Under 2-in. steel/iron pipe, halfway between locations 4 and 6, approximately 29 ft from location 4	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under piping	6	Under 2-in. steel/iron pipe connection to 4-in. steel/iron pipe 5 ft north of building 21-155	0.0-1.0 2.0-3.0	X X	X X	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, Explosive Compounds, PCBs
Lateral and vertical extent of contamination under piping	7	Under 4-in. steel/iron pipe exiting north end of bldg 21-155 approximately 10 ft east of location 6, 5 ft north of building 21-155	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under manhole	8	Under manhole 21-222 and associated piping	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X
Lateral and vertical extent of contamination under piping	9	Under acid waste line (6-in. case iron [CI] pipe) approximately 45 ft east of location 8 (halfway between locations 8 and 10)	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under piping	10	Under acid waste line (6-in. CI pipe) at the east end of the line at manhole 21-221	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under piping	11	Under acid waste line (6-in. CI pipe) approximately 40 ft west of location 8 (halfway between locations 8 and 12)	0.0-1.0 2.0-3.0	X X	X X	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, Explosive Compounds, PCBs
Lateral and vertical extent of contamination under piping	12	Under acid waste line (6-in. CI pipe) at bend to the north towards sump 21-223	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under sump connection to acid waste line	13	Under inlet pipe connection to sump 21-223	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under Sump 21-223	14	Under sump 21-223	0.0-1.0 5.0-6.0 10.0-11.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X
Lateral and vertical extent of contamination under sump connection to acid waste line	15	Under outlet pipe connection to sump 21-223	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under piping	16	Under 3-in. CI acid waste line 50 ft west of location 15	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under piping	17	Under 3-in. CI acid waste line 50 ft west of location 16	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under piping	18	Under 3-in. CI acid waste line 50 ft west of location 17	0.0-1.0 2.0-3.0	X X	X X	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, Explosive Compounds, PCBs
Lateral and vertical extent of contamination under piping	19	Under 3-in. CI acid waste line 50 ft west of location 18	0.0-1.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
Lateral and vertical extent of contamination under piping	20	Under 3-in. CI acid waste line 50 ft west of location 19	0.0-1.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
Lateral and vertical extent of contamination under piping	21	Under 3-in. CI acid waste line 50 ft west of location 20	0.0-1.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
Lateral and vertical extent of contamination under piping	22	Under 3-in. CI acid waste line 50 ft west of location 21	0.0-1.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
Lateral and vertical extent of contamination under piping	23	Under 3-in. CI acid waste line 50 ft west of location 22	0.0-1.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
Lateral and vertical extent of contamination under piping	24	Under 3-in. CI acid waste line 50 ft west of location 23	0.0-1.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
Lateral and vertical extent of contamination under piping	25	Under 3-in. CI acid waste line 50 ft west of location 24	0.0-1.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
Lateral and vertical extent of contamination under piping	26	Under 3-in. CI acid waste line 50 ft west of location 25	0.0-1.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			2.0-3.0	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, Explosive Compounds, PCBs
Lateral and vertical extent of contamination under piping	27	Under 3-in. CI acid waste line at bend toward building 21-257 approximately 50 ft west of location 26	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X
Lateral and vertical extent of contamination under piping	28	Under 3-in. CI acid waste line 50 ft SW of location 27	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under piping	29	Under 3-in. CI acid waste line 50 ft SW of location 28	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under piping	30	Under 3-in. CI acid waste line at bend to the north approximately 50 ft SW of location 29	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under piping	31	Under 3-in. CI acid waste line at 90 degree bend to the west, north of building 21-257	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X
Lateral and vertical extent of contamination under piping	32	Under 3-in. CI acid waste line approximately 30 ft from location 31 (halfway between locations 31 and 33)	0.0-1.0 2.0-3.0	X X	X X	X X	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, Explosive Compounds, PCBs
Lateral and vertical extent of contamination under piping	33	Under 3-in. CI acid waste line at bend to the SW around north side of building 21-257	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under piping	34	Under 3-in. CI acid waste line approximately 40 ft from location 33 (halfway between locations 33 and 35)	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under piping	35	Under 3-in. CI acid waste line at bend to the south	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under piping	36	Under 3-in. CI acid waste line at bend to the SW	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under piping	37	Under 3-in. CI acid waste line at bend to the NW toward removed building 21-035	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X
Lateral and vertical extent of contamination under piping	38	Under 3-in. CI acid waste line 50 ft west of location 37	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under piping	39	Under 3-in. CI acid waste line 50 ft west of location 38	0.0-1.0 2.0-3.0	X X	X X	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, Explosive Compounds, PCBs
Lateral and vertical extent of contamination under piping	40	Under 3-in. CI acid waste line 50 ft west of location 39	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under piping	41	Under 3-in. CI acid waste line approximately 40 ft west of location 40 (halfway between locations 40 and 42)	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under piping	42	Under 3-in. CI acid waste line at 90 degree bend to former building 21-035	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X
Lateral and vertical extent of contamination under piping	43	Under 3-in. CI acid waste line connection to former building 21-035	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X

[a] At least 20% of the total samples will be analyzed for dioxins, furans, explosives compounds, and PCBs (extended suite). If field-screening results identify locations with higher readings than those already selected for extended suite analyses, these locations will be analyzed for the extended suite instead.

[b] X = Analyzed for.

[c] — = Not analyzed for.

Table 6.2-1
Proposed Sampling at Consolidated Unit 21-022(b)-99, Industrial Waste Lines and Sumps

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	Asbestos	Dioxins, Furans, Explosive Compounds, PCBs[a]
Lateral and vertical extent of contamination under inlet connection of sump 21-082	1	Under inlet pipe connection to west side of former sump 21-082 (under fill if encountered)	0.0-1.0	X[b]	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—[c]
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
Vertical extent of contamination under former sump 21-082	2	Under former sump 21-082 (under fill, starting at approximately 15 ft bgs)	0.0-1.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	X
			5.0-6.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	X
			10.0-11.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	X
Lateral and vertical extent of contamination under outlet connection of sump 21-082	3	Under outlet pipe connection to north side of former sump 21-082 (under fill if encountered)	0.0-1.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
Lateral and vertical extent of contamination under piping	4	Under 90 degree connection of 6-in. steel/iron pipe (originating from former sump 21-082) and industrial waste line	0.0-1.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
Lateral and vertical extent of contamination under piping	5	Under 90 degree connection of 4-in. CI and 1.5 in. stainless steel (SS) pipes (originating from former sump 21-082) and industrial waste lines	0.0-1.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	X
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	X

Table 6.2-1 (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	Asbestos	Dioxins, Furans, Explosive Compounds, PCBs[a]
Lateral and vertical extent of contamination under piping	6	Under industrial waste lines 50 ft east of location 5	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	— —
Lateral and vertical extent of contamination under piping	7	Under industrial waste lines 50 ft east of location 6	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	— —
Lateral and vertical extent of contamination under piping	8	Under 6-in. steel/iron industrial waste line 50 ft east of location 4	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	— —
Lateral and vertical extent of contamination under piping	9	Under 6-in. steel/iron industrial waste line 50 ft east of location 8	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	— —
Lateral and vertical extent of contamination under connection to former bldg 21-003	10	Under pipe connection to former bldg 21-003 (under fill if encountered)	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	— —
Lateral and vertical extent of contamination under inlet connection of former sump 21-084	11	Under inlet pipe connection to west side of former sump 21-084 (under fill if encountered)	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	— —
Vertical extent of contamination under former sump 21-084	12	Under former sump 21-084 (under fill, starting at approximately 15 ft bgs)	0.0-1.0 5.0-6.0 10.0-11.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	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 6.2-1 (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	Asbestos	Dioxins, Furans, Explosive Compounds, PCBs[a]
Lateral and vertical extent of contamination under outlet connection of former sump 21-084	13	Under outlet pipe connection to north side of former sump 21-084 (under fill if encountered)	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	— —
Lateral and vertical extent of contamination under piping	14	Under 90 degree connection of 1.5-in. SS pipe (originating from former sump 21-084) and industrial waste line	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	X X
Lateral and vertical extent of contamination under piping	15	Under connection of 4-in. CI pipe (originating from former sump 21-084) and industrial waste line	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	— —
Lateral and vertical extent of contamination under piping	16[d]	Under industrial waste lines 50 ft east of location 7	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	— —
Lateral and vertical extent of contamination under piping	17	Under connection of 4-in. CI pipe (diagonal pipe originating from former sump 21-084) and industrial waste line approximately 40 ft east of location 16	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	— —
Lateral and vertical extent of contamination under piping	18[d]	Under industrial waste lines 50 ft east of location 16	0.0-1.0 2.0-3.0	X X	X X	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 6.2-1 (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	Asbestos	Dioxins, Furans, Explosive Compounds, PCBs[a]
Lateral and vertical extent of contamination under piping	19[d]	Under industrial waste lines 50 ft east of location 18	0.0-1.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
Lateral and vertical extent of contamination under piping	20	Under 6-in. steel/iron industrial waste line 50 ft east of location 9	0.0-1.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
Lateral and vertical extent of contamination under piping	21	Under 6-in. steel/iron industrial waste line 50 ft east of location 20	0.0-1.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
Lateral and vertical extent of contamination under piping	22	Under 6-in. steel/iron industrial waste line 50 ft east of location 21	0.0-1.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
Lateral and vertical extent of contamination under connection to former bldg 21-004	23	Under pipe connection to former bldg 21-004 (under fill if encountered)	0.0-1.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
Lateral and vertical extent of contamination under inlet connection of former sump 21-087	24	Under inlet pipe connection to west side of former sump 21-087 (under fill if encountered)	0.0-1.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
Vertical extent of contamination under former sump 21-087	25	Under former sump 21-087 location (under fill, starting at approximately 15 ft bgs)	0.0-1.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	X
			5.0-6.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	X
			10.0-11.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	X

Table 6.2-1 (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	Asbestos	Dioxins, Furans, Explosive Compounds, PCBs[a]
Lateral and vertical extent of contamination under outlet connection of former sump 21-087	26	Under outlet pipe connection to north side of former sump 21-087 (under fill if encountered)	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	— —
Lateral and vertical extent of contamination under piping	27	Under connection of 4-in. CI pipe and industrial waste line	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	X X
Lateral and vertical extent of contamination under piping	28[d]	Under industrial waste lines 50 ft east of location 19	0.0.-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	— —
Lateral and vertical extent of contamination under piping	29[d]	Under industrial waste lines 50 ft east of location 28	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	— —
Lateral and vertical extent of contamination under piping	30	Under 6-in. steel/iron industrial waste line 50 ft east of location 22	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	— —
Lateral and vertical extent of contamination under piping	31	Under 6-in. steel/iron industrial waste line 50 ft east of location 30	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	— —
Lateral and vertical extent of contamination under piping	32	Under 90 degree connection of 1.5-in. SS pipe (originating from building 21-005) and industrial waste line	0.0-1.0 2.0-3.0	X X	X X	X X	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 6.2-1 (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	Asbestos	Dioxins, Furans, Explosive Compounds, PCBs[a]
Lateral and vertical extent of contamination under inlet connection of former sump 21-089	33	Under inlet pipe connection to west side of former sump 21-089 (under fill if encountered)	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	— —
Vertical extent of contamination under former sump 21-089	34	Under former sump 21-089 (under fill, starting at approximately 15 ft bgs)	0.0-1.0 5.0-6.0 10.0-11.0	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	— — —	X X X
Lateral and vertical extent of contamination under outlet connection of former sump 21-089	35	Under outlet pipe connection to north side of former sump 21-089 (under fill if encountered)	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	— —
Lateral and vertical extent of contamination under piping	36	Under 6-in. steel/iron industrial waste line approximately 45 ft east of location 31 at 45 degree bend	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	— —
Lateral and vertical extent of contamination under piping	37	Under connection of 4-in. CI pipe (originating from former sump 21-089) and industrial waste line	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	— —
Lateral and vertical extent of contamination under piping	38	Under 4-in. CI industrial waste line exiting former building 21-003 approximately 40 ft from location 17	0.0-1.0 2.0-3.0	X X	X X	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 6.2-1 (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	Asbestos	Dioxins, Furans, Explosive Compounds, PCBs[a]
Lateral and vertical extent of contamination under piping	39	Under connection of 1.5-in. SS industrial waste line and removed piping connected to former building 21-035	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	— —
Lateral and vertical extent of contamination under piping	40	Under connection of 1.5-in. SS industrial waste line and removed piping connected to former building 21-035	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	— —
Lateral and vertical extent of contamination under piping	41	Under connection of 1.5-in. SS industrial waste line and removed piping connected to former building 21-035	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	— —
Lateral and vertical extent of contamination under piping	42	Under connection of 4-in. CI pipe (originating from former sump 21-189) and removed piping connected to former building 21-035	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	— —
Lateral and vertical extent of contamination under piping	43	Under piping/pipe excavation area southwest of former building 21-035	0.0-1.0 2.0-3.0	X X	X X	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 6.2-1 (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	Asbestos	Dioxins, Furans, Explosive Compounds, PCBs[a]
Lateral and vertical extent of contamination under piping	44	Under western pipe (or at bottom of excavation if pipe not found) exiting north side of former building 21-035 which terminated in the NES area 5 ft from the NES boundary	0.0-1.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
Lateral and vertical extent of contamination under piping	45	Under pipe (or at bottom of excavation if pipe not found) exiting north side of former building 21-035 which terminated in the NES area 5 ft from the NES boundary approximately 17 ft east of location 44	0.0-1.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
Lateral and vertical extent of contamination under inlet connection of former sump 21-189	46	Under the inlet pipe connection to the east side of former sump 21-189 (under fill if encountered)	0.0-1.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
Vertical extent of contamination under former sump 21-189	47	Under former sump 21-189 (under fill, starting at approximately 15 ft bgs)	0.0-1.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	X
			5.0-6.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	X
			10.0-11.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	X

Table 6.2-1 (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	Asbestos	Dioxins, Furans, Explosive Compounds, PCBs[a]
Lateral and vertical extent of contamination under outlet connection of former sump 21-189	48	Under the outlet pipe connection to the north side of former sump 21-189 (under fill if encountered)	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	— —
Lateral and vertical extent of contamination under piping	49	Under 4-in. CI piping (originating from former sump 21-189) halfway between locations 48 and 50 (approximately 45 ft north of location 48)	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	— —
Lateral and vertical extent of contamination under piping	50	Under 4-in. CI piping originating from former sump 21-189 approximately 25 ft north of location 49 at pipe intersection	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	— —
Lateral and vertical extent of contamination under piping	51	Under connection of 4-in. CI pipe (originating from former sump 21-189) and industrial waste line	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	X X
Lateral and vertical extent of contamination under piping	52[d]	Under industrial waste lines 50 ft east of location 51	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	— —
Lateral and vertical extent of contamination under piping	53[d]	Under bend of industrial waste lines toward building 21-257	0.0-1.0 2.0-3.0	X X	X X	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 6.2-1 (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	Asbestos	Dioxins, Furans, Explosive Compounds, PCBs[a]
Lateral and vertical extent of contamination under piping	54[d]	Under industrial waste lines 50 ft east of location 53	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	— —
Lateral and vertical extent of contamination under piping	55[d]	Under industrial waste lines 50 ft east of location 54	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	— —
Lateral and vertical extent of contamination under piping	56[d]	Under industrial waste lines halfway between 55 and 57 (approximately 30 ft east of location 55)	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	— —
Lateral and vertical extent of contamination under piping	57[d]	Under industrial waste lines connection with junction box at northwest corner of building 21-257 (at least 5 ft from the building structure)	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	— —
Lateral and vertical extent of contamination under piping	58	Under pipe tunnel center of north side of removed building 21-003 (approximately 18 ft east of location 59)	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under piping	59	Under pipe tunnel at NW corner of removed building 21-003	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X
Lateral and vertical extent of contamination under piping	60	Under west pipe tunnel of removed building 21-003 20 ft from location 61	5.0-6.0 7.0-8.0	X X	X X	X X	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 6.2-1 (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	Asbestos	Dioxins, Furans, Explosive Compounds, PCBs[a]
Lateral and vertical extent of contamination under piping	61	Under west pipe tunnel of removed building 21-003 20 ft from location 62	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under piping	62	Under west pipe tunnel of removed building 21-003 20 ft from location 63	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under piping	63	Under west pipe tunnel of removed bldg 21-003 5 ft north of remaining building 21-003	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under piping	64	Under west pipe tunnel of removed bldg 21-003 5 ft south of remaining building 21-003	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X
Lateral and vertical extent of contamination under piping	65	Under west pipe tunnel of removed building 21-003 20 ft from location 64	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under piping	66	Under west pipe tunnel of removed building 21-003 20 ft from location 65	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under piping	67	Under west pipe tunnel at SW corner of removed building 21-003	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X
Lateral and vertical extent of contamination under piping	68	Under south pipe tunnel halfway between locations 67 and 69 (approximately 18 ft from location 67)	5.0-6.0 7.0-8.0	X X	X X	X X	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 6.2-1 (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	Asbestos	Dioxins, Furans, Explosive Compounds, PCBs[a]
Lateral and vertical extent of contamination under piping	69	Under east pipe tunnel at SE corner of removed building 21-003	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X
Lateral and vertical extent of contamination under piping	70	Under east pipe tunnel of removed building 21-003 20 ft from location 71	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under piping	71	Under east pipe tunnel of removed building 21-003 20 ft from location 72	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under piping	72	Under east pipe tunnel of removed building 21-003 20 ft from location 73	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under piping	73	Under east pipe tunnel of removed building 21-003 20 ft from location 74	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under piping	74	Under east pipe tunnel of removed bldg 21-003 5 ft south of remaining building 21-003	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under piping	75	Under east pipe tunnel of removed bldg 21-003 5 ft north of remaining building 21-003	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under piping	76	Under east pipe tunnel of removed building 21-003 20 ft from location 75	5.0-6.0 7.0-8.0	X X	X X	X X	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 6.2-1 (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	Asbestos	Dioxins, Furans, Explosive Compounds, PCBs[a]
Lateral and vertical extent of contamination under piping	77	Under east pipe tunnel of removed building 21-003 20 ft from location 76	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under piping	78	Under east pipe tunnel of removed building 21-003 20 ft from location 77	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under piping	79	Under pipe tunnel center of north side of removed building 21-004 (approximately 18 ft from location 80)	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under piping	80	Under pipe tunnel at NW corner of removed building 21-004	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X
Lateral and vertical extent of contamination under piping	81	Under west pipe tunnel of removed building 21-004 20 ft from location 82	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under piping	82	Under west pipe tunnel of removed building 21-004 20 ft from location 83	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under piping	83	Under west pipe tunnel of removed bldg 21-004 5 ft north of remaining building 21-004	5.0-6.0 7.0-8.0	X X	X X	X X	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 6.2-1 (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	Asbestos	Dioxins, Furans, Explosive Compounds, PCBs[a]
Lateral and vertical extent of contamination under piping	84	Under west pipe tunnel of removed bldg 21-004 5 ft south of remaining building 21-004	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under piping	85	Under west pipe tunnel of removed building 21-004 20 ft from location 84	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under piping	86	Under west pipe tunnel of removed building 21-004 20 ft from location 85	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under piping	87	Under west pipe tunnel of removed building 21-004 20 ft from location 86	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under piping	88	Under west pipe tunnel at SW corner of removed building 21-004	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X
Lateral and vertical extent of contamination under piping	89	Under south pipe tunnel halfway between locations 88 and 90 (approximately 18 ft from location 88)	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under piping	90	Under east pipe tunnel at SE corner of removed building 21-004	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X
Lateral and vertical extent of contamination under piping	91	Under east pipe tunnel of removed building 21-004 20 ft from location 92	5.0-6.0 7.0-8.0	X X	X X	X X	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 6.2-1 (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	Asbestos	Dioxins, Furans, Explosive Compounds, PCBs[a]
Lateral and vertical extent of contamination under piping	92	Under east pipe tunnel of removed building 21-004 20 ft from location 93	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under piping	93	Under east pipe tunnel of removed building 21-004 20 ft from location 94	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under piping	94	Under east pipe tunnel of removed bldg 21-004 5 ft south of remaining building 21-004	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under piping	95	Under east pipe tunnel of removed bldg 21-004 5 ft north of remaining building 21-005	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under piping	96	Under east pipe tunnel of removed building 21-004 20 ft from location 95	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under piping	97	Under east pipe tunnel of removed building 21-004 20 ft from location 96	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under piping	98	Under former building 21-003 footprint, NW side, 40 ft NW of location 60	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	— —
Lateral and vertical extent of contamination under piping	99	20 ft south of location 98	5.0-6.0 7.0-8.0	X X	X X	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 6.2-1 (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	Asbestos	Dioxins, Furans, Explosive Compounds, PCBs[a]
Lateral and vertical extent of contamination under piping	100	20 ft south of location 99	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	— —
Lateral and vertical extent of contamination under piping	101	20 ft south of location 100	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	— —
Lateral and vertical extent of contamination under piping	102	20 ft east of location 98	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	— —
Lateral and vertical extent of contamination under piping	103	20 ft south of location 102	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	— —
Lateral and vertical extent of contamination under piping	104	20 ft south of location 103	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	— —
Lateral and vertical extent of contamination under piping	105	20 ft south of location 104	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	— —
Lateral and vertical extent of contamination under piping	106	SW addition to former building 21-003, NW corner	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	— —
Lateral and vertical extent of contamination under piping	107	20 ft south of location 106	5.0-6.0 7.0-8.0	X X	X X	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 6.2-1 (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	Asbestos	Dioxins, Furans, Explosive Compounds, PCBs[a]
Lateral and vertical extent of contamination under piping	108	20 ft east of location 106	5.0-6.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
			7.0-8.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
Lateral and vertical extent of contamination under piping	109	20 ft south of location 108	5.0-6.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
			7.0-8.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
Lateral and vertical extent of contamination under piping	110	Northeast addition to former building 21-003, 10 ft east of location 78	5.0-6.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
			7.0-8.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
Lateral and vertical extent of contamination under piping	111	20 ft south of location 110	5.0-6.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
			7.0-8.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
Lateral and vertical extent of contamination under piping	112	20 ft east of location 111	5.0-6.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
			7.0-8.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
Lateral and vertical extent of contamination under piping	113	20 ft south of location 112	5.0-6.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
			7.0-8.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
Lateral and vertical extent of contamination under piping	114	20 ft south of location 111	5.0-6.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
			7.0-8.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
Lateral and vertical extent of contamination under piping	115	Approximately 15 ft east of location 75	5.0-6.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
			7.0-8.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—

Table 6.2-1 (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	Asbestos	Dioxins, Furans, Explosive Compounds, PCBs[a]
Lateral and vertical extent of contamination under piping	116	SE addition to former building 21-003 approximately 15 ft NE of location 70	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	— —
Lateral and vertical extent of contamination under piping	117	Approximately 18 ft east of location 60, along building 21-003 center axis	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	X X
Lateral and vertical extent of contamination under piping	118	20 ft south of location 117, along building 21-003 center axis	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	— —
Lateral and vertical extent of contamination under piping	119	20 ft south of location 118, along building 21-003 center axis	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	X X
Lateral and vertical extent of contamination under piping	120	20 ft south of location 119, 5 ft north of remaining building 21-003, along building 21-003 center axis	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	— —
Lateral and vertical extent of contamination under piping	121	5 ft south of remaining building 21-003, along building 21-003 center axis	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	— —
Lateral and vertical extent of contamination under piping	122	20 ft south of location 121, along building 21-003 center axis	5.0-6.0 7.0-8.0	X X	X X	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 6.2-1 (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	Asbestos	Dioxins, Furans, Explosive Compounds, PCBs[a]
Lateral and vertical extent of contamination under piping	123	20 ft south of location 122, along building 21-003 center axis	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	X X
Lateral and vertical extent of contamination under piping	124	20 ft south of location 123, along building 21-003 center axis	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	— —
Lateral and vertical extent of contamination under piping	125	20 ft south of location 124, along building 21-003 center axis	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	X X
Lateral and vertical extent of contamination under piping	126	Approximately 10 ft west of location 80, NW addition to former building 21-004	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	— —
Lateral and vertical extent of contamination under piping	127	20 ft south of location 126	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	— —
Lateral and vertical extent of contamination under piping	128	20 ft south of location 127	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	— —
Lateral and vertical extent of contamination under piping	129	20 ft north of location 130, along building 21-004 center axis	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	X X
Lateral and vertical extent of contamination under piping	130	20 ft north of location 131, along building 21-004 center axis	5.0-6.0 7.0-8.0	X X	X X	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 6.2-1 (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	Asbestos	Dioxins, Furans, Explosive Compounds, PCBs[a]
Lateral and vertical extent of contamination under piping	131	5 ft north of remaining building 21-004, center, approximately 18 ft east of location 83	5.0-6.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	X
			7.0-8.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	X
Lateral and vertical extent of contamination under piping	132	5 ft south of remaining building 21-004, along building 21-004 center axis	5.0-6.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
			7.0-8.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
Lateral and vertical extent of contamination under piping	133	20 ft south of location 132, along building 21-004 center axis	5.0-6.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	X
			7.0-8.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	X
Lateral and vertical extent of contamination under piping	134	20 ft south of location 133, along building 21-004 center axis	5.0-6.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
			7.0-8.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
Lateral and vertical extent of contamination under piping	135	20 ft south of location 134, along building 21-004 center axis	5.0-6.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	X
			7.0-8.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	X
Lateral and vertical extent of contamination under piping	136	NE addition to former building 21-004, approximately 20 ft NE of location 97	5.0-6.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
			7.0-8.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
Lateral and vertical extent of contamination under piping	137	20 ft south of location 136	5.0-6.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
			7.0-8.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—

Table 6.2-1 (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	Asbestos	Dioxins, Furans, Explosive Compounds, PCBs[a]
Lateral and vertical extent of contamination under piping	138	Southeast addition to former building 21-004	5.0-6.0 7.0-8.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	X X
Lateral and vertical extent of contamination under piping	139[d]	Industrial waste line excavation trench southeast of former building 21-035	0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —	X X

[a] At least 20% of the total samples will be analyzed for dioxins, furans, explosive compounds, and PCBs (extended suite). If field-screening results identify locations with higher readings than those already selected for extended suite analyses, these locations will be analyzed for the extended suite instead.

[b] X = Analyzed for.

[c] — = Not analyzed for.

[d] Samples to be collected from trench as indicated by field screening (i.e., north side, south side, center, etc.). If field-screening results are inconclusive, the center of the pipe trench will be sampled.

Table 7.2-1
Proposed Sampling at Former Building 21-035 Area at MDA T

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, Explosive Compounds, PCBs[a]
Lateral and vertical extent of contamination at former septic tank 21-185	1	Under inlet pipe connection to former septic tank 21-185	0.0-1.0	X[b]	X	X	X	X	X	X	X	X	X	X	X	X	X	—[c]
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
Vertical extent of contamination under former septic tank 21-185	2	Under center of former septic tank 21-185	0.0-1.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
			5.0-6.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
			10.0-11.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Lateral and vertical extent of contamination at former septic tank 21-185	3	Under outlet pipe connection to former septic tank 21-185	0.0-1.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
Vertical extent of contamination under leach field	4	Under the leach field area, west end	0.0-1.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			5.0-6.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
Vertical extent of contamination under leach field	5	Under the leach field area, center	0.0-1.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
			5.0-6.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Vertical extent of contamination under leach field	6	Under the leach field area, east end	0.0-1.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			5.0-6.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—

Table 7.2-1 (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, Explosive Compounds, PCBs[a]
Lateral and vertical extent of contamination under pipe connecting former building 21-012 and MDA T	7	Under outlet pipe connection to former building 21-012	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X
Lateral and vertical extent of contamination under pipe connecting former building 21-012 and MDA T	8	Under outlet pipe 50 ft from location 7	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under pipe connecting former building 21-012 and MDA T	9	Under outlet pipe 50 ft from location 8	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under pipe connecting former building 21-012 and MDA T	10	Under outlet pipe 50 ft from location 9	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under pipe connecting former building 21-012 and MDA T	11	Under outlet pipe 5 ft from NES boundary	0.0-1.0 2.0-3.0	X X	X X	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 7.2-1 (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, Explosive Compounds, PCBs [a]
Lateral and vertical extent of contamination under piping north of former building 21-035	12 [d]	Under piping (or at bottom of excavation if pipe not found) north of former building 21-035, highest field-screening location	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under piping north of former building 21-035	13 [d]	Under piping (or at bottom of excavation if pipe not found) north of former building 21-035, second highest field-screening location	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under piping south of former building 21-035 north of former tanks 21-110 and 21-211	14 [d]	Under piping (or at bottom of excavation if pipe not found) south of former building 21-035, highest field-screening location	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X
Lateral and vertical extent of contamination under piping east of former building 21-035	15 [d]	Under piping (or at bottom of excavation if pipe not found) east of former building 21-035, highest field-screening location	0.0-1.0 2.0-3.0	X X	X X	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 7.2-1 (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, Explosive Compounds, PCBs[a]
Lateral and vertical extent of contamination under removed piping south of leach field	16[d]	Under removed piping south of leach field, highest field-screening location	0.0-1.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
Vertical extent under manhole structure	17	Under removed buried structure 21-093	0.0-1.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			5.0-6.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			10.0-11.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
Vertical extent under manhole structure	18	Under removed buried structure 21-271	0.0-1.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			5.0-6.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			10.0-11.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
Vertical extent under tank structure	19	Under removed buried structure 21-147	0.0-1.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
			5.0-6.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
			10.0-11.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Vertical extent under manhole/tank structure	20	Under removed buried structure 21-091	0.0-1.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			5.0-6.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			10.0-11.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
Vertical extent of contamination under removed tank	21	Under removed aboveground structure 21-255	0.0-0.5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			5.0-6.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—

Table 7.2-1 (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, Explosive Compounds, PCBs [a]
Vertical extent of contamination under removed tank	22	Under removed aboveground structure 21-256	0.0-0.5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			5.0-6.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
Vertical extent under grit chamber	23	Under removed buried structure 21-192	0.0-1.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			5.0-6.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			10.0-11.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—

[a] At least 20% of the total samples will be analyzed for dioxins, furans, explosive compounds, and PCBs (extended suite). If field-screening results identify locations with higher readings than those already selected for extended suite analyses, these locations will be analyzed for the extended suite instead.

[b] X = Analyzed for.

[c] — = Not analyzed for.

[d] Samples to be collected from trench as indicated by field screening (i.e., north side, south side, center, etc.). If field-screening results are inconclusive, the center of the pipe trench will be sampled.

Table 7.3-1
Proposed Sampling at Building 21-257 Area at MDA T

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, Explosive Compounds, PCBs[a]
Vertical extent of contamination under former tank 21-256	1	Under former tank 21-256	0.0-0.5 2.0-3.0 5.0-6.0	—[b] X X	X[c] X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X
Lateral and vertical extent of contamination under 2.5-in. steel piping	2	Under 2.5-in. steel piping exiting southwest side of building 21-257, at first bend approximately 15 ft from building 21-257	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X
Lateral and vertical extent of contamination under 2.5-in. steel piping	3	Under 2.5-in. steel piping exiting southwest side of building 21-257, 50 ft from location 2	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under 2.5-in. steel piping	4	Under 2.5-in. steel piping exiting southwest side of building 21-257, 50 ft from location 3	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under 2.5-in. steel piping	5	Under 2.5-in. steel piping exiting southwest side of building 21-257, 5 ft from NES boundary	0.0-1.0 2.0-3.0	X X	X X	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 7.3-1 (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, Explosive Compounds, PCBs
Vertical extent of contamination under tank 21-289	6	Under tank 21-289 beneath concrete containment area	0.0-0.5	—	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			5.0-6.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
Vertical extent of contamination under tank 21-288	7	Under tank 21-288 beneath concrete containment area	0.0-0.5	—	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			5.0-6.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
Lateral and vertical extent of contamination under floor drain piping	8	Under floor drain piping near tanks 21-288 and 21-289	0.0-1.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
Lateral and vertical extent of contamination under floor drain piping	9	Under floor drain piping near tank 21-110	0.0-1.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
Vertical extent of contamination under polyethylene tank	10	Under polyethylene tank under concrete containment area	0.0-0.5	—	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			5.0-6.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
Vertical extent of contamination under removed tank 21-110	11	Under tank 21-110 beneath concrete containment area	0.0-0.5	—	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			5.0-6.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
Vertical extent of contamination under removed tank 21-111	12	Under tank 21-111 beneath concrete containment area	0.0-0.5	—	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			5.0-6.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—

Table 7.3-1 (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, Explosive Compounds, PCBs
Lateral and vertical extent of contamination under inlet and outlet piping at tank 21-110	13	Under inlet and outlet piping connections to tank 21-110	0.0-1.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
Lateral and vertical extent of contamination under inlet and outlet piping at tank 21-111	14	Under inlet and outlet piping connections to tank 21-111	0.0-1.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
Lateral and vertical extent of contamination under inlet and outlet piping at tank 21-110	15	Under inlet and outlet piping bends north of tank 21-110	0.0-1.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
Lateral and vertical extent of contamination under inlet and outlet piping at tank 21-110	16	Under inlet and outlet piping bends north of tank 21-110	0.0-1.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
Lateral and vertical extent of contamination under inlet and outlet piping at tank 21-111	17	Under inlet and outlet piping bends north of tank 21-111	0.0-1.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—

Table 7.3-1 (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, Explosive Compounds, PCBs
Lateral and vertical extent of contamination under inlet and outlet piping at tank 21-111	18	Under inlet and outlet piping bends north of tank 21-111	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination at floor drain outfall	19	5 ft west of floor drain outfall pipe	0.0-0.5 2.0-3.0	— X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Vertical extent of contamination at floor drain outfall	20	0.5 ft downslope of floor drain outfall pipe	0.0-0.5 2.0-3.0 5.0-6.0	— X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X
Lateral and vertical extent of contamination at floor drain outfall	21	5 ft east of floor drain outfall pipe	0.0-0.5 2.0-3.0	— X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination at floor drain outfall	22	10 ft downslope and 10 ft west of the floor drain outfall pipe	0.0-0.5 2.0-3.0	— X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination at floor drain outfall	23	10 ft downslope of the floor drain outfall pipe	0.0-1.0 2.0-3.0	X X	X X	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 7.3-1 (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, Explosive Compounds, PCBs
Lateral and vertical extent of contamination at floor drain outfall	24	10 ft downslope and 10 ft east of the floor drain outfall pipe	0.0-0.5 2.0-3.0	— X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under 4-in. cast iron piping near junction box	25	Under 4-in. cast iron piping exiting the north side of the junction box at the northwest corner of building 21-257	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X
Lateral and vertical extent of contamination under 3-in. steel and 4-in. cast iron piping	26	Under 3-in. steel and 4-in. cast iron piping bends exiting the junction box at the northwest corner of building 21-257	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under 4-in. cast iron piping	27	Under 4-in. floor drain cast iron piping at 90 degree bend approximately 15 ft west of location 26	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Vertical extent of contamination under 4-in. cast iron piping	28	Under 4-in. floor drain cast iron piping exiting the northwest corner of building 21-257 at connection approximately 20 ft north of location 27	0.0-1.0 2.0-3.0	X X	X X	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 7.3-1 (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, Explosive Compounds, PCBs
Lateral and vertical extent of contamination under 4-in. cast iron piping	29	Under 4-in. cast iron piping exiting the northwest corner of building 21-257 at 90 degree bend	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X
Lateral and vertical extent of contamination under 4-in. cast iron piping	30	Under 4-in. cast iron piping approximately 50 ft from location 29 at t-connection near northern site boundary	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under 4-in. cast iron piping	31	Under 4-in. cast iron piping approximately 15 ft from location 30 and 5 ft from NES boundary	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X
Lateral and vertical extent of contamination under 4-in. cast iron piping	32	Under 4-in. cast iron piping at former connection to removed vitrified clay pipe outfall at site boundary	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X
Lateral and vertical extent of contamination under 4-in. cast iron piping	33	Under 4-in. cast iron inlet and outlet pipe 90 degree bends west of tank 21-112	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Vertical extent of contamination under tank 21-112	34	Under tank 21-112 beneath concrete containment area	0.0-0.5 2.0-3.0 5.0-6.0	— X X	X X X	X X X	X X X	X X X	X X X	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 7.3-1 (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, Explosive Compounds, PCBs
Vertical extent of contamination under tank 113	35	Under tank 21-113 beneath concrete containment area	0.0-0.5	—	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			5.0-6.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
Lateral and vertical extent of contamination under 4-in. cast iron piping	36	Under inlet and outlet piping connections to tank 21-112	0.0-1.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
Lateral and vertical extent of contamination under 4-in. cast iron piping	37	Under inlet and outlet piping approximately 6 ft northeast of location 36	0.0-1.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
Lateral and vertical extent of contamination under 4-in. cast iron piping	38	Under inlet and outlet piping connections to tank 21-113	0.0-1.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
Lateral and vertical extent of contamination under 4-in. cast iron piping	39	Under inlet and outlet piping approximately 6 ft northeast of location 38	0.0-1.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
Lateral and vertical extent of contamination under 3-in. steel piping	40	Under 3-in. steel piping exiting the northwest corner of 21-257 at bend	0.0-1.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
			2.0-3.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—

Table 7.3-1 (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, Explosive Compounds, PCBs
Lateral and vertical extent of contamination under 3-in. steel piping	41	Under 3-in. steel piping 5 ft from the NES boundary	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination under previously removed 6-in. cast iron piping	42	Under 6-in. cast iron piping at 90 degree bend to building 21-257	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X
Lateral and vertical extent of contamination under previously removed 6-in. cast iron piping	43	Under former 6-in. cast iron piping at 90 degree bend to former building 21-035	0.0-1.0 2.0-3.0	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	X X	— —
Lateral and vertical extent of contamination from tank overflow	44	10 ft west of tank 21-112	0.0-0.5 2.0-3.0 5.0-6.0	— X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	— — —
Lateral and vertical extent of contamination from tank overflow	45	10 ft east of tank 21-113	0.0-0.5 2.0-3.0 5.0-6.0	— X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X	X X X

[a] At least 20% of the total samples will be analyzed for dioxins, furans, explosive compounds, and PCBs (extended suite). If field-screening results identify locations with higher readings than those already selected for extended suite analyses, these locations will be analyzed for the extended suite instead.

[b] — = Not analyzed for.

[c] X = Analyzed for.

Table 8.0-1
Summary of Investigation Methods

Method	Summary
Spade and Scoop Collection of Soil Samples	This method is typically used to collect shallow (i.e., approximately 0–0.5 and 0–1.0 ft) soil or sediment samples from the surface or at the surface of an excavation area. The "spade-and-scoop" method involves digging a hole to the desired depth, as prescribed in the sampling and analysis plan, and collecting a discrete grab sample. The sample is typically placed in a clean, stainless-steel bowl for transfer into various sample containers.
Hand Auger Sampling	This method is typically used for sampling soil or sediment at depths of less than 10–15 ft but may in some cases be used for collecting samples of weathered or nonwelded tuff. The method involves hand-turning a stainless-steel bucket auger (typically 3–4 in. inner diameter [I.D.]), creating a vertical hole which can be advanced to the desired sample depth. When the desired depth is reached, the auger is decontaminated before advancing the hole through the sample depth. The sample material is transferred from the auger bucket to a stainless-steel sampling bowl before filling the various required sample containers.
Split-Spoon Core-Barrel Sampling	In this method, a stainless-steel core barrel (typically 4-in. I.D., 2.5 ft long) is advanced using a powered drilling rig. The core barrel extracts a continuous length of soil and/or tuff/rock that can be examined as a unit. The split-spoon core barrel is a cylindrical barrel split lengthwise so that the two halves can be separated to expose the core sample. Once extracted, the section of core is typically screened for radioactivity and organic vapors, photographed, and described in a geologic log. A portion of the core may then be collected as a discrete sample from the desired depth.
Headspace Vapor Screening	Individual soil, tuff, or sediment samples may be field-screened for VOCs by placing a portion of the sample in a plastic sample bag or in a glass container with a foil-sealed cover. The container is sealed and gently shaken and allowed to equilibrate for 5 minutes. The sample is then screened by inserting a PID probe into the container and measuring and recording any detected vapors. PIDs must use lamps with voltage of 11.6 eV or higher.
Handling, Packaging, and Shipping of Samples	Field team members seal and label samples before packing and ensure that the sample containers and the containers used for transport are free of external contamination. Field team members package all samples so as to minimize the possibility of breakage during transportation. After all environmental samples are collected, packaged, and preserved, a field team member transports the samples to either the SMO or an SMO-approved radiation screening laboratory under chain of custody. The SMO arranges for shipping of samples to analytical laboratories. The field team member must inform the SMO and/or the radiation screening laboratory coordinator when levels of radioactivity are in the action-level or limited-quantity ranges.
Sample Control and Field Documentation	The collection, screening, and transport of samples are documented on standard forms generated by the SMO. These include sample collection logs, chain-of-custody forms, and sample container labels. Collection logs are completed at the time of sample collection and are signed by the sampler and a reviewer who verifies the logs for completeness and accuracy. Corresponding labels are initialed and applied to each sample container, and custody seals are placed around container lids or openings. Chain-of-custody forms are completed and assigned to verify that the samples are not left unattended. Site attributes (e.g., former and proposed soil sampling locations, sediment sampling locations) are located by using a global positioning system. Horizontal locations will be measured to the nearest 0.5 ft. The survey results for this field event will be presented as part of the investigation report. Sample coordinates will be uploaded into the Sample Management Database.

Table 8.0-1 (continued)

Method	Summary
Field Quality Control Samples	Field quality control samples are collected as follows: *Field Duplicate*: At a frequency 10%; collected at the same time as a regular sample and submitted for the same analyses. *Equipment Rinsate Blank*: At a frequency of 10%; collected by rinsing sampling equipment with deionized water, which is collected in a sample container and submitted for laboratory analysis. *Trip Blanks*: Required for all field events that include the collection of samples for VOC analysis. Trip blanks containers of certified clean sand that are opened and kept with the other sample containers during the sampling process, one trip blank per cooler.
Field Decontamination of Drilling and Sampling Equipment	Dry decontamination is the preferred method to minimize generating liquid waste. Dry decontamination may include the use of a wire brush or other tool to remove soil or other material adhering to the sampling equipment, followed by use of a commercial cleaning agent (nonacid, waxless cleaners) and paper wipes. Dry decontamination may be followed by wet decontamination if necessary. Wet decontamination may include washing with a nonphosphate detergent and water, followed by a water rinse and a second rinse with deionized water. Alternatively, steam cleaning may be used.
Containers and Preservation of Samples	Specific requirements/processes for sample containers, preservation techniques, and holding times are based on EPA guidance for environmental sampling, preservation, and quality assurance. Specific requirements for each sample are printed on the sample collection logs provided by the SMO (size and type of container). All samples are preserved by placing in insulated containers with ice to maintain a temperature of 4˚C. Other requirements such as nitric acid or other preservatives may apply to different media or analytical requests.
Management, Characterization, and Storage of Investigation-Derived Waste	IDW is managed, characterized, and stored in accordance with an approved waste characterization strategy form that documents site history, field activities, and the characterization approach for each waste stream managed. Waste characterization shall be adequate to comply with on-site or off-site waste acceptance criteria. All stored IDW will be marked with appropriate signage and labels, as appropriate. Drummed IDW will be stored on pallets to prevent the containers from deterioration. Generators are required to reduce the volume of waste generated as much as technically and economically feasible. Means to store, control, and transport each potential waste type and classification shall be determined before field operations that generate waste begin. A waste storage area shall be established before generating waste. Waste storage areas located in controlled areas of the laboratory shall be controlled as needed to prevent inadvertent addition or management of wastes by unauthorized personnel. Each container of waste generated shall be individually labeled as to waste classification, item identification number, and radioactivity (if applicable), immediately following containerization. All waste shall be segregated by classification and compatibility to prevent cross-contamination. See Appendix B for additional information.

Table 8.0-2
Analytical Methods for Surface and Subsurface Soil/Tuff Samples

Analytical Method	Analytical Description	Analytical Suite
Inorganic Chemical Methods		
EPA Method 300	Ion chromatography	Anions (nitrate)
EPA SW-846: 9012A	Colorimetric	Cyanide
EPA SW-846: 6010B/6020	Inductively Coupled Plasma Emission Spectrometry —Atomic Emission Spectroscopy	Aluminum, antimony, arsenic, barium, beryllium, calcium, cadmium, cobalt, chromium, copper, iron, lead, magnesium, manganese, nickel, potassium, selenium, sodium, silver, thallium, vanadium, and zinc (TAL metals)
EPA SW-846:7471A	Mercury in solid or semisolid waste-manual CVAA	Mercury
EPA SW-846: 6850	Liquid Chromatography/Mass Spectrometry	Perchlorate
Organic Chemical Methods		
EPA SW-846:8270C	Gas Chromatograph/Mass Spectrometry	SVOCs
EPA SW-846:8260B	Gas Chromatograph/Mass Spectrometry	VOCs
EPA SW-846:8082	Gas Chromatograph	PCBs
SW-846:8321A-MOD	High explosives by high performance/liquid chromatography/thermospray/mass spectrometry or ultraviolet detection	Explosive Compounds
SW-846:8290	Dioxins/furans by high resolution gas chromatography/mass spectroscopy	Dioxins and Furans
Radionuclide Methods		
HASL-300	Chemical Separation/Alpha Spectrometry	Isotopic plutonium, isotopic uranium, and americium-241
EPA 901.1M	Gamma Spectroscopy	Cesium-134, cesium-137, cobalt-60, europium-152, sodium-22, and ruthenium-106
EPA 906	Liquid Scintillation	Tritium
EPA Method: 905.0	Radiochemical separation and beta counting	Strontium-90
Asbestos Method		
EPA Method 600-R-93-116	Microscopy	Asbestos

Table 10.0-1
Proposed Schedule for Delayed Sites Investigation Reports and Letter Work Plans

Activity Description	Date Complete
NMED Approval of Delayed Sites Investigation Work Plan	January 5, 2010
Award Contract to implement work plan	May 27, 2010
DP East Building Foot Print Letter Work Plan	May 11, 2010
Readiness Review and Mobilization	October 20, 2010
DP West Building 21-002 Building Foot Print Letter Work Plan	January 14, 2011
21-004(b)-99, 21-011(b), DP East Building Foot Print Fieldwork	April 8, 2011
Investigation Report 21-004(b)-99, 21-011(b), DP East Building Foot Prints	October 3, 2011
DP West Buildings 21-005, 21-150 Building Foot Print Letter Work Plan	May 15, 2012
DP West Building 21-257 Building Foot Print Letter Work Plan	October 1, 2012
21-022(b)-99, MDA T, DP West Building Foot Print Fieldwork	January 28, 2013
Investigation Report 21-022(b)-99, MDA T, DP West Building Foot Prints	June 19, 2014

Appendix A

Acronyms and Abbreviations,
Metric Conversion Table, and Data Qualifier Definitions

A-1.0 ACRONYMS AND ABBREVIATIONS

AK	acceptable knowledge
AOC	area of concern
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CI	case iron
COPC	chemical of potential concern
CST	Chemical Sciences and Technology
D&D	decontamination and demolition
DOE	U.S. Department of Energy
DP	Delta Prime
EHCI	extra heavy cast iron
EP	Environmental Programs Directorate
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration (Project)
GIS	geographic information system
GPS	global-positioning system
HIR	historical investigation report
i.d.	inner diameter
ID	identification
IDW	investigation-derived waste
LANL	Los Alamos National Laboratory
LLW	low level waste
MDA	Material Disposal Area
NES	nuclear environmental site
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NOI	Notice of Intent
OU	operable units
PCB	polychlorinated biphenyl
pH	potential of hydrogen
PID	photoionization detector
QA/QC	quality assurance/quality control

RCRA	Resource Conservation and Recovery Act
RFI	Resource Conservation and Recovery Act facility investigation
RPF	Records Processing Facility
SAL	screening action level
SMO	sample management office
SOP	standard operating procedure
SS	stainless steel
SSL	soil screening level
SVOCs	semivolatile organic compounds
SWMU	solid waste management unit
TA	technical area
TAL	target analyte list
TPH	total petroleum hydrocarbons
TRU	transuranic
TSTA	Tritium Systems Test Assembly
VOC	volatile organic compound
WAC	waste acceptance criteria
WCSF	waste characterization strategy form
WIPP	Waste Isolation Pilot Plant
WQCC	Water Quality Control Commission

A-2.0 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)

A-3.0 DATA QUALIFIER DEFINITIONS

Data Qualifier	Definition
U	The analyte was analyzed for but not detected.
J	The analyte was positively identified, and the associated numerical value is estimated to be more uncertain than would normally be expected for that analysis.
J+	The analyte was positively identified, and the result is likely to be biased high.
J-	The analyte was positively identified, and the result is likely to be biased low.
UJ	The analyte was not positively identified in the sample, and the associated value is an estimate of the sample-specific detection or quantitation limit.
R	The data are rejected as a result of major problems with quality assurance/quality control (QA/QC) parameters.

Appendix B

Management Plan for Investigation-Derived Waste

B-1.0 INTRODUCTION

This appendix describes how the investigation-derived waste (IDW) generated during the Delta Prime (DP) Site Aggregate Area Delayed Sites investigation will be managed by Los Alamos National Laboratory (the Laboratory). IDW may include, but is not limited to, drill cuttings, excavated media, excavated man-made debris, contact waste, decontamination fluids, and all other waste that potentially has come into contact with contaminants.

B-2.0 INVESTIGATION-DERIVED WASTE

All IDW generated during investigation activities will be managed in accordance with the current version of standard operating procedure (SOP) EP-ERSS-SOP-5022, Characterization and Management of Environmental Restoration (ER) Project Waste (http://www.lanl.gov/environment/all/qa/adep.shtml). This SOP incorporates the requirements of all applicable U.S. Environmental Protection Agency (EPA) and New Mexico Environment Department (NMED) regulations, U.S. Department of Energy orders, and Laboratory requirements.

The most recent version of the Laboratory's Hazardous Waste Minimization Report will be implemented during the investigation to minimize waste generation. The Hazardous Waste Minimization Report is updated annually as a requirement of Module VIII of the Laboratory's Hazardous Waste Facility Permit.

A waste characterization strategy form (WCSF) will be prepared and approved per requirements of EP-ERSS-SOP-5022, Characterization and Management of ER Project Waste. The WCSF will provide detailed information on IDW characterization methods, management, containerization, and potential volumes. Characterization of IDW is completed through review of sampling data and/or documentation, or by direct sampling of the IDW or the media being investigated (e.g., surface soil, subsurface soil, etc.). Waste characterization may include a review of historical information and process knowledge to identify whether listed hazardous waste may be present (i.e., due diligence reviews). If low levels of listed hazardous waste are identified, a "contained in" determination may be submitted for approval to NMED. Data currently available for the sites addressed in this plan do not identify polychlorinated biphenyl (PCB) concentrations greater than 1 mg/kg. However, if this investigation identifies PCB concentrations of greater than 1 mg/kg, the Laboratory may submit a request to EPA (with a copy to NMED) to manage the waste as PCB remediation waste.

Considerable material will be excavated during the remediation of:

- Consolidated Unit 21-004(b)-99, structure 21-346, aboveground overflow holding tanks [Solid Waste Management Units (SWMUs) 21-004(b and c)], waste line, and outfall Area [area of Concern, (AOC) 21-004(d)],
- SWMU 21-011(b), structure 21-223, acid waste sump and lines originating at DP East and terminating at Material Disposal Area (MDA) T,
- Consolidated Unit 21-022(b)-99, structures 21-082, 21-084, 21-087, 21-089, and 21-189, removed waste sumps [SWMUs 21-022(b)-(e) & (g)] and industrial waste lines originating in DP West buildings 21-002, 21-003, 21-004, 21-005, and 21-150 and terminating at MDA T; and
- MDA T outside of the nuclear environmental site (NES) boundary.

To facilitate the staging and segregation of the remediation waste, the Laboratory will submit area of contamination designation requests for the consolidated units, SWMUs, AOCs, and MDA T outside of the

NES boundary to NMED for approval. The request will specify the boundaries of the proposed areas of contamination and will describe the activities to be conducted within the boundaries.

Wastes will be containerized and placed in clearly marked and appropriately constructed waste accumulation areas. Waste accumulation area postings, regulated storage duration, and inspection requirements will be based on the type of IDW and its classification. Container and storage requirements will be detailed in the WCSF and approved before the waste is generated. Table B-2.0-1 summarizes how waste will be managed.

The waste streams that are anticipated to be generated during work plan implementation are described below.

B-2.1 Drill Cuttings

This waste stream consists of soil and tuff/rock chips generated by the drilling of boreholes for the intent of sampling. Drill cuttings include excess core sample not submitted for analysis and any returned samples sent for analysis. Drill cuttings will be containerized in 20 yd^3 roll-off containers, 55-gal. drums, B-12 containers, or other appropriate containers at the point of generation. If drilling is conducted within the boundary of an area of contamination, the drill cuttings will be managed within those boundaries. If drilling occurs outside the area of contamination boundaries, the initial management of the cuttings will rely on the data from previous investigations and/or process knowledge. Drill cuttings will be managed in secure, designated areas appropriate to the type of the waste. If new analytical data changes the expected waste category, the waste will be managed in accumulation areas appropriate to the final waste determination. Cuttings will be land applied if they meet the criteria in the NMED-approved Notice of Intent (NOI) Decision Tree for Land Application of Investigation Derived Waste Solids from Construction of Wells and Boreholes. This waste stream will be characterized based either on direct sampling of the waste or on the results from core samples collected during drilling. If directly sampled, the following analyses will be performed: volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), explosive compounds (if site sampling indicates the presence of high explosives), radionuclides, total metals, and if needed, toxicity characteristic metals. Asbestos will be analyzed for in soil/tuff generated by drilling under the former pipe tunnels at former buildings 21-003 and 21-004. Other constituents may be analyzed as necessary to meet the waste acceptance criteria (WAC) for a receiving facility. The Laboratory expects most cuttings will be land applied, disposed of as a low-level waste (LLW) at Technical Area 54 (TA-54), Area G. If screening indicates transuranic (TRU) levels of contamination, the work will be stopped, NMED notified, and an evaluation of how to proceed will be developed.

B-2.2 Excavated Environmental Media

Layback and overburden spoils (including environmental media mixed with buried debris) will consist of soil and tuff removed from within or adjacent to (e.g., from benching to stabilize a trench) the sites to be excavated. This material will be field screened for radioactivity and organic vapors during the excavation process. If contamination is not detected during screening, the spoils will be stored either in roll-off bins, other suitable containers, or on the ground surface with appropriate best management practices. If field screening indicates the potential for contamination, the layback and overburden spoils will be placed in roll-off bins or other suitable containers. The spoils will remain within the area of contamination boundary of the consolidated unit or SWMU from which spoils were excavated, awaiting analytical results. Samples of the spoils will be collected as the spoils are excavated and composited, if appropriate (one composite sample for every 20 to 50 yd^3, depending on the homogeneity of spoils). The samples will be analyzed for VOCs, target analyte list (TAL) metals, radionuclides, and toxicity characteristic metals, as needed. Other constituents may be analyzed as necessary to meet the WAC for a receiving facility. If process

knowledge, odors, or staining indicate the soils may be contaminated with petroleum products, the materials will also be analyzed for total petroleum hydrocarbons (TPH) and PCBs. If the spoils are determined to be suitable for reuse (i.e., is not hazardous waste and meets residential soil screening levels [SSLs] or screening action levels [SALs]), the Laboratory will segregate any man-made debris from the soil and will use this soil to backfill the excavations. If the spoils do not meet residential SSLs/SALs or are determined to be hazardous waste, they will be treated/disposed of at an authorized facility appropriate for the waste regulatory classification. Based on existing data, the Laboratory expects spoils that cannot be reused to be designated as industrial waste, LLW and disposed of at TA-54, Area G. If screening indicates TRU levels of contamination, the work will be stopped, NMED notified, and an evaluation of how to proceed will be developed.

B-2.3 Excavated Man-Made Debris

Excavated man-made debris will be generated from the removal of pipelines, a sump, aboveground storage tanks, concrete, asphalt, and any other encountered buried structures. Debris will be segregated as it is excavated based on factors such as the type of debris, the type of alternative treatment technology that would be used to treat the debris, field screening, process knowledge, and/or staining or odors. Where practicable, this waste stream will be characterized by direct sampling of the waste (e.g., concrete). Direct samples will be analyzed for VOCs, SVOCs, explosive compounds, radionuclides, total metals, and, if needed, toxicity characteristic metals. Other constituents may be analyzed as necessary to meet the WAC for a receiving facility or if process knowledge or visual observations indicate other contaminants may be present (e.g., PCBs or asbestos). For debris that is difficult to characterize; acceptable knowledge (AK) will be used whenever possible, supplemented by sampling as needed. Sampling methods will often have to be identified on a case-by-case basis by qualified sampling personnel and all decisions documented in the field activity notebook.

Waste minimization will be implemented, where practicable, through segregation of waste materials. Nonhazardous materials that can be shown to have no detectable activity for radionuclides or that can be decontaminated to meet this criterion, will be recycled, if practicable.

B-2.4 Estimated Debris by Site

The types of debris expected to be excavated from each of the sites are identified in the following subsections. It is likely that three separate areas of contamination will be requested: one near Consolidated Unit 21-004(b)-99 and the eastern portion of SWMU 21-011(b); one between MDA A and MDA T; and one on the west side of removed building 21-035 outside of the NES. Tables B-2.4-1 to B-2.4-4 estimate the waste volume by type generated at each site.

B-2.4.1 Excavated Waste from Consolidated Unit 21-004(b)-99

This waste stream will consist of components from the waste lines that connected the sump structure, 21-223, to the aboveground storage tanks structure, 21-346; as well as the concrete headwall and possibly contaminated soil that will be managed within the areas of contamination boundaries for the site.

The excavated materials will be placed initially in containers (e.g., roll-off bins) within the boundaries of an area of contamination. The Laboratory expects most of this waste to be designated as industrial waste that will be disposed of at an authorized off-site treatment/disposal facility or as LLW that will be disposed of at TA-54, Area G. If screening indicates TRU levels of contamination, the work will be stopped, NMED notified, and an evaluation of how to proceed will be developed.

B-2.4.2 Excavated Waste from SWMU 21-011(b)

This waste stream will consist of components from the acid waste sump, including the aboveground structure, and lines originating at DP East and terminating at MDA T (e.g., piping and metal), as well as asphalt, and possibly contaminated soil that will be managed within the areas of contamination boundaries for the site.

The excavated materials will be placed initially in containers (e.g., roll-off bins) within the boundaries of an area of contamination. The Laboratory expects most of this waste to be designated as industrial waste that will be disposed of at an authorized off-site treatment/disposal facility or as LLW that will be disposed of at TA-54, Area G. If screening indicates TRU levels of contamination, the work will be stopped, NMED notified, and an evaluation of how to proceed will be developed.

B-2.4.3 Excavated Waste from Consolidated Unit 21-022(b)-99

This waste stream will consist of the industrial waste lines (e.g., steel, iron, etc.) that connected the previously removed sumps (structures 21-082, 21-084, 21-087, 21-089, and 21-189) to their associated buildings (if accessible) at MDA T, and possibly contaminated soil that will be managed within the areas of contamination boundaries for the site.

The excavated materials will be placed initially in containers (e.g., roll-off bins) within the boundaries of an area of contamination. The Laboratory expects most of this waste to be designated as industrial waste that will be disposed of at an authorized off-site treatment/disposal facility or as LLW that will be disposed of at TA-54, Area G. If screening indicates TRU levels of contamination, the work will be stopped, NMED notified, and an evaluation of how to proceed will be developed. There is a possibility of asbestos-containing waste (e.g., soil, piping). This waste will be disposed of at Energy Solutions in Clive, Utah or another approved waste facility.

B-2.4.4 Excavated Waste from MDA T Outside of the NES

This waste stream will consist of seven aboveground tanks (6 metal and 1 polyethylene), piping, (e.g., stainless steel, clay, iron, Orangeburg, duriron, etc.), buried structures that may or may not be present (e.g., manholes and storage tanks), concrete, and possibly contaminated soil that will be managed within the areas of contamination boundaries for the site.

The excavated materials will be placed initially in containers (e.g., roll-off bins) within the boundaries of an area of contamination. The Laboratory expects most of this waste to be designated as industrial waste that will be disposed of at an authorized off-site treatment/disposal facility or as LLW that will be disposed of at TA-54, Area G. If screening indicates TRU levels of contamination, the work will be stopped, NMED notified, and an evaluation of how to proceed will be developed.

B-2.5 Contact Waste

The contact waste stream consists of potentially contaminated materials that “contacted” waste during sampling and excavation. This waste stream consists primarily of, but is not limited, to personal protective equipment such as gloves, decontamination wastes such as paper wipes, and disposable sampling supplies. Characterization of this waste stream will use AK of the waste materials, the methods of generation, and analysis of the material contacted (e.g., drill cuttings, soil, etc.). Initially, contact waste generated within an area of contamination will be placed in containers and managed within the area. If contact waste is generated at a location that is not within the area of contamination, the initial

management of waste will rely on the data from previous investigations and/or process knowledge. Contact waste will be managed in secure, designated areas appropriate to the type of the waste. If new analytical data changes the expected waste category, the waste will be managed in accumulation areas appropriate to the final waste determination. The Laboratory expects most of the contact waste to be designated as nonhazardous waste that will be disposed of at an authorized facility or as LLW that will be disposed of at TA-54, Area G. If screening indicates TRU levels of contamination, the work will be stopped, NMED notified, and an evaluation of how to proceed will be developed.

B-2.6 Decontamination Fluids

The decontamination fluids waste stream will consist of liquid wastes from decontamination activities (i.e., decontamination solutions and rinse waters). Consistent with waste minimization practices, the Laboratory employs dry decontamination methods to the extent possible. If dry decontamination cannot be performed, liquid decontamination wastes will be collected in containers at the point of generation. The decontamination fluids will be characterized through AK of the waste materials, the levels of contamination measured in the environmental media (e.g., the results of the associated drill cuttings) and, if necessary, direct sampling of the containerized waste. If directly sampled, the following analyses will be performed: VOCs, SVOCs, radionuclides, explosive compounds, total metals, and, if needed, toxicity characteristic metals. The Laboratory expects most of these wastes to be nonhazardous liquid waste or radioactive liquid waste that will be sent to one of the Laboratory's wastewater treatment facilities with a WAC allowing the waste to be received. If screening indicates TRU levels of contamination, the work will be stopped, NMED notified, and an evaluation of how to proceed will be developed.

B-3.0 REFERENCES

The following list includes all documents cited in this report. Parenthetical information following each reference provides the author(s), publication date, and ER ID. This information is also included in text citations. ER IDs are assigned by the Environmental Programs Directorate's Records Processing Facility (RPF) and are used to locate the document at the RPF and, where applicable, in the master reference set.

Copies of the master reference set are maintained at the NMED Hazardous Waste Bureau and the Directorate. The set was developed to ensure that the administrative authority has all material needed to review this document, and it is updated with every document submitted to the administrative authority. Documents previously submitted to the administrative authority are not included.

Crocker, S., and R.C. King, 1973. Excerpted pages from *Piping Handbook*, Fifth Edition, McGraw-Hill Book Company, United States. (Crocker and King 1973, 106782)

LANL (Los Alamos National Laboratory), February 2004. "Investigation Work Plan for Material Disposal Area T at Technical Area 21, Solid Waste Management Unit 21-016(a)-99," Los Alamos National Laboratory document LA-UR-04-0559, Los Alamos, New Mexico. (LANL 2004, 085641)

Sherwood, D.R., and D.J. Whistance, 1991. Excerpted pages from *The 'Piping Guide' for the Design and Drafting of Industrial Piping Systems*, Second Edition, Syentek Books Company, Inc., San Francisco, California. (Sherwood and Whistance 1991, 106781)

Table B-2.0-1
Summary of Estimated IDW Generated and Managed

Waste Stream	Expected Waste Type	Expected Disposition
Drill cuttings	Nonhazardous, LLW, TRU, or asbestos-containing	Land application, disposal at TA-54, Area G, shipped to the Waste Isolation Pilot Plant (WIPP), or Energy Solutions in Utah (for asbestos)
Excavated environmental media	Nonhazardous, LLW, TRU, or asbestos-containing	Reused as fill at the excavation location, disposed of at an approved off-site disposal facility or on-site at TA-54, Area G, shipped to the WIPP, or Energy Solutions in Utah (for asbestos)
Excavated man-made debris	Nonhazardous, industrial, LLW, TRU, or asbestos-containing	Recycle, disposed of at an approved off-site disposal facility or on-site at TA-54, Area G, shipped to the WIPP, or Energy Solutions in Utah (for asbestos)
Contact waste	Nonhazardous, LLW, or TRU	Disposed of at an approved off-site solid waste disposal facility or on-site at TA-54, Area G, or shipped to the WIPP
Decontamination fluids	Nonhazardous, LLW, or TRU	Treatment at an on-site wastewater treatment facility or shipped to the WIPP
Aboveground structures	Nonhazardous, industrial, LLW, or TRU	Recycle, disposed of at an approved off-site disposal facility or on-site at TA-54, Area G, or shipped to the WIPP

Table B-2.4-1
Pipe Waste Volume Calculations

SWMU/Consolidated Unit/Area	Type of Piping	Status	Pipe Length (ft)[a]	Radius of Pipe (ft)[b]	Volume of Piping (yd^3)[c]	Volume of piping by SWMU/Consolidated Unit/Area (yd^3)
21-004(b)-99	6-in. galvanized	present	47.17	0.28	0.43034	1.2
21-004(b)-99	6-in. vitrified clay	present	68.74	0.31	0.768621	
21-011(b)	2-in. steel or iron	present	187.45	0.1	0.218103	6.0
21-011(b)	3-in. cast iron	present	1351.38	0.15	3.537897	
21-011(b)	4-in. steel or iron	present	96.05	0.19	0.403448	
21-011(b)	6-in. cast iron	present	201.99	0.28	1.84259	
21-022(b)-99	1.5-in. stainless steel	present	1856.33	0.08	1.382357	11.2
21-022(b)-99	3-in. cast iron	present	22.28	0.15	0.058341	
21-022(b)-99	4-in. EHCI	present	1224.20	0.19	5.142171	
21-022(b)-99	4-in. EHCI	unknown	28.43	0.19	0.119414	
21-022(b)-99	6-in. steel or iron	present	427.22	0.28	3.897214	
21-022(b)-99	6-in. steel or iron	unknown	64.59	0.28	0.589227	
21-022(b)-99	2-in. cast iron	unknown	6.36	0.1	0.007399	
MDA T	2-in. steel or iron	present	212.17	0.1	0.246865	6.8
MDA T	2.5-in. steel	present	131.70	0.12	0.220668	
MDA T	3-in. EHCI	unknown	8.60	0.15	0.022514	
MDA T	3-in. steel	present	104.88	0.15	0.274581	
MDA T	4-in. cast iron	present	652.27	0.19	2.739814	
MDA T	4-in. cast iron	unknown	137.37	0.19	0.576995	
MDA T	4-in. EHCI	present	23.27	0.19	0.097762	
MDA T	4-in. orangeburg fiber	unknown	64.47	0.19	0.270818	
MDA T	4-in. vitrified clay	unknown	9.53	0.21	0.048917	
MDA T	6-in. cast iron	unknown	31.61	0.28	0.288325	
MDA T	6-in. galvanized	present	47.17	0.28	0.43034	

Table B-2.4-1 (continued)

SWMU/Consolidated Unit/Area	Type of Piping	Status	Pipe Length (ft) [a]	Radius of Pipe (ft) [b]	Volume of Piping (yd^3) [c]	Volume of Piping by SWMU/Consolidated Unit/Area (yd^3)
MDA T	6-in. cast iron	present	150.63	0.28	1.374115	6.8
MDA T	6-in. duriron	unknown	69.18	0.28	0.631113	

[a] Pipe length generated by ArcInfo database field.

[b] Vitrified-clay piping radii based on Crocker and King (1973, 106782, pp. 8-25-8-26). All other types of pipe radii based on standard schedule 40 steel piping, Sherwood and Whistance (1991, 106781, pp. 48-49).

[c] Volume of a cylinder = π x r2 x h.

Table B-2.4-2
Tank Waste Volume Calculations

SMWU/Consolidated Unit/Area	Steel Tank Structure Number	Radius (ft)[a]	Calculated Height (ft)[b]	Volume of Tank (yd^3)[c]	Volume of Tank by SMWU/Consolidated Unit/Area (yd^3)
MDA T	21-110	6	17.5	73.30	**306.13**
MDA T	21-111	6	17.5	73.30	
MDA T	21-112	6	17.5	73.30	
MDA T	21-113	6	17.5	73.30	
MDA T	21-288	2.72	5.77	4.97	
MDA T	21-289	2.72	9.23	7.94	
21-004(b)-99	21-346	4	9	16.76	**33.51**
21-004(b)-99	21-346	4	9	16.76	

[a] Obtained from finding a scale on drawing and measuring radius on drawing in the case of tanks 21-288 and 21-289. The radius was provided on engineering drawings for the other tanks.

[b] For tanks 21-288 and 21-289, height was calculated by taking volume divided by cross sectional area; for tanks 21-110, 21-111, 21-112 and 21-113, height was provided on engineering drawings. These 4 tanks are the same sizes and gallon capacity was not used in any of the calculations.

[c] Volume of a cylinder = $\pi \times r^2 \times h$.

Table B-2.4-3
Trench Media Waste Volume Calculations

SWMU/Consolidated Unit /Area	Estimated Area of Soil/Tuff/Gravel to be Removed from Trench and Disposed Of (ft^2)	Estimated Volume of Removed Soil/Tuff/Gravel (1 ft deep) (yd^3)
21-022(b)-99	6903	255
21-011(b)	3668	136
21-004(b)-99	235	9
MDA T	3858	143

Table B-2.4-4
Concrete, Asphalt, and Metal Waste Volume Calculations

SWMU/Consolidated Unit/Area	Volume of Asphalt (yd^3)	Volume of Concrete (yd^3)	Volume of Metal Sheeting (yd^3)
21-004(b)-99	26[a]	negligible	n/a[b]
21-011(b)	n/a	4[c]	2[d]
MDA T	n/a	39[e]	n/a

[a] Assumed to be 1 ft thick, area under aboveground tanks 21-346.

[b] n/a = Not applicable.

[c] Assumed to be 0.67 ft thick, area under sump 21-223.

[d] Assumed to be 0.2 ft thick, building covering sump 21-223.

[e] Assumed to be 0.5 ft thick in all places under remaining tanks at MDA T for estimation purposes; valve pit north of tanks 21-112 and 21-113 estimated to be 5 yd^3 of concrete based on engineering drawing (LANL 2004, 085641, Appendix B).