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Delta Prime East Building Footprints Letter Work Plan, Revision 1

Prepared by the Environmental Programs Directorate

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EXECUTIVE SUMMARY

This letter work plan addresses building footprints at Delta Prime (DP) East. The investigation of these sites is proposed in the Investigation Work Plan for Delta Prime Site Aggregate Area Delayed Sties. These buildings were connected to various solid waste management units, areas of concern (AOCs), and consolidated units, which are part of the DP Site Aggregate Area at Los Alamos National Laboratory.

This letter work plan proposes subsurface investigation sampling for the following building footprints after building/structure demolition is complete:

- Building 21-152, laboratory research building, associated air-handling structures 21-166, 21-167, and 21-370, and exhaust-stack structures 21-322, 21-323, and one unnumbered exhaust stack;
- Building 21-155, laboratory research building, cooling tower structures 21-220 and 21-420, warehouse building 21-213, and exhaust-stack structure 21-388; and
- Building 21-209, laboratory research building, exhaust-stack structure 21-466, and AOC 21-028(d), storage dock.

Sampling will be coordinated with demolition activities to determine if additional sampling locations are needed based on field-screening results.

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1.0 INTRODUCTION

Los Alamos National Laboratory (LANL or the Laboratory) Technical Area 21 (TA-21) Closure Project is investigating Delta Prime (DP) Site Aggregate Area sites potentially contaminated by past Laboratory operations. In accordance with the New Mexico Environment Department (NMED) approved Investigation Work Plan for Delta Prime Site Aggregate Area Delayed Sites (LANL 2009, 107119; NMED 2010, 108443), LANL is submitting this letter work plan outlining proposed investigations of the DP East building footprints following decontamination and demolition (D&D). The building footprints addressed in this plan are located on DP Mesa within TA-21 at DP East (Figure 1.0-1). The building footprints under investigation are designated as 21-152, 21-153, 21-155, 21-166, 21-167, 21-209, 21-213, 21-220, 21-370, and 21-420. Also included in this investigation are five exhaust stacks: structures 21-322, 21-323, 21-388, 21-466, and one unnumbered stack. These buildings were used for a variety of projects including initiator research during the Manhattan Project, the Rover Project (nuclear propulsion systems for long-range missiles), and the Tritium Systems Test Assembly (TSTA) project (tritium processing for fusion reactor research).

2.0 BACKGROUND AND SCOPE OF ACTIVITIES

The operational history, previous investigations, and/or field activities for each site are presented below. The work will be conducted in accordance with the field methods outlined in the approved Investigation Work Plan for Delta Prime Site Aggregate Area Delayed Sites (LANL 2009, 107119, section 8.0); (NMED 2010, 108443). Sampling outlined in this plan will occur after D&D is completed. The D&D scope includes removing all concrete slabs, piping, and subsurface structures within 10 ft below ground surface (bgs). In addition, soil contaminated with radionuclides greater than ten times the background readings will be removed to 10 ft bgs. The excavation area dimensions, as well as areas with elevated radiological field-screening results, will be recorded and used by the field teams performing the work outlined in this plan to finalize sampling locations and depths.

2.1 Building 21-152

2.1.1 Operational History

Building 21-152 was formerly named building 21-52 and was built in middle to late 1945. It was originally a laboratory for polonium initiator research and production. This high-temperature chemistry research continued through work on Project Rover, in which the building supported the project as a production facility. Project Rover was a program to develop the technology to build a thermonuclear rocket and was a major program that took place at the Laboratory from 1952 to 1973. Actinium and polonium were used in the initiator research conducted in this building (McGehee and Garcia 1999, 087442). Actinium-227 has a 21.8-yr half-life and polonium-210 has a half-life of 138.4 days.

The coating of reactor parts and fuel elements with a refractory material for protection from high-temperature hydrogen for Project Rover was conducted in this building. After the shutdown of Project Rover in 1972−1974, cold-fusion work was conducted in the south end of the building. In 1977, the TSTA project took over the building as a laboratory for tritium research and technology in support of the fusion program (McGehee and Garcia 1999, 087442).

Building 21-153 was constructed in 1945 and used as a filter house connected to Building 21-152 (LANL 1990, 007512). It was demolished in the late 1970s (Harper and Garde 1981, 006281) and is currently a parking area. There are underground pipe trenches around the perimeter of building 21-152. In 1958, an

equipment room was added to the northwest corner of building 21-152 for the propulsion program work. In 1960, a small room was added at the southeast corner of building 21-152 along the east wall to house vacuum pumps. Buildings 21-166 and 21-167 were constructed in the middle 1940s and used to collect vacuum-pump waste from the building 21-152 laboratories (LANL 1984, 109229) and to house air-conditioning/heating equipment (LASL 1945, 109230). Building 21-370 was constructed in 1985 to house air-handling equipment (McGehee and Garcia 1999, 087442). Buildings 21-166, 21-167, and 21-370 have been recently demolished. Two exhaust stacks (structures 21-322 and 21-323) were constructed of steel and were approximately 50 ft tall. They were mounted on reinforced concrete pads and were connected to the building by ductwork. Exhaust from laboratory hoods was vented through the stacks. The stacks received mainly tritium, which entered the stacks above ground surface (http://www.lanl.gov/environment/air/neshap/hist_ast.shtml). These will be removed during D&D activities. In 2003, DP East buildings were shut down and left in a safe configuration.

2.1.2 Previous Investigations

Subsurface sampling has not been completed to address the building 21-152 footprint.

2.1.3 Scope of Activities for Building 21-152 and Associated Structures

The proposed sampling locations for the building 21-152 footprint and associated-structure footprints are shown in Figure 2.1-1. Table 2.1-1 provides a summary of the proposed sampling objectives, number of samples, sample locations and depths, and analytical suites.

All samples (except for those collected from under the former generators and the exhaust stacks) will be analyzed for target analyte list (TAL) metals, cyanide, nitrate, perchlorates, volatile organic chemicals (VOCs), semivolatile organic chemicals (SVOCs), radionuclides (americium-241, isotopic plutonium, isotopic thorium [to detect actinium-227], isotopic uranium, strontium-90, tritium, and by gamma spectroscopy), moisture, and pH. Since polonium-210 has a short half-life, the likelihood of polonium-210 contamination is low. Therefore, samples will not be analyzed for polonium-210. In addition, 20% of all samples will be analyzed for an extended suite consisting of dioxins/furans, explosive compounds, and polychlorinated biphenyls (PCBs) (Table 2.1-1). 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, floor drains, pits). If field-screening results identify locations with higher readings than those already selected for extended suite analyses, these locations will be analyzed for an extended suite instead. Samples collected from under the former generators (locations 1 and 2) will be analyzed only for total petroleum hydrocarbon-diesel range organics (TPH-DRO), SVOCs, VOCs, and pH (Table 2.1-1). If elevated field-screening results are recorded in the deepest sampling depth 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 after the data have been received and reviewed.

The investigation of the building 21-152 footprint and the associated-structure footprints will consist of the following activities:

- *Under the former diesel generators at the northwest corner of building 21-152*. One location will be sampled from under the former diesel generators at 0 to 1.0 ft, 2.0 to 3.0 ft, and 4.0 to 5.0 ft bgs (Figure 2.1-1, locations 1 and 2). These samples will be analyzed only for TPH-DRO, SVOCs, VOCs, and pH. Zero depth is defined as immediately below the excavated concrete slab.

- *Under the former waste lines that ran within the pipe tunnel around the perimeter of building 21-152.* These pipes, which received waste from laboratory floor troughs, drains, and sinks, were suspended in 4-ft by 4-ft bgs pipe tunnels with a dirt floor. After piping removal by D&D activities, 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 2.1-1, locations 3–30). At these locations, samples will be collected at 4.0 to 5.0 ft and 6.0 to 7.0 ft bgs (pipe floor tunnel currently approximately 4 ft bgs). At these locations, samples will be analyzed for asbestos in addition to the suites listed above. Zero depth is defined as immediately below the excavated piping.
- *Under the center of building 21-152 laboratories.* Samples will be collected along the center of former building 21-152 in a 20-ft-based grid pattern (Figure 2.1-1, locations 31–41) at 0 to 1.0 ft and 2.0 to 3.0 ft bgs. One location will also be sampled under a small former laboratory area south of the hallway between buildings 21-152 and 21-155 (Figure 2.1-1, location 61). At these locations, samples will be analyzed for asbestos in addition to the suites listed above. Samples are not planned to be collected under the hallway or north of the hallway connecting buildings 21-152 and 21-155; these were locker/shower/bathroom areas with low potential for contamination. The shower/locker/bathroom areas have a low potential for contamination for the following reasons:
    - These areas were used for worker personal hygiene.
    - No laboratory procedures occurred in these areas.
    - There was no radiological/chemical inventory stored in this area.
    - No spills were reported to have occurred in this area.

Sample locations may be adjusted and/or added based on field screening performed during the D&D activities. Zero depth is defined as immediately below the excavated concrete slab.

- *Under former structures 21-166, 21-167, and 21-370.* These structures have recently been removed by D&D. Concrete slabs remain. No evidence of the dry well was seen during site inspection. Therefore, trenching will determine the location and depth of the dry well. Trenching will begin at the approximate location obtained from engineering drawings and shown on Figure 2.1-1. The first depth of native soil/tuff is defined as zero depth under the dry well. Samples will be collected from under former floor drains, pits, and dry wells at these structures (Figure 2.1-1, locations 42–50) at 0 to 1.0 ft and 2.0 to 3.0 ft bgs. The sump and dry-well locations (locations 42, 44, and 45) will have samples collected from one additional depth, 4.0 to 5.0 ft bgs. Zero depth is defined as immediately below the excavated floor-drains/pits/dry wells.
- *Under former waste lines connecting buildings 21-166 and 21-167.* These waste lines will be removed during D&D activities. Samples will be collected from under former waste lines (Figure 2.1-1, locations 51–54) at 0 to 1.0 ft and 2.0 to 3.0 ft bgs. Zero depth is defined as immediately below the excavated piping.
- *Under former building 21-153 and associated plenum.* This building and plenum have been previously removed. Samples will be collected from under the former building and associated plenum (Figure 2.1-1, locations 55, 56, and 57) at 0 to 0.5 ft and 2.0 to 3.0 ft bgs. These samples will be analyzed for all suites listed above except for SVOCs and VOCs, as well as asbestos. Zero depth is defined as 0.5 ft under any asphalt or concrete present in the area. The justification not to sample for SVOCs and VOCs in this area is that the location of the former building and plenum is now partially covered with asphalt. Therefore, the detection of any VOCs and SVOCs at the site would not be tied directly to site operations. Additionally, building 21-153 and the

associated plenum were used as a filter house (filtered laboratory exhaust), which was not associated with the storage or direct use of chemicals.

- *Under the exhaust stacks: structures 21-322, 21-323, and an undesignated stack.* Samples will be collected from under the former stacks at building 21-152 (Figure 2.1-1, locations 58, 59, and 60) at 0 to 1.0 ft, 4.0 to 5.0 ft, and 9.0 to 10.0 ft bgs. These samples will be analyzed for all suites listed above except for SVOCs and VOCs. Zero depth is defined as immediately below the excavated concrete slabs.

2.2 Building 21-155

2.2.1 Operational History

Building 21-155 is the combination of three buildings: 21-55, 21-206, and 21-207. The original building, 21-55 was built in 1949 for initiator research and production until the middle to late 1960s. Buildings 21-206 and 21-207 were built in 1963 through 1965 for continued support of high-temperature chemistry work. These two buildings were constructed to support Project Rover. Building 21-151 was built in the 1940s as administrative offices and was connected to building 21-55. Building 21-151 was removed in the 1960s and is now a parking lot. Cooling-tower structure 21-220 was constructed in 1964−1965, used for heating, ventilation, and air conditioning, and was recently demolished. Cooling-tower structure 21-420 replaced structure 21-220 and was also recently demolished. Building 21-213 was used as a warehouse and was built in 1964. An exhaust stack, structure 21-388, was constructed of steel and was approximately 50 ft tall. It was mounted on reinforced concrete pads and was connected to the building by ductwork. Exhaust from laboratory hoods was vented through the stack. The stack received mainly tritium, which entered the stack above the ground surface (http://www.lanl.gov/environment/air/neshap/hist_ast.shtml). This stack will be removed during D&D activities.

After Project Rover ended, building 21-155 was used as a production center and a center of tritium research and development for the Laboratory's fusion program (McGehee and Garcia 1999, 087442). In 2003, DP East buildings were shut down and left in a safe configuration. Actinium and polonium were used in the initiator research conducted in this building. Actinium-227 has a 21.8-yr half-life and polonium-210 has a half-life of 138.4 days. Tritium, which has a half-life of 12.3 yr, was also used in this building (McGehee and Garcia 1999, 087442).

2.2.2 Previous Investigations

Subsurface sampling has not been completed to address the building 21-155 footprint.

2.2.3 Scope of Activities for Building 21-155 and Associated Structures

The proposed sampling locations for the building 21-155 footprint and associated-structure footprints are shown in Figure 2.2-1. Table 2.2-1 provides a summary of the proposed sampling objectives, number of samples, sample locations and depths, and analytical suites. Administrative offices building 21-151 footprint will not be sampled; it was removed in the 1960s, has low potential for contamination, and is currently a parking lot.

All samples (except those collected from under the exhaust stack) will be analyzed for TAL metals, cyanide, nitrate, perchlorates, VOCs, SVOCs, radionuclides (americium-241, isotopic plutonium, isotopic thorium [to detect actinium-227], isotopic uranium, strontium-90, tritium, and by gamma spectroscopy), moisture, and pH. Since polonium-210 has a short half-life, the likelihood of polonium-210 contamination is low. Therefore,

samples will not be analyzed for polonium-210. In addition, 20% of all samples will be analyzed for an extended suite consisting of dioxins/furans, explosive compounds, and PCBs (Table 2.2-1). 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, pits, floor drains). If field-screening results identify locations with higher readings than those already selected for extended suite analyses, these locations will be analyzed for an extended suite instead. 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 after the data have been received and reviewed.

The investigation of the building 21-155 footprint and the associated-structure footprints will consist of the following activities:

- *Under building 21-155 former office areas and original 21-55 laboratory building.* Samples will be collected north and south of the office areas of former building 21-155, along the center in an approximate 50-ft-spaced pattern, and under the former original building 21-55 laboratory (Figure 2.2-1, locations 1–7). At all locations, samples will be collected at 0 to 1.0 ft and 2.0 to 3.0 ft bgs. Sample locations may be adjusted and/or added to based on field screening performed during the D&D activities. Zero depth is defined as immediately below the excavated concrete slab.
- *Under the former furnace pit, holding pit, and isotope separation pit areas and associated piping.* These large pit areas were used initially as furnace pits and then later for the isotope separation research system. Samples will be collected from under former floor drains, piping, sumps, and the furnace-pit area (Figure 2.2-1, locations 8–16 and 18–25), at 0 to 1.0 and 2.0 to 3.0 ft bgs. At these locations, samples will be analyzed for asbestos in addition to the suites listed above. There is also a 20-ft-deep, 5-ft-wide pit lined with a corrugated metal pipe used in the isotope separation research, which will be removed during D&D. Samples will be collected from under this pit at 20.0 to 21.0 ft and 30.0 to 31.0 ft bgs (Figure 2.2-1, location 17). One location will be sampled from under the holding-pit area, at 0 to 1.0 ft, 4.0 to 5.0 ft, and 9.0 to 10.0 ft bgs, with zero depth defined as the floor of the excavation (Figure 2.2-1, location 39). Sample locations may be adjusted and/or added to based on field screening performed during the D&D activities. Zero depth is defined as immediately below the floor of the excavated pits. The isotope separation research pit will not be removed during D&D activities.
- *Under the former waste lines in the former laboratory areas.* These lines received waste from laboratory drains, vacuum-pump systems, and sinks and were located throughout the northern portion of the building; the southern portion of the building was primarily administrative offices. After waste-line removal by D&D activities, samples will be collected from the former piping areas under connections and bends in piping and under former floor drains at 0 to 1.0 ft and 2.0 to 3.0 ft bgs (Figure 2.2-1, locations 26–38). At these locations, samples will be analyzed for asbestos in addition to the suites listed above. Sample locations may be adjusted and/or added to based on field screening performed during D&D activities. Zero depth is defined as immediately below the excavated piping and floor drains.
- *Under the former cooling-tower structures 21-220 and 21-420 and associated piping.* Structures 21-220 and 21-420 were recently removed; concrete slabs remain but will be removed during D&D. Samples will be collected from under former cooling-tower piping at the bend/exit from building 21-155, halfway along the piping, and under the bend near the piping connection to structure 21-220 at 0 to 1.0 and 2.0 to 3.0 ft bgs (Figure 2.2-1, locations 40, 41, and 42). One location will also be sampled under the center of former structure 21-220 (Figure 2.2-1,

location 43) and one location under the center of former structure 21-420 (Figure 2.2-1, location 49). Samples will be collected at 0 to 1.0 ft and 2.0 to 3.0 ft bgs. At locations 43 and 49, samples will be analyzed for asbestos in addition to the suites listed above. Zero depth is defined as immediately below the excavated concrete slabs or excavated piping.

- *Under former storage building 21-213.* Samples will be collected from under the former building 21-213 footprint at 0 to 1.0 ft and 2.0 to 3.0 ft bgs (Figure 2.2-1, locations 44–48). Zero depth is defined as immediately below the excavated concrete slab.
- *Under the exhaust stack 21-388.* Samples will be collected from under the former stack 21-388 at building 21-155 (Figure 2.2-1, location 50), at 0 to 1.0 ft, 4.0 to 5.0 ft, and 9.0 to 10.0 ft bgs. These samples will be analyzed for all suites listed above except for SVOCs and VOCs. Zero depth is defined as immediately below the excavated concrete slab. Stack 21-388 was recently removed during demolition activities at DP East. The concrete below the base of the stack was approximately 5 ft thick. No cracks in the concrete or any visible staining were evident below the stack. Radiological field screening determined this area was not contaminated. The other stacks at DP East should be of similar construction. Similar radiological field screening is to be performed during the future demolition of remaining stack structures 21-322, 21-323, 21-466, and one undesignated stack. If levels of radionuclides indicating a release are encountered during field screening under the removed stacks, SVOCs and VOCs will be added to the sampling suite for the stacks.

2.3 Building 21-209

2.3.1 Operational History

Building 21-209 was originally designated as the “High-Temperature Chemistry Facility” (McGehee and Garcia 1999, 087442). The original building was constructed in 1964 to 1965 and held the administrative office facility and laboratories for TSTA. When first constructed, it was used to support Project Rover and then, after 1977, to conduct tritium research for the fusion program. The central portion of the building was constructed with a basement. The east and west wings were constructed as slab on grade. All of the piping under the central portion of the building is attached to the basement ceiling. The northwest section of the building was added as the dry-glove-box facility in approximately 1970 (LASL 1969, 109232). The eastern wing of the building was used for offices (LASL 1964, 109231). An exhaust stack, structure 21-466, was constructed of steel and was approximately 50 ft tall. It was mounted on reinforced concrete pads and was connected to the building by ductwork. Exhaust from laboratory hoods was vented through the stack. The stack received mainly tritium, which entered the stack above ground surface (http://www.lanl.gov/environment/air/neshap/hist_ast.shtml). This stack will be removed during D&D activities. In 2003, DP East buildings were shut down and left in a safe configuration. Tritium was used in this building (McGehee and Garcia 1999, 087442) and has a 12.3-yr half-life.

2.3.2 Previous Investigations

Subsurface sampling has not been completed to address the building 21-209 footprint.

2.3.3 Scope of Activities for Building 21-209 and Associated Exhaust-Stack Structure

The proposed sampling locations for the building 21-209 footprint and associated exhaust-stack structure footprints are shown in Figure 2.3-1. Table 2.3-1 provides a summary of the proposed sampling objectives, number of samples, sample locations and depths, and analytical suites.

All samples (except those collected from under the exhaust stack) will be analyzed for TAL metals, cyanide, nitrate, perchlorates, VOCs, SVOCs, radionuclides (americium-241, isotopic plutonium, isotopic thorium [to detect actinium-227], isotopic uranium, strontium-90, tritium, and by gamma spectroscopy), asbestos, moisture, and pH. Since polonium-210 has a short half-life, the likelihood of polonium-210 contamination is low. Therefore, samples will not be analyzed for polonium-210. In addition, 20% of all samples will be analyzed for an extended suite consisting of dioxins/furans, explosive compounds, and PCBs (Table 2.3-1). 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, piping bends, connections in piping, and floor drains). If field-screening results identify locations with higher readings than those already selected for extended suite analyses, these locations will be analyzed for an extended suite instead. 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 after the data have been received and reviewed.

The investigation of the building 21-209 footprint will consist of the following activities:

- *Under laboratory waste lines associated with the former dry-box laboratory area.* Samples will be collected from under the former dry-box laboratory waste lines (Figure 2.3-1, locations 1–11). There was no basement in this area; therefore, the soil from under these former lines can be sampled. At all locations, samples will be collected at 0 to 1.0 ft and 2.0 to 3.0 ft bgs. Sample locations may be adjusted and/or added to based on field screening performed during the D&D activities. Zero depth is defined as immediately below the excavated concrete slab.
- *Under the exhaust stack 21-466.* Samples will be collected from under the former stack at building 21-209 (Figure 2.3-1, location 12) at 0 to 1.0 ft, 4.0 to 5.0 ft, and 9.0 to 10.0 ft bgs. These samples will be analyzed for all suites listed above except for SVOCs and VOCs. Zero depth is defined as immediately below the excavated concrete slab.
- *Under the floor drains in the basement.* Seven locations will be sampled under former floor drains in the basement (Figure 2.3-1, locations 13–19) at 0 to 1.0 ft and 2.0 to 3.0 ft bgs. Sample locations may be adjusted and/or added to based on field screening performed during the D&D activities. Zero depth is defined as immediately below the excavated floor drains.

2.4 Sampling Activities for Area of Concern 21-028(d), Active Container Storage Dock Area at Building 21-209

Area of Concern (AOC) 21-028(d) consists of a former less-than-90-day storage site located on a concrete loading dock on the northwest corner of building 21-209 (Figure 2.3-1) (LANL 1991, 007529). The dimensions of the dock are approximately 8.5 ft wide by 60 ft long by 3.25 ft deep. This site was previously addressed in the Supplemental Investigation Work Plan for Delta Prime Site Aggregate Area at Technical Area 21 (LANL 2006, 092079). The loading dock will be removed during D&D activities.

The sampling locations at AOC 21-028(d) are shown in Figure 2.3-1. Table 2.4-1 provides a summary of the proposed sampling location boreholes (BHs), depths, the objective of each sample, and the analytical suites. Zero depth is defined as 0.5 ft under the removed asphalt/concrete. The sampling locations and depths were previously presented in the Supplemental Investigation Work Plan for Delta Prime Site Aggregate Area at Technical Area 21 (LANL 2006, 092079, Figure 2.6-1 and Table 2.6-1). Isotopic thorium was added to the analytical suites for consistency with the other DP East building footprint sampling.

3.0 SCHEDULE

D&D of building 21-152 should be completed by the end of August 2010. D&D of building 21-155 should be completed by the end of June 2010. D&D of building 21-209 should be completed by the end of October 2010. Sampling outlined in this work plan will be completed after D&D of DP East building footprints is finished. The letter work plan investigation results will be included in the October 2, 2011, TA-21 delayed sites investigation report.

4.0 REFERENCES AND MAP DATA SOURCES

4.1 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.

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LASL (Los Alamos Scientific Laboratory), January 30, 1964. "High Temperature Chemistry Facility, Floor Plan-First Floor, Bldg. DP-209, TA-21," Engineering Drawing ENG-PL-1134, Los Alamos, New Mexico. (LASL 1964, 109231)

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4.2 Map Data Sources

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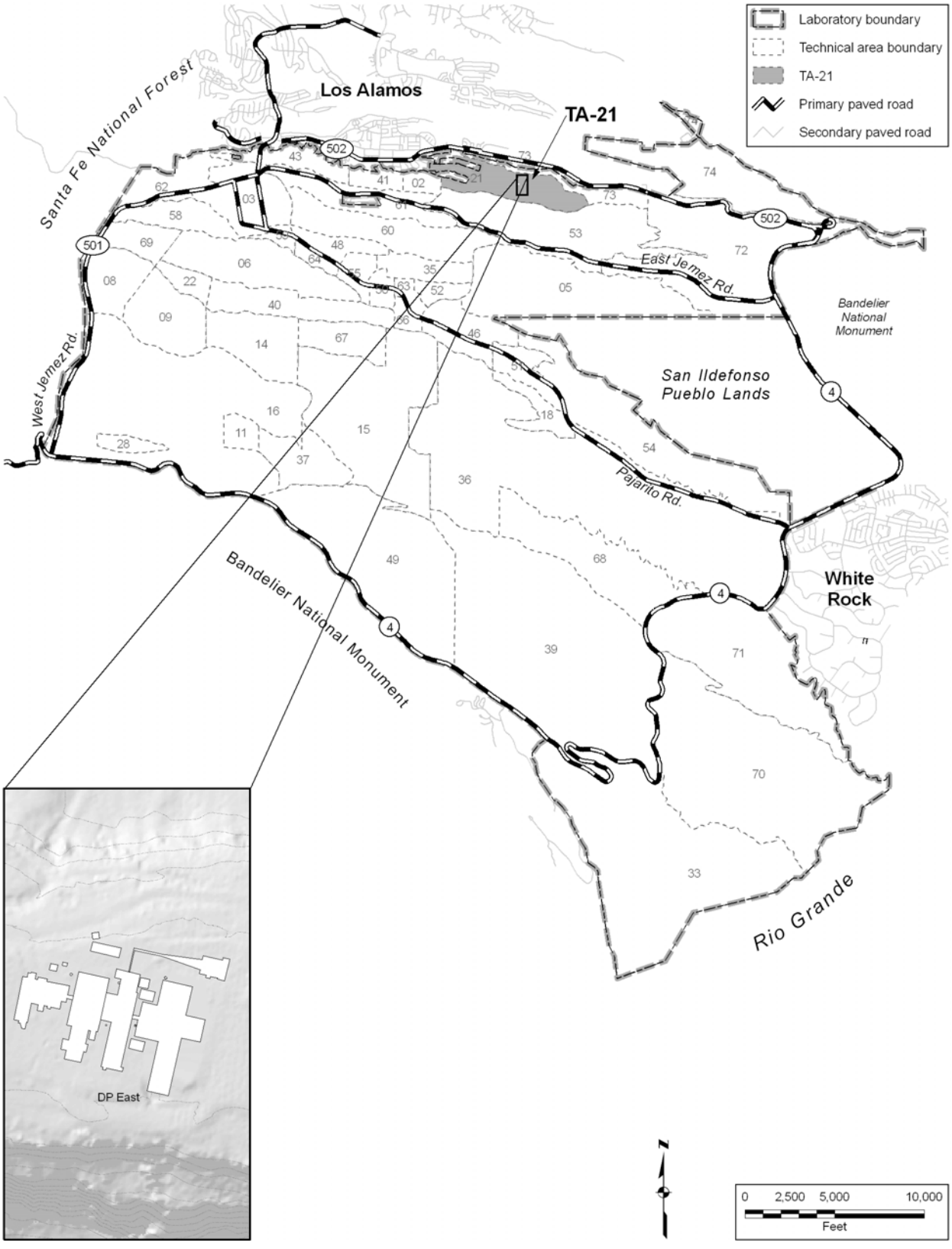

Figure 1.0-1 Location of DP East buildings within TA-21

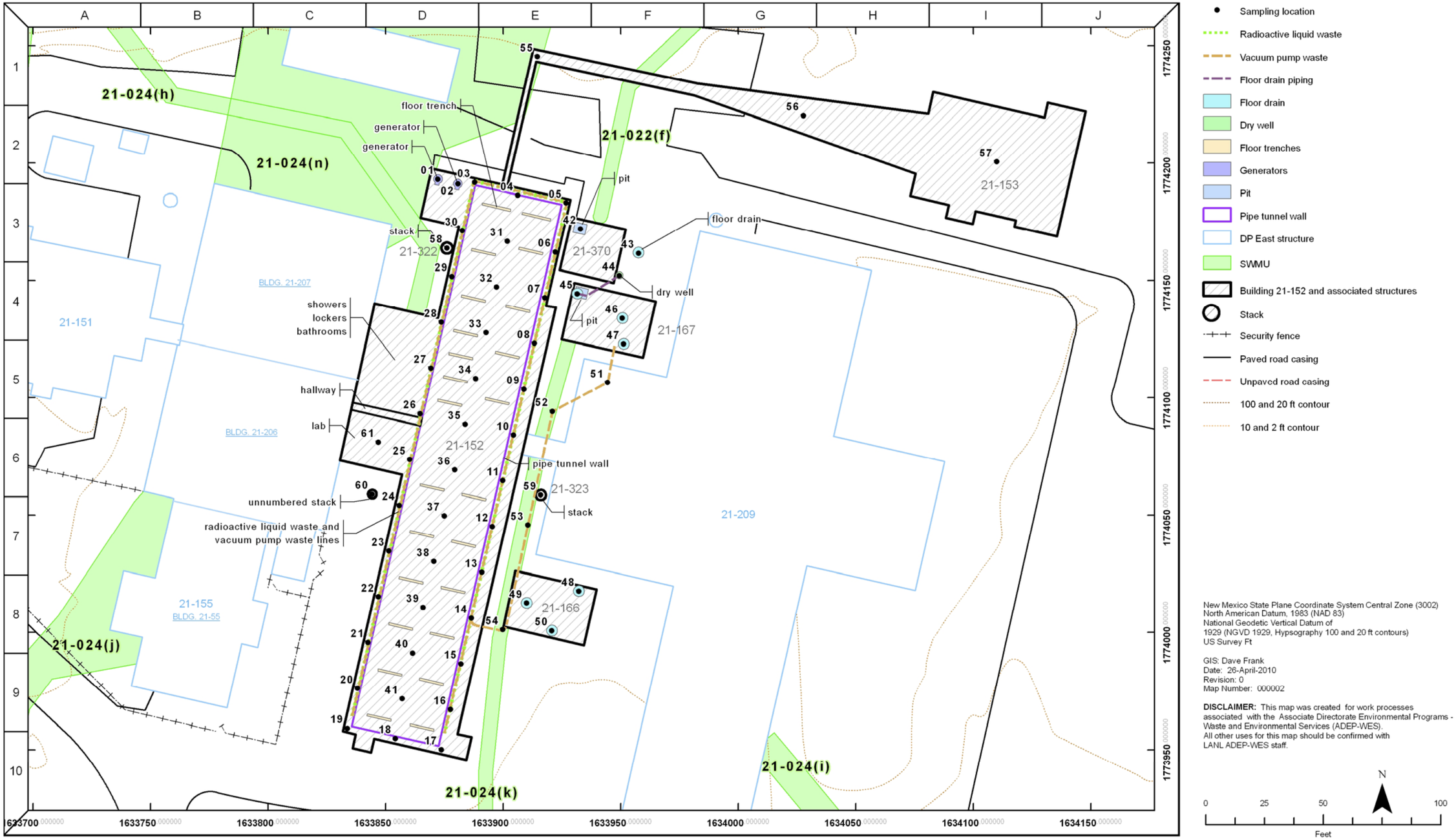

Figure 2.1-1 Proposed sampling locations at building 21-152 and associated structures 21-153, 21-166, 21-167, 21-322, 21-323, and 21-370

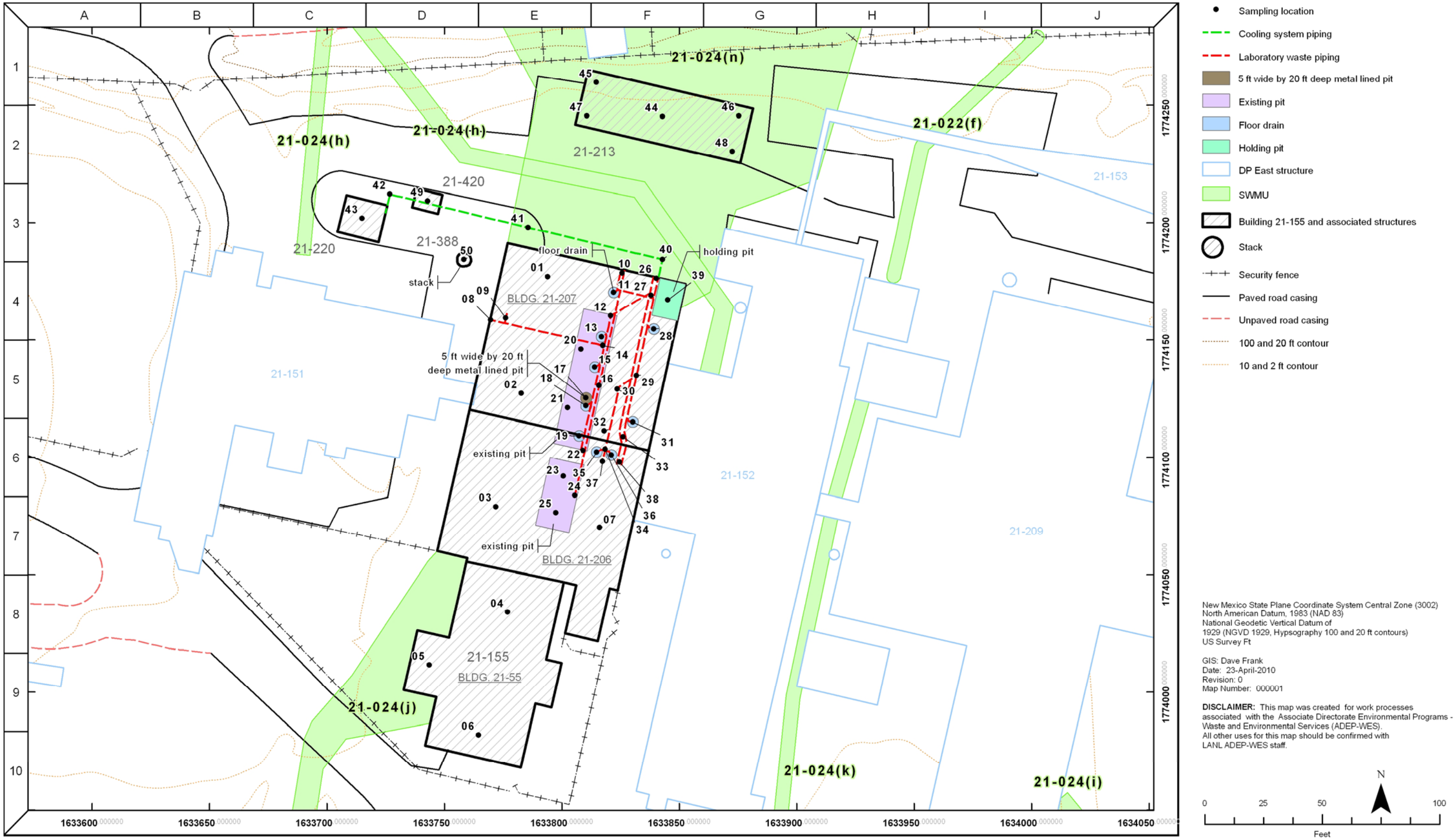

Figure 2.2-1 Proposed sampling locations at building 21-155 and associated structures 21-213, 21-220, 21-388, and 21-420

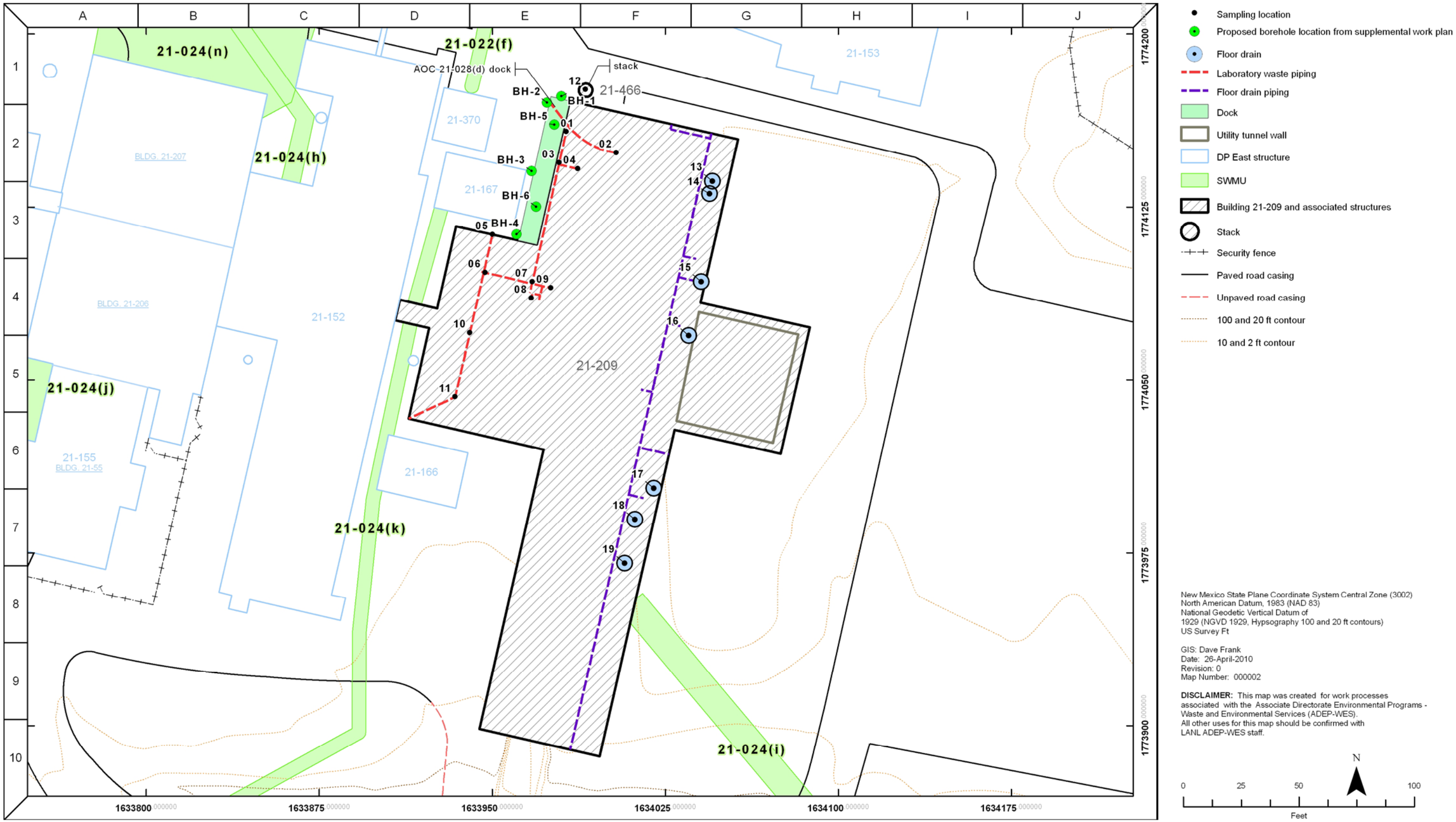

Figure 2.3-1 Proposed sampling locations at building 21-209, associated structure 21-466, and AOC 21-028(d) loading dock

Table 2.1-1
Proposed Sampling at Building 21-152 Footprint and Associated Structures 21-153, 21-166, 21-167, 21-322, 21-323, and 21-370

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs	SVOCs	TPH-DRO	TAL Metals	Cyanide	Nitrate	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Thorium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Asbestos	Dioxins, Furans, Explosive Compounds, PCBs[a]
Lateral and vertical extent of contamination under former diesel generator	1	Under former diesel generator	0.0–1.0 2.0–3.0 4.0–5.0	X[b] X X	X X X	X X X	—[c] — —	— — —	— — —	— — —	— — —	— — —	— — —	— — —	— — —	— — —	— — —	— — —	X X X	— — —	— — —
Lateral and vertical extent of contamination under former diesel generator	2	Under former diesel generator	0.0–1.0 2.0–3.0 4.0–5.0	X X X	X X X	X X X	— — —	— — —	— — —	— — —	— — —	— — —	— — —	— — —	— — —	— — —	— — —	— — —	X X X	— — —	— — —
Vertical extent of contamination under former pipe tunnel	3	Under pipe tunnel	4.0–5.0 6.0–7.0	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
Vertical extent of contamination under former pipe tunnel	4	Under pipe tunnel	4.0–5.0 6.0–7.0	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	— —
Vertical extent of contamination under former pipe tunnel	5	Under pipe tunnel	4.0–5.0 6.0–7.0	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
Vertical extent of contamination under former pipe tunnel	6	Under pipe tunnel	4.0–5.0 6.0–7.0	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	— —
Vertical extent of contamination under former pipe tunnel	7	Under pipe tunnel	4.0–5.0 6.0–7.0	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	— —

Table 2.1-1 (continued)

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs	SVOCs	TPH-DRO	TAL Metals	Cyanide	Nitrate	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Thorium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Asbestos	Dioxins, Furans, Explosive Compounds, PCBs
Vertical extent of contamination under former pipe tunnel	8	Under pipe tunnel	4.0–5.0 6.0–7.0	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	— —
Vertical extent of contamination under former pipe tunnel	9	Under pipe tunnel	4.0–5.0 6.0–7.0	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	— —
Vertical extent of contamination under former pipe tunnel	10	Under pipe tunnel	4.0–5.0 6.0–7.0	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	— —
Vertical extent of contamination under former pipe tunnel	11	Under pipe tunnel	4.0–5.0 6.0–7.0	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
Vertical extent of contamination under former pipe tunnel	12	Under pipe tunnel	4.0–5.0 6.0–7.0	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	— —
Vertical extent of contamination under former pipe tunnel	13	Under pipe tunnel	4.0–5.0 6.0–7.0	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	— —
Vertical extent of contamination under former pipe tunnel	14	Under pipe tunnel	4.0–5.0 6.0–7.0	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	— —
Vertical extent of contamination under former pipe tunnel	15	Under pipe tunnel	4.0–5.0 6.0–7.0	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	— —

Table 2.1-1 (continued)

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs	SVOCs	TPH-DRO	TAL Metals	Cyanide	Nitrate	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Thorium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Asbestos	Dioxins, Furans, Explosive Compounds, PCBs
Vertical extent of contamination under former pipe tunnel	16	Under pipe tunnel	4.0–5.0 6.0–7.0	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	— —
Vertical extent of contamination under former pipe tunnel	17	Under pipe tunnel	4.0–5.0 6.0–7.0	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
Vertical extent of contamination under former pipe tunnel	18	Under pipe tunnel	4.0–5.0 6.0–7.0	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	— —
Vertical extent of contamination under former pipe tunnel	19	Under pipe tunnel	4.0–5.0 6.0–7.0	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
Vertical extent of contamination under former pipe tunnel	20	Under pipe tunnel	4.0–5.0 6.0–7.0	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	— —
Vertical extent of contamination under former pipe tunnel	21	Under pipe tunnel	4.0–5.0 6.0–7.0	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	— —
Vertical extent of contamination under former pipe tunnel	22	Under pipe tunnel	4.0–5.0 6.0–7.0	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	— —
Vertical extent of contamination under former pipe tunnel	23	Under pipe tunnel	4.0–5.0 6.0–7.0	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	— —

Table 2.1-1 (continued)

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs	SVOCs	TPH-DRO	TAL Metals	Cyanide	Nitrate	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Thorium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Asbestos	Dioxins, Furans, Explosive Compounds, PCBs
Vertical extent of contamination under former pipe tunnel	24	Under pipe tunnel	4.0–5.0 6.0–7.0	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	— —
Vertical extent of contamination under former pipe tunnel	25	Under pipe tunnel	4.0–5.0 6.0–7.0	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
Vertical extent of contamination under former pipe tunnel	26	Under pipe tunnel	4.0–5.0 6.0–7.0	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	— —
Vertical extent of contamination under former pipe tunnel	27	Under pipe tunnel	4.0–5.0 6.0–7.0	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	— —
Vertical extent of contamination under former pipe tunnel	28	Under pipe tunnel	4.0–5.0 6.0–7.0	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	— —
Vertical extent of contamination under former pipe tunnel	29	Under pipe tunnel	4.0–5.0 6.0–7.0	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	— —
Vertical extent of contamination under former pipe tunnel	30	Under pipe tunnel	4.0–5.0 6.0–7.0	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 former building 21-152 laboratories	31	Under former laboratories	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	X X	— —

Table 2.1-1 (continued)

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs	SVOCs	TPH-DRO	TAL Metals	Cyanide	Nitrate	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Thorium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Asbestos	Dioxins, Furans, Explosive Compounds, PCBs
Lateral and vertical extent of contamination under former building 21-152 laboratories	32	Under former laboratories	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	X X	— —
Lateral and vertical extent of contamination under former building 21-152 laboratories	33	Under former laboratories	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	X X	X X
Lateral and vertical extent of contamination under former building 21-152 laboratories	34	Under former laboratories	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	X X	— —
Lateral and vertical extent of contamination under former building 21-152 laboratories	35	Under former laboratories	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	X X	— —
Lateral and vertical extent of contamination under former building 21-152 laboratories	36	Under former laboratories	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	X X	— —
Lateral and vertical extent of contamination under former building 21-152 laboratories	37	Under former laboratories	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	X X	— —
Lateral and vertical extent of contamination under former building 21-152 laboratories	38	Under former laboratories	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	X X	— —
Lateral and vertical extent of contamination under former building 21-152 laboratories	39	Under former laboratories	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	X X	X X

Table 2.1-1 (continued)

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs	SVOCs	TPH-DRO	TAL Metals	Cyanide	Nitrate	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Thorium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Asbestos	Dioxins, Furans, Explosive Compounds, PCBs
Lateral and vertical extent of contamination under former building 21-152 laboratories	40	Under former laboratories	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	X X	— —
Lateral and vertical extent of contamination under former building 21-152 laboratories	41	Under former laboratories	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	X X	— —
Vertical extent of contamination under former floor drains/pumps/piping associated with structures 21-166, 21-167, and 21-370	42	Under sump in building 21-370	0.0–1.0 2.0–3.0 4.0–5.0	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	— — —	X X X
Vertical extent of contamination under former floor drains/pumps/piping associated with structures 21-166, 21-167, and 21-370	43	Under floor drain	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	— —	X X
Vertical extent of contamination under former floor drains/pumps/piping associated with structures 21-166, 21-167, and 21-370	44	Under dry well	0.0–1.0 2.0–3.0 4.0–5.0	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	— — —	X X X
Vertical extent of contamination under former floor drains/pumps/piping associated with structures 21-166, 21-167, and 21-370	45	Under sump room in building 21-167	0.0–1.0 2.0–3.0 4.0–5.0	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 2.1-1 (continued)

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs	SVOCs	TPH-DRO	TAL Metals	Cyanide	Nitrate	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Thorium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Asbestos	Dioxins, Furans, Explosive Compounds, PCBs
Vertical extent of contamination under former floor drains/pumps/piping associated with structures 21-166, 21-167, and 21-370	46	Under floor drain in building 21-167	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	— —	— —
Vertical extent of contamination under former floor drains/pumps/piping associated with structures 21-166, 21-167, and 21-370	47	Under floor drain in building 21-167	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	— —	— —
Vertical extent of contamination under former floor drains/pumps/piping associated with structures 21-166, 21-167, and 21-370	48	Under floor drain in building 21-166	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	— —	— —
Vertical extent of contamination under former floor drains/pumps/piping associated with structures 21-166, 21-167, and 21-370	49	Under floor drain in building 21-166	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	— —	X X
Vertical extent of contamination under former floor drains/pumps/piping associated with structures 21-166, 21-167, and 21-370	50	Under floor drain in building 21-166	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 2.1-1 (continued)

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs	SVOCs	TPH-DRO	TAL Metals	Cyanide	Nitrate	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Thorium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Asbestos	Dioxins, Furans, Explosive Compounds, PCBs
Vertical extent of contamination under former floor drains/pumps/waste lines associated with structures 21-166, 21-167, and 21-370	51	Under waste lines connecting buildings 21-166 and 21-167	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	— —	— —
Vertical extent of contamination under former floor drains/pumps/waste lines associated with structures 21-166, 21-167, and 21-370	52	Under waste lines connecting buildings 21-166 and 21-167	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	— —	— —
Vertical extent of contamination under former floor drains/pumps/waste lines associated with structures 21-166, 21-167, and 21-370	53	Under waste lines connecting buildings 21-166 and 21-167	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	— —	— —
Vertical extent of contamination under former floor drains/pumps/waste lines associated with structures 21-166, 21-167, and 21-370	54	Under waste lines connecting buildings 21-166 and 21-167	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	— —	— —
Vertical extent of contamination under former plenum area	55	Under plenum bend	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 X	— —
Vertical extent of contamination under former plenum area	56	Under plenum	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 X	— —

Table 2.1-1 (continued)

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs	SVOCs	TPH-DRO	TAL Metals	Cyanide	Nitrate	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Thorium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Asbestos	Dioxins, Furans, Explosive Compounds, PCBs
Vertical extent of contamination under building 21-153	57	Under building footprint	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 X	— —
Vertical extent of stack 21-322	58	Under stack 21-322	0.0–1.0 4.0–5.0 9.0–10.0	— — —	— — —	— — —	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	— — —	— — —
Vertical extent of stack 21-323	59	Under stack 21-323	0.0–1.0 4.0–5.0 9.0–10.0	— — —	— — —	— — —	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	— — —	— — —
Vertical extent of undesignated stack	60	Under undesignated stack	0.0–1.0 4.0–5.0 9.0–10.0	— — —	— — —	— — —	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	— — —	— — —
Vertical extent of contamination under building 21-152 south of hallway connecting building to 21-155	61	Under former laboratory	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	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 an extended suite instead.

[b] X = Analyzed for.

[c] — = Not analyzed for.

Table 2.2-1
Proposed Sampling at Building 21-155 Footprint and Associated Structures 21-213, 21-220, 21-388, and 21-420

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrate	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Thorium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Asbestos	Dioxins, Furans, Explosive Compounds, PCBs[a]
Lateral and vertical extent of contamination under former laboratories/offices	1	Under former laboratories/offices	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	X X	—[c] —	— —
Lateral and vertical extent of contamination under former laboratories/offices	2	Under former laboratories/offices	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 former laboratories/offices	3	Under former laboratories/offices	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 former laboratories/offices	4	Under former laboratories/offices	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 former laboratories/offices	5	Under former laboratories/offices	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 former laboratories/offices	6	Under former laboratories/offices	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 former laboratories/offices	7	Under former laboratories/offices	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 2.2-1 (continued)

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrate	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Thorium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Asbestos	Dioxins, Furans, Explosive Compounds, PCBs
Vertical extent of contamination under laboratory waste lines/floor drains/pits	8	Under waste lines	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	X X	— —
Vertical extent of contamination under laboratory waste lines/floor drains/pits	9	Under waste lines	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	X X	— —
Vertical extent of contamination under laboratory waste lines/floor drains/pits	10	Under waste lines	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	X X	— —
Vertical extent of contamination under laboratory waste lines/floor drains/pits	11	Under floor drain	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	X X	X X
Vertical extent of contamination under laboratory waste lines/floor drains/pits	12	Under waste lines	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	X X	— —
Vertical extent of contamination under laboratory waste lines/floor drains/pits	13	Under floor drain	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	X X	X X

Table 2.2-1 (continued)

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrate	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Thorium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Asbestos	Dioxins, Furans, Explosive Compounds, PCBs
Vertical extent of contamination under laboratory waste lines/floor drains/pits	14	Under waste lines	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	X X	— —
Vertical extent of contamination under laboratory waste lines/floor drains/pits	15	Under floor drain	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	X X	X X
Vertical extent of contamination under laboratory waste lines/floor drains/pits	16	Under waste lines	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	X X	— —
Vertical extent of contamination under laboratory waste lines/floor drains/pits	17	Under 20-ft-deep pit	20.0–21.0 30.0–31.0	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
Vertical extent of contamination under laboratory waste lines/floor drains/pits	18	Under floor drain	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	X X	X X
Vertical extent of contamination under laboratory waste lines/floor drains/pits	19	Under floor drain	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	X X	X X

Table 2.2-1 (continued)

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrate	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Thorium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Asbestos	Dioxins, Furans, Explosive Compounds, PCBs
Lateral and vertical extent of contamination under laboratory waste lines/floor drains/pits	20	Under northern pit	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	X X	— —
Lateral and vertical extent of contamination under laboratory waste lines/floor drains/pits	21	Under northern pit	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	X X	— —
Vertical extent of contamination under laboratory waste lines/floor drains/pits	22	Under waste lines	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	X X	— —
Lateral and vertical extent of contamination under laboratory waste lines/floor drains/pits	23	Under southern pit	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	X X	— —
Vertical extent of contamination under laboratory waste lines/floor drains/pits	24	Under waste lines	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	X X	— —
Lateral and vertical extent of contamination under laboratory waste lines/floor drains/pits	25	Under southern pit	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	X X	— —

Table 2.2-1 (continued)

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrate	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Thorium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Asbestos	Dioxins, Furans, Explosive Compounds, PCBs
Vertical extent of contamination under laboratory waste lines/floor drains/pits	26	Under waste lines	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	X X	— —
Vertical extent of contamination under laboratory waste lines/floor drains/pits	27	Under waste lines	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	X X	— —
Vertical extent of contamination under laboratory waste lines/floor drains/pits	28	Under floor drain	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	X X	X X
Vertical extent of contamination under laboratory waste lines/floor drains/pits	29	Under waste lines	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	X X	— —
Vertical extent of contamination under laboratory waste lines/floor drains/pits	30	Under waste lines	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	X X	— —
Vertical extent of contamination under laboratory waste lines/floor drains/pits	31	Under floor drain	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	X X	X X

Table 2.2-1 (continued)

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrate	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Thorium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Asbestos	Dioxins, Furans, Explosive Compounds, PCBs
Vertical extent of contamination under laboratory waste lines/floor drains/pits	32	Under waste lines	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	X X	— —
Vertical extent of contamination under laboratory waste lines/floor drains/pits	33	Under waste lines	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	X X	— —
Vertical extent of contamination under laboratory waste lines/floor drains/pits	34	Under waste lines	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	X X	— —
Vertical extent of contamination under laboratory waste lines/floor drains/pits	35	Under floor drain	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	X X	X X
Vertical extent of contamination under laboratory waste lines/floor drains/pits	36	Under floor drain	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	X X	X X
Vertical extent of contamination under laboratory waste lines/floor drains/pits	37	Under waste lines	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	X X	— —

Table 2.2-1 (continued)

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrate	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Thorium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Asbestos	Dioxins, Furans, Explosive Compounds, PCBs
Vertical extent of contamination under laboratory waste lines/floor drains/pits	38	Under waste lines	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	X X	— —
Lateral and vertical extent of contamination under laboratory waste lines/floor drains/pits	39	Under northeast pit	0.0–1.0 4.0–5.0 9.0–10.0	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	— — —	X X X
Vertical extent of contamination under cooling-tower piping	40	Under cooling tower 21-220 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	— —	— —
Vertical extent of contamination under cooling-tower piping	41	Under cooling tower 21-220 piping, 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	X X	— —	— —
Vertical extent of contamination under cooling-tower piping	42	Under cooling tower 21-220 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	— —	— —
Vertical extent of contamination under cooling-tower piping	43	Under former cooling tower 21-220 concrete pad	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	X X	— —
Lateral and vertical extent of contamination under building 21-213	44	Under building 21-213 concrete	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 2.2-1 (continued)

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrate	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Thorium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Asbestos	Dioxins, Furans, Explosive Compounds, PCBs
Lateral and vertical extent of contamination under building 21-213	45	Under building 21-213 concrete	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 building 21-213	46	Under building 21-213 concrete	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 building 21-213	47	Under building 21-213 concrete	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 building 21-213	48	Under building 21-213 concrete	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 cooling-tower piping	49	Under former cooling tower 21-420 concrete pad	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	X X	— —
Vertical extent of contamination under stack 21-388	50	Under stack 21-388	0.0–1.0 4.0–5.0 9.0–10.0	— — —	— — —	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	— — —	— — —

[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 an extended suite instead.

[b] X = Analyzed for.

[c] — = Not analyzed for.

Table 2.3-1
Proposed Sampling at Building 21-209 Footprint and Associated Structure 21-466

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrate	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Thorium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Asbestos	Dioxins, Furans, Explosive Compounds, PCBs[a]
Vertical extent of contamination under former laboratories/offices	1	Under dry-box facility waste lines	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	X X	X X	—[c] —
Vertical extent of contamination under former laboratories/offices	2	Under dry-box facility waste lines	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	X X	— —
Vertical extent of contamination under former laboratories/offices	3	Under dry-box facility waste lines	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	X X	— —
Vertical extent of contamination under former laboratories/offices	4	Under dry-box facility waste lines	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	X X	— —
Vertical extent of contamination under former laboratories/offices	5	Under dry-box facility waste lines	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	X X	— —
Vertical extent of contamination under former laboratories/offices	6	Under dry-box facility waste lines	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	X X	— —

Table 2.3-1 (continued)

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrate	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Thorium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Asbestos	Dioxins, Furans, Explosive Compounds, PCBs
Vertical extent of contamination under former laboratories/offices	7	Under dry-box facility waste lines	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	X X	X X
Vertical extent of contamination under former laboratories/offices	8	Under dry-box facility waste lines	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	X X	— —
Vertical extent of contamination under former laboratories/offices	9	Under dry-box facility waste lines	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	X X	— —
Vertical extent of contamination under former laboratories/offices	10	Under dry-box facility waste lines	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	X X	— —
Vertical extent of contamination under former laboratories/offices	11	Under dry-box facility waste lines	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	X X	— —
Vertical extent of contamination under exhaust stack 21-466	12	Under exhaust stack 21-466	0.0–1.0 4.0–5.0 9.0–10.0	— — —	— — —	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	— — —	— — —
Vertical extent of contamination under basement	13	Under basement floor drains	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	X X	X X
Vertical extent of contamination under basement	14	Under basement floor drains	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	X X	— —

Table 2.3-1 (continued)

Objective Addressed	Location Number	Location	Sample Depths (ft)	VOCs	SVOCs	TAL Metals	Cyanide	Nitrate	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Thorium	Isotopic Uranium	Strontium-90	Tritium	Moisture	pH	Asbestos	Dioxins, Furans, Explosive Compounds, PCBs
Vertical extent of contamination under basement	15	Under basement floor drains	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	X X	— —
Vertical extent of contamination under basement	16	Under basement floor drains	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	X X	X X
Vertical extent of contamination under basement	17	Under basement floor drains	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	X X	— —
Vertical extent of contamination under basement	18	Under basement floor drains	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	X X	— —
Vertical extent of contamination under basement	19	Under basement floor drains	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	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 an extended suite instead.

[b] X = Analyzed for.

[c] — = Not analyzed for.

Table 2.4-1
Summary of Proposed Soil Sampling at AOC 21-028(d) at Building 21-209

Objective Addressed	Location Number	Location	Sample Depths (ft)[a]	VOCs	SVOCs	TAL Metals	Cyanide	Nitrate	Perchlorates	Gamma Spectroscopy	Americium-241	Isotopic Plutonium	Isotopic Thorium	Isotopic Uranium	Strontium-90	Tritium	PCBs	Moisture	pH
Determine lateral and vertical extent north of the loading dock	BH-1	Just north of the loading dock, centered	0.0–1.0 5.0– 6.0 10.0 to 11.0	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 X X	X X X	X X X	X X X	X X X	X X X	X X X
Determine lateral and vertical extent west of the loading dock	BH-2	Just west of the loading dock, northern end	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	X X X
Determine lateral and vertical extent north of the loading dock	BH-3	Just west of the loading dock, centered	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	X X X
Determine lateral and vertical extent under the loading dock	BH-4	Just west of the loading dock, southern end	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	X X X
Determine lateral and vertical extent under the loading dock	BH-5	Under the base of the loading dock, centered between BH-2 and BH-3.	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	X X X
Determine lateral and vertical extent under the loading dock	BH-6	Under the base of the loading dock, centered between BH-3 and BH-4	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	X X X

[a] Zero depth is defined as 0.5 ft under the asphalt (BH-1 through BH-4) or directly under the base of the loading dock (BH-5 and BH-6).

[b] X = Analyzed for.