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Livermore Site Office, Livermore, California 94551

Lawrence Livermore National Laboratory

Lawrence Livermore National Security, LLC, Livermore, California 94551

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Summary Report for the Delineation of Mercury in Soil at the Former Building 212 Facility Lawrence Livermore National Laboratory

March 2011

Environmental Restoration Department

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Summary

This report describes the activities conducted to determine the lateral and vertical extent of elemental mercury in accessible areas near the former Building 212 at the Lawrence Livermore National Laboratory (LLNL) Livermore Site. This work was executed by the LLNL Environmental Restoration Department (ERD) for the U.S. Department of Energy (DOE) in accordance with the existing plans and procedures developed for LLNL's ongoing Livermore Site cleanup under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).

Free-phase mercury was identified in soil during demolition of Building 212 in April 2008. Soil removal soil containing mercury was performed by LLNL at that time. However confirmation sampling indicated that mercury remained in subsurface soil, and the extent of mercury was not fully defined.

The objectives of this investigation were to define the lateral and vertical extent of mercury in the unsaturated zone while minimizing waste generation and the spread of mercury. Gross alpha, gross beta and tritium activities were also analyzed to assist with determining the disposition of any soil waste that may be generated in the future on this project. In addition, the analytic data acquired during this investigation will allow DOE and LLNL to prepare a cost estimate for completing a removal of mercury-impacted soil from the Building 212 area, if necessary.

This investigation employed a phased, "step-out" approach to define the lateral and vertical extent of mercury in soil. The first phase consisted of discrete-depth soil sampling to a depth of 5 ft. If mercury concentrations were above the U.S. EPA Residential Screening Level (SL) of 5.6 milligrams per kilogram (mg/kg), a second phase consisting of adjacent vertical and horizontal "step-out" sampling was conducted to define the extent of mercury. Although the Livermore Site is considered an industrial site, the Residential SL was used as a comparison level for determining "step-out" sampling locations. In addition, soil sampling was conducted in all areas where mercury was suspected to occur, a surface soil gas walk-over survey was also performed using real-time onsite field analytical techniques to help identify any other areas where additional soil samples should be collected.

The field investigation was conducted between June 7 and June 16, and on June 29 and June 30, 2010. Soil samples were analyzed onsite using an Ohio Lumex mercury analyzer (RA-915+) with soil attachment (RP-91C). This Ohio Lumex devise (RA-915+/RP-91C) was evaluated in 2004 by the EPA SITE program (EPA, 2004) and approved as a viable field measurement technology.

Soil samples were collected at 45 locations including seven step-out locations. All mercury concentrations were below the U.S. EPA Industrial SL of 34 mg/kg. The sampling results indicate that no free mercury was encountered and the extent of mercury in soil in the Building 212 area is limited to two areas. The first area which is approximately 45 ft x 10 ft includes the eastern 15 ft of the trench excavated in 2008 where free mercury was observed and extends just east of the corner of Building 212. Mercury was detected at 14 and 26 mg/kg, but additional samples to the east confirmed that mercury above the Residential SL does not extend

further east than the corner of the building, and no further than 10 ft north from the edge of the building foundation. Mercury is not considered to extend deeper than 2 ft below ground surface in this area, as there is a concrete capped utility corridor preventing deeper migration.

The second mercury-impacted area, which is approximately 35 ft x 10 ft, is west of the former trench and near a former staircase that led into Building 212. In this area, mercury was detected at 8.9 and 5.69 mg/kg at the surface and 1.5 ft, respectively. Additional adjacent samples confirmed mercury above the Residential SL at 7.0 mg/kg at the surface but below the Residential SL at concentrations ranging between 0.9 and 1.17 mg/kg mercury in samples at 1, 2 and 3 ft. Surface samples from locations SSS-212-023 through -027 and SSS-212-040 confirmed that mercury above the Residential SL does not extend any further west along the northern perimeter of Building 212. Step-out locations also confirm that mercury above the Residential SL does not extend any further than 10 ft north from the edge of the building foundation. Mercury is not considered to extend deeper than 2 ft bgs in this area, as there is a concrete capped utility corridor preventing deeper migration.

The results from the walk-over survey were interpreted to be inconclusive because the survey readings were similar in areas where mercury in soil samples was known to be above and below the EPA Residential SL.

The findings of this investigation indicate mercury concentrations in soil are below the EPA Industrial SL of 34 mg/kg in the vicinity of Building 212. As site usage is not expected to change, LLNL recommends leaving the soil in place. The need for additional soil sampling will be reviewed pending further demolition of the Building 212 foundation or if planned site usage changes.

1. Introduction

This report summarizes the activities conducted to determine the lateral and vertical extent of elemental mercury near the former Building 212 at the Lawrence Livermore National Laboratory (LLNL) Livermore Site. Elemental mercury was discovered during demolition of Building 212 in 2008. Except as noted herein, the sampling described in this report was performed in June 2010 in accordance with the *Work Plan for Delineation of Mercury in Soil at the Building 212 Facility*, dated May 26, 2010 (LLNL, 2010). This work was executed by the LLNL Environmental Restoration Department (ERD) for the U.S. Department of Energy (DOE) in accordance with the existing plans and procedures developed for LLNL's ongoing Livermore site cleanup under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).

1.1. Objectives

The objectives of this investigation were to define the lateral and vertical extent of mercury in the unsaturated zone while minimizing waste generation and the spread of mercury. Gross alpha, gross beta and tritium were also analyzed to assist with determining the disposition of any additional soil waste that may be on this project. However, defining the full extent of radionuclides in the Building 212 area and their isotopic speciation was beyond the scope of this investigation.

The analytic data acquired during this investigation will allow DOE and LLNL to prepare a cost estimate for completing the removal of mercury from the Building 212 area, if necessary. The May 26, 2010 work plan for mercury delineation (ERD, 2010) was reviewed and approved by the U.S. Environmental Protection Agency (EPA), California Department of Toxic Substances Control (DTSC), and San Francisco Bay Regional Water Quality Control Board (RWQCB) prior to the start of work.

1.2. Scope of Work

Free-phase mercury was identified in soil during demolition of Building 212 in April 2008. Removal of some soil containing mercury was performed by LLNL in August 2008. However confirmation sampling indicated that mercury remained in subsurface soil, and the extent of mercury was not known.

The May 2010 work plan specified a phased, "step-out" approach to define the lateral and vertical extent of mercury in soil. The first phase consisted of discrete-depth soil sampling to a depth of 5 ft. If mercury concentrations were found to be above the EPA Residential Screening Level (SL) of 5.6 milligrams per kilogram (mg/kg), vertical and horizontal "step-out" soil sampling was used to define the extent of mercury. Although the Livermore Site is considered an industrial site, the Residential SL was used as a comparison level for determining "step-out" sampling locations. In addition a surface soil gas walk-over survey was conducted using real-time onsite field analytical techniques to assist with selecting additional soil sample locations in areas that were considered to be free of mercury contamination.

2. Former Building 212 History and Description

2.1. Former Building 212 Location and Use

LLNL is in the process of demolishing, decontaminating and decommissioning Building 212, which is located on the south perimeter of the Livermore Site along East Avenue (Figure 1). The building was constructed during the mid-1940s and was in continuous use by the Naval Air Station (NAS) Livermore and LLNL until the mid-1980s. Activities conducted in Building 212 summarized below are from the *Historic Context and Building Assessments for the Lawrence Livermore National Laboratory Built Environment* (LLNL, September 2007).

Building 212 was originally constructed in 1943 as a Drill Hall for NAS Livermore. In 1952, the Drill Hall was renovated for the fusion research program, Project Sherwood. In 1954, the Drill Hall underwent major structural renovations when a 90-inch cyclotron and a 0.5 Mega electron Volt (MeV) Cockcroft-Walton accelerator were installed. Each of these machines required a forty-foot deep pit and blockhouse. In 1964, a 630-ft concrete addition was completed to the east end of the building to accommodate the new Crockcroft-Walton accelerator. In 1968, a 90-inch cyclotron was removed and a 80-centimeter cyclotron and Van de Graaf accelerator were installed. It is believed that mercury-sealed vacuum pumps were serviced in a machine shop on the north side of Building 212 (Figure 2). During the 1970s and 1980s, modifications continued to accommodate various research programs such as the Rotating Target Neutron Source, the Two Stage Light Gas Gun, the Flash Light Source Facility, the High-Energy X-ray Calibration Spectrometer, the Electron Beam Ion Trap, the Vacuum Coating Facility, and the Phase R Dye laser.

North of Building 212, Buildings 211 and 218 were primarily used for office space (Figure 3). Building 2127, an old barracks, has always been used as office space. However from 1967 to 1975, a machine shop with a mercury reclaimer was present in the south side of Building 211 (as referenced in Figure 4.1-2 and Table 4.1-2 from LLNL, 1990, and Table B-1 from LLNL, 1985).

2.2. Geology and Hydrogeology

The Building 212 area is underlain by Quaternary-age alluvial fan deposits consisting primarily of sandy silt, clayey silt, and silty sand with occasional interbeds of sandy gravel and gravelly sand. Depth to water in the area is currently about 92 ft below ground surface (bgs) and the ground water flow direction is generally to the west. Hydrostratigraphic unit 2 (HSU 2) extends from 88 to 160 ft bgs, is the first saturated HSU in the area, and contains low concentrations of volatile organic compounds (VOCs), including trichloroethylene (TCE), carbon tetrachloride (CTET), chloroform, and Freon 113. TCE and CTET concentrations are at or slightly below their respective 5 and 0.5 parts per billion (ppb) maximum contaminant levels (MCLs), Freon 113 is below its MCL of 1,200 ppb and a chloroform concentrations are below the Livermore Site cleanup standard of 100 ppb for total trihalomethanes. This dilute plume is currently being hydraulically contained and treated at Treatment Facility G - 1 (TFG-1) located about 200 ft north of Building 212. The VOCs in ground water in the Building 212 area are thought to have been derived from areas to the east.

2.3. Previous Investigations

In the vicinity of Building 212, 33 borings and monitoring wells have been installed to characterize soil and ground water contamination (Figure 3). A total of 28 borings were drilled and five wells/piezometers were installed between 1984 and 2009. The total depth investigated was 262 ft bgs. The chronology of Building 212 borehole drilling and well/piezometer installation is summarized below:

- 1984: five borings, C-212-1 through -5 were drilled and one monitoring well, W-111, was installed. These borings ranged in depth from 11 ft to 117 ft bgs.
- 1988 through 1989: six borings (B-464, B-560, SIB-212-001, -002, -003, and -004) and two monitoring wells (W-464 and W-560) were drilled to depths ranging from 91.3 to 262.7 ft bgs.
- 1996 through 1997: three wells/piezometers were installed: SIP-212-101, TW-11, and TW-11A.
- 1994 through 2007: seven shallow pre-construction borings, (PC-B212-012, -013, -014, -015, -016, -017 and -018) were drilled between the surface and 4 ft bgs.
- 2009: ten shallow pre-construction borings, PC-B212-019 through -028, were drilled between the surface and 3 ft bgs.

Samples from the borings and monitoring wells were analyzed for various analytes, including the contaminants of concern for this investigation: mercury, gross alpha, gross beta and tritium (Tables 1 and 2). Based on the historical data, mercury was not detected in soil samples from boring B-464, B-560 or SIB-212-101. However, mercury was detected in PC-212 borings drilled between 1997 and 2009. Mercury was detected in six samples at low concentrations ranging from 0.03 milligrams per kilogram (mg/kg) to 0.21 mg/kg. These concentrations are all below the EPA SL of 5.6 mg/kg for residential land use.

Gross alpha and gross beta were detected during previous investigations but at low levels: gross alpha up to 10 picocuries per gram (pCi/g) and gross beta up to 23 pCi/g.

LLNL background concentrations for gross alpha and gross beta are indeterminate at this time. In the early 1990, gross alpha and gross beta background values were calculated to be 15 pCi/g and 25 pCi/g, respectively. In 2008, the LLNL background concentrations were recalculated and gross alpha and gross beta background values were 6.5 pCi/g and 11 pCi/g, respectively (LLNL, 2008). However, based on regulatory response to the methodology used in the 2008 calculations, LLNL currently plans to collect additional data and recalculate the gross alpha and gross beta background values for the Livermore Site.

Mercury was not detected in 14 of the 15 ground water samples collected between 1983 and 1996 in wells TW-11, TW-11A and W-560, which are upgradient (east) of Building 212, and in well W-464, which is downgradient (west) of the Building 212 Area (Table 3). Mercury was detected in well W-464 in 1989 at 0.0003 mg/L, but was not detected in two sampling events for this well in 1990 and 1995. The mercury result for well W-464 is well below the mercury MCL of 0.002 mg/L.

Tritium was detected in ground water from five wells between 1983 and 2006, SIP-212-101, TW-11, TW-11A, W-111, and W-464 at activities well below the MCL of 20,000 picocuries per

liter (pCi/L). Wells TW-11 and TW-11A, are upgradient (east) of Building 212, well SIP-212-101 is on the south side of Building 212, well W-111 is directly downgradient (west) of Building 212, and well W-464 is downgradient to the north of Building 212 (Figure 3). Tritium was detected in ground water at activities up to 2,000 pCi/L during this time period, with the highest activities detected in well W-464 in 1991 (Table 3). Gross alpha was detected in 1996 in wells TW-11, W-111, and W-464 at activities up to 10.6 pCi/L. Gross beta was detected in 1984 in well TW-11A at 8 pCi/L, but was not detected in well TW-11A in 1996. Gross beta was detected in 1996 in ground water from well TW-11 at 7.6 pCi/L. Tritium was detected in the soil in the vicinity of Building 212, but the activities detected in ground water do not indicate that there is a source of tritium to ground water in the vicinity of Building 212.

2.4. Recent Activities in the Building 212 Area

LLNL began demolition of Building 212 in April 2008. The demolition activities included cutting and capping or cutting and plugging the building sanitary sewer lines that connected to main sanitary sewer lines, and sampling and analyzing all the sink sediment traps for mercury. None of the sink sediment trap samples contained mercury at detectable levels. During the demolition activities, free mercury was encountered in a low spot in a copper sink drain line along the south side of the building in Room 160.

On April 16, 2008, demolition staff discovered several small beads of mercury on the concrete foundation on the north side of the building (Figures 4 and 5). LLNL staff responded, cleaned up the mercury and managed it as hazardous waste. On April 17, 2008, additional small beads of mercury were discovered in soil adjacent to the foundation. The extent of visible mercury in the soil was small, and LLNL developed and implemented a plan to clean up the affected area. However, after a shovel of soil approximately one-inch deep was removed, a larger amount of elemental mercury was discovered, at which point clean-up actions were halted for further evaluation.

Visually-verifiable mercury was in an area approximately 18 inches wide by 24 inches long to an unknown depth. The area was bound on the north by a pedestrian sidewalk and on the south by the Building 212 concrete foundation (Figures 5 and 6). Because the mercury was beneath the surface, it was impossible to determine its extent without subsurface investigation. Therefore, LLNL prepared a time-critical removal action plan (LLNL, 2008) to further investigate the extent of the mercury in soil. To be conservative, soil was excavated 25 ft horizontally and to a depth of 3 ft along the north side of the building in the vicinity of the observed beads of mercury. Based on the analytical data, the horizontal extent of the mercury exceeded the 25-foot removal area and the vertical extent of mercury was detected at a depth of 3-ft just above the utility corridor. In addition, utilities were encountered at a depth of 3-feet depth (LLNL, 2009).

Confirmation sample data indicated that the extent of mercury was not fully defined vertically or laterally (Table 4). Mercury was above the total threshold limit concentration (TTLC) in the samples collected from the north sidewall, east sidewall and the bottom of the excavation on the eastern end (Figure 7).

Gross alpha and gross beta activities in samples collected from the bottom of the excavation during the initial mercury removal action ranged from 8.95 to 11.1 pCi/g and 17.2 to 19.9 pCi/g,

respectively. Isotopic data for this soil indicate that the suite of isotopes present and their activities are generally consistent with typical isotopic background activities encountered in the Coast Range Province of California (Devany, 2009). Site-specific isotopic background values, however, are not currently available for the Livermore Site.

Since the topography in the Building 212 area gently slopes to the west, storm drains downgradient of the site to the west were checked in December 2009 (Figure 4). The inspection consisted of observing whether there was any sediment that could be sampled and analyzed for mercury. During the inspection no sediment was found. LLNL has an industrial storm water permit, No. 95174, which requires sampling storm water upstream and downstream of LLNL. Storm water data were reviewed for 1991 through 2009 for mercury in storm water runoff samples from two offsite discharge locations, ASS2 and ASW, downgradient (west) from Building 212 (Figure 1). Mercury has not been detected in storm water runoff from location ASS2 in the 18 year sampling period. Mercury was detected in storm water runoff at 0.0039 mg/L in November 1997 and at 0.0002 mg/L in November 2002 from location ASW. Mercury has not been detected in storm water runoff from ASW for the last 7 years (Table 5).

In December 2009, wells in the vicinity of Building 212, W-111, W-464, SIP-212-101, TW-11 and TW-11A were sampled and analyzed for mercury, gross alpha and gross beta. All the results were consistent with historical data (Table 3).

2.5. Investigation Areas

Based on the recent building demolition activities, the following areas were defined to investigate the lateral and vertical extent of mercury (Figure 8).

Area 1 – The general area within the footprint of the north side of the building and the landscaped area and sidewalk adjacent to Rooms 145, 151 and 167, including the previously excavated area. Rooms 145 and 151 were machine shops, and Room 167 was a boiler room. A walk-in spray booth was present in the east corner of Room 151. Exhaust from the booth was vented to the outside (Figure 2) in the vicinity of where the mercury beads were found on the concrete foundation during the Building 212 demolition activities.

Area 2 – This area includes: 1) the landscaped area, sidewalk, and street gutter along the north side of the building east and west of Area 1 where mercury may have been transported by wind and storm water runoff, respectively; 2) the area within South Mall Street where mercury may have migrated laterally from the area where the exhaust vented from the building and into the permeable backfill surrounding underground utilities; and 3) the north side of South Mall Street in the vicinity of Building 211 which had a mercury reclaimer in the machine shop in the south side of the building that operated from 1967 to 1975.

Area 3 – The parking lot on east side of Building 212 in the vicinity of Building 2128. This building has been removed and the former chemical usage in the building is unknown.

Area 4 – The landscaped area adjacent to the Building 212 foundation on the south side of the building near the lab sinks in Rooms 154, 160, 162 and 170. Room 160 where free mercury was encountered in a low spot in a copper sink drain line along the south side of the building.

3. Sampling

Depth-discrete soil sampling and a surface soil gas walk-over survey were conducted between June 7 and June 16, and on June 29 and June 30, 2010 (Figures 9 and 10). Depth-discrete soil samples in areas of known or suspected mercury contamination were collected and analyzed onsite and duplicate and confirmation samples were analyzed offsite. When mercury concentrations were above 5.6 mg/kg, depth-discrete soil samples from additional "step out" locations were collected and analyzed until mercury was below 5.6 mg/kg. Soil samples were analyzed onsite, using an Ohio Lumex RA-915+ with soil attachment RP-91C and analyzed offsite using EPA Method 7471 for mercury at Curtis and Tompkins, LTD and BC Laboratories, Inc. This Ohio Lumex device (RA-915+/RP-91C) was evaluated in 2004 by the EPA SITE program (EPA, 2004). This evaluation indicated that the Lumex system could achieve minimum detection limits between 0.0053 and 0.042 mg/kg (EPA, 2004) and could achieve a reasonable throughput of 59 samples in an 8-hr day. Therefore EPA approved this device as a viable field measurement technology. Ground surface air monitoring was conducted to identify potential hotspots and areas where additional soil sampling should be conducted. An Ohio Lumex mercury analyzer (RA-915+), a portable, high-sensitivity atomic absorption spectrometer, was used to monitor the surface soil gas in three of the four investigation areas.

3.1. Field Work Preparation

Prior to starting the field work, the proposed boring locations were cleared for subsurface obstructions by LLNL facilities staff. At some locations the concrete was cored to allow sampling of the underlying materials. Since the laboratory scale for weighing soil sample aliquots was very sensitive, a small trailer was mobilized to the Building 212 area to house the field laboratory and minimize weight scale errors due to wind.

3.2. Depth-Discrete Soil Sampling

The sampling approach was developed to systematically delineate the extent of mercury. The sampling approach consisted of four different sampling scenarios as described below and shown on Figure 8:

- Scenario 1: Surface sampling in areas where there was a high likelihood of mercury transport via storm water runoff or wind;
- Scenario 2: Sampling at 1, 3 and 5 ft bgs at locations where mercury may have been transported via root holes, macropores, and/or utility conduits;
- Scenario 3: Sampling at 5 ft bgs at locations where mercury exceeding 5.6 mg/kg was previously encountered at 3 ft during the removal action but due to work scope limitations was not investigated at greater depth;
- Scenario 4: Step-out sampling at locations and depths determined by the mercury results from Scenarios 1 through 3.

Depth-discrete soil sampling was conducted by hand-augering at the boring locations shown in Figure 9 to depths identified per the sampling scenario. The work surface at each boring was covered with poly sheeting to minimize the spread of contamination. At each depth, soil cuttings

for each sample interval were collected, placed in a heavy-duty plastic bag, which was sealed and homogenized by squeezing and shaking the bag. Approximately 200 milligrams (mg) of soil was then removed from the bag and analyzed onsite using the Ohio Lumex mercury analyzer (RA-915+) with soil attachment RP-91C. A total of three analyses were conducted on soil from each interval. The results were averaged and compared to the 5.6 mg/kg SL for elemental mercury (Table 6). If the average mercury concentration was above the 5.6 mg/kg SL, additional step-out borings were completed to delineate the lateral and vertical extent of mercury.

At each location, the deepest sample with mercury below 5.6 mg/kg, or the last sample before refusal, was sent to an offsite contract analytical laboratory (CAL) for confirmation analysis. In addition, on a daily basis, at least 10% of the samples with field concentrations above 5.6 mg/kg were selected at random and submitted to an offsite CAL for confirmation analysis. In accordance with LLNL ERD SOP 4.9: Collection of Field QC Samples, and to meet the ERD data quality objectives as defined in the Quality Assurance Project Plan (QAPP) for the ERD Projects (LLNL, 1992), half of the field QC samples were designated for interlaboratory analysis and half were designated for intralaboratory analysis.

Duplicate and confirmation mercury samples were shipped for analysis at a National Environmental Laboratory Accreditation Program (NELAP) CAL. Samples for gross alpha, gross beta and tritium analysis for waste characterization purposes were shipped to a NELAP CAL that participates in the Department of Energy Consolidated Auditing Program (DOECAP) and that is licensed to receive and manage potentially radioactive material. Analyses were performed under a NELAP certification for the state of California using the methods and procedures specified in Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846, EPA, 1986 [and updates]). The applicable SW-846 method for mercury is EPA Method 7471. The applicable lab-specific SOPs were selected for the radionuclide analyses. Field blanks and rinseate blank samples were collected in accordance with the ERD QAPP.

For waste characterization purposes, the deepest soil sample in a borehole where mercury exceeded the 5.6 mg/kg mercury SL was submitted for offsite gross alpha, gross beta and tritium analyses. A 32-ounce (oz) sample volume was collected for the radionuclide analysis. Extra soil remaining after the radionuclide analysis was held at the CAL for future isotopic analysis, if required.

The soil generated during this investigation was segregated into labeled plastic bags at 1-ft intervals and poured back in each borehole in the same order that it was removed and tamped into place. In concrete areas, once the boring was completed and backfilled with the soil from the boring, the top six inches was backfilled with cement grout. In areas where the ground surface was soil, any unfilled space in the boring was backfilled to the top with clean soil.

3.3. Surface Soil Gas Walk-over Survey

As an additional measure to identify mercury where soil sampling was not planned, a surface soil gas walk-over survey was conducted. This survey was conducted in three of the four investigation areas in the vicinity of the Building 212 where elemental mercury in the soil was encountered, and in investigation areas where mercury may conceivably have been transported by wind and storm water runoff (Figure 10). The walk-over survey was used as a screening tool and was considered to be a secondary means for identifying additional soil sampling locations.

The walk-over survey was conducted by monitoring the air with the RA-915+ mercury analyzer with the intake tube approximately one-inch off the ground. The walk-over survey was only conducted when the wind speed was less than 5 miles per hour (mph) and there had been no measurable rain for a period of 10 days. Prior to conducting the walk-over survey, wind speed and direction from the LLNL meteorological station (Figure 1), and the daily ambient mercury-in-air concentration was measured at least 200 ft upgradient of Building 212. In the Building 212 area, surface soil gas measurements for mercury were collected on a 5 ft x 5 ft grid in the areas shown in Figure 10. Surface soil gas readings were measured at the center of each grid space and the information recorded. If the reading at any grid location was above the daily ambient air concentration range, then soil samples were to be collected from a depth of 0.5, 1, 3 and 5 ft bgs.

3.4. Deviations from the Work Plan

Due to field conditions encountered in the Building 212 area, certain tasks detailed in the work plan could not be completed as envisioned. Deviations from the work plan are described below:

- Scenario 2: 3 ft and 5 ft bgs soil samples could not be collected at the specified depth in five borings: SSS-212-001, -002, -003, -004, -017, due to refusal at 1.5 to 2 ft bgs. Refusal was due to a concrete cap that covers the main utility corridor, which runs along the length of Building 212.
- Scenario 3: 5 ft depth samples within the trench could not be collected because of the utility corridor capped with concrete described above.
- The walk-over survey was to be conducted when the wind speed was below 5 miles per hour (mph). However, wind speed was below 5 mph during work hours for only two days in June but did not stay below 5 mph all day, and thus the walk-over survey could not be conducted in Area 4.
- Initially, a screening reading of the soil vapor was conducted for each sample bag. Because the readings did not correlate well with the actual field laboratory results, this step was eliminated.

4. Results

4.1. Depth-discrete Soil Sampling Results

During the investigation, a total of 82 soil samples from 45 locations were collected and analyzed using the field laboratory (Table 6 and Figures 10 and 11). All mercury concentrations were below the U.S. EPA Industrial SL of 34 mg/kg. Out of the 82 samples analyzed, only four, SSS-212-001-0F, 004-0F, -022-1.5F, and -039-0F, contained mercury above the EPA 5.6 mg/kg Residential SL. Two of these samples were sent offsite for analysis and mercury concentrations above the EPA Residential SL was confirmed in both. Mercury was also detected above the EPA Residential SL by the offsite laboratory in samples SSS-212-001-1F, SSS-212-002-0F, and SSS-212-022-0.5F, although the field laboratory analysis did not detect mercury above the EPA Residential SL (Table 6).

Based on detections above the EPA Residential SL at four of the initial locations, SSS-212-001, -002, -004 and -022, seven step-out locations, SSS-212-038, -039, -040, -042, -043, -044 and -045, were sampled to define the lateral and vertical extent of the mercury (Figure 9). Samples from locations SSS-212-038, -039 and -040 contained mercury just slightly below or above the EPA Residential SL (Figure 11, Table 6). Therefore, three additional step-out locations, SSS-212-043, -044, and -045 were sampled. Mercury was below the EPA Residential SL at all of these step-out locations.

To ensure that the field laboratory data was representative of actual mercury concentrations in Building 212 soil, the field laboratory data was compared to the offsite laboratory data two ways. First, field laboratory data was plotted graphically with the offsite duplicate or confirmation results from the 36 sample locations (Figure 12). The plot shows that the majority of the field laboratory results were higher than the offsite laboratory results.

The second comparison was done by calculating the relative percent difference (RPD), a measure of analytic precision. The work plan stated that if the offsite laboratory data were at least 25% higher than the field laboratory data and exceeded the SL, then the field laboratory data would not be considered valid, and additional sampling and analyses exclusively by an offsite laboratory would be required. Accordingly, the RPD were used to compare the field laboratory and offsite laboratory results, and to verify that the field laboratory results were indeed representative. RPD is calculated using the following formula:

$$RPD\% = (X1-X2/ ((X1+X2)/2)) \times 100$$

Where:

X1=concentration observed from the field laboratory

X2=concentration observed from the offsite laboratory

Thirty-six RPD calculations were conducted (Table 7). Seven of the RPD calculations indicated results where the offsite laboratory concentrations were 25% above field laboratory concentrations. However in only two of these cases was the EPA SL exceeded. SSS-212-002-0F and -022-0.5F were found to contain mercury concentrations above the EPA SL. Because step-out locations from SSS-212-02 and -022 have already been sampled and found to be below the EPA SL, no additional sampling is necessary.

4.2. Surface Soil Gas Walk-over Survey Results

The ability to conduct surface soil gas walk-over surveys was limited to two days during June because the wind speed was greater than 5 mph. The surface soil gas walk-over survey was conducted in Areas 1, 2 and 3 (Figure 10). The Area 4 surface soil gas walk-over survey could not be completed since wind speeds did not remain below 5 mph on the days the other walk-over surveys were conducted. A total of 96 locations were surveyed in the three areas (Figure 10) and no surface soil gas readings were found to be above the ambient air concentration. The surface soil gas walk-over survey results in Areas 1 and 2 did not correlate with the soil sample locations where mercury was reported above the EPA Residential SL (Table 8). Based on these findings, the results of the walk-over survey were interpreted to be of questionable value and inconclusive.

4.3. Waste Characterization Sample Results

Three samples were analyzed for STLC and gross alpha, gross beta and tritium as part of the waste characterization profiling for future work on this project. Lead exceeded its 5 mg/L STLC in two of the three samples, SSS-212-004 and SSS-212-039 (Table 9). The gross alpha and gross beta results are below the former background activities (circa 1990s), but above the preliminary 2008 background activities for LLNL (Table 9). However, since the background values for the LLNL Livermore Site are currently being recalculated, these results will be re-evaluated once the background values have been established.

5. Conclusions

Extensive, depth-discrete soil sampling was conducted in areas near Building 212 during June 2010 to delineate mercury soil contamination. Analytic results indicate that mercury concentrations were below the EPA Industrial SL at all locations sampled and only exceeded the EPA Residential SL in two relatively small areas. No free phase mercury was encountered in either area.

The first area where mercury concentrations exceed the Residential SL extends just east of the corner of Building 212. This area measures approximately 45 ft x 10 ft, and includes the eastern 15 ft of the trench excavated in 2008 where free mercury was observed (Figure 11). Mercury was detected at 26 mg/kg at location SSS-212-001 and at 14 mg/kg at location SSS-212-004 (Figure 11). Additional samples to the east, SSS-212-009 and -010 confirm mercury above the Residential SL does not extend any further east than the corner of the building and no further north than 10 ft from the edge of the building foundation, as delineated by sample locations SSS-212-011 through SSS-212-016 and SSS-212-042. The depth of mercury is considered to be no deeper than 2 ft bgs, as there is a capped utility corridor preventing deeper migration of the mercury in this area.

The second area, which measures approximately 35 ft x 10 ft, is close to where stairs used to lead into the north side of the building (Figure 11). In this area, mercury was detected at 8.9 and 5.69 mg/kg at the surface and 1.5 ft, respectively at location SSS-212-002. Additional adjacent samples confirmed mercury was detected at 7.0 mg/kg at the surface but below the SL at concentrations ranging between 0.9 and 1.17 mg/kg mercury in samples at 1, 2 and 3 ft. Surface samples from location SSS-212-023 to SSS-212-027 and SSS-212-040 confirmed mercury above the SL does not extend any further west along the northern perimeter of Building 212. Step-out locations, SSS-212-043, -044 and -045 to the north of SSS-212-022 confirm that mercury above the SL does not extend any further than 10 ft north from the building foundation. Again, the depth of mercury is considered to be no deeper than 2 ft bgs in this area, as there is a capped utility corridor preventing deeper migration of the mercury.

The results from the surface soil gas walk-over survey were inconclusive. The survey readings were similar in areas where mercury was above and below the EPA Residential SL. Most of the survey readings were collected over concrete or asphalt, which seems to be preventing mercury vapors from reaching the surface. Therefore, the surface soil gas walk-over survey was found to be not useful for identifying potential “hot spots” for additional soil

sampling. However, since all known or suspected areas containing mercury were included in the soil sampling campaign, this is not considered to adversely affect the findings of the project.

6. Recommendations

The findings of this investigation indicate mercury concentrations in soil are below the EPA Industrial SL of 34 mg/kg in the vicinity of Building 212. As site usage is not expected to change, LLNL recommends leaving the soil in place. The need for additional soil sampling will be reviewed pending further demolition of the Building 212 foundation or if planned site usage changes.

7. References

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8. Acronyms and Abbreviations

bgs	Below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CoC	Chain of custody
CTET	Carbon tetrachloride
DHS	California Department of Health Services
DOE	U.S. Department of Energy
DQOs	Data Quality Objectives
DTSC	California Department of Toxic Substances Control
ERD	Environmental Restoration Department
ES&H	Environmental Safety & Health
HSU	Hydrostratigraphic unit
LLNL	Lawrence Livermore National Laboratory
MCL	Maximum Contaminant Level
MeV	Mega electron volt
Mg/kg	Milligram per kilogram
Mph	Miles per hour
NAS	Naval Air Station
OSHA	Occupational Safety and Health Administration
pCi/g	Picocuries per gram
pCi/L	Picocuries per liter
PPE	Personal protective equipment
QA	Quality assurance
QC	Quality control
RPM	Remedial Project Manager
RWQCB	San Francisco Bay Regional Water Quality Control Board
SARA	Superfund Amendments and Reauthorization Act
SL	Screening level
SOP	Standard operating procedure
STLC	Soluble Threshold Limit Concentration
SVOCs	Semi-volatile organic compounds
TCE	Trichloroethylene
TCLP	Toxicity Characteristic Leaching Procedure
TFG-1	Treatment Facility G-1
TTLC	Total Threshold Limit Concentration
US EPA	United States Environmental Protection Agency
VOC	Volatile organic compound

Figures

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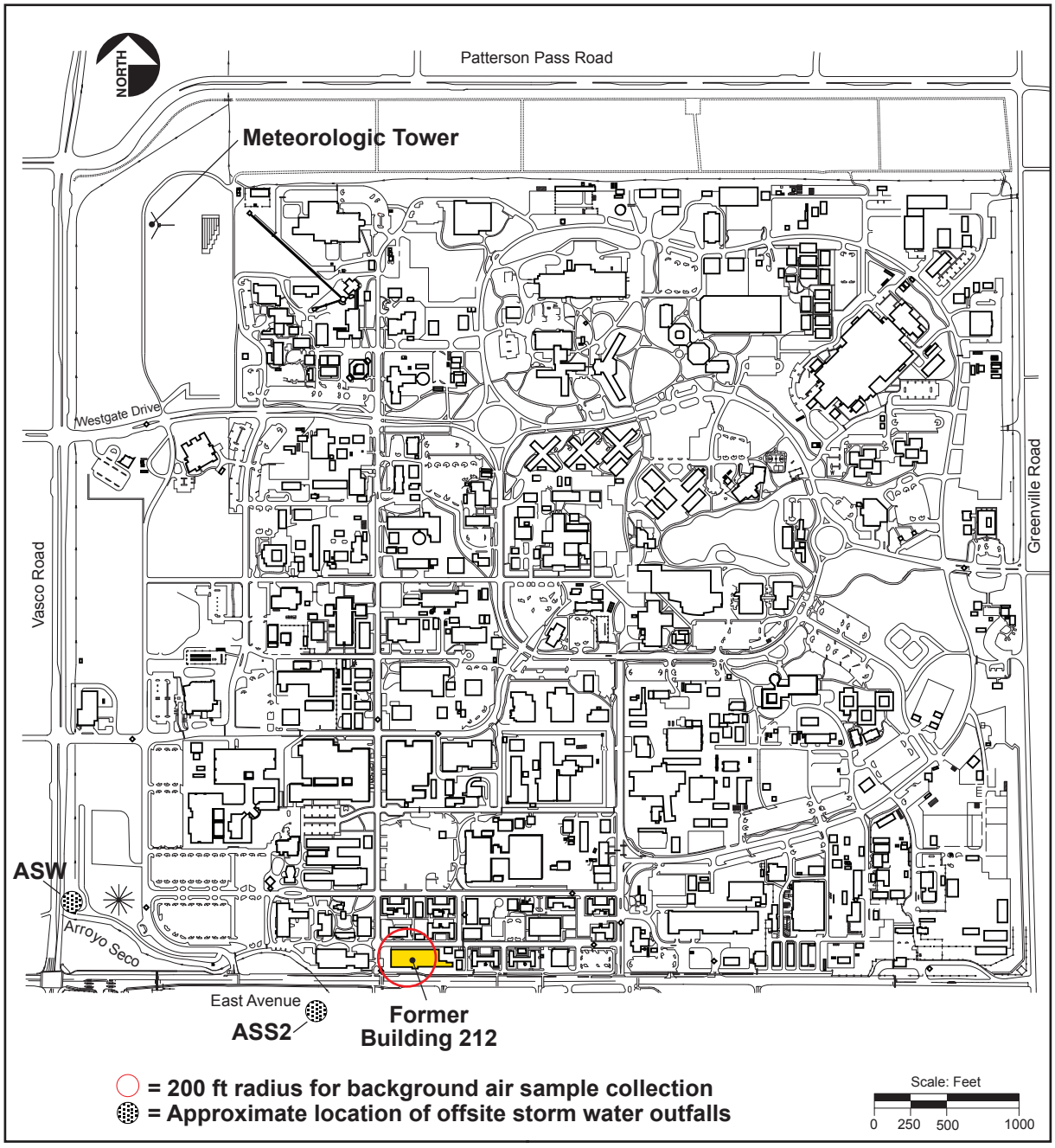

ERD-LSR-10-0001

Figure 1. Location of the former Building 212 at the Livermore Site, Lawrence Livermore National Laboratory (LLNL).

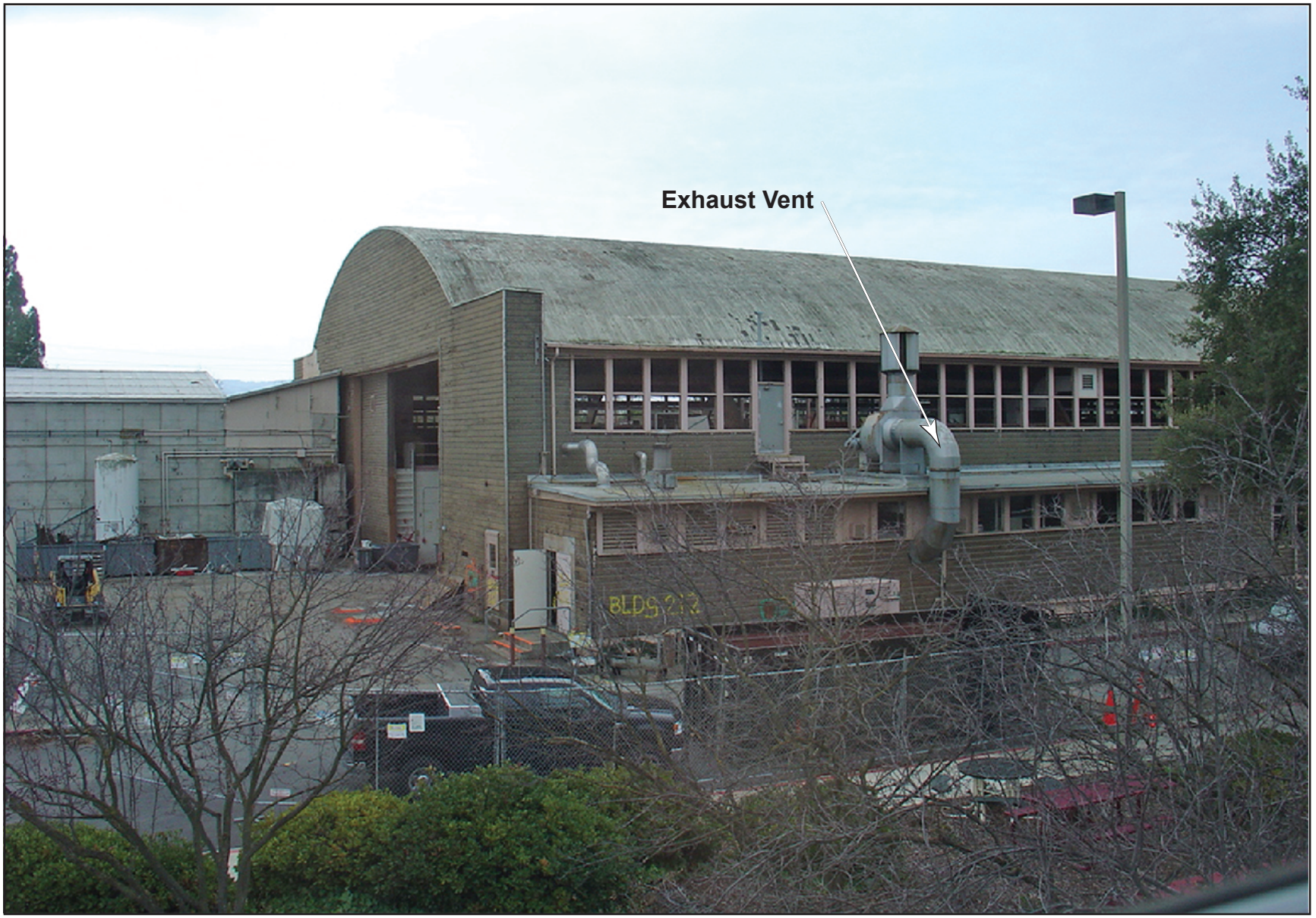

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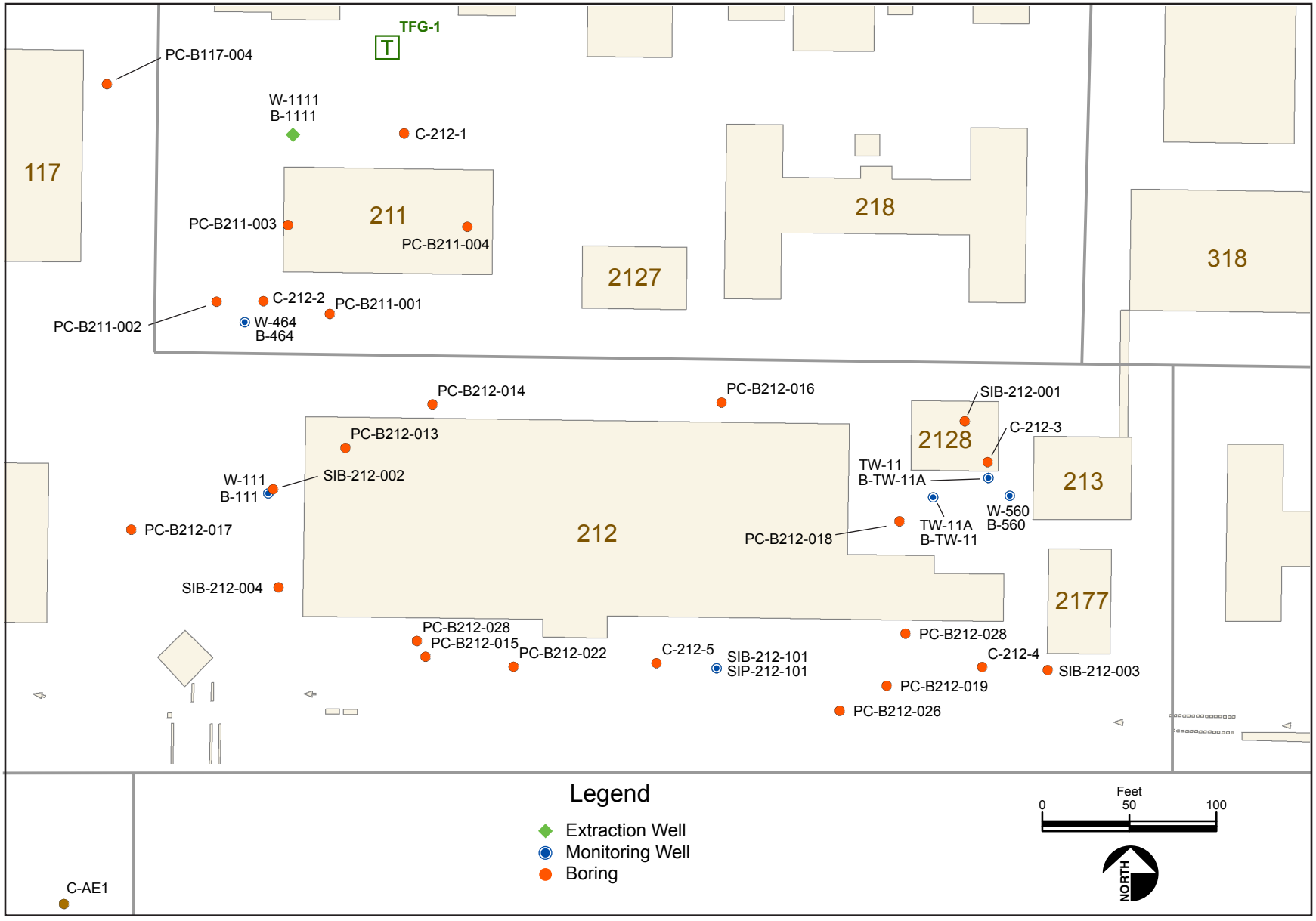
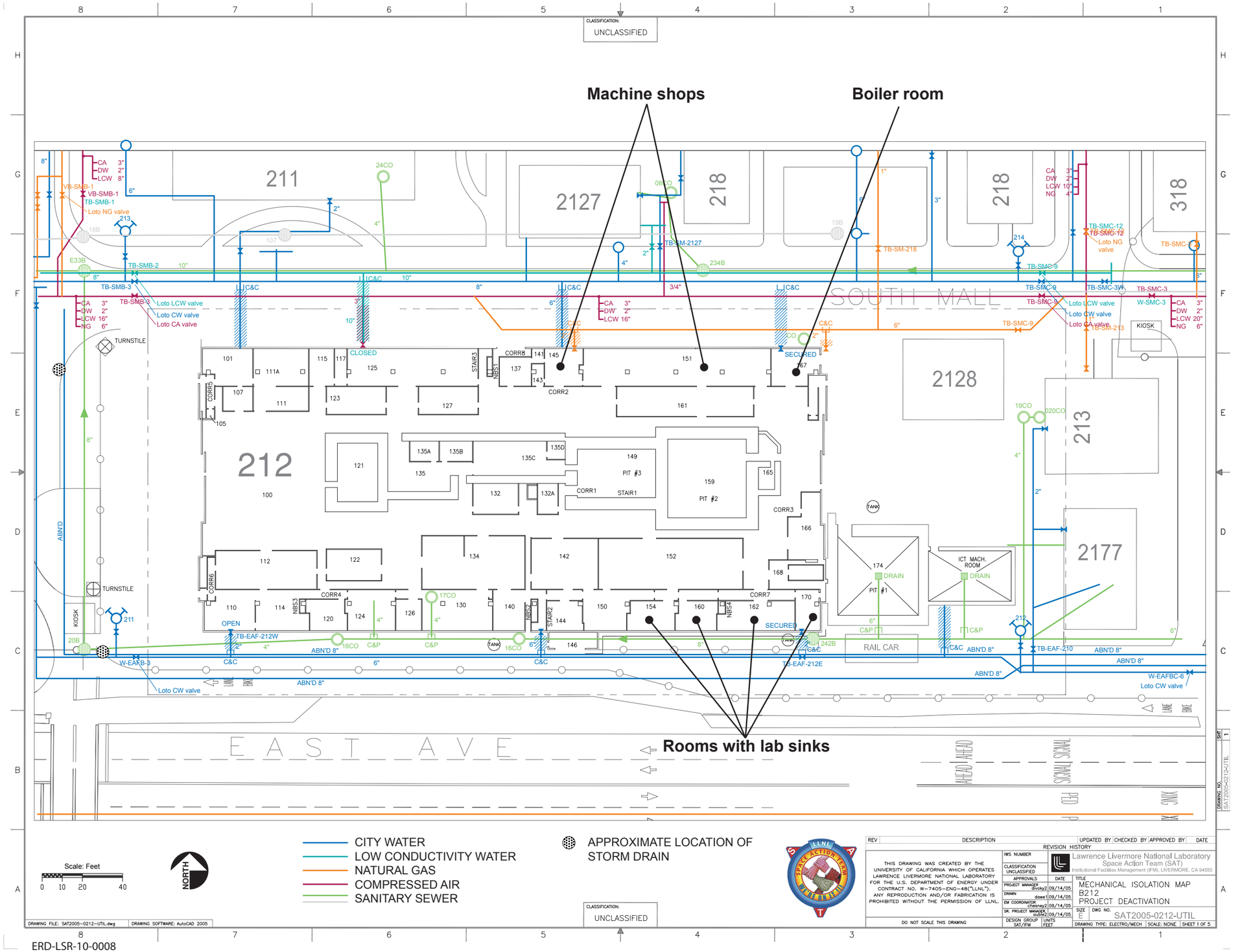
Figure 2. Building 212 looking southwest, February 2008, LLNL.



ERD-LSR-10-0010

Figure 3. Borings and wells in the vicinity of Building 212, LLNL.



ERD-LSR-10-0008

Figure 4. Building 212 Area utility drawings and summary of known room activities with potential mercury sources, LLNL.

ERD-LSR-10-0005

Figure 5. Building 212 foundation looking southwest showing former vegetation area between sidewalk and building foundation, August 2008, LLNL.

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Figure 6. Building 212 foundation looking southwest showing the trench between sidewalk and foundation (excavated area), August 2008, LLNL.

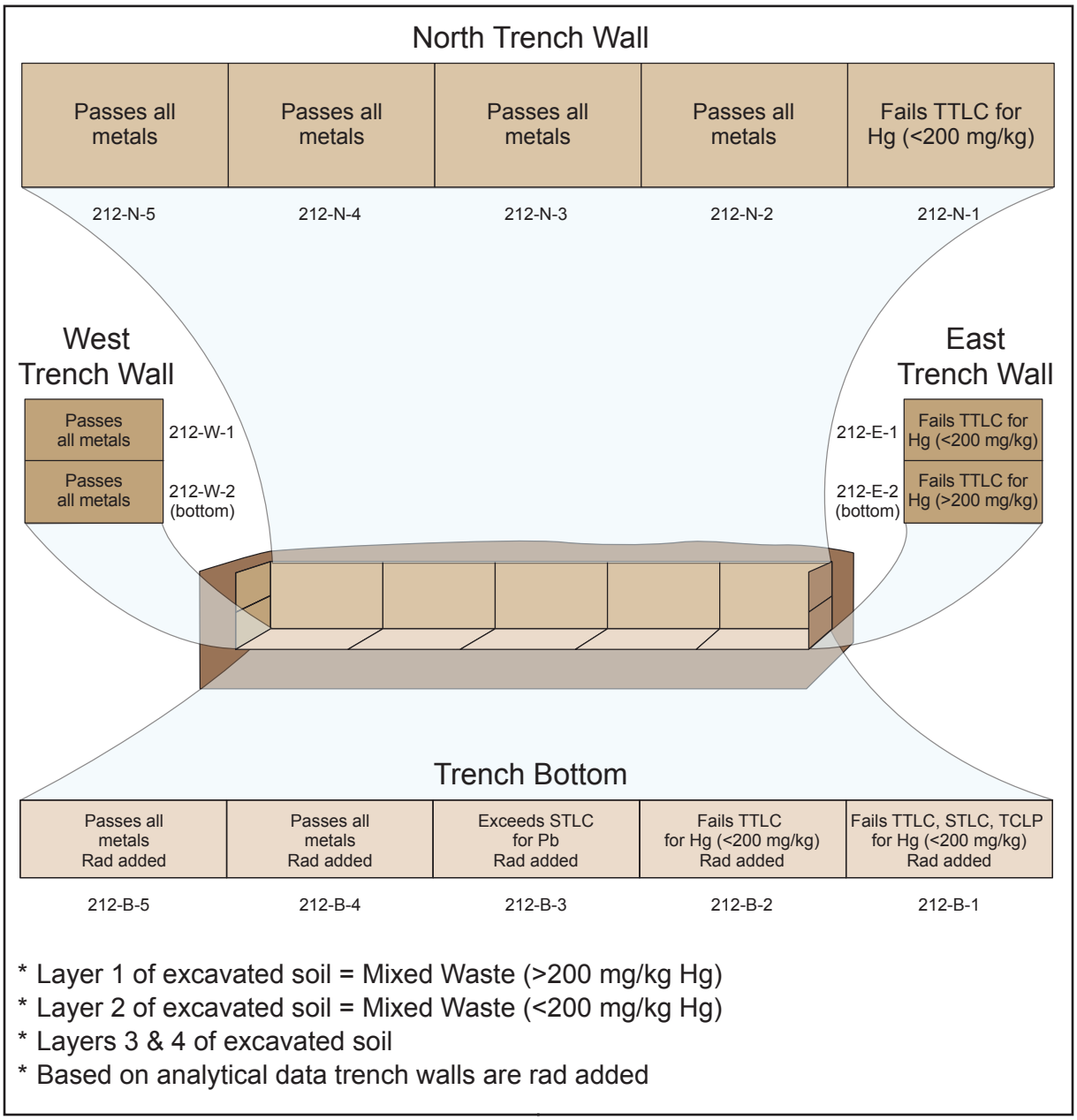

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Figure 7. Building 212 confirmation sample locations and results, LLNL (Trench location shown on Figure 6).

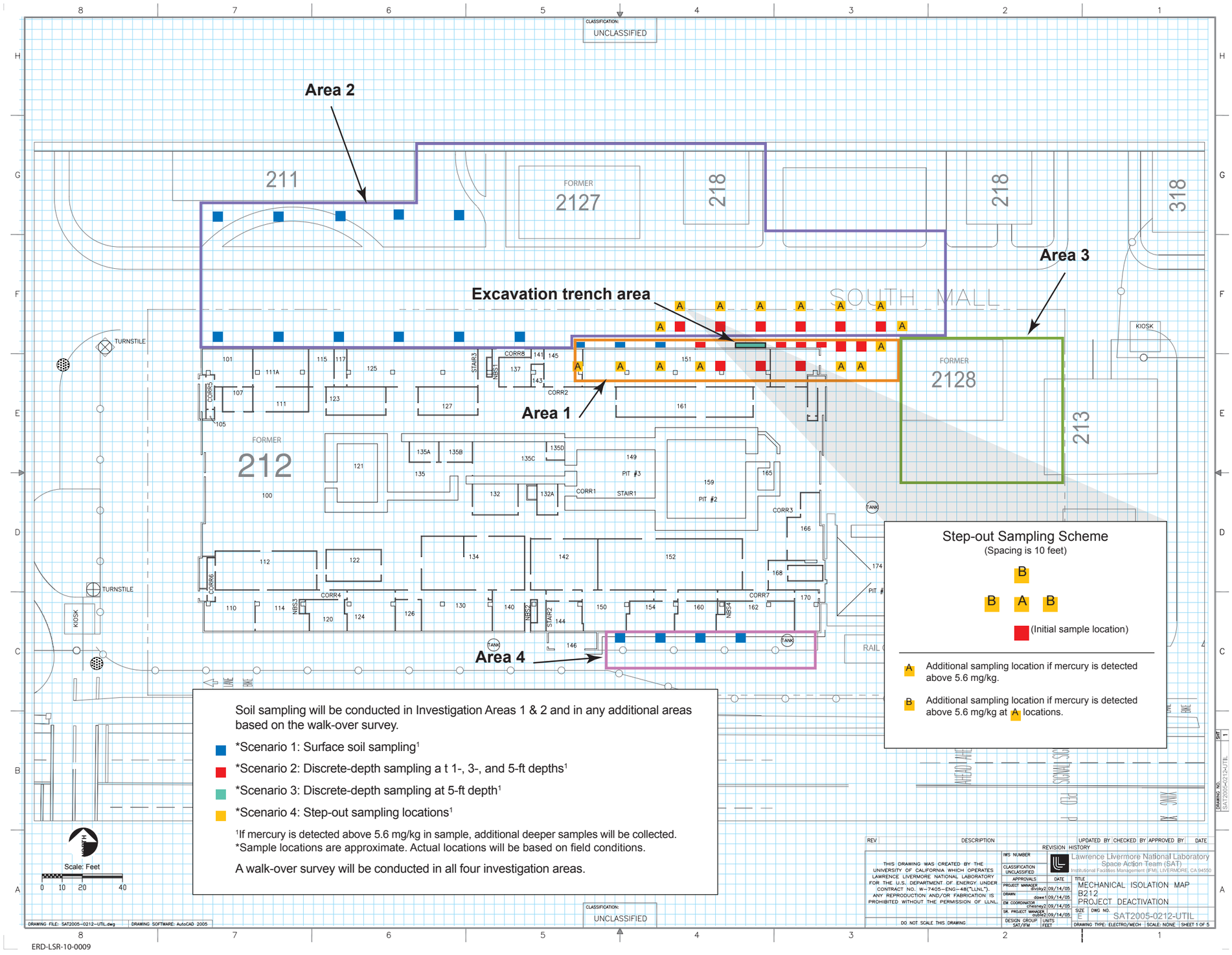

Figure 8. Investigation areas and planned soil sampling locations, Building 212 Area, LLNL.

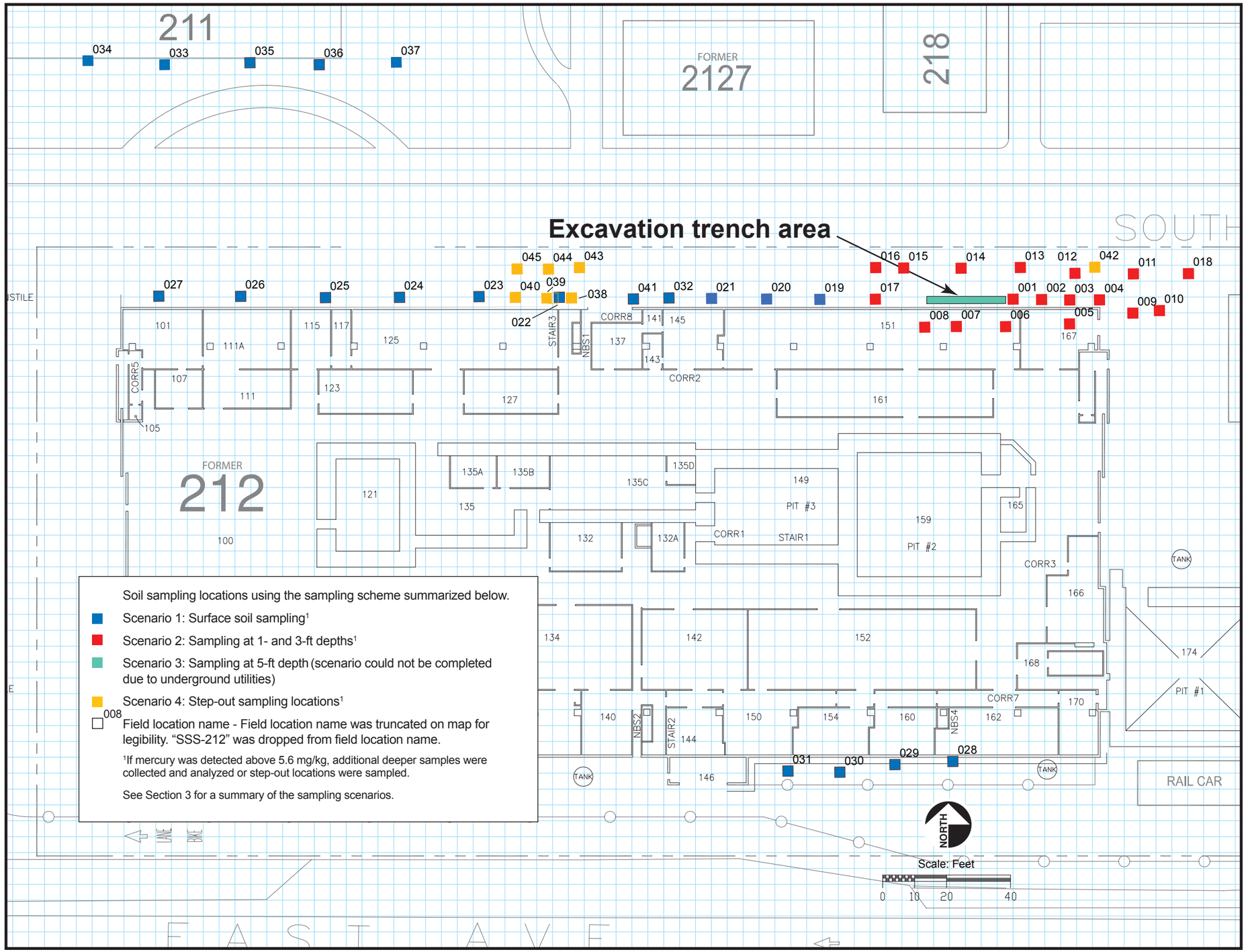

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Figure 9. Soil sample locations, Building 212 Area, LLNL.

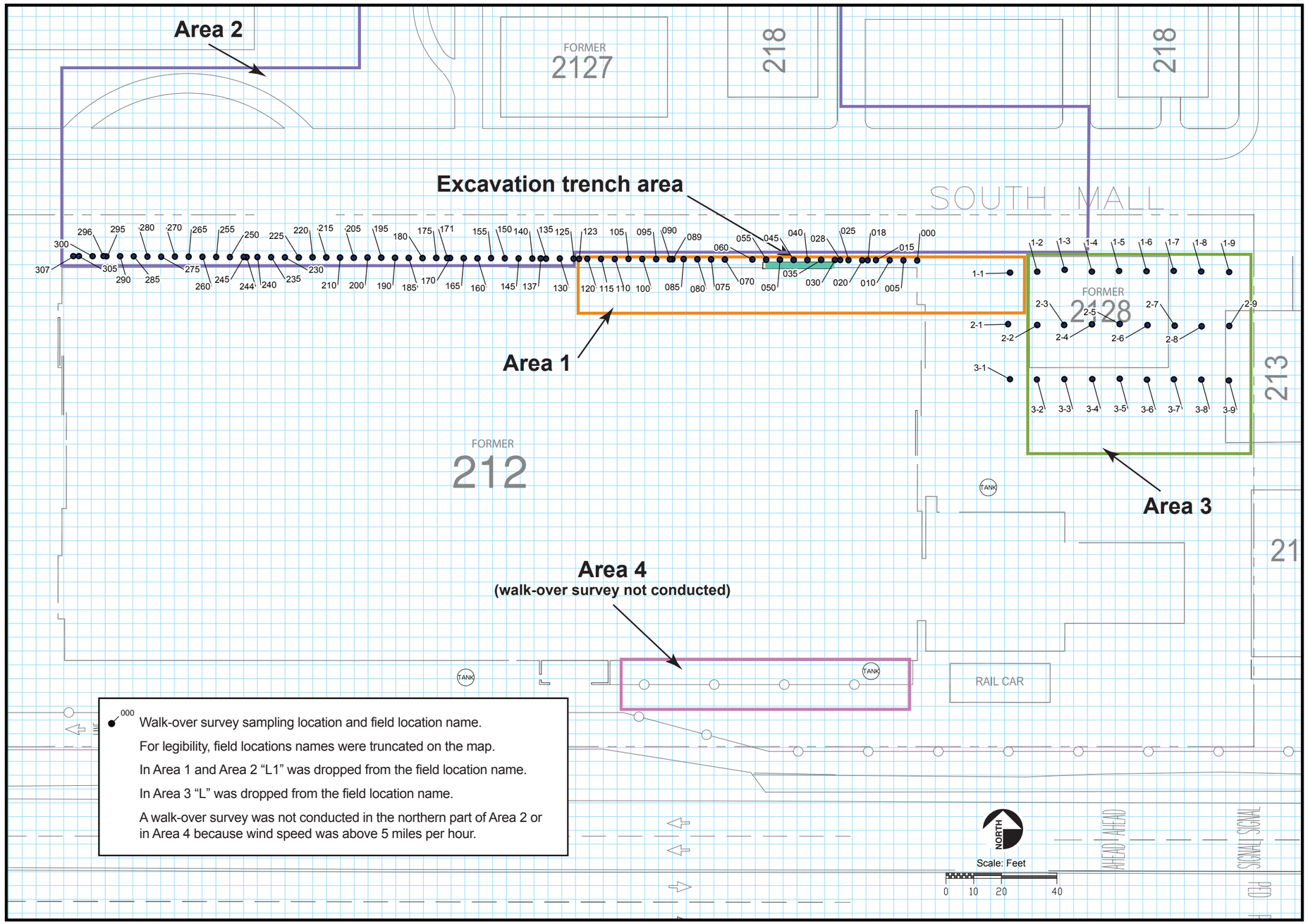

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Figure 10. Walk-over survey locations, Building 212 area, LLNL.

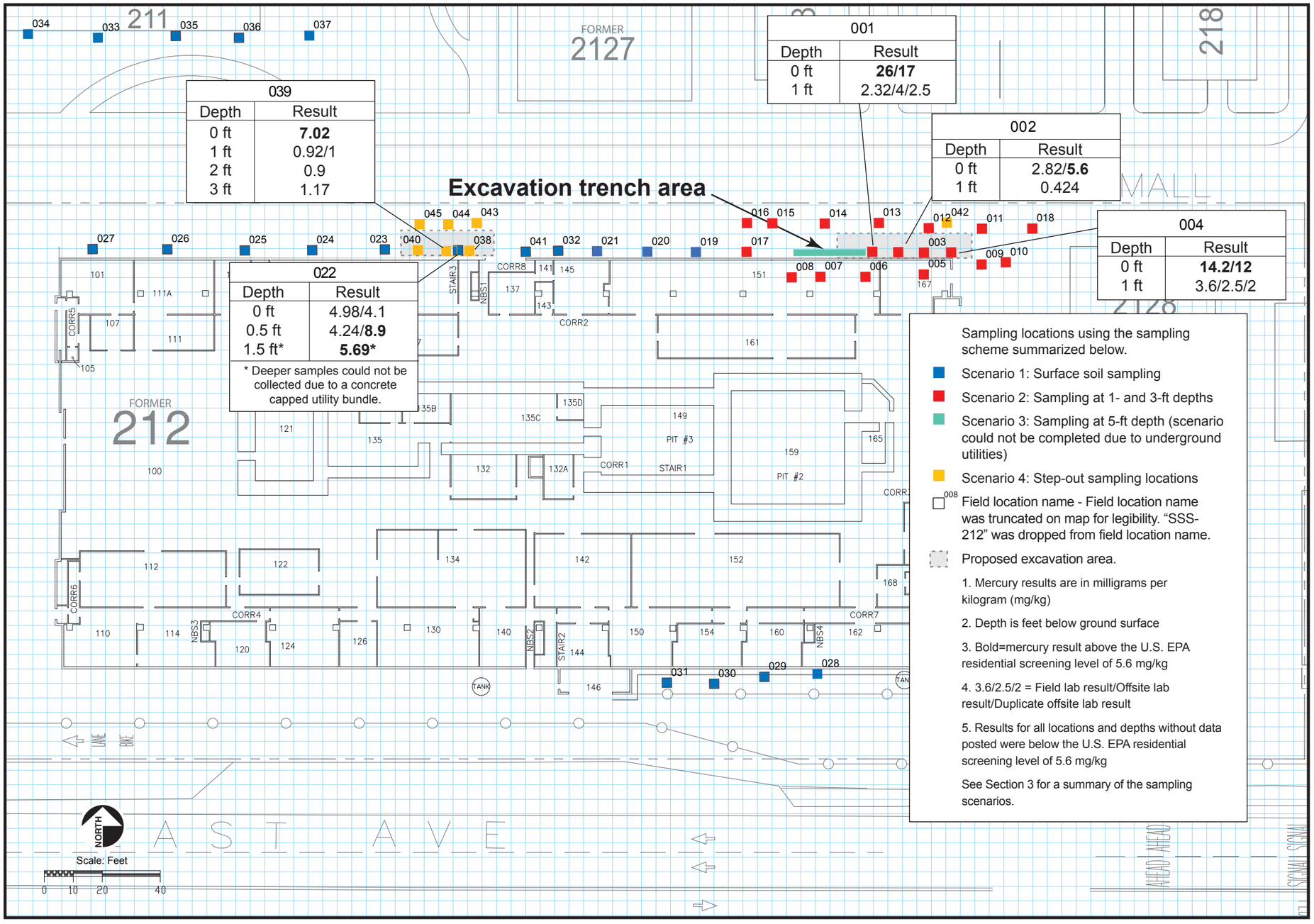

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Figure 11. Mercury results in soil above the U.S. EPA Screening Level and proposed excavation area, Building 212 Area, LLNL.

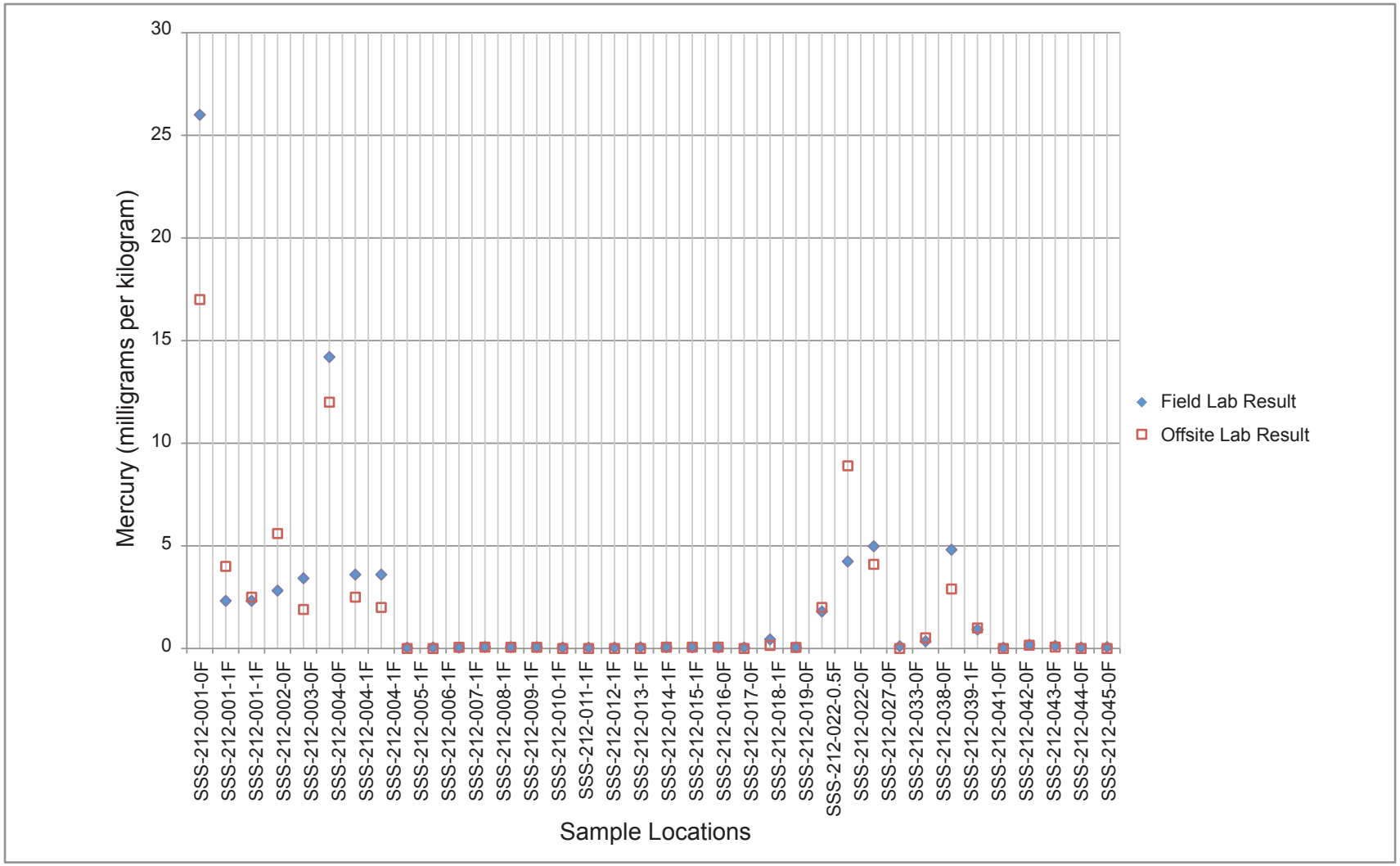

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Figure 12. Field lab results versus Offsite lab results, Building 212 Area, LLNL.

Tables

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Table 1. Summary of Analytic Results of Soil Samples, 1984 to 1997, Building 212 Area, LLNL.

Boring Identification	Analyte	Results	Detection Limit	Units	Date Sampled	Depth (ft bgs)
B-464	Gross alpha	5	0	pCi/g	9/20/88	11.8
B-464	Gross alpha	< 4	4	pCi/g	9/21/88	96.8
B-560	Gross alpha	4	3	pCi/g	1/26/89	7.5
B-560	Gross alpha	< 4	4	pCi/g	1/26/89	21.3
B-560	Gross alpha	10	6	pCi/g	1/30/89	127.8
SIB-212-101	Gross alpha	4.2	0.97	pCi/g	3/12/96	5.4
SIB-212-101	Gross alpha	4	1.4	pCi/g	3/12/96	10.4
SIB-212-101	Gross alpha	5.7	1.2	pCi/g	3/12/96	20.4
SIB-212-101	Gross alpha	5.2	1.1	pCi/g	3/12/96	30.4
SIB-212-101	Gross alpha	3.58	0.82	pCi/g	3/12/96	40.4
SIB-212-101	Gross alpha	6.7	0.9	pCi/g	3/13/96	50.5
SIB-212-101	Gross alpha	3.7	0.8	pCi/g	3/13/96	60.4
SIB-212-101	Gross alpha	5.1	0.81	pCi/g	3/13/96	70.4
SIB-212-101	Gross alpha	5.7	1	pCi/g	3/13/96	80.4
SIB-212-101	Gross alpha	3.7	0.85	pCi/g	3/13/96	90.4
SIB-212-101	Gross alpha	4	1.5	pCi/g	3/13/96	93.4
B-464	Gross beta	15	0	pCi/g	9/20/88	11.8
B-464	Gross beta	23	0	pCi/g	9/21/88	96.8
B-560	Gross beta	13	5	pCi/g	1/26/89	7.5
B-560	Gross beta	17	5	pCi/g	1/26/89	21.3
B-560	Gross beta	14	4	pCi/g	1/30/89	127.8
SIB-212-101	Gross beta	3.71	0.93	pCi/g	3/12/96	5.4
SIB-212-101	Gross beta	4.98	0.9	pCi/g	3/12/96	10.4
SIB-212-101	Gross beta	6.71	0.84	pCi/g	3/12/96	20.4
SIB-212-101	Gross beta	7.29	0.82	pCi/g	3/12/96	30.4
SIB-212-101	Gross beta	4.83	0.63	pCi/g	3/12/96	40.4
SIB-212-101	Gross beta	9	0.92	pCi/g	3/13/96	50.5
SIB-212-101	Gross beta	5.04	0.69	pCi/g	3/13/96	60.4
SIB-212-101	Gross beta	5	0.74	pCi/g	3/13/96	70.4
SIB-212-101	Gross beta	3.08	0.84	pCi/g	3/13/96	80.4
SIB-212-101	Gross beta	6.84	0.73	pCi/g	3/13/96	90.4
SIB-212-101	Gross beta	3.86	0.86	pCi/g	3/13/96	93.4
B-464	Mercury	< 0.001	0.001	mg/L	9/20/88	11.0
B-464	Mercury	< 0.001	0.001	mg/L	9/21/88	95.3
B-560	Mercury	< 0.01	0.01	mg/L	1/26/89	7.3

Table 1. Summary of Analytic Results of Soil Samples, 1984 to 1997, Building 212 Area, LLNL. (Continued)

Boring Identification	Analyte	Results	Detection Limit	Units	Date Sampled	Depth (ft bgs)
SIB-212-002	Mercury	< 0.01	0.01	mg/L	5/17/89	6.0
SIB-212-002	Mercury	< 0.01	0.01	mg/L	5/17/89	11.0
SIB-212-004	Mercury	< 0.01	0.01	mg/L	5/17/89	5.8
SIB-212-101	Mercury	< 0.005	0.005	mg/L	3/12/96	5.6
SIB-212-101	Mercury	< 0.05	0.05	mg/kg	3/12/96	5.6
SIB-212-101	Mercury	< 0.005	0.005	mg/L	3/12/96	10.6
SIB-212-101	Mercury	< 0.05	0.05	mg/kg	3/12/96	10.6
SIB-212-101	Mercury	< 0.005	0.005	mg/L	3/13/96	50.8
SIB-212-101	Mercury	< 0.05	0.05	mg/kg	3/13/96	50.8
SIB-212-101	Mercury	< 0.005	0.005	mg/L	3/13/96	50.9
SIB-212-101	Mercury	< 0.05	0.05	mg/kg	3/13/96	50.9
B-464	Tritium	< 1000	1000	pCi/L	9/20/88	11.8
B-464	Tritium	< 1000	1000	pCi/L	9/21/88	96.8
B-560	Tritium	6000	1000	pCi/L	1/26/89	7.5
B-560	Tritium	7000	1000	pCi/L	1/26/89	21.3
B-560	Tritium	< 1000	1000	pCi/L	1/30/89	127.8
SIB-212-001	Tritium	3800	500	pCi/L	5/19/89	50.8
SIB-212-001	Tritium	< 1000	1000	pCi/L	5/19/89	98.0
SIB-212-002	Tritium	< 1000	1000	pCi/L	5/16/89	50.5
SIB-212-002	Tritium	< 1000	1000	pCi/L	5/16/89	100.5
SIB-212-003	Tritium	2000	500	pCi/L	5/16/89	10.8
SIB-212-003	Tritium	1000	500	pCi/L	5/16/89	20.5
SIB-212-003	Tritium	2000	500	pCi/L	5/16/89	54.8
SIB-212-003	Tritium	1000	500	pCi/L	5/16/89	90.8
SIB-212-004	Tritium	3000	500	pCi/L	5/18/89	50.8
SIB-212-004	Tritium	2000	500	pCi/L	5/18/89	95.5
SIB-212-101	Tritium	< 1	1	pCi/g	3/12/96	5.2
SIB-212-101	Tritium	650	140	pCi/L	3/12/96	5.3
SIB-212-101	Tritium	< 1	1	pCi/g	3/12/96	10.2
SIB-212-101	Tritium	360	160	pCi/L	3/12/96	10.3
SIB-212-101	Tritium	< 1	1	pCi/g	3/12/96	20.2
SIB-212-101	Tritium	400	160	pCi/L	3/12/96	20.3
SIB-212-101	Tritium	< 1	1	pCi/g	3/12/96	30.2
SIB-212-101	Tritium	960	160	pCi/L	3/12/96	30.3
SIB-212-101	Tritium	< 1	1	pCi/g	3/12/96	40.2

Table 1. Summary of Analytic Results of Soil Samples, 1984 to 1997, Building 212 Area, LLNL. (Continued)

Boring Identification	Analyte	Results	Detection Limit	Units	Date Sampled	Depth (ft bgs)
SIB-212-101	Tritium	2040	160	pCi/L	3/12/96	40.3
SIB-212-101	Tritium	< 1	1	pCi/g	3/12/96	50.3
SIB-212-101	Tritium	2900	170	pCi/L	3/13/96	50.4
SIB-212-101	Tritium	< 1	1	pCi/g	3/12/96	60.2
SIB-212-101	Tritium	5140	160	pCi/L	3/13/96	60.3
SIB-212-101	Tritium	1.5	1	pCi/g	3/12/96	70.2
SIB-212-101	Tritium	7000	900	pCi/L	3/12/96	70.2
SIB-212-101	Tritium	9590	160	pCi/L	3/13/96	70.3
SIB-212-101	Tritium	2	1	pCi/g	3/12/96	80.2
SIB-212-101	Tritium	8000	900	pCi/L	3/12/96	80.2
SIB-212-101	Tritium	9300	170	pCi/L	3/13/96	80.3
SIB-212-101	Tritium	< 1	1	pCi/g	3/12/96	90.2
SIB-212-101	Tritium	9990	150	pCi/L	3/13/96	90.3
SIB-212-101	Tritium	< 1	1	pCi/g	3/12/96	93.2
SIB-212-101	Tritium	2110	160	pCi/L	3/13/96	93.3

Notes:

ft bgs = Feet below ground surface.
mg/L = Milligrams per liter.
mg/kg = Milligrams per kilogram.
pCi/L = Picocuries per liter.
pCi/g = Picocuries per gram.

Table 2. Summary of Analytic Results for Asphalt and Soil Samples from Pre-Construction Borings (PC-212), 1997 to 2009, Building 212 Area, LLNL.

Boring Identification	Analyte	Result	Detection Limit	Units	Date Sampled	Depth (ft bgs)	Matrix
PC-B212-019	Gross alpha	< 2.7	2.7	pCi/g	3/4/09	0	AS
PC-B212-020	Gross alpha	< 2.7	2.7	pCi/g	3/4/09	0	AS
PC-B212-021	Gross alpha	< 2.64	2.64	pCi/g	3/4/09	0	AS
PC-B212-022	Gross alpha	< 2.58	2.58	pCi/g	3/4/09	0	AS
PC-B212-023	Gross alpha	< 2.85	2.85	pCi/g	3/4/09	0	AS
PC-B212-019	Gross beta	< 4.4	4.4	pCi/g	3/4/09	0	AS
PC-B212-020	Gross beta	< 4.43	4.43	pCi/g	3/4/09	0	AS
PC-B212-021	Gross beta	< 4.36	4.36	pCi/g	3/4/09	0	AS
PC-B212-022	Gross beta	< 4.21	4.21	pCi/g	3/4/09	0	AS
PC-B212-023	Gross beta	< 4.7	4.7	pCi/g	3/4/09	0	AS
PC-B212-019	Tritium	< 2.9	2.9	pCi/g	3/4/09	0	AS
PC-B212-020	Tritium	< 2.28	2.28	pCi/g	3/4/09	0	AS
PC-B212-021	Tritium	< 1.83	1.83	pCi/g	3/4/09	0	AS
PC-B212-022	Tritium	< 1.96	1.96	pCi/g	3/4/09	0	AS
PC-B212-023	Tritium	< 1.88	1.88	pCi/g	3/4/09	0	AS
PC-B212-013	Gross alpha	< 1.9	1.9	pCi/g	12/2/97	0	SO
PC-B212-013	Gross alpha	3.5	2.8	pCi/g	12/2/97	0	SO
PC-B212-014	Gross alpha	< 3.4	3.4	pCi/g	11/28/05	4	SO
PC-B212-015	Gross alpha	< 2.3	2.3	pCi/g	12/16/05	4	SO
PC-B212-016	Gross alpha	< 3.2	3.2	pCi/g	1/24/06	4	SO
PC-B212-017	Gross alpha	< 3.4	3.4	pCi/g	3/1/06	3	SO
PC-B212-017	Gross alpha	< 3.8	3.8	pCi/g	3/1/06	3	SO
PC-B212-018	Gross alpha	< 2.5	2.5	pCi/g	9/27/07	4	SO
PC-B212-024	Gross alpha	< 2.56	2.56	pCi/g	3/4/09	3	SO
PC-B212-025	Gross alpha	< 2.39	2.39	pCi/g	3/4/09	3	SO
PC-B212-026	Gross alpha	< 2.53	2.53	pCi/g	3/4/09	3	SO
PC-B212-027	Gross alpha	< 2.71	2.71	pCi/g	3/4/09	3	SO
PC-B212-028	Gross alpha	< 2.27	2.27	pCi/g	3/4/09	3	SO
PC-B212-028	Gross alpha	< 2.69	2.69	pCi/g	3/4/09	3	SO
PC-B212-013	Gross beta	< 3.2	3.2	pCi/g	12/2/97	0	SO
PC-B212-013	Gross beta	4.1	3	pCi/g	12/2/97	0	SO
PC-B212-014	Gross beta	< 3.7	3.7	pCi/g	11/28/05	4	SO
PC-B212-015	Gross beta	4.1	1.7	pCi/g	12/16/05	4	SO
PC-B212-016	Gross beta	4.1	3.1	pCi/g	1/24/06	4	SO

Table 2. Summary of Analytic Results for Asphalt and Soil Samples from Pre-Construction Borings (PC-212), 1997 to 2009, Building 212 Area, LLNL. (Continued)

Boring Identification	Analyte	Result	Detection Limit	Units	Date Sampled	Depth (ft bgs)	Matrix
PC-B212-017	Gross beta	3.2	2.6	pCi/g	3/1/06	3	SO
PC-B212-017	Gross beta	< 3.8	3.8	pCi/g	3/1/06	3	SO
PC-B212-018	Gross beta	4.6	2.6	pCi/g	9/27/07	4	SO
PC-B212-024	Gross beta	< 4.21	4.21	pCi/g	3/4/09	3	SO
PC-B212-025	Gross beta	< 3.91	3.91	pCi/g	3/4/09	3	SO
PC-B212-026	Gross beta	< 4.12	4.12	pCi/g	3/4/09	3	SO
PC-B212-027	Gross beta	< 4.46	4.46	pCi/g	3/4/09	3	SO
PC-B212-028	Gross beta	< 3.71	3.71	pCi/g	3/4/09	3	SO
PC-B212-028	Gross beta	< 4.35	4.35	pCi/g	3/4/09	3	SO
PC-B212-012	Mercury	< 0.005	0.005	mg/L	12/5/94	0	SO
PC-B212-012	Mercury	< 0.05	0.05	mg/kg	12/5/94	0	SO
PC-B212-013	Mercury	< 0.005	0.005	mg/L	12/4/97	0	SO
PC-B212-014	Mercury	< 0.05	0.05	mg/L	11/28/05	4	SO
PC-B212-015	Mercury	< 0.05	0.05	mg/L	12/16/05	4	SO
PC-B212-016	Mercury	< 0.005	0.005	mg/L	1/24/06	4	SO
PC-B212-017	Mercury	< 0.05	0.05	mg/L	3/1/06	3	SO
PC-B212-017	Mercury	< 0.05	0.05	mg/L	3/1/06	3	SO
PC-B212-013	Mercury	0.058	0.05	mg/kg	12/4/97	0	SO
PC-B212-014	Mercury	0.03	0.0049	mg/kg	11/28/05	4	SO
PC-B212-015	Mercury	0.21	0.0098	mg/kg	12/16/05	4	SO
PC-B212-016	Mercury	0.033	0.005	mg/kg	1/24/06	4	SO
PC-B212-017	Mercury	0.042	0.005	mg/kg	3/1/06	3	SO
PC-B212-017	Mercury	0.038	0.0049	mg/kg	3/1/06	3	SO
PC-B212-013	Potassium 40	9.2	1.37	pCi/g	12/2/97	0	SO
PC-B212-013	Potassium 40	3.7	1.37	pCi/g	12/2/97	0	SO
PC-B212-014	Radiation scan	< 100	100	DPM/g	11/28/05	4	SO
PC-B212-013	Radium 226	0.34	0.29	pCi/g	12/2/97	0	SO
PC-B212-013	Radium 228	0.46	0.26	pCi/g	12/2/97	0	SO
PC-B212-013	Radium 228	< 0.26	0.26	pCi/g	12/2/97	0	SO
PC-B212-013	Tritium	< 5	5	pCi/g	12/2/97	0	SO
PC-B212-013	Tritium	< 4.9	4.9	pCi/g	12/2/97	0	SO
PC-B212-014	Tritium	< 4.4	4.4	pCi/g	11/28/05	4	SO
PC-B212-015	Tritium	4.6	3.6	pCi/g	12/16/05	4	SO
PC-B212-016	Tritium	< 3.7	3.7	pCi/g	1/24/06	4	SO

Table 2. Summary of Analytic Results for Asphalt and Soil Samples from Pre-Construction Borings (PC-212), 1997 to 2009, Building 212 Area, LLNL. (Continued)

Boring Identification	Analyte	Result	Detection Limit	Units	Date Sampled	Depth (ft bgs)	Matrix
PC-B212-017	Tritium	< 4.9	4.9	pCi/g	3/1/06	3	SO
PC-B212-017	Tritium	< 4.8	4.8	pCi/g	3/1/06	3	SO
PC-B212-018	Tritium	62	2.5	pCi/g	9/27/07	4	SO
PC-B212-024	Tritium	< 1.98	1.98	pCi/g	3/4/09	3	SO
PC-B212-025	Tritium	< 2.06	2.06	pCi/g	3/4/09	3	SO
PC-B212-026	Tritium	< 1.92	1.92	pCi/g	3/4/09	3	SO
PC-B212-027	Tritium	< 2.19	2.19	pCi/g	3/4/09	3	SO
PC-B212-028	Tritium	< 2.07	2.07	pCi/g	3/4/09	3	SO
PC-B212-028	Tritium	< 1.95	1.95	pCi/g	3/4/09	3	SO
PC-B212-013	Uranium 235 by mass measurement	< 0.06	0.06	pCi/g	12/2/97	0	SO

Notes:

AS = Asphalt.
ft bgs = Feet below ground surface.
mg/L = Milligrams per liter.
mg/kg = Milligrams per kilogram.
pCi/L = Picocuries per liter.
pCi/g = Picocuries per gram.
SO = Soil.
0 = Surface soil sample.

Table 3. Summary of Analytic Results of Ground Water Samples, 1983 to 2009, Building 212 Area, LLNL.

Boring Identification	Analyte	Results	Units	Date Sampled
TW-11	Mercury	< 1.00E-04	mg/L	4/22/83
TW-11	Mercury	< 1.00E-04	mg/L	3/29/84
TW-11	Mercury	< 1.00E-04	mg/L	11/27/84
TW-11	Mercury	< 1.00E-04	mg/L	11/27/84
TW-11	Mercury	< 0.0002	mg/L	5/4/95
TW-11	Mercury	< 0.0002	mg/L	12/10/09
TW-11A	Mercury	< 1.00E-04	mg/L	11/20/84
TW-11A	Mercury	< 0.0002	mg/L	8/8/95
TW-11A	Mercury	< 0.0002	mg/L	12/10/09
W-111	Mercury	< 0.0002	mg/L	5/4/95
W-111	Mercury	< 0.0002	mg/L	12/16/09
W-464	Mercury	0.0003	mg/L	12/1/89
W-464	Mercury	< 0.001	mg/L	8/24/90
W-464	Mercury	< 0.0002	mg/L	5/9/95
W-464	Mercury	< 0.0002	mg/L	12/10/09
W-560	Mercury	< 1.00E-04	mg/L	3/7/89
TW-11	Gross alpha	< 3	pCi/L	11/27/84
TW-11	Gross alpha	< 3	pCi/L	11/27/84
TW-11	Gross alpha	10.6	pCi/L	2/9/96
TW-11	Gross alpha	6.33	pCi/L	12/10/09
TW-11A	Gross alpha	< 4	pCi/L	11/20/84
TW-11A	Gross alpha	< 6.1	pCi/L	2/9/96
TW-11A	Gross alpha	2.95	pCi/L	12/10/09
W-111	Gross alpha	7.3	pCi/L	2/9/96
W-111	Gross alpha	5	pCi/L	5/20/96
W-111	Gross alpha	4.61	pCi/L	12/16/09
W-464	Gross alpha	2	pCi/L	6/5/96
W-464	Gross alpha	< 2	pCi/L	12/10/09
W-560	Gross alpha	< 4.9	pCi/L	2/9/96
TW-11	Gross beta	< 4	pCi/L	11/27/84
TW-11	Gross beta	< 4	pCi/L	11/27/84
TW-11	Gross beta	7.6	pCi/L	2/9/96
TW-11	Gross beta	3.61	pCi/L	12/10/09

Table 3. Summary of Analytic Results of Ground Water Samples, 1983 to 2009, Building 212 Area, LLNL. (Continued)

Boring Identification	Analyte	Results	Units	Date Sampled
TW-11A	Gross beta	8	pCi/L	11/20/84
TW-11A	Gross beta	< 5	pCi/L	2/9/96
TW-11A	Gross beta	3.25	pCi/L	12/10/09
W-111	Gross beta	< 4.9	pCi/L	2/9/96
W-111	Gross beta	< 6	pCi/L	5/20/96
W-111	Gross beta	< 3	pCi/L	12/16/09
W-464	Gross beta	< 4.3	pCi/L	6/5/96
W-464	Gross beta	< 3	pCi/L	12/10/09
W-560	Gross beta	< 3.9	pCi/L	2/9/96
SIP-212-101	Tritium	1900	pCi/L	5/31/96
SIP-212-101	Tritium	1800	pCi/L	8/27/96
SIP-212-101	Tritium	< 210	pCi/L	2/7/97
SIP-212-101	Tritium	300	pCi/L	4/14/97
SIP-212-101	Tritium	600	pCi/L	3/19/98
SIP-212-101	Tritium	< 129	pCi/L	7/13/98
SIP-212-101	Tritium	140	pCi/L	3/3/99
SIP-212-101	Tritium	151	pCi/L	9/15/99
SIP-212-101	Tritium	182	pCi/L	3/3/00
SIP-212-101	Tritium	114	pCi/L	3/9/01
SIP-212-101	Tritium	188	pCi/L	3/15/02
TW-11	Tritium	< 1000	pCi/L	11/27/84
TW-11	Tritium	< 1000	pCi/L	11/27/84
TW-11	Tritium	650	pCi/L	2/9/96
TW-11	Tritium	600	pCi/L	4/14/97
TW-11	Tritium	231	pCi/L	6/4/99
TW-11A	Tritium	< 1000	pCi/L	11/20/84
TW-11A	Tritium	200	pCi/L	2/9/96
W-111	Tritium	520	pCi/L	2/9/96
W-111	Tritium	900	pCi/L	5/20/96
W-111	Tritium	597	pCi/L	12/4/98
W-111	Tritium	303	pCi/L	12/19/00
W-111	Tritium	281	pCi/L	11/15/01
W-111	Tritium	268	pCi/L	12/4/02
W-111	Tritium	158	pCi/L	10/29/03
W-111	Tritium	< 100	pCi/L	12/1/04
W-111	Tritium	162	pCi/L	11/27/06
W-464	Tritium	2000	pCi/L	2/27/91

Table 3. Summary of Analytic Results of Ground Water Samples, 1983 to 2009, Building 212 Area, LLNL. (Continued)

Boring Identification	Analyte	Results	Units	Date Sampled
W-464	Tritium	900	pCi/L	6/5/96
W-560	Tritium	< 200	pCi/L	2/21/91
W-560	Tritium	< 170	pCi/L	2/9/96

Table 4. Confirmation Sample Results from Soil Removal, September 2008, Building 212 Area, LLNL.

Sample Identification	Date	Screening levels	TTLC (mg/kg) Mercury (20 mg/kg)	STLC (mg/kg) Mercury (0.20 mg/L)	TCLP (mg/L) Mercury (0.2 mg/L)	Gross Alpha (pCi/g) NE	Gross Beta (pCi/g) NE	Tritium (pCi/L) NE
212-B-1	9/15/08		**32.2**	**0.565**	**0.269**	11.1	17.4	-0.348 U
212-B-2	9/15/08		**131**	<0.200	0.0799	9.43	19.9	-0.373 U
212-B-3	9/15/08		7.58	<0.200	0.0105	8.95	17.2	-0.19 U
212-B-4	9/15/08		7.83	<0.200	<0.002	9.39	17.2	0.209 U
212-B-5	9/15/08		3.32	<0.200	<0.002	9.96	17.7	-0.115 U
212-E-1	9/15/08		**69.4**	<0.200	0.0162	NA	NA	NA
212-E-2	9/15/08		**291**	<0.200	0.0765	NA	NA	NA
212-W-1	9/15/08		2.35	<0.200	<0.002	NA	NA	NA
212-W-1RP	9/15/08		5.15	<0.200	<0.002	NA	NA	NA
212-W-2	9/15/08		6.32	<0.200	<0.002	NA	NA	NA
212-N-1	9/15/08		**137**	<0.200	<0.002	NA	NA	NA
212-N-2	9/15/08		15	<0.200	<0.002	NA	NA	NA
212-N-3	9/15/08		7.75	<0.200	<0.002	NA	NA	NA
212-N-4	9/15/08		0.802	<0.200	<0.002	NA	NA	NA
212-N-5	9/15/08		0.185	<0.200	<0.002	NA	NA	NA

Notes:

Bold = If above the screening level.
mg/L = Milligrams per liter.
mg/kg = Milligrams per kilogram.
NA = Not analyzed.
NE = Not established.
pCi/L = Picocuries per liter.
pCi/g = Picocuries per gram.
STLC = Soluble Threshold Limit Concentration.
TTLC = Total Threshold Limit Concentration.
TCLP = Toxicity Characteristic Leaching Procedure.
U = Not detected.

Table 5. Summary of Analytic Results of Storm Water Runoff Samples, 1991 to 2009, LLNL.

Sample Idenitification	Analyte	Results	Units	Date Sampled
L-ASS2-RO	Mercury	< 0.0005	mg/L	2/27/91
L-ASS2-RO	Mercury	< 0.0005	mg/L	3/1/91
L-ASS2-RO	Mercury	< 0.0005	mg/L	3/10/91
L-ASS2-RO	Mercury	< 0.0005	mg/L	11/17/91
L-ASS2-RO	Mercury	< 0.0005	mg/L	12/27/91
L-ASS2-RO	Mercury	< 0.0002	mg/L	1/5/92
L-ASS2-RO	Mercury	< 0.0002	mg/L	1/28/92
L-ASS2-RO	Mercury	< 0.0002	mg/L	2/12/92
L-ASS2-RO	Mercury	< 0.0002	mg/L	3/5/92
L-ASS2-RO	Mercury	< 0.0002	mg/L	10/29/92
L-ASS2-RO	Mercury	< 0.0002	mg/L	12/6/92
L-ASS2-RO	Mercury	< 0.0002	mg/L	1/6/93
L-ASS2-RO	Mercury	< 0.0002	mg/L	2/8/93
L-ASS2-RO	Mercury	< 0.0002	mg/L	3/25/93
L-ASS2-RO	Mercury	< 0.0002	mg/L	11/10/93
L-ASS2-RO	Mercury	< 0.0002	mg/L	1/24/94
L-ASS2-RO	Mercury	0.00021	mg/L	4/25/94
L-ASS2-RO	Mercury	< 0.0002	mg/L	11/5/94
L-ASS2-RO	Mercury	< 0.0002	mg/L	3/3/95
L-ASS2-RO	Mercury	< 0.0002	mg/L	5/13/95
L-ASS2-RO	Mercury	< 0.0002	mg/L	12/11/95
L-ASS2-RO	Mercury	< 0.0002	mg/L	1/16/96
L-ASS2-RO	Mercury	< 0.0002	mg/L	4/1/96
L-ASS2-RO- DUP	Mercury	< 0.0002	mg/L	4/1/96
L-ASS2-RO	Mercury	< 0.0002	mg/L	5/15/96
L-ASS2-RO	Mercury	< 0.0002	mg/L	10/29/96
L-ASS2-RO	Mercury	< 0.0002	mg/L	1/15/97
L-ASS2-RO	Mercury	< 0.0002	mg/L	11/15/97
L-ASS2-RO	Mercury	< 0.0002	mg/L	11/15/97
L-ASS2-RO	Mercury	< 0.0002	mg/L	12/8/97
L-ASS2-RO	Mercury	< 0.0002	mg/L	12/8/97
L-ASS2-RO	Mercury	< 0.0002	mg/L	2/12/98
L-ASS2-RO	Mercury	< 0.0002	mg/L	2/12/98
L-ASS2-RO	Mercury	< 0.0002	mg/L	3/31/98
L-ASS2-RO	Mercury	< 0.0002	mg/L	3/31/98
L-ASS2-RO	Mercury	< 0.0002	mg/L	11/30/98
L-ASS2-RO	Mercury	< 0.0002	mg/L	11/30/98
L-ASS2-RO	Mercury	< 0.0002	mg/L	1/26/99
L-ASS2-RO	Mercury	< 0.0002	mg/L	1/26/99
L-ASS2-RO	Mercury	< 0.0002	mg/L	2/8/99
L-ASS2-RO	Mercury	< 0.0002	mg/L	2/8/99
L-ASS2-RO	Mercury	< 0.0002	mg/L	4/8/99
L-ASS2-RO	Mercury	< 0.0002	mg/L	4/8/99
L-ASS2-RO	Mercury	< 0.0002	mg/L	1/11/00
L-ASS2-RO	Mercury	< 0.0002	mg/L	2/14/00
L-ASS2-RO	Mercury	< 0.0002	mg/L	3/8/00
L-ASS2-RO	Mercury	< 0.0002	mg/L	1/10/01
L-ASS2-RO	Mercury	< 0.0002	mg/L	2/12/01
L-ASS2-RO	Mercury	< 0.0002	mg/L	4/6/01

Table 5. Summary of Analytic Results of Storm Water Runoff Samples, 1991 to 2009, LLNL. (Continued)

Sample Idenitification	Analyte	Results	Units	Date Sampled
L-ASS2-RO	Mercury	< 0.0002	mg/L	4/6/01
L-ASS2-RO	Mercury	< 0.0002	mg/L	11/12/01
L-ASS2-RO	Mercury	< 0.0002	mg/L	11/12/01
L-ASS2-RO	Mercury	< 0.0002	mg/L	12/20/01
L-ASS2-RO	Mercury	< 0.0002	mg/L	12/20/01
L-ASS2-RO	Mercury	< 0.0002	mg/L	5/20/02
L-ASS2-RO	Mercury	< 0.0002	mg/L	11/8/02
L-ASS2-RO	Mercury	< 0.0002	mg/L	11/8/02
L-ASS2-RO	Mercury	< 0.0002	mg/L	12/16/02
L-ASS2-RO	Mercury	< 0.0002	mg/L	12/16/02
L-ASS2-RO	Mercury	< 0.0002	mg/L	4/28/03
L-ASS2-RO	Mercury	< 0.0002	mg/L	12/11/03
L-ASS2-RO	Mercury	< 0.0002	mg/L	12/11/03
L-ASS2-RO-DUP	Mercury	< 0.0002	mg/L	12/29/03
L-ASS2-RO	Mercury	< 0.0002	mg/L	12/29/03
L-ASS2-RO-DUP	Mercury	< 0.0002	mg/L	12/29/03
L-ASS2-RO	Mercury	< 0.0002	mg/L	12/29/03
L-ASS2-RO	Mercury	< 0.0002	mg/L	2/2/04
L-ASS2-RO	Mercury	< 0.0002	mg/L	2/25/04
L-ASS2-RO	Mercury	< 0.0002	mg/L	10/26/04
L-ASS2-RO	Mercury	< 0.0002	mg/L	1/11/05
L-ASS2-RO	Mercury	< 0.0002	mg/L	2/16/05
L-ASS2-RO	Mercury	< 0.0002	mg/L	1/18/06
L-ASS2-RO	Mercury	< 0.0002	mg/L	3/3/06
L-ASS2-RO	Mercury	< 0.0002	mg/L	12/12/06
L-ASS2-RO-DUP	Mercury	< 0.0002	mg/L	2/22/07
L-ASS2-RO	Mercury	< 0.0002	mg/L	2/22/07
L-ASS2-RO	Mercury	< 0.0002	mg/L	12/18/07
L-ASS2-RO	Mercury	< 0.0002	mg/L	1/4/08
L-ASS2-RO	Mercury	< 0.0002	mg/L	1/22/09
L-ASS2-RO	Mercury	< 0.0002	mg/L	2/17/09
L-ASS2-RO	Mercury	< 0.0002	mg/L	10/13/09
L-ASW-RO	Mercury	< 0.0005	mg/L	2/2/91
L-ASW-RO	Mercury	< 0.0005	mg/L	2/4/91
L-ASW-RO	Mercury	< 0.0005	mg/L	3/1/91
L-ASW-RO	Mercury	< 0.0005	mg/L	3/10/91
L-ASW-RO	Mercury	< 0.0005	mg/L	12/27/91
L-ASW-RO-DUP	Mercury	< 0.0005	mg/L	12/27/91
L-ASW-RO	Mercury	< 0.0002	mg/L	1/5/92
L-ASW-RO	Mercury	< 0.0002	mg/L	1/28/92
L-ASW-RO	Mercury	< 0.0002	mg/L	2/12/92
L-ASW-RO	Mercury	< 0.0002	mg/L	3/5/92
L-ASW-RO	Mercury	< 0.0002	mg/L	10/29/92
L-ASW-RO	Mercury	< 0.0002	mg/L	12/6/92
L-ASW-RO	Mercury	< 0.0002	mg/L	1/6/93
L-ASW-RO	Mercury	< 0.0002	mg/L	2/8/93
L-ASW-RO	Mercury	< 0.0002	mg/L	3/25/93
L-ASW-RO	Mercury	< 0.0002	mg/L	11/10/93

Table 5. Summary of Analytic Results of Storm Water Runoff Samples, 1991 to 2009, LLNL. (Continued)

Sample Idenitification	Analyte	Results	Units	Date Sampled
L-ASW-RO-DUP	Mercury	< 0.0002	mg/L	1/24/94
L-ASW-RO	Mercury	< 0.0002	mg/L	1/24/94
L-ASW-RO	Mercury	0.00023	mg/L	4/25/94
L-ASW-RO-DUP	Mercury	< 0.0004	mg/L	11/5/94
L-ASW-RO	Mercury	< 0.0002	mg/L	11/5/94
L-ASW-RO	Mercury	< 0.0002	mg/L	3/2/95
L-ASW-RO	Mercury	< 0.0002	mg/L	5/13/95
L-ASW-RO	Mercury	< 0.0002	mg/L	12/11/95
L-ASW-RO	Mercury	< 0.0002	mg/L	1/16/96
L-ASW-RO	Mercury	< 0.0002	mg/L	4/1/96
L-ASW-RO	Mercury	< 0.0002	mg/L	5/15/96
L-ASW-RO	Mercury	< 0.0002	mg/L	10/29/96
L-ASW-RO	Mercury	< 0.0002	mg/L	1/15/97
L-ASW-RO-DUP	Mercury	< 0.0002	mg/L	1/15/97
L-ASW-RO	Mercury	< 0.0002	mg/L	5/23/97
L-ASW-RO-DUP	Mercury	< 0.0002	mg/L	5/23/97
L-ASW-RO	Mercury	0.0039	mg/L	11/15/97
L-ASW-RO	Mercury	< 0.0002	mg/L	11/15/97
L-ASW-RO	Mercury	< 0.0002	mg/L	12/8/97
L-ASW-RO	Mercury	< 0.0002	mg/L	12/8/97
L-ASW-RO	Mercury	< 0.0002	mg/L	2/12/98
L-ASW-RO	Mercury	< 0.0002	mg/L	2/12/98
L-ASW-RO	Mercury	< 0.0002	mg/L	3/31/98
L-ASW-RO	Mercury	< 0.0002	mg/L	3/31/98
L-ASW-RO	Mercury	< 0.0002	mg/L	11/30/98
L-ASW-RO	Mercury	< 0.0002	mg/L	11/30/98
L-ASW-RO	Mercury	< 0.0002	mg/L	1/26/99
L-ASW-RO	Mercury	< 0.0002	mg/L	1/26/99
L-ASW-RO	Mercury	< 0.0002	mg/L	2/8/99
L-ASW-RO	Mercury	< 0.0002	mg/L	2/8/99
L-ASW-RO	Mercury	< 0.0002	mg/L	4/8/99
L-ASW-RO	Mercury	< 0.0002	mg/L	4/8/99
L-ASW-RO	Mercury	< 0.0002	mg/L	11/8/99
L-ASW-RO	Mercury	< 0.0002	mg/L	1/11/00
L-ASW-RO	Mercury	< 0.0002	mg/L	2/14/00
L-ASW-RO-DUP	Mercury	< 0.0002	mg/L	2/14/00
L-ASW-RO-DUP	Mercury	< 0.0002	mg/L	3/8/00
L-ASW-RO	Mercury	< 0.0002	mg/L	3/8/00
L-ASW-RO	Mercury	< 0.0002	mg/L	1/8/01
L-ASW-RO	Mercury	< 0.0002	mg/L	1/8/01
L-ASW-RO	Mercury	< 0.0002	mg/L	2/12/01
L-ASW-RO	Mercury	< 0.0002	mg/L	3/2/01
L-ASW-RO	Mercury	< 0.0002	mg/L	3/2/01
L-ASW-RO	Mercury	< 0.0002	mg/L	4/6/01
L-ASW-RO	Mercury	< 0.0002	mg/L	4/6/01
L-ASW-RO	Mercury	< 0.0002	mg/L	11/12/01
L-ASW-RO	Mercury	< 0.0002	mg/L	11/12/01

Table 5. Summary of Analytic Results of Storm Water Runoff Samples, 1991 to 2009, LLNL. (Continued)

Sample Idenitification	Analyte	Results	Units	Date Sampled
L-ASW-RO	Mercury	< 0.0002	mg/L	12/20/01
L-ASW-RO	Mercury	< 0.0002	mg/L	12/20/01
L-ASW-RO	Mercury	< 0.0002	mg/L	5/20/02
L-ASW-RO	Mercury	0.0002	mg/L	11/8/02
L-ASW-RO	Mercury	< 0.0002	mg/L	11/8/02
L-ASW-RO-DUP	Mercury	< 0.0002	mg/L	12/16/02
L-ASW-RO	Mercury	< 0.0002	mg/L	12/16/02
L-ASW-RO-DUP	Mercury	< 0.0002	mg/L	12/16/02
L-ASW-RO	Mercury	< 0.0002	mg/L	12/16/02
L-ASW-RO	Mercury	< 0.0002	mg/L	4/28/03
L-ASW-RO	Mercury	< 0.0002	mg/L	12/11/03
L-ASW-RO	Mercury	< 0.0002	mg/L	12/11/03
L-ASW-RO	Mercury	< 0.0002	mg/L	12/29/03
L-ASW-RO	Mercury	< 0.0002	mg/L	12/29/03
L-ASW-RO	Mercury	< 0.0002	mg/L	2/2/04
L-ASW-RO	Mercury	< 0.0002	mg/L	2/25/04
L-ASW-RO	Mercury	< 0.0002	mg/L	10/26/04
L-ASW-RO	Mercury	< 0.0002	mg/L	1/11/05
L-ASW-RO	Mercury	< 0.0002	mg/L	2/16/05
L-ASW-RO-DUP	Mercury	< 0.0002	mg/L	2/16/05
L-ASW-RO	Mercury	< 0.0002	mg/L	1/18/06
L-ASW-RO	Mercury	< 0.0002	mg/L	3/3/06
L-ASW-RO	Mercury	< 0.0002	mg/L	12/12/06
L-ASW-RO	Mercury	< 0.0002	mg/L	2/22/07
L-ASW-RO	Mercury	< 0.0002	mg/L	12/18/07
L-ASW-RO-DUP	Mercury	< 0.0002	mg/L	1/4/08
L-ASW-RO	Mercury	< 0.0002	mg/L	1/4/08
L-ASW-RO	Mercury	< 0.0002	mg/L	1/22/09
L-ASW-RO	Mercury	< 0.0002	mg/L	2/17/09
L-ASW-RO	Mercury	< 0.0002	mg/L	10/13/09

Notes:

mg/L = milligrams per liter.

Table 6. Summary of Field and Offsite Laboratory Analytic Results of Mercury in Soil Samples, June 2010, Building 212 Area, LLNL.

Area*	Field Location*	Field Sample Identification	Sample Depth (ft bgs)	Sample Date	Field Results (mg/kg)	Laboratory Sample Identification	Laboratory Results (mg/kg)	Laboratory Name	Sample Type
Area 1	SSS-212-001	SSS-212-001-0F	0	8-Jun-10	**26**				
Area 1	SSS-212-001		0	9-Jun-10		SSS-212-001-0F	**17**	C&T	Confirmation
Area 1	SSS-212-001	SSS-212-001-1F	1	8-Jun-10	2.32	SSS-212-001-1F	4	C&T	DUP
Area 1	SSS-212-001	SSS-212-001-1F	1	8-Jun-10	2.32	SSS-212-001-DUP-1F	2.5	BC Labs	DUP
Area 1	SSS-212-002	SSS-212-002-0F	0	8-Jun-10	2.82	SSS-212-002-0F	**5.6**	C&T	Confirmation
Area 1	SSS-212-002	SSS-212-002-1F	1	8-Jun-10	0.424				
Area 1	SSS-212-003	SSS-212-003-0F	0	8-Jun-10	3.42	SSS-212-003-0F	1.9	C&T	Confirmation
Area 1	SSS-212-003	SSS-212-003-1F	1	8-Jun-10	0.837				
Area 1	SSS-212-004	SSS-212-004-0F	0	9-Jun-10	**14.2**	SSS-212-004-0F	**12**	C&T	Confirmation
Area 1	SSS-212-004	SSS-212-004-1F	1	9-Jun-10	3.6	SSS-212-004-1F	2.5	C&T	DUP
Area 1	SSS-212-004	SSS-212-004-1F	1	9-Jun-10	3.6	SSS-212-004-DUP-1F	2	C&T	DUP
Area 1	SSS-212-005	SSS-212-005-1F	1	9-Jun-10	0.04	SSS-212-005-1F	< 0.05	C&T	Confirmation
Area 1	SSS-212-005	SSS-212-005-3F	3	9-Jun-10	0.07				
Area 1	SSS-212-005	SSS-212-005-5F	5	9-Jun-10	0.06				
Area 1	SSS-212-006	SSS-212-006-1F	1	9-Jun-10	0.05	SSS-212-006-1F	< 0.05	C&T	Confirmation
Area 1	SSS-212-006	SSS-212-006-3F	3	9-Jun-10	0.05				
Area 1	SSS-212-006	SSS-212-006-5F	5	9-Jun-10	0.08				
Area 1	SSS-212-007	SSS-212-007-1F	1	9-Jun-10	0.04	SSS-212-007-1F	0.057	C&T	Confirmation
Area 1	SSS-212-007	SSS-212-007-3F	3	9-Jun-10	0.09				
Area 1	SSS-212-007	SSS-212-007-5F	5	9-Jun-10	0.05				
Area 1	SSS-212-008	SSS-212-008-1F	1	9-Jun-10	0.07	SSS-212-008-1F	0.066	C&T	Confirmation
Area 1	SSS-212-008	SSS-212-008-3F	3	9-Jun-10	0.04				
Area 1	SSS-212-008	SSS-212-008-5F	5	9-Jun-10	0.16				
Area 1	SSS-212-009	SSS-212-009-1F	1	10-Jun-10	0.07	SSS-212-009-1F	0.06	C&T	DUP

Table 6. Summary of Field and Offsite Laboratory Analytic Results of Mercury in Soil Samples, June 2010, Building 212 Area, LLNL. (Continued)

Area*	Field Location*	Field Sample Identification	Sample Depth (ft bgs)	Sample Date	Field Results (mg/kg)	Laboratory Sample Identification	Laboratory Results (mg/kg)	Laboratory Name	Sample Type
Area 1	SSS-212-009	SSS-212-009-1F	1	10-Jun-10	0.07	SSS-212-009-DUP-1F	0.057	BC Labs	DUP
Area 1	SSS-212-009	SSS-212-009-3F	3	10-Jun-10	0.07				
Area 1	SSS-212-009	SSS-212-009-5F	5	10-Jun-10	0.06				
Area 1	SSS-212-010	SSS-212-010-1F	1	10-Jun-10	0.05	SSS-212-010-1F	< 0.05	C&T	Confirmation
Area 1	SSS-212-010	SSS-212-010-3F	3	10-Jun-10	0.07				
Area 1	SSS-212-010	SSS-212-010-5F	5	10-Jun-10	0.06				
Area 2	SSS-212-011	SSS-212-011-1F	1	10-Jun-10	0.04	SSS-212-011-1F	< 0.05	C&T	Confirmation
Area 2	SSS-212-011	SSS-212-011-3F	3	10-Jun-10	0.21				
Area 2	SSS-212-011	SSS-212-011-5F	5	10-Jun-10	0.06				
Area 2	SSS-212-012	SSS-212-012-1F	1	10-Jun-10	0.05	SSS-212-012-1F	< 0.05	C&T	Confirmation
Area 2	SSS-212-012	SSS-212-012-3F	3	10-Jun-10	0.07				
Area 2	SSS-212-012	SSS-212-012-5F	5	10-Jun-10	0.06				
Area 2	SSS-212-013	SSS-212-013-1F	1	10-Jun-10	0.06	SSS-212-013-1F	< 0.05	C&T	Confirmation
Area 2	SSS-212-013	SSS-212-013-3F	3	10-Jun-10	0.07				
Area 2	SSS-212-013	SSS-212-013-5F	5	10-Jun-10	0.06				
Area 2	SSS-212-014	SSS-212-014-1F	1	11-Jun-10	0.06	SSS-212-014-1F	0.064	C&T	Confirmation
Area 2	SSS-212-014	SSS-212-014-3F	3	11-Jun-10	0.07				
Area 2	SSS-212-014	SSS-212-014-5F	5	11-Jun-10	0.06				
Area 2	SSS-212-015	SSS-212-015-1F	1	11-Jun-10	0.06	SSS-212-015-1F	0.064	C&T	Confirmation
Area 2	SSS-212-015	SSS-212-015-3F	3	11-Jun-10	0.11				
Area 2	SSS-212-015	SSS-212-015-5F	5	11-Jun-10	0.1				
Area 2	SSS-212-016	SSS-212-016-0F	0	11-Jun-10	0.05	SSS-212-016-DUP-0F	0.066	C&T	DUP
Area 2	SSS-212-016	SSS-212-016-1F	1	11-Jun-10	0.05	SSS-212-016-1F	< 0.05	C&T	Confirmation
Area 1	SSS-212-017	SSS-212-017-0F	0	11-Jun-10	0.44	SSS-212-017-0F	0.15	C&T	Confirmation
Area 1	SSS-212-017	SSS-212-017-1F	1	11-Jun-10	0.14				

Table 6. Summary of Field and Offsite Laboratory Analytic Results of Mercury in Soil Samples, June 2010, Building 212 Area, LLNL. (Continued)

Area*	Field Location*	Field Sample Identification	Sample Depth (ft bgs)	Sample Date	Field Results (mg/kg)	Laboratory Sample Identification	Laboratory Results (mg/kg)	Laboratory Name	Sample Type
Area 2	SSS-212-018	SSS-212-018-1F	1	11-Jun-10	0.06	SSS-212-018-1F	0.052	C&T	Confirmation
Area 2	SSS-212-018	SSS-212-018-3F	3	11-Jun-10	0.07				
Area 2	SSS-212-018	SSS-212-018-5F	5	11-Jun-10	0.06				
Area 1	SSS-212-019	SSS-212-019-0F	0	14-Jun-10	1.8	SSS-212-019-DUP-0F	2	C&T	DUP
Area 1	SSS-212-020	SSS-212-020-0F	0	14-Jun-10	0.342				
Area 1	SSS-212-021	SSS-212-021-0F	0	14-Jun-10	2.13				
Area 2	SSS-212-022	SSS-212-022-0F	0	14-Jun-10	4.98	SSS-212-022-0F	4.1	C&T	Confirmation
Area 2	SSS-212-022	SSS-212-022-0.5F	0.5	15-Jun-10	4.24	SSS-212-022-.5F	**8.9**		Confirmation
Area 2	SSS-212-022	SSS-212-022-1.5F	1.5	16-Jun-10	**5.69**				
Area 2	SSS-212-023	SSS-212-023-0F	0	14-Jun-10	1.55				
Area 2	SSS-212-024	SSS-212-024-0F	0	14-Jun-10	0.889				
Area 2	SSS-212-025	SSS-212-025-0F	0	14-Jun-10	0.868				
Area 2	SSS-212-026	SSS-212-026-0F	0	14-Jun-10	0.771				
Area 2	SSS-212-027	SSS-212-027-0F	0	14-Jun-10	0.11	SSS-212-027-0F	< 0.19	C&T	Confirmation
Area 4	SSS-212-028	SSS-212-028-0F	0	15-Jun-10	0.05				
Area 4	SSS-212-029	SSS-212-029-0F	0	15-Jun-10	0.794				
Area 4	SSS-212-030	SSS-212-030-0F	0	15-Jun-10	0.08				
Area 4	SSS-212-031	SSS-212-031-0F	0	15-Jun-10	0.06				

Table 6. Summary of Field and Offsite Laboratory Analytic Results of Mercury in Soil Samples, June 2010, Building 212 Area, LLNL. (Continued)

Area*	Field Location*	Field Sample Identification	Sample Depth (ft bgs)	Sample Date	Field Results (mg/kg)	Laboratory Sample Identification	Laboratory Results (mg/kg)	Laboratory Name	Sample Type
Area 1	SSS-212-032	SSS-212-032-0F	0	15-Jun-10	2.51				
Area 2	SSS-212-033	SSS-212-033-0F	0	15-Jun-10	0.35	SSS-212-033-0F	0.52	C&T	Confirmation
Area 2	SSS-212-034	SSS-212-034-0F	0	15-Jun-10	1.15				
Area 2	SSS-212-035	SSS-212-035-0F	0	15-Jun-10	0.17				
Area 2	SSS-212-036	SSS-212-036-0F	0	15-Jun-10	0.33				
Area 2	SSS-212-037	SSS-212-037-0F	0	15-Jun-10	0.11				
Area 2	SSS-212-041	SSS-212-041-0F	0	29-Jun-10	0.04	SSS-212-041-0F	< 0.05	C&T	Confirmation
STEP-OUT LOCATIONS									
Area 2	SSS-212-038	SSS-212-038-0F	0	16-Jun-10	4.81	SSS-212-038-0F	2.9	C&T	Confirmation
Area 2	SSS-212-039	SSS-212-039-0F	0	16-Jun-10	**7.02**				
Area 2	SSS-212-039	SSS-212-039-1F	1	16-Jun-10	0.92	SSS-212-039-1F	1	C&T	Confirmation
Area 2	SSS-212-039	SSS-212-039-2F	2	16-Jun-10	0.9				
Area 2	SSS-212-039	SSS-212-039-3F	3	16-Jun-10	1.17				
Area 2	SSS-212-040	SSS-212-040-0F	0	16-Jun-10	4.57				
Area 2	SSS-212-042	SSS-212-042-0F	0	29-Jun-10	0.179	SSS-212-042-0F	0.16	C&T	Confirmation
Area 2	SSS-212-042	SSS-212-042-1F	1	29-Jun-10	0.08				
Area 2	SSS-212-042	SSS-212-042-2F	2	29-Jun-10	0.06				
Area 2	SSS-212-043	SSS-212-043-0F	0	29-Jun-10	0.126	SSS-212-043-0F	0.069	C&T	Confirmation
Area 2	SSS-212-044	SSS-212-044-0F	0	29-Jun-10	0.05	SSS-212-044-0F	< 0.05	C&T	Confirmation

Table 6. Summary of Field and Offsite Laboratory Analytic Results of Mercury in Soil Samples, June 2010, Building 212 Area, LLNL. (Continued)

Area*	Field Location*	Field Sample Identification	Sample Depth (ft bgs)	Sample Date	Field Results (mg/kg)	Laboratory Sample Identification	Laboratory Results (mg/kg)	Laboratory Name	Sample Type
Area 2	SSS-212-045	SSS-212-045-0F	0	29-Jun-10	0.07	SSS-212-045-0F	< 0.05	C&T	Confirmation

Notes:

ft bgs = Feet below ground surface.
mg/kg = Milligrams per kilogram.
DUP = Duplicate sample.
Confirmation = Confirmation sample to verify concentrations are below the U.S. EPA 5.6 mg/kg Screening Level for mercury.
C&T = Curtis & Tompkins Laboratory, Berkeley, California.
BC Labs = BC Laboratory, Bakersfield, California.
<# = Not detected above detection limit.
Bold = Concentration at or above the U.S. EPA 5.6 mg/kg Screening Level for mercury.
*** = See Figures 3, 4, 5, and 6 for Area and sample locations.**

Table 7. Summary of Relative Percent Difference between the Field and Offsite Laboratory Analytic Results for Mercury in Soil Samples, June 2010, Building 212 Area, LLNL.

Area	Field Location	Field Sample Identification	Sample Depth (ft bgs)	Field Results (mg/kg)	Lab Results (mg/kg)	Relative Percent Difference (%)
Area 1	SSS-212-001	SSS-212-001-0F	0	**26**	**17**	-42
Area 1	SSS-212-001	SSS-212-001-1F	1	2.32	4	53
Area 1	SSS-212-001	SSS-212-001-1F	1	2.32	2.5	7
Area 1	SSS-212-002	SSS-212-002-0F	0	2.82	**5.6**	66
Area 1	SSS-212-003	SSS-212-003-0F	0	3.42	1.9	-57
Area 1	SSS-212-004	SSS-212-004-0F	0	**14.2**	**12**	-17
Area 1	SSS-212-004	SSS-212-004-1F	1	3.6	2.5	-36
Area 1	SSS-212-004	SSS-212-004-1F	1	3.6	2	-57
Area 1	SSS-212-005	SSS-212-005-1F	1	0.04	< 0.05	22
Area 1	SSS-212-006	SSS-212-006-1F	1	0.05	< 0.05	0
Area 1	SSS-212-007	SSS-212-007-1F	1	0.04	0.057	35
Area 1	SSS-212-008	SSS-212-008-1F	1	0.07	0.066	-6
Area 1	SSS-212-009	SSS-212-009-1F	1	0.07	0.06	-15
Area 1	SSS-212-009	SSS-212-009-1F	1	0.07	0.057	-20
Area 1	SSS-212-010	SSS-212-010-1F	1	0.05	< 0.05	0
Area 2	SSS-212-011	SSS-212-011-1F	1	0.04	< 0.05	22
Area 2	SSS-212-012	SSS-212-012-1F	1	0.05	< 0.05	0
Area 2	SSS-212-013	SSS-212-013-1F	1	0.06	< 0.05	-18
Area 2	SSS-212-014	SSS-212-014-1F	1	0.06	0.064	6
Area 2	SSS-212-015	SSS-212-015-1F	1	0.06	0.064	6
Area 2	SSS-212-016	SSS-212-016-0F	0	0.05	0.066	28
Area 2	SSS-212-016	SSS-212-016-1F	1	0.05	< 0.05	0
Area 1	SSS-212-017	SSS-212-017-0F	0	0.44	0.15	-98
Area 2	SSS-212-018	SSS-212-018-1F	1	0.06	0.052	-14
Area 1	SSS-212-019	SSS-212-019-0F	0	1.8	2	11
Area 2	SSS-212-022	SSS-212-022-0F	0	4.98	4.1	-19
Area 2	SSS-212-022	SSS-212-022-0.5F	0.5	4.24	**8.9**	71

Table 7. Summary of Relative Percent Difference between the Field and Offsite Laboratory Analytic Results for Mercury in Soil Samples, June 2010, Building 212 Area, LLNL. (Continued)

Area	Field Location	Field Sample Identification	Sample Depth (ft bgs)	Field Results (mg/kg)	Lab Results (mg/kg)	Relative Percent Difference (%)
Area 2	SSS-212-027	SSS-212-027-0F	0	0.11	< 0.19	53
Area 2	SSS-212-033	SSS-212-033-0F	0	0.35	0.52	39
Area 2	SSS-212-041	SSS-212-041-0F	0	0.04	< 0.05	22
STEP-OUT LOCATIONS						
Area 2	SSS-212-038	SSS-212-038-0F	0	4.81	2.9	-50
Area 2	SSS-212-039	SSS-212-039-1F	1	0.92	1	8
Area 2	SSS-212-042	SSS-212-042-0F	0	0.179	0.16	-11
Area 2	SSS-212-043	SSS-212-043-0F	0	0.126	0.069	-58
Area 2	SSS-212-044	SSS-212-044-0F	0	0.05	< 0.05	0
Area 2	SSS-212-045	SSS-212-045-0F	0	0.07	< 0.05	-33

Notes:

ft bgs = Feet below ground surface.

mg/kg = Milligrams per kilogram.

Bold = Concentration at or above the Environmental Protection Agency Screening Level of 5.6 mg/kg for mercury.

Table 8. Summary of surface soil gas walk-over survey, June, 2010, Building 212 Area, LLNL.

Area	Grid Number	Date	Result (ng/m^3)	Co-Location Sample ID
Upgradient	Ambient Air	6/16/10	12-30	
Area 1	L1-0	6/16/10	10	SSS-212-004
Area 1	L1-5	6/16/10	13	
Area 1	L1-10	6/16/10	17	SSS-212-003
Area 1	L1-15	6/16/10	18	
Area 1	L1-18	6/16/10	13	SSS-212-002
Area 1	L1-20	6/16/10	14	
Area 1	L1-25	6/16/10	14	
Area 1	L1-28	6/16/10	16	SSS-212-001
Area 1	L1-30	6/16/10	14	
Area 1	L1-35	6/16/10	16	
Area 1	L1-40	6/16/10	20	
Area 1	L1-45	6/16/10	16	
Area 1	L1-50	6/16/10	13	
Area 1	L1-55	6/16/10	25	
Area 1	L1-60	6/16/10	15	
Area 1	L1-70	6/16/10	17	SSS-212-017
Area 1	L1-75	6/16/10	16	
Area 1	L1-80	6/16/10	17	
Area 1	L1-85	6/16/10	15	
Area 1	L1-89	6/16/10	17	SSS-212-019
Area 1	L1-90	6/16/10	17	
Area 1	L1-95	6/16/10	18	
Area 1	L1-100	6/16/10	16	
Area 1	L1-105	6/16/10	20	SSS-212-020
Area 1	L1-110	6/16/10	25	
Area 1	L1-115	6/16/10	18	
Area 1	L1-120	6/16/10	18	
Area 1	L1-123	6/16/10	22	SSS-212-021
Area 2	L1-125	6/16/10	21	
Area 2	L1-130	6/16/10	19	
Area 2	L1-135	6/16/10	19	
Area 2	L1-137	6/16/10	22	SSS-212-032
Area 2	L1-140	6/16/10	21	
Area 2	L1-145	6/16/10	19	
Area 2	L1-150	6/16/10	20	
Area 2	L1-155	6/16/10	19	
Area 2	L1-160	6/16/10	23	
Area 2	L1-165	6/16/10	20	
Area 2	L1-170	6/16/10	21	
Area 2	L1-171	6/16/10	21	SSS-212-022
Area 2	L1-175	6/16/10	20	
Area 2	L1-180	6/16/10	20	
Area 2	L1-185	6/16/10	23	
Area 2	L1-190	6/16/10	21	
Area 2	L1-195	6/16/10	21	SSS-212-023
Area 2	L1-200	6/16/10	21	
Area 2	L1-205	6/16/10	20	
Area 2	L1-210	6/16/10	22	
Area 2	L1-215	6/16/10	22	
Area 2	L1-220	6/16/10	22	SSS-212-024
Area 2	L1-225	6/16/10	20	
Area 2	L1-230	6/16/10	20	
Area 2	L1-235	6/16/10	22	
Area 2	L1-240	6/16/10	21	

Table 8. Summary of surface soil gas walk-over survey, June, 2010, Building 212 Area, LLNL. (Continued)

Area	Grid Number	Date	Result (ng/m^3)	Co-Location Sample ID
Area 2	L1-244	6/16/10	21	SSS-212-025
Area 2	L1-245	6/16/10	20	
Area 2	L1-250	6/16/10	21	
Area 2	L1-255	6/16/10	23	
Area 2	L1-260	6/16/10	21	
Area 2	L1-265	6/16/10	21	
Area 2	L1-270	6/16/10	21	SSS-212-026
Area 2	L1-275	6/16/10	20	
Area 2	L1-280	6/16/10	22	
Area 2	L1-285	6/16/10	22	
Area 2	L1-290	6/16/10	21	
Area 2	L1-295	6/16/10	22	
Area 2	L1-296	6/16/10	21	SSS-212-027
Area 2	L1-300	6/16/10	21	
Area 2	L1-305	6/16/10	21	
Area 2	L1-307	6/16/10	20	
Area 3	L1-1	6/30/10	6	
Area 3	L1-2	6/30/10	9	
Area 3	L1-3	6/30/10	4	
Area 3	L1-4	6/30/10	6	
Area 3	L1-5	6/30/10	3	
Area 3	L1-6	6/30/10	1	
Area 3	L1-7	6/30/10	4	
Area 3	L1-8	6/30/10	4	
Area 3	L1-9	6/30/10	14	
Area 3	L2-1	6/30/10	10	
Area 3	L2-2	6/30/10	6	
Area 3	L2-3	6/30/10	3	
Area 3	L2-4	6/30/10	2	
Area 3	L2-5	6/30/10	7	
Area 3	L2-6	6/30/10	15	
Area 3	L2-7	6/30/10	16	
Area 3	L2-8	6/30/10	9	
Area 3	L2-9	6/30/10	15	
Area 3	L3-1	6/30/10	5	
Area 3	L3-2	6/30/10	5	
Area 3	L3-3	6/30/10	18	
Area 3	L3-4	6/30/10	9	
Area 3	L3-5	6/30/10	11	
Area 3	L3-6	6/30/10	3	
Area 3	L3-7	6/30/10	9	
Area 3	L3-8	6/30/10	3	
Area 3	L3-9	6/30/10	13	

Notes:

ng/m3 = nanograms per cubic meter.

Table 9. Analytic results for waste characterizaton profiling, June 2010, Building 212 Area, LLNL.

Field Location Identification	Date Sampled	Depth (ft bgs)	Sample Identification	Analyte	Results (mg/L)	STLC (mg/L)
STLC Metals Results						
SSS-212-039	16-Jun-10	0	SSS-212-039-0F	Molybdenum	< 0.25	350
SSS-212-039	16-Jun-10	0	SSS-212-039-0F	Nickel	0.55	20
SSS-212-039	16-Jun-10	0	SSS-212-039-0F	Selenium	< 0.5	1
SSS-212-039	16-Jun-10	0	SSS-212-039-0F	Silver	< 0.25	5
SSS-212-039	16-Jun-10	0	SSS-212-039-0F	Thallium	< 0.5	7
SSS-212-039	16-Jun-10	0	SSS-212-039-0F	Vanadium	0.45	24
SSS-212-039	16-Jun-10	0	SSS-212-039-0F	Zinc	20	250

Field Location Identification	Date Sampled	Depth (ft bgs)	Sample Identification	Analyte	Results (pCi/g)	Former LLNL Background (1990s) (pCi/g)	Preliminary LLNL Background[1] (pCi/g)
Radionuclide Results							
SSS-212-001	8-Jun-10	0	SSS-212-001-0F	Gross alpha	**6.65**	15	6.5
SSS-212-001	8-Jun-10	0	SSS-212-001-0F	Gross beta	**16.6**	25	11
SSS-212-001	8-Jun-10	0	SSS-212-001-0F	Tritium	< 2	NE	NE
SSS-212-004	9-Jun-10	0	SSS-212-004-0F	Gross alpha	**7.33**		6.5
SSS-212-004	9-Jun-10	0	SSS-212-004-0F	Gross beta	**16.8**	11	11
SSS-212-004	9-Jun-10	0	SSS-212-004-0F	Tritium	< 2	NE	NE
SSS-212-039	16-Jun-10	0	SSS-212-039-0F	Gross alpha	**9.11**		6.5
SSS-212-039	16-Jun-10	0	SSS-212-039-0F	Gross beta	**21.6**	11	11
SSS-212-039	16-Jun-10	0	SSS-212-039-0F	Tritium	< 2		NE

Notes:

[1] Preliminary background values based on Background Values of Gross Alpha and Gross Beta in Soil for Lawrence Livermore National Laboratory, LLNL, 2008. LLNL currently plans to collect additional data and recalculate the background values.

Analytic method for metals was EPA Method 6010B.
Analytic method for gross alpha and beta was EPA Method 900.0.
Analytic method for tritium was EPA Method 906.0.

STLC = Soluble Threshold Limit Concentration, result is bold if above the STLC.
ft bgs = Feet below ground surface.
mg/L = Milligrams per liter.
pCi/g = Picocuries per gram.
NE = Not established.
Bold = Concentration above the STLC or LLNL background.

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