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Progress Report for Cleanup Activities at Material Disposal Area B, Solid Waste Management Unit 21-015, at Technical Area 21, Fourth Quarter of Fiscal Year 2010

Prepared by the Environmental Programs Directorate

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EXECUTIVE SUMMARY

Material Disposal Area (MDA) B is an inactive disposal area located at Technical Area (TA) 21 on Delta Prime (DP) Mesa that received chemical and radioactive waste from operations from 1944 to 1948. MDA B is designated as Solid Waste Management Unit 21-015. The MDA B site will be remediated to residential cleanup levels. Excavation activities commenced at the site on June 30, 2010. This quarterly report presents the progress of excavation, waste removal, and confirmation sampling activities at MDA B from June 30 through August 17, 2010.

Previous remediation activities at MDA B included excavation of Areas 9 and 10 to confirm that no waste was buried in those areas, removal of the asphalt cover that covered 75% of MDA B, and removal of overburden from the east end of MDA B. Fourth quarter fiscal year 2010 activities included excavation of 33 grid cells within enclosure 1 and 20 grid cells within enclosure 2. Three confirmation samples were collected in grid cell row 260.

Air sampling along the northern boundary of MDA B during the project period indicated a maximum dose of 0.014 mrem to the public during the project period with a year-to-date maximum total of 0.236 mrem. These measurements are significantly lower than the Environmental Protection Agency limit of 10 mrem per year from the air pathway.

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1.0 INTRODUCTION

Material Disposal Area (MDA) B received contaminated materials that contained both chemical and radioactive waste. The New Mexico Environment Department (NMED) approved a work plan (LANL 2006, 095499) that states the disposal trenches at MDA B will be completely remediated to residential cleanup levels. This quarterly report focuses on the progress of excavation, waste removal, and confirmation sampling at MDA B during fourth quarter fiscal year (FY) 2010 from June 30 through August 17, 2010.

1.1 Site Background for MDA B

MDA B is an inactive subsurface disposal site, designated Solid Waste Management Unit 21-015, which contains both chemical and radioactive waste. The site is located on Delta Prime (DP) Mesa in Technical Area 21 (TA-21). Figure 1.1-1 shows the location of MDA B within Los Alamos. MDA B occupies approximately 6 acres and consists of multiple disposal trenches. From 1944 until it closed in 1948, MDA B likely received process wastes from various operational sites. Wastes disposed at MDA B were highly heterogeneous, consisting primarily of radioactively-contaminated laboratory wastes, radioactive debris, and limited liquid-chemical waste; however, a formal waste inventory was not maintained (LANL 1991, 007529).

Radioactive contaminants that may be present consist of the types of radioactive materials used during the time MDA B was active: plutonium, polonium, uranium, americium, curium, radioactive lanthanum, and actinium. Additionally, there could be waste products that may be contaminated with either uranium-235 or cesium-137 from the water boiler. Short-lived radionuclides, such as radioactive lanthanum that may have been disposed at MDA B, are no longer present because of radioactive decay. Most radioactively-contaminated waste probably consisted of paper, rags, rubber gloves, glassware, and small metal apparatuses placed in cardboard boxes by the waste originator and sealed with masking tape. The remainder of the waste consisted of metal debris such as air ducts and large metal apparatuses. The latter type of material was placed in wooden boxes or wrapped with paper (Meyer 1952, 028154; LANL 1991, 007529; Ferguson et al. 1998, 058212).

2.0 SCOPE AND OBJECTIVES OF ACTIVITIES

Activities at MDA B consisted of excavation of overburden material, excavation of contaminated soil and buried waste, contaminated soil and debris sampling and confirmation sampling, trench backfill, and site restoration. The objective is to remediate the site to residential levels and transfer the land to Los Alamos County.

2.1 Deviations from Project Plans

Sampling of overburden, waste, and excavated trench bottom and side walls was intended to be conducted in accordance with the MDA B Sampling and Analysis Plan (SAP), Revision 0 (LANL 2010, 110411). This plan detailed the required analysis for each type of sample and waste stream. The plan also provided procedures for sample collection. The SAP was approved by MDA B project personnel before excavation. As excavation progressed, it became apparent that the sampling procedures in the SAP were not compatible with actual excavation procedures and site conditions. The SAP was reviewed and modifications were made to the sampling procedures to reflect actual conditions within the excavation environment. The revised SAP was approved by MDA B project personnel on August 10, 2010 (LANL 2010, 110398). Before August 10, 2010, sampling occurred under Revision 0 of the approved

SAP, although needed operational deviations were incorporated. Revision 1 of the approved SAP included these operational deviations. All sampling has been conducted in accordance with Revision 1 of the SAP. All samples collected during the fourth quarter of FY10 were in compliance with approved Los Alamos National Laboratory (LANL) sampling and documentation procedures.

2.2 Field Monitoring

During excavation activities, industrial hygiene instrumentation was used inside the enclosures to monitor immediate danger to life and health conditions, toxic gases, and dust that could present a hazard to personnel entering the enclosure. Field screening for radioactivity levels on surfaces and in the work environment was also conducted within the enclosure during excavation and personnel entry and egress.

Protection of site workers, the public, and the environment requires limits on the amount of radioactive material at risk (MAR) removed from MDA B. The purpose of MAR screening was to ensure that the amount of radioactively-contaminated material removed was below the Department of Energy STD-1027 threshold quantity for a Hazard Category 3 nuclear facility (DOE 1997, 076008). The MAR is the quantity of radioactivity in material removed during excavation activities and is expressed in units of plutonium-239-equivalent curies. To ensure safety, MAR screening was conducted during the excavation process for each waste container before it was removed from the enclosure. Gamma spectroscopy was performed on the screening samples using a high-purity germanium detector to measure isotope levels in the sample. These MAR screening results were used to determine radioactivity levels, which provided preliminary characterization data until analytical laboratory results were received (LANL 2010, 110397).

2.3 Excavation Operations Overview

MDA B was split into a grid of cells measuring 10–ft long × 10–ft wide, as shown in Figure 2.3-1. Excavation progress was tracked using cell identification (ID) codes composed of letters along an approximate north-south axis and numbers along an approximate east-west axis. Grid cells were excavated within an area currently covered by a movable enclosure to protect equipment and excavation operations from weather. Excavation activities at MDA B commenced in enclosure 1 on June 30, 2010, and in enclosure 2 on July 19, 2010. Exploratory trenches excavated in February 2010 verified that waste was not present in the westernmost portion of MDA B, previously designated as Areas 9 and 10. A separate investigation report (IR) for MDA B Areas 9 and 10 was submitted to NMED in May 2010 (LANL 2010, 109526).

Excavation operations generally consisted of overburden removal, contaminated soil and waste removal, and confirmation sampling. Waste containers were located inside the enclosure during excavation activities. Overburden was first removed from the enclosed trench area and placed into containers. The filled containers were then staged in a dedicated material staging area to await analytical results. Once overburden is determined to be clean, the material can be used as backfill at MDA B. Following the removal of overburden material, excavation into the waste material proceeded on a grid-by-grid basis. As waste was removed from each grid cell, it was placed into an appropriate waste container based upon visual observation, chemical screening, and radiological instrument screening. Each waste container was marked with a unique bar code number used for waste management tracking. Composite samples of contaminated soil and waste debris were collected and submitted for laboratory analysis. Analytical suites were dependent upon the waste-stream type. Once the contaminated soil and buried waste were removed from an area, confirmation samples were collected from the floor and side walls of the open excavation.

2.3.1 Overburden Removal

Overburden material consisted of the soil and tuff fill capping the trenches that contain buried waste. Overburden also included various other clean materials such as base course material added during site preparation activities that has not been in contact with contaminated soil or waste.

Before enclosures were installed, several lifts of overburden material were removed from the east end of MDA B and staged in a stockpile. Additional material was added to a second stockpile as foundation footers were excavated for fixed enclosures. The stockpiles will remain in place at the west lay-down area of MDA B until analytical results can be reviewed to determine if the material can be reused as backfill in the MDA B excavation.

The overburden material was removed from groups of grid cells before waste excavation. Figure 2.3-2 indicates the grid cells that were excavated from June 30 through August 17, 2010. Overburden material was removed from each grid cell and placed into containers labeled with a unique LANL material-tracking bar code ID.

2.3.2 Overburden Sample Collection

As noted in section 2.3.1, several lifts of overburden material were removed and staged in a stockpile at the west lay-down area before the moveable enclosures were installed in the eastern end of MDA B. Every 2-ft lift in this 8-ft deep stockpile was divided into grid cells that were sampled every 50 yd^3 during April and May 2010. Following the stockpile sampling in April and May, additional material was added to a second stockpile as foundation footers were excavated for the fixed enclosures constructed in the western portion of MDA B. This additional overburden material was sampled at a frequency of 1 sample per 50 yd^3 as overburden was added to the second stockpile. The stockpiles will remain in place at the west lay-down area of MDA B until analytical results determine that the material can be reused as backfill.

After the enclosures were installed, composite sample piles of any removed overburden were accumulated within the enclosure. One composite sample pile was produced for each overburden container. After 50 yd^3 were excavated and added to the containers, a composite sample was collected from the composite sample piles previously set aside. This sampling process ensures that each filled container is associated with a representative composite sample. At the beginning of fourth quarter FY10 excavation activities, there were instances when acceptable knowledge (AK) of overburden material was used to associate containers with analytical samples. Following the issue of Revision 1 of the SAP, AK was no longer used to link overburden samples with their associated containers. The excavated overburden material was kept in labeled containers to await analytical results that will determine if the material can be used as backfill at MDA B. Table 2.3-1 presents the overburden samples collected through August 17, 2010. Overburden material with analytical results below residential soil screening levels will be reused in the excavated trenches after all the contaminated soil has been removed and confirmation sampling has been completed.

2.3.3 Overburden Reuse

Clean, excavated overburden material will be reused as backfill once the contaminated soil and buried waste have been removed from the trenches and sampling has confirmed that contamination has been removed. As of August 17, 2010, none of the MDA B trenches has been backfilled, pending receipt of overburden characterization analyses from an off-site analytical laboratory.

2.4 Waste Excavation

Once the overburden material was removed from the grid cells (Figure 2.3-2), contaminated soil and waste debris were removed and placed in segregated waste bins labeled with unique LANL bar code IDs. Waste streams are identified, collected, and sampled in accordance with the LANL-approved waste characterization strategy form (WCSF). All waste excavation was conducted completely within an enclosure (LANL 2010, 109754; LANL 2010, 109769).

As of August 17, 2010, only contaminated soil and a small amount of debris have been excavated. Excavated debris included items such as pipe, wire, cable, cement, three empty drums, and an empty glass bottle. The contaminated soil and small percentages of debris were not being segregated into separate containers. Table 2.4-1 presents estimated volumes of waste and overburden removed from MDA B during the fourth quarter of FY10, including the debris percentages that are containerized with the excavated soil.

Excavated waste is kept in containers marked with unique bar code numbers until the waste characterization is complete. Once characterization is complete for each waste container, the container will be sent to the appropriate treatment, storage, and disposal facility (TSDF).

2.4.1 Waste Sample Collection

As waste was removed, composite sample piles of contaminated soil were accumulated. Composite samples were collected at a rate of 1 sample per 100 yd^3. Contaminated soil containing a small percentage of debris is the only waste stream that has been removed from MDA B during the period of June 30 through August 17, 2010. When a new waste stream is encountered during the excavation, waste will be diverted to a new waste container and composite samples collected in accordance with revision 1 of the approved SAP and the approved WCSF.

2.5 Confirmation Sampling

Confirmation samples will be collected within the excavation every 50 ft along the bottom and side walls after buried waste and contaminated soil have been removed from the excavation trench. Both random and biased sampling will be conducted. Randomly selected locations have been chosen every 50 ft using a random number generator. Biased samples will be collected if the sample is deemed necessary due to visual indicators, such as fractures or staining, of potential contamination. Samples are collected at a depth of 0–2 ft below ground surface (bgs). A Trimble VX Spatial Station measures the precise location where each confirmation sample is collected. Field screening for radioactive contaminants is used to aid in determining if all impacted soil has been removed; if field-screening results indicate detectable activity, and if additional excavation of the trench will occur. Once field-screening results no longer indicate detectable concentrations of contamination, the moveable enclosure will then be moved to the next portion of the trench to be excavated. Confirmation samples are collected with a dedicated, clean excavator outside of the movable enclosure.

As of August 17, 2010, three confirmation samples and NMED split samples have been collected as described. The samples were collected from row 260 after soil-screening results did not indicate detectable activity and enclosure 1 had been moved over the next area of the trench to be excavated. Samples were collected from row 260 from the trench bottom, north side wall, and south side wall using the dedicated, clean excavator bucket. The excavator bucket was covered in plastic during sampling to prevent any cross-contamination of the samples. The plastic was replaced and the bucket decontaminated between each confirmation sample. Table 2.5-1 presents location and ID information for

the confirmation and split samples collected. Analytical results for these samples were not received before production of this report; results will be presented in the final IR.

2.6 Air Sampling

Eight air-monitoring network (AIRNET) stations are located along the northern boundary of MDA B. The location of these monitoring stations is shown in Figure 2.3-1. Each AIRNET station collects airborne radionuclides, such as plutonium, americium, and uranium, on a particulate filter and a water vapor sample (for measuring tritium) in a silica gel cartridge. The particulate filters and silica gel cartridges are changed every two weeks and the sample media are sent to a commercial laboratory for analysis using Environmental Protection Agency- (EPA) approved methods. After sufficient time to allow natural radon and progeny to decay, the particulate filters are measured for gross alpha and beta radioactivity using a gas-flow proportional counter. Each calendar quarter, six or seven of the biweekly filters from a given station are assembled into a single composite sample and prepared for isotopic analysis by dissolution and radiochemical separation techniques. These separated samples are analyzed with alpha spectroscopy and inductively coupled plasma emission spectroscopy according to EPA requirements in 40 Code of Federal Regulations 61, National Emission Standards for Hazardous Air Pollutants, Appendix B, Test Methods. Distillate from the silica gel cartridges is analyzed for tritium using liquid scintillation counting. Annual emissions reporting and compliance evaluations for a station are based on the sum of the four quarterly composite samples (for particulate matter) and the sum of biweekly tritium analyses.

On a biweekly basis, the compliance status of the eight AIRNET stations along DP Road is determined using similar isotopic analyses, but focusing solely on plutonium. A single air sample that represents two weeks of sampling is sent to an off-site analytical laboratory. At this point, the filter is cut in half, making an A and B sample for that station and that sample period. The A sample is processed by the techniques described above. The B sample is dissolved and radiochemical separation is used to isolate the plutonium in the sample. Again, alpha spectroscopy is used to determine plutonium concentrations in the air sample. Air concentrations are converted to an estimated radioactive dose for that two-week sample period. Year-to-date sums and trends based on these two-week dose measurements are generated to evaluate compliance status in comparison with EPA's limit of 10 mrem per year dose from the air pathway to a member of the public. None of the actual doses measured at the 8 MDA B AIRNET stations during the project period exceeded 0.014 mrem (June 28, 2010 to August 16, 2010). The maximum year-to-date total for these 8 stations is 0.236 mrem (January 1, 2010 to August 16, 2010).

3.0 WASTE EXCAVATION TO DATE

From June 30 through August 17, 2010, moveable enclosures 1 and 2, each with a footprint of 60-ft long × 60-ft wide, were used at MDA B. Based on the area of each enclosure, a maximum of six grid cells was excavated beneath either of these enclosures before the enclosure was moved. Enclosures 3 and 4 will be fixed enclosures that are currently being constructed. Enclosure 3 will be connected to enclosure 4 with a synthetic material along the roofline, permanently covering a 220-ft long × 75-ft wide footprint. Enclosures 3 and 4 are expected to be operational by early September 2010.

MAR screening was conducted for each overburden or waste container before the container was removed from the enclosure. Section 2.2 describes MAR screening in greater detail.

3.1 Enclosure 1

Trenches were excavated until native tuff was reached. To date, trenches excavated within enclosure 1 have been excavated to approximately 8–12 ft bgs.

3.1.1 Activities Completed to Date

As of August 17, 2010, grid cells AH 252 through AJ 262 have been excavated. Overburden material, contaminated soil, and waste debris have been removed. Overburden and waste samples have been sent for analysis. Confirmation samples were collected in three of these grid cells. These cells have not been backfilled, pending receipt of a confirmation sample and overburden analyses from an off-site analytical laboratory.

Once confirmation sample results are reviewed, the cells will be backfilled using clean overburden material. Figure 2.3-2 shows the location of the excavated grid cells and the confirmation sampling locations.

3.1.2 Waste Streams and Volumes

Eleven containers of overburden material have been removed from enclosure 1. The volume of overburden material is estimated to be approximately 173 yd^3. Twenty-seven containers of contaminated soil have been excavated from enclosure 1. The volume of contaminated soil was estimated to be approximately 533 yd^3. These containers were screened and sampled according to the procedure in sections 2.2, 2.3, and 2.4, and are awaiting characterization. Pending sampling results, the filled containers will be shipped to the appropriate TSDF. Waste shipping is anticipated to begin in September 2010.

3.2 Enclosure 2

Trenches were excavated until native tuff was reached. To date, trenches excavated within enclosure 2 have been excavated to approximately 20–23 ft bgs.

3.2.1 Activities Completed to Date

As of August 17, 2010, grid cells NE 52 through NI 56 have been excavated. Overburden material, contaminated soil, and waste debris have been removed. Overburden and waste samples have been sent for analysis. Confirmation sampling has not been conducted in these grid locations; therefore, they have not been backfilled. Figure 2.3-2 shows the location of the excavated grid cells in enclosure 2.

3.2.2 Waste Streams and Volumes

Ten containers of overburden material have been removed from enclosure 2. The volume of overburden material is estimated to be approximately 201 yd^3. Twenty-six containers of contaminated soil have been removed from enclosure 2. The volume of contaminated soil is estimated to be approximately 504 yd^3. These containers were screened and sampled according to the procedure in sections 2.2, 2.3, and 2.4, and are awaiting characterization. Pending sampling results, the filled containers will be shipped to the appropriate TSDF. Waste shipping is anticipated to begin in September 2010.

4.0 SUMMARY/STATUS

Excavation activities to remediate MDA B to residential cleanup levels occurred during the fourth quarter of FY10. Previous remediation activities at MDA B included excavation of the western end of MDA B (Areas 9 and 10) to confirm that no waste was buried in those areas and that overburden was removed from the east end of MDA B.

As of August 17, 2010, the following activities have been accomplished.

- Thirty-three grid cells within enclosure 1 have been excavated. Estimated volumes of waste and overburden removed from enclosure 1 are approximately 533 yd^3 and 173 yd^3, respectively. Waste and overburden samples have been sent for characterization analysis. Three confirmation samples were collected in grid cells in row 260 and sent for analysis to an off-site analytical laboratory. NMED split samples were taken at the same time as the confirmation samples.
- Twenty grid cells within enclosure 2 have been excavated. Estimated volumes of waste and overburden removed from enclosure 2 are approximately 504 yd^3 and 201 yd^3, respectively. Waste and overburden samples have been sent for characterization analyses. No confirmation sampling has been conducted in these grid cells

Air sampling along the northern boundary of MDA-B during the project period indicated a maximum dose of 0.014 mrem to the public during the project period, with a year-to-date maximum total of 0.236 mrem. These measurements are significantly lower than EPA's limit of 10 mrem per year from the air pathway.

5.0 REFERENCES AND MAP DATA SOURCES

5.1 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.

DOE (U.S. Department of Energy), September 1997. Excerpted pages from "Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports," Change Notice No. 1, DOE Standard No. DOE-STD-1027-92, U.S. Department of Energy, Washington, D.C. (DOE 1997, 076008)

Ferguson, J.F., W.S. Baldridge, G.R. Jiracek, V. Gonzales, and P.A. Pope, 1998. "An Investigation of a Los Alamos National Laboratory, New Mexico, Environmental Restoration Site," draft manuscript for Eos, Transactions, American Geophysical Union, Los Alamos National Laboratory document LA-UR-98-900, Los Alamos, New Mexico. (Ferguson et al. 1998, 058212)

LANL (Los Alamos National Laboratory), May 1991. "TA-21 Operable Unit RFI Work Plan for Environmental Restoration," Vol. II (Chapters 14 to 16), Los Alamos National Laboratory document LA-UR-91-962, Los Alamos, New Mexico. (LANL 1991, 007529)

LANL (Los Alamos National Laboratory), October 2006. "Investigation/Remediation Work Plan for Material Disposal Area B, Solid Waste Management Unit 21-015, at Technical Area 21, Revision 1," Los Alamos National Laboratory document LA-UR-06-6918, Los Alamos, New Mexico. (LANL 2006, 095499)

LANL (Los Alamos National Laboratory), May 2010. "Investigation Report for Material Disposal Area B, Areas 9 and 10, Solid Waste Management Unit 21-015, at Technical Area 21," Los Alamos National Laboratory document LA-UR-10-3301, Los Alamos, New Mexico. (LANL 2010, 109526)

LANL (Los Alamos National Laboratory), May 30, 2010. "Waste Characterization Strategy Form for TA-21 MDA-B, 21-015 Excavation," Los Alamos, New Mexico. (LANL 2010, 109754)

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LANL (Los Alamos National Laboratory), June 15, 2010. "MDA-B Sampling and Analysis Plan," TA-21 Document No. TA21-MDAB-PLAN-00017, Rev. 0, Los Alamos National Laboratory, Los Alamos, New Mexico. (LANL 2010, 110411)

LANL (Los Alamos National Laboratory), June 16, 2010. "MDA-B Aboveground Inventory Management Plan," TA-21 Document No. TA21-MDAB-PLAN-00013, Rev 0, Los Alamos National Laboratory, Los Alamos, New Mexico. (LANL 2010, 110397)

LANL (Los Alamos National Laboratory), August 10, 2010. "MDA-B Sampling and Analysis Plan," TA-21 Document No. TA21-MDAB-PLAN-00017, Rev. 1, Los Alamos National Laboratory, Los Alamos, New Mexico. (LANL 2010, 110398)

Meyer, D.D., January 31, 1952. "Location of Contaminated Waste Burial Pits (Area A, B, and C)," Los Alamos Scientific Laboratory memorandum to S.E. Russo (ENG-4) from D.D. Meyer (H-1), Los Alamos, New Mexico. (Meyer 1952, 028154)

5.2 Map Data Sources

Legend Item	Data Source
10-ft by 10-ft Project reference grid	10 ft by 10 ft Project Reference Grid, Material Disposal Area B, Unpublished Data; Portage, Inc., January 1, 2009
Air sampling location	AIRNET radiological ambient air sampling network. Los Alamos National Laboratory, Waste and Environmental Services Division; as published August 8, 2010
Confirmation sample	MDA B Confirmation Samples, TA-21 Material Disposal Area B, Unpublished Data; Portage, Inc., August 11, 2010
Fence	Security and Industrial Fences and Gates; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; January 6, 2004; as published October 15, 2008
Laboratory boundary	LANL Areas Used and Occupied; Los Alamos National Laboratory, Site Planning & Project Initiation Group, Infrastructure Planning Office; September 19, 2007; as published December 4, 2008
Material disposal area	Materials Disposal Areas; Los Alamos National Laboratory, ENV Environmental Remediation and Surveillance Program; ER 2004-0221, 1:2,500 Scale Data, April 23, 2004
MDA B direct-push sampling	MDA B DPT All Phases; Los Alamos National Laboratory, ENV Environmental Remediation and Surveillance Program, December 14, 2009
Paved road	Paved Road Arcs; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; January 6, 2004; as published October 15, 2008
Primary paved road/secondary paved road	Road Centerlines for the County of Los Alamos; County of Los Alamos, Information Services; as published December 3, 2007
Structure	Los Alamos County Structures; County of Los Alamos; Original data from Los Alamos National Laboratory, Environmental Restoration (ER) Project. After 2003 flyover, 1400 new structure polygons added by Bohannan Houston, Inc.; as published August 2003
Technical area boundary	LANL Technical Areas of Department of Energy Property in and around the Los Alamos National Laboratory Area. Los Alamos National Laboratory, Site and Project Planning (PM-1); as published September 2007
Trench area	Trench Boundaries per Direct Push Technology, Material Disposal Area B, Unpublished Data; Portage, Inc., January 12, 2010
Unpaved road	Dirt Road Arcs; Los Alamos National Laboratory, KSL Site Support Services, Planning, Locating and Mapping Section; January 6, 2004; as published October 15, 2008

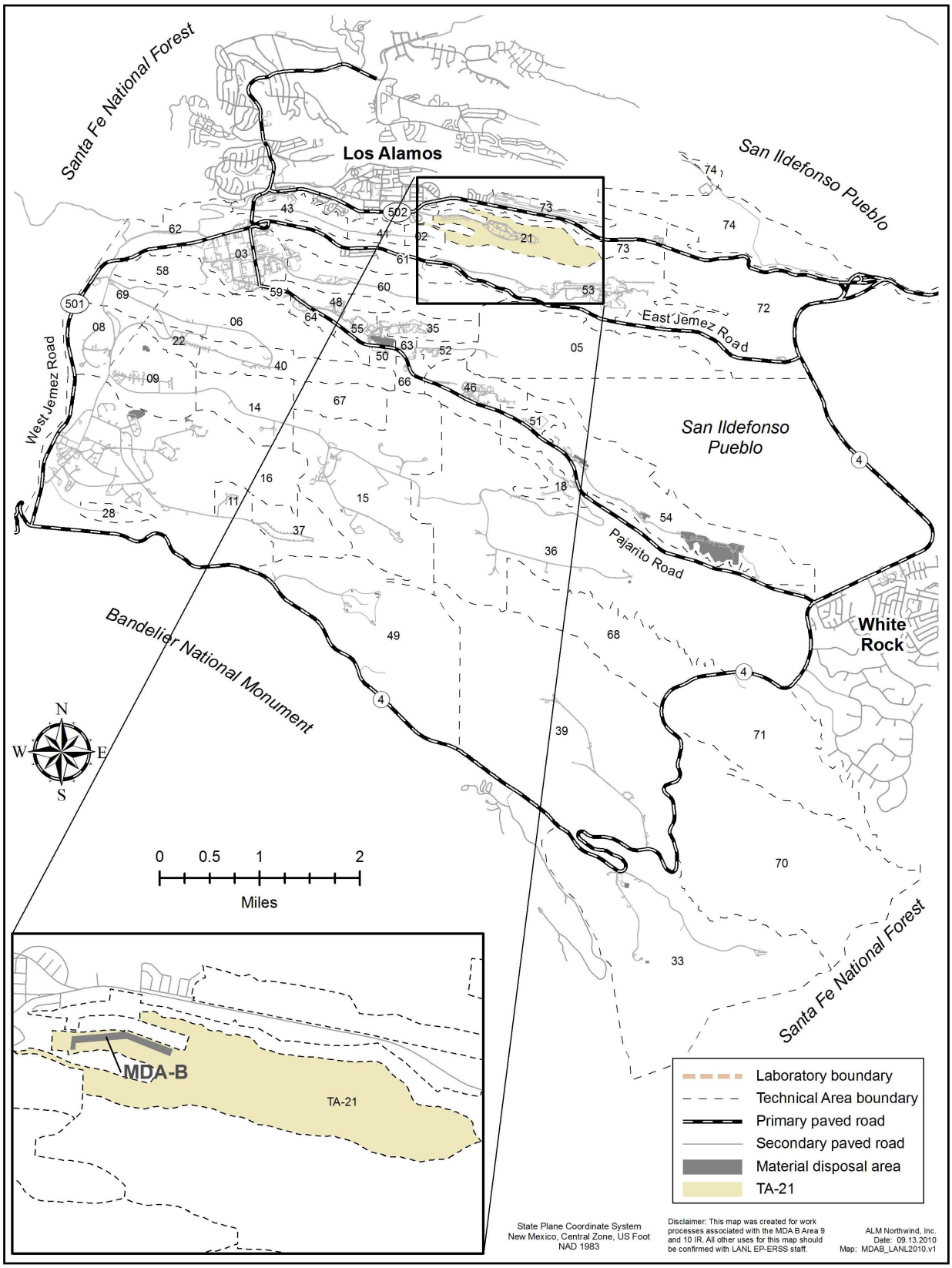

Figure 1.1-1 MDA B in TA-21 with respect to Laboratory technical areas and surrounding landholdings

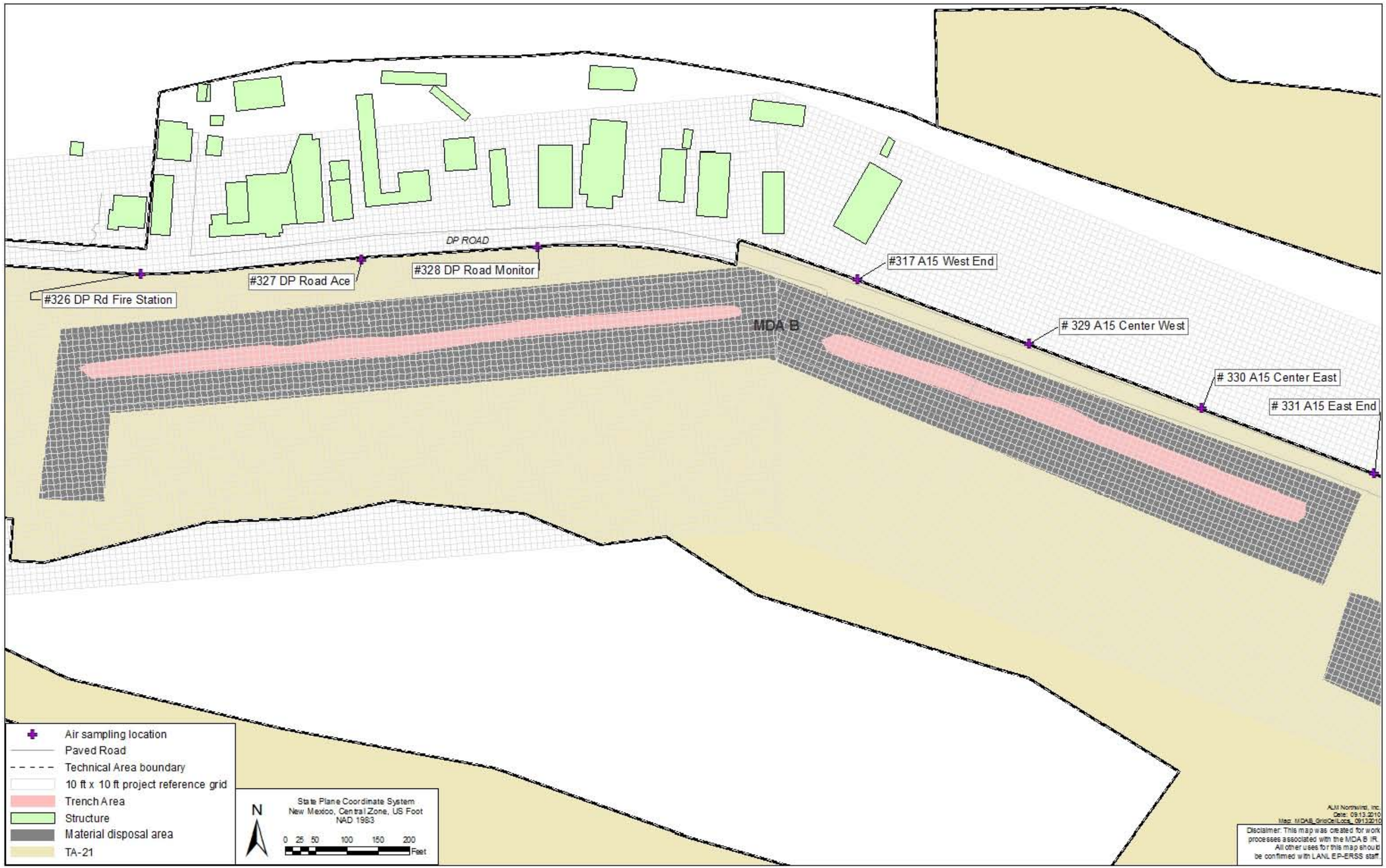

Figure 2.3-1 Grid cell locations within MDA B excavation

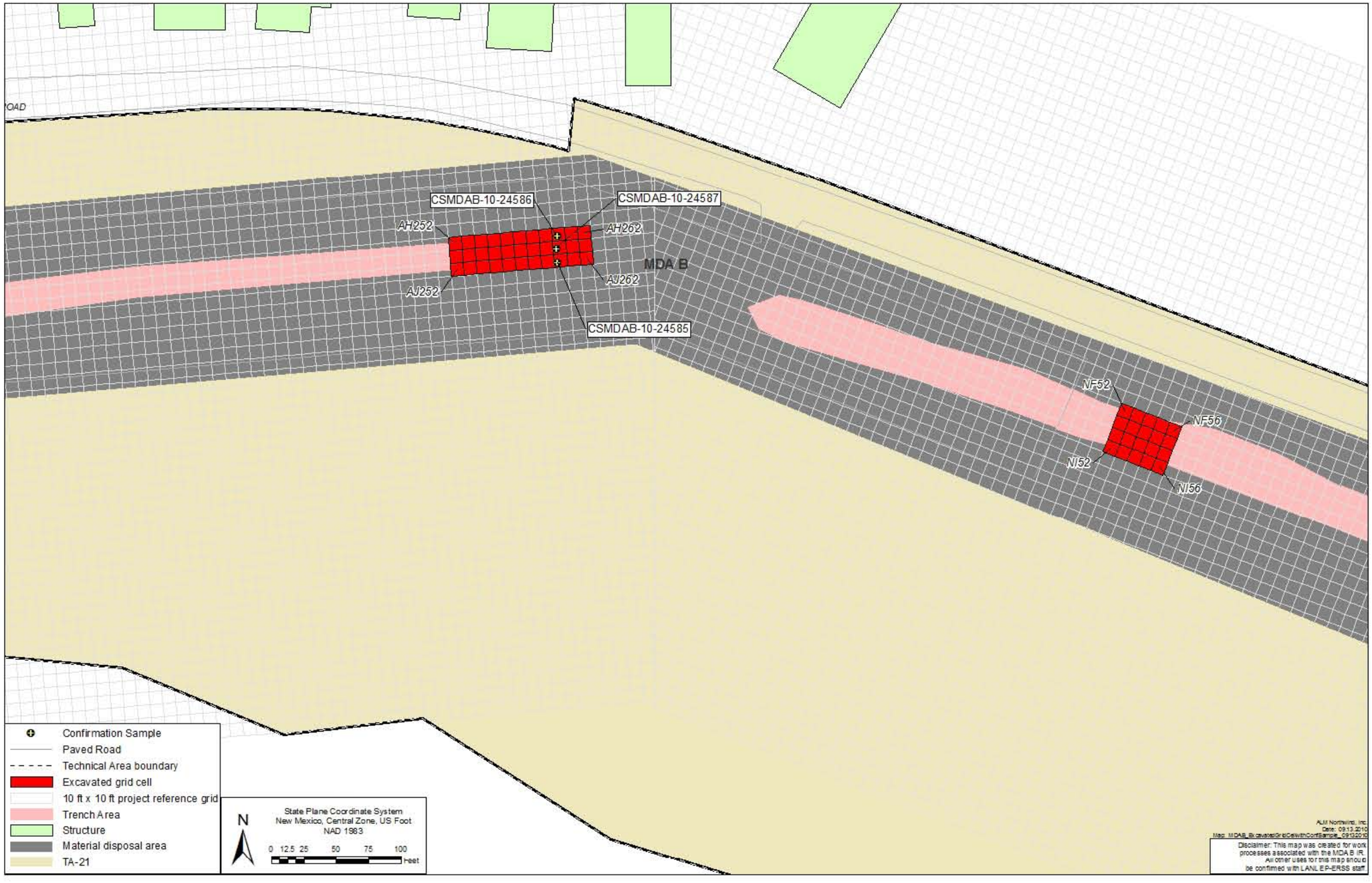

Figure 2.3-2 Excavated grid cells and confirmation sample locations as of August 17, 2010

Table 2.3-1
Overburden Samples Collected to Date

Location Where Overburden Removed	Sample ID	Date Collected
East end of MDA B	MD21-10-16019	04/22/10
East end of MDA B	MD21-10-16020	04/22/10
East end of MDA B	MD21-10-16021	04/22/10
East end of MDA B	MD21-10-16022	04/22/10
East end of MDA B	MD21-10-16023	04/22/10
East end of MDA B	MD21-10-16024	04/22/10
East end of MDA B	MD21-10-16025	04/22/10
East end of MDA B	MD21-10-16026	04/22/10
East end of MDA B	MD21-10-16027	04/22/10
East end of MDA B	MD21-10-16028	04/22/10
East end of MDA B	MD21-10-16029	04/22/10
East end of MDA B	MD21-10-16030	04/22/10
East end of MDA B	MD21-10-16031	04/23/10
East end of MDA B	MD21-10-16032	04/23/10
East end of MDA B	MD21-10-16033	04/22/10
East end of MDA B	MD21-10-16034	04/22/10
East end of MDA B	MD21-10-16035	04/22/10
East end of MDA B	MD21-10-16036	04/22/10
East end of MDA B	MD21-10-16037	04/22/10
East end of MDA B	MD21-10-16038	04/22/10
East end of MDA B	MD21-10-16039	04/22/10
East end of MDA B	MD21-10-16040	04/22/10
East end of MDA B	MD21-10-16041	04/22/10
East end of MDA B	MD21-10-16042	04/22/10
East end of MDA B	MD21-10-16043	04/23/10
East end of MDA B	MD21-10-16044	04/23/10
East end of MDA B	MD21-10-16045	04/23/10
East end of MDA B	MD21-10-16046	04/23/10
East end of MDA B	MD21-10-16047	04/23/10
East end of MDA B	MD21-10-16048	04/23/10
East end of MDA B	MD21-10-16049	04/23/10
East end of MDA B	MD21-10-16050	04/23/10
East end of MDA B	MD21-10-16051	04/23/10
East end of MDA B	MD21-10-16052	04/23/10
East end of MDA B	MD21-10-16053	04/23/10

Table 2.3-1 (continued)

Location Where Overburden Removed	Sample ID	Date Collected
East end of MDA B	MD21-10-16054	04/23/10
East end of MDA B	MD21-10-16055	04/23/10
East end of MDA B	MD21-10-16056	04/23/10
East end of MDA B	MD21-10-16057	04/23/10
East end of MDA B	MD21-10-16058	04/23/10
East end of MDA B	MD21-10-16059	04/23/10
East end of MDA B	MD21-10-16060	04/23/10
East end of MDA B	MD21-10-16061	04/26/10
East end of MDA B	MD21-10-16062	04/26/10
East end of MDA B	MD21-10-16063	04/26/10
East end of MDA B	MD21-10-16064	04/28/10
East end of MDA B	MD21-10-16065	04/28/10
East end of MDA B	MD21-10-16066	04/28/10
East end of MDA B	MD21-10-16067	04/28/10
East end of MDA B	MD21-10-16068	04/28/10
East end of MDA B	MD21-10-16069	04/28/10
East end of MDA B	MD21-10-16070	04/28/10
East end of MDA B	MD21-10-16071	04/28/10
East end of MDA B	MD21-10-16072	04/28/10
East end of MDA B	MD21-10-16073	04/28/10
East end of MDA B	MD21-10-16074	04/28/10
East end of MDA B	MD21-10-16075	04/29/10
East end of MDA B	MD21-10-16076	04/28/10
East end of MDA B	MD21-10-16077	04/29/10
East end of MDA B	MD21-10-16078	04/29/10
East end of MDA B	MD21-10-16079	04/29/10
East end of MDA B	MD21-10-16080	04/29/10
East end of MDA B	MD21-10-16081	04/29/10
East end of MDA B	MD21-10-16082	04/29/10
East end of MDA B	MD21-10-16083	04/29/10
East end of MDA B	MD21-10-16084	04/29/10
East end of MDA B	MD21-10-16085	05/03/10
East end of MDA B	MD21-10-16086	05/03/10
East end of MDA B	MD21-10-16087	05/03/10
East end of MDA B	MD21-10-16088	05/03/10
East end of MDA B	MD21-10-16089	05/03/10
East end of MDA B	MD21-10-16090	05/03/10
East end of MDA B	MD21-10-16091	05/03/10

Table 2.3-1 (continued)

Location Where Overburden Removed	Sample ID	Date Collected
East end of MDA B	MD21-10-16092	05/03/10
East end of MDA B	MD21-10-16093	05/03/10
East end of MDA B	MD21-10-16094	05/03/10
East end of MDA B	MD21-10-16095	05/03/10
East end of MDA B	MD21-10-16096	05/03/10
East end of MDA B	MD21-10-16097	05/03/10
East end of MDA B	MD21-10-16098	05/03/10
East end of MDA B	MD21-10-16099	05/05/10
East end of MDA B	MD21-10-16100	05/05/10
East end of MDA B	MD21-10-16101	05/05/10
East end of MDA B	MD21-10-16102	05/05/10
East end of MDA B	MD21-10-16103	05/05/10
East end of MDA B	MD21-10-16104	05/05/10
East end of MDA B	MD21-10-16105	05/05/10
East end of MDA B	MD21-10-16106	05/05/10
East end of MDA B	MD21-10-16107	05/05/10
East end of MDA B	MD21-10-16108	05/05/10
East end of MDA B	MD21-10-16109	05/05/10
East end of MDA B	MD21-10-16110	05/05/10
East end of MDA B	MD21-10-16111	05/05/10
East end of MDA B	MD21-10-16112	05/05/10
East end of MDA B	MD21-10-16113	05/05/10
East end of MDA B	MD21-10-16114	05/05/10
East end of MDA B	MD21-10-16115	05/05/10
East end of MDA B	MD21-10-16116	05/05/10
East end of MDA B	MD21-10-16117	05/05/10
East end of MDA B	MD21-10-16118	05/05/10
East end of MDA B	MD21-10-16149	05/05/10
East end of MDA B	MD21-10-16150	05/05/10
East end of MDA B	MD21-10-16151	05/05/10
East end of MDA B	MD21-10-16152	05/05/10
East end of MDA B	MD21-10-16153	05/05/10
East end of MDA B	MD21-10-16154	05/05/10
East end of MDA B	MD21-10-16155	05/06/10
East end of MDA B	MD21-10-16156	05/06/10
East end of MDA B	MD21-10-16157	05/06/10
East end of MDA B	MD21-10-16158	05/06/10
East end of MDA B	MD21-10-16159	05/06/10

Table 2.3-1 (continued)

Location Where Overburden Removed	Sample ID	Date Collected
East end of MDA B	MD21-10-16160	05/06/10
East end of MDA B	MD21-10-16161	05/06/10
East end of MDA B	MD21-10-16162	05/06/10
East end of MDA B	MD21-10-16163	05/06/10
East end of MDA B	MD21-10-16164	05/06/10
East end of MDA B	MD21-10-16165	05/06/10
East end of MDA B	MD21-10-16166	05/06/10
East end of MDA B	MD21-10-16167	05/06/10
East end of MDA B	MD21-10-16168	05/06/10
East end of MDA B	MD21-10-16169	05/06/10
East end of MDA B	MD21-10-16170	05/10/10
East end of MDA B	MD21-10-16171	05/10/10
East end of MDA B	MD21-10-16172	05/10/10
East end of MDA B	MD21-10-16173	05/10/10
East end of MDA B	MD21-10-16174	05/10/10
East end of MDA B	MD21-10-16175	05/10/10
East end of MDA B	MD21-10-16176	05/10/10
East end of MDA B	MD21-10-16177	05/10/10
East end of MDA B	MD21-10-16178	05/10/10
East end of MDA B	MD21-10-16179	05/10/10
East end of MDA B	MD21-10-16180	05/10/10
East end of MDA B	MD21-10-16181	05/10/10
East end of MDA B	MD21-10-16182	05/10/10
East end of MDA B	MD21-10-16183	05/10/10
East end of MDA B	MD21-10-16184	05/10/10
East end of MDA B	MD21-10-16185	05/10/10
East end of MDA B	MD21-10-16186	05/10/10
East end of MDA B	MD21-10-16187	05/10/10
East end of MDA B	MD21-10-16188	05/10/10
East end of MDA B	MD21-10-16189	05/10/10
East end of MDA B	MD21-10-16190	05/18/10
East end of MDA B	MD21-10-16191	05/18/10
East end of MDA B	MD21-10-16192	05/18/10
East end of MDA B	MD21-10-16193	05/18/10
East end of MDA B	MD21-10-16194	05/18/10
East end of MDA B	MD21-10-16195	05/18/10
East end of MDA B	MD21-10-16196	05/18/10
East end of MDA B	MD21-10-16197	05/18/10

Table 2.3-1 (continued)

Location Where Overburden Removed	Sample ID	Date Collected
East end of MDA B	MD21-10-16198	05/18/10
East end of MDA B	MD21-10-16199	05/18/10
East end of MDA B	MD21-10-16200	05/18/10
East end of MDA B	MD21-10-16201	05/18/10
East end of MDA B	MD21-10-16202	05/18/10
East end of MDA B	MD21-10-16203	05/18/10
East end of MDA B	MD21-10-16204	05/18/10
East end of MDA B	MD21-10-16205	05/18/10
East end of MDA B	MD21-10-16206	05/18/10
East end of MDA B	MD21-10-16207	05/18/10
East end of MDA B	MD21-10-16208	05/18/10
East end of MDA B	MD21-10-16209	05/18/10
East end of MDA B	MD21-10-16210	05/18/10
East end of MDA B	MD21-10-16211	05/18/10
East end of MDA B	MD21-10-16212	05/18/10
East end of MDA B	MD21-10-16213	05/18/10
East end of MDA B	MD21-10-16214	05/18/10
East end of MDA B	MD21-10-16215	05/18/10
East end of MDA B	MD21-10-16216	05/18/10
East end of MDA B	MD21-10-16217	05/18/10
East end of MDA B	MD21-10-16218	05/18/10
East end of MDA B	MD21-10-16219	05/18/10
East end of MDA B	MD21-10-16220	05/18/10
Northwest corner of MDA B	MDABEWS1-10-21228	06/29/10
Trenching outside MDA B excavation area	MDABEWS1-10-21229	06/30/10
Northwest corner of MDA B	MDABEWS1-10-21230	06/30/10
Northwest corner of MDA B	MDABEWS1-10-21231	07/08/10
Fixed enclosure foundations	MDABEWS1-10-21232	07/08/10
Fixed enclosure foundations	MDABEWS1-10-21233	07/01/10
Fixed enclosure foundations	MDABEWS1-10-21234	07/01/10
Northeast side of MDA B	MDABEWS1-10-21235	07/14/10
Fixed enclosure foundations	MDABEWS1-10-21236	07/01/10
Northeast side of MDA B	MDABEWS1-10-21237	07/14/10
Fixed enclosure foundations	MDABEWS1-10-21238	07/01/10
Northeast side of MDA B	MDABEWS1-10-21239	07/14/10
Northeast side of MDA B	MDABEWS1-10-21240	07/14/10
Enclosure 1: grid cells AH261 through AJ262	MDABEWS1-10-21241	07/08/10

Table 2.3-1 (continued)

Location Where Overburden Removed	Sample ID	Date Collected
Northeast side of MDA B	MDABEWS1-10-21242	07/14/10
Enclosure 1: grid cells AH261 through AJ261	MDABEWS1-10-21243	07/13/10
Southeast side of MDA B	MDABEWS1-10-21244	07/14/10
Southeast side of MDA B	MDABEWS1-10-21245	07/14/10
Fixed enclosure foundations	MDABEWS1-10-21246	07/06/10
Southeast side of MDA B	MDABEWS1-10-21247	07/14/10
Enclosure 2: grid cells NE53 through NI56	MDABEWS1-10-21248	07/21/10
Fixed enclosure foundations	MDABEWS1-10-21249	07/06/10
East side of MDA B	MDABEWS1-10-21250	07/22/10
Fixed enclosure foundations	MDABEWS1-10-21251	07/06/10
East side of MDA B	MDABEWS1-10-21252	07/22/10
East side of MDA B	MDABEWS1-10-21253	07/22/10
East side of MDA B	MDABEWS1-10-21254	07/22/10
East side of MDA B	MDABEWS1-10-21255	07/22/10
Fixed enclosure foundations	MDABEWS1-10-21256	08/06/10
Fixed enclosure foundations	MDABEWS1-10-21257	07/25/10
Fixed enclosure foundations	MDABEWS1-10-21258	07/25/10
Fixed enclosure foundations	MDABEWS1-10-21259	08/01/10
Fixed enclosure foundations	MDABEWS1-10-21260	08/06/10
Fixed enclosure foundations	MDABEWS1-10-21261	08/06/10
Fixed enclosure foundations	MDABEWS1-10-21262	08/06/10
Fixed enclosure foundations	MDABEWS1-10-21263	08/06/10
Fixed enclosure foundations	MDABEWS1-10-21264	08/06/10
Fixed enclosure foundations	MDABEWS1-10-21265	08/06/10
Fixed enclosure foundations	MDABEWS1-10-21266	08/06/10

Table 2.4-1
Waste and Overburden Volumes
Removed during Fourth Quarter FY10

Enclosure Number	Waste or Material Type	Estimated Volume (yd^3)
1	100% Soil	8
1	100% Soil	8
1	100% Soil	8
1	99% Overburden soil, 1% debris	14
1	99% Overburden soil, 1% debris	14
1	100% Overburden soil with rocks	17
1	80% Soil and tuff, 20% debris	20
1	80% Soil and tuff, 20% debris	20
1	90% Soil and tuff, 10% debris	20
1	80% Soil and tuff, 20% debris	20
1	97% Soil, 3% debris	24
1	95% Soil and tuff, 5% debris, including an empty glass bottle	23
1	80% Soil, 20% debris, including pipes	20
1	80% Soil and tuff, 20% debris, including 2 empty 30-gal. drums	20
1	99% Soil, 1% debris, including wire and empty 30-gal. drum	19
1	100% Soil	21
1	99% Soil, 1% debris	20
1	98% Soil, 2% debris	20
1	95% Soil, 5% debris	20
1	95% Soil, 5% debris	22
1	90% Soil, 10% debris	20
1	100% Soil	20
1	90% Soil, 10% debris	20
1	75% Soil, 25% debris	20
1	80% Soil, 20% debris	21
1	90% Soil, 10% debris	20
1	90% Soil, 10% debris	20
1	90% Soil, 10% debris	20
1	90% Soil, 10% debris	20
1	90% Soil, 10% debris	20

Table 2.4-1 (continued)

Enclosure Number	Waste or Material Type	Estimated Volume (yd^3)
1	90% Soil, 10% debris	20
1	90% Soil, 10% sheet metal and pipes	18
1	99% Soil, 1% debris	18
1	90% Soil, 10% debris	18
1	50% Soil, 50% debris	18
1	75% Soil, 25% debris	19
1	40% Soil, 60% debris	18
1	25% Soil, 75% debris	18
2	85% Soil, 15% debris	20
2	100% Soil	14
2	100% Soil	20
2	95% Soil, 5% debris	21
2	99% Soil, 1% debris	20
2	95% Soil and tuff, 5% debris	25
2	80% Soil, 20% debris	20
2	99% Soil, 1% debris	20
2	98% Soil, 2% debris	20
2	98% Soil, 2% debris	21
2	98% Soil, 2% debris, including wire, cable, and cement	20
2	100% Soil	16
2	99% Soil, 1% debris	20
2	95% Soil, 5% debris	20
2	99% Soil, 1% debris	14
2	80% Soil, 20% debris	20
2	90% Soil, 10% debris	20
2	90% Soil, 10% debris	20
2	70% Soil, 30% debris	20
2	99% Soil, 1% debris	20
2	95% Soil, 5% debris	16
2	98% Soil, 2% debris	20
2	99% Soil, 1% debris	21
2	80% Soil, 20% debris	20
2	99% Soil, 1% debris	16
2	99% Soil, 1% debris	20
2	99% Soil, <1% debris	20
2	100% Soil	21
2	90% Soil, 10% construction debris	20
2	99% Soil, 1% debris	21

Table 2.4-1 (continued)

Enclosure Number	Waste or Material Type	Estimated Volume (yd^3)
2	99% Soil, 1% metal	21
2	93% Soil, 7% debris	21
2	99% Soil, 1% concrete and rebar	19
2	99% Soil, 1% debris	19
2	99% Soil, 1% debris	20
2	98% Soil, 2% debris	19

Table 2.5-1
Confirmation Samples Collected during Fourth Quarter FY10

MDA B Enclosure	LANL Sample ID	Location ID	NMED Split-Sample ID	Trench Location	Date Collected
1	CSMDAB-10-24585	MDAB-612790	MDA-B-260-south wall	South side wall	08/11/10
1	CSMDAB-10-24586	MDAB-612791	MDA-B-260-north wall	North side wall	08/11/10
1	CSMDAB-10-24587	MDAB-612792	MDA-B-260-floor	Excavation floor	08/11/10

Appendix A

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

A-1.0 ACRONYMS AND ABBREVIATIONS

AIRNET	air-monitoring network
AK	acceptable knowledge
bgs	below ground surface
DP	Delta Prime
EPA	Environmental Protection Agency (U.S.)
FY	fiscal year
ID	identification code
IR	investigation report
LANL	Los Alamos National Laboratory
MAR	material at risk
MDA	material disposal area
NMED	New Mexico Environment Department
SAP	Sampling and Analysis Plan
TA	technical area
TSDF	treatment, storage, and disposal facility
WCSF	waste characterization strategy form

A-2.0 METRIC CONVERSION TABLE

Multiply SI (Metric) Unit	By	To Obtain U.S. Customary Unit
kilometers (km)	0.622	miles (mi)
kilometers (km)	3281	feet (ft)
meters (m)	3.281	feet (ft)
meters (m)	39.37	inches (in.)
centimeters (cm)	0.03281	feet (ft)
centimeters (cm)	0.394	inches (in.)
milliimeters (mm)	0.0394	inches (in.)
micrometers or microns (µm)	0.0000394	inches (in.)
square kilometers (km^2)	0.3861	square miles (mi^2)
hectares (ha)	2.5	acres
square meters (m^2)	10.764	square feet (ft^2)
cubic meters (m^3)	35.31	cubic feet (ft^3)
kilograms (kg)	2.2046	pounds (lb)
grams (g)	0.0353	ounces (oz)
grams per cubic centimeter (g/cm^3)	62.422	pounds per cubic foot (lb/ft^3)
milligrams per kilogram (mg/kg)	1	parts per million (ppm)
micrograms per gram (µg/g)	1	parts per million (ppm)
liters (L)	0.26	gallons (gal.)
milligrams per liter (mg/L)	1	parts per million (ppm)
degrees Celsius (°C)	9/5 + 32	degrees Fahrenheit (°F)

A-3.0 DATA QUALIFIER DEFINITIONS

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