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Closure/Post-Closure Plan for the Technical Area 54 Area L Landfill (Shafts 1, 13-17 and 19-34, and Impoundments B and D)

Revision 1.0

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Los Alamos National Laboratory

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LIST OF ACRONYMS AND ABBREVIATIONS

20.4.1 NMAC	New Mexico Administrative Code, Title 20, Chapter 4, Part 1
CFR	Code of Federal Regulations
CME	Corrective Measures Evaluation
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
ft	feet
HDPE	High density polyethylene
HWB	Hazardous Waste Bureau
in.	inch(es)
LANL	Los Alamos National Laboratory
NIOSH	National Institute of Occupational Safety and Health
NMED	New Mexico Environment Department
PCE	Tetrachloroethene
PPE	personal protective equipment
P&T	Packaging and Transportation
QA	quality assurance
QC	quality control
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
SW-846	Test Methods for Evaluating Solid Waste, Physical/Chemical Methods
TA	Technical Area
TCA	1,1,1 trichloroethane
TCE	Trichloroethene

LOS ALAMOS NATIONAL LABORATORY TECHNICAL AREA 54 AREA L CLOSURE AND POST-CLOSURE PLAN

1 INTRODUCTION

This plan describes the activities necessary to achieve closure and post-closure of the Area L hazardous waste disposal units at Los Alamos National Laboratory (LANL) Technical Area (TA) 54. The units are subject to closure under Resource Conservation and Recovery Act (RCRA) and New Mexico Hazardous Waste Act regulations because they received hazardous waste after November 19, 1980. The information provided in this plan is submitted to address the applicable closure and post-closure requirements specified in the New Mexico Administrative Code, Title 20, Chapter 4, Part 1, (20.4.1 NMAC), Section 600 incorporating the Code of Federal Regulations, Title 40 (40 CFR) Part 265, Subparts F and G, (all regulatory references to 20.4.1 NMAC in this document are as revised October 1, 2003) and 20.4.1 NMAC incorporating 40 CFR §265.310 . The Area L units are also "regulated units," as defined in 20.4.1 NMAC, incorporating 40 CFR §264.90(a)(2) and are subject to the requirements referenced therein.

The Area L land disposal units are located below grade and within the boundaries of the TA-54 Area L waste storage facility. The units include Disposal Shafts 1, 13-17, 19-34, and Impoundments B and D. The phrase "Area L Landfill" is used as a general term to denote these combined waste management units throughout this plan.

Some or all of the individual units in the Area L Landfill are expected to be closed in place without removing the waste. These units are co-located with other land disposal units that comprise a Solid Waste Management Unit (SWMU) to be remediated under the LANL corrective action program and subject to the LANL Compliance Order on Consent (Consent Order) signed by the U.S. Department of Energy (DOE), the University of California, and the New Mexico Environment Department (NMED) on March 1, 2005. The Consent Order includes closure deadlines for completing corrective actions at TA-54 that will require coordination between corrective action and the closure activities described in this plan. The closure and post-closure activities for the Area L landfill may potentially be included with corrective actions through alternative requirements to meet closure and post-closure care requirements, as allowed by 20.4.1 NMAC incorporating 40 CFR §265.110(d).

The closure of Impoundments B and D may involve the removal of hazardous waste as determined by sampling and analysis required by the New Mexico Environment Department through interactions with the LANL corrective action program. A discussion of the status of that investigation at the time of preparation of this plan and the resulting options for closure is included in this plan.

Closure of the Area L Landfill will ensure that the wastes and/or waste residues that remain in place are stabilized and will likely involve the use of an engineered cover followed by post-closure care activities. The cover will be designed and constructed to minimize the need for further maintenance and be protective of human health. Post-closure care will include monitoring, maintenance, and reporting requirements for the cover. These activities will occur in conjunction with remediation efforts of the LANL corrective action program and the Consent Order.

2 GENERAL CLOSURE INFORMATION

This section includes a discussion of the performance standards for closure of the Area L Landfill units and the relationship of this closure with closure of the remainder of the waste management units in the general LANL facility.

2.1 Closure Performance Standard

The Area L landfill will be closed to meet the following performance standards as required by 20.4.1 NMAC incorporating 40 CFR §265.111 [10-1-03]:

- Minimize the need for further maintenance,
- Control, minimize, or eliminate, to the extent necessary to protect human health and the environment, the post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated runoff, or hazardous waste decomposition products to the ground or surface waters or atmosphere,
- Comply with the applicable closure and post-closure requirements of 20.4.1 NMAC incorporating 40 CFR Part 265, Subpart G and 20.4.1 NMAC incorporating 40 CFR §265.228 (surface impoundments) and §265.310 (landfills).

To meet the above closure performance standards, the final remediation option chosen for the specified shafts and impoundments that comprise the Area L landfill will be designed and implemented to either meet the closure requirements for surface impoundments (if this is the option chosen for impoundments B and D) or for landfills (any unit left in place). For the surface impoundments, these include:

- Remove or decontaminate all waste residues, contaminated containment system components, contaminated subsoils, and structures and equipment contaminated with waste and leachate, and manage them as hazardous waste, as necessary,

or

- Close the impoundment as a landfill by removing or solidifying liquid wastes,
- Stabilize remaining wastes to a bearing capacity sufficient to support a final cover.

Closure standards for any units closing as landfills include the use of a cover or other alternative that will:

- Minimize long-term migration of liquids through the closed unit
- Function with minimum maintenance
- Promote drainage and minimize erosion or abrasion of the cover
- Accommodate settling and subsidence so that the cover's integrity is maintained, and
- Have a permeability that is less than or equal to the permeability of the natural subsoils present.

2.2 Partial and Final Closure Activities

This closure plan has been written for partial closure rather than final closure of the entire LANL facility. Partial closure will consist of closing an individual hazardous or mixed waste management unit while leaving the other active RCRA-regulated units at LANL in service. Partial closure of each unit (hereinafter referred to simply as "closure") will be deemed complete when closure has been certified by an independent, professional engineer licensed in the State of New Mexico and closure certification has been submitted to and approved by the NMED.

Final closure of the LANL facility will occur when all the remaining hazardous or mixed waste management units at LANL have been closed. Final closure will consist of assembling documentation on the closure status of each unit, including all previous partial closures as well as permitted or interim status land-based units that have been or are being addressed via coordination with corrective action projects. Final closure will be deemed complete when the information has been submitted to the NMED and approved.

3 DESCRIPTION OF UNITS TO BE CLOSED

This section provides a general description of TA-54 and Area L. It also presents a more detailed description of the Area L Landfill regulated unit and includes a discussion of the wastes in and the maximum capacities of the specified shafts and impoundments.

3.1 TA-54 Description

LANL is located in Los Alamos County, an incorporated county, in north-central New Mexico, approximately 60 miles north of Albuquerque and 25 miles northwest of Santa Fe. LANL is divided into separate TAs (see Figure 1). TA-54 is located on top of Mesita del Buey, an east-west trending mesa that is bordered on the north by Cañada del Buey and on the south by Pajarito Canyon. The elevation at TA-54 is approximately 6,800 feet (ft). TA-54 is used primarily for waste management. It includes four waste disposal areas (one each at Areas G, H, J, and L, see Figure 2), storage areas for hazardous and mixed (hazardous with a radioactive component) waste, and supporting structures or offices. Further information regarding the TA-54 facility, including hydrogeologic conditions, is available in Section 2.0 of the latest revision of the Los Alamos National Laboratory Technical Area 54 Part B Permit Renewal

Application and the latest revision of the Los Alamos National Laboratory General Part B Permit Renewal Application. Further characterization of the Area L site is also ongoing under the Consent Order investigation activities.

3.2 Area L Landfill Description

Area L is a 2.58-acre site in the north-central portion of TA-54 (Figure 2). The irregularly-shaped area is located on the north side of Mesita del Buey Road and is surrounded by an 8-ft-high chain-link security fence topped with barbed or razor wire. Entrance to the area is restricted to authorized and/or escorted personnel. Between the late 1950s and the mid-1980s, Area L was used for below-grade disposal of non-radiological chemical wastes in 34 shafts, 3 surface impoundments, and 1 pit. Disposal of hazardous waste at Area L ceased after that period and these disposal units were covered. The surface of Area L above these inactive disposal units is presently used for hazardous and mixed waste storage in various structures.

Area L is situated on a relatively flat portion of the Mesita del Buey. Near Area L, Cañada del Buey is roughly 100 ft below the north mesa rim, and Pajarito Canyon is approximately 140 ft below the south mesa rim. Precipitation runoff at Area L is channeled northward into a drainage that is a tributary of Cañada del Buey. Erosion controls divert water away from the Area L Landfill subsurface units; these include an asphalt cover, asphalt curbing, and asphalt drainage channels.

3.2.1 Shafts 1, 13-17, and 19-34

Between 1975 and 1985, 34 chemical waste disposal shafts at Area L were used for waste disposal. The shafts are no longer in active use as disposal units. They have all been capped with concrete and covered over with the asphalt working surface at Area L. Brass markers show the locations of the shafts. Only Shafts 1, 13-17, and 19-34 received hazardous waste after November 19, 1980, making them subject to regulation under RCRA as disposal shafts. Therefore, these shafts are subject to RCRA closure standards and are addressed in this plan as part of the Area L Landfill. The other 12 shafts are subject to corrective action under the Consent Order. They are part of SWMU 54-006, which is described as Material Disposal Area (MDA) L in this and related documents.

Shafts 1, 13-17, and 19-28 are located at the eastern end of Area L; Shafts 29-34 are located at the northwest end (Figure 3). The dates of use, dimensions, capacities, and waste types of these shafts are presented in Table 1 and Appendix A. The shafts were dry-drilled with an auger into the Bandelier Tuff below Area L. Three feet of crushed tuff was placed in the bottom of each shaft as a base. When in use, the shafts were covered with a heavy steel cap to prevent inflow of precipitation. The steel cap could be opened or removed, depending on the design, to allow the placement of waste in the shaft.

Prior to 1982, liquids were disposed of in drums or other containers without adding absorbents. Uncontainerized waste items were also disposed of in this manner. After 1981, only containerized wastes were disposed of in the shafts. From 1982 until 1985 when disposal practices ended, wastes were accumulated on site and packaged in drums until sufficient quantities had been collected to facilitate batch placement in the shafts. The drums were lowered by crane into a shaft and arranged in layers. Layers in 3-ft and 4-ft diameter shafts contain 1 drum, layers in 6-ft diameter shafts contain 4 to 5 drums, and layers in 8-ft diameter shafts contain 6 drums. The space around the drums was filled with crushed tuff, and a 6-inch layer of crushed tuff was placed between each layer of drums. The crushed tuff was added to provide structural support to help prevent failure of drums in the bottom of the shafts (LANL, 1992a). When the use period for these disposal shafts ended, they were backfilled with crushed tuff and approximately the uppermost 3 ft of each shaft was plugged with concrete, which was rounded at the surface to form a dome (LANL, 1986). By 1996, the shafts had been covered by an asphalt layer placed over the site to accommodate active waste management activities.

Examples of the wastes disposed of in the shafts include chromic acid, lithium hydride-contaminated articles, paint thinner, mercury contaminated glassware, trichloroethylene, barium nitrate, methylene chloride, perchloric acid, photochemical wastes, and benzene (see Appendix A). The total amount of waste materials disposed of in the Area L Landfill shafts is approximately 160 cubic meters (m^3) based upon the LANL Solid Waste Operations database (Appendix A).

3.2.2 Surface Impoundments B and D

Three unlined impoundments used for waste treatment and disposal are present in Area L. These impoundments are located in the north-central region of Area L and are designated from east to west as Impoundments B, C, and D (Figure 3). The dates of use, dimensions, capacities, and waste types of these impoundments are presented in Table 2. Impoundments B and D received hazardous waste after November 19, 1980. As such, they are subject to RCRA closure standards and are addressed in this plan as part of the Area L Landfill. Impoundment C is part of MDA L (SWMU 54-006) and is subject to corrective action under the Consent Order. The impoundments were backfilled and the ground surface was covered with asphalt upon concurrence with the New Mexico Environmental Improvement Division in 1988. A container storage dome (TA-54-215) was placed over a portion of the asphalt pad above the impoundments in 1995.

Impoundment B was excavated in 1978. It is approximately 60 ft long, 18 ft wide, and 10 ft deep. Impoundment B was used from January 1979 through June 1985 to evaporate treated salt solutions (e.g., ammonium bifluoride) and electroplating wastes (e.g., chromium wastes). The treated aqueous waste was discharged into the impoundment where it pooled until evaporated. The impoundment capacity was

calculated to be approximately 7,560-cubic-ft filled to within 3 ft of the surface. Impoundment B was backfilled with a clean fill cover after use and later covered with asphalt.

Impoundment D was used to treat small batch quantities of lithium hydride by reaction with water. The neutralized liquid from this treatment was then allowed to evaporate. This practice began in 1972 and was discontinued in 1984 for safety reasons. The approximately 75-ft-long, 18-ft-wide, 10-ft-deep impoundment was not used for disposal of any other hazardous wastes. The impoundment capacity was calculated to be approximately 9,450-cubic-ft filled to within 3 ft of the surface. (LANL, 1992a).

Impoundment D was back-filled with tuff after treatment of lithium hydride was discontinued. A rectangular 5,650-gallon steel waste-oil storage tank was placed above the impoundment (LANL, 1992a) and a secondary containment structure built. A 5,086-gallon waste-oil tanker truck was parked at the surface adjacent to and just west of Impoundment D, and four 771-gallon fiberglass waste-oil storage tanks were stored at the surface adjacent to and just east of the impoundment. When the waste-oil storage tanks were closed, it was decided that closure would not include removal of any associated contaminated soil; rather, the soil would be addressed during closure and corrective actions at Area L. Prior to backfilling the area with clean fill, a plastic liner was placed on the ground where the tanks were located. Closure of the tanks was completed by removal in 1990, and a closure report was submitted to the NMED in 1992 (LANL, 1992b).

3.3 Other Disposal Units at Area L

Other closely located disposal units at Area L became inactive prior to November 19, 1980, or did not receive hazardous waste after that date. They are therefore subject to corrective action under the Consent Order rather than the closure requirements in this closure plan. They are currently included as part of SWMU 54-006 and are under investigation by LANL's corrective action program. They are collectively described as MDA L. The most recent description and project status for characterization and remediation of the site are included in Section 3.4 below.

The remaining 12 shafts at Area L (Shafts 2-12 and 18) are similar in location, construction, and contents as those described for closure in this plan. These shafts are located in the eastern shaft field (Figure 3).

Impoundment C is located between Impoundment B and D. This impoundment is 35 ft long and 12 ft wide with a depth of 10 ft. The impoundment was used for the same evaporation function as Impoundment B. It had a capacity of approximately 2940 cubic ft assuming it was filled to within 3 ft of the surface before being backfilled after use. Impoundment C was described as closed prior to 1980 in documents dating from the late 1980s (LANL, 1988). In a subsequent corrective action document,

Impoundment C was described as operating from July 1985 through December 1986 (LANL, 1992a). Further investigation of LANL records cited for these dates could not substantiate this operating period and the earlier descriptions have been determined to be correct. Logbooks of waste management activities in the time frame indicate that Impoundment C was closed in July 1978. The impoundment is included in SWMU No. 54-006 and is subject to corrective action.

Pit A is located in the eastern portion of Area L. This unlined pit was used for disposal of chemical waste from the late 1950s until 1978. The pit is 200 ft long and 12 ft wide with a depth of 12 ft. Pit A was filled with waste to within approximately 3 ft of the surface and then covered with crushed tuff. It is currently included for characterization as part of SWMU 54-006.

3.4 Environmental Remediation Project Activities at Area L

Several previous investigations have taken place at MDA L. Since 1982, channel sediments have been collected from permanent stations in the main drainages surrounding TA-54 to monitor the potential transport of radionuclides and chemical constituents by storm water runoff. No inorganic chemicals were detected but the pesticide methoxychlor was detected at low concentrations in two samples. In 1985 NMED issued a compliance order to LANL that required quarterly pore-gas monitoring at Area L because early disposal practices at Area L resulted in a subsurface volatile organic vapor plume that extends beneath the facility and beyond its boundary. Nine boreholes were drilled between 1985 and 1988 in response to the order to monitor the subsurface plume. Analytical data from the pore-gas monitoring shows that 1,1,1-trichloroethane (TCA), a volatile organic compound (VOC) is the primary plume constituent. Other compounds detected include trichloroethene (TCE), tetrachloroethene (PCE), and Freon-113. The vapor was determined to be present to at least 200 feet below the mesa surface, and concentrations vary across the plume. In 1986, additional boreholes were drilled to measure air permeability in the tuff. The data were used to evaluate the nature and extent and the fate and transport of subsurface contamination at MDA L. Periodic pore-gas sampling of the vapor phase VOC plume at MDA L is ongoing; sampling results are submitted to NMED.

The LANL Environmental Remediation (ER) Project conducted RCRA Facility Investigation (RFI) fieldwork at MDA L from 1993 to 2001 to characterize the nature and extent of any releases. Evaluation of the site characterization data has determined that the known sources of environmental contamination at MDA L include tritium and the VOC vapor releases from the subsurface units. In addition, it was determined that metals present in liquid wastes were released into the tuff below these subsurface units. The results of subsurface sample analyses detected a number of organic and inorganic chemicals beneath the former disposal units. All the chemical concentrations beneath the disposal units were detected at trace levels. Subsurface samples collected to evaluate moisture properties did not identify any perched groundwater zones to a depth of 660 ft. beneath MDA L.

The most recent borehole sampling was undertaken in 2004 through 2005 as a result of the NMED approved work plan for MDA L by the LANL corrective action program under the Consent Order. As reported in the March 2006 Investigation Report for Area L (LANL, 2006a), seven shallow boreholes and one deep borehole were drilled at MDA L to collect rock and pore-gas samples. These samples confirm that the VOC plume is in a near steady condition in terms of areal extent, contaminant concentrations, and composition.

Site characterization activities were completed in 2005 and an Investigation Report was submitted to NMED in March 2006 (LANL, 2006a). The results of the human health and ecological assessment have determined that MDA L currently poses no unacceptable risk to human health and the environment. In August 2006, NMED issued a Notice of Disapproval for the Investigation Report requiring LANL to drill 3 additional boreholes to monitor vapor-phase VOCs in deeper geologic units and to collect waste characterization samples from Impoundments B, C, and D. The results of the supplemental investigation will be reported to NMED in May 2007.

A soil vapor extraction pilot study was conducted in 2006 to evaluate extraction rates in support of the Corrective Measures Evaluation under the Consent Order. The pilot study demonstrated that soil vapor extraction was an effective remedy for VOC plume remediation.

4 CLOSURE SCHEDULE

The TA-54 Area L Landfill will close on a schedule that supports the schedule for completion of corrective action under the Consent Order. The Consent Order currently requires completion of remediation of MDA L by 2011. The RCRA waste disposal units described in this closure plan need to be closed prior to or during the remediation activities necessary to meet that deadline. The completion of closure for these units is therefore currently anticipated for 2011. Final closure activity for the entire LANL facility is estimated not to occur before the year 2100. The closure schedule given in Table 3 of this closure plan reflects this coordination of activities with the corrective action process for the Consent Order (see Section 5.7.1).

Written notification will be provided to the NMED 60 days before the start of closure activities for the Area L Landfill. However, pursuant to 20.4.1 NMAC, incorporating 40 CFR §265.112(e), removing hazardous waste and decontaminating or dismantling equipment in accordance with an approved closure plan may be conducted at any time before or after notification of closure. Closure activities will begin in accordance with 20.4.1 NMAC incorporating 40 CFR §265.112(d). Because closure of the Area L Landfill units must be preceded by closure of the Area L surface storage units, the start of closure of the landfill units will be tied to the schedule for closure of the storage units. Treatment, removal, or disposal of hazardous waste will begin in accordance with the approved closure plan, as required by 20.4.1 NMAC incorporating 40

CFR §265.113(a), within 90 days after approval of the closure plan. In the event that closure activities cannot begin within 90 days of approval, LANL will notify the Secretary of the NMED in accordance with the extension requirements in 20.4.1 NMAC incorporating 40 CFR §265.113(a).

In the event that closure of the Area L Landfill units cannot proceed according to schedule, LANL will notify the Secretary of the NMED in accordance with 20.4.1 NMAC incorporating §265.113(b). In addition, the demonstrations in 20.4.1 NMAC incorporating 40 CFR §265.113(a)(1) and (b)(1), will be made in accordance with 20.4.1 NMAC incorporating §265.113(c).

5 CLOSURE PROCEDURES

Closure activities at the TA-54 Area L Landfill may include the removal of hazardous wastes from Impoundments B and D subject to coordination with the LANL corrective action program; closure of all disposal units in place as landfills; proper management and disposition of hazardous waste residues, contaminated equipment, and contaminated structures associated with the closure of the landfill; and verification that the closure performance standards have been achieved. The following sections describe the closure procedures applicable to the Area L Landfill closure activities.

Closure of Impoundments B and D may occur either through the removal of hazardous waste and hazardous waste residuals (i.e., clean closure) or by closure in place. Sampling and analysis procedures for the units are currently scheduled to be completed and reported to NMED by May 31, 2007, as required by communications between LANL and the New Mexico Environment Department (NMED, 2006b). Depending upon the results of these analyses, it may be determined that removal of the waste contents of the impoundments is the preferred closure option. Therefore, this closure plan contains a discussion of related closure procedures. If this option is not determined to be necessary, the impoundments will be closed in place as landfills. The disposal shaft units at Area L will be closed in place as landfills.

As discussed in Section 5.7.1, closure activities will be coordinated with activities associated with remediation of the disposal units at Area L regulated under the Consent Order (i.e. MDA L). At the time of development of this closure plan, the LANL Corrective Action Program has submitted a Corrective Measures Evaluation Plan (LANL, 2006b) that described the technical approach to be used to develop the Corrective Measures Evaluation Report for MDA L. The CME Report is scheduled for submittal to the NMED by July 31, 2007. The CME Report will identify and evaluate corrective measure alternatives that address potential unacceptable future risks and recommend one or more alternatives for implementation. The Corrective Measures Evaluation Report will recommend a final remedy for MDA L; however, NMED will select the final remedy.

5.1 Records

Until closure is complete and has been certified in accordance with 20.4.1 NMAC incorporating 40 CFR §265.115, a copy of the approved closure plan, any approved revisions, and closure activity documentation associated with the closure will be on file at the LANL Environmental Protection Division-Water Quality and RCRA Group and at the DOE Los Alamos Site Office.

5.2 Pre-Closure and Structural Assessment

Before starting closure activities, the operating records for the TA-54 Area L Landfill will be reviewed to determine any previous finding(s) or action(s) that may influence closure activities or potential sampling locations. Goals of this review will be to determine the specific hazardous waste constituents of concern; determine potential sampling locations by identifying any events or chronic conditions in the operating record that would indicate the type and location of released constituents; and differentiate equipment or other materials that will undergo decontamination from those to be recycled, reused, or managed as waste. Background samples or data derived from studies developed under the LANL Corrective Action Program or other programs will be reviewed to determine levels or concentration thresholds applicable for the purposes of closure. Any hazards associated with the work necessary for closure activities will be identified, their effect on procedures assessed, and controls developed before the closure activities begin.

5.3 New Mexico Environment Department Closure Assessment

LANL will notify the NMED Hazardous Waste Bureau (HWB) prior to the pre-closure and structural assessment of the waste management unit, described above, to provide an opportunity to participate in the unit's physical condition review. LANL may also arrange for other on-site reviews of closure activities at reasonable times upon request by NMED representatives. When the closure certification report described in Section 10 of this closure plan is submitted to NMED, LANL will arrange an on-site closure review with representatives of the HWB or equivalent NMED representatives to assess the completion of the closure activities.

5.4 Security

Because of the ongoing nature of operations at TA-54, site security at the Area L Landfill will be maintained by the DOE for as long as necessary to prohibit public access. The security fence at TA-54 will be maintained to prevent public access. Further information regarding security provisions at TA-54 is available in Section G.1.2, "Security and Access Control," in the "Los Alamos National Laboratory Technical Area 54 Part B Permit Renewal Application, " Revision 3.0 (LANL, 2003b).

5.5 Safety Precautions

In accordance with LANL safety procedures, job hazards associated with closure activities will be identified, controls developed, and workers briefed before closure activities are conducted. Personnel involved in closure activities will wear appropriate personal protective equipment (PPE) specified by LANL

industrial hygiene and health physics procedures and will follow good hygiene practices to protect themselves from exposure to hazardous waste. The level of PPE required will depend upon the physical hazards present and the levels of radiological and/or chemical contamination detected, if any. Contaminated PPE will be decontaminated or managed in accordance with appropriate waste management regulations.

All workers involved in closure activities will be required to have appropriate training as required by site-specific work procedures. Workers who will manage hazardous waste or hazardous waste constituents during closure activities will follow the training requirements in the LANL RCRA Training Plan of the LANL Hazardous Waste Facility Permit.

5.6 Removal of Waste from Area L Landfill Units

The closure of Impoundments B and D may involve the removal of hazardous waste as determined by sampling and analysis required by the New Mexico Environment Department through interactions with the LANL corrective action program. On January 5, 2006, the Hazardous Waste Bureau responded to the Investigation Report for Material Disposal Area L of September 2005 and required that supplemental sampling be included for the characterization of the impoundments. The stated reason for the additional sampling was to obtain any additional information needed to develop a closure plan for the interim status surface impoundments (NMED, 2006a).

5.6.1 Impoundment Waste Characterization Procedures

As revised by the Approval with Modifications for the Supplemental Investigation Work Plan for Sampling at Material Disposal Area L of November 13, 2006 (NMED, 2006c), the sampling plan agreed upon for Impoundments B and D consisted of the development of a set of randomized locations for boreholes and core sampling of sludge or sediment in the impoundments. Boreholes will be drilled by the direct-push method to permit sampling of undisturbed core from the impoundments and into the Bandelier Tuff. Samples will be field screened by visual examination, radionuclide screening, and VOC vapor screening. Vapor screening will be conducted using a photo-ionization detector equipped with an 11.7 eV lamp. Core samples will be analyzed for VOCs, RCRA metals (totals and toxicity characteristic leachate procedure [TCLP]), nickel, hexavalent chromium, and cyanide. Samples collected from within Impoundment D will also be analyzed for lithium, semi-volatile organic compounds (SVOC), and total petroleum hydrocarbons-diesel range organics (TPH-DRO). Sample collection methods, analytical methods and quality assurance procedures will be conducted in accordance with the Consent Order. Further details regarding these procedures as included in the approval are available in Appendix B of this closure plan. Table 4 of this closure plan summarizes the potential analytical requirements for these samples.

5.6.2 Procedures for Removal of Waste

It may be determined that waste removal is necessary based upon the characterization of the impoundments described in Section 5.6.1, or upon any further characterization or decision process associated with the Consent Order. In that event, the following procedures will be followed to meet the requirement.

Two project activities will occur prior to excavation of the waste in the impoundments. These involve establishing a staging area for segregation and management of the excavated materialsand removing any asphalt overlying the impoundments.

A staging area will be set up in the vicinity in Area L for the management of the waste material removed during the closure. Material will be placed in containers at this staging area, inspected, segregated, and packaged for subsequent disposition. The staging area will include a protective layer to prevent contamination of the underlying asphalt or soil unless it is determined that this level of protection is not necessary based upon the results of the pre-closure assessment described in Section 5.2 of this closure plan and/or as a result of the supplemental 2007 borehole characterization sampling. The layer will consist of an 80-mil high density polyethylene (HDPE) liner or equivalent containment. An additional layer of plywood or steel may be included above the liner material if the removed waste contains materials that would cause damage to the liner. Run-on and run-off will be controlled through the use of raised berms at the sides of the containment layer.

The asphalt layer above the impoundments may have been partially or completely removed during the closure of the surface container storage unit above the site (Dome 215) and/or the solidified hazardous waste storage unit within Area L (LANL Hazardous Waste Facility Permit, Permit Attachment E.9). Any remaining asphalt and soil above the impoundments will be removed and segregated separately from the waste material in the impoundments. The asphalt and soil will be characterized for reuse or waste disposal using LANL waste characterization procedures in compliance with 20.4.1 NMAC regulations.

Following the removal of any covering, the waste sludge and residues contained within the surface impoundments will be removed by soil collection and handling equipment. This may include powered equipment such as back-hoes or excavators with the potential for using manual methods such as shovels and wheelbarrows as necessary. If necessary, the waste will be loaded into containers such as roll-off bins to be moved to the staging area. Waste material will be excavated initially to the known boundaries of the impoundments or the visible interface with the tuff. Sampling of the undisturbed soil may be used to verify that waste residuals are no longer present at the site. Determination of the soil analytes used to

make this demonstration will be based upon the results of the characterization discussed in Section 5.6.1 of this closure plan. Verification of waste removal will be determined by applying the verification criteria discussed in Section 5.8.3 of this closure plan if deemed necessary through the review of the impoundment characterization data. Sampling will occur pursuant to the procedures contained in Section 6 of this closure plan.

In the event that further analytical or visual evidence is found of waste residual migration beyond the boundaries of the surface impoundment, the site will be reassessed for further excavation or closure as a landfill. Criteria for this determination will include a review of the available data indicating the extent of contamination, the appropriateness of the threshold values being used to determine contamination for the site, coordination with site remediation activities associated with the corrective action program, and the potential for complication of the Consent Order deadlines.

Surface water run-on will be controlled during the waste removal from these impoundments. Raised soil berms will be created around the units to divert water away from the excavation. Areas where excavations are in progress will be covered during any storm events with tarps, plastic, or other coverings to minimize rain water entering the exposed areas.

5.6.3 Equipment Disposition

Reusable protective clothing, tools, and equipment used during waste removal activities will be cleaned with a wash water solution or by dry decontamination methods such as wiping. Residue, disposable equipment, and reusable equipment that cannot be decontaminated will be containerized and managed as waste in accordance with LANL waste management procedures, depending on the regulated constituents present.

5.6.4 Wastes Managed

Wastes that may be generated during the removal of the contents of Impoundments B and D include any asphalt or fill removed from above the impoundments, the waste material removed from the impoundments, tuff beneath the impoundments, sampling wastes, and contaminated equipment or PPE used during the procedure. The list of potential wastes and disposition options is included in Table 7 of this closure plan.

5.7 Closure In Place

If closure by removal of hazardous waste and hazardous waste residuals is not determined to be necessary, the impoundments will be closed and post-closure care provided as landfills. Closure of the shafts units at the Area L Landfill will also involve closure as landfills. As discussed in Section 2.1 of this

closure plan, closure as a landfill requires the use of a final cover for the units. This requirement will be coordinated with the remediation options and activities conducted under the Consent Order. LANL proposes that if the closure option for a cover is chosen, the closure will include installation of an evapotranspiration (ET) cover or covers for all the shafts and impoundments at Area L. Soil vapor extraction may also be part of the final remedy, if selected by NMED.

Because of the generally arid environment of the site, MDA L is considered a prime candidate for a site specific RCRA alternative cover (e.g., ET cover). ET cover systems use one or more vegetated soil layers to retain water until it is either transpired through vegetation or evaporated from the soil surface and can be appropriate for use in arid and semi-arid areas. A schematic of an ET cover is presented in Figure 5. The vegetated ET cover proposed was developed based upon early research into this concept at a test site near TA-54. The cover will be designed to capture sufficient moisture to prevent the percolation of liquids into and through the waste material below. By their nature, ET covers may not have a permeability less than or equal to that of the natural surrounding materials but their function is designed to achieve equivalent performance. The cover will function with minimum maintenance, promote drainage, and minimize erosion or abrasion of the cover in accordance with 20.4.1 NMAC § 265.310(a). In addition, the cover will provide run-on and runoff control, pursuant to 20.4.1 NMAC § 265.112(b)(5). Any cover installed as part of a corrective action must meet the corrective action objective and clean up goals of the Consent Order. These include assuring long-term protection of human health and the environment, achieving a lifetime excess cancer risk of 10^{-5} or less, and a hazard index for noncarcinogenic contaminants of 1 or less.

The following measures will be taken to establish the ET cover although final design details are subject to change as additional information becomes available through the corrective action design process and the Consent Order. As currently planned, a nominal 3 ft of clean crushed tuff will be placed over the disposal units in the Area L Landfill (for proposed boundary, see Figure 4). The tuff layer will be applied in lifts and compacted. Additional layers of material may be added to the cover for drainage or biotic barriers as determined appropriate for the site conditions and decided upon during the corrective action design review process. Topsoil will be placed to a depth of between 6 and 8 inches and a gravel layer may be placed over the topsoil. The surface of the cover will be seeded with a native mix, including grasses and forbes. Fertilizer will be used on the seeded area to eliminate deficiencies in topsoil, and the seeded area will be stabilized. A temporary watering system will be provided and maintained until adequate vegetative growth has been established. Storm water run-on and runoff controls will be installed as part of the cover. The controls will be designed to reduce storm water run-on to the cover. Controls will also be designed to convey storm water run-off away from the area and towards the storm water monitoring station(s) operating at Area L. The cover will help to stabilize the wastes in the pit and will provide long-term minimization of precipitation infiltration.

5.7.1 Relationship with Consent Order

The LANL Consent Order requires corrective action program activities for SWMUs and Areas of Concern at Area L based upon the known release of contaminants from past waste disposal activities. The Consent Order further requires that a Corrective Measures Evaluation Report for MDA L be submitted to the NMED by July 2007. The purposes of the CME Report are to identify and evaluate corrective measure alternatives that address potential unacceptable future risks, and to recommend one or more of these alternatives for implementation. The procedures described in this closure plan may be impacted by the results of the NMED and public review of the CME Report and the final corrective action alternative chosen for remediation of MDA L. This corrective action decision process may affect the technical requirements for closure of the Area L Landfill units although the administrative process for closure will be retained under the requirements of 20.4.1 NMAC incorporating 40 CFR Part 265, Subpart G or, potentially, in the LANL Hazardous Waste Facility Permit.

The CME Plan for MDA L (LANL, 2006b), describes the integrated closure approach for Area L. This includes both the possibility that all the affected units will be subject to the same chosen alternatives or that the closure activities would need to be integrated between closure and corrective action if the units are not closed to the same alternative. The CME options to be considered for the corrective action units include 1) removal of the buried waste inventory through excavation and off-site disposal, 2) containment of the waste inventory by an engineered cover, 3) in-situ stabilization, 4) treatment of the subsurface vapor plumes by SVE, or 5) some combination of these options.

This procedures in this closure plan for the disposal units in the Area L Landfill generally represent those considered most likely based upon the information obtained to this point. As described above, these fit within Alternative 2 and potentially Alternatives 1, 4, and 5.

As described above, the final technical details for characterization and corrective action at MDA L are subject to review and approval through the Consent Order process, which has not been completed at this point. Therefore, future changes to this closure plan may become necessary in order to maintain the coordination of the closure and corrective action plans for these units. If the incorporation of necessary changes becomes difficult in terms of the schedules required for technical review or for the Consent Order deadlines including timeframes needed for review and approval by the NMED, LANL may propose using the option of alternative closure or post-closure requirements under an enforceable document as contained by 20.4.1 NMAC $265.110(d). This option would be allowable if the appropriate conditions for the option are determined to be met. These include the use of the Consent Order as an enforceable document, the proximity of units regulated by corrective action, the presence of a release, and the

likelihood that both types of units have contributed to the release. If this option is utilized, all outstanding closure or post-closure care requirements will revert to the appropriate permit document upon termination of the Consent Order.

5.8 General Decontamination Procedures

To the extent necessary, all contaminated equipment and structures present at closure will be decontaminated. Discarded materials and equipment that cannot or will not be decontaminated will be managed as waste or otherwise dispositioned in compliance with applicable regulations. The necessity for decontamination will be reviewed as part of the pre-closure assessment for these units.

If decontamination is necessary, all sampling during closure and decontamination will be conducted in accordance with quality assurance (QA)/quality control (QC) procedures defined by the latest revision of "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (SW-846) (EPA, 1986) or other approved methods. Monitoring for contamination will occur throughout closure activities, as appropriate.

5.8.1 Equipment Used During Closure

Reusable protective clothing, tools, and equipment used during decontamination activities will be cleaned with a wash water solution. Residue, disposable equipment, and reusable equipment that cannot be decontaminated will be containerized and managed as waste in accordance with LANL waste management procedures, depending on the regulated constituents present.

5.8.2 Verification of Decontamination

LANL proposes analysis of water and/or wipe samples for equipment decontamination verification for closure at the Area L Landfill. Wipe samples may be used where the surfaces of the equipment, the analytical constituents, and any analytical constraints are appropriate. In cases where wipe sampling is not appropriate or feasible, verification will be confirmed by sampling and analyzing the collected verification solutions. Decontamination verification will use the following methods:

- When liquid sampling, the verification solution will be limited to an amount that is sufficient to wipe down the surface to be verified and collect the required number of samples. This will minimize dilution of hazardous constituents present at the location.
- For wipe sampling, guidance from the analytical laboratory must be obtained prior to wipe verification sampling to confirm that the solution chosen for each analysis is appropriate for the analysis to be conducted.
- Decontamination will be verified by comparing the discrete analytical results for liquid sampling to a baseline result (blank) obtained from the verification solution prior to its use for the verification

wipe down. Comparison of wipe sample analytical results to an unused wipe media sample (blank) will be used to determine the presence or absence of contamination.

- If the result is at or below that of the blank, decontamination is verified for the discrete area sampled.
- If the result is above the blank, decontamination and verification will be repeated for the discrete location or decontamination will be verified as described in Section 5.8.3.

These proposed methods minimize dilution and establish criteria by which successful decontamination is verified. Analytical procedures will conform to the procedures found in Section 7.

If analysis of the decontamination verification water or wipes indicates that hazardous constituents are present and the verification criteria described below cannot be met, decontamination and sampling will continue until the equipment has been decontaminated, the decision is made to proceed with an alternative demonstration of decontamination, or the decision is made to manage the equipment as contaminated waste.

5.8.3 Verification Criteria

Successful decontamination of waste residues will meet a minimum of one of the following criteria:

- No detectable RCRA-regulated constituent residues from the management of stored authorized RCRA-regulated waste are identified in samples collected during closure activities.

- Analytical results of samples collected during decontamination verification activities identify no statistically significant concentrations of RCRA-regulated constituents above baseline/background data.

- Detectable concentrations of RCRA-regulated constituents in samples collected during verification activities are at or below levels agreed upon with the NMED to be protective of human health and the environment, based on the results of risk assessment methods.

- Detectable concentrations of RCRA-regulated constituents that cannot be removed or decontaminated to acceptable levels, as described above, will be allowed to remain, provided that these RCRA-regulated constituents do not pose an unacceptable risk when combined with technical or administrative control measures agreed upon with the NMED.

In the event that the above verification criteria cannot be met, an alternative demonstration of decontamination may be proposed and justified to NMED at the time of unit closure. The Secretary may

review the proposed alternative in accordance with the standards and guidance then in effect. If approved, any changes in the verification criteria implemented will be reported as a variance in the closure certification report described in Section 10 of this closure plan.

5.8.4 Decontamination Waste Management

After any decontamination wash down process needed for the closing unit, used wash water will be collected, transferred to containers, sampled, and analyzed for the hazardous constituents likely to be present. Results of this analysis will determine if the used wash water should be managed as hazardous or non-hazardous wastewater. The wastewater, PPE, and any other waste generated as a result of closure will be managed as indicated in Table 7.

6 SAMPLE MANAGEMENT PROCEDURES

The following information presents general sample management and sampling equipment cleaning procedures for closure of the waste management units described in this closure plan. In the event that discrepancies exist or develop between these procedures and those instituted for corrective action program activities under the Consent Order, sample management procedures will be implemented to meet the conditions of the Consent Order.

Samples will be collected and transported using documented chain-of-custody and sample management procedures to ensure the integrity of the sample and provide an accurate and defensible written record of the possession and handling of a sample from the time of collection through laboratory analysis. Sample collection equipment will include coolers, EPA-certified clean containers, preservatives, labels, chain-of-custody forms, and custody seals. The following provides a description of sample documentation; sample handling, preservation, and storage; and sample packaging and transportation requirements that will be followed during the sampling activities associated with the closure.

6.1 Sample Documentation

Sampling personnel will complete and maintain records to document sampling and analysis activities. Sample documentation will include sample identification numbers, chain-of-custody forms, analyses requested, sample logbooks detailing sample collection activities, and shipping forms (if necessary).

6.1.1 Chain-of-Custody

Chain-of-custody forms will be maintained by sampling personnel until the samples are relinquished to the analytical laboratory. One chain-of-custody form may be used to document all of the samples

collected from a single sampling event. The sample collector will be responsible for the integrity of the samples collected until properly transferred to another person.

The EPA considers a sample to be in a person's custody if it is:

- In a person's physical possession,
- In view of the person in possession, or
- Secured by that person in a restricted access area to prevent tampering.

The sample collector will document all pertinent sample collection data. Individuals relinquishing or receiving custody of the samples will sign, date, and note the time on the analysis request/chain-of-custody form. A chain-of-custody form must accompany all samples from collection through laboratory analysis. The completed original chain-of-custody form will be returned by the analytical laboratory and will become a part of the permanent record documenting the sampling effort.

6.1.2 Sample Labels and Custody Seals

A sample label will be affixed to each sample container. The sample label will include the following information:

- A unique sample identification number;
- Name of the sample collector;
- Date and time of collection;
- Type of preservatives used, if any; and
- Location from which the sample was collected.

A custody seal will be placed on each sample container to detect unauthorized tampering with the samples. These labels must be initialed, dated, and affixed by the sample collector in such a manner that the seal must be broken to open the container.

6.1.3 Sample Logbook

All pertinent information on the sampling effort must be recorded in a bound logbook. Information must be recorded in ink and any cross-outs must be made with a single line and the change initialed and dated by the author. The sample logbook will include the following information:

- The sample location,
- Suspected composition,

- Sample identification number,
- Volume/mass of sample taken,
- Purpose of sampling,
- Description of sample point and sampling methodology,
- Date and time of collection,
- Name of the sample collector,
- Sample destination and how it will be transported,
- Observations, and
- Signatures of personnel responsible for the observations.

6.2 Sample Handling, Preservation, and Storage

Samples will be collected and containerized in appropriate pre-cleaned sample containers. Table 4 presents the requirements specified in SW-846 (EPA, 1986) for sample containers, preservation techniques, and holding times. Samples that require cooling to 4 degrees Celsius will be placed in a cooler with ice or ice gel or in a refrigerator immediately upon collection.

6.3 Packaging and Transportation of Samples

All packaging and transportation activities will meet safety expectations, QA requirements, DOE Orders, and relevant local, state, and federal laws (including 10 CFR and 49 CFR). Appropriate LANL documents establish these requirements for packaging design, testing, acquisition, acceptance, use, maintenance, and decommissioning and for on-site, intra-site, and off-site shipment preparation and transportation of general commodities, hazardous materials, substances, waste, and defense program materials.

Off-site transportation of samples will occur via private, contract, or common motor carrier; air carrier; or freight. All off-site transportation will be processed through the LANL Packaging and Transportation (P&T) Organization, unless the shipper is specifically authorized through formal documentation by the P&T Organization to independently tender shipments to common motor or air carriers.

6.4 Sample Collection Procedures

Samples will be collected in accordance with the most recent and appropriate LANL sampling plan incorporating guidance from the EPA (EPA, 2002) and DOE (DOE, 1995), or other approved procedures.

6.4.1 Liquid Sampling

For verification sampling of decontaminated equipment, each discrete sample location will be wiped down with clean water. A mop, cloth, and/or other absorbent material will be submerged into the container and squeezed out prior to wiping down the discrete surface to be verified. Excess solution will collect in a

bermed area if necessary. To minimize dilution of the samples, the wipe down solution will be limited to a quantity sufficient to collect the appropriate number of samples. Liquid sampling will be conducted using glass or plastic tubes, a composite liquid waste sampler, a bacon bomb, a bailer, or by pouring liquid into sample containers.

6.4.2 Solids (Wipe) Sampling

In some cases, equipment may need to be decontaminated prior to removal from the site and is not amenable to liquid wash down due to its size or composition. This equipment may include items such as monitoring equipment. In such cases, surface wipe samples may be used to determine whether hazardous waste constituents are present.

Surface wipe samples will be taken in accordance with the National Institute of Occupational Safety and Health (NIOSH) *Manual of Analytical Methods*, Method 9100 (NIIOSH, 1994), or other approved methodology. The appropriate use of wipe sample methods will consider the type of surface being sampled, the type of contaminant, the solution used, and the desired contaminant concentration detection limits. The NIOSH method includes wiping a 100 square centimeter area at each discrete location with a gauze wipe wetted with a liquid solution appropriate for the desired analysis (e.g., deionized water for lead). The solution used depends on the analysis; therefore, the analytical laboratory will be consulted prior to sampling activities to ensure that the correct solution is employed for each analysis and that wipe sampling is a proper technique for the specific analysis.

6.4.3 Soil Sampling

Surface or shallow subsurface soil samples will be collected using stainless steel scoops or hand augers. Samples for VOC analysis will be collected using disposable En Core® samplers or equivalent. Surface soil samples will be collected at each sample location in accordance with the most recent and appropriate LANL sampling plan, incorporating SW-846 or other approved methods.

6.4.4 Core Sampling

As included in the November 13, 2006 Approval with Modifications for the Supplemental Investigation Work Plan for Area L, sample boring for Impoundments B and D will use the direct push method. Sampling using this method will be consistent with Section IX.B.2.b.i “Drilling” of the Consent Order.

6.4.5 Cleaning of Sampling Equipment

Reusable sampling equipment will be cleaned and rinsed prior to use. Sampling equipment rinsate blanks will be collected and analyzed only if reusable sampling equipment is used. Reusable decontamination equipment, including protective clothing and tools, used during closure activities will be

scraped or wiped as necessary to remove residue and cleaned with a wash water solution or dry decontamination methods. Sampling equipment will be cleaned prior to each use with a wash solution, rinsed several times with tap water, and air-dried or wiped dry to prevent cross contamination of samples. A disposable sampler is considered clean if still in a factory-sealed wrapper. Residue, disposable decontamination equipment, and reusable decontamination equipment that cannot be decontaminated will be containerized and managed appropriately at an approved on-site facility.

7 ANALYSIS REQUIREMENTS

The following information presents general analysis procedures shared in common for closure of the waste management units described in this closure plan. In the event that discrepancies exist or develop between these procedures and those instituted for corrective action program activities under the Consent Order, analytical procedures will be implemented to meet the conditions of the Consent Order.

7.1 Analytical Laboratory Requirements

The analytical laboratory will perform the detailed qualitative and quantitative chemical analyses specified in this closure plan. The qualifications for the analytical laboratory will include:

- A documented comprehensive QA and QC program,
- Technical analytical expertise,
- A document control/records management plan, and
- The capability to perform data reduction, validation, and reporting.

The selection of the analytical testing methods identified in Table 4 is based on the following considerations:

- The physical form of the waste,
- Constituents of interest,
- Required detection limits (e.g., regulatory thresholds), and
- Information requirements (e.g., waste classification).

7.2 Quality Assurance/Quality Control

Field sampling procedures and laboratory analyses will be evaluated through the use of QA/QC samples to assess the overall quality of the data produced. QC samples used to evaluate precision, accuracy, and potential sample contamination associated with the sampling/analysis process are described in the following sections, along with information on calculations necessary to evaluate the QC results. These QA/QC samples will be collected in accordance with the most recent and appropriate LANL sampling plan incorporating guidance from the EPA (EPA, 2002) and DOE (DOE, 1995), or other approved procedures.

Analysis will be conducted in accordance with procedures given in SW-846 (EPA, 1986), or other approved procedures or methods.

7.2.1 Field Quality Control

The field QC samples that may be collected include trip blanks, field blanks, field duplicates, and equipment rinsate blanks. Table 6 summarizes QC sample types, applicable analyses, frequency, and acceptance criteria. QC samples will be given a unique sample identification number and submitted to the analytical laboratory as blind samples. QC samples will be identified on the applicable forms so that the results can be applied to the associated sample.

7.2.2 Analytical Laboratory QC Samples

QA/QC considerations are an integral part of analytical laboratory operations. Laboratory QA ensures that analytical methods generate data that are technically sound, statistically valid, and that can be documented. Individual QC procedures measure the degree to which these QA objectives are met.

7.3 Data Reduction, Verification, Validation, and Reporting

Analytical data generated by the activities described in this closure plan will be verified and validated. Data reduction involves the conversion of raw data to reportable units; transfer of data between recording media; and computation of summary statistics, standard errors, confidence intervals, and statistical tests.

7.4 Data Reporting Requirements

Analytical results will include all pertinent information about the condition and appearance of the sample-as-received. Analytical reports will include:

- A summary of analytical results for each sample;
- Results from QC samples such as blanks, spikes, and calibrations;
- Reference to standard methods or a detailed description of analytical procedures; and
- Raw data printouts for comparison with summaries.

The laboratory will describe off-normal sample preparations that occur during the analysis in sufficient detail so that the data user can understand how the sample was analyzed.

8 AMENDMENT OF THE CLOSURE PLAN

In accordance with 20.4.1 NMAC incorporating 40 CFR §265.112(c), LANL will submit a written change in the approved closure plan whenever:

- There are changes in operating plans or facility design that affect the closure plan, or
- There is a change in the expected date of closure, or

- Unexpected events occur during closure that require modification of the approved closure plan.

LANL will submit a written request for a permit modification with a copy of the amended closure plan at least 60 days prior to the proposed change in unit design or operation or no later than 60 days after an occurrence of an unexpected event that affects the closure plan. If the unexpected event occurs during closure, the permit modification will be requested within 30 days of the occurrence. The Secretary of the NMED may request a modification of the closure plan under the conditions presented in the bulleted items above. LANL will submit the modified plan in accordance with the request within 60 days of notification, or within 30 days of notification if a change in facility condition occurs during the closure process.

9 CLOSURE COST ESTIMATE, FINANCIAL ASSURANCE, AND LIABILITY REQUIREMENTS

In accordance with 20.4.1 NMAC incorporating 40 CFR §265.140(c), LANL, as a federal facility, is exempt from the requirements of 20.4.1 NMAC incorporating 40 CFR Part 265, Subpart H, to provide a cost estimate, financial assurance mechanisms, and liability insurance for closure actions.

10 CLOSURE CERTIFICATION REPORT

Upon completion of the closure activities at the Area L Landfill, a closure certification report will be prepared and submitted to the Secretary of the NMED. The report will document the closure and contain the following:

- A copy of the certification described in Section 2.2 of this closure plan.
- Any significant variance from the approved activities and the reason for the variance.
- A description of cover construction activities including as-built details and engineering QA sampling results.
- A description of any additional design or closure process activities added to the project through the Consent Order.
- A summary of all sampling results, showing:
  - -Sample identification
  - -Sampling location
  - -Datum reported
  - -Detection limit for each datum
  - -A measure of analytical precision (e.g., uncertainty, range, variance)
  - -Identification of analytical procedure
  - -Identification of analytical laboratory.
- A QA/QC statement on analytical data validation and decontamination verification.
- The location of the file of supporting documentation, including:

-Field logbooks

-Laboratory sample analysis reports

-QA/QC documentation

-Chain-of-custody forms.

- Storage or disposal location of regulated hazardous waste resulting from closure activities.
- A certification of accuracy of the report.

11 GENERAL POST-CLOSURE INFORMATION

Area L units closed as regulated unit landfills will be subject to the requirements of 20.4.1 NMAC incorporating 40 CFR Part 265, Subpart G and 40 CFR § 265.310, as applicable.

11.1 Post-Closure Performance Standard

Post-closure of the Area L Landfill will meet the following performance standards:

- Provide long term minimization of migration of liquids through the closed landfill;
- Function with minimum maintenance;
- Promote drainage and minimize erosion or abrasion of the cover;
- Accommodate settling and subsidence so that the cover's integrity is maintained; and
- Have a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present unless an alternative with equivalent performance to this condition is determined to be appropriate for the final remediation option chosen for this project.

After closure, the measures by which LANL will meet the applicable 20.4.1 NMAC incorporating 40 CFR § 265.310(b) requirements (or equivalents thereof) are presented in Section 12 of this plan.

11.2 Post-Closure Care Requirements

In accordance with 20.4.1 NMAC incorporating 40 CFR §265.117(a)(1), post-closure care for the Area L Landfill will begin after completion of closure of the unit and will continue for 30 years. The Secretary of the NMED may shorten the post-closure care period at any time during the post-closure period if all disposal units at the facility are closed and it is determined that the reduced period is sufficient to protect human health and the environment, in accordance with 20.4.1 NMAC incorporating 40 CFR §265.117(a)(2)(i). Alternatively, the Secretary of the NMED may extend the post-closure care period if it is determined that the extended period is necessary to protect human health and the environment, in accordance with 20.4.1 NMAC incorporating 40 CFR §265.117(a)(2)(ii).

As required by 20.4.1 NMAC incorporating 40 CFR § 265.117(a)(1)(i and ii), post-closure care of the Area L landfill will include maintenance, monitoring, and reporting as appropriate and in accordance with the

requirements of 20.4.1 NMAC incorporating 40 CFR Subpart V, Part 264, Subpart F and 20.4.1 NMAC incorporating 40 CFR § 265.310, as described in Section 12.

11.3 Amendment of the Post-Closure Plan

In accordance with 20.4.1 NMAC incorporating 40 CFR §265.118(d)(1), LANL may submit a written notification of or request for a permit modification to authorize a change in the approved post-closure plan at any time during the active life of the facility or during the post-closure care period. In accordance with 20.4.1 NMAC incorporating 40 CFR §265.118(d)(2), LANL will submit a written notification of or request for a permit modification to authorize a change in the approved post-closure plan whenever:

- There are changes in operating plans or facility design that affect the approved post-closure plan
- There is a change in the expected year of final closure, if applicable
- Events which occur during the active life of the facility, including partial and final closures, affect the approved post-closure plan
- LANL requests the Secretary of the NMED to apply alternative requirements (e.g., if corrective action necessitates changes to the closure configuration or the post-closure care requirements) to a regulated unit under 20.4.1 NMAC incorporating 40 CFR §264.90(f) and/or §264.110(c).

The written notification or request will include a copy of the amended post-closure plan for review or approval by the NMED, in accordance with 20.4.1 NMAC incorporating 40 CFR §265.118(d). LANL will submit a written request for a plan amendment at least 60 days prior to the proposed change in unit design or operation, or no later than 60 days after an occurrence of an unexpected event that affects the post-closure plan in accordance with 20.4.1 NMAC incorporating 40 CFR 265.112(d)(3).

The Secretary of the NMED may request modifications to the plan under the conditions presented in the bulleted items above. LANL will submit the modified plan no later than 60 days after the Secretary's request. Any modifications requested by the Secretary will be approved, disapproved, or modified in accordance with the procedures in 20.4.1 NMAC incorporating 40 CFR 265.112(d)(4).

In accordance with 20.4.1 NMAC incorporating 40 CFR § 265.119(c), LANL or a subsequent owner or operator may request a modification to the approved post-closure plan to authorize the removal of hazardous wastes and hazardous waste residues or contaminated soils. If approval to conduct such removal activities is granted, the owner or operator may request that the Secretary of the NMED approve the removal of the post-closure notice filed with the County of Los Alamos, other authorized agencies, or the Secretary of the NMED. Alternatively, the owner or operator may provide an additional post-closure notice indicating the removal of the hazardous waste, with approval from the Secretary of the NMED.

11.4 Post-Closure Cost Estimate, Financial Assurance, and Liability Requirements

In accordance with 20.4.1 NMAC incorporating 40 CFR §265.140(c), LANL, as a federal facility, is exempt from the requirements of 20.4.1 NMAC incorporating 40 CFR Part 265, Subpart H to provide a cost estimate, financial assurance mechanisms, and liability insurance for post-closure actions.

11.5 Post-Closure Certification Report

Within 60 days after completion of the established post-closure care period for the Area L landfill, LANL will submit to the Secretary of the NMED, by registered mail, a certification that the post-closure care period for the unit was performed in accordance with the approved post-closure plan. The certification will be signed by the appropriate DOE and LANL officials and by an independent, registered professional engineer licensed in the State of New Mexico. Documentation supporting the engineer's certification will be furnished to the Secretary of the NMED upon request. A copy of the certification and supporting documentation will be maintained by DOE/LASO. The supporting documentation may include, for example, the following:

- Any significant variance from the approved activities and the reason for the variance
- A summary of all sampling results
- A quality assurance/quality control statement on analytical data validation
- The location of the file of supporting documentation
- Storage or disposal location of hazardous waste resulting from post-closure activities.

11.6 Security

Because of the ongoing nature of waste management operations at TA-54, security and administrative controls for the Area L landfill will be under the care of the DOE or another authorized federal agency during the post-closure care period. The security fence at TA-54 will be maintained during that period to prohibit public access into Area L.

11.7 Survey Plat and Post-Closure Requirements

A survey plat prepared in accordance with 20.4.1 NMAC incorporating 40 CFR §265.116 will be filed with the appropriate authorities at certification of closure. No later than 60 days after certification of closure of the Area L landfill, LANL will submit to the County of Los Alamos and other authorized agencies and to the Secretary of the NMED a record of the type, location, and quantity of hazardous wastes disposed of within the unit. For hazardous wastes disposed of before January 12, 1981, LANL will identify the type, location, and quantity of the hazardous wastes to the best of their knowledge and in accordance with any records that have been kept.

Post-closure care pursuant to 20.4.1 NMAC incorporating 40 CFR §265.117 through §265.120 will begin after closure of a disposal unit. Post-closure notices will be filed with appropriate authorities within 60 days of certification of closure of the first disposal unit and within 60 days of certification of closure of the last disposal unit, as described in 20.4.1 NMAC incorporating 40 CFR §265.119. To meet that requirement, DOE will file a "Land Use Restriction Notice" or equivalent document with the County of Los Alamos and other authorized agencies. The "Land Use Restriction Notice" will indicate that the land has been used to manage hazardous wastes and that its use is restricted under 20.4.1 NMAC incorporating 40 CFR Part 265, Subpart G regulations. It will also indicate that the survey plat and record of the type, location, and quantity of hazardous wastes disposed of have been filed with the County of Los Alamos and other authorized agencies and with the Secretary of the NMED. LANL will also submit a certification, signed by DOE and LANL, that they have recorded the notation specified in 20.4.1 NMAC incorporating 40 CFR §265.119(b)(1), including a copy of the document in which the notation has been placed, to the Secretary of the NMED.

Within 60 days after completion of the established post-closure care period for the unit, LANL will submit to the Secretary of the NMED, via certified mail, a certification of completion of post-closure care in accordance with the requirements of 20.4.1 NMAC incorporating 40 CFR §265.120. Certification of completion of post-closure care is described in Section 11.5.

12 POST-CLOSURE INFORMATION

Pursuant to 20.4.1 NMAC incorporating 40 CFR § 265.118(c), the post-closure portion of this plan identifies the activities that will be conducted after closure of the Area L Landfill and the frequency of these activities. In some cases, these activities must be coordinated with the LANL corrective action process under the Consent Order. These post-closure activities are described below and include activities that are planned as well as those that may be conducted as a result of the corrective action process.

This section describes these activities, which include monitoring activities and the frequencies at which they will be performed to be consistent with 20.4.1 NMAC incorporating 40 CFR Part 264, Subpart F, as appropriate, and 20.4.1 NMAC incorporating 40 CFR § 265.310 during the post-closure care period, in accordance with 20.4.1 NMAC incorporating 40 CFR § 265.118(c)(1). The activities also include maintenance activities and the frequencies at which they will be performed, as required in 20.4.1 NMAC incorporating 40 CFR § 265.118(c)(2).

12.1 Monitoring and Frequency

The monitoring activities and the frequencies at which they will be performed, pursuant to 20.4.1 NMAC incorporating 40 CFR § 265.118(b)(1), are described to the extent known in the following sections. Monitoring of the vadose zone and groundwater will be conducted as appropriate according to currently existing schedules, pending potential modifications as determined by the characterization and monitoring process under the Consent Order and/or implementation of LANL's Groundwater Protection Program. The frequency of monitoring for each medium is also discussed.

12.1.1 Vadose Zone

Vadose zone monitoring at MDA L has been ongoing since the mid-1980s. This has included quarterly sampling of VOCs in pore gas since 1985 and analysis of core samples associated with borehole drillings. The most recent borehole sampling was undertaken in 2004 through 2005 as a result of the NMED approved work plan for MDA L by the LANL corrective action program and quarterly sampling has continued to the time of the development of this closure plan. Figures 6 and 7 show the locations of the sampling locations at Area L.

Quarterly pore gas samples have been taken with rigorous QA/QC procedures from 1997 to the present. The analyses of the data indicate that two sources of the subsurface vapor-phase VOC plumes are present. These generally agree in location with the shaft fields at Area L. Both source areas are dominated by the presence of TCA although the relative compositions and concentrations of lesser compounds differ. The plume extends vertically between the top surface and into the top of the basalt layer underlying the tuff in the region at approximately 320 feet below grade. Concentrations of VOCs detected in the basalt are several orders of magnitude less than detected in shallow samples collected near source areas. The plume extends laterally north-south about 1000 feet and east-west to the width of the mesa top at 450 feet.

As reported in the March 2006 Investigation Report for Area L (LANL, 2006a), seven shallow boreholes and one deep borehole were drilled at MDA L to collect rock and pore-gas samples. These samples confirm that the VOC plume is in a near steady condition in terms of areal extent, contaminant concentrations, and composition.

As concluded in the "Subsurface Vapor-Phase Transport of TCA at MDA L: Model Predictions" (Stauffer et al., 2000), the observed site data and site numerical modeling results also indicate that, currently, the vapor-phase plume at MDA L is at a near steady condition, both in concentration and size. The authors also concluded that the current location of the vapor-phase plume is not expected to spread any closer to the facility boundary or to the deep aquifer. In addition, because there is no evidence of liquid migration and it has been determined that saturated flow through the tuff is not a viable transport mechanism, it is

not anticipated that VOCs can migrate as liquids to the uppermost aquifer. It is predicted that the plume size will begin to decrease when the contaminant source is depleted (likely before the year 2060), based on estimates of a conservative TCA source. The site numerical model will provide a useful tool in the future to explore the effects of potential corrective measures (e.g., passive venting, optimized passive venting) (Stauffer et al., 2000).

The pore-gas monitoring program has been successful in defining both the nature and extent of the vapor-phase plume at MDA L, as indicated by the agreement of the numerical model with pore-gas and surface flux data. Both the current and future plume growth over the next 50 years are anticipated to be small, according to the simulations (e.g., by the year 2050, the simulation results for the 50 parts per million by volume TCA contour show very little lateral growth). The modeling results indicate that pore-gas monitoring could be performed less frequently than the current quarterly regime, and less frequent monitoring is supported by the recent observations of slowly changing pore-gas concentrations. It is believed that annual monitoring would be sufficient to identify any significant changes in the plume, as demonstrated by the simulation of catastrophic drum failure that predicts that such an event would be captured in the monitoring data for several years. Overall, annual monitoring is believed to be capable of assessing the current rate of plume growth as well as detecting a large perturbation to the system (e.g., a drum failure) (Stauffer et al., 2000).

Although the actual frequency of monitoring is not precisely defined at this time for activities implemented under the LANL corrective action program, the “Corrective Measures Evaluation for Material Disposal Area L”, which will be submitted to the NMED in 2007, may recommend a revised schedule for pore-gas monitoring

12.1.2 Regional Aquifer Groundwater

The regulated disposal units at the Area L Landfill are subject to groundwater monitoring requirements under 20.4.1 NMAC incorporating 40 CFR 264 Subpart F. Under Section IV.A.1 of the Consent Order, “Background,” these groundwater monitoring requirements will be met through implementation of the groundwater monitoring requirements of the Consent Order. In the event that the Consent Order expires before final implementation of these requirements for these regulated units, the conditions will continue under this post-closure plan as necessary to meet the post-closure requirements.

The Interim Facility-Wide Groundwater Monitoring Plan (Interim Plan) (LANL, 2006d) is the currently approved document that incorporates Consent Order monitoring requirements. Upon completion of the Canyon Watershed and Technical Area Investigations required by the Consent Order, the Interim Plan will be replaced by approved watershed specific long-term groundwater monitoring plans. The Interim

Plan lists four aquifer monitoring wells in the vicinity of TA-54 that will monitor for potential releases from TA-54 to satisfy the regulatory requirements.

The Interim Plan organizes groundwater monitoring into watersheds. Area G is bordered by Cañada del Buey on the north and Pajarito Canyon on the south. Cañada del Buey is a tributary of Mortandad Canyon. Both the Mortandad and Pajarito Canyon watersheds are included in the Interim Plan. Of the four wells near TA-54, well R-21 is in the Mortandad watershed and wells R-20, R-22, and R-32 are in the Pajarito watershed (Figure 7). Well R-22 was completed in March 2001 and Well R-32 was completed in August 2002. Wells R-20 and R-21 were completed in early 2003.

Each newly installed well is incorporated into the Interim Plan and LANL's Groundwater Protection Program. The monitoring data are managed in a database that is available to LANL and external stakeholders. Under the Groundwater Protection Program, all water sampling, water-level measurements, and other testing will be implemented consistent with laws, regulations, and DOE orders.

The four regional monitoring wells described above and/or any additional wells installed for this purpose pursuant to Consent Order investigations will be monitored at a frequency described in each annual update of the Interim Plan to support performance evaluation of the disposal facilities at TA-54. The monitoring suite is also described in each annual update and generally includes determination of water levels and chemical analysis for metals and organic compounds.

12.2 Maintenance and Frequency

Pursuant to 20.4.1 NMAC incorporating 40 CFR §264.118(b)(2), the planned maintenance activities and the frequencies at which they will be performed are discussed in the following sections. Planned maintenance will include inspections at prescribed frequencies and potential resulting maintenance activities consistent with 20.4.1 NMAC incorporating 40 CFR §265.310. The planned maintenance will also ensure the function of the monitoring equipment consistent with 20.4.1 NMAC incorporating 40 CFR Part 264, Subpart F and 20.4.1 NMAC incorporating 40 CFR § 265.310.

12.2.1 Integrity of Cap/Cover

The cover at the Area L regulated unit will be maintained during post-closure to preserve its integrity and effectiveness in accordance with 20.4.1 NMAC incorporating 40 CFR § 265.310(b)(1). Inspections of the cover will be conducted quarterly while treatment and storage operations continue on the surface in the area adjacent to the cover, and repairs will be made, if necessary, to correct the effects of settling, subsidence, erosion, or other events. After active operations cease, the cover will be inspected on a schedule to be defined by the Consent Order. Inspection results and subsequent repairs will be noted in the facility record. In addition to inspections, the effectiveness of the ET cover will also be monitored

through collection of moisture content data from beneath the cover. Moisture monitoring equipment will be installed to verify the cover is performing as designed in preventing migration of moisture through the cover and into the waste. Moisture probes (time domain reflectometry [TDR] probes or equivalent) will be installed within and below the cover. A neutron probe will be used to monitor moisture levels in existing boreholes. The specific moisture monitoring requirements will be developed as part of the final cover design. The final selected corrective measure will be maintained to prevent run-on and runoff from eroding or otherwise damaging the selected measure if waste remains in place, consistent with 20.4.1 NMAC incorporating 40 CFR §265.310(b)(5).

12.2.2 Monitoring Equipment

As discussed in Section 12.1.1, LANL will continue to conduct vadose zone monitoring at MDA L and may modify the existing vadose zone monitoring program based on the results of groundwater transport modeling. Continued vadose zone monitoring will allow early detection of potential contaminant transport toward the regional aquifer. The continued vadose zone monitoring will be conducted to meet 20.4.1 NMAC incorporating 40 CFR §265.310(b)(2) requirements. Prior to each sampling event, the protective surface casing of each selected borehole will be inspected to ensure that it has not been damaged. The locking mechanisms at each borehole will be checked to verify that they have not been compromised. Vapor ports will also be inspected to ensure that they are not obstructed and have not degraded or lost their plugs. In addition, vapor port depth tags will be inspected for legibility, as will the identification number on the inside of the borehole. Sampling equipment will also be inspected and tested, as necessary, prior to each sampling event. Over time, the monitoring systems that contain the sampling membranes (e.g., socks) within a borehole may require replacement. If the borehole is in an area where vehicle traffic might pose a hazard, the guard or bumper posts will be inspected to ensure their integrity is maintained. Maintenance will be performed on an as-needed basis when the necessity is indicated as a result of inspections. Moisture monitoring equipment in the cover will be inspected regularly and replaced as necessary.

The groundwater monitoring system, discussed in Section 12.1.2, will also be maintained to ensure maximum operating conditions, consistent with 20.4.1 NMAC incorporating 40 CFR §265.310(b)(3). Prior to each sampling event, the protective steel casing and locking mechanism(s) will be inspected to ensure that they have not been compromised. The well identification number on the inside and/or outside of the cover will also be inspected for legibility. In addition, the brass monument on the concrete protective pad, placed around the well casing to ensure long-term structural integrity of the well, will be inspected to verify that the location identification number remains clearly imprinted on the monument. If the well is in an area where vehicle traffic might pose a hazard, the guard or bumper posts will be inspected to ensure their integrity is maintained. Maintenance will be performed on an as-needed basis when the necessity is indicated as a result of inspections.

Surveyed benchmarks used in accordance with 20.4.1 NMAC incorporating 40 CFR §265.309 will be protected and maintained throughout the post-closure period, pursuant to 20.4.1 NMAC incorporating 40 CFR §265.310(b)(5). If a benchmark is in an area where vehicle traffic might pose a hazard, guard or bumper posts will be installed to provide protection. The condition of the surveyed benchmarks will be inspected for legibility and to identify any potential maintenance needs. Maintenance will be performed on an as-needed basis when the necessity is indicated as a result of inspections.

12.3 Reporting

Post-closure care will also include reporting consistent with 20.4.1 NMAC, Subpart V, Part 264, Subpart F and 20.4.1 NMAC § 265.310, as appropriate. As described in Section 12.1.2 of this closure plan, the Consent Order includes a provision that implementation of the groundwater monitoring requirements of the Consent Order will fulfill the requirements of 20.4.1 NMAC, Subpart V, Part 264, Subpart F.

The Interim Facility-Wide Groundwater Monitoring Plan is the current document under the Consent Order addressing reporting requirements for schedule and format of reports. Reporting of monitoring data for the post-closure activities described in this closure plan will be in accordance with Section 1.8, “Sampling Frequency and Schedule” of the monitoring plan and Section IV.A and Section XI.D “Periodic Monitoring Report” of the Consent Order. At the time of development of this closure plan, these include the condition that data from watershed sampling will be reported to NMED within 120 days after the last location has been sampled in each watershed. The required contents and format of periodic monitoring reports for groundwater, vapor, and remediation system monitoring are also described. These reporting provisions are subject to modification in compliance with the provisions of Section III.J.1 of the Consent Order. In the event that such modifications create conflicts with this post-closure plan, LANL will request amendemnts as necessary. In the event of such conflicts, the requirements of the Consent Order will take precedence over the requirements of the post-closure plan.

12.4 Post-Closure Use of Property

In accordance with 20.4.1 NMAC incorporating 40 CFR §265.117(c), post-closure use of property on or in which hazardous waste remains after partial or final closure will not be allowed to disturb the integrity of the final cover or any other components of the containment system, if present. In addition, post-closure use of property will not be allowed to disturb the function of the monitoring systems unless the Secretary of the NMED finds that the disturbance is necessary to the proposed use of the property and will not increase the potential hazard to human health or the environment, or it is necessary to reduce a threat to human health or the environment.

12.5 Post-Closure Care Period Contact Office

As required by 20.4.1 NMAC incorporating 40 CFR §265.118(c)(3), the name, address, and phone number of the office to contact about the Area L landfill during the post-closure care period is:

U.S. Department of Energy
National Nuclear Security Administration
Office of Los Alamos Site Operations
528 35th Street
Los Alamos, New Mexico
87544
505-667-5105

13 REFERENCES

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Table 1

Dates of Use, Dimensions, Capacities, and Contents of Shafts 1, 13-17, and 19-34 at Technical Area 54 Area L Landfill

Shaft No.	Start Date of Use	End Date of Use	Depth (feet)	Diameter (feet)	Capacity (cubic feet)	Waste Contents[a]
1	4/80	8/83	60	3	424	Organics
13	6/79	4/82	60	8	3016	Inorganics
14	6/79	4/82	60	3	424	Reactives
15	6/79	4/82	60	3	424	Reactives
16	6/79	4/82	60	3	424	Gas Cylinders
17	6/79	4/82	60	3	424	Organics
19	4/80	4/82	60	8	3016	Waste Oil
20	3/82	8/83	60	3	424	Inorganics
21	3/82	12/85	60	3	424	Gas Cylinders
22	3/82	8/83	60	3	424	Organics
23	4/82	2/84	60	4	754	Waste Oil
24	4/82	3/84	60	4	754	Organics & Waste Oil
25	9/82	4/85	60	6	1696	Inorganics
26	9/82	2/84	60	6	1696	Organics
27	1/83	1/85	60	4	754	Special Waste[b]
28	1/82	4/85	60	4	754	Special Waste
29	12/83	7/84	65	6	1838	Organics
30	12/83	4/84	65	6	1838	Organics
31	12/83	8/84	61	6	1725	Organics
32	3/84	8/84	15	4	188	Organics
33	3/84	1/85	65	6	1838	Organics
34	2/85	4/85	63	6	1781	Organics

[a] US-EPA Hazardous Waste Numbers in Appendix A

[b] Used for miscellaneous wastes requiring greater isolation.

Table 2

Dates of Use, Dimensions, Capacities, and Contents of Impoundments B and D at Technical Area 54 Area L Landfill

Unit	Dates of Use	Length	Width	Depth	Capacity	Waste Contents and Waste Categories
Impoundment B	1979-1985	60 ft	18 ft	10 ft	7,560 ft3	Electroplating Waste, D007
Impoundment D	1972-1984	75 ft	18 ft	10 ft	9,450 ft3	Lithium hydride, D003

Table 3

Schedule for Closure Activities at Technical Area 54 Area L Landfill

Deliverable[a]	Date
Corrective Measures Evaluation Report	July 31, 2007
Remedy Completion Report	June 30, 2011

[a] From Section XII, "Compliance Schedule Tables," Compliance Order on Consent between NMED, the U.S. Department of Energy, and the Regents of the University of California," March 1, 2005, Santa Fe, New Mexico

Table 4

**Analysis Requirements for Impoundments B and D
At Technical Area 54 Area L Landfill**

Analyte	EPA SW-846 Analytical Method [a]	Test Methods/ Instrumentation	Target Detection Limit [b]	Rationale
Metal Analysis				
Arsenic	1311, 7060A [c], 7061A	FLAA, GFAA	10 µg/L	Determine the total and TCLP metal concentration in the samples.
	6010B	ICP-AES	35 µg/L	
	6020	ICP-MS	0.1 µg/L	
Barium	1311, 7080A [d], 7081 [c]	FLAA, GFAA	200 µg/L	
	6010B	ICP-AES	1 µg/L	
	6020	ICP-MS	0.1 µg/L	
Cadmium	1311, 7130 [d], 7131A [c]	FLAA, GFAA	2 µg/L	
	6010B	ICP-AES	3 µg/L	
	6020	ICP-MS	0.1 µg/L	
Chromium	1311, 7190 [d], 7191 [c]	FLAA, GFAA	10 µg/L	
	6010B	ICP-AES	5 µg/L	
	6020	ICP-MS	0.1 µg/L	
Lead	1311, 7420 [d], 7421 [c]	FLAA, GFAA	5 µg/L	
	6010B	ICP-AES	28 µg/L	
	6020	ICP-MS	0.1 µg/L	
Mercury	1311, 7470A, 7471A [e]	CVAA	0.2 µg/L	
	6010B	ICP-AES	20 µg/L	
Selenium	1311, 7740[c], 7741A	FLAA, GFAA	5 µg/L	
	6010B	ICP-AES	50 µg/L	
Silver	1311, 7760A[d], 7761 [c]	FLAA, GFAA	10 µg/L	
Nickel	7520[c], 7521[d]	FLAA, GFAA	40 µg/L	Determine total metal concentration in samples
	6010B	ICP-AES	10 µg/L	
	6020	ICP-MS	0.2 µg/L	
Hexavalent Chromium	7196A	C	0.5mg/L	Determine total metal concentration in samples
Organic Analysis				
Target compound list VOCs	8260B	GC/MS	10 µg/L	Determine the VOCs concentration in the samples.

Target compound list SVOCs	8270D [c]	GC/MS	10 µg/L	Determine the SVOCs concentration in the samples.
Total Petroleum Hydrocarbons - Diesel-range organics (C_{10}-C_{36})	8015B	GC/FID	10 µg/L	Determine concentration of specified organics.
Inorganic Analysis				
Cyanide	9010C, 9014	C	20 µg/L	Determine total cyanide concentration in the samples.

[a] U.S. Environmental Protection Agency (EPA), 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846.
[b] Detection limits listed for metals are for clean water. Detection limits for organics are expressed as practical quantitation limits. Actual detection limits may be higher depending on sample composition and matrix type.
[c] Method being integrated into Method 7010, per the May 1998 SW-846 Draft Update IVA.
[d] Method being integrated into Method 7000B, per the May 1998 SW-846 Draft Update IVA.
[e] Method being revised to 7471B per the May 1998 SW-846 Draft Update IVA.

C = Colorimetric
CVAA = Cold-vapor atomic absorption spectroscopy
FLAA = Flame atomic absorption spectroscopy
GC/FID = Gas chromatography/flame ionization detector
GC/MS = Gas chromatography/mass spectrometry
GFAA = Graphite furnace atomic absorption spectroscopy
ICP/AES = Inductively coupled plasma – atomic emission spectrometry
ICP/MS = Inductively coupled plasma – mass spectrometry
mg/L = milligrams per liter
SVOC = semi-volatile organic compounds
TCLP = Toxicity Characteristic Leaching Procedure
ug/L = micrograms per liter.
VOC = volatile organic compounds

Table 5

Recommended Sample Containers[a], Preservation Techniques, and Holding Times[b]

Analyte Class and Sample Type	Container Type and Materials	Preservation	Holding Time
Metals			
TCLP Metals: Arsenic, Barium,Cadmium, Chromium, Lead, Selenium, Silver	Aqueous Media: 500-mL Wide-Mouth Polyethylene or Glass with Teflon Liner	Aqueous Media: HNO_3 to pH <2 Cool to 4°C	180 Days
	Solid Media: 125-mL Glass	Solid Media: Cool to 4°C	
TCLP/Total Mercury	Aqueous Media: 500-mL Wide-Mouth Polyethylene or Glass with Teflon Liner	Aqueous Media: HNO_3 to pH <2 Cool to 4 °C	28 Days
	Solid Media: 125-mL Glass	Solid Media: Cool to 4°C	
Volatile Organic Compounds			
Target Compound Volatile Organic Compounds	Aqueous Media: Two 40 mL Amber Glass Vials with Teflon-Lined Septa	Aqueous Media: HCl to pH<2 Cool to 4 °C	14 days
	Solid Media: 125-mL Glass jar with Teflon-Lined Septa or Two 40 mL Amber Glass Vials with Teflon-Lined Septa	Solid Media: Cool to 4°C Add 5 mLs Methanol or Other Water Miscible Organic Solvent to 40-mL Glass Vials	
Semi-Volatile Organic Compounds			
Target Compound Semi-volatile Organic Compounds	Aqueous Media: Four 1-L Amber Glass with Teflon-Lined Lid	Aqueous Media: Cool to 4 °C	Seven days from field collection to preparative extraction. 40 days from preparative extraction to determinative analysis.
	Solid Media: 250-mL Glass	Solid Media: Cool to 4°C	

[a] Smaller sample containers may be required due to health and safety concerns associated with potential radiation exposure, transportation requirements, and waste management considerations.

[b] Information obtained from "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, U.S. Environmental Protection Agency, 1986 and all approved updates.

°C = degrees Celsius
HNO_3 = nitric acid
HCl = hydrochloric acid
L = Liter
mL = milliter
TCLP = Toxicity Characteristic Leaching Procedure

Table 6

Recommended Quality Control Sample Types, Applicable Analyses, Frequency, and Acceptance Criteria

QC Sample Type	Applicable Analysis[a]	Frequency	Acceptance Criteria
Trip Blank	VOC	One set per shipping cooler containing samples to be analyzed for VOCs	Not Applicable
Field Blank	VOC/SVOC, metals,	One sample daily per analysis	Not Applicable
Field Duplicate	Chemical	One for each sampling sequence	Relative percent difference less than or equal to 20 percent
Equipment Rinsate Blank[b]	VOC/SVOC, metals,	One sample daily	Not Applicable

[a] For VOC and SVOC analysis, if blank shows detectable levels of any common laboratory contaminant (e.g., methylene chloride, acetone, 2-butanone, toluene, and/or any phthalate ester), sample must exhibit that contaminant at a level 10 times the quantitation limit to be considered detectable. For all other contaminants, sample must exhibit the contaminant at a level 5 times the quantitation level to be considered detectable.
[b] Collected only if reusable sampling equipment used.
QC = quality control
VOC = volatile organic compound
SVOC = semi-volatile organic compound

Table 7

Potential Waste Materials, Waste Types, and Disposal Options

Potential Waste Materials	Waste Types	Disposal Options
Personal protective equipment (PPE)	Non-regulated solid waste	Subtitle D landfill
	Hazardous waste	The PPE will be treated to meet Land Disposal Restriction (LDR) treatment standards, if necessary, and disposed in a Subtitle C or D landfill, as appropriate.
Decontamination wash water	Non-regulated liquid waste	Sanitary sewer
	Hazardous liquid waste	Waste will be treated to meet LDR treatment standards, if necessary, and disposed in a Subtitle C or D landfill, as appropriate.
Verification water	Non-regulated liquid waste	Sanitary sewer
	Hazardous liquid waste	Waste will be treated to meet LDR treatment standards, if necessary, and disposed in a Subtitle C or D landfill, as appropriate.
Removed waste and waste residuals	Non-regulated solid waste	Subtitle D landfill or recycled
	Hazardous waste	Waste will be treated to meet LDR treatment standards, if necessary, and disposed in a Subtitle C or D landfill, as appropriate.
Discarded asphalt	Non-regulated solid waste	Subtitle D landfill
	Hazardous waste	Waste will be treated to meet LDR treatment standards, if necessary, and disposed in a Subtitle C or D landfill, as appropriate.
Removed soil	Non-regulated solid waste	Re-use as fill material
	Hazardous waste	Waste will be treated to meet LDR treatment standards, if necessary, and disposed in a Subtitle C or D landfill, as appropriate.
Discarded waste management equipment	Non-regulated solid waste	Subtitle D landfill
	Hazardous waste	Waste will be treated to meet LDR treatment standards, if necessary, and disposed in a Subtitle C or D landfill, as appropriate.
Sampling equipment	Non-regulated solid waste	Subtitle D landfill
	Hazardous waste	Waste will be treated to meet LDR treatment standards, if necessary, and disposed in a Subtitle C or D landfill, as appropriate.

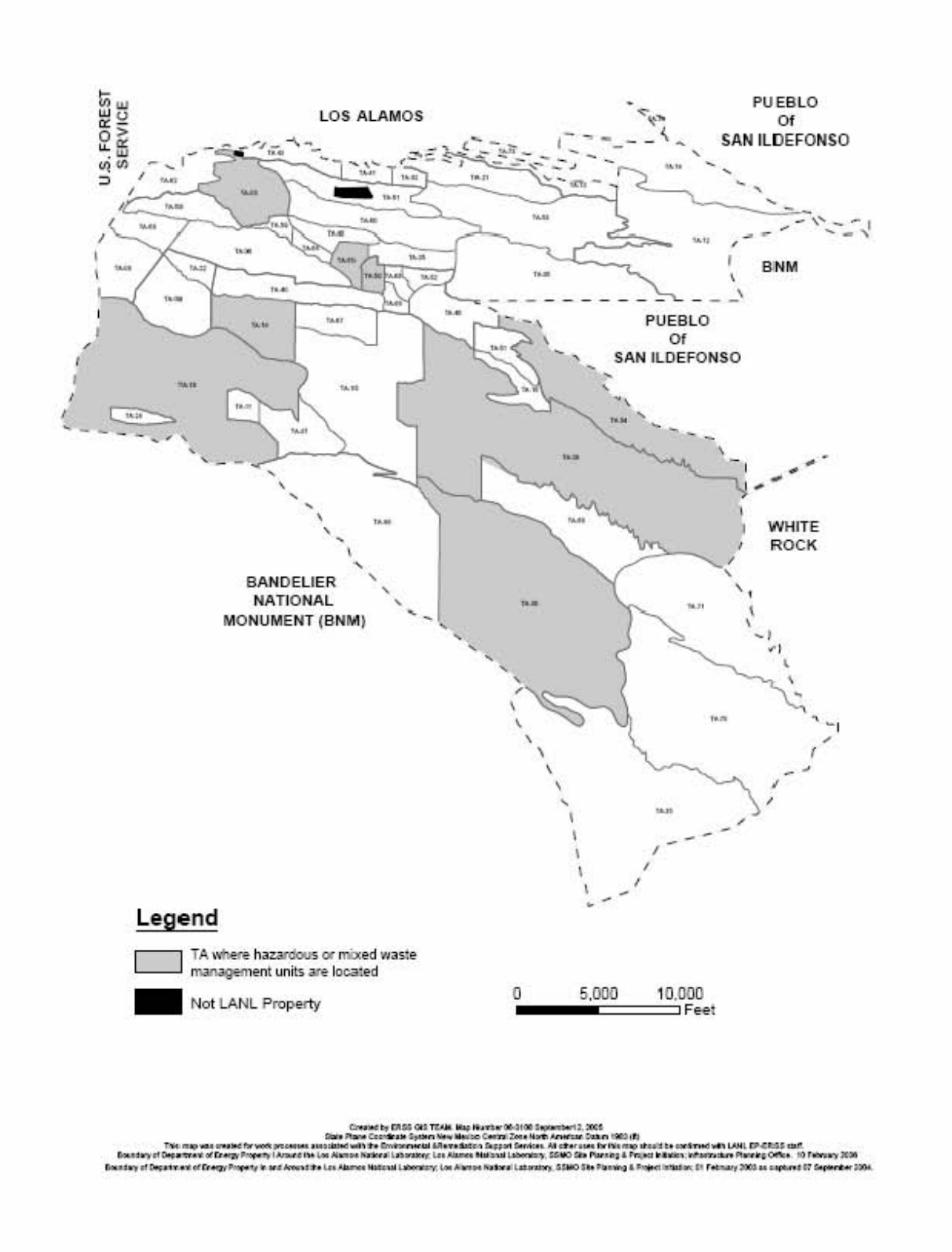

Figure 1: Location Map of Los Alamos National Laboratory (LANL) Technical Areas (TA)

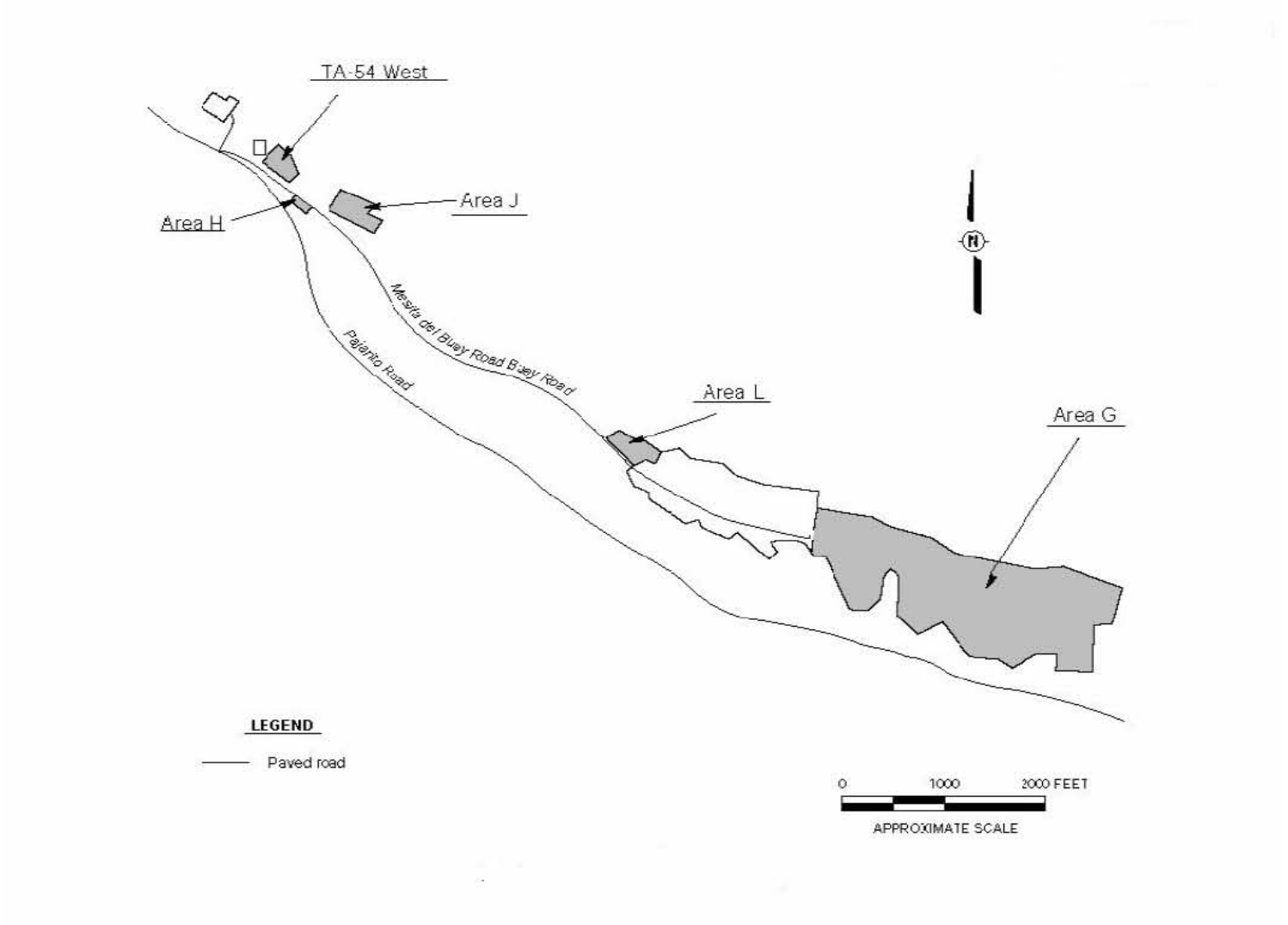

Figure 2: Technical Area (TA) 54, Site Location Map

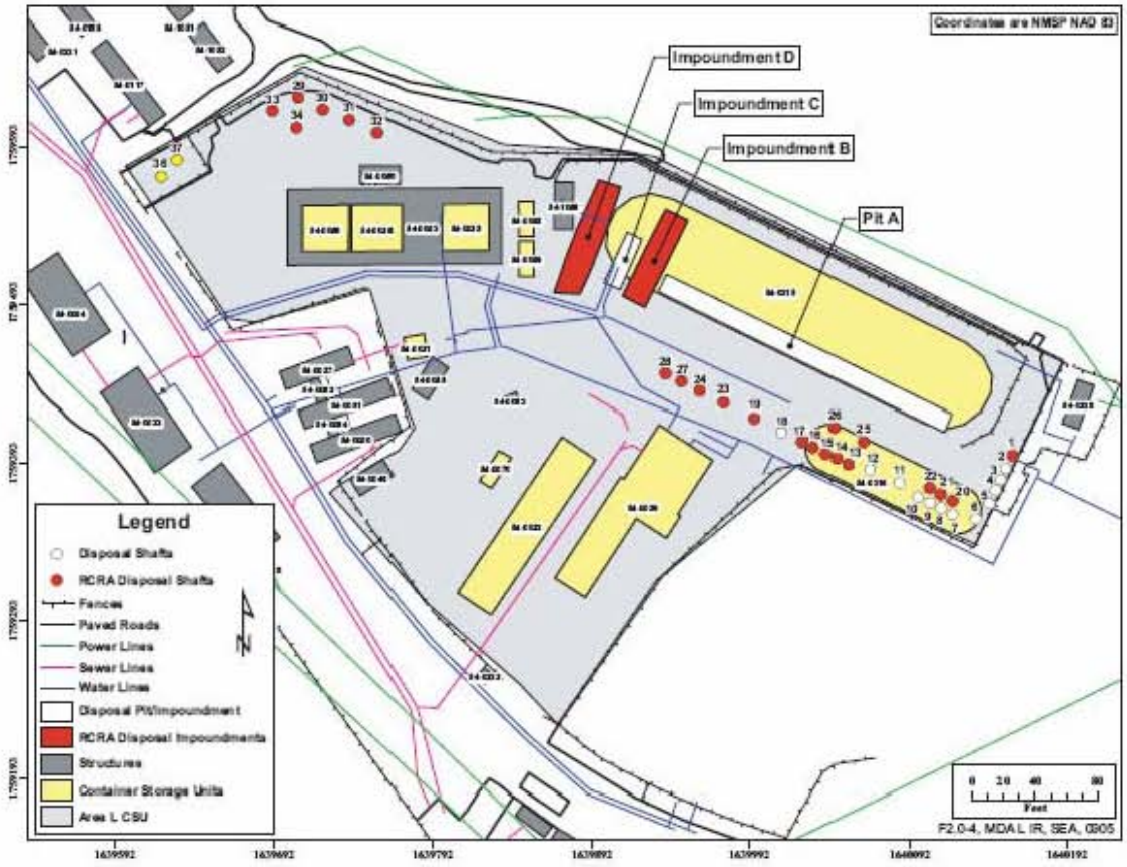

Figure 3: Technical Area (TA) 54, Area L

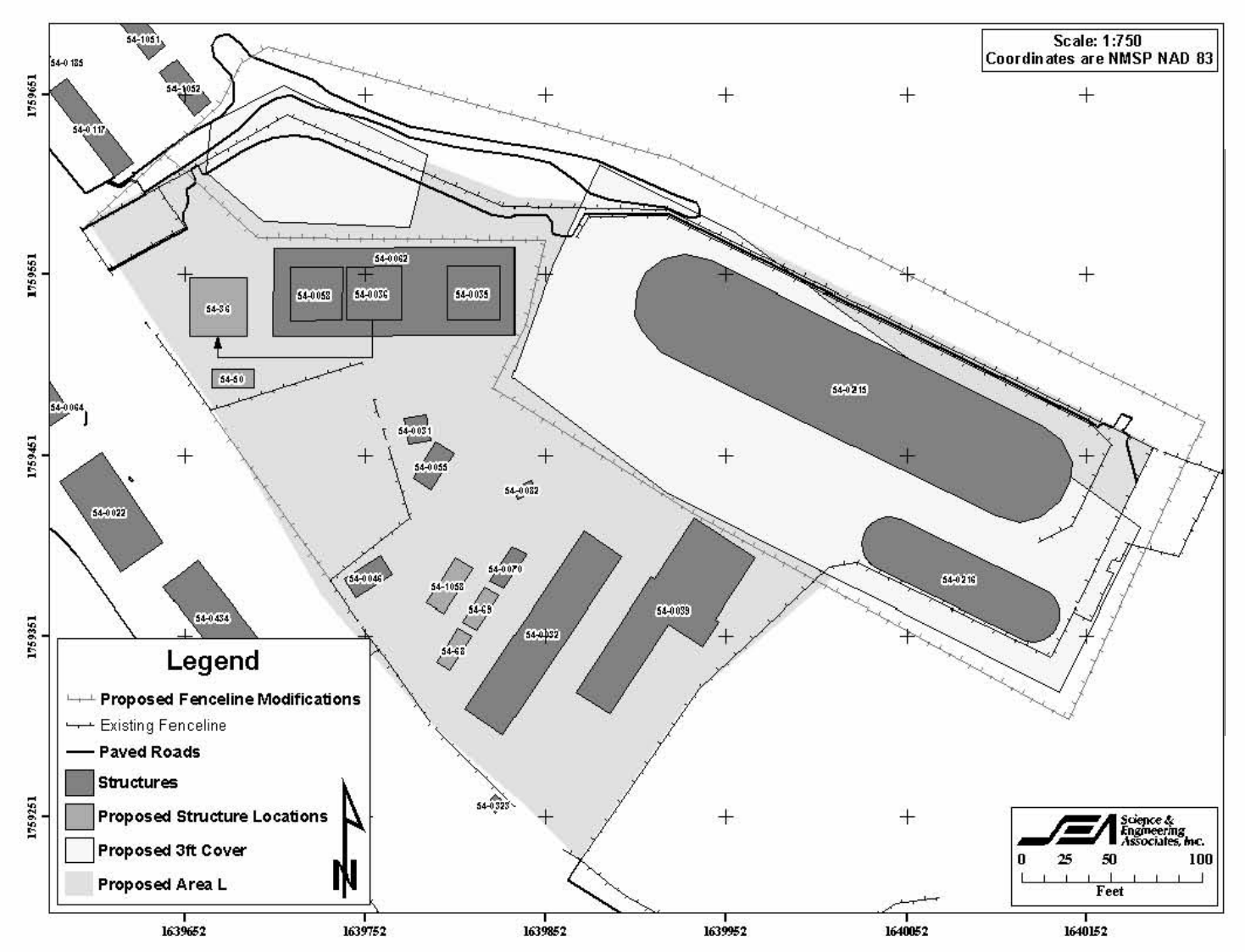

Figure 4: Area of Proposed Cover, Technical Area TA-54, Area L

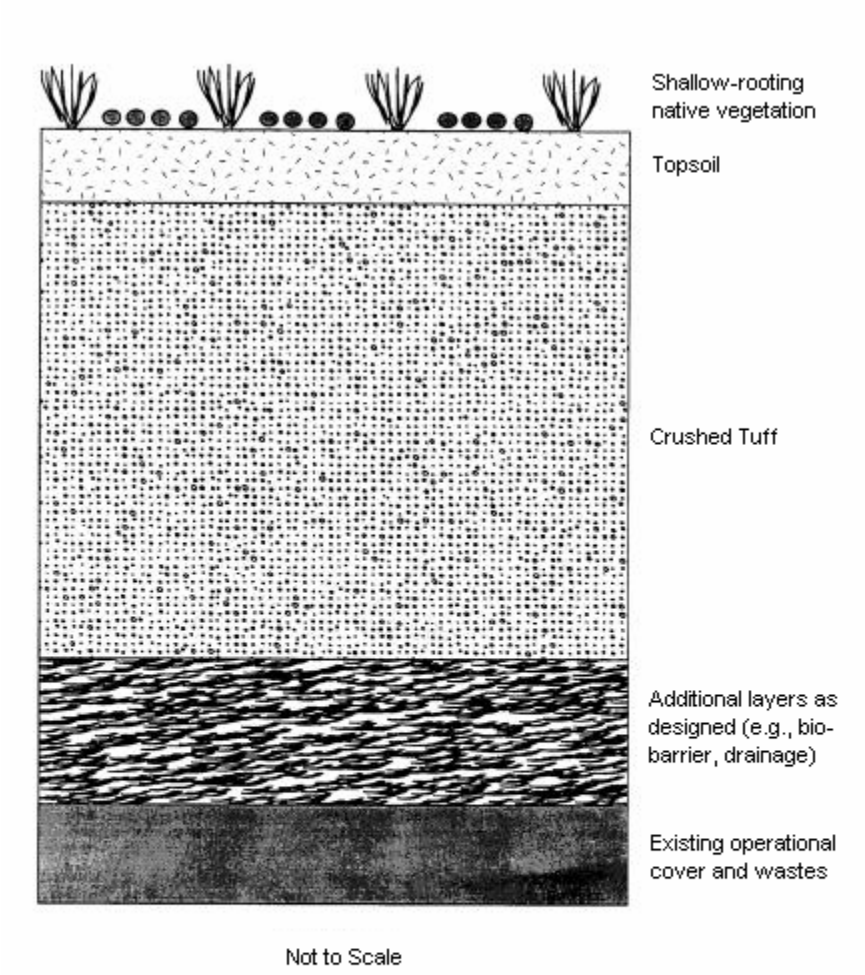

Figure 5: Example of an Evapotranspiration Cover

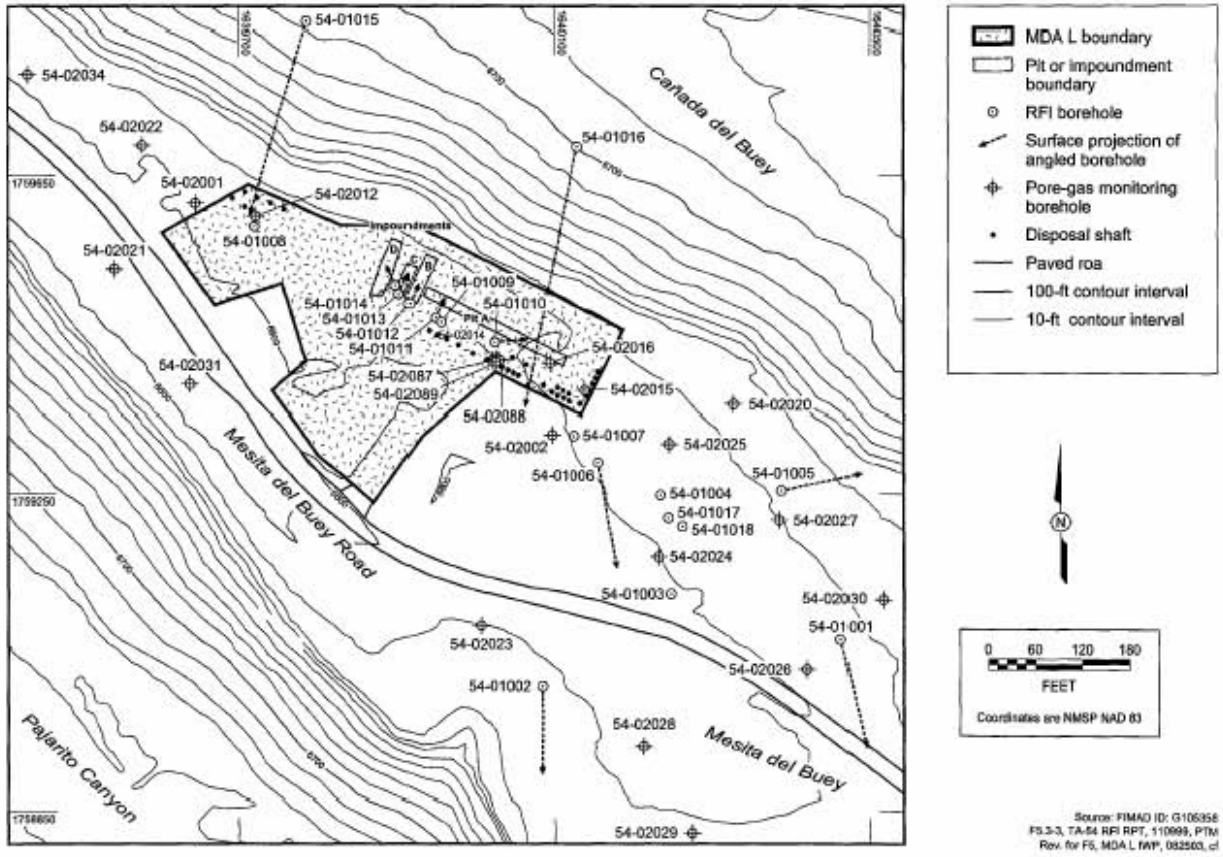

Figure 6:Technical Area (TA) 54, Phase 1 RFI Pore Gas Boreholes

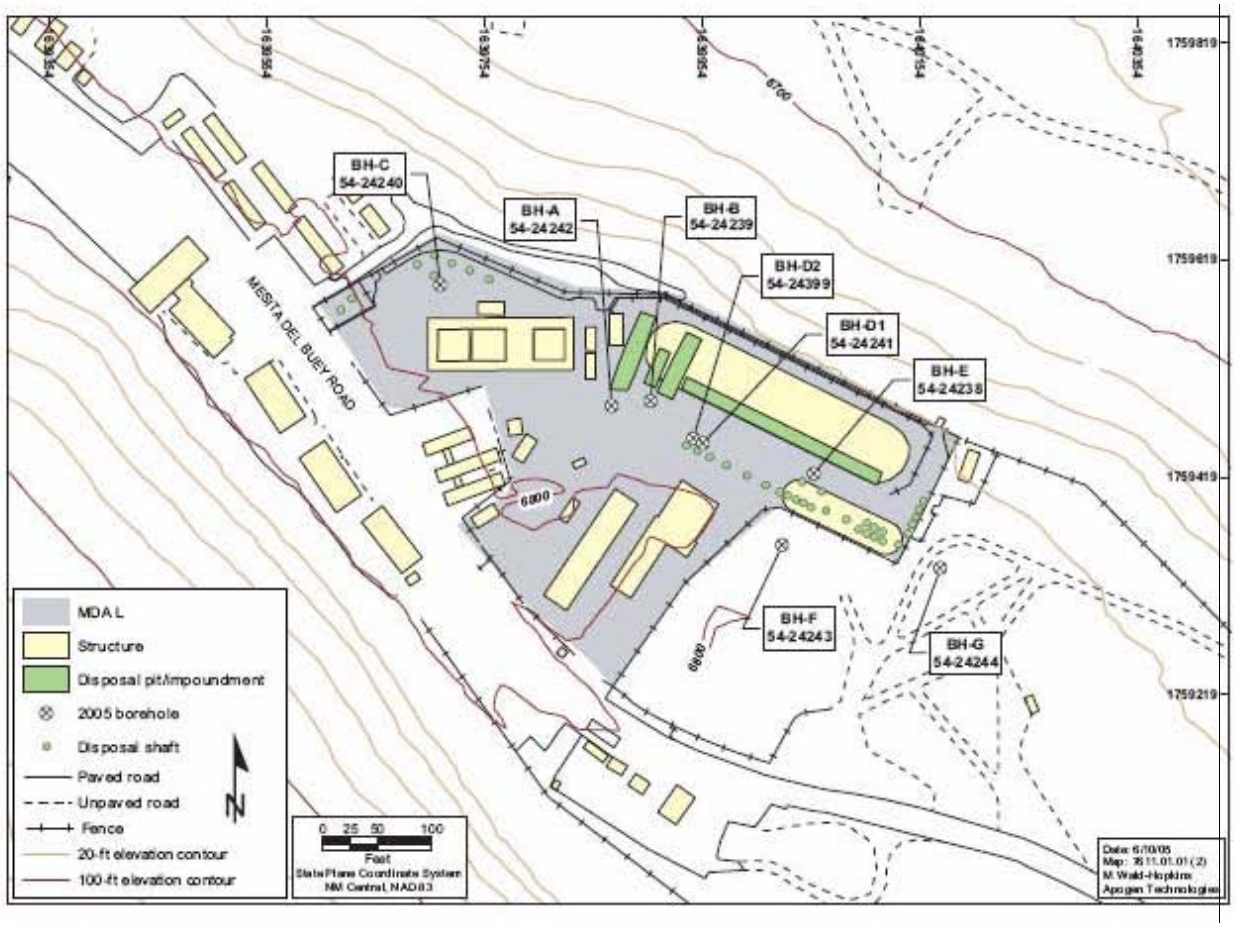

Figure 7: Technical Area (TA) 54, 2004-5 Investigation Boreholes

Figure 8: R-Wells Located Near TA-54

Appendix A

Contents of Area L Landfill Shafts

APPENDIX A
MDA L SHAFT DISPOSAL INFORMATION[1]

Vol (m^3)	Wgt (Kg)	Received	Disposed	EPA Code	Description
0.1136	81.6	15-Feb-83	23-Feb-83	D001	ORGANICS IN DRUM #47
0.1136	99.8	5-Jan-83	23-Feb-83	D001	ORGANICS IN DRUM #39
0.1136	79.4	5-Jan-83	23-Feb-83	P015	ALUMINUM CHLORIDE IN DRUM #17 PLUS BE
0.1136	79.4	18-Jan-83	23-Feb-83	D007	INORGANICS IN DRUM #18
0.1136	86.2	18-Jan-83	23-Feb-83	D002	INORGANICS IN DRUM #19
0.3407	299.4	5-Jan-83	23-Feb-83	NONE	CUTTING OIL ON VERMICULITE
0.6246	635.0	6-Jan-83	23-Feb-83	D001	PAINT THINNER IN VERMICULITE
0.0038	0.9	3-Feb-83	3-Feb-83	D002	PERCHLORIC ACID
0.2082	88.5	17-Feb-83	25-Mar-83	D002	INORGANIC IN DRUM #20
0.1136	117.9	18-Feb-83	25-Mar-83	D009	INORGANICS IN DRUM #21
0.1136	74.8	4-Mar-83	25-Mar-83	D002	INORGANICS IN DRUM #22
0.1136	181.4	4-Mar-83	25-Mar-83	D004	GaAs ABSORBED ON PAPER TOWELS DRUM #23
0.2082	122.9	18-Feb-83	25-Mar-83	D001	0RGANICS DRUM #48
0.2082	103.4	18-Feb-83	25-Mar-83	D001	ORGANICS DRUM #49
0.2082	104.3	17-Feb-83	25-Mar-83	D001	ORGANICS IN DRUM #50
0.2082	131.5	17-Feb-83	25-Mar-83	D001	ORGANICS IN DRUM #51
0.2082	122.0	17-Feb-83	25-Mar-83	D001	ORGANICS IN DRUM #52
0.2082	77.1	4-Mar-83	25-Mar-83	U220	0RGANICS DRUM #56
0.2082	131.5	15-Mar-83	25-Mar-83	D001	ORGANICS IN DRUM #57
0.2082	147.4	15-Mar-83	25-Mar-83	D001	FLAMMABLE ORGANICS IN DRUM #58
0.2082	167.8	15-Mar-83	25-Mar-83	D001	ORGANICS IN DRUM #59
0.2082	156.5	15-Mar-83	25-Mar-83	U239	ORGANICS IN DRUM #60
0.4542	453.6	15-Mar-83	24-Mar-83	D002	INORGANICS DISPOSED OF IN OWN DRUM
0.2271	83.9	15-Mar-83	15-Mar-83	NONE	CHEMICALS DISPOSED OF IN OWN CONTAINER
3.1000	1905.1	24-Mar-83	24-Mar-83	NONE	UNREACT ORGANICS BURIED IN OWN CONTAINER
0.2082	61.2	17-Mar-83	25-Mar-83	D001	ORGANICS IN DRUM #60
0.1136	68.0	2-Mar-83	25-Mar-83	NONE	TRANSFORMER OIL ON ZORBAL & VERMICULITE
0.4164	272.2	24-Feb-83	25-Mar-83	NONE	DIOCTYL PHTHALATE CONTAMINATED EQUIPMENT
0.0379	37.8	24-Mar-83	24-Mar-83	D008	10 GAL OF FUME LITHARGE (PB0)
0.1136	31.8	22-Feb-83	25-Mar-83	D001	1 PT. TRIFLUOROMETHANE & SULFAMIC ACID
0.0568	45.4	5-Apr-83	5-Apr-83	NONE	SULFAMIC ACID ABSORBED ON VERMICULITE
0.0189	4.5	24-Mar-83	5-Apr-83	D003	PERCHLORIC ACID
0.8328	725.8	23-May-83	25-May-83	D001	OIL ON VERMICULITE
0.8328	362.9	20-Apr-83	25-May-83	D001	OIL ON VERMICULITE
0.2082	136.1	22-Feb-83	25-May-83	D001	VACUUM PUMP OIL ON VERMICULITE

1 Available historical data from LANL Solid Waste Operations database.

APPENDIX A
MDA L SHAFT DISPOSAL INFORMATION[1]

Vol (m^3)	Wgt (Kg)	Received	Disposed	EPA Code	Description
0.1136	79.4	4-Jun-82	25-May-83	D001	OIL ABSORBED ON VERMICULITE
0.0379	40.8	16-May-83	25-May-83	D001	REGAL OIL GR AND O
0.0757	90.7	25-May-83	25-May-83	NONE	CORRODED CL2 AND HF CYLINDERS-VENTED
0.0151	18.1	13-May-83	25-May-83	D002	DEVELOPER TO INORGANIC PIT
0.0009	15.9	2-Mar-83	12-May-83	U151	MERCURY WITH HIGH EXPLOSIVE TO SHAFT #27
0.2082	136.1	3-May-83	25-May-83	D001	ETHANOL AND FREON ON VERMICULITE
0.6246	453.6	28-Feb-83	25-May-83	U226	SOLVENT PACKED ON VERMICULITE
0.3218	136.1	16-Mar-83	25-May-83	D003	LIH ON MISC. ARTICLES I-55 GAL, I- 30GAL
0.4164	226.8	4-May-83	25-May-83	U226	CHLOROTHENE ON VERMICULITE
0.2082	181.4	25-Mar-83	25-May-83	D002	PHOTOCHEMICAL WASTES IN DRUM 23
0.2082	190.5	21-Mar-83	25-May-83	D002	INORGANICS IN DRUM #24
0.1136	90.7	17-May-83	25-May-83	D002	PHOTOCHEMICALS INORGANIC DRUM #25
0.1136	99.8	19-Apr-83	25-May-83	D002	PHOTOCHEMICALS IN DRUM INORGANIC 26
0.2082	204.1	11-May-83	25-May-83	NONE	UNKNOWN WHITE POWDER IN INORG. DRUM #27
0.2082	170.1	25-Mar-83	25-May-83	D001	PHOTOCHEMICAL WASTES IN DRUM #61
0.2082	190.5	25-May-83	25-May-83	D002	ORGANICS IN DRUM #62
0.2082	204.1	6-Apr-83	25-May-83	U220	ORGANICS IN DRUM #63
0.2082	204.1	6-Apr-83	25-May-83	D001	ORGANICS IN DRUM #64
0.2082	190.5	6-Apr-83	25-May-83	D001	ORGANICS IN DRUM #65
0.2082	158.8	2-May-83	25-May-83	D001	ORGANICS IN DRUM #66
0.2082	190.5	6-May-83	25-May-83	D001	ORGANICS IN DRUM #67
0.2082	181.4	18-May-83	25-May-83	D001	ORGANICS IN DRUM #68
0.1136	63.5	17-May-83	25-May-83	D001	ORGANICS IN DRUM #69
0.1136	49.9	12-May-83	25-May-83	NONE	CUSO4 AND OIL ON VERMICULITE IN DRUM #70
0.1136	122.5	18-May-83	25-May-83	D001	ORGANICS IN DRUM #71
0.1136	68.0	24-May-83	25-May-83	D001	ETHYLENE DIAMINE LEAKING DRUM #72
0.4542	453.6	24-May-83	26-May-83	D001	CUTTING OIL ON VERMICULITE
0.0757	68.0	1-Jun-83	20-Jun-83	NONE	4-5 GAL. CANS OF OIL
0.3104	308.4	9-Jun-83	9-Jun-83	NONE	CN PLATING WASTES TREATED AT TA50
0.2082	61.2	9-Jun-83	25-Jul-83	U165	ORGANICS IN DRUM #77
0.2082	36.3	9-Jun-83	25-Jul-83	NONE	INORGANICS IN DRUM #29
0.2082	136.1	27-Jul-83	27-Jul-83	D003	LiH CONTAMINATED ARTICLES
0.8328	1360.8	14-Jun-83	25-Jul-83	P015	CLEANING SOL. CONTAIN Be ON VERMICULITE
0.2082	158.8	27-Jun-83	25-Jul-83	D002	INORGANICS IN DRUM #28
0.1136	93.0	14-Jun-83	25-Jul-83	D002	INORGANICS IN DRUM #29

1 Available historical data from LANL Solid Waste Operations database.

APPENDIX A
MDA L SHAFT DISPOSAL INFORMATION[1]

Vol (m^3)	Wgt (Kg)	Received	Disposed	EPA Code	Description
0.2082	158.8	21-Jun-83	25-Jul-83	D002	INORGANICS IN DRUM #30
0.2082	113.4	1-Jul-83	25-Jul-83	D009	INORGANICS IN DRUM #31
0.1136	49.9	8-Jul-83	25-Jul-83	D003	Na-K CONTAMINATED MATERIAL IN DRUM #32
0.2082	136.1	27-May-83	25-Jul-83	D001	ORGANICS IN DRUM #73
0.2082	113.4	2-Jun-83	25-Jul-83	D001	ORGANICS IN DRUM #74
0.2082	158.8	14-Jun-83	25-Jul-83	D001	ORGANICS IN DRUM #75
0.2082	147.4	15-Jun-83	25-Jul-83	D001	ORGANICS IN DRUM #76
0.2082	181.4	7-Jun-83	25-Jul-83	D001	ORGANICS IN DRUM #77
0.2082	204.1	13-Jul-83	25-Jul-83	D001	ORGANICS IN DRUM #78
0.2082	181.4	14-Jul-83	25-Jul-83	D001	ORGANICS IN DRUM #79
2.6687	2268.0	15-Sep-83	29-Sep-83	D001	ORGANIC CHEMICALS FROM S-SITE CLEANUP
0.4164	226.8	8-Sep-83	29-Sep-83	NONE	OIL ON VERMICULITE
0.4542	249.5	7-Sep-83	29-Sep-83	NONE	CUTTING OIL ON VERMICULITE
0.0005	0.9	18-Aug-83	28-Sep-83	D009	MERCURY VAPOR LIGHT IN SAHFT 27
0.0142	9.1	28-Sep-83	29-Sep-83	NONE	F2 CYCLINDER VENTED PUT IN SHAFT
0.6246	635.0	12-Aug-83	29-Sep-83	U080	SOLVENT WASTE ON VERMICULITE
0.4164	226.8	20-Jul-83	29-Sep-83	D001	ORGANICS ABSORBED ON VERMICULITE
1.3627	1360.8	29-Jun-83	29-Sep-83	NONE	INORGANICS IN OWN CARTONS
0.0757	45.4	6-Sep-83	9-Sep-83	P015	Be WASTE IN SPECIAL SHAFT
0.6246	226.8	2-Sep-83	29-Sep-83	NONE	OIL ABSORBED ON VERMICULITE
0.2082	172.4	21-Sep-83	29-Sep-83	D001	ORGANICS IN DRUM 80
0.1136	68.0	10-Aug-83	29-Sep-83	NONE	ORGANICS IN DRUM 81
0.2082	181.4	21-Sep-83	29-Sep-83	NONE	DYE ON VERMICULITE DRUM 82
0.2082	181.4	21-Sep-83	29-Sep-83	D001	ORGANICS IN DRUM 83
0.1136	34.0	21-Sep-83	29-Sep-83	D001	ORGANICS IN DRUM 84 ON VERMICULITE
0.1136	68.0	21-Sep-83	29-Sep-83	D001	DRUM 85 DYE ON VERMICULITE
0.2082	204.1	27-Sep-83	29-Sep-83	D001	ORGANICS IN DRUM 86
0.2082	136.1	27-Sep-83	29-Sep-83	D001	ORGANICS IN DRUM 87
0.0038	3.6	24-Oct-83	24-Oct-83	D002	CORRSIVE LIQUID TO PIT B
0.0100	68.0	28-Oct-83	1-Nov-83	D004	AQUEOUS SOLUTION TO INORGANIC PIT
0.2082	192.8	12-Dec-83	16-Dec-83	D001	ORGANICS IN DRUM 91
0.8328	544.3	16-Dec-83	16-Dec-83	NONE	OIL AND KEROSENE ON VERMICULITE
0.2082	90.7	16-Dec-83	16-Dec-83	U226	TRICHLOROETHANE ON VERMICULITE
0.6246	453.6	16-Dec-83	16-Dec-83	NONE	RESIN
0.2082	90.7	16-Dec-83	16-Dec-83	NONE	ETHYLENE GLYCOL ON VERMICULITE

1 Available historical data from LANL Solid Waste Operations database.

APPENDIX A
MDA L SHAFT DISPOSAL INFORMATION[1]

Vol (m^3)	Wgt (Kg)	Received	Disposed	EPA Code	Description
0.8328	544.3	16-Dec-83	16-Dec-83	D001	STODDARD SOLVENT ON VERMICULITE
0.2082	217.7	16-Dec-83	16-Dec-83	D001	ORGANICS IN DRUM 88
0.2000	204.1	18-Oct-83	16-Dec-83	D001	ORGANICS IN DRUM #89
0.2082	222.3	8-Dec-83	16-Dec-83	U002	ORGANICS IN DRUM 90
2.9148	1360.8	16-Dec-83	16-Dec-83	NONE	LOW PCB OIL FOR AREA L
0.4542	272.2	8-Nov-83	16-Dec-83	NONE	CUTTING OIL ON VERMICULITE
1.8738	1088.6	16-Dec-83	16-Dec-83	NONE	LOW PCB OIL ON VERMICULITE
0.6246	362.9	16-Dec-83	16-Dec-83	NONE	OIL AND H20 ABSORBED ON VERMICULITE
0.0189	22.7	12-Dec-83	16-Dec-83	NONE	DIRTY OIL TO OIL SHAFT
5.6000	1814.4	28-Oct-83	16-Dec-83	NONE	DIESEL FUEL OIL ON VERMICULITE
0.2082	190.5	2-Nov-83	16-Dec-83	NONE	INORGANICS IN DRUM #34
0.1136	68.0	12-Oct-83	16-Dec-83	D002	SODA LIME IN OWN DRUM
0.2082	272.2	27-Sep-83	16-Dec-83	D009	INORGANICS IN DRUM #33
0.2000	136.1	15-Dec-83	15-Dec-83	NONE	8 CYLINDERS FROM C AREA TO CYL. SHAFT
0.0001	2.3	13-Dec-83	16-Dec-83	NONE	LIGHT WEIGHT OIL TO OIL SHAFT
0.3028	302.5	29-Jun-83	29-Sep-83	NONE	2-ETHYL-1-HEXANOL
0.2265	204.1	30-Jan-84	27-Jan-84	NONE	INORGANICS BURIED IN OWN CONTAINERS
0.6246	635.0	26-Jan-84	26-Jan-84	NONE	BORIC ACID SOL TO PIT
0.0030	4.5	22-Feb-84	27-Feb-84	P015	BERYLLIUM OXIDE
1.0410	453.6	6-Feb-84	23-Feb-84	D002	CLEANUP FROM HYDROXYL AMMINE NO3 SPILL
0.8328	272.2	20-Jan-84	23-Feb-84	NONE	MG TURNINGS
0.0028	6.8	1-Feb-84	1-Feb-84	P087	LASER CELL WITH OSMIUM TETROXIDE
0.2082	204.1	16-Jan-84	23-Feb-84	P015	INORGANICS IN DRUM 35
0.0568	45.4	6-Feb-84	23-Feb-84	D002	OAKITE -STRONG DETERGENT
0.1136	22.7	26-Jan-84	23-Feb-84	D002	CHEESECLOTH WITH DIL. ACIDS IN PLASTIC
0.2082	136.1	7-Feb-84	23-Feb-84	NONE	OIL ON VERMICULITE
0.8328	453.6	26-Jan-84	23-Feb-84	NONE	PCB FREE OIL ON VERMICULITE
0.4542	272.2	26-Jan-84	23-Feb-84	NONE	USED CUTTING OIL ON VERMICULITE
0.4164	181.4	19-Jan-84	23-Feb-84	D001	PAINT THINNER ABSORBED ON VERMICULITE
0.4164	181.4	19-Jan-84	23-Feb-84	D001	2-PROPANOL ABSORBED ON VERMICULITE
0.2082	181.4	16-Jan-84	23-Feb-84	D001	ORGANICS IN DRUM 92
0.3218	158.8	1-Feb-84	23-Feb-84	NONE	SURFACTANT OVERPACKED IN VERMICULITE
0.2082	204.1	26-Jan-84	23-Feb-84	D001	ORGANICS IN DRUM 93
0.2082	226.8	23-Feb-84	23-Feb-84	D001	ORGANICS IN DRUM 94
0.4164	272.2	6-Feb-84	23-Feb-84	D001	PAINT THINNER ON VERMICULITE

1 Available historical data from LANL Solid Waste Operations database.

APPENDIX A
MDA L SHAFT DISPOSAL INFORMATION[1]

Vol (m^3)	Wgt (Kg)	Received	Disposed	EPA Code	Description
0.1325	68.0	3-Feb-84	23-Feb-84	D001	GLYCOL ETHER EB ON VERMICULITE
2.2902	2268.0	11-Jan-84	23-Feb-84	D001	OILS WITH SOLVENT ON VERMICULITE
1.0410	907.2	15-Feb-84	23-Feb-84	U226	1,1,1 TRICHLOROETHANE ON VERMICULITE
0.2082	204.1	17-Feb-84	23-Feb-84	NONE	ORGANICS IN DRUM 95
0.2082	204.1	17-Feb-84	23-Feb-84	NONE	ORGANICS IN DRUM 96
0.2082	190.5	17-Feb-84	23-Feb-84	NONE	ORGANICS IN DRUM 97
0.2082	204.1	17-Feb-84	23-Feb-84	NONE	ORGANICS IN DRUM 98
0.2082	226.8	17-Feb-84	23-Feb-84	NONE	ORGANICS IN DRUM 99
0.1136	36.3	9-Jan-84	23-Feb-84	D004	CLOTHING,GLOVES ETC.CONTAMINATED WITH AS
0.0283	13.6	6-Mar-84	9-Mar-84	NONE	ROLL OF ASBESTOS
0.0379	2.3	21-Mar-84	23-Mar-84	D003	MATERIALS CONTAMINATED WITH NA-K
0.2082	136.1	4-Apr-84	5-Apr-84	NONE	ORGANICS IN DRUM 113-OIL
0.2082	204.1	28-Mar-84	5-Apr-84	D001	ORGANICS IN DRUM 112
0.2082	170.1	27-Mar-84	5-Apr-84	D001	ORGANICS IN DRUM 111
0.1136	90.7	27-Mar-84	5-Apr-84	D001	ORGANICS IN DRUM 110
0.1136	90.7	13-Mar-84	5-Apr-84	U019	ORGANICS IN DRUM 109 (BENZENE)
0.2082	181.4	16-Mar-84	5-Apr-84	D001	ORGANICS IN DRUM 108
0.2082	181.4	16-Mar-84	5-Apr-84	D001	ORGANICS IN DRUM 107
0.2082	181.4	16-Mar-84	5-Apr-84	D001	ORGANICS IN DRUM 106
0.2082	181.4	16-Mar-84	5-Apr-84	D001	ORGANICS IN DRUM 105
0.2082	181.4	16-Mar-84	5-Apr-84	D001	ORGANICS IN DRUM 104
0.2082	158.8	9-Mar-84	5-Apr-84	D001	ORGANICS IN DRUM 103
0.2082	170.1	9-Mar-84	5-Apr-84	D001	ORGANICS IN DRUM 102
0.2082	181.4	27-Feb-84	5-Apr-84	D001	ORGANICS IN DRUM 101
0.1136	113.4	22-Feb-84	5-Apr-84	D001	ORGANICS IN DRUM 100
0.2082	181.4	28-Mar-84	5-Apr-84	D002	INORGANICS IN DRUM 41
0.1136	90.7	20-Mar-84	5-Apr-84	D001	INORGANICS IN DRUM 40
0.2082	181.4	16-Mar-84	5-Apr-84	D002	INORGANICS IN DRUM 39
0.2082	181.4	16-Mar-84	5-Apr-84	D002	INORGANICS IN DRUM 38
0.2082	181.4	8-Mar-84	5-Apr-84	D009	INORGANICS IN DRUM 37(HG)
0.2082	181.4	20-Jan-84	5-Apr-84	D002	INORGANICS IN DRUN 36
3.5394	2721.6	3-Apr-84	5-Apr-84	NONE	OIL ON VERMICULITE
2.9148	1814.4	9-Mar-84	5-Apr-84	NONE	LOW LEVEL PCB OIL ON VERMICULITE
0.3407	272.2	21-Mar-84	5-Apr-84	NONE	VACUUM PUMP OIL ON VERMICULITE
1.0410	725.8	22-Mar-84	5-Apr-84	NONE	TEXACO REGAL OIL ON VERMICULITE

1 Available historical data from LANL Solid Waste Operations database.

APPENDIX A
MDA L SHAFT DISPOSAL INFORMATION[1]

Vol (m^3)	Wgt (Kg)	Received	Disposed	EPA Code	Description
3.6719	2268.0	22-Mar-84	5-Apr-84	D001	ORGANIC AND OIL ON VERMICULITE
0.2082	113.4	4-Apr-84	5-Apr-84	D009	GLASSWARE-HG CONTAMINATED
0.1136	68.0	5-Mar-84	5-Apr-84	D004	VARIOUS ARTICLES CONTAM. WITH AS
0.1136	45.4	2-Mar-84	5-Apr-84	NONE	LOW LEVEL PCB CONTAM. ARTICLES IN VERM.
0.2082	136.1	24-Apr-84	5-Apr-84	NONE	HYDRAULIC OIL (REGAL B) ON VERMICULITE
0.0142	18.1	24-Apr-84	24-Apr-84	NONE	EMPTY CYLINDERS TO SHAFT
0.2082	204.1	24-Apr-84	26-Apr-84	D002	INORGANICS IN DRUM #46
0.2082	204.1	24-Apr-84	26-Apr-84	D002	INORGANICS IN DRUM #45
0.2082	226.8	20-Apr-84	26-Apr-84	D002	INORGANICS IN DRUM #44
0.2082	215.5	20-Apr-84	26-Apr-84	D001	ORGANICS IN DRUM #116
0.2082	204.1	20-Apr-84	26-Apr-84	U154	ORGANICS IN DRUM #115 (METHANOL)
0.4542	226.8	24-Apr-84	26-Apr-84	NONE	VACUUM PUMP OIL ON VERMICLITE
4.8000	3628.8	18-Apr-84	26-Apr-84	NONE	OIL ON VERMICULITE
0.2082	294.8	20-Apr-84	26-Apr-84	D006	INORGANICS IN DRUM 43 (CD)
0.2082	158.8	6-Apr-84	26-Apr-84	D002	INORGANICS IN DRUM 42
0.2082	204.1	6-Apr-84	26-Apr-84	D001	ORGANICS IN DRUM 114
0.2082	113.4	12-Apr-84	26-Apr-84	NONE	MECHANICAL PUMP OIL
0.2082	113.4	12-Apr-84	26-Apr-84	U002	CHLOROETHANE,ETOH AND ACETONE(ACETONE)
0.2082	136.1	18-Apr-84	26-Apr-84	D001	DYE,METHANOL AND ETOH ON VERMICULITE
0.0189	6.8	28-Mar-84	26-Apr-84	P015	BE SCRAPS
0.0568	13.6	8-May-84	14-May-84	D001	CELLULOSE NITRATE FILM
0.0028	0.9	10-May-84	10-May-84	NONE	HG VAPOR TUBE FROM OZALID MACHINE
0.2082	204.1	4-Jun-84	18-Jun-84	D001	ORGANICS IN DRUM #127~
0.2082	213.2	4-Jun-84	18-Jun-84	NONE	ORGANICS IN DRUM #126
0.2082	204.1	24-May-84	18-Jun-84	D001	ORGANICS IN DRUM #125
0.2082	181.4	18-May-84	18-Jun-84	D001	ORGANICS IN DRUM #123
0.2082	204.1	17-May-84	18-Jun-84	D001	ORGANICS IN DRUM #122
0.2082	204.1	17-May-84	18-Jun-84	D001	ORGANICS IN DRUM #121
0.2082	204.1	15-May-84	18-Jun-84	D001	ORGANICS IN DRUM #120
0.2082	192.8	10-May-84	18-Jun-84	D001	ORGANICS IN DRUM #119
0.2082	181.4	2-May-84	18-Jun-84	D001	ORGANICS IN DRUM #118
0.2082	181.4	26-Apr-84	18-Jun-84	D001	ORGANICS IN DRUM #117
0.2082	181.4	4-Jun-84	18-Jun-84	D009	INORGANICS IN DRUM #51
0.1136	34.0	24-May-84	18-Jun-84	D004	GALLIUM ARSENIDE IN DRUM #50
0.2082	204.1	15-May-84	18-Jun-84	D002	INORGANICS IN DRUM #49

1 Available historical data from LANL Solid Waste Operations database.

APPENDIX A
MDA L SHAFT DISPOSAL INFORMATION[1]

Vol (m^3)	Wgt (Kg)	Received	Disposed	EPA Code	Description
0.2082	192.8	3-May-84	18-Jun-84	D002	INORGANICS IN DRUM #48
0.2082	204.1	26-Apr-84	18-Jun-84	D002	INORGANICS IN DRUM #47
0.8328	635.0	4-May-84	18-Jun-84	NONE	SLUDGE WITH PCB <10PPM
0.2082	136.1	4-May-84	18-Jun-84	D004	DIELECTRIC FLUID WITH TRACE OF AS
0.4164	272.2	4-May-84	18-Jun-84	D001	MISC. ORGANIC FLUIDS ON VERMICULITE
0.2082	136.1	4-May-84	18-Jun-84	U002	OIL WITH ACETONE ON VERMICULITE
0.2082	136.1	4-May-84	18-Jun-84	U159	METHYL ETHYL KETONE ON VERMICULITE
0.2082	136.1	4-May-84	18-Jun-84	NONE	OIL ON VERMICULITE
1.6656	1088.6	31-May-84	18-Jun-84	NONE	SLIMCIDE FUNGICIDE F-16
0.2082	204.1	19-Jun-84	18-Jun-84	D002	SIGMA CHEMICALS DISPOSED OF IN OWN DRUMS
0.2082	113.4	8-Jun-84	18-Jun-84	D002	BROKEN BATTERY PLUS CLEANUP ON VER.
0.2082	90.7	2-May-84	18-Jun-84	D002	ENBOND Z-72
0.2082	192.8	18-Jun-84	18-Jun-84	D001	ORGANICS IN DRUM 128
0.2082	136.1	4-Jun-84	18-Jun-84	NONE	OIL ABSORBED ON VERMICULITE
0.2082	136.1	6-Jun-84	18-Jun-84	NONE	DMSO ON VERMICULITE
6.2000	4082.4	18-Jun-84	18-Jun-84	NONE	OIL ON VERMICULITE
0.6246	408.2	24-Jul-84	23-Jul-84	NONE	MIXED ORGANIC WASTES ON VERMICULITE
0.6246	408.2	24-Jul-84	23-Jul-84	NONE	SOLVENTS AND OILS ON VERMICULITE
0.3785	226.8	16-Jul-84	23-Jul-84	NONE	SOLIDIFIED PAINT
0.4164	226.8	2-Jul-84	23-Jul-84	U069	DIBUTYL PHTHALATE ON VERMICULITE
3.5394	1995.8	2-Jul-84	23-Jul-84	NONE	OIL ON VERMICULITE
0.2082	136.1	3-Jul-84	23-Jul-84	NONE	CHLOROETHANE,ETOH,ACETONE,OIL ON VERMIC.
0.4164	226.8	2-Jul-84	23-Jul-84	NONE	DIBUTYL CARBITOL ON VERMICULITE
0.4164	226.8	2-Jul-84	23-Jul-84	D001	STODDARD SOLVENT ON VERMICULITE
0.4164	226.8	2-Jul-84	23-Jul-84	U228	TRICHLOROETHYLENE ON VERMICULITE
0.4164	226.8	2-Jul-84	23-Jul-84	D001	ISOBUTYL ACETATE ON VERMICULITE
0.4164	226.8	2-Jul-84	23-Jul-84	U161	METHYL ISOBUTYLKETONE ON VERMICULITE
0.4164	226.8	2-Jul-84	23-Jul-84	D002	DOWCLENE ON VERMICULITE
0.4164	226.8	2-Jul-84	23-Jul-84	NONE	CIMCOOL CONCENTRATE ON VERMICULITE
0.4164	226.8	2-Jul-84	23-Jul-84	NONE	TRIBUTYL PHOSPHATE ON VERMICULITE
0.2082	113.4	2-Jul-84	23-Jul-84	NONE	DIESEL OIL ON VERMICULITE
0.4164	226.8	2-Jul-84	23-Jul-84	U002	ACETONE ON VERMICULITE
0.4164	226.8	2-Jul-84	23-Jul-84	U080	METHYLENE CHLORIDE ON VERMICULITE
0.6246	340.2	2-Jul-84	23-Jul-84	NONE	FREON ON VERMICULITE
0.2082	113.4	2-Jul-84	23-Jul-84	NONE	WASTE OIL ON VERMICULITE

1 Available historical data from LANL Solid Waste Operations database.

APPENDIX A
MDA L SHAFT DISPOSAL INFORMATION[1]

Vol (m^3)	Wgt (Kg)	Received	Disposed	EPA Code	Description
0.1136	113.4	5-Jul-84	23-Jul-84	D008	LEAD CHIPS
0.0100	9.1	3-Jul-84	3-Jul-84	NONE	EMPTY GAS MIXING CYLINDER
2.2712	2177.3	13-Jul-84	13-Jul-84	NONE	AMMONIUM BIFLUORIDE
0.0284	27.2	16-Jul-84	16-Jul-84	NONE	P.T.ACTIVATOR-DEVELOPER
0.2082	136.1	23-Jul-84	24-Jul-84	NONE	ORGANIC DYE ON VERMICULITE
0.6246	340.2	16-Jul-84	24-Jul-84	D001	PAINT THINNER ON VERMICULITE
0.2082	90.7	22-Jun-84	24-Jul-84	NONE	VACUUM PUMP OIL ON VERMICULITE
0.8328	725.8	3-Jul-84	24-Jul-84	NONE	DIRT WITH ORGANICS
0.2082	217.7	5-Jul-84	24-Jul-84	D002	INORGANICS IN DRUM 57 COPIER FLUID
0.2082	204.1	5-Jul-84	24-Jul-84	D002	INORGANICS IN DRUM 56 COPIER FLUID
0.2082	204.1	5-Jul-84	24-Jul-84	D002	INORGANICS IN DRUM 55 COPIER FLUID
0.2082	217.7	22-Jun-84	24-Jul-84	D008	INORGANICS IN DRUM 54
0.2082	204.1	22-Jun-84	24-Jul-84	D004	INORGANICS IN DRUM 53
0.2082	192.8	17-Jul-84	23-Jul-84	NONE	ORGANICS IN DRUM 132
0.2082	204.1	5-Jul-84	23-Jul-84	D001	ORGANICS IN DRUM 131
0.2082	204.1	5-Jul-84	23-Jul-84	D001	ORGANICS IN DRUM 130
0.2082	217.7	5-Jul-84	23-Jul-84	D001	ORGANICS IN DRUM 129
1.8927	1814.4	25-Jul-84	25-Jul-84	NONE	AMMONIUM BIFLUORIDE
2.2712	2268.0	1-Aug-84	1-Aug-84	NONE	AMMONIUM BIFLUORIDE
0.0142	4.5	7-Aug-84	6-Aug-84	NONE	BERYLLIUM OXIDE FROM MACHINING
0.0566	18.1	7-Aug-84	6-Aug-84	NONE	EMPTY GAS CYLINDERS
0.2082	204.1	11-Sep-84	29-Oct-84	D001	ORGANICS IN DRUM 142
0.2082	215.5	10-Sep-84	29-Oct-84	D001	ORGANICS IN DRUM 141
0.2082	204.1	10-Sep-84	29-Oct-84	D001	ORGANICS IN DRUM 140
0.2082	204.1	6-Sep-84	24-Sep-84	D001	ORGANICS IN DRUM 139
0.2082	204.1	24-Aug-84	29-Oct-84	D001	ORGANICS IN DRUM 138
0.2082	204.1	9-Aug-84	24-Sep-84	D001	ORGANICS IN DRUM 137
0.2082	192.8	9-Aug-84	24-Sep-84	D001	ORGANICS IN DRUM 136
0.2082	204.1	9-Aug-84	24-Sep-84	D001	ORGANICS IN DRUM 135
0.2082	204.1	9-Aug-84	29-Oct-84	D001	ORGANICS IN DRUM 134
0.2082	108.9	31-Jul-84	29-Oct-84	D001	ORGANICS IN DRUM 133
0.2082	204.1	17-Sep-84	29-Oct-84	NONE	INORGANICS IN DRUM 60
0.2082	190.5	16-Aug-84	24-Sep-84	NONE	INORGANIC DRUM 59
0.2082	192.8	16-Jul-84	24-Sep-84	D002	INORGANIC DRUM 58
0.2082	136.1	29-Aug-84	29-Oct-84	D001	ORGANICS SOLVENTS ON VERMICULITE

1 Available historical data from LANL Solid Waste Operations database.

APPENDIX A
MDA L SHAFT DISPOSAL INFORMATION[1]

Vol (m^3)	Wgt (Kg)	Received	Disposed	EPA Code	Description
0.6246	408.2	31-Jul-84	24-Sep-84	NONE	OIL ON VERMICULITE
0.3407	340.2	16-Aug-84	24-Sep-84	NONE	OILON VERMICULITE
1.0410	1542.2	24-Aug-84	24-Sep-84	D001	SHEATH(STODDARD SOLVVENT) ON VERMICULITE
0.4164	226.8	30-Aug-84	24-Sep-84	U228	TRICHLOROETHYLENE ON VERMICULITE
0.2082	204.1	31-Aug-84	24-Sep-84	NONE	SODIUM SILICATE
2.7066	1814.4	12-Sep-84	29-Oct-84	NONE	LOW LEVEL PCB OIL ON VERMICULITE
0.2082	204.1	29-Sep-84	29-Oct-84	D001	ORGANICS IN DRUM 143
0.2082	204.1	16-Oct-84	29-Oct-84	D001	ORGANICS IN DRUM 144
3.7476	2086.5	29-Aug-84	24-Sep-84	NONE	OIL ON VERMICULITE
0.1416	45.4	24-Sep-84	24-Sep-84	NONE	EMPTY CYLINDERS
0.0481	11.3	26-Sep-84	26-Sep-84	NONE	EMPTY CYLINDERS
0.1136	36.3	1-Oct-84	29-Oct-84	NONE	BE WASTES PACKED IN VERMICULITE
0.2082	136.1	16-Oct-84	29-Oct-84	NONE	NON PCB TRANS. OIL AND H20 ON VERMIC.
0.9085	1179.4	25-Oct-84	29-Oct-84	D001	BARIUM NITRATE
0.0566	4.5	14-May-84	14-Nov-84	NONE	4-EMPTY KRYPTON CYLINDERS
0.0850	22.7	9-Nov-84	20-Nov-84	NONE	EMPTY GAS CYLINDERS
0.9061	90.7	20-Nov-84	20-Nov-84	NONE	EMPTY GAS CYLINDERS
0.0005	0.5	28-Nov-84	28-Nov-84	D002	PICRIC ACID
0.2082	231.3	24-Oct-84	19-Dec-84	U122	ORGANICS IN DRUM #148
0.2082	235.9	24-Oct-84	19-Dec-84	NONE	ORGANICS IN DRUM #149
0.2082	215.5	24-Oct-84	19-Dec-84	NONE	INORGANICS IN DRUM#64 (SALTS)
1.6656	907.2	5-Nov-84	19-Dec-84	NONE	OIL ON VERMICULITE
0.2082	226.8	28-Nov-84	19-Dec-84	D001	ORGANICS IN DRUM #146
0.2082	213.2	17-Oct-84	19-Dec-84	D001	ORGANICS IN DRUM #145
0.3028	302.5	8-Nov-84	19-Dec-84	D002	EBONAL-C
0.4164	453.6	8-Nov-84	19-Dec-84	D002	PHOTO RESIST STRIPPER
0.2082	222.3	24-Oct-84	19-Dec-84	D001	ORGANICS IN DRUM #147
0.6246	635.0	8-Nov-84	19-Dec-84	D002	AMMONIA ETCHANT
0.2082	68.0	20-Nov-84	19-Dec-84	NONE	MACHINE OIL ON VERMICULITE
1.6656	1632.9	8-Nov-84	19-Dec-84	U226	TRICHLORETHANE 1-1-1 ON VERMICULITE
0.2082	208.7	5-Nov-84	19-Dec-84	NONE	INORGANICS IN DRUM #62
0.2082	204.1	15-Oct-84	19-Dec-84	NONE	INORGANICS IN DRUM #61
0.2082	0.5	5-Nov-84	19-Dec-84	NONE	INORGANICS IN DRUM #63
0.2082	215.5	30-Nov-84	19-Dec-84	NONE	ORGANICS ON VERMICULITE
0.0644	29.5	30-Nov-84	19-Dec-84	NONE	USED PUMP OIL ON VERMICULITE

1 Available historical data from LANL Solid Waste Operations database.

APPENDIX A
MDA L SHAFT DISPOSAL INFORMATION[1]

Vol (m^3)	Wgt (Kg)	Received	Disposed	EPA Code	Description
0.2082	249.5	30-Nov-84	19-Dec-84	NONE	INORGANICS IN DRUM #65
0.1416	31.8	13-Dec-84	18-Dec-84	NONE	HEPA FILTERS WITH CARCINOGENS
0.1136	22.7	10-Dec-84	19-Dec-84	NONE	HYDROGEN CHLORIDE ON SODIUM CARBONATE
0.2271	68.0	10-Dec-84	19-Dec-84	NONE	USED VACUUM PUMP OIL ON VERMICULITE
0.6814	204.1	25-Jan-85	21-Feb-85	NONE	BERYLLIUM WASTE
0.2082	181.4	12-Dec-84	21-Feb-85	D001	CHLORETHANE ON VERMICULITE
0.3407	158.8	22-Jan-85	21-Feb-85	U228	ORGANICS TRICHLOROETHYLENE
0.2082	235.9	23-Jan-85	21-Feb-85	D001	ORGANICS IN DRUM #152
0.1136	45.4	21-Jan-85	21-Feb-85	U154	METHANOL & LASER DYE ON VERMICULITE
0.1136	43.1	24-Jan-85	21-Feb-85	NONE	MOTOR OIL ABSORBED ON VERMICULITE
0.2082	96.6	19-Dec-84	21-Feb-85	D001	ORGANICS IN DRUM #150
0.2082	249.5	28-Jan-85	21-Feb-85	D001	ORGANICS IN DRUM #151
0.2082	217.7	28-Jan-85	21-Feb-85	D001	ORGANICS IN DRUM #153
1.0410	1360.8	30-Jan-85	21-Feb-85	U228	USED TRASH FLUIDS IN VERMICULITE
0.4164	385.6	12-Feb-85	21-Feb-85	D001	CHLORETHANE,ETHANOL 190, ACETONE, OIL
0.8328	1451.5	24-Jan-85	21-Feb-85	U002	ACETONE ON VERMICULITE
0.1136	38.6	28-Jan-85	21-Feb-85	NONE	VACUUM PUMP OIL ON VERMICULITE
0.4164	367.4	25-Jan-85	21-Feb-85	NONE	VACUUM PUMP OIL ON VERMICULITE
0.2082	238.1	7-Dec-84	21-Feb-85	NONE	INORGANICS IN DRUM #66
0.2082	113.4	8-Jan-84	21-Feb-85	D002	INORGANICS IN DRUM #67
0.2082	158.8	6-Feb-85	21-Feb-85	D007	INORGANICS IN DRUM #68
0.1133	45.4	19-Mar-85	19-Mar-85	NONE	GAS CYLINDERS THAT HAVE BEEN VENTED
0.2082	204.1	26-Feb-85	26-Apr-85	D002	INORGANICS IN DRUM #69
0.2082	106.6	4-Feb-85	26-Apr-85	D001	ORGANICS IN DRUM #154
0.2082	204.1	11-Feb-85	26-Apr-85	D001	PHOTO CHEMICALS IN DRUM #155
0.2271	102.1	5-Feb-85	26-Apr-85	NONE	EPOXY IN DRUMS #156 & 157
0.2082	117.0	25-Feb-85	26-Apr-85	D001	ORGANICS IN DRUM #158
0.2082	147.4	18-Mar-85	26-Apr-85	D001	ORGANICS IN DRUM #159
0.4164	415.9	17-Apr-85	26-Apr-85	D001	ORGANICS IN DRUM #160
0.6246	635.0	20-Mar-85	26-Apr-85	F002	ORGANICS IN DRUMS # 162,163 & 164
1.8738	1905.1	22-Apr-85	26-Apr-85	NONE	PSEUDO CUMIN (TRI-METHYL-BENZENE)
1.8738	1905.1	4-Apr-85	26-Apr-85	D001	PAINT ON VERMICULITE
0.2082	147.4	25-Jan-85	26-Apr-85	NONE	EPON RESIN
0.6246	840.0	25-Jan-85	26-Apr-85	NONE	OIL ON VERMICULITE
3.9559	5352.4	25-Apr-85	26-Apr-85	NONE	LOW PCB OIL ON VERMICULITE

1 Available historical data from LANL Solid Waste Operations database.

APPENDIX A
MDA L SHAFT DISPOSAL INFORMATION[1]

Vol (m^3)	Wgt (Kg)	Received	Disposed	EPA Code	Description
0.3218	204.1	5-Apr-85	26-Apr-85	NONE	NEUTRALIZED ACIDS HYDRIDES & SULFATES
0.4164	249.5	7-Mar-85	26-Apr-85	D016	WEED KILLER & COMPOUND SPRAY ON VERMIC.
0.2082	207.7	10-Apr-85	26-Apr-85	D001	DISEL FUEL ON VERMICULITE
0.2271	226.8	12-Apr-85	26-Apr-85	NONE	USED CUTTING OIL ON VERMICULITE
0.4164	415.9	16-Apr-85	26-Apr-85	NONE	TRANSFORMER OIL ON VERMICULITE < 50 PPM
0.2082	113.4	29-Apr-85	7-May-85	D001	ORGANICS IN DRUM #161
0.2082	136.1	24-Apr-85	7-May-85	D001	ORGANICS IN DRUM #165
1.0410	725.8	29-Apr-85	7-May-85	U226	TRICHLOROETHANE ON VERMICULITE
0.7382	453.6	29-Apr-85	7-May-85	D001	PHOTORESIST STRIPPER ON VERMICULITE
0.6246	635.0	30-Apr-85	7-May-85	NONE	WASTE FLUID MIXED WITH VERMICULITE
0.4542	102.1	28-Mar-85	7-May-85	NONE	BERYLLIUM WASTE
3.1230	3084.5	6-May-85	7-May-85	D001	ORGANICS OF VARIOUS TYPES
0.0050	13.6	26-Jun-85	15-Jul-85	NONE	EMPTY HELIUM CYLINDERS
0.0198	4.5	25-Jul-85	25-Jul-85	NONE	EMPTY KRYPTON GAS CYLINDERS
0.0850	102.1	18-Jul-85	13-Aug-85	NONE	EMPTY FLOURINE CYCLINDERS
0.4164	181.4	27-Jun-85	5-Aug-85	D008	BATTERIES

1 Available historical data from LANL Solid Waste Operations database.

Appendix B

Approval with Modifications for the Supplemental Investigation Work Plan for Sampling at Material Disposal Area L, New Mexico Environment Department, November 13, 2006

State of New Mexico
ENVIRONMENT DEPARTMENT
Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303
Telephone (505) 428-2500
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BILL RICHARDSON
GOVERNOR

RON CURRY
SECRETARY

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

November 13, 2006

David Gregory
Federal Project Director
Los Alamos Site Office
Department of Energy
528 35th Street, Mail Stop A316
Los Alamos, NM 87544

David McInroy
Remediation Services Deputy Project Director
Los Alamos National Laboratory
P.O. Box 1663, Mail Stop M992
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RE: APPROVAL WITH MODIFICATIONS FOR THE SUPPLEMENTAL INVESTIGATION WORK PLAN FOR SAMPLING AT MATERIAL DISPOSAL AREA L, SOLID WASTE MANAGEMENT UNIT 54-006 AND THE SAMPLING AND ANALYSIS PLAN FOR IMPOUNDEMENTS B, C, AND D AT MATERIAL DISPOSAL AREA (MDA) L, SOLID WASTE MANAGEMENT UNIT 54-006, AT TECHNICAL AREA 54, LOS ALAMOS NATIONAL LABORATORY (LANL) EPA ID #NM0890010515, HWB-LANL-06-020

Dear Messrs. Gregory and McInroy:

The New Mexico Environment Department (NMED) has received and reviewed the United States Department of Energy and the Los Alamos National Security, LLC's (collectively, the Permittees) *Supplemental Investigation Work Plan for Sampling at Material Disposal Area L, Solid Waste Management Unit 54-006* and the *Sampling and Analysis Plan for Impoundments B, C, and D at Material Disposal Area L, Solid Waste Management Unit 54-006, Revision 1,* dated October 2006 and referenced by LA-UR-06-7348/EP2006-0906 and LA-UR-06-7347/EP2006-0925, respectively. NMED hereby issues this Approval with Modifications for the aforementioned documents. NMED makes the following modifications to the proposed work:

Comments on the Supplemental Investigation Work Plan for Sampling at Material Disposal Area L, Solid Waste Management Unit 54-006

1) Section 3.1 Field Screening, page 5:

NMED Comment: The Permittees state that a Brüel and Kjaer (B&K) monitor will be used for vapor phase field screening of VOCs and a Photoionization Detector (PID) equipped with an 11.7 eV lamp will be used to field screen core samples for VOCs. NMED requires the Permittees to use both the PID and B&K monitor for vapor phase field screening of VOCs. NMED does not require field screening of core samples for VOCs because the headspace cannot be contained. Results will therefore be unreliable.

2) Section 4.6 Collection of Pore-Gas Samples, page 7:

NMED Comment: The Permittees proposed analyzing pore-gas samples for VOCs and moisture. Tritium was detected in borehole 54-24241 (BH D-1) at a concentration of 19,500 pico-curies per liter (pCi/L) at a depth of 154-156 feet -- nearly 5 times higher than the concentration of 3,820 pCi/L reported at a depth of 15-17 feet in the same borehole. Similar conditions were observed in borehole 54-24242 (BH-A), where tritium was detected at a concentration of 2,560 pCi/L at a depth of 15-17 feet and 12,000 pCi/L at a depth of 100-102 feet. An increase in tritium concentrations with depth suggests the likelihood of preferential pathways for downward transport of contaminants beneath the site that may result in more rapid contaminant transport toward the regional water table. The Permittees must therefore include tritium in the vapor sampling analytical suite.

3) Table 4.4-1 Proposed Sample Descriptions and Rationale, page 19:

NMED stated in the Notice of Disapproval (NOD) dated August 25, 2006, that "[p]ore-gas samples must be collected at a minimum of one sample for every 50 feet of boring including depths corresponding to the depths of tuff sample collection and depths corresponding to the pore-gas sampling ports in boreholes A, B, C, E, F, and G..." The Permittees state in their Supplemental Plan that, "Pore-gas samples will be collected at the sampling port with the highest concentration of VOCs and at the deepest instrumented sampling port." Collecting vapor samples from two sampling ports will not accomplish the goal of obtaining corresponding data from the existing boreholes. The Permittees must collect vapor samples in the existing boreholes at 20 feet, 80 feet, and the deepest instrumented sampling port. These depths correspond to the proposed pore-gas sampling intervals in the three new boreholes and target each of the stratigraphic units present at MDA L.

Comments on the Sampling and Analysis Plan for Impoundments B, C, and D at Material Disposal Area L, Solid Waste Management Unit 54-006, Revision 1

1) Section 3.1 Borehole Drilling, page 5:

NMED concurs with the 18 proposed borehole locations. However, in order to confirm the presence of the ramps shown in Figure 3.1-1, the Permittees must drill the additional boreholes identified on the attached figure. As with all other borings, these additional boreholes must be advanced using the direct push method. The Permittees must advance all boreholes beyond the sludge/tuff interface to ensure that the entire contents of the impoundments have been sampled. The Permittees are not required to collect a sample of the tuff below the base of the impoundments.

The Respondents must document in the Supplemental Investigation Report all activities conducted pursuant to this approval, including the modifications outlined in this letter. The Supplemental Investigation Report, summarizing the results of both the Work Plan and SAP implementation, must be submitted by April 30, 2007.

Please contact Kathryn Chamberlain at (505) 428-2546 should you have any questions.

Sincerely,

James P. Bearzi
Chief
Hazardous Waste Bureau

JPB:kc

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J. Ellvinger, LANL RRES-SWRC, MS K490
file: Reading and LANL TA-54 '06 (SWMU; 54-006)

Figure 3.1-1. Proposed borehole locations based on MDA L Impoundment sampling plan

○ NMED Proposed Boreholes

CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Richard S. Watkins — 3/29/07

Richard S. Watkins
Associate Director
Environment, Safety, Health, & Quality
Los Alamos National Laboratory
Operator

Date Signed

Daniel E. Glenn — 3/29/07

Daniel E. Glenn
Acting Manager, Los Alamos Site Office
National Nuclear Security Administration
U.S. Department of Energy
Owner/Operator

Date Signed