SOLID WASTE MANAGEMENT UNIT ASSESSMENT REPORT FOR THE PIT 38 NEWLY IDENTIFIED AREA OF CONCERN

INTRODUCTION

On October 1, 2012, the New Mexico Environment Department (NMED) requested that the U.S. Department of Energy and Los Alamos National Security, LLC (DOE/LANS, also the Permittees) submit a solid waste management unit (SWMU) assessment report for newly identified area of concern (AOC) Pit 38. This request was triggered by the Permittees' submittal of a Notice of Intent to Discharge Potable Water Used for Dust Suppression and Decontamination at Technical Area 54 Disposal Pit 38 (the NOI) by DOE/LANS on August 13, 2012, regarding the placement of low-level waste (LLW) from Material Disposal Area (MDA) B.[1]

The Permittees recently performed an extent-of-condition review regarding bulk LLW disposal operations at Technical Area 54 (TA-54). During this review, waste characterization and disposal records were evaluated to determine if any mixed wastes that would be subject to regulation under the Compliance Order on Consent (the Consent Order) may have been disposed of in Pit 38. This review identified approximately 2.9 m^3 of potentially mixed LLW that was disposed of in Pit 38 in 1996. Based on this finding, DOE/LANS have conservatively identified Pit 38 is an AOC as defined in Section III.A of the Consent Order and have therefore completed this SWMU assessment report for Pit 38 in accordance with Section V.C.

As detailed below, this evaluation determined the following:

- The potentially mixed waste that was placed in Pit 38 in 1996 and the bulk LLW from MDA B did not contain any hazardous constituents other than were previously identified in the September 2005 MDA G investigation report (LANL 2005, 090513).
- The use of approximately 460,000 gal. of water related to the disposal of the bulk LLW from MDA B is not expected to significantly affect the migration of water-soluble contaminants or result in an increase in volatile organic compound (VOC) vapor concentrations in the vadose zone above screening levels. Therefore, no changes to the recommended remedy in the MDA G corrective measures evaluation (CME) are proposed.

PIT 38 DESCRIPTION

Pit 38 is one of the disposal units at Los Alamos National Laboratory (the Laboratory) that the Permittees use for the permanent disposal of LLW. Pit 38 is located within Area G at TA-54, which is situated on Mesita del Buey, an east-west trending mesa bounded by Pajarito Canyon to the south and Cañada del Buey to the north. Figure 1 is a topographic map showing the location of Pit 38.

[1] DOE/LANS respectfully disagree with NMED's assertion that these wastes are subject to regulation under the Consent Order. The definition of "solid waste" provided in the Consent Order expressly excludes "source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954, as amended…" [Consent Order § III.B; 42 United States Code §6903(27); New Mexico Statutes Annotated §74-4-3(O)]. The presence of hazardous constituents alone does not transform AEA-regulated waste into "solid waste." The bulk LLW from MDA B is covered by the AEA exclusion and therefore is not "solid waste."

Disposal Unit Dimensions and Structural Description

Since 1957, about 65 acres of TA-54 have been used for radioactive waste disposal; the site has served as the primary LLW disposal site for the Laboratory since 1959. The development of disposal units has progressed generally from east to west in accordance with the pit- and shaft-construction guidelines in effect at the time of construction. The result has been the construction of 35 disposal pits and more than 200 shafts, the general layout of which is also shown in Figure 1.

Pit 38 was excavated directly into the Tshirege Member of the Bandelier Tuff. Crushed tuff removed during excavation was then used to line and backfill the pit to absorb moisture. An extension was constructed along the eastern boundary of Pit 38 in 2012 to provide for future disposal capacity. Figure 1 shows both the original Pit 38 and the extension.

The original dimensions of Pit 38 are 600 ft × 80 ft × 60 ft (length × width × depth). The approximate dimensions of the extension are 250 ft × 60 ft × 35 ft. The field surveyed area and volume of both the original Pit 38 and the extension are provided in Table 1. Figure 2 provides a plan and cross-sectional view of Pit 38.

Table 1
Area and Volume for LLW Disposal Pit 38

Unit	Area (ft^2)	Volume (yd^3)
Pit 38 as originally constructed	58,600	78,800
Pit 38 extension	17,850	15,700

DATES OF OPERATION

LLW disposal began in September 1994 in Pit 38 and continues to the present day. The Laboratory has not begun to use the Pit 38 extension.

WASTE SUMMARY

The existing LLW inventory in Pit 38 includes demolition debris, soil, and a wide range of operational wastes. DOE/LANS reviewed a waste inventory summary that was prepared in 2009, which included all waste profile forms and associated documentation for all wastes placed in Pit 38 through 2009. This review determined that one waste stream that was originally characterized as LLW may have been a mixed waste. Approximately 14, 55-gal. drums or approximately 2.9 m^3 of this waste stream was disposed of in Pit 38 in 1996. This volume is equivalent to 0.0065% of the approximately 44,500 m^3 of total waste inventory at Pit 38.

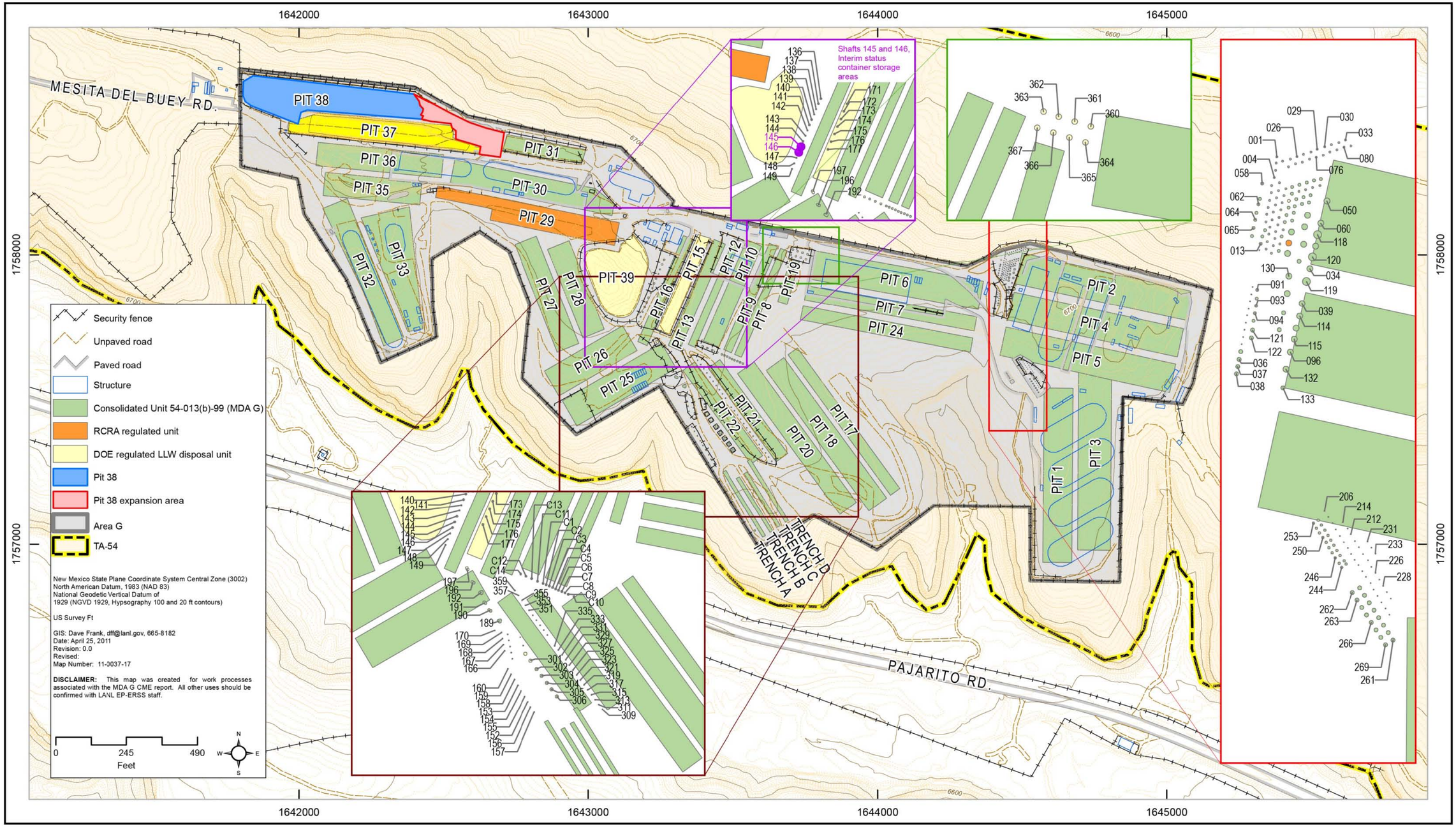


Figure 1 Area G with location of Pit 38

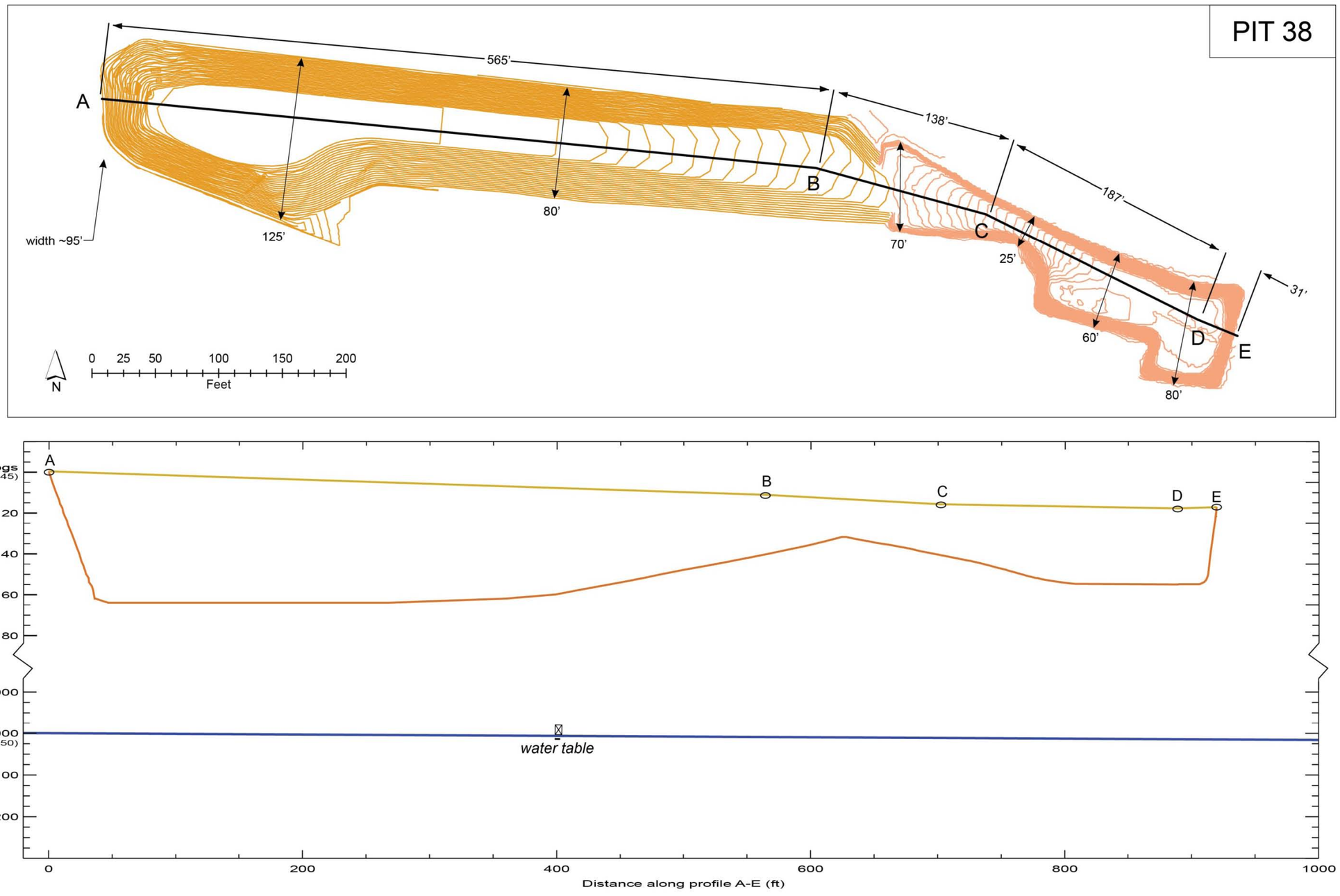


Figure 2 Pit 38 plan and cross-section

This waste stream was generated when a water pump was excavated at TA-50. The waste profile form states that the waste stream contained the pump as well as plastic, soil, cement, personal protective equipment, and absorbent generated during the excavation of the pump. Further review of the analytical data attached to the original waste profile form indicated total mercury and total chromium were detected at concentrations greater than the "twenty times rule of thumb" for assessing whether a metal could potentially leach above the applicable toxicity characteristic regulatory level in Table 1 of 40 Code of Federal Regulations (CFR) 261.24. The total mercury concentration was 45 ppm, which is above 4 (i.e., 20 times the regulatory level of 0.2 mg/L). The total chromium concentration was 180 ppm, which is above 100 (i.e., 20 times the regulatory level of 5.0 mg/L). Because a toxicity characteristic leaching procedure (TCLP) analysis was not performed on a representative sample of this waste, DOE/LANS cannot rule out the possibility that this waste stream was a mixed waste. The relevant documentation for this waste stream is provided in Appendix A.

The bulk LLW from MDA B in Pit 38 described in the August 13, 2012, NOI was characterized to determine its status under the Resource Conservation and Recovery Act (RCRA) before it was transported to TA-54. This waste stream was disposed of in Pit 38 during two phases: June 2011 to February 2012 and July to August 2, 2012.

This waste consists of soil/debris excavated during remediation activities from the historical waste disposal trenches and contains small amounts of radionuclides. Anomalies such as sludge, discolored soil, or ash were segregated during excavation and were characterized and managed separately. As set forth below, the MDA B waste placed in Pit 38 was determined not to be either mixed LLW or hazardous waste.

Characterization and sampling of the MDA B waste was performed in accordance with the MDA B waste management plan and sampling and analysis plan (SAP). DOE/LANS performed due diligence to determine if the waste was listed in Subpart D of 40 CFR 261 in accordance with the U.S. Environmental Protection Agency's Management of Remediation Waste under RCRA (EPA 530-F-98-026), Determination of When Contamination Is Caused by Listed Hazardous Waste. It was determined that because the available 60-yr-old documentation regarding the source(s) of contamination, contaminant, or waste was unavailable or inconclusive, this waste stream was not a listed waste.

Representative composite samples were collected for waste characterization in accordance with the MDA B SAP. These samples were analyzed for dioxins and furans, herbicides and pesticides, high explosives, total metals, polychlorinated biphenyls, VOCs, semivolatile organic compounds, total petroleum hydrocarbons, and diesel range organics. In the event that any constituents listed in Table 1 of 40 CFR 261.24, Toxicity Characteristic*,* were found to be elevated (i.e., close to 20 times the TCLP regulatory level), a TCLP analysis was performed to confirm that the bin did not contain a characteristically hazardous waste. The MDA B Investigation/Remediation Report, Revision 1 (LANL 2012, 215119) contains a complete description of waste characterization activities and the supporting analytical data.

AVAILABLE INFORMATION PERTAINING TO ANY RELEASE OF CONTAMINANTS FROM PIT 38

The MDA G CME report (LANL 2011, 206324) identified two potential transport pathways to groundwater: leaching of water-soluble contaminants and vapor-phase transport of VOCs. As a result, the CME proposed two remedies to minimize these pathways. An evapotranspiration (ET) cover was recommended as a protective remedy to address uncertainty related to potential leachate production from the unlined pits and shafts at MDA G. Soil-vapor extraction (SVE) was the proposed remedy to remove

VOCs within target locations with vapor concentrations that exceed screening criteria developed in the CME.

Leaching of Water-Soluble Constituents

The September 2005 MDA G investigation report (LANL 2005, 090513) summarizes the results of the Consent Order field investigation. Thirty-nine boreholes were drilled to collect soil, rock, and pore gas samples to determine the nature and extent of any releases of contaminants from the MDA G pits and shafts. The only organic constituents detected in soil were trace levels of several dioxin and furan congeners. Inorganic constituents were detected above background values next to the base of the disposal pits, trenches, and shafts at concentrations less than 5 times the background value.

Infiltration rates, thickness of the unsaturated zone, and geochemical properties affect the transport of soluble contaminants by leaching. The CME identified future risk associated with this pathway to be very low because infiltration rates through the mesa are low and the depth to groundwater is large (~900 to 1000 ft). Average travel times for water flowing through the unsaturated zone from the pits to the regional aquifer of several hundred years to several thousand years are predicted under disturbed (e.g., pits that remain open to precipitation, paved areas) and undisturbed conditions (natural vegetated mesa top), respectively. Contaminants will generally travel more slowly than the infiltrating pore water. Contaminants must dissolve into water to be transported by leaching. Waste containers can limit dissolution of waste. In addition, soluble species like some inorganic chemicals (e.g., nitrate, perchlorate, salts) will readily dissolve, while insoluble species (e.g., metals, asphalt) have limited solubility. Adsorption onto soils also affects transport rates, with nonsorbing species (e.g., nitrate and perchlorate salts) transporting at a rate similar to the water and adsorbing species (e.g., metals, polycyclic aromatic hydrocarbons) transporting more slowly. Although the future risk from the transport of leachate is considered to be very low, the CME recommends an ET cover as a protective remedy to address uncertainty related to potential leachate production from the unlined pits and shafts at MDA G. An ET cover will help restore infiltration rates in disturbed zones back to levels present in native undisturbed zones.

Neither the bulk LLW from MDA B or the potentially mixed LLW stream from TA-50 contained any hazardous constituents other than were previously identified in the September 2005 MDA G investigation report (LANL 2005, 090513) as being above background values next to the base of the disposal pits, trenches, and shafts. Because these wastes did not introduce any new contaminants to Pit 38, the evaluation of the potential effects of water use for dust suppression and decontamination focused on the potential for the additional water to alter any of the assumptions used to develop the proposed preferred remedy in the 2011 MDA G CME (LANL 2011, 206324).

The use of 460,000 gal. of potable water for dust suppression related to the disposal of the bulk LLW from MDA B did not result in a new release mechanism but may have temporarily increased the rate of release at Pit 38. An estimate of the added water volume (approximately 460,000 gal.) shows it is equivalent to slightly less than a year's worth of precipitation over the area of the pit (approximately 520,000 gal.). The leaching pathway remains potentially complete, with projected travel times to groundwater on the order of hundreds of years for uncontainerized conservative species. However, much of the LLW inventory buried in Pit 38 is in containers, and many of the contaminants have low solubility and high adsorption coefficients (e.g., metals); these contaminants will transport much more slowly than the pore water. An ET cover will decrease infiltration rates to more natural conditions and is the appropriate remedy to minimize future leaching as recommended in the CME. Therefore, no additional investigation or change in the proposed remedy is warranted with respect to leaching of water-soluble constituents from Pit 38.

Vapor-Phase Transport

Vapor-phase transport of VOCs occurs at MDA G and is considered to be a mechanism that may lead to a potentially complete pathway to groundwater in the future. Pore-gas sampling confirmed the presence of VOCs in the vadose zone beneath MDA G. The CME identified future risk associated with this pathway from VOC migration to range from very low to medium. To prevent groundwater from being impacted above a regulatory standard by the transport of VOCs through soil vapor, SVE is the proposed site remedy to remove VOCs within target locations having vapor concentrations that exceed Tier 2 screening criteria developed in the CME. Data analysis identified three comingled plume areas across MDA G: an eastern plume near Pits 1 through 5, a central plume near Pit 6, and a western plume near Pits 29 and 33.

VOCs are detected in the closest vapor-monitoring well located west of Pit 38. However, vapor concentrations are significantly lower than both the Tier 2 screening levels proposed in the CME and the more conservative Tier 1 screening levels presented in the periodic monitoring reports for vapor sampling. The area near Pit 38 was not targeted for SVE because of the low vapor concentrations.

The additional water may displace the current vapor plume laterally and downward relative to its current position but would not increase vapor concentrations to above screening levels or increase the rate of release of VOCs. Vapors from any future volatilization within the pit waste would diffuse more slowly toward groundwater because of the presence of higher pore moisture. Therefore, no additional investigation or change in the proposed remedy is warranted with respect to VOCs near Pit 38.

CONCLUSIONS

Neither the potentially mixed waste that was placed in Pit 38 in 1996 nor the bulk LLW from MDA B contained any hazardous constituents other than were previously identified in the September 2005 MDA G investigation report (LANL 2005, 090513).

The potential of the 460,000 gal. of water used for dust suppression and equipment in 2011 and 2012 did not affect any of the assumptions regarding the leaching of contaminants or the vapor-phase transport of VOCs underlying the remedy recommended by DOE/LANS in the MDA G CME. While this addition of water could temporarily result in an increased rate of leaching of water-soluble contaminants, the projected travel times to groundwater will not be significantly affected. The additional water may displace the current vapor plume but would not cause an increase in vapor concentrations to above screening levels or increase the rate of VOC release. Therefore, no additional investigation or change in the proposed remedy is warranted with respect to water soluble contaminants or VOCs near Pit 38.

REFERENCES

LANL (Los Alamos National Laboratory), September 2005. "Investigation Report for Material Disposal Area G, Consolidated Unit 54-013(b)-99, at Technical Area 54," Los Alamos National Laboratory document LA-UR-05-6398, Los Alamos, New Mexico. (LANL 2005, 090513)

LANL (Los Alamos National Laboratory), September 2011. "Corrective Measures Evaluation Report for Material Disposal Area G, Solid Waste Management Unit 54-013(b)-99, at Technical Area 54, Revision 3," Los Alamos National Laboratory document LA-UR-11-4910, Los Alamos, New Mexico. (LANL 2011, 206324)

LANL (Los Alamos National Laboratory), April 2012. "Investigation/Remediation Report for Material Disposal Area B, Solid Waste Management Unit 21-015, Revision 1," Los Alamos National Laboratory document LA-UR-12-20089, Los Alamos, New Mexico. (LANL 2012, 215119)