Response to the Notice of Disapproval for the Corrective Measures Evaluation Report (CME) for Material Disposal Area G, Solid Waste Management Unit 54-013(b)-99, at Technical Area 54, Revision 1, Los Alamos National Laboratory EPA ID No: NM0890010515, HWB-LANL-08-025, Dated July 26, 2010

INTRODUCTION

To facilitate review of this response, the New Mexico Environment Department's (NMED's) comments are included verbatim. The comments are divided into general and specific categories, as presented in the notice of disapproval (NOD). Los Alamos National Laboratory's (LANL's or the Laboratory's) responses follow each NMED comment. This response contains data on radioactive materials, including source, special nuclear, and byproduct material. Information on radioactive materials and radionuclides, including the results of sampling and analysis of radioactive constituents, is voluntarily provided to NMED in accordance with U.S. Department of Energy (DOE) policy and Section III.A of the Compliance Order on Consent (Consent Order).

Regulatory Basis and Scope of the Corrective Measures Evaluation Report and Corrective Measures Implementation Plan

Several NMED comments raise questions about the appropriate level of detail necessary to evaluate corrective measures alternatives in the corrective measures evaluation (CME). Pursuant to Section VII.E of the Consent Order, the corrective measures implementation (CMI) plan is where the detailed engineering takes place, including the development of design drawings and system specifications, a construction work plan, and an operation and maintenance plan. The level of engineering detail provided in the enclosed Revision 2 of the CME is focused on facilitating an objective comparison of potential remedial alternatives that will lead to the identification of the Laboratory's proposed preferred remedy or remedies. As discussed in more detail below, the CME and CMI process under the Consent Order proceeds independently of any corrective-action-related activities for radionuclides or the radioactive component of mixed waste.

1) **Regulatory Basis and Scope of the Performance Assessment and Composite Analysis for Technical Area 54, Material Disposal Area G.**

   A number of the comments in the NOD question the differences between the robustness of the engineering methods and the complexity of modeling tools in the performance assessment and composite analysis (PACA) and the CME. LANL is required by DOE under Order 435.1 to prepare a PACA because low-level waste (LLW) was accepted for disposal after September 26, 1988. The scope of the PACA process, as defined in DOE Order 435.1, is more comprehensive than the CME process under the Consent Order. The robustness of the engineering methods in the PACA is required based upon the longevity of the radioactive wastes and resulting 1000-yr compliance period. The complexity of modeling tools and the conservative modeling assumptions in the PACA are the result of the uncertainties regarding potential impacts of such long-lived waste to human health and the environment.

   The performance assessment is an analysis of the physical and chemical mechanisms that control the migration of radioactive materials through the environment to points of potential human exposure. Because the potential impacts from the disposal of LLW on the public or the environment may not be realized until hundreds or thousands of years after the disposal facility has been closed, the performance assessment process is performed to specify details of design, operational controls, and closure requirements to ensure that DOE performance objectives are met.

The composite analysis is the planning tool used to analyze the interaction of other radioactive sources at a LLW disposal facility to determine how to minimize the likelihood that current LLW disposal activities will result in the need for future corrective or remedial actions. The composite analysis is used by DOE for planning, establishing radiation protection services, and making commitments concerning future uses of land or resources.

Because the Consent Order excludes radionuclides, the DOE's remedy selection process is independent of the CME. The Laboratory has, however, voluntarily provided information from the PACA and other information concerning radionuclides and the radioactive component of mixed waste under Section III.A of the Consent Order. The selected remedy that DOE chooses for the LLW, TRU, and the radioactive portion of mixed waste using the PACA process, however, will not be less protective than the selected remedy under the CME to ensure that the Laboratory's obligations under the Consent Order are met.

2) Integration of the March 2005 Consent Order with the Laboratory's Hazardous Waste Facility Permit.

A number of comments in the NOD address the definition of the term "regulated unit" and the applicability of alternative closure. The Laboratory agrees with NMED that alternative closure under 40 CFR 264.110(c), as implemented through the Consent Order, is the regulatory mechanism for corrective action for solid waste management units (SWMUs) and regulated units at Material Disposal Area (MDA) G. For the reasons outlined below, the Laboratory respectfully disagrees with NMED's identification of the regulated units.

Section III.W of the Consent Order describes the integration of the current and any future Hazardous Waste Facility Permits (HWFPs) with the Consent Order. All corrective action for releases of hazardous waste or hazardous constituents required by Sections 3004(u) and (v) and 3008(h) of the federal Resource Conservation and Recovery Act (RCRA); Sections 74-4-4(A)(5)(h) and (i), 74-4-4.2(B) and 7-7-10(E) of the Hazardous Waste Act (HWA); the federal and state implementing regulations at 40 Code of Federal Regulations (CFR) Part 264, Subpart F; and the New Mexico Administrative Code (NMAC) Section 20.6.2.3103, shall be conducted solely under the Consent Order.

The CME for MDA G recommends corrective measures alternatives for the closure of SWMUs, which include eight subsurface SWMUs and one surface SWMU. In addition to these SWMUs, MDA G also includes SWMUs that meet the regulatory definition of regulated units. These regulated units would have been subject to closure under the HWFP but are included as part of the corrective action under the Consent Order through the use of alternative closure requirements in 40 CFR §264.110(c). A "regulated unit" is defined in 40 CFR 264.90(a)(2) as "any landfill, surface impoundment, waste pile or land treatment facility that received wastes after July 26, 1982 or that certified closure after July 26, 1983." The regulated units are a small subset of the SWMUs that compose MDA G. There are four regulated units at MDA G: Shafts 142, 145, and 146 and Pit 29.

Subpart F of Parts 264 and 265 set forth closure requirements for regulated units, including design requirements for caps for land disposal units and postclosure care (including cap maintenance and groundwater monitoring). The U.S. Environmental Protection Agency (EPA) and NMED have recognized that complex sites, such as MDA G, are potentially subject to two different sets of RCRA requirements that apply to a single release if both regulated units and SWMUs have contributed to the release. To avoid unnecessary impediments to cleanups while ensuring that both SWMUs and regulated units are cleaned up in a manner that is protective of human health and the environment, 40 CFR 264.110(c) provides EPA and authorized states,

such as New Mexico, with the discretion to prescribe alternative closure requirements under certain circumstances. MDA G meets the requirements for the application of 40 CFR 264.110(c) because

- MDA G has four regulated units situated among eight subsurface SWMUs, and both types of units have likely contributed to the releases indentified during site investigation.
- The alternative closure and postclosure requirements for MDA G are set out in the Consent Order, which is an "enforceable document" as defined in 40 CFR 270.1(c)(7).

In summary, although LANL respectfully disagrees with NMED's identification of the entirety of MDA G as a regulated unit, LANL agrees with NMED that the use of alternative closure for the regulated units at MDA G is appropriate because regulated units are situated among the SWMUs, and both the SWMUs and the regulated units are likely to have contributed to the releases at MDA G. The identification of the regulated units does not change the alternatives analysis or the proposed alternative set forth in the CME. The inclusion of the regulated units in the CME and, ultimately in the CMI, ensures that the corrective action and closure of MDA G will be completed using a comprehensive and integrated approach that is protective of human health and the environment.

GENERAL COMMENTS

NMED Comment

1. *NMED received a copy of the Performance Assessment and Composite Analysis for Los Alamos National Laboratory, Technical Area 54, Material Disposal Area G, Revision 4 (October 2008) (PACA) in June 2010, which is referenced in the MDA G CME. There were numerous disparities with respect to thoroughness between the CME and the PACA. For example, the hydraulic parameters for the evapotranspiration (ET) cover construction materials (which is likely to be crushed tuff due to availability) in the PACA were interpolated from a tabulation of a variety of specific test results from on-site tuff sources and relevant off-site tuff sources. In contrast, the CME discarded site-specific tuff testing results and instead used assumed hydraulic properties from a table of values (Table 3.2, Appendix C) for "typical sandy loam," resulting in a reduction of cover thickness by approximately one foot from the PACA design. Rather than enhancing the engineering evaluation, the CME developed a less suitable material specification for the ET cover, which is arguably the most critical component of the cover design. The level of effort for water balance and erosion modeling in the PACA provides a more appropriate level of effort for long-term assessment of the Area G cover. In addition to testing of site-specific materials (with amendments if needed) for hydraulic parameters, construction and performance monitoring of a test pad using specified materials should also be considered during the CMI design. Additionally, cliff retreat is another significant long-term issue that was identified in the PACA, but not addressed in the CME. The Permittees must revise the CME to address the discrepancies between the CME and the PACA and discuss why less robust engineering methods and assumptions were applied in the CME than in the PACA or modify the CME to incorporate the level of effort utilized in the PACA.*

LANL Response

1. As discussed in the introduction, the scope of the PACA process is more comprehensive than the CME process under the Consent Order. The DOE's remedy selection process is independent of the CME; the information from the PACA and any other plans, reports, or references to or information concerning radionuclides or the radioactive component of mixed waste is provided voluntarily.

The introduction summarizes the differences in scope and level of detail between the CME and the CMI. The purpose of the CME is to identify, develop, and evaluate potential remedial alternatives for removal, containment, and/or treatment of RCRA-regulated contamination. The CMI includes the detailed design, construction, operation, maintenance, and performance monitoring for the selected remedy in accordance with Section VII.E.2 of the Consent Order. In accordance with Section VII.E.2 of the Consent Order, additional detail related to the design, construction, operation, maintenance, and performance monitoring of the selected remedy will be included in the CMI Plan.

NMED Comment

2. *The Permittees must provide additional justification of the efficacy of waste removal as part of Alternative 2C, which involves partial waste excavation to allow construction of a lower profile ET cover. NMED notes that the Permittees' value assessment (VA) process (presented in Appendix H of the CME) ranked partial waste excavation as a low priority. In comparison, Alternative 2B represents the conceptual ET cover design as evaluated in the PACA.*

   The Permittees state in the first paragraph of Section 8.3.1.5 that "Alternative 2C is optimized through the value engineering process and is an improvement over Alternative 2B because the modifications optimize ET, reduce infiltration, and minimize long-term erosion and biointrusion. These modifications are detailed in Appendixes C and D." Based on this statement, ET cover design was not effectively optimized in Alternative 2C. The Permittees used only select VA approaches with a priority that did not match the Permittees' own VA ranking. Value engineering and the suggested modifications have potential benefit, but have not been evaluated with comparable modeling tools as provided for Alternative 2B in the PACA. Therefore, these modifications (where justified) should only be used as design concepts to be proven during the CMI design stage. The Permittees must revise the CME to resolve these issues.

LANL Response

2. The evaluation of remedial alternatives in section 8 has been revised.

NMED Comment

3. *There appear to be two somewhat parallel and redundant efforts expended toward ET cover design: the CME and the PACA. The PACA appears to provide a substantial multi-disciplinary approach towards analyzing the multiple pathways of radiological contaminant migration through vapor phase diffusion, plant uptake, vertical migration through leaching, soil erosion, and groundwater transport. The CME, Appendix C (Conceptual Cover Design Report) appears to be based on more cursory evaluations of leaching and soil erosion, and utilizes different models. Further, the CME loosely references the PACA for justification of the cover performance criteria and overall conclusions. Given the long-term requirements of this cover, the level of detail provided in the PACA with regard to cover design is crucial for the design of the cover in the CME.*

   The last two paragraphs of Section 7.3.7, Cover Optimization, of the PACA states "[r]ough estimates ... of the final cover ... could cost upwards of $70 million. This high cost, combined with the level of performance projected for the disposal facility, suggests an opportunity for cover design optimization. ... The modeling tools developed in support of the performance assessment and composite analysis will aid in any such optimization effort." However, the CME conceptual design evaluation did not utilize the modeling tools developed and refined during the two previous PACA evaluations (1997 and more recently in 2008). Instead, a more simplified approach based on different modeling of unsaturated zone leaching and engineering judgment has been provided as the basis for the ET cover in the CME. Further, a generalized interpretation of the PACA results is referenced,

where convenient, within the CME conceptual design. While the conceptual design work performed to support the CME would be adequate for a more typical solid waste cover design (or in the absence of other evaluations), it does not appear to be based upon the PACA evaluations at all. In fact, it appears that the CME substituted a conceptual design based on less substantial modeling and non-site specific (e.g., Table 3.2) parameters representing the soil cover material. Compared to the PACA the CME lacks thoroughness and reliability with regard to the ET cover design. While the ET cover concept and the potential for design optimization as presented in the CME could be reasonable, the basis for further design should be founded on the recommendations found in Section 7.3 of the PACA, rather than Appendix C (Conceptual Cover Design Report) of the CME.

LANL Response

3. As discussed in the introduction, the scope of the PACA process is more comprehensive than the CME process under the Consent Order. The robustness of the engineering methods and the complexity of modeling tools and the conservative modeling assumptions in the PACA are the result of the uncertainties regarding potential impacts of such long-lived waste to human health and the environment.

NMED Comment

4. NMED acknowledges that the Permittees have devoted a considerable amount of time and resources to installing groundwater monitoring wells around TA-54. However, representative and reliable groundwater data from those wells is not included in the CME. NMED has, on several occasions, informed the Permittees that selection of a remedy at MDA G would depend on reliable groundwater data. The Permittees have not provided an accurate description of the groundwater conditions beneath MDA G in accordance with Section XI.F.6.b of the Order, and therefore have not met the requirements set forth in Section VII.D.2 (specifically numbers 4, 5, and 7). The Permittees must revise the CME, to include data from all wells in the groundwater monitoring network at TA-54.

LANL Response

4. The revised text and Figure 2.3-3 reflect the current monitoring network at TA-54. The entire network was used to develop the description of the hydrogeology and the water table maps presented in Appendix E. In addition, wells R-22, R-39, R-41, R-49, R-55 and R-57 are immediately downgradient from MDA G; wells R-23i and R-23 are further downgradient. Groundwater data from these downgradient wells are presented in Appendix D.

NMED Comment

5. NMED acknowledges that the Permittees have revised the cost estimates and supporting information considerably from the original CME submittal (September 2008); however, there are still several instances where the Permittees have not provided unit costs and/or assumptions used in development of the cost estimates. For example, in Attachment E-4 (Cost Estimate Details for Alternative 5B) of Appendix E, the Permittees provide cost estimate detail reports for all portions of Alternative 5B. In the cost detail report for "Remedial Action Complete Excavation Phase Technology" (58.01.05, page 9), the Permittees provide cost estimates associated with "Off-Site Transportation and Waste Disposal." Row one of the report lists the following line item:

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Extended Cost
33190103	Load Drums on Disposal Vehicle	1,428,000.00	EA	0.00	4.12	1.37	$7,843,432.80

The Permittees did not provide the assumptions used to determine that 1,428,000 drums would be loaded for off-site disposal, the labor cost of 4.12, or the equipment unit cost of 1.37. Furthermore, the Permittees do not provide any kind of explanation for the "Unit of Measure." Does "EA" mean each drum, each load, or some other measurement? In the same cost detail report, under the technology heading "Decontamination Facilities," the Permittees list a unit cost for a field technician of $471.36/hour for 360,000 hours. The Permittees provided no explanation of the assumptions used to estimate the number of hours the field technician would be on-site or supporting documentation supporting a unit cost of $471.36/per hour. The Permittees must revise the text of the CME and Appendix E, where appropriate, to include any unit costs and assumptions used to develop the cost estimates.

LANL Response

5. The revised cost estimates (Appendix G) include unit costs where applicable and identify the assumptions used for the various line items for each alternative.

NMED Comment

6. *The Permittees state that prior to implementation of corrective measures, transuranic (TRU) waste stored at Area G container storage units (CSUs) will be excavated and disposed of off-site at the Waste Isolation Pilot Plant (WIPP) and the surface CSUs will be closed under the Resource Conservation and Recovery Act (RCRA) closure process. NMED agrees that these activities are not part of the CME; however, implementation of these activities will affect the schedule established in Section 11.0. The TRU waste must be removed and the surface CSUs must be closed prior to implementation of a remedy. The Permittees must address removal of TRU waste and closure of the surface units; in so far as it pertains to the schedule for implementation of a remedy at MDA G.*

LANL Response

6. The revised MDA G CME addresses the milestones necessary for the removal of transuranic (TRU) waste and closure of the surface container storage units (CSUs).

NMED Comment

7. *The Permittees have developed and used a system model to evaluate potential long-term human health impacts from contaminants released over time at MDA G. NMED will not select a preferred remedy based on conclusions drawn primarily by the use of models. If a containment alternative is selected as a preferred remedy, NMED will require and rely on monitoring data to evaluate the performance of the selected remedy. NMED may in the future require additional remedial action at the site based on the results of long-term monitoring.*

LANL Response

7. The CME includes provisions for long-term monitoring of hazardous waste and hazardous waste constituents. The Laboratory recognizes that NMED may in the future require additional remedial action at the site based on the results of long-term monitoring for RCRA constituents.

NMED Comment

8. *Based on a preliminary review of the MDA G Soil Vapor Extraction (SVE) Pilot Test Report submitted to NMED on June 1, 2010, it appears that SVE is a viable remedial technology for MDA G. The Permittees must include a preliminary design for installation of an SVE system for all applicable alternatives. The Permittees must use the results of both pilot tests to design the recommended system rather than their numeric model that is primarily based on data from MDA L.*

The CME must be revised to include preliminary design criteria for the SVE system at MDA G. The preliminary design must include, but is not limited to the following:

- *The depths of the extraction wells,*
- *The zones to be targeted for extraction,*
- *The spacing of the wells,*
- *The locations across MDA G that will be targeted,*
- *The number of blowers and ancillary equipment (locations of sample ports and gauges) and the specifications and necessary capabilities for each blower/system (such as flow rates, maximum vacuum, target applied vacuum, target vacuum levels at the anticipated limits of the radius of influence),*
- *The locations of vapor monitoring wells and the port depths,*
- *A discussion of emissions and the need/method for treatment,*
- *A discussion of how the SVE system construction will interface with the rest of the remedial alternative, and*
- *Itemized costs for construction, startup testing and sampling and including operation and maintenance (O&M) costs.*

LANL Response

8. As discussed in the introduction, the intent of the CME is to identify, develop, and evaluate potential remedial alternatives for removal, containment, and/or treatment of RCRA-regulated contamination. The Laboratory agrees with NMED's assertion that "SVE is a viable remedial technology for MDA G." Should NMED choose soil-vapor extraction (SVE) as part of the remedial alternative, the details of the SVE system design will be included in the CMI Plan in accordance with Section VII.E.2 of the Consent Order.

NMED Comment

9. In Section 5.3.2 (Soil), the Permittees reference NMED's "Technical Background Document for Development of Soil Screening Levels, Revision 4.0." The Permittees must revise this reference and any tables that refer to the values to the updated version, Revision 5.0, August 2009 which is available at NMED's website http://www.nmenv.state.nm.us/hwb/documents/NMED_SSG_August_2009_Dec09Table A-1_clean.pdf.

LANL Response

9. The revised MDA G CME includes references to Revision 5.0 of the NMED soil screening levels.

SPECIFIC COMMENTS

NMED Comment

1. Executive Summary, page v:

Permittees' Statement: *"The alternatives must meet the cleanup objectives of the Consent Order, RCRA closure standards for Pit 29 and Shaft 124, and DOE performance objectives for LLW disposal sites. The alternatives also assume that the subsurface RCRA units will be closed using alternative closure requirements developed through the CME and CMI processes."*

NMED Comment: *The entirety of MDA G (approximately 63 acres) is a regulated unit and therefore the remedy selected applies to the entire 63 acres. See NMED's July 6,2009 Fact Sheet for the Intent to Issue a Hazardous Waste Facility Permit Under the New Mexico Hazardous Waste Act, Los Alamos National Laboratory (LANL) (pages 24–28).*

LANL Response

1. The Laboratory respectfully disagrees with NMED's statement that "the entirety of MDA G (approximately 63 acres) is a regulated unit". MDA G is composed of all subsurface pits, trenches, and shafts located within the boundary of Area G. The Consent Order applies to releases from SWMUs and regulated units that managed hazardous wastes or hazardous waste constituents. the introduction summarizes the integration of the Consent Order with the HWFP, including the use of alternative closure for the regulated units at MDA G (i.e., Shafts 142, 145, and 146 and Pit 29) pursuant to 40 CFR 264.110(c). The regulated units at MDA G are a small subset of the SWMUs that are subject to corrective action under the Consent Order. The collocation of the regulated units with other SWMUs and the presence of comingled releases allows for the use of alternative closure requirements under 40 CFR 264.110(c).

NMED Comment

2. Section 2.2.1, LLW and MLLW, page 4, paragraph 1:

Permittees' Statement: *"The Pits and shafts of Area G were used mainly for the disposal of LLW. Three subsurface pits and 98 shafts at Area G (exclusive of the MDA G subsurface units) are regulated as LLW disposal units pursuant to DOE Order 435.1. These units are not identified as SWMUs and are not subject to corrective actions under the Consent Order. Consistent with implementing a comprehensive, integrated strategy for Area G closure, these units will be included in the CMI Plan."*

NMED Comment: *The Permittees state in the Introduction to the CME that "[t]his CME is part of a comprehensive, integrated approach to remediation and closure of all subsurface units at Area G, including the MDA G subsurface corrective action units, the RCRA landfill and RCRA-subsurface CSU, and DOE-regulated LLW units." However, on page 96 of the CME, the Permittees state that "[a]s noted in section 7.3.12, Alternative 5B does not include removal of wastes from the LLW disposal pits and shafts that are not identified as subject to corrective action and regulated only by DOE. The cost estimate for Alternative 5B is based on an ET cover design." NMED agrees that a comprehensive, integrated approach, makes sense. However, such an approach must include all subsurface units in their cost estimates; particularly for Alternatives 5B, 5C, and 5D otherwise the approach is integrated and comprehensive in name only.*

LANL Response

2. As summarized in the introduction, the closure of LLW disposal units and corrective action for RCRA constituents under the Consent Order will proceed on parallel tracks based upon regulatory authority. Every effort will be made to integrate the schedules for all waste management units at MDA G. However, the selected remedy that DOE chooses for the LLW, TRU, and the radioactive portion of mixed waste using the PACA process, will not be less protective than the selected remedy under the CME to ensure that the Laboratory's obligations under the Consent Order are met.

NMED Comment

3. Section 2.3.8, Groundwater Monitoring, page 11, paragraph 3:

Permittees' Statement: *"None of the groundwater samples collected in the watershed exceeds the New Mexico Water Quality Control Commission (NMWQCC) groundwater standards (LANL 2009, 106771), which are the applicable standards for these organic constituents. The source of these organic chemicals has not been determined with certainty."*

NMED Comment: *Pursuant to Section VIIIA.1. of the March 1, 2005 Order on Consent (Order), the Permittees must utilize both the New Mexico Water Quality Control Commission (NMWQCC) and the drinking water maximum contaminant levels (MCLs) for groundwater. If both a NMWQCC standard and an MCL have been established for an individual substance, then the lower of the two levels will be considered the cleanup level for the substance. The Permittees must revise the text to indicate that both NMWQCCs and MCLs are applicable groundwater cleanup standards.*

The Permittees have omitted several detections of organic, inorganic, and radionuclide constituents that exceeded the cleanup levels listed in Section IIIA.1 of the Order. For example, 1,4-dioxane was detected in regional well R-20 at a concentration of 61.4 µg/L between August 31, 2008 and August 31, 2009 and bis(2-ethylhexyl)phthalate was detected in regional well R-38 at a concentration of 35.6 µg/L during the same time period. The Permittees must revise the text to identify all exceedances of the cleanup levels included in Section IILA1 of the Order for all constituents at all wells located in the vicinity of TA-54.

LANL Response

3. In accordance with Section VIII.A.1 of the Consent Order, the revised MDA G CME clarifies that whichever of the two levels is lower—the New Mexico Water Quality Control Commission (NMWQCC) standards or the maximum contaminant levels (MCLs) for groundwater—will be considered the cleanup level. In addition, the revised CME identifies the exceedences of the cleanup levels at the wells located near TA-54.

NMED Comment

4. Section 4.2.1, Contaminant Transport Pathways, page 20, paragraph 1:

Permittees' Statement: *"This decline indicates tritium in the well may have been introduced during or shortly after drilling. Declining concentrations in screen 5 before the test may have resulted from radioactive decay and mixing with native groundwater."*

NMED Comment: *There appears to be a duplication of the above two sentences in the eighth and ninth sentences of the first paragraph. The Permittees must revise the text to remove the duplicative sentences.*

LANL Response

4. The text has been revised.

NMED Comment

5. Section 5.1, DOE Closure Requirements, page 23, paragraph 4:

Permittees' Statement: *"The performance assessment/composite analysis report (French et al. 2009, 106890) presents the radiological performance assessment and composite analysis for TA-54, Area G."*

NMED Comment: *The above-referenced statement refers to the performance assessment/composite analysis report as French et aI., 2009; the correct citation is French et aI., 2008. The same error is found in the first full paragraph on page 24. The Permittees must revise the text to correct the typographical error, unless there is a 2009 version of the report. In that case the Permittees must provide the 2009 report to NMED with the Revision to the MDA G CME.*

LANL Response

5. The citation has been corrected.

NMED Comment

6. Section 6.2, Screening of Technologies, page 29 and Figure 6.2-1,1-4, pages 153-156:

The Permittees must resolve the following discrepancies in Section 6.2 and Figure 6.2-1:

1) Page 1 of 4 of Figure 6.2-1: The "Multi-Layer Cover" is rejected as a technology but subsequently retained in Alternative 2A (RCRA Subtitle C final cover). Although there are potential desiccation problems associated with compacted clay barriers in arid climates, if this technology is not retained it prescribes the ET cover at the technology screening level, which is presumptive.

2) It appears that biotic barriers (for engineered covers) and thermal desorption were retained as potentially viable technologies in Figure 6.2-1, but not discussed as retained in the Section 6.2.2.7 text.

3) Concrete-grout mixture as a cover layer was retained in the text (last paragraph in Section 6.2.2.7), but not presented in Figure 6.2-1. This appears to be the technology subsequently used for Alternative 2D; therefore, resistance to erosion should also be mentioned.

4) Page 1 of 4 of Figure 6.2-1, under the "description" heading for Soil-Grout Mix, "penetration" should be spelled "penetration"

5) Page 4 of 4 of Figure 6.2-1, under the heading "description" for Thermal Destruction, change first "of' to "or"

LANL Response

6. The revised section 6 addresses the discrepancies listed above.

NMED Comment

7. Section 6.2.2.2, In Situ Physical/Chemical Treatment, SVE, page 30

Permittees' Statement: *"This technology is primarily applicable to VOCs."*

NMED Comment: *In addition to volatile organic compounds (VOCs), SVE is also potentially applicable for removal of tritium from subsurface environmental media. At a minimum, the Permittees must acknowledge that SVE treatment residuals (i.e., offgas) could be affected by the presence of tritium. The Permittees must revise this section to reflect that SVE treatment residuals may be affected by tritium.*

LANL Response

7. Tritium is not a hazardous waste or hazardous waste constituent that is regulated under the Consent Order. However, NMED is correct that the SVE system treatment residuals may contain tritium and therefore may impact SVE treatment residuals. This is discussed in section 7.4.4.4 of the revised report.

NMED Comment

8. Section 6.2.2.7, Containment, page 32, paragraph 3:

Permittees' Statement: *"The vegetated ET cover was developed explicitly for landfills located in arid and semiarid environments such as at the Laboratory. The earliest research in this area was conducted at a test site within 1 mile of MDA G subsurface units. Cover system design guidance provides requirements and considerations for design of cover systems at the Laboratory. An engineered ET cover could enhance the existing MDA G cover and is retained for further consideration."*

NMED Comment: *ET covers perform well in arid and semi-arid climates; however, Los Alamos is located in a wetter environment than semi-arid and receives a considerable amount of snow which is especially detrimental to ET covers. ET covers are also proven to leak. Additionally, an ET cover may not comply with the RCRA post-closure requirements for all pits, shafts, and trenches at MDA G. Because the Permittees propose an ET cover as a remedial alternative at MDA G, the Permittees must propose to conduct vapor moisture monitoring. Additionally, the Permittees must describe how the ET cover meets the RCRA closure/post-closure care requirements.*

LANL Response

8. RCRA postclosure requirements do not apply to all pits, shafts, and trenches at MDA G. The sole mechanism for enforcing corrective action for the release of hazardous waste and hazardous waste constituents from SWMUS, including the four regulated units, is the Consent Order. The requirements of the Consent Order do not apply to radionuclides, including, but not limited to, source, special nuclear or byproduct material as defined in the Atomic Energy Act of 1954 or the radioactive portion of mixed waste. As summarized in the introduction, the four regulated units at MDA G are incorporated under the alternative closure requirements in 40 CFR 264.110(c), which allows the Secretary to replace all or a part of the requirements in 40 CFR Subpart G with alternative requirements set out in the Consent Order.

   The evapotranspiration (ET) cover can be designed to meet the requirements for an alternative cover for a hazardous waste landfill as specified in 40 CFR Part 264, Subpart G – Closure and Post-Closure. Section 7.3.4 discusses the details of the ET cover technology.

NMED Comment

9. Section 7.3.4, Alternative 2B: ET Cover, Monitoring and Maintenance, and SVE, page 37:

The description of Alternative 2B does not mention the PACA evaluation, but Table 7.3-1 states that this is the DOE Order 435.1 base design. Further, Figure 8.2-1 presents the same cover design as presented in the 2008 PACA. The Permittees must reference the PACA in this Section to clarify that the Alternative 2B represents the same design evaluated in the PACA.

LANL Response

9. Section 7 was revised, and Alternative PS-3b, which replaces Alternative 2B, is not based on the DOE Order 435.1 base design (see introduction).

NMED Comment

10. Section 7.3.6, Alternative 2D: ET Cover with Partial Waste Excavation, Targeted Stabilization, Monitoring and Maintenance, and SVE, page 38, paragraph 2:

Permittees' Statement: *"This alternative includes the use of in situ waste stabilization technologies and the partial excavation of selected near-surface waste to support minimized cover thickness. During design of a final remedy, engineering studies will determine whether excavation of a limited portion of the MDA G waste will be cost effective in reducing cover thickness."*

NMED Comment: *Studies necessary to determine whether or not a remedial technology is viable should have already been conducted. The Permittees cannot propose to conduct such studies in the CME. The Permittees did not provide sufficient information for NMED to determine whether or not Alternative 2D is a viable remedial alternative for MDA G. The Permittees must revise the text by removing the statement referencing engineering studies, conduct the necessary studies, and include the results in the revised CME.*

The Permittees also state in this section that "[f]or the purpose of developing this alternative, it is assumed that all waste will be disposed of off-site." The Permittees must clarify whether or not on-site consolidation within the Area G disposal area is an option for design optimization.

LANL Response

10. Sections 6, 7, and 8 were rewritten to address the remedial action objectives that were developed in section 4.

    Technologies were identified to address the source areas independently and were subsequently combined into remedial alternatives for MDA G.

    Additionally, the revised CME no longer states that additional studies are necessary to make a remedy decision.

NMED Comment

11. Section 7.3.8, Alternative 4A: Partial Waste Stabilization, Monitoring and Maintenance, and SVE, page 39:

The Permittees must revise this Section and Section 7.3.10 (Alternative 4C) to provide more detail regarding the differences between the two Alternatives.

LANL Response

11. The revised MDA G CME clarifies the differences between similar alternatives (e.g., vegetative cover and ET cover).

NMED Comment

12. Section 7.3.13, Alternative 5C: Complete Waste Excavation, On-Site Waste Treatment, Disposal of Wastes in a RCRA Subtitle C Landfill, and SVE, pages 40–41:

Permittees' Statement: *"Overburden generated during excavation will be characterized to determine final disposition. Material meeting SSLs will be returned to the excavation."*

NMED Comment: *The Permittees are prohibited, under any alternative, from returning overburden material that does not meet residential soil screening levels (SSLs) to the excavation. The Permittees must revise the text, where applicable, to indicate that only material that meets or is below residential SSLs may be returned to the excavation.*

LANL Response

12. The revised text states that only materials that meet or are below residential soil screening levels (SSLs) will be returned to the excavation.

NMED Comment

13. Section 7.4, Corrective Measures Alternatives Threshold Screening Criteria, page 41:

Permittees' Statement: *"Alternatives where waste is to remain in place must also meet the requirements of DOE Order 435...Based on results of the performance assessment and composite analysis for Area G (French et al. 2009, 106890), only alternatives with ET cover designs were determined to meet criterion 3."*

NMED Comment: *The Permittees' statement suggests that all ET cover alternatives meet the PACA evaluation, but only Alternative 2B was evaluated against the conceptual design criteria of the PACA. In contrast, Alternatives 2C and 2D were based on other design criteria (i.e., Appendix C of the CME). The Permittees must revise the text to resolve this discrepancy.*

LANL Response

13. As discussed in the introduction, the scope of the PACA process, as defined in DOE Order 435.1, is more comprehensive than the CME process under the Consent Order. The robustness of the engineering methods and the complexity of modeling tools and the conservative modeling assumptions in the PACA are the result of the uncertainties regarding potential impacts of such long-lived waste to human health and the environment.

NMED Comment

14. Section 7.4, Corrective Measures Alternatives Threshold Screening Criteria, page 42, paragraph 3:

Permittees' Statement: *"Alternatives that generate waste (e.g., through excavation) must manage these wastes in compliance with all applicable regulatory standards to meet criterion 4. The RCRA-regulated units (Pit 29 and Shaft 124) will be closed using alternative closure standards."*

NMED Comment: *See Specific Comment # 1.*

LANL Response

14. See LANL response to Specific Comment # 1.

NMED Comment

15. Section 7.4.2.2, 7.4.3.2, 7.4.4.2, 7.4.5.2, 7.4.6.2, 7.4.7.2, 7.4.8.2, 7.4.9.2, 7.4.10.2, 7.4.11.2, Threshold Criterion 2, Attains Media Cleanup Standards, page 43:

Permittees' Statement: *"The media cleanup standards apply to contaminated environmental media. Media cleanup standards have been established for soil and groundwater. Sampling conducted to date indicates that the media cleanup standards are currently being met for soil and groundwater outside the waste disposal units."*

NMED Comment: *Sampling to date does not indicate that the media cleanup standards are being met for soil and groundwater outside the waste disposal units. The Permittees have detected multiple constituents at concentrations that exceed the groundwater cleanup levels (See Specific Comment # 3). The Permittees must revise the text by removing this statement, or include a sentence indicating that the media cleanup standards may have been met for soil, but not for groundwater.*

LANL Response

15. The revised "Attainment of Media Cleanup Standards" sections of the MDA G CME (sections 7.3.1.2−7.3.10.2) describe whether or not the technology can potentially achieve media cleanup standards for soil and groundwater in the future.

NMED Comment

16. Section 7.4.5.4, Threshold Criterion 4 Complies with Applicable Standards for Waste Management, page 46:

Permittees' Statement: *"Requirements for management of waste are not applicable for this alternative because wastes will not be generated or actively managed."*

NMED Comment: *Alternative 2C includes partial waste excavation. Therefore, wastes will be generated as part of this Alternative. The Permittees must revise this section to account for management of wastes generated during implementation of this remedy, if chosen.*

LANL Response

16. Sections 6, 7, and 8 were rewritten to address the remedial action objectives that were developed in section 4.

    Technologies were identified to address the source areas independently and were subsequently combined into remedial alternatives for MDA G.

    Any waste generated as part of an excavation technology will be managed in accordance with applicable state and federal regulations.

NMED Comment

17. Section 7.4.6.2, Alternative 2D Threshold Criteria 2, Attains Media Cleanup Standards, page 47:

The Permittees must revise the second to last sentence to read "[w]astes that are not excavated would remain within the closed unit."

LANL Response

17. Revised section 7 text no longer includes the above-referenced statement.

NMED Comment

18. Section 7.4.11.2, Alternative 5A, Threshold Criterion 2, Attains Media Cleanup Standards, page 51:

Permittees' Statement: *"Media cleanup standards would also apply to any waste residue or residual contamination that remains in place following waste excavation; however, this alternative does not involve any waste excavation."*

NMED Comment: *The Permittees state in Section 7.4.11, that Alternative 5A includes partial waste excavation. The Permittees must revise the text to resolve the discrepancy.*

LANL Response

18. Sections 6, 7, and 8 were rewritten to address the remedial action objectives that were developed in section 4.

    Technologies were identified to address the source areas independently and were subsequently combined into remedial alternatives for MDA G.

    Any waste generated will be managed in accordance with applicable state and federal regulations.

NMED Comment

19. Section 7.5.3, Alternative 2C: ET Cover with Partial Waste Excavation, Monitoring and Maintenance, and SVE, page 55:

a) Permittees' Statement: *"Alternative 2C is intended to contain MDA G subsurface waste, realize the benefits from excavation of waste potentially exposed by erosion, incorporate a biointrusion barrier in the ET cover profile, treat subsurface vapors with SVE, and maintain the site for 100 yr."*

NMED Comment: *The Permittees statement indicates that this alternative will "...realize the benefits from excavation of waste potentially exposed by erosion..." However, it appears from preceding portions of the text that this alternative includes waste excavation to lower the cover profile. The Permittees must revise the text to resolve this discrepancy.*

b) Permittees' Statement: *"Excavating the uppermost portion of selected pits and shafts to flatten the topography under the cover (both to reduce the amount of fill needed for the cover and to reduce the likelihood of erosion)"*

NMED Comment: *The Permittees must revise the text to specify which pits and shafts will be partially excavated to flatten the topography for the ET cover.*

LANL Response

19. Sections 6, 7, and 8 were rewritten to address the remedial action objectives that were developed in section 4.

    Technologies were identified to address the source areas independently and were subsequently combined into remedial alternatives for MDA G.

NMED Comment

20. Sections 7.5.2 through 7.5.4, pages 55-57:

The Permittees do not clearly distinguish between the three Alternatives that propose covers. For example, the first bullet under Section 7.5.2 and the third bullet under Sections 7.5.3 and 7.5.4 describes the cover's slopes as two to ten percent for all three alternatives, but elsewhere in the text (see the first paragraph, 2nd sentence of Section 7.3.5) the lower profile cover of Alternatives 2C and 2D is described as less than four percent. The Permittees must revise the text to resolve this discrepancy.

In addition, all three ET cover alternative descriptions include the following bullet: "designing cover thickness and properties (e.g., gas permeability and saturated/unsaturated hydraulic properties) to meet radioactive gas flux limits from the unit and limit water infiltration to maintain pathway-specific exposures." This appears to describe the Alternative 2B design because radiological flux was estimated in the PACA report; however, the design concept for Alternatives 2C and 2D (Appendix C of the CME) does not assess "radioactive gas flux limits." The Permittees must revise the text to resolve this discrepancy.

LANL Response

20. Revised section 7 no longer includes statements regarding the ability of the ET cover to meet radioactive gas flux limits from the unit.

NMED Comment

21. Section 7.5.4, Alternative 2D: ET Cover with Partial Waste Excavation, Targeted Stabilization, Monitoring and Maintenance, and SVE, page 56:

The Permittees must revise the description of Alternative 2D to clarify whether or not the upper portion of the operational soil cover overlying the waste or the waste itself will be stabilized. There are significant differences in implementation between these two approaches. For example, the second sentence in Section 7.5.4 indicates cover (i.e., soil) will be stabilized, but the second bullet indicates that waste will be stabilized.

LANL Response

21. Sections 6, 7, and 8 were rewritten to address the remedial action objectives that were developed in section 4.

    Technologies were identified to address the source areas independently and were subsequently combined into remedial alternatives for MDA G.

    Although stabilization of the operational soil cover and underlying waste were among the technologies considered in section 6, they did not pass the screening criteria and therefore were not included in section 7.

NMED Comment

22. Section 8.0, Evaluation of Alternatives Against Remedial Alternative Evaluation Criteria, Cost, page 60, paragraph 3:

Permittees' Statement: *"These alternatives assume that the RCRA surface CSUs have been closed, retrievably stored TRU waste has been removed from the site, and SVE will be implemented for VOC releases."*

NMED Comment: *It is the Permittees' responsibility to ensure that the surface CSUs have been closed and retrievably stored TRU waste has been removed. Failure to complete either of these tasks will result in delays to remedy implementation and are not good cause for an extension of time to implement the selected remedy. Also see General Comment # 8.*

LANL Response

22. For the purposes of comparing the remedial alternatives for closure of MDA G, the Laboratory must assume that the RCRA surface CSUs have undergone closure, and retrievably stored TRU waste has been removed from the site. This ensures that an objective comparison is made for all alternatives. The Laboratory will continue to work with the DOE and NMED to meet Consent Order milestones.

NMED Comment

23. Section 8.1, Alternative 1B: Monitoring and Maintenance of Existing Cover and SVE, page 61, bullet 1:

Permittees' Statement: *"Regrading and revegetation of the surface will provide ET of soil moisture to limit infiltration, except in extreme climate conditions (gravimetric moisture content in the 107-ft [33-m] bgs depth is 5.7%."*

NMED Comment: *It is not clear what the Permittees are attempting to demonstrate by providing the reported gravimetric moisture content at 107 feet below ground surface (bgs). Is the intent to demonstrate: 1) that ET is working, 2) that ET is not working due to extreme climate conditions, or 3) that Los Alamos might experience "extreme climate" during the performance period? The Permittees must revise the text to clarify the intent of including this information in the CME.*

LANL Response

23. Revised section 8 no longer includes this discussion.

NMED Comment

24. Section 8.1.1, Long-Term Reliability and Effectiveness, page 61, paragraph 3:

The Permittees must revise this section and all other applicable sections to include the results of the SVE pilot test at MDA G.

LANL Response

24. The results of the 2010 SVE pilot test at MDA G are included in the revised CME.

NMED Comment

25. Section 8.1.5, Alternative 1B, Cost, page 67:

Permittees' Statement: *"The estimated capital cost is $9.7 million. PV value estimates range from $45 million to $33 million (PV of 3% to 7%, respectively)."*

NMED Comment: *The Permittees must revise the text to explain the assumptions used to determine the percentage rates used in the present value calculations.*

LANL Response

25. The assumptions used to determine the percentage rates used in the present value calculations are included in Appendix G.

NMED Comment

26. Section 8.2, Alternative 2B: ET Cover, Monitoring and Maintenance, and SVE, page 70:

Permittees' Statement: *"A third layer of the base cover consists of 12 in. (30 cm) of clean gravel that will serve as a capillary break."*

NMED Comment: *Figure 8.2-1 describes the layer below the amended crushed tuff as an "optional filter zone," not a "capillary break layer" as described in the text. NMED concurs that this material may be useful as a capillary break layer, but this function has not been evaluated in the supporting documentation (i.e., the PACA). The Permittees must explain this discrepancy.*

LANL Response

26. An ET cover option was retained (Technology PS-3b) and includes 1.5 ft of vegetated topsoil-gravel admixture at the surface and a lower, 3.5-ft infiltration layer composed of crushed tuff.

    As discussed in the introduction, the scope of the PACA process, as defined in DOE Order 435.1, is more comprehensive than the CME process under the Consent Order. The robustness of the engineering methods and the complexity of modeling tools and the conservative modeling assumptions in the PACA are the result of the uncertainties regarding potential impacts of such long-lived waste to human health and the environment.

NMED Comment

27. Section 8.2.4.3, Cleanup Technology Difficulties, page 75:

The Permittees must explain why the cleanup technology difficulties identified in this section (top gravel mulch size, roofline design, rock armoring, no local source for bentonite) would not apply to other similar Alternatives (e.g., Alternative 2C, Section 8.3.4.3).

LANL Response

27. Difficulties associated with each technology have been incorporated into the discussions on implementability. The revised section 8 addresses the discrepancies identified by NMED.

NMED Comment

28. Section 8.3, Alternative 2C: ET Cover with Partial Waste Excavation, Monitoring and Maintenance, and SVE, page 77:

a) Permittees' Statement*: "The design of the Alternative 2C cover is similar to that of the Alternative 2B cover, except the design of the latter is optimized to minimize erosion by reducing the slope of the cover."*

NMED Comment*: NMED assumes the Permittees intended this sentence to read, "[t]he design of the Alternative 2C cover is similar to that of the Alternative 2B cover, except the design of the former is optimized to minimize erosion by reducing the slope of the cover." The Permittees must revise the text to correct the apparent typographical error.*

b) Permittees' Statement: *"The existing site will be graded to 2 ft (0.6 m) above the waste, except in areas where the existing grade exceeds 4%. The existing mounds will be leveled to minimize creation of a cover roofline that requires excessive fill."*

NMED Comment: The Permittees must revise the text to indicate the planned disposition of the removed material, waste, or both.

c) Permittees' Statement: *The design includes a biobarrier and partial excavation of waste in pits and shafts to be determined during the cover design. Alternative 2C was optimized by value assessment (VA) engineering presented in Appendix H."*

NMED Comment: *The distinguishing characteristic of this alternative (partial excavation) was ranked lowest in the reported list of positive ideas from the VA process (Appendix H, Table H-5.0-1). Other VA ideas that ranked high, such as maximizing a south-facing surface, have either been ignored or were not clearly conveyed in the CME. Also, the Appendix C conceptual design has not been referenced, but appears to be the basis for this alternative. The Permittees must revise the text to resolve this discrepancy.*

In addition, the design basis for this alternative is only appropriate for the CME comparison, and is not sufficiently detailed to provide a basis for Corrective Measures Implementation (CMI) design. The level of detail for water balance and erosion modeling in the PACA is more appropriate for long-term assessment of the Area G cover. Construction and performance monitoring of a test pad using specified materials should also be considered during the CMI design if an Alternative that includes an ET cover is selected.

d) Permittees' Statement: *"The uppermost portion of selected pits and shafts will be excavated to flatten the topography under the cover (both to reduce the amount of fill needed for the cover and to reduce the likelihood of erosion)."*

NMED Comment: *See Specific Comment # 19(b).*

e) NMED Comment: *The third bullet in this Section indicates a total of 7 ft of cover thickness for this alternative. This includes a specified 1-ft thick filter layer; however, this thickness is not included in Figure 8.3-3 (The Material layers of the cover for Alternative 2C). Also, the Appendix E cost estimate information (page E-11, WBS 2C.1.6) indicates the cover is approximately 6 ft thick. The Permittees must revise the text to resolve the discrepancy. The Permittees must also revise the text in the last paragraph of Section 8.3, on pg. 78, which also indicates a combined thickness of 6 ft.*

f) NMED Comment: *The Permittees must revise the text to indicate if, after partial excavation of wastes, the 3 ft intermediate cover will be replaced prior to construction of the overlying cover to protect onsite workers as well as offsite receptors from potential exposure during the time between partial waste excavation and final cover completion.*

g) NMED Comment: *The Permittees must revise the CME to include a figure showing the assumed waste and soil excavation areas proposed for Alternative 2C.*

h) Permittees' Statement: *"The cover thickness is designed to minimum thickness necessary to reach RCRA Subtitle C equivalent infiltration (5 ft [1.5 m]). The additional 1.5 ft (0.5 m) of soil/mulch cover contributes to the total water-storage capacity."*

NMED Comment: *In the conceptual design (Figure 8.3-3), an "additional 1.5 ft" beyond the 5 ft mentioned in the Permittees above statement is not included. Also, from Appendix C, Section 3.3, 3rd paragraph, the 5 ft thickness is based on "minimizing flux to a point of diminishing returns" for the typical soil evaluated, not on "reaching RCRA Subtitle C equivalent infiltration." The Permittees must revise the text to resolve this discrepancy.*

LANL Response

28. Sections 6, 7, and 8 were rewritten to address the remedial action objectives that were developed in section 4.

    Technologies were identified to address the source areas independently and were subsequently combined into remedial alternatives for MDA G.

    Section 8 addresses the discrepancies identified by NMED.

    As discussed in the introduction, the scope of the PACA process, as defined in DOE Order 435.1, is more comprehensive than the CME process under the Consent Order. The robustness of the engineering methods and the complexity of modeling tools and the conservative modeling assumptions in the PACA are the result of the uncertainties regarding potential impacts of such long-lived waste to human health and the environment.

NMED Comment

29. Section 8.3, Alternative 2C: ET Cover with Partial Waste Excavation, Monitoring and Maintenance, and SVE, page 78:

Permittees' Statement: *"In the vicinity of Pit 28, a constant cover thickness will create a steep cover slope (above 4%). It is essential to lower the slope gradient to reduce erosion potential. Without waste excavation, extra fill will be required to maintain a maximum cover slope of 4%."*

NMED Comment: *In light of the cost estimate information in Appendix E, the intent of this paragraph appears to be that soils and waste from Pit 28 need to be removed to reduce the slope of the cover to less than 4 percent. There does not seem to be a coherent connection between the low profile cover concept and Pit 28. For example, according to Figure 8.1-1, Pit 39 appears to be higher than Pit 28, and therefore would also require excavation. The Permittees must clarify whether or not there are other pits at Area G that will require excavation per the proposed cover details in Alternative 2C.*

LANL Response

29. Sections 6, 7, and 8 were rewritten to address the remedial action objectives that were developed in section 4.

    Technologies were identified to address the source areas independently and were subsequently combined into remedial alternatives for MDA G.

    Section 8 addresses the discrepancies identified by NMED.

NMED Comment

30. Section 8.3.1, Long-Term Reliability and Effectiveness, page 78, paragraph 1:

Permittees' Statement: *"Alternative 2C has the best aesthetic of the engineered covers because it is the most similar to the natural landscape, requires less rock armor, and is constructed from materials that are readily available."*

NMED Comment: *NMED acknowledges the importance of the long-term appearance and aesthetic of the final remedy to adjacent landowners, specifically, San Ildefonso Pueblo. After all, MDA G is adjacent to some of San Ildefonso Pueblo's sacred lands, and is in plain site from several sacred areas. However, cover aesthetics are not relevant to long-term reliability and effectiveness of the ET cover.*

Also, the Permittees state that elimination of the use of the bentonite amendment and the angular rock in the cover is "increasing its practicability because no local source of bentonite or angular rock is available." Since offsite sources of rip rap and bentonite can be found, this appears to be a cost factor, but does not influence long-term reliability and effectiveness. The Permittees must revise the text to reflect that having no local source of bentonite or angular rock is a cost consideration rather than a long-term reliability and effectiveness consideration.

LANL Response

30. Sections 6, 7, and 8 were rewritten to address the remedial action objectives that were developed in section 4.

    Technologies were identified to address the source areas independently and were subsequently combined into remedial alternatives for MDA G.

    Section 8 addresses the discrepancies identified by NMED.

NMED Comment

31. Section 8.3.1.5, Long-Term Potential for Failure of Remedy, page 79, paragraph 1:

Permittees' Statement: *"Alternative 2C is optimized through the value engineering process and is an improvement over Alternative 2B because the modifications optimize ET, reduce infiltration, and minimize long-term erosion and biointrusion. These modifications are detailed in Appendixes C and D."*

NMED Comment: *NMED disagrees that the parameters were optimized. The Permittees used only selected VA approaches with a priority that did not match the Permittees own VA ranking. Value engineering and the suggested modifications have potential benefit, but have not been evaluated with comparable modeling tools as provided for Alternative 2B in the PACA. Therefore, these modifications, where applicable, should only be used as concept design elements to be demonstrated during the CMI design stage.*

LANL Response

31. Sections 6, 7, and 8 were rewritten to address the remedial action objectives that were developed in section 4.

    Technologies were identified to address the source areas independently and were subsequently combined into remedial alternatives for MDA G.

    Additional modeling and design elements of the chosen remedial alternative will be included in the CMI Plan.

    As discussed in the introduction, the scope of the PACA process, as defined in DOE Order 435.1, is more comprehensive than the CME process under the Consent Order. The robustness of the engineering methods and the complexity of modeling tools and the conservative modeling assumptions in the PACA are the result of the uncertainties regarding potential impacts of such long-lived waste to human health and the environment.

NMED Comment

32. Section 8.3.3.1, Short-Term Risk to Community, Workers, and Environment during implementation, page 80, paragraph 2:

Permittees' Statement: *"Following the method described in section 8.1.3.1, the total of 119,000 work hours estimated for installing the cover and excavating the top 6 ft (1.8 m) of Pit 28 will result in an estimated 4 nonfatal injuries."*

NMED Comment: *The Permittees state in Sections 7.5.3 and 8.3 that they will be "excavating the uppermost portion of selected pits and shafts to flatten the topography under the cover," implying that the upper most portion of more than one pit or shaft will be excavated. However, in Section 8.3.3.1, the Permittees state that only the top 6 ft of Pit 28 will be excavated. The Permittees must explain this discrepancy and revise the text accordingly.*

LANL Response

32. Sections 6, 7, and 8 were rewritten to address the remedial action objectives that were developed in section 4.

    Technologies were identified to address the source areas independently and were subsequently combined into remedial alternatives for MDA G.

    Section 8 addresses the discrepancies identified by NMED.

NMED Comment

33. Section 8.3.3.2, Short-Term Human Health Risk, page 81, paragraph 1:

Permittees' Statement: *"In the short term, after the partial removal of MDA G subsurface waste and construction of the ET cover, the enhanced cover is assumed to function as designed, and appropriate institutional controls will be in place and periodic maintenance activities will occur."*

NMED Comment: *The period of time following partial waste excavation and cover construction is assessed as long-term risk, not short-term risk. Also, contrary to the statement in the fourth sentence of the first paragraph, short-term human health risks to workers will be greater under Alternative 2C than Alternative 1B due to the excavation and management of wastes during implementation, as well as due to increased construction traffic. The Permittees must revise the text to resolve the discrepancy.*

LANL Response

33. Sections 6, 7, and 8 were rewritten to address the remedial action objectives that were developed in section 4.

    Technologies were identified to address the source areas independently and were subsequently combined into remedial alternatives for MDA G.

    Section 8 addresses the discrepancies identified by NMED.

NMED Comment

34. Section 8.3.3.3, Short-Term Ecological Risk, page 81:

The Permittees must clarify why the southwestern willow flycatcher was addressed in Alternative 2C but not in Alternative 2B.

LANL Response

34. Sections 6, 7, and 8 were rewritten to address the remedial action objectives that were developed in section 4.

    Technologies were identified to address the source areas independently and were subsequently combined into remedial alternatives for MDA G.

    Section 8 addresses the discrepancies identified by NMED.

NMED Comment

35. Section 8.3.4, Implementability, page 82: n 5.1, DOE Closure Requirements, page 23, paragraph 4:

The lack of discussion regarding the implementability of partial excavation of buried radioactive wastes is a significant omission. The Permittees must revise the text to include a discussion similar to that in Section 8.5.4.

Section 8.3.4.3: NMED acknowledges that excavation of wastes present more cleanup technology difficulties than not excavating under Alternative 2B. The Permittees must therefore provide additional descriptive language in this Section.

Section 8.3.4.4: The Permittees must revise the text in this Section to include permitting processes, if any, involved with excavating radioactive wastes per DOE order 435.1.

Section 8.3.4.5: The Permittees must revise the text to describe the assumed volume and proposed disposition of the wastes removed.

LANL Response

35. Sections 6, 7, and 8 were rewritten to address the remedial action objectives that were developed in section 4.

    Technologies were identified to address the source areas independently and were subsequently combined into remedial alternatives for MDA G.

    Appendix F includes a discussion of the procedures outlined in DOE Order 435.1. Revised Section 8 addresses NMED's above comments.

    As discussed in the introduction, the scope of the PACA process, as defined in DOE Order 435.1, is more comprehensive than the CME process under the Consent Order. The robustness of the engineering methods and the complexity of modeling tools and the conservative modeling assumptions in the PACA are the result of the uncertainties regarding potential impacts of such long-lived waste to human health and the environment.

NMED Comment

36. Section 8.3.5, Alternative 2C, Cost, page 83, paragraph 1:

Permittees' Statement: *Costs associated with Alternative 2C have been estimated for all phases of the project activities, including support activities, site preparation, SVE operations, construction, materials, and continuation of the 100-yr active institutional control period following completion of construction of the cover."*

NMED Comment: *The Permittees must revise the CME where appropriate (e.g., cost estimates and long-term reliability) to incorporate the results of the SVE pilot test. See General Comment # 8.*

LANL Response

36. Sections 6, 7, and 8 were rewritten to address the remedial action objectives that were developed in section 4.

    Technologies were identified to address the source areas independently and were subsequently combined into remedial alternatives for MDA G.

    The CME reflects the two different source areas: (1) pits and shafts and (2) vadose zone. The results of the SVE pilot test have been incorporated into the assumptions for the SVE technology.

NMED Comment

37. Section 8.3.5.1, Estimate of Capital Costs, page 83:

The Permittees must include references to the appropriate/corresponding tables in Appendix E for each of the bulleted items in this Section.

LANL Response

37. Sections 6, 7, and 8 were rewritten to address the remedial action objectives that were developed in section 4.

Technologies were identified to address the source areas independently and were subsequently combined into remedial alternatives for MDA G.

References to appropriate sections and appendixes have also been revised.

NMED Comment

38. Section 8.4, Alternative 2D: ET Cover with Partial Waste Excavation, Targeted Stabilization, Monitoring and Maintenance, and SVE, page 84:

Permittees' Statement: *"The design and construction of Alternative 2D includes all the elements described for Alternative 2C in section 8.3 including stabilization of the operational cover in areas of high erosion potential by stabilization technologies."*

NMED Comment: *The Permittees state that the operational cover (i.e., the soil above waste) in potentially high erosion areas will be stabilized, which suggests physical stabilization to improve the engineering properties of the overlying soil. Therefore, the Permittees must add "soil stabilization" to the Section 8.4 heading and alternative title. The Permittees also discuss waste stabilization, which is typically used to reduce the leachability of waste components. Other portions of the CME are inconsistent on this point: Table 7.3-1 states that waste stabilization is a component of this remedy, and it "removes waste from potential high erosion areas." This component of the remedy is only briefly mentioned in the Section 7.4.6 description of the alternative; specifically, the last sentence of Section 7.4.6.1 states, "[a]reas of high erosion potential near bluff areas are targeted for stabilization." Table 9.0-1 is also inconsistent with the soil stabilization assumption. The Permittees must revise all relevant sections of the CME to specify whether or not waste or soil stabilization is the technology utilized as part of Alternative 2D.*

LANL Response

38. Sections 6, 7, and 8 were rewritten to address the remedial action objectives that were developed in section 4.

    Technologies were identified to address the source areas independently and were subsequently combined into remedial alternatives for MDA G.

    The scope of NMED's comment has been addressed as appropriate.

NMED Comment

39. Section 8.4, Section 8.4, Alternative 2D: ET Cover with Partial Waste Excavation, Targeted Stabilization, Monitoring and Maintenance, and SVE, page 84:

The Permittees must revise the CME to include a figure showing the proposed soil stabilization areas for Alternative 2D.

LANL Response

39. Sections 6, 7, and 8 were rewritten to address the remedial action objectives that were developed in section 4.

    Technologies were identified to address the source areas independently and were subsequently combined into remedial alternatives for MDA G.

    The scope of NMED's comment has been addressed as appropriate.

NMED Comment

40. Section 8.4, Section 8.4, Alternative 2D: ET Cover with Partial Waste Excavation, Targeted Stabilization, Monitoring and Maintenance, and SVE, page 84:

Permittees' Statement: *"An estimated 5000 yd^3 (3800 m^3) of soil above waste in these areas will be stabilized to reduce erosion potential."*

NMED Comment: *The Permittees have presented an estimated quantity of soil requiring stabilization. The Permittees must present the corresponding quantity of soil/waste removed here and in Section 8.3.*

LANL Response

40. Sections 6, 7, and 8 were rewritten to address the remedial action objectives that were developed in section 4.

    Technologies were identified to address the source areas independently and were subsequently combined into remedial alternatives for MDA G.

    The estimated quantity of soil and waste impacted by each technology/alternative is provided in Appendix G.

NMED Comment

41. Section 8.4, Section 8.4, Alternative 2D: ET Cover with Partial Waste Excavation, Targeted Stabilization, Monitoring and Maintenance, and SVE, page 84:

Permittees' Statement: *"Erosion modeling in the Area G performance assessment will be used to identify areas of high erosion potential."*

NMED Comment: *The Permittees use the PACA as the source for identifying areas requiring stabilization under Alternative 2D. The Permittees must clarify what the specific criteria are within the PACA report that have been used to identify areas with high erosion potential. For example, are they the areas where the soil cover is predicted to erode within 3 ft above the waste interval after 1000 years (e.g., the yellow to orange areas [indicating less than 3 ft of cover] shown in Figure 4-25 of the PACA report)?*

LANL Response

41. As discussed in the introduction, the scope of the PACA process, as defined in DOE Order 435.1, is more comprehensive than the CME process under the Consent Order. The robustness of the engineering methods and the complexity of modeling tools and the conservative modeling assumptions in the PACA are the result of the uncertainties regarding potential impacts of such long-lived waste to human health and the environment.

NMED Comment

42. Section 8.4.1.1, Long-Term Human Health Risk, page 84, paragraph 1:

Permittees' Statement: *"Partial removal of waste in MDA G subsurface units, stabilization of the soil, construction of the ET cover, and operation of the SVE system will reduce risks in the long term (1000 yr) to human and ecological receptors, assuming institutional controls are in place and periodic maintenance activities occur. As with Alternative 2C, removal of the wastes and operation of the SVE system will reduce the risk of groundwater contamination compared to Alternative 1B and 2B."*

NMED Comment: *It is not clear how Alternative 2D demonstrated that it would be protective for 1000 years, rather than the less specific 100 to 1000 years described for Alternative 2C. The Permittees must provide supporting information which documents the assertion that Alternative 2D would be protective for 1000 years. See Specific Comment # 19(b) and General Comment # 8.*

LANL Response

42. The compliance period for a remedial alternative under this CME is 100 yr. As discussed in the introduction, the scope of the PACA process, as defined in DOE Order 435.1, is more comprehensive than the CME process under the Consent Order. The robustness of the engineering methods and the complexity of modeling tools and the conservative modeling assumptions in the PACA are the result of the uncertainties regarding potential impacts of such long-lived waste to human health and the environment. DOE Order 435.1 (discussed in Appendix F) has a compliance period of 1000 yr.

NMED Comment

43. Section 8.4.1.5 Long-Term Potential for Failure of Remedy, page 85, paragraph 1:

Permittees' Statement: *"Alternative 2D was optimized through the VA engineering process and is an improvement over Alternative 2B because the modifications optimize ET, reduce infiltration, and minimize long-term erosion and biointrusion."*

NMED Comment: *Table H-5.0-1 states that the distinguishing component of Alternative 2D, "stabilize area surrounding waste in high erosion areas," is ranked 19th out of the 26 positive ideas from the VA process. Many of the other ideas presented in Table H-5.0-1 were not presented in the CME alternatives; therefore, it is unclear whether or not there was some other unreported process of screening the VA ideas that were subsequently selected for development of the alternatives. Also, it appears that Alternative 2D exhibits less long-term potential for failure than Alternative 2C by enhancing protection from erosion at stabilized areas along the edges of the cover. The Permittees must revise the text to resolve these discrepancies.*

LANL Response

43. Sections 6, 7, and 8 were rewritten to address the remedial action objectives that were developed in section 4.

    Technologies were identified to address the source areas independently and were subsequently combined into remedial alternatives for MDA G.

    The scope of NMED's comment has been addressed as appropriate.

NMED Comment

44. Section 8.4.3.1, Short-Term Risk to Community, Workers, and Environment during Implementation, pages 85-86:

Permittees' Statement: *"This alternative also includes additional risks associated with implementation of waste stabilization."*

NMED Comment: *The Permittees must clarify if this remedial alternative includes waste stabilization or stabilization of operational cover soil overlying the waste.*

LANL Response

44. Sections 6, 7, and 8 were rewritten to address the remedial action objectives that were developed in section 4.

Technologies were identified to address the source areas independently and were subsequently combined into remedial alternatives for MDA G.

The scope of NMED's comment has been addressed as appropriate.

NMED Comment

45. Section 8.4.4.4, Permitting and Approvals, page 87:

Permittees' Statement: *"Stabilization is a waste treatment process performed in situ and does not require a permit modification."*

NMED Comment: *See Specific Comment #43.*

LANL Response

45. Sections 6, 7, and 8 were rewritten to address the remedial action objectives that were developed in section 4.

Technologies were identified to address the source areas independently and were subsequently combined into remedial alternatives for MDA G.

The scope of NMED's comment has been addressed as appropriate.

NMED Comment

46. Section 8.5, Alternative 5B: Complete Waste Excavation, Waste Treatment, Off-Site Disposal, and SVE, page 88:

The Permittees must revise the CME to include a figure showing the proposed or typical configuration of the excavation tent, the waste classification facility, and the storage vault and storage areas for Alternative 5B.

LANL Response

46. Sections 6, 7, and 8 were rewritten to address the remedial action objectives that were developed in section 4.

    Technologies were identified to address the source areas independently and were subsequently combined into remedial alternatives for MDA G.

    Four excavation alternatives are included in the revised CME. An excavation enclosure will likely be similar to that used at MDA B; however, the enclosure selected will depend on the remedy selected. The final enclosure design will be included in the CMI Plan.

NMED Comment

47. Section 8.5, Alternative 5B: Complete Waste Excavation, Waste Treatment, Off-Site Disposal, and SVE, page 89, paragraph 5:

Permittees' Statement: *"All waste requiring off-site disposal will be transported on Pajarito Road and then on NM 4. An estimate of 835,000 yd^3 (638,000 m^3) of disposal-unit waste, including residual waste, will be transported on public roads. An estimate of 2,074,000 yd^3 (1,590,000 m^3) of fill material will be imported from a location estimated at approximately 12 mi (19 km) away."*

NMED Comment: *The Permittees must revise the text to identify the source of the imported fill material.*

LANL Response

47. Sections 6, 7, and 8 were rewritten to address the remedial action objectives that were developed in section 4.

    Technologies were identified to address the source areas independently and were subsequently combined into remedial alternatives for MDA G.

    Four excavation technologies are included in the revised CME. Appendix G includes revised cost estimates and a discussion of the assumptions used to calculate the estimates for each technology.

NMED Comment

48. Section 8.5.1.1, Long-Term Human Health Risk, page 90, paragraphs 2 and 4:

Permittees' Statement: *"Complete excavation of waste within MDA G subsurface units eliminates the need for long-term maintenance and/or monitoring at the locations, but will take approximately 30 yr to implement. This alternative transfers the potential impact of the waste to the off-site disposal facility that accepts the waste and will result in transporting thousands of truckloads of hazardous and radioactive waste through local communities over a 30-yr period."*

NMED Comment: *The Permittees have asserted that it will take 30 years to completely excavate all the subsurface waste within MDA G and transport it off-site. The Permittees must provide supporting information for this assertion in the text and identify where this cost is explained in Appendix E (Supporting Information for Cost).*

The Permittees also state in paragraph four of this Section that "[t]he presence of unknown waste within numerous units, necessitating the use of remote-handling and/or robotic equipment during the excavation, sorting, segregation, and stockpiling of waste, indicates an estimate of at least 23 yr to complete the project..." The Permittees must explain the discrepancy for the implementation time estimate identified in paragraph 2 (30 years) and the estimate in paragraph four of 23 years.

LANL Response

48. Sections 6, 7, and 8 were rewritten to address the remedial action objectives that were developed in section 4.

    Technologies were identified to address the source areas independently and were subsequently combined into remedial alternatives for MDA G.

    Four excavation technologies are included in the revised CME, two of which are off-site disposal. These technologies assume a 30-yr duration given an assumed production rate based on recent experience excavating MDAs (e.g., MDA B and MDA Y). The revised text resolves the discrepancy in implementation times.

NMED Comment

49. Section 8.5.3.1, Short-Term Risk to Community, Workers, and Environment during Implementation, page 92, paragraphs 6 and 8:

***a) Permittees' Statement**: "Assuming 163,765,000 truck miles, or a probability of approximately 4 fatalities."*

***NMED Comment:** The Permittees must provide a brief description of how the truck miles were estimated (i.e., number of crews, number of days, hours per day) and provide a reference to the section of the CME that provides supporting information for such estimates.*

***b) Permittees' Statement:** "Assuming 1,400,000 total labor hours to remove waste from pits and shafts (DOE 2008, 102731, Table I-78) and estimated worker dose rates of 2.5 x 10^{-4} rem per hour for removal of the waste in shafts and 3.5 x 10^{-5} rem per hour for removal of the waste in pits (DOE 2008, 102731, Table I-79)."*

***NMED Comment:** Tables I-78 and I-79 of the Final Site-Wide Environmental Impact Statement for Continued Operation of Los Alamos National Laboratory only provide the estimates included in this Section of the CME. NMED acknowledges that there are many assumptions; however, there is no explanation of what the assumptions are or how they were used to calculate these numbers. The Permittees must provide a brief description of how the labor hours were calculated (e.g., number of crews, number of days, hours per day) and provide a reference to the section of the CME that provides supporting information for such estimates.*

LANL Response

49. Sections 6, 7, and 8 were rewritten to address the remedial action objectives that were developed in section 4.

    Technologies were identified to address the source areas independently and were subsequently combined into remedial alternatives for MDA G.

    Four excavation technologies are included in the revised CME. Appendix G includes revised cost estimates and a discussion of the assumptions used to calculate the estimates for each technology.

NMED Comment

50. Section 8.5.3.1, Short-Term Risk to Community, Workers, and Environment during Implementation, page 93, paragraph 2:

Permittees' Statement: *"Some estimates indicate that it may take 23 yr to completely remove the waste from MDA G subsurface units, based on retrieving and segregating similar waste at INL."*

NMED Comment: *See Specific Comment # 47.*

LANL Response

50. Sections 6, 7, and 8 were rewritten to address the remedial action objectives that were developed in section 4.

    Technologies were identified to address the source areas independently and were subsequently combined into remedial alternatives for MDA G.

    Four excavation technologies in the revised CME, two of which are off-site disposal. These technologies assume a 30-yr implementation duration given an assumed production rate based on recent experience excavating MDAs (e.g., MDA B and MDA Y). The revised text resolves the discrepancy in implementation times.

NMED Comment

51. Section 8.5.3.2, Short-Term Human Health Risk (Alternative 5B), page 93, bullet 1:

Permittees' Statement: *"During excavation, the potential exists for rainfall or snow melt to accumulate in the excavation that could result in the potential for leachate generation that could affect groundwater."*

NMED Comment: *Section 8.5.4.1, 5th bullet states that implementation of Alternative 5B would require removing materials from the units inside a movable temporary structure.*

LANL Response

51. Sections 6, 7, and 8 were rewritten to address the remedial action objectives that were developed in section 4.

    Technologies were identified to address the source areas independently and were subsequently combined into remedial alternatives for MDA G.

    There are four excavation technologies in the revised CME, two of which include off-site disposal. These technologies include an assumption that excavations would take place within a temporary enclosure. The revised text resolves the discrepancy.

NMED Comment

52. Section 8.5.3.4, Time Needed to Achieve Reduction in Risk, page 94:

Permittees' Statement: *"Implementation of Alternative 5B is expected to take up to 30 yr."*

NMED Comment: *See Specific Comment # 47.*

LANL Response

52. Sections 6, 7, and 8 were rewritten to address the remedial action objectives that were developed in section 4.

    Technologies were identified to address the source areas independently and were subsequently combined into remedial alternatives for MDA G.

    Four excavation technologies are included in the revised CME, two of which are off-site disposal. These technologies assume a 30-yr implementation duration given an assumed production rate based on recent experience excavating MDAs (e.g., MDA B and MDA Y). The revised text resolves the discrepancy in implementation times.

NMED Comment

53. Section 8.5.4.1, Installation and Construction Difficulties, page 95, paragraph 1:

Permittees' Statement: *"Alternative 5B is estimated to take 12 mo to design and up to 30 yr for waste removal, depending on federal funding levels."*

NMED Comment: *A discussion of federal funding levels are not appropriate for a remedy evaluation and are not good cause for failing to implement a remedy in a timely manner. Once a remedy is selected, the Permittees must have funding in place to execute the approved remedial alternative. The Permittees must revise the text by removing this statement.*

LANL Response

53. The revised CME no longer includes the statement "depending on federal funding levels."

NMED Comment

54. Section 8.5.5.1, Estimate of Capital Costs (Alt. 5B), page 96, paragraph 3:

Permittees' Statement: *"As noted in section 7.3.12, Alternative 5B does not include removal of wastes from the LLW disposal pits and shafts that are not identified as subject to corrective action and regulated only by DOE. The cost estimate for Alternative 5B is based on an ET cover design."*

NMED Comment: *As stated in Specific Comment # 1, NMED considers all disposal pits, trenches, and shafts within the boundary of MDA G (~63 acres) to be a regulated unit. Additionally, the Permittees state in Section 2.2.1 (LLW and MLLW) of the CME that there are three subsurface pits and 98 shafts that are regulated as LLW waste disposal. However, "[c]onsistent with implementing a comprehensive, integrated strategy for Area G closure, these units will be included in the CMI Plan." Therefore, the Permittees must include the costs for removal of low-level waste (LLW) from disposal pits and shafts in the cost estimates for any alternatives proposing waste excavation (e.g., Alternatives 5B, 5C, and 5D). Also, the last sentence of this paragraph should be further clarified to express the intent to construct the ET cover over all waste pits and shafts, or not.*

LANL Response

54. The Laboratory respectfully disagrees with NMED's statement that "the entirety of MDA G (approximately 63 acres) is a regulated unit". MDA G is composed of all subsurface pits, trenches, and shafts located within the boundary of Area G. The Consent Order applies to the SWMUs and regulated units that managed hazardous wastes or hazardous waste constituents. General Comment 2 summarizes the integration of the Consent Order with the Permit, including the use of alternative closure for the regulated units at MDA G (i.e., Shafts 142, 145, and 146 and Pit 29) pursuant to 40 CFR 264.110(c). The regulated units at MDA G are a small subset of the SWMUs that are subject to corrective action under the Consent Order. The collocation of the regulated units with other SWMUs and the presence of comingled releases allows for the use of alternative closure requirements under 40 CFR 264.110(c).

    As summarized in the introduction, the closure of LLW disposal units and corrective action for RCRA constituents under the Consent Order will proceed on parallel tracks based upon regulatory authority. The costs for the removal of LLW are not part of the scope of the CME.

NMED Comment

55. Section 8.6, Alternative 5C: Complete Waste Excavation, On-Site Waste Treatment, Disposal of Wastes in RCRA Subtitle C Landfill, and SVE, pages 96-97:

As written, the multiple-layer liner and single leachate collection system are not described in the text until Section 8.6.3.1. The Permittees must revise the text to include a brief description of the technical aspects of the RCRA Subtitle C Landfill, similar to the description provided in Appendix E, WBS 5C.1.5.

LANL Response

55**.** Section 8.3.4 describes Technology PS-4a, Excavation of Pits and Shafts with On-Site Disposal in a CAMU or RCRA Landfill. Should NMED select this technology as part of the final remedy, a detailed description of the construction aspects of the landfill, including liner design and leachate collection systems, will be included in the CMI Plan in accordance with Section VII.E.2 of the Consent Order.

NMED Comment

56. Section 8.6, Alternative 5C: Complete Waste Excavation, On-Site Waste Treatment, Disposal of Wastes in RCRA Subtitle C Landfill, and SVE, pages 98:

The Permittees must revise the CME to include a figure showing the proposed RCRA Subtitle C landfill location for Alternative 5C.

LANL Response

56. For the purposes of this CME, the Laboratory assumes that the CAMU/RCRA facility would be located at TA-54. Should NMED select this technology as part of the final remedy, the proposed location of the Subtitle C landfill will be included in a Class 3 Permit Modification Request subject to NMED review and approval.

NMED Comment

57. Section 8.6.3, Short-Term Effectiveness, page 98, paragraph 3:

Permittees' Statement: *"This alternative involves workers spending 29,267,000 work hours on-site."*

NMED Comment: *The Permittees must provide a brief description of how the worker hours were estimated (i.e., number of crews, number of days, hours per day) and provide a reference to the section of the CME that provides supporting information for such estimates. The Permittees must also explain how the worker hours are exactly the same for Alternatives 5C and 5D.*

LANL Response

57. Four excavation technologies are included in the revised CME. Appendix G includes revised cost estimates and a discussion of the assumptions used to calculate the estimates for each technology.

NMED Comment

58. Section 8.6.3.2, Short-Term Human Health Risk, RCRA Subtitle C Landfill, page 100, bullets 3-5:

The fourth and fifth bullets pertain to long-term risk, not short-term risk. Furthermore, it is not clear how short-term risks would be less during placement of waste in the RCRA Subtitle C landfill than is currently present in undisturbed portions of the site (as represented in the MDA G investigation report). The Permittees must revise the text to clarify how short-term risks are less during placement of waste in the RCRA Subtitle C landfill compared to leaving waste in place.

LANL Response

58. Revised section 8 clarifies the short- and long-term risks associated with each retained technology.

NMED Comment

59. Section 8.6.3.4, Time Needed to Achieve Reduction in Risk, page 101:

See Specific Comment # 47.

LANL Response

59. Revised section 8 clarifies the short- and long-term risks associated with each retained technology.

NMED Comment

60. Section 8.7, Alternative 5D: Complete Waste Excavation, On-Site Waste Treatment, Disposal of Wastes in CAMU, and SVE, page 103:

As written, the multiple-layer liner and single leachate collection system are not described in the text until Section 8.7.3.1. The Permittees must revise the text to include a brief description of the technical aspects of the Corrective Action Management Unit (CAMU), similar to the description provided in Appendix E, WBS 5D.1.5.

LANL Response

60. Section 8.3.4 describes Technology PS-4a, Excavation of Pits and Shafts with On-Site Disposal in a CAMU or RCRA Landfill. For the purposes of this CME, the Laboratory assumes that the CAMU/RCRA facility would be located at TA-54. Should NMED select this technology as part of the final remedy, a detailed description of the construction aspects of the landfill, including liner design and leachate collection systems, will be included in the CMI Plan in accordance with Section VII.E.2 of the Consent Order.

NMED Comment

61. Section 8.7, Alternative 5D: Complete Waste Excavation, On-Site Waste Treatment, Disposal of Wastes in CAMU, and SVE, page 103:

The Permittees must revise the CME to include a figure showing the proposed CAMU location for Alternative 5D.

LANL Response

61. For the purposes of this CME, the Laboratory assumes that the CAMU/RCRA facility would be located at TA-54. Should NMED select this technology as part of the final remedy, the proposed location of the Subtitle C landfill will be included in a Class 3 Permit Modification Request subject to NMED review and approval.

NMED Comment

62. Section 8.7.3, Short-Term Effectiveness, page 104, paragraph 3:

Permittees' Statement: *"Because of the extensive excavation and waste handling required at the site, Alternative 5D poses the highest exposure to workers and exposure to the public from transportation of waste on public roads. Worker risk associated with the implementation of Alternative 5B is based on the requirement that all workers adhere to rigorous DOE, state, and federal worker-safety regulations and that engineered barriers are designed to protect workers."*

NMED Comment: *Although the risks associated with Alternative 5D are substantial, NMED disagrees that Alternative 5D poses the greatest short-term risk exposure to workers and the public; this distinction should be reserved for Alternative 5B due to transportation of large waste volumes on public roads to offsite disposal facilities. Also, the reference to Alternative 5B in the second sentence suggests this paragraph was copied from previous sections and not specific to Alternative 5D. The Permittees must revise the text accordingly. Also, the on-site work hours reported in this paragraph are identical to those reported for Alternative 5B in Section 8.5.3.1. The Permittees must provide documentation which supports the estimates for on-site work hours for Alternatives 5B, 5C, and 5D.*

LANL Response

62. The short- and long-term risks associated with each retained technology have been revised. Appendix G includes revised cost estimates and a discussion of the assumptions used to calculate the estimates for each technology.

NMED Comment

63. Section 8.7.3.1, Short-Term Risk to Community, Workers, and Environment during Implementation, RCRA CAMU, page 105, paragraph 1:

Permittees' Statement: *"The RCRA CAMU will contain a single, multiple-layer liner and a single leachate collection system. Additionally, the CAMU will contain an ET cover rather than a RCRA Subtitle C equivalent cover."*

NMED Comment: *The CAMU rule requires an engineered cover with a permeability less than or equal to the permeability of the bottom liner system. Given that a composite liner (with geomembrane) is prescribed for the bottom liner system, it follows that the engineered cover system for a CAMU should include an equivalent geomembrane component. The Permittees may petition for an alternate cover system; however, for purposes of this CME, an ET cover is not appropriate. The Permittees must revise the text to remove the reference to an ET cover.*

LANL Response

63. Section 8.3.4 describes Technology PS-4a, Excavation of Pits and Shafts with On-Site Disposal in a CAMU or RCRA Landfill. Should NMED select this technology as part of the final remedy, a detailed description of the construction aspects of the CAMU (including the cover) will be included in the CMI Plan in accordance with Section VII.E.2 of the Consent Order. Construction of the engineered cover will comply with section 264.552(e)(6)(iv) (Cap Requirements for CAMUs).

NMED Comment

64. Section 8.7.3.2, Short-Term Human Health Risk, RCRA CAMU, page 106:

Several of the items in this Section pertain to long-term risk rather than short-term risk. It would be more appropriate for the Permittees to consider the potential for leachate production caused by precipitation events during filling of the landfill cell; in that case, the landfill liner system would help to mitigate short-term risk. The Permittees must revise the text to resolve this discrepancy and discuss the short-term risks of Alternative 5D.

LANL Response

64. Revised section 8 clarifies the short- and long-term risks associated with each retained technology.

NMED Comment

65. Section 8.7.4.2, Operations and Maintenance Difficulties, page 107:

Permittees' Statement: *"Operation of maintenance difficulties for Alternative 5D will be similar to those described for Alternative 5C."*

NMED Comment: *Treatment standards for CAMU disposal differ from, and are generally less stringent than, a RCRA-permitted Subtitle C landfill. Therefore, it is reasonable to assume that the Alternative 5C operations and maintenance difficulties would be more difficult to implement than those for Alternative 5D. The Permittees must revise the text to resolve this discrepancy.*

LANL Response

65. Section 8 clarifies the difficulties of implementing each of the retained technologies and addresses the discrepancies identified by NMED.

NMED Comment

66. Section 9.2.3, Controlling or Eliminating Sources of Contamination, page 111:

Permittees' Statement: *"The use of an ET cover in Alternative 2C will be as effective as the other alternatives in controlling sources of contamination from MDA G."*

NMED Comment: *An ET cover will not be as effective as complete waste removal in controlling sources of contamination from MDA G. This statement is misleading and must either be revised to state "[t]he use of an ET cover in Alternative 2C will be as effective as the other alternatives that recommend a cover or that assume wastes will be left in place in controlling sources of contamination from MDA G" or deleted.*

LANL Response

66. The statement "[t]he use of an ET cover in Alternative 2C will be as effective as the other alternatives in controlling sources of contamination from MDA G," has been deleted.

NMED Comment

67. Section 10.1, Design Approach, page 111:

The Permittees must revise the text to include the following:

1) Between line items 2 and 3, insert "determine cover soil borrow source and soil amendments required for water-storage capacity through site-specific testing."

2) Between line items 3 and 4, insert "determine locations and amount of existing soil cover and waste requiring removal to optimize grading design."

LANL Response

67. These requirements of the ET cover are included in section 10 of the revised CME.

NMED Comment

68. Section 10.2, Preliminary Design Criteria and Rationale, page 112, bullet 1:

Permittees' Statement: *"This monitoring criterion is applicable to all boreholes in unit Qbtv(u) from depths of 60 ft to 100 ft (18 m to 30 m) and will ensure that downward aqueous-phase transport through the vadose zone is sufficiently slow to prevent exceedances of groundwater screening criteria in the regional aquifer and prevent MCLs from being exceeded."*

NMED Comment: *This statement implies that downward aqueous-phase transport, albeit slow, could eventually exceed groundwater screening criteria. The ET cover is intended to prevent infiltration and thus aqueous-phase transport of contaminants capable of contaminating groundwater. The Permittees must revise the text to explain how the monitoring criterion will ensure that the ET cover is functioning properly (e.g., by not allowing snowmelt or storm runoff to infiltrate into and through the cover material).*

LANL Response

68. This statement has been removed from section 10.2 because downward aqueous-phase transport will not impact groundwater above screening criteria. The ET cover will be designed and installed to minimize infiltration.

NMED Comment

69. Section 10.2.1, Surface Treatments, page 113:

The Permittees provide a description of two alternative approaches for the uppermost layer of the cover: a gravel layer and a soil/gravel admixture. NMED acknowledges that there may be an advantage to using gravel as the top layer of the cover. It will likely minimize erosion and potentially result in a desert pavement-type surface. However, the material selected must be verified with more detailed and long-term water-balance and erosion evaluations during the CMI design should this Alternative be chosen.

LANL Response

69. Additional water-balance and erosion evaluations will be included in the CMI Plan.

NMED Comment

70. Section 10.4, Additional Engineering Data Required, page 114:

Permittees' Statement: *"Before the CMI design is completed, additional data is required to aid in design, including..."*

NMED Comment: *The statements may be sufficiently broad to accommodate most data needs, but the Permittees must provide a more specific, detailed analysis of data needs prior to implementing the CMI design. Therefore, the Permittees must revise the above sentence to read "[b]efore the CMI design is completed, additional data is required to aid in design, including, but not limited to..."*

LANL Response

70. Section 10.4 was revised to address NMED's comment.

NMED Comment

71. Section 11.2, Intermediate Milestones, page 116:

Design deliverables must be added to the implementation schedule, including 30% conceptual (or 60% intermediate) design, pre-final design, and final design. NMED expects water-balance and erosion modeling, and site-specific material specifications, as part of an initial design submittal. The Permittees must revise the text and Figure 11.-0-1 accordingly.

LANL Response

71. Revised section 11 includes milestones required by the Consent Order. A schedule for specific design deliverables (e.g., concept design, prefinal design) and intermediate milestones will be included in the CMI Plan in accordance with Section VII.E.2 of the Consent Order.

NMED Comment

72. Figure 8.1-1, Isopach Map of Proposed Alternative 1B, page 157:

Figure 8.1-1 appears to be a surface topography map, not a soil isopach (thickness) map. The Permittees must revise the title of Figure 8.1-1 and revise any corresponding text accordingly.

LANL Response

72. Figure 7.3-1, a cover map, replaced Figure 8.1-1 of the original report. All associated text has been revised accordingly.

NMED Comment

73. Table 1.0-2, Consolidated Unit 54-013(b)-99 SWMUs, page 166:

There is a typographical error in the second sentence of the entry for SWMU 54-014(d). The Permittees must replace "TRA-54's" with "TA-54's." Also, the length of Trench D (60 ft) is not consistent with Table 2.1-2 (250 ft), or the depiction of Trench D in Figure 1.0-3. The Permittees must resolve the discrepancy.

LANL Response

73. Table 2.0-2 replaces Table 1.0-2 of the original report, and the errors have been corrected.

NMED Comment

74. Table 8.3-1, CME Alternative 2C – ET Cover with Partial Waste Excavation, Monitoring, Maintenance, and SVE Capital, Recurring, and Periodic Cost Estimate in 2009 Dollars and PV Analysis, page 232:

Table 8.2-1 (page 231) shows the estimated cost for the ET cover for Alternative 2B is $53,250,000. The estimated cost for the ET cover for Alternative 2C is $17,766,000. The Permittees must explain why there is an approximately $35,000,000 difference in cost for the ET cover in Alternative 2B and Alternative 2C or provide a reference to the appropriate section of Appendix E (Supporting Information for Cost).

LANL Response

74. Appendix G includes revised cost estimates and a discussion of the assumptions used to calculate the estimates for each technology.

NMED Comment

75. Table 9.0-1, Comparative Analysis of Alternatives, page. 237:

NMED Comment: *NMED has the following comments on Table 9.0-1:*

1. *Alternative 2B, Long-term Effectiveness: The Permittees must replace "optimized" with "ET" because the optimized cover design has generally been reserved for the lower profile cover in Alternatives 2C and 2D.*

2. *Alternative 2D, Implementability: The time frame for design and construction should not be the same for Alternative 2B as for Alternative 2D due to the partial waste excavation component. The Permittees must revise the text to reflect a time frame similar to Alternative 2C.*

3. *The Permittees must revise the ratings as follows:*

    a) *Alternatives 2C and 2D, Implementability: 2C and 2D should be similar, and rated higher than 2B because the design is optimized for less cover material. The ratings for Implementability should be 2B=3, 2C=4, and 2D=4.*

b) *The rating for Alternative 2D, Cost must be changed to 4 because the costs are almost identical to those of Alternative 2C.*

c) *Based on the above comments, the Permittees must revise the total scores for Alternatives 2B (23) and 2D (24).*

LANL Response

75. Revised section 9 addresses the discrepancies identified by NMED.

NMED Comment

76. Table 10.2-1, MDA G Conceptual Cover Profile Layer Specifics and Justification, page. 243:

The description of the surface treatment layer is prescriptive, and is based on the Appendix C conceptual design. This must be verified or modified in the CMI design. The cover layer performance is based on both the thickness and the soil type, which currently is specified as local crushed tuff "as amended." Because the Permittees have not developed specific soil parameters, site-specific testing and re-analysis of water balance and erosion modeling must be performed during design to verify the borrow source and selected amendment specifications.

There may be difficulty selecting a filter material with long-term capability of maintaining void space within the biobarrier layer, and thus maintaining a capillary barrier as frequently referred to in the Appendix C conceptual design. The Permittees should note that cobble biointrusion barrier was used to fill in void spaces and assure compaction of overlying layers in the recent construction of the cover at the Sandia National Laboratory's mixed waste landfill. The Permittees must therefore evaluate this material for use as part of the alternative.

LANL Response

76. Should NMED select the biotic barrier technology (PS-3c) as part of the final remedy, additional analysis regarding the specific soil parameters, water-balance, and erosion modeling will be conducted as part of the cover design in the CMI Plan. The Laboratory will consider the successes and failures of filter material used at other sites when choosing a filter material for the cover at MDA G.

NMED Comment

77. Appendix C, Conceptual Cover Design Report, Executive Summary, page 4, paragraph 3:

a) Permittees' Statement: *"The MDA G PA (i.e., the PACA) suggested a flux less than 1 mm/yr would limit the migration of contaminants due to surface infiltration."*

NMED Comment: *NMED was unable to verify this statement from the PACA. However, the modeled drainage quantities reported in the Preliminary Assessment (Appendix G, Section 3.0 and Table 3) were between 1.3 x 10^{-4} to 0.61 mm/yr, which were all less than 1 mm/year for vegetated covers. This also applies to Section 3.3, second paragraph, third sentence of this Appendix, where the 1 mm/yr criterion is reportedly "stated" in the PACA. The Permittees must revise the text to remove the reference to the PACA.*

b) Permittees' Statement: *"Engineering judgment was used to determine that 5 ft (1.5 m) of cover soil would offer adequate storage capacity even under an enhanced set of climate scenarios representative of a 1000 year return period to reduce infiltration to less than 1 mm/year. Especially considering that the inclusion of a bio-barrier in the cover profile introduced a capillary barrier that further enhances the storage capacity of the cover soil."*

NMED Comment: *The UNSAT-H modeling used to determine the cover soil thickness included model weather data based on the "wettest decade in recorded history in Los Alamos (1985 to 1994)", rather than 1000-year weather predictions. Also, the capillary effects of the bio-barrier were only stated in general terms, and were not modeled or quantitatively assessed. This type of inference-based conclusion pales in comparison to the level of detail performed for the PACA of the Area G cover. Table 3.1 "Design Justification" for "Cover Spoil" also addresses this issue but unsatisfactorily. The Permittees must revise the text to address these concerns.*

LANL Response

77. The Conceptual Cover Design Report was previously included to address the PACA requirements to satisfy the conceptual cover design for the CME. Appendix G now includes the conceptual design details for all alternatives. If selected, the Conceptual Cover Design Report may be incorporated into the CMI Plan. In accordance with Section VII.E.2 of the Consent Order, additional design specifications will also be included in the CMI Plan.

    As discussed in the introduction, the scope of the PACA process, as defined in DOE Order 435.1, is more comprehensive than the CME process under the Consent Order. The robustness of the engineering methods and the complexity of modeling tools and the conservative modeling assumptions in the PACA are the result of the uncertainties regarding potential impacts of such long-lived waste to human health and the environment.

NMED Comment

78. Appendix C, Conceptual Cover Design Report, Section 3.2, Surface Treatment, paragraph 1:

Permittees' Statement: *"The Performance Assessment for MDA G states that biointrusion and erosion are the two primary mechanisms to control contaminant releases from the site."*

NMED Comment: *Several issues were identified in the PACA (Appendix H Conceptual Design, Section 2.2 Design Criteria), including gas emissions, water infiltration, wind and water erosion. However, NMED concurs that erosion is a significant long-term issue for the proposed ET cover that must be thoroughly evaluated. The gravel admixture approach appears to have merit and, if included in the design, must be more thoroughly assessed with more refined analytical tools such as additional modeling and possibly test pads.*

LANL Response

78. The Conceptual Cover Design Report was previously included to address the PACA requirements to satisfy the conceptual cover design for the CME. Appendix G now includes the conceptual design details for all alternatives. If selected, the Conceptual Cover Design Report may be incorporated into the CMI Plan. In accordance with Section VII.E.2 of the Consent Order, additional design specifications will also be included in the CMI Plan.

As discussed in the introduction, the scope of the PACA process, as defined in DOE Order 435.1, is more comprehensive than the CME process under the Consent Order. The robustness of the engineering methods and the complexity of modeling tools and the conservative modeling assumptions in the PACA are the result of the uncertainties regarding potential impacts of such long-lived waste to human health and the environment.

NMED Comment

79. Appendix C, Conceptual Cover Design Report, Section 3.3, Cover Soil, paragraph 1:

Permittees' Statement: *"The cover soil layer beneath the gravel/soil admixture shall be a minimum of 3.5 feet (1m) of amended soil meeting the water storage capacity properties of a typical sandy loam soil (ROSETTA 2000)."*

NMED Comment: *The ROSETTA software for vadose zone modeling and the integral material properties tables have become the property specification for the main cover soil component. It is inappropriate to use a published value for "typical sandy loam soil" to represent the modeling input parameters for the material used when the dominant material available onsite is crushed tuff, not "sandy loam soil." The Permittees must revise the vadose zone modeling using an input parameter comparable to the available on-site material.*

LANL Response

79. The Conceptual Cover Design Report was previously included to address the PACA requirements to satisfy the conceptual cover design for the CME. Appendix G now includes the conceptual design details for all alternatives. If selected, the Conceptual Cover Design Report may be incorporated into the CMI Plan. In accordance with Section VII.E.2 of the Consent Order, additional design specifications will also be included in the CMI Plan.

NMED Comment

80. Appendix C, Conceptual Cover Design Report, Section 3.3, Cover Soil:

a) Table 3.2 appears to be a matrix of scores based on various material types. The Permittees must explain the significance of this Table and what the recommended score or material type.

b) Tables 3.3 and 3.4 list requirements for plant nutrients and salts recommended for the "cover soil." The Permittees must clarify whether or not the specifications in Tables 3.3 and 3.4 apply to the surface treatment layer as well as the cover soil layer.

LANL Response

80. The Conceptual Cover Design Report was previously included to address the PACA requirements to satisfy the conceptual cover design for the CME. Appendix G now includes the conceptual design details for all alternatives. If selected, the Conceptual Cover Design Report may be incorporated into the CMI Plan. In accordance with Section VII.E.2 of the Consent Order, additional design specifications will also be included in the CMI Plan.

NMED Comment

81. Appendix C, Conceptual Cover Design Report, Section 3.3, Cover Soil, Soil Placement:

It appears that placement of soils up to the optimum moisture content will not prevent potential desiccation cracking. Therefore, additional material-specific testing and evaluation is required to determine compaction and moisture specifications.

LANL Response

81. The Conceptual Cover Design Report was previously included to address the PACA requirements to satisfy the conceptual cover design for the CME. Appendix G now includes the conceptual design details for all alternatives. If selected, the Conceptual Cover Design Report may be incorporated into the CMI Plan. In accordance with Section VII.E.2 of the Consent Order, additional design specifications will also be included in the CMI Plan.

NMED Comment

82. Appendix C, Conceptual Cover Design Report, Section 3.3, Cover Soil, paragraph 2:

Permittees' Statement: *Modeling using UNSAT H (Fayer 2000) was performed to determine the minimum thickness required to provide adequate storage capacity for an upper boundary condition consisting of the wettest decade in recorded history in Los Alamos."*

NMED Comment: *NMED generally agrees that UNSAT H is an appropriate model to utilize when estimating cover thickness, as is HYDRUS which was used in the PACA, but the use of both models under independent studies should be avoided unless used as an uncertainty analysis or quality check. An exhaustive comparison of the two modeling approaches was not performed as part of this review; however, it is apparent that the PACA approach was more complete and better integrated with other analytical tools (such as the erosion modeling, radiological exposure, groundwater transport, etc.) and therefore appears to be the more appropriate model. The Permittees must recalculate the thickness estimates using the HYDRUS model.*

LANL Response

82. The Conceptual Cover Design Report was previously included to address the PACA requirements to satisfy the conceptual cover design for the CME. Appendix G now includes the conceptual design details for all alternatives. If selected, the Conceptual Cover Design Report may be incorporated into the CMI Plan. In accordance with Section VII.E.2 of the Consent Order, additional design specifications will also be included in the CMI Plan.

    As discussed in the introduction, the scope of the PACA process, as defined in DOE Order 435.1, is more comprehensive than the CME process under the Consent Order. The robustness of the engineering methods and the complexity of modeling tools and the conservative modeling assumptions in the PACA are the result of the uncertainties regarding potential impacts of such long-lived waste to human health and the environment.

NMED Comment

83. Appendix C, Conceptual Cover Design Report, Section 3.3, Cover Soil, paragraph 3:

Available local material with site-specific test data was evaluated with the conclusion that 6.6 ft of cover thickness was required. It appears that this result was unacceptable to the design team, and therefore a surrogate material with lookup table values for hydraulic parameters was also modeled

with the conclusion that 5 ft of cover thickness was required. This approach is unacceptable; site-specific hydraulic parameters must be used for locally available materials, or alternatively, materials listed in the look-up tables that the Permittees are willing to import to the site during cover construction. Also, Table C.1 indicates that the selected soil has hydraulic conductivity values that are an order of magnitude less than the tested on-site TA-61 soil, which indicates a poor fit with locally available materials. The Permittees must revise Appendix C to reflect the evaluation using the site-specific test data.

LANL Response

83. The Conceptual Cover Design Report was previously included to address the PACA requirements to satisfy the conceptual cover design for the CME. Appendix G now includes the conceptual design details for all alternatives. If selected, the Conceptual Cover Design Report may be incorporated into the CMI Plan. In accordance with Section VII.E.2 of the Consent Order, additional design specifications will also be included in the CMI Plan.

NMED Comment

84. Appendix C, Conceptual Cover Design Report, Section 3.4, Filter Medium:

The Permittees must consider a test pad approach during the design process to refine the requirement and thickness of filter material required, and to assess possible constructability issues and hydraulic properties (e.g., the capillary barrier concept) for the bio-barrier layer.

LANL Response

84. The Conceptual Cover Design Report was previously included to address the PACA requirements to satisfy the conceptual cover design for the CME. Appendix G now includes the conceptual design details for all alternatives. If selected, the Conceptual Cover Design Report may be incorporated into the CMI Plan. In accordance with Section VII.E.2 of the Consent Order, additional design specifications will also be included in the CMI Plan.

NMED Comment

85. Appendix C, Conceptual Cover Design Report, Section 3.5, Bio-Barrier:

Permittees' Statement: *There are many studies, many of which are summarized in Dwyer et al (2006) that discuss the effects of biointrusion on cover systems and waste sites. Several specifically applicable to MDA G are summarized in Appendix B."*

NMED Comment: *This document seems to be devoid of practical references or other justification for the prescribed bio-barrier. Appendix B of this Appendix C includes text that provides a very cursory overview of biointrusion concepts, such as absorption of select radionuclides into ecological receptor tissue and uptake in plants. However, this appendix does not provide any substantive support for the design aspects of minimizing biointrusion through a landfill cover. Nevertheless, NMED agrees that a cobble layer has potential merit for the proposed ET cover. Therefore the Permittees must develop this concept with practical examples or biointrusion studies. Pg. 4-85 of the PACA states that a significant potential mechanism for spreading radiological contaminants at the ground surface is deep rooted trees. Therefore, the Permittees must determine the optimum depth of a cobble layer for minimizing the growth of trees.*

LANL Response

85. The Conceptual Cover Design Report was previously included to address the PACA requirements to satisfy the conceptual cover design for the CME. Appendix G now includes the conceptual design details for all alternatives. If selected, the Conceptual Cover Design Report may be incorporated into the CMI Plan. In accordance with Section VII.E.2 of the Consent Order, additional design specifications will also be included in the CMI Plan.

    As discussed in the introduction, the scope of the PACA process, as defined in DOE Order 435.1, is more comprehensive than the CME process under the Consent Order. The robustness of the engineering methods and the complexity of modeling tools and the conservative modeling assumptions in the PACA are the result of the uncertainties regarding potential impacts of such long-lived waste to human health and the environment.

NMED Comment

86. Appendix C, Conceptual Cover Design Report, Appendix C, Modeling: Upper Boundary Condition -Climate Data:

Permittees' Statement: *"The surface boundary condition during evaporation was modeled as a flux that required daily weather data. The wettest decade on record was used (1985 to 1994) from Los Alamos National Laboratory (weather.lanl.gov)."*

NMED Comment: *Although the decade selected was the wettest on record, this selection does not lend itself to other extreme weather conditions that should also be evaluated for the cover, such as a 100-year storm. The Permittees must provide justification for choosing the wettest decade versus other extreme weather events.*

LANL Response

86. The Conceptual Cover Design Report was previously included to address the PACA requirements to satisfy the conceptual cover design for the CME. Appendix G now includes the conceptual design details for all alternatives. If selected, the Conceptual Cover Design Report may be incorporated into the CMI Plan. In accordance with Section VII.E.2 of the Consent Order, additional design specifications will also be included in the CMI Plan.

NMED Comment

87. Appendix C, Conceptual Cover Design Report, Appendix C, Modeling: Soil Properties Related to Vegetation, Soil Properties:

Permittees' Statement: *"Unsaturated soil properties were obtained from data using pressure plates and water columns (depending on the suction values) to develop values of water content as a function of pressure head (ASTM D 6836)."*

NMED Comment: *It is not clear what the source is for the soil water characteristic curve data from ASTM 6836. This type of testing on available on-site soils, as well as possible amendments of on-site soils, is a significant data need for the ET cover design. Therefore, the Permittees must provide the source of the soil water characteristic curve data by either reporting this data or providing the appropriate citation.*

LANL Response

87. The Conceptual Cover Design Report was previously included to address the PACA requirements to satisfy the conceptual cover design for the CME. Appendix G now includes the conceptual design details for all alternatives. If selected, the Conceptual Cover Design Report may be incorporated into the CMI Plan. In accordance with Section VII.E.2 of the Consent Order, additional design specifications will also be included in the CMI Plan.

NMED Comment

88. Appendix E, Section E-6.0, Alternative 2C: ET Cover with Partial Waste Excavation, Monitoring and Maintenance, and SVE, page E-9:

Permittees' Statement: *Footnote: "During Title 1 design, the exact volume of waste to be removed from pits and shafts will be determined to provide a lower profile cover."*

NMED Comment: *The footnote demonstrates that the quantity of wastes requiring removal to accommodate a lower profile cover has not yet been determined. The volume of waste to be removed is a significant factor in the erosion model and ultimately determining that the cover meets long-term reliability and effectiveness requirements. This is the Permittees' recommended alternative; therefore, the Permittees must provide an estimate of the quantity of wastes removed and adjust the cost estimate accordingly.*

LANL Response

88. Sections 6, 7, and 8 were rewritten to address the remedial action objectives that were developed in section 4.

Technologies were identified to address the source areas independently and were subsequently combined into remedial alternatives for MDA G.

Appendix G includes revised cost estimates and a discussion of the assumptions used to calculate the estimates for each technology. Appendix G no longer includes the footnote discussed above.

NMED Comment

89. Appendix E, Section E-6.0, Alternative 2C: ET Cover with Partial Waste Excavation, Monitoring and Maintenance, and SVE, page E-9:

Permittees' Statement: *"ET cover encompassing 63 acres"*

NMED Comment: *The Permittees must explain why the Alternative 2C cover is only 63 acres, in comparison to 80 acres for Alternative 2B.*

LANL Response

89. The cover technologies evaluated within the revised CME total an area of 51 acres. The discrepancy between the 63 acres for Area G and the cover area is because not all of Area G must be covered. A portion of the 63 acres has not been impacted by waste disposal or storage (see Figure 1.0-3).

NMED Comment

90. Appendix E, Section WBS 2C.1.5, RA Waste Excavation/Waste Management, page E-11:

a) ***Permittees' Statement:*** *"The horizontal extent of contamination is assumed not to extend beyond the edges of the pits and shafts, and the vertical extent of contaminants is assumed to be at the bottom of the disposal units."*

NMED Comment: *The above information is not relevant to Alternative 2C; therefore, the Permittees must remove this sentence from Section WBS 2C.1.5.*

b) ***NMED Comment:*** *The level of detail in Section WBS 5B.1.5 is appropriate for this Section as well, given that a partial implementation of the waste removal strategy is proposed under Alternative 2C. The Permittees must revise Section WBS 2C.1.5 to include more detail with respect to waste excavation.*

LANL Response

90. Sections 6, 7, and 8 were rewritten to address the remedial action objectives that were developed in section 4.

Technologies were identified to address the source areas independently and were subsequently combined into remedial alternatives for MDA G.

Appendix G includes revised cost estimates and a discussion of the assumptions used to calculate the estimates for each technology.

NMED Comment

91. Appendix E, Section WBS 2D.1.6, RA Stabilization, page E-14:

Permittees' Statement: *"An assumption was made that stabilization of potential erosion areas would require 5000 yd^3 of jet grouting."*

NMED Comment: *The Permittees must provide the basis for the aforementioned assumption. The Permittees must also correct the typographical error; "of" should not be in the superscript.*

LANL Response

91. Sections 6, 7, and 8 were rewritten to address the remedial action objectives that were developed in section 4.

Technologies were identified to address the source areas independently and were subsequently combined into remedial alternatives for MDA G.

In situ stabilization technologies were screened out in section 6 because the use of high pressure at shallow depths can be hazardous to workers and possibly breach the pits and shafts.

NMED Comment

92. Appendix E, Section WBS 2D.1.7, RA ET Cover, page E-14:

Permittees' Statement: *"Alternative 2D represents an optimized engineered cover approximately 6 ft thick over the 80-acre site."*

NMED Comment: *The first bullet in Section E-7.0, states that Alternative 2D includes an "ET cover encompassing 63 acres." See Specific Comment # 89.*

LANL Response

92. The cover technologies evaluated within the revised CME total an area of 51 acres. The discrepancy between the 63 acres for Area G and the cover area is because not all of Area G must be covered. A portion of the 63 acres has not been impacted by waste disposal or storage (*see* Figure 1.0-3).

NMED Comment

93. Appendix E, Section WBS 5C.1.5, RA Construction of RCRA Landfill, page E-21:

Permittees' Statement: *"Additionally, an independent assessment is required at a cost of $47,000.00 per acre. Traffic control study costs are two engineers at $90/h for 160 h, with travel and per diem. Costs for the cover were not included."*

NMED Comment: *The Permittees must clarify what is meant by "independent assessments" that cost $47,000 per acre; specifically, what is the nature and intent of the assessment. The Permittees must also explain the relevance of the information on traffic control study costs.*

LANL Response

93. An independent study involving traffic control, to be implemented as part of the CMI Plan, was assumed to be part of the conceptual design costs. Conceptual design costs are 16% of direct costs in the MDA G CME cost estimate (Appendix G).

NMED Comment

94. Appendix E, Section WBS 5C.1.6, RA Installation of Groundwater Monitoring Well Network at RCRA Landfill, page E-21:

Permittees' Statement: *"This estimate assumes eight regional groundwater monitoring wells will be required to be constructed and sampled quarterly to demonstrate performance of the RCRA landfill Construction of regional groundwater monitoring wells is estimated at $2.3 million each. Groundwater sampling costs are estimated at $11,000 per event."*

NMED Comment: *The Permittees must provide documentation supporting the estimate of $2.3 million for each regional groundwater monitoring well.*

LANL Response

94. For the purposes of this CME, the Laboratory assumes that the CAMU or RCRA facility would be located at TA-54, and the existing groundwater-monitoring system is adequate to meet the requirements of a CAMU/RCRA Subtitle C landfill.

NMED Comment

95. Appendix E, Section WBS 5D.1.7, RA Waste Excavation/Waste Management page E-28:

The bulleted list shows identical treatment costs for Alternative 5D as previously shown for Alternative 5C. NMED assumes that there would be different treatment standards under the CAMU rule as opposed to Land Disposal Requirement (LDR) treatment standards for the RCRA Subtitle C landfill), which would result in different costs for waste treatment. The Permittees must revise the text to justify the listed identical waste treatment costs for Alternatives 5C and 5D.

LANL Response

95. Sections 6, 7, and 8 were rewritten to address the remedial action objectives that were developed in section 4.

    Technologies were identified to address the source areas independently and were subsequently combined into remedial alternatives for MDA G.

    Appendix G includes revised cost estimates and a discussion of the assumptions used to calculate the estimates for each technology.

NMED Comment

96. Appendix E, Section E-8.0, References, page E-30:

The Permittees list the following reference in their list of documents cited in Appendix E:

> *Daniel B. Stephens & Associates Inc., April 12, 2005. "Borrow Source Survey for Evapotranspiration Covers at Los Alamos National Laboratory," Albuquerque, New Mexico. (Daniel B. Stephens 2005, 089548)*

NMED was unable to identify where this document was cited in Appendix E. The Permittees must provide the section and page number where the citation appears or revise the text to include a reference to the document because it appears to be relevant for the ET cover design.

The reference document must also be provided to NMED.

LANL Response

96. The reference noted is no longer applicable for the CME.