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CERTIFIED MAIL - RETURN RECEIPT REQUESTED

April 1, 2011

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RE: NOTICE OF DISAPPROVAL
CORRECTIVE MEASURES EVALUATION REPORT REVISION 2
MATERIAL DISPOSAL AREA G, CONSOLIDATED UNIT 54-013(b)-99
LOS ALAMOS NATIONAL LABORATORY
EPA ID #NM0890010515
HWB-LANL-08-025

Dear Messrs. Rael and Graham:

The New Mexico Environment Department (NMED) has received the United States Department of Energy (DOE) and the Los Alamos National Security L.L.C.'s (LANS) (collectively, the Permittees) *Corrective Measures Evaluation (CME) Report for Material Disposal Area (MDA) G, Solid Waste Management Unit 54-013(b)-99, at Technical Area 54, Revision 2* (Report), dated November 2010 and referenced by LA-UR-10-7868/EP2010-0507. NMED has reviewed the Report and hereby issues this Notice of Disapproval (NOD). The Permittees must address the following comments before NMED can consider the Report further.

GENERAL COMMENTS:

1) Previous NOD

The Permittees did not adequately address many of the comments from the original CME NOD (2010 NOD) dated July 26, 2010. Specifically:

a) NMED's General Comment 5. The Permittees have actually provided less information regarding costs in the current revision of the Report than in the previous version. The Permittees have not provided unit costs for any items other than a "Gross Unit Price" per line item, which includes a summation of all labor, materials, subcontractor, equipment and other costs divided by the quantity of units of the particular line item. There are no unit costs provided for labor, materials or equipment. The cost estimates must include unit cost and volume estimates for each line item including hourly rates for personnel and equipment and per-unit volume costs for waste management and restoration. For example, waste removal cost estimates must include the cost of excavation, loading, transport, disposal, backfill and compaction as well as unit equipment costs if not included in the cost (per ton or cubic yard) of moving material. Provide this information in the next revision of the Report. Comment 9 provides more detailed information regarding cost tables and Appendix G (Supporting Information for Cost Estimates for Material Disposal Area G).

b) NMED's General Comment 8. Section XI.F.12 (Design Criteria To Meet Cleanup Objectives) of the Consent Order specifically states, "The Respondents shall present descriptions of the preliminary design for the selected corrective measures in this section. The description shall include appropriate preliminary plans and specifications to effectively illustrate the technology and the anticipated implementation of the remedial option at the subject area. The preliminary design shall include a discussion of the design life of the alternative and provide engineering calculations for proposed remediation systems." While the Permittees have provided some of this information, delaying specification of the preliminary design until the CMI does not allow for an effective evaluation of the alternative. The evaluation of technologies requires a critical evaluation of long-term reliability and effectiveness for the reduction of toxicity, mobility, or volume of contaminants, and an evaluation of cost, all of which cannot be accurately completed without the requested information.

c) NMED's Specific Comment 41. The Permittees' reply was repeated in response to several comments within the 2010 NOD and does not adequately address or respond to the question posed in the comment. Provide the specific criteria within the PACA report that have been used to identify areas with high erosion potential as requested in the 2010 NOD.

d) NMED's Specific Comment 42. This response was repeated in response to several comments within the 2010 NOD and does not adequately address or respond to the question posed in the comment. Provide supporting information that documents the assertion that Alternative 2D would be protective for 1000 years as requested in the 2010 NOD.

e) NMED's Specific Comment 46. The Permittees did not provide the requested figure. Section XI.F.15 (Figures) of the Consent Order, number 11, specifies, "Figures presenting the locations of existing and proposed remediation systems" shall be included in the CME Report. This figure is therefore mandatory.

f) NMED's Specific Comment 55. The Permittees have not provided a brief description of the technical aspects of the RCRA Subtitle C landfill as requested. In order for NMED to properly evaluate the potential alternatives presented, a description of the technical aspects of the alternative is required. Also, include a conceptual siting for the RCRA landfill.

g) NMED's Specific Comment 56. The Permittees have not provided the requested figure. The Consent Order (Section IX.F.15.11) specifically states that the figure requested is a requirement of the Report. (See also Comment 1e).

h) NMED's Specific Comment 60. The Permittees have not provided a brief description of the technical aspects of the Corrective Action Management Unit (CAMU) as requested. In order for NMED to properly evaluate the potential alternatives presented, a description of the technical aspects of the alternative is required. (See also Comment 1f). Also, include a conceptual siting for the CAMU.

i) NMED's Specific Comment 61. The Permittees have not provided the requested figure. The Consent Order (Section IX.F.15.11) specifically states that the figure requested is a requirement of the Report. (See General Comment 1e and 1g).

j) NMED Specific Comment 63. In order to adequately and appropriately evaluate technologies and compare them to one another, an accurate preliminary design that follows the CAMU rule is required. Remove the reference to an ET cover from the CAMU description and adjust costs appropriately.

k) NMED Specific Comment 71. Section XI.F.13 (Schedule) of the Consent Order states, "...this section shall provide a schedule for submittal of reports and data to the Department, including a schedule for submitting all status reports and preliminary data." The Permittees have not provided the requested schedule of deliverables, "including 30% conceptual (or 60% intermediate) design, pre-final design, and final design."

l) NMED's Specific Comment 77. Removing the Conceptual Cover Design Report from the Report and repeatedly asserting the robustness of the PACA does not

answer the questions put forth in the comments from NMED. Whether or not the Conceptual Cover Design Report is included, either remove reference to the PACA or provide support and references that support the assertions based on the PACA. This applies to Specific Comments 77 – 87 of the 2010 NOD.

Revise the Report to provide appropriate responses to the comments provided in the original NOD.

2) **Technologies versus Alternatives**

The concept of a remediation technology versus a remedy alternative is an overarching issue in this version of the CME. Section VII.D.2 of the 2005 Compliance Order on Consent (Order) states that the Report shall include:

10. An identification and description of a range of remedy alternatives, and
12. A detailed evaluation and rating of each of the remedy alternatives, applying the criteria set forth in Section VII.D.4.

The Permittees have instead provided an identification of a wide range of technologies, many of which are not applicable to MDA G, and have evaluated and rated these technologies against the criteria in Section VII.D.4 of the Order. This is not an effective strategy to ensure the best remedies are selected and does not comply with the requirements of the Order.

A remedy alternative typically includes a combination of various remediation technologies whose combined application will meet the requirements of the criteria set forth in Section VII.D.4 of the Order. While a remedy alternative consisting of a combination of technologies may rate highly against these criteria, the individual technologies may rate poorly on their own. For example, evaluating and rating a biotic barrier as a remedy alternative instead of as a component of a cover system is not appropriate. The biotic barrier on its own will rate poorly against the criteria, while an engineered cover system that includes a biotic barrier will likely rate highly.

In Section 6.2 (Screening of Technologies), the Permittees include a number of technologies that are not appropriate for MDA G. While it is important to review all viable technologies against site specific criteria, it is not appropriate to include technologies in the screening that are specific to conditions that are not directly relevant to MDA G. For example, electrokinetic and electroacoustic soil treatment technologies are not applicable to MDA G because they are specific to the treatment of soils, which are of minimal concern at MDA G. These technologies should therefore not be included in the screening process or as a part of any remedy alternative. A large amount of effort was spent describing and eliminating 32 different technologies in the screening process. The Consent Order does not require a "laundry list" of all remedial technologies; it simply requires a range of remedy alternatives that are applicable to the site being addressed.

Revise the Report to remove technologies from the screening process that are not applicable to MDA G. Develop remedy alternatives that are applicable to MDA G, and then evaluate and rate these alternatives against the criteria set forth in Section VII.D.4 of the Order. By addressing this overarching issue, the Permittees may minimize the need to address many of the more detailed revision comments herein.

3) **General Lack of Detail**

The Report lacks sufficient justification and detail in design that would allow NMED to select and defend a suitable remedy, particularly in Sections 6 through 10 and their related figures and tables. Specific reasoning and rationale in the screening and evaluation of alternatives, and explanations regarding the cost estimates and rankings given in each category of the evaluation are lacking. It is important to provide a basis for all assertions, estimates, and/or assumptions, including specific detail regarding how each alternative will meet the criteria in the Order.

Examples of sections lacking detail include, but are not limited to:

a) In Sections 7.3.2.1, 7.3.2.3, 7.3.3.1, and 7.3.3.3 (Protection of Human Health and the Environment and Control of Source and Releases sections for Technologies PS-2 and PS-3a), the Permittees state that these technologies will limit, minimize, reduce or provide protection against "erosion, direct contact, and biointrusion" with no explanation as to how they will accomplish this. In Section B-4.1 (Rooting Depth Study), the Permittees state, "In general, the greatest observed biomass of the roots of all trees, shrubs, and forbs was located in the upper 6 ft of soil." With no cover (PS-2) or an 18-inch soil cover (PS-3a), there is no control of this 6-ft root biomass unit. The Permittees have not demonstrated how these technologies will limit, minimize, reduce or provide protection against "erosion, direct contact, and biointrusion."

b) In Sections G-3.4.1 (Assumptions) and G-3.8.1 (Assumptions), the Permittees provide estimates regarding percentages of excavated materials to be processed and disposed of in different manners. For example, bullet 10 of Section G-3.8.1 states, "85% of the MLLW is assumed to need on-site treatment and the remaining 15% is assumed to be shipped off-site. Of the 85% of the MLLW receiving treatment 55% will be cleaned to meet necessary standard to be returned to the excavation at MDA G, and the remaining 30% will be shipped off-site as industrial waste." The Permittees provide no justification or basis for the estimated percentages of waste streams from the proposed excavations. Also, the description for Section 7.3.8 is not complete without a conceptual siting of the proposed RCRA landfill or CAMU.

Provide considerably more detail regarding the reasoning and rationale in the screening and evaluation of alternatives. Provide explanations specific to the cost estimates and

rankings given in each category of the evaluation. Include detail specific to how each alternative will meet the criteria in the Order.

4) **Groundwater**

a) Through approval of the Investigation Report (June 8, 2007), and in accordance with Section IV.C.1.e of the Order, NMED determined that the Permittees have completed characterization of contamination in the vadose zone at MDA G. While NMED recognizes that that Permittees have installed recent additions to the well network at Technical Area (TA) 54, the Permittees have not completed characterization of potential groundwater contamination at MDA G. It is crucial that the CME process for waste sites at TA 54 include an accurate description of the groundwater conditions (see Sections VII.D.2 and XI.F.6.b of the Order). This involves presentation of a minimum of four quarters of groundwater data from all wells located in the vicinity of TA 54, in addition to other items. (*see* also NMED's September 15, 2010 letter to the Permittees (RE: Clarification of Groundwater Data Requirements [for] Corrective Measures Evaluation Reports (CMEs) at Technical Area 54)). NMED expects that four quarters will be presented by the time it issues its Statement of Basis for its proposed remedy in November 2011.

b) Assertions claiming an average travel time of several hundred to several thousand years for waterborne contaminants from the surface to the regional aquifer, based on the study by Stauffer et al. 2005, 097432, have been proven inaccurate by the presence of LANL-generated contaminants in the regional aquifer. Theoretical modeling results, especially those that have been proven wrong, provide little if no value to the remedy selection process. Such references should be removed or justified.

c) Add well R-55i to the Report and update relevant text, maps, and tables with information for that well. Add wells R-38 and R-53 to the list of wells (currently R-21, R-32 and R-56) that form the upgradient portion of the groundwater monitoring network specific to MDA G. Update relevant text, tables and figures accordingly.

d) When evaluating the nature and extent of groundwater contamination at MDA G, apply screening protocols implemented in Appendix D to all wells, both downgradient and upgradient, that form the groundwater monitoring network specific to MDA G.

e) It is not specified in the Report whether the water-quality data screened to evaluate the presence of contaminants in groundwater was obtained by contract laboratories or by both contract and on-site laboratories. State the origin of water-quality data in relevant tables and text. Include the data produced by both contract and on-site laboratories, if not done so already, in the Report.

f) Update the Report with the latest information on the MDA G groundwater monitoring network, including but not limited to water level measurements, pumping test results, water-quality data, geology and stratigraphy, and other information obtained since this version of the Report. Update relevant text, tables, and figures, including water-table and structure-contour maps, and geologic cross-sections.

5) Screening versus Evaluation

The Permittees have not distinguished between "screening" and "evaluation" in the Report. "Screening" should be used to reduce the number of items carried forward for further consideration, while the numerical ranking of alternatives is an "evaluation." While Section 7 provides screening of the alternatives and Section 8 is titled "Evaluation of Alternatives Against Remedial Alternative Evaluation Criteria", in Sections 8.3, 8.3.9 and 8.4.4.6, the Permittees revert to using the term "screening." This also applies to Tables 8.3-1, 8.4-1 and 8.5-1. Revise the Report to more clearly distinguish between "screening" and "evaluation".

6) Cover Alternatives

In Sections 7.3.4 (Technology PS-3b: Evapotranspiration Cover), the Permittees do not provide a design basis for the ET covers. This is especially important regarding the cover thickness, which greatly impacts both effectiveness and cost. In general, the preliminary design basis for covers in the Report is inadequate for purposes of a CME and final remedy selection. Minimum technical information required for a soil cover in the Report must include the following preliminary design details:

a) Initial grading plan,
b) Minimum and maximum final cover slopes,
c) Final grading and drainage plan,
d) Draft cover materials specifications,
e) Site-specific materials testing for hydraulic parameters,
f) Water balance studies for proposed cover material,
g) Conceptual design for surface admixture for erosion resistance,
h) Erosion modeling over the life of the cover system, and
i) Itemized costs for construction, startup testing, sampling and operation and maintenance (O&M).

The Permittees' January 4, 2008 "*Response to Request for Public Comment – Selection of a Remedy for Corrective Action at Material Disposal Area H, Solid Waste Management Unit 54-004 at Technical Area 54, Los Alamos National Laboratory, Los Alamos, New Mexico*" (2008 Public Comment Letter), referenced by EP2007-0760, proposed a revised, or enhanced, ET cover, which incorporates a total of 8-feet of material, including a minimum 2.5-ft thick composite capillary break/biointrusion barrier layer. In contract to

the information provided in the Report, the 2008 Public Comment Letter contains an adequate level of information and design criteria to make a remedy selection.

A 5 ft thick ET cover and SVE were recommended as the preferred alternative for MDA G. The previous version of the Report, *Corrective Measures Evaluation Report for Material Disposal Area G, Consolidated Unit 54-013(b)-99, at Technical Area 54, Revision 1,* dated September 2009 (CME Rev.1), recommended a 7 ft thick ET cover with a biointrusion barrier and SVE as the preferred alternative. Based on thickness alone, the previously proposed 7 ft ET cover system is more protective than the currently recommended 5 ft ET cover. No justification is provided for the Permittees' new preference for a less protective cover.

The Permittees indicate that the Federal Remediation Technologies Roundtable (FRTR) screening matrix was used to identify the general types of corrective measure technologies. In the FRTR, "vegetative cover" is synonymous with "ET cover" as alternate cover technology. Not only must consistent terms be used (the term "ET cover" is preferred), but also the term is related to a specified set of performance criteria against which the alternative must be evaluated.

FRTR suggests only two containment technologies: RCRA compliant covers (Subtitle D or C) or alternate/enhanced covers. The 18-inch thick "vegetative cover" layer is deficient in that it does not fulfill the minimum technical requirements for a RCRA Subtitle D solid waste final cover as described in 40 Code of Federal Regulations (CFR) §258.60 (i.e., an 18-inch infiltration layer with maximum 10-5 cm/sec hydraulic conductivity and a six-inch erosion layer that supports plant growth).

The cover technology in the Report is certainly less costly than technologies in CME Rev.1, but it also substantially less protective than the conventional or previously proposed alternate cover technologies which are within the same range of costs. Also, considering the fact that biointrusion is both a primary and secondary release mechanism of the site's Conceptual Site Model, that biointrusion by gophers has been an issue at other MDAs, and that Section B-4.1 (Rooting Depth Study) specifically states that the majority of biomass of roots exist in the upper 6 ft of soil, the Permittees must evaluate cover designs with a minimum of 6 ft of cover and a biointrusion barrier.

The Permittees must retain several cover components identified as "technologies" in Section 6.2.1.4 (Surface Barriers) that are better described as individual components of an engineered cover system (e.g., compacted clay layer, biointrusion barrier, and flexible membrane liner). While clay desiccation in arid environments is a valid concern, a RCRA Subtitle C final cover with a compacted clay layer component could be designed with a protective layer (such as a geomembrane) to reduce or eliminate desiccation of the compacted clay layer. Concerns with differential settlement can be addressed through design components to provide added strength and reduce damage due to settlement of overlying cover components, including additional stress-bearing layers over the waste shafts or impoundments (e.g., geonet, geotextile, or concrete), use of high-strain

geomembrane materials (e.g., linear-low density polyethylene), and waste removal (especially for the relatively shallow pit and impoundments). Internal bearing strength of the waste material, particularly for the pit and impoundments, may require analysis to demonstrate that this material can support an overlying soil cover. The primary function of a Flexible Membrane Liner (FML) is generally not VOC control, but rather to eliminate vertical migration of moisture and contaminants. It is appropriate to state the potential limitations of FML while acknowledging it is an integral component of a multilayer (RCRA) cover. A compliant RCRA Subtitle C cover system must be included in the evaluation of alternatives (i.e., in Section 8.6, Development and Evaluation of Alternatives).

Revise the Report to remove all references to the vegetative cover technology, and retain compliant conventional and alternate covers, both of which must include a biointrusion barrier component. Include a level of technical information similar to that provided in the aforementioned 2008 Public Comment Letter for MDA H.

7) **Soil Vapor Extraction Alternatives**

The preliminary design for SVE at MDA G must include, but not necessarily be limited to, the following:

a) The locations across MDA G that will be targeted,
b) The spacing of the extraction wells,
c) The stratigraphic zones to be targeted for extraction,
d) The depths of the extraction wells, including total depth and depths of screens,
e) 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),
f) The locations of vapor monitoring wells and the monitoring port depths,
g) A discussion of emissions and the need/method for treatment, as well as inclusion in cost estimates,
h) A discussion of how the SVE system construction will interface with the rest of the remedial alternative, and
i) Itemized costs for construction, startup testing, sampling and operation and maintenance (O&M).

In addition, it appears the proposed SVE system design is based on inaccurate assumptions. First, Section 3.2 (SVE Pilot Test Summary) of the January 2009 *Pilot Test Report for Evaluating Soil-Vapor Extraction at Material Disposal Area G at Technical Area 54, Revision 1* (2008 SVE Report), states that, "[t]he shallow-extraction borehole was constructed to evaluate SVE in the Tshirege Member of the Bandelier Tuff. The borehole was cored and logged from the surface to a total depth (TD) of 182.5 ft bgs. The bottom of the shallow-extraction borehole was grouted up to a depth of 145 ft bgs to avoid shortcircuiting of air-flow through the more permeable Tsankawi Pumice Bed. The

top of the borehole was completed with a 10-in.-diameter steel casing from the ground surface to 63 ft bgs, approximately 3 ft into the top of Qbt 1v of the Tshirege Member, resulting in an 82-ft extraction interval within the Tshirege Member from 63 ft to145 ft bgs (Figure 3.2-2)." However, based on Figure 3.2-2 of the 2008 SVE Report and, more importantly, on comparison of the 2008 reported flow rates and vacuum pressures with the same parameters reported for the 2010 SVE pilot test, the shallow-extraction borehole short-circuited to the Tsankawi Pumice Bed (Qbtt).

Second, Section 5.3.1 (Extraction Well Depth, Diameter, and Extraction Interval) of the May 2010 *Report for Supplemental Soil-Vapor Extraction Pilot Test at Material Disposal Area G, Technical Area 54* (2010 SVE Report), states, "[t]he results of the previous numerical simulation of SVE at MDA G (LANL 2009, 105413) showed that extraction from the Qbt 1v and Qbt 1g units would still remove contaminants from the Qbtt and Qct units. Therefore, the design extraction interval should be in the Qbt 1v and Qbt 1g units." As stated in the February 23, 2011 NOD for the MDA L CME Report, NMED will select a remedy based on conclusions drawn primarily from data, not from models. In any event, the numerical simulations were based on the results of the short-circuited shallow extraction well from the 2008 pilot test. Also, comparison of "calibrated" permeability values in the March 2009 *Numerical Analysis of the Soil-Vapor Extraction Test at Material Disposal Area G, Technical Area 54 (*2009 SVE Modeling Report) with results of permeability testing during the 2010 pilot test shows that most of the calibrated values are higher than the field tested values, some by an order of magnitude.

Permeability results presented in the 2010 SVE Report indicate that the stratigraphic units proposed for the focus of the SVE system are on the lower end of the range of permeabilities for which SVE has been demonstrated to be effective. This conclusion is supported by the very low flow rates achieved within the Qbt 1g and Qbt 1v units during the 2010 pilot test, even at very high vacuum pressures.

Section 10.1 (Design Approach), under SVE, states, "[t]he results and conclusions of the SVE pilot tests conducted at MDA G in 2008 and 2010 (LANL 2009, 105112; LANL 2010, 109657) determined that SVE is a viable technology for removing VOCs from the subsurface at MDA G. They also determined that the effective extraction [radius of influence] ROI was approximately 150 ft at the vapor-extraction vacuums and flow rates at which the SVE systems were operated." While the results of the pilot tests may have shown that SVE is a viable technology for removing VOCs at MDA G, they did not support a ROI of 150 ft, especially in the stratigraphic units proposed in the preliminary design. The results from the 2010 SVE Report show that there was minimal pressure response at any port depth for any of the applied vacuums in all observation wells in the stratigraphic units proposed for SVE. The 2009 SVE Modeling Report shows that the 150 ft ROI was estimated through the numerical simulation which was based on permeability values assumed to be much higher than what the data support.

Annual or biannual soil gas monitoring is not sufficient during the implementation of SVE. Consider a more frequent monitoring approach for performance monitoring (e.g.,

biweekly or monthly) during initiation of active SVE. Any future reduction in the frequency of compliance monitoring will be based upon SVE performance results. In the revised Report, adjust the cost estimates accordingly.

8) Rankings

The rankings in Tables 8.3-1 (Screening of Technologies for Pits and Shafts against the Balancing Criteria) and 8.4-1 (Screening of Technologies for Vadose Zone Contamination against the Balancing Criteria), pages 155 - 157, lack supporting information, rendering the decision-making process opaque. While NMED noted many individual discrepancies within the rankings, adherence to Comment 2 of this NOD by the Permittees should render these specific issues moot.

Evaluate each of the remedy alternatives based on the Balancing Criteria and assess the scores for each in a manner consistent with the Balancing Criteria. Provide improved and enhanced reasoning for the rankings in the text associated with each considered alternative in all tables related to ranking of alternatives (e.g., Tables 8.3-1 and 8.4-1).

9) Cost Estimates

Attachment G-1 (Detailed Cost Estimate Report) provided in Appendix G does not include sufficient information to enable NMED to effectively review this attachment. Specific examples include, but are not limited to:

a) Vegetative Cover - DC - Fence, page 1 of 33: There is no explanation of how labor amounts were estimated, the unit cost of labor, or how the materials and equipment costs were estimated.
b) Vegetative Cover - DC - Project Costs, page 1 of 33, and all subsequent "Project Costs" Sections: Thousands to millions of hours of labor are listed with no explanation of how these estimates were calculated. Also, thousands to millions of hours for "Draft Distributable – Materials" are listed, which then have a total cost under the Materials column. The Permittees provide no explanation of how hours relate to material costs.
c) Vegetative Cover - DC - Project Costs, page 1 of 33, and all subsequent "Project Costs" Sections: The Permittees list a lump sum cost for a subcontractor to provide storm water prevention with no basis or justification.
d) Vegetative Cover – IC - Contingency, page 1 of 33: Contingency rates are provided as a percentage of some other amount. The costs do not correspond to the given percentage of any prior total costs.
e) Vegetative Cover – IOM – Professional Management, page 2 of 33: The Permittees provide no basis for the significant reduction of costs between time periods "years 0-30" and "years 31-100".
f) ET Cover – DOM – Cover Maintenance and Inspections, page 3 of 33: "TDR Monitoring of ET Cover" is not explained or justified in the text, and there is no

explanation of what "TDR" means in the Section titled "Acronyms and Abbreviations for Attachment G-1."

g) Excavation, Treatment, Onsite – DC – Shafts – Excavation - PCB, page 5 of 33, and all subsequent Sections that deal with excavation or retrieval of shaft waste: The Permittees break up the costs into Shafts 1-6 with no explanation or definition of what these refer to.

h) Excavation & Overcore, Treatment, Onsite – Excavation - Shafts - PCB, Shaft 1, page 14 of 33, and all other Sections that provide costs for overcore of shafts: The Permittees list three different "Overcoring shaft size" costs for Shaft 1 with no explanation of what these refer to or why Shaft 1 will require three different overcoring sizes.

i) Monitoring Natural Attenuation – DC – Demo, Add/Remove Monitoring Ports, Removal of Monitoring Tubing, page 26 of 33, and subsequent "Removal of Monitoring Tubing" line items: The Permittees list 32 hours under the Quantity and Unit columns, then list 120.3 hours under the Labor Hours column. Also included under these line items are significant equipment costs, nearing three quarters of a million dollars for the Soil Gas Venting and Soil Vapor Extraction Sections. There should be no equipment costs related to "Removal of Monitoring Tubing."

j) Soil Gas Venting – Direct Cost, VZ – Project Costs, page 29 of 33, and all subsequent "Project Costs" Sections: Personnel costs are repeated. For example, the "Project Manager" is listed as requiring 18,186 hours twice, the "Health and Safety Office – Readiness" is listed as requiring 1,429 hours twice, and the "Health and Safety Officer – Site" is listed as requiring 3,464 hours and then another 10,825 hours. The same personnel are also listed multiple times at the bottom of the page. No basis or justification for these costs is provided.

Revise the Report to provide explanations, separate labor, materials, equipment and subcontractor costs, and include unit costs for each, not an overall unit cost for each line item. Revise the text of the Report and Appendix G, where appropriate, to include any and all unit costs and assumptions used to develop the cost estimates. Although only a select number of examples are provided above, this information must be provided for each and every line item. Provide attached explanatory text stating all assumptions, estimations, and unit costs for each labor cost, material cost, subcontractor cost, and equipment cost for each line item in this attachment.

Miscellaneous

10) The potential for vapor intrusion into buildings has not been discussed in the conceptual site model (CSM). Include vapor intrusion into buildings in the CSM and evaluate the need for shallow SVE or other remedies to address this risk.

SPECIFIC COMMENTS:

11) Section 2.3.5, Regional Aquifer Hydrology, pages 8 and 9

NMED Comment: Several passages of this section erroneously refer to Figure E-2.2-1. The correct reference is Figure E-2.3-1.

12) Section 2.3.5, Regional Aquifer Hydrology, page 9

NMED Comment: Well R-22 is omitted from the list of wells belonging to the regional groundwater monitoring well network downgradient of MDA G. In Section 3.2.5, the Permittees list R-22 as part of that network. Resolve this discrepancy.

13) Section 2.3.5, Regional Aquifer Hydrology, page 9

NMED Comment: The Permittees erroneously refer to Table E-2.1-1. The correct reference is Table E-2.1-2.

14) Section 2.5, Status of Groundwater Monitoring, pages 14 and 15

NMED Comment: List all wells, both upgradient and downgradient, which form the groundwater monitoring network specific to MDA G.

15) Section 3.2.4, Nature and Extent of Vadose Zone Contaminants, page 16

Permittees' Statement: "The VOC vapor plumes differ across the site in terms of the constituents and concentrations of VOCs of which they are composed (LANL 2010, 108496). An important aspect of vapor migration is that vapors are transported predominantly by vapor-phase diffusion; in the dry environment present at MDA G, this process is faster than migration in the liquid phase."

NMED Comment: Vapor transport has been modeled by assuming vapor-phase diffusion through the Bandelier Tuff; adsorption by subsurface moisture has been ignored as a conservative measure. However, diffusion may not adequately model transport through the voids and fractures in the Cerros del Rio basalt, which may be better modeled as advective transport through the flow of subterranean air. Remove this statement or provide an explanation as to how the model addresses this concern.

16) Section 3.2.5, Nature and Extent of Groundwater Contaminants, page 18, first paragraph

NMED Comment: When discussing the results of screening for contaminants in groundwater wells, make reference to Table 3.3-1.

17) Section 4.2, Nature and Extent of Groundwater Contaminants, page 19

Permittees' Statement: Leach rates in covered units are currently expected to be controlled by infiltration rates, which are estimated to be 10 mm/yr or less in paved areas and less than 1 mm/yr in vegetated areas (section 2.2.4).

NMED Comment: The Permittees erroneously refer to Section 2.2.4, which does not exist. The correct reference is Section 2.3.4.

18) Section 5.2, Regulated Units and Solid Waste Management Units, page 24

Permittees' Statement: "Pit 29 and Shafts 124, 145, and 146 are regulated units. Pit 29 is 600 ft long and 30 ft deep and received nonliquid waste. Shaft 124 is 6 ft in diameter and 65 ft deep and was used for disposal of solid radioactive wastes but included approximately 1 ft^2 of hazardous wastes made up of organic liquids and vials."

NMED Comment: A unit of area (ft^2) does not describe a volume. Also, NMED disputes the Permittees' designation and interpretation of regulated units at MDA G.

19) Section 5.2.2, Groundwater, page 25

NMED Comment: When discussing groundwater quality standards, make reference to Table 5.3-1.

20) Section 6.2.1.1, Vertical Barriers, page 28

Permittees' Statement: "Limiting the lateral component of vapor-phase transport of a limited number of volatile contaminants at the site is one potential application for vertical barriers at MDA G. However, modeling indicates that vertical barriers may enhance downward migration of volatile contaminants and, as a result, may have a higher potential to impact groundwater."

NMED Comment: Provide a reference for this modeling and additional validation of this claim.

21) Section 6.2.1.3, Near Surface Horizontal Barriers, Soil-Grout Mix, page 30

Permittees' Statement: "A concrete-grout mixture containing soil or crushed tuff was considered as an alternative to replace a subsurface portion of the existing cover materials over the MDA G pits and shafts. Although this barrier may be safely constructed and has the potential to decrease permeability to water and/or penetrability by plants and animals, this type of barrier does not provide water storage for evapotranspiration."

NMED Comment: Water storage and evapotranspiration is not required if the near-surface grouting prevents surface moisture from contacting the waste. It appears from this statement that the Permittees are pre-determining the need for an ET cover in the technology screening stage. Water storage for evapotranspiration is not an *a priori* remediation requirement. Revise the document accordingly. Take care to provide the utmost objectivity to the technology screening process.

22) **Section 6.2.1.4, Surface Barriers, Biotic Barriers, page 32**

Permittees' Statement: "Installation of horizontal barriers constructed of cobble-sized rocks or pea gravel inhibits deeprooting plants and discourages burrowing animals."

NMED Comment: Pea gravel is unlikely to impede burrowing animals. Angular cobbles with a minimum diameter of 4 to 6 inches would be adequate. Revise the Report to eliminate "pea gravel" as a biotic barrier material, or provide justification for its inclusion.

23) **Section 6.2.1.4, Surface Barriers, Concrete Cap, page 32**

Permittees' Statement: "Moisture trapped under the cap may induce transport of contaminants to the groundwater."

NMED Comment: Reference the basis for the statements that indicate that a low permeability layer will retain moisture under the layer and enhance the downward migration of VOCs. Cover technologies by themselves do not directly address VOC contamination in the vadose zone; it is therefore not appropriate to eliminate these technologies solely for this reason. However, if this concern can be validated, it may be applied as balancing criteria in Section 8. Describe the functions and relative benefits or disadvantages of individual cover components, but retain both a conventional and alternate cover technology for further evaluation.

24) **Section 6.2.2.3, Physical Treatment Technologies, Jet Grouting, page 36**

Permittees' Statement: "The waste material in the pits and shafts ranges from 8 ft to 65 ft bgs. Use of high pressure at the shallower depths could be hazardous to workers and a breach of the pits and/or shafts."

NMED Comment: The justification for eliminating this technology is not well supported since nearly any technology provides some hazard to workers. Provide additional justification such as the potential to adversely affect waste forms, similar to the justification for Dynamic Compaction.

25) **Section 6.2.4.5, Thermal Treatment Technologies, Thermal Destruction, page 42**

Permittees' Statement: "This technology was not retained for further consideration because it has no additional benefit over thermal desorption."

NMED Comment: Given that there is no destruction of the contaminant waste stream and secondary treatment would be required with thermal desorption, thermal destruction would appear to have additional benefits. Revise this section of the Report to address this issue or remove it from consideration, as the technology is not feasible for the site and, therefore, should not be evaluated.

26) Section 7.2, Corrective Measures Threshold Screening Criteria, #2 attain media cleanup standards, page 46

Permittees' Statement: "The applicable cleanup standards developed in accordance with Section VIII of the Consent Order are presented in section 5.1."

NMED Comment: The referenced section, Section 5.1, is entitled "Permitted and Interim-Status Container Storage Units" and does not contain the information specified. Table 5.3-1 lists regulatory criteria and cleanup levels. Revise the Report to reconcile these issues.

27) Section 7.3.1.5, Summary, page 47

Permittees' Statement: "Although the no-action technology does not meet any of the threshold criteria, it is carried forward for comparison purposes in evaluating the other technologies."

NMED Comment: Section 7.3.1.4 (Compliance with Applicable Waste Management Standards), states, "No wastes will be generated under the no-action technology; therefore, this technology complies with applicable state and federal waste management standards." Resolve these contradictory statements.

28) Sections 7.3.6, Technology PS-4a: Excavation of Pits and Shafts with On-Site Disposal in CAMU or RCRA Unit, bullet #8, page 53

Permittees' Statement: "[C]losing the on-site disposal unit and constructing a vegetated soil or ET cover over the disposal unit;"

NMED Comment: An ET, vegetative, or other alternate cover is not appropriate for the disposal unit in this alternative; it appears an alternative cover is presumed. A Corrective Action Management Unit- (CAMU) compliant or standard RCRA Subtitle C cover must be evaluated for the on-site disposal unit. This comment also applies to Appendix G, page G-7. Construction of a CAMU/RCRA cell should not necessitate an ET cover. Revise the Report to address these issues.

29) Section 7.3.10.5, Summary, page 59

Permittees' Statement: "When used in combination, the ex situ treatment technologies of thermal desorption and macroencapsulation are the preferred technologies. They meet the threshold screening criteria and are retained for further evaluation."

NMED Comment: The Permittees state that these two technologies are "preferred," but do not indicate whether these technologies were the assumption used for the cost estimates. Clarify what the assumed treatment technologies are for the purpose of evaluation based on cost.

30) Section 8.3.3.1, Long-Term Reliability and Effectiveness, page 68

Permittees' Statement: "ET covers have been proven effective in the arid and semiarid environments of the southwestern United States, (Dwyer et al. 2000, 069673, p. 24; LANL 2005, 089332, p. 25)."

NMED Comment: The Dwyer *et al.* reference is a Sandia National Laboratory document that is not directly applicable to LANL because of differences in climate. The LANL (2005) document refers to a Corrective Measures Study report for MDA H where grout-encapsulation of disposal shafts, followed by an ET cover, was the preferred alternative. Neither of these references provides direct support of the ET cover concept at MDA G. Revise the Report to consider this information.

31) Section 9.1, Selection of Recommended Corrective Measure, page 80

Permittees' Statement: "The ET cover would be placed over the pits and shafts, as shown in Figure 7.3-1. Twenty SVE boreholes will then be installed to facilitate active extraction of vapor-phase VOCs from the vadose zone. The ROI for each extraction borehole conservatively assumes 150 ft from the point of extraction. The 20 boreholes will be spaced laterally to provide coverage of the highest concentrations (approximately 10 times the screening values for TCA and TCE—see section 3.2.4 and Appendix C) of overlapping VOC plumes shown in Figure 2.4-2 and Figures C-3.1-1 through C-3.1-5 (Appendix C)."

NMED Comment: The Permittees reference Figure 2.4-2 as illustrating the overlapping VOC plumes. However, Figure 2.4-2 shows the layout of the 2008 SVE pilot test. NMED assumes that the reference should point to Figure 2.4-1.

32) Section 10.3, General Operation and Maintenance Requirements, page 84

Permittees' Statement: "The SVE system will be operated as described in Appendix H."

NMED Comment: Appendix H describes pore gas monitoring, not SVE operation and maintenance.

33) **Section 10.5.3, Health and Safety Requirements, page 85**

Permittees' Statement: "A site-specific health and safety plan will be prepared to describe the health and safety requirements to be followed during construction of the MDA G cover, construction of the SVE-monitoring system, O&M activities, and monitoring activities."

NMED Comment: The Permittees make no mention of health and safety plan requirements for installation of the SVE boreholes and SVE equipment. Include these activities in the health and safety requirements.

34) **Section 11.0, Schedule for Completion of Activities, page 85**

Permittees' Statement: "The Consent Order requires that a schedule for completion of activities be submitted in the CME report. Activities leading to completion of the remedy includes planning, design, and construction of the ET cover; operation of the SVE system and installation and testing of monitoring systems."

NMED Comment: The Permittees make no mention of planning, design and construction of the SVE boreholes or the SVE system. Include these elements in the schedule for completion of activities.

35) **Section 11.0, Schedule for Completion of Activities, page 86, bullet 7**

Permittees' Statement: "Active SVE and pore-gas monitoring will occur as discussed in Appendix H and presented in Table 11.0-1."

NMED Comment: Appendix H and Table 11.0-1 only discuss pore gas monitoring, not active SVE.

36) **Figure 2.3-3, TA-54 groundwater monitoring network, page 99**

NMED Comment: Revise the figure to make a distinction between regional and intermediate wells.

37) **Figure 2.4-4, MDA G pore-gas monitoring borehole locations, page 103**

NMED Comment: The Permittees have shown contour lines on the figure, but have not specified the contour interval.

38) **Figure 4.0-1, Hydrogeologic conceptual site model for Area G, page 105**

Permittees' Statement: In "Vapor Phase Transport" box, "Diffusion of volatile chemicals accounts for their observed distribution in the unsaturated zone."

NMED Comment: Vapor monitoring has been conducted only within the Bandelier Tuff; conformance of VOCs distribution in the underlying basalt to a diffusion model therefore cannot be verified at this time. Revise the text of the Report to add "...observed distribution in the unsaturated zone of the Bandelier Tuff."

39) **Figure 7.3-1, Cover site map, page 108**

NMED Comment: The 10-ft and 100-ft contour lines are indistinguishable from one another.

40) **Table 3.3-1, Statistical Summary of Analytes Detected Above Screening Levels in Groundwater Samples from MDA G Monitoring Network Wells through October 2010, page 139**

NMED Comments:

a) Specify in the Table caption whether the table represents all analytical data collected since well construction or data collected within a specific timeframe.
b) Include data for all wells, both upgradient and downgradient (including well R-22), that form the groundwater monitoring network specific to MDA G. (See also Comment 4)
c) List all organic analytes that were detected below their respective Practical Quantitation Limits (PQLs) if the PQLs were above the corresponding screening levels.
d) For the naturally-occurring general inorganics, metals and radionuclides, list all analytes that were detected above the screening levels defined as the first-tier screening levels in Section D-3.0. Also, separately list all analytes that were detected above the screening levels defined as the second-tier screening levels in Section D-3.0.

41) **Table 5.3-1, Summary of Regulatory Criteria and Cleanup Levels, page 140**

NMED Comment: The regulatory criteria listed in the Table for groundwater are incomplete. Update the Table to include all regulatory criteria described in Section 5.2.2.

42) **Table 6.3-1, Summary of Technologies Retained for Further Evaluation at MDA G, page 140**

NMED Comment: In the footnotes of Table 6.3-1, footnote c is missing an "x" and the "=". Compare with footnotes a and b. Also, the table does not include the off-site or on-site disposal alternatives.

43) Table 8.2-1, Comparison of Retained Corrective Measure Technologies by Area, page 149

NMED Comment: In Table 8.2-1, rows VZ-2a (Monitored natural attenuation) and VZ-2b (Soil-gas venting), the Permittees indicate that SVE duration for these technologies will be 30 years. There is no SVE associated with natural attenuation or soil-gas venting. Correct this discrepancy. Also, footnotes c and d should indicate that these are "estimated" time frames. Include "estimated" in footnotes c and d.

44) Table 8.2-2, Explanation of Ranking System Used for Evaluating Remedial Technology Evaluation Criteria, page 150

Permittees: Column entitled Reduction of Toxicity, Mobility, or Volume.

NMED Comment: The Permittees place greater value on reduction of mobility and toxicity than on reduction of volume. This is not a valid usage of the criteria stated in Section VII.D.4.b of the Order, which states that, at paragraph 4.b.ii, "Respondents shall give preference to [the] remedy that uses treatment to more completely and permanently reduce the toxicity, mobility and volume of contaminants." Revise the ranking system to value the reduction of mobility, toxicity, and volume equally and to weigh evaluation based on treatment that "more completely and permanently reduces" them.

45) Section B-3.1, 2005 Activities, paragraph 3, page B-3

Permittees' Statement: "The soil and tuff sampling results indicated a number of inorganic and organic chemicals (Plates 2 and 3, respectively) were detected at trace levels beneath the former disposal units and were consistent with the results obtained during the Phase I RFI. The only organic compounds detected in core samples were trace levels of several dioxin and furan congeners. The inorganic chemicals detected above BVs did not show any discernable patterns or trends and did not indicate a release from the historical subsurface waste units at MDA G."

NMED Comment: The Permittees state that inorganic and organic chemicals are shown on Plates 2 and 3, respectively. However, the inorganic results are shown on Plate B-1 and organic results are shown on Plate B-2. Also, in the last statement of the paragraph, the Permittees conclude that the data "did not indicate a release." The data do not support this conclusion. Remove this statement from the Report or justify the conclusion.

46) Section B-3.1, 2005 Activities, paragraph 4, page B-3

Permittees' Statement: "Naturally occurring and anthropogenic radionuclides were confirmed at levels above BVs in soil and rock samples collected beneath MDA G. The anthropogenic radionuclides detected sporadically across the site included americium-241, plutonium-238, plutonium-239, and strontium-90. Naturally occurring radionuclides

detected above BVs included thorium isotopes, uranium-234, uranium-235, and uranium-238. Naturally occurring radionuclides were detected at concentrations within the natural variability in the subsurface tuff (Plate 3)."

NMED Comment: The Plate reference should refer to Plate B-3 which does not contain information supporting the assertion. Such conclusions must be supported with the range of background values for subsurface tuff, or removed from the Report.

47) **Table B-3.1-4, Gravimetric Moisture Content and Matric Potential in Samples Collected from MDA G at BH 54-25423, page B-46**

NMED Comment: The abbreviation Tcb in the Matrix column, for Cerros del Rio Volcanic Series, is incorrect. The correct abbreviation is Tb4.

48) **Section C-4.0, Vapor Transport at MDA G, page C-9**

Permittees' Statement: "It is uncertain if diffusion through the low-porosity, fractured Cerros del Rio basalt will be uniform or follow preferential pathways. Open, interconnected air pathways probably occur between the top of the Cerros del Rio volcanic series and the regional aquifer beneath MDA G."

NMED Comment: This observation supports the suggestion that advective flow, instead of diffusion, may control VOC migration in the Cerros del Rio basalt. Revise the Report to discuss this issue. (See also Comment 15).

49) **Figures C-3.1-3, East-west cross-section through interpolated vapor plume for TCA at MDA G based on fourth quarter FY2009 data and C-3.1-4, East-west cross-section through interpolated vapor plume for TCE at MDA G based on fourth quarter FY2009 data, pages C-16 and C-17**

NMED Comment: In both figures, the Permittees provide a cross-section from A to A'. The line A-A' is not defined on Figures C-3.1-1 and C-3.1-2.

50) **Figure C-3.1-4, East-west cross-section through interpolated vapor plume for TCE at MDA G based on fourth quarter FY2009 data, page C-17**

Permittees' Statement: "Note: The color scheme for concentrations reflects multiples of the Henry's Law based vapor phase screening value of 42,300-$\mu g/m^3$."

NMED Comment: The Permittees have used the Henry's Law based vapor phase screening value for 1,1,1-TCA instead of TCE. Revise the Report accordingly.

51) **Table C-3.1-1, Total Contaminant Mass (kg) of TCA and TCE Exceeding 10 Times the Tier I Vapor-Phase SL, page C-20**

NMED Comment: The Permittees have miscalculated the Total for TCA (i.e., 195+16≠210).

52) Section D-2.0, Geochemical Performance of Monitoring Wells, pages D-1 and D-2

NMED Comment: Reevaluate the representativeness of water-quality data from monitoring wells at MDA G using the criteria specified in the NMED's March 2011 letter *Approval with Modification, 2010 Interim Facility-Wide Groundwater Monitoring Plan.*

53) Section D-3.0, Screening Protocol and Results, page D-3, #1

NMED Comment: Groundwater background values for MDA G must be based on analyte concentrations in an upgradient portion of the groundwater monitoring network specific to MDA G and in those downgradient, or off-gradient, MDA G wells that do not show contamination. For the naturally-occurring analytes that do not have numerical background values that are based on UTLs, use the lowest PQLs achievable by the most recent EPA and industry-accepted extraction and analytical methods as the first-tier screening levels.

54) Section D-3.0, Screening Protocol and Results, page D-3, #2, 3rd bullet

NMED Comment: The screening protocol described in Section D-3.0 is inconsistent with the screening protocol presented in Section 5.2.2, which states, "If there is no NMED tap water screening level, the Laboratory will use EPA regional tap water screening levels (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm), adjusted to the 10^{-5} risk for carcinogens. Use the screening protocol presented in Section 5.2.2 uniformly.

55) Section D-3.2, Inorganic COPC Detections, page D-5, 1st bullet

Permittees' Statement: "The R-23 analytical result in which the concentration of total dissolved solids (2900 mg/L) exceeds one-half of the lowest applicable standard (one-half standard = 500 mg/L) appears to be an analytical reporting error because such a high concentration is inconsistent with concentrations reported for individual dissolved constituents, none of which are out of line with the overall stable geochemical trends at this well."

NMED Comment: The concentration of total dissolved solids in R-23 (2900 mg/L) exceeds the standard of 1000 mg/L. Make the appropriate correction.

56) Section D-3.2, Inorganic COPC Detections, pages D-5 and D-6

NMED Comment: Discuss detections of radionuclides other than tritium in groundwater monitoring wells specific to MDA G. If there were no detections of radionuclides (other than tritium) above background levels, state so. If there were detections, either include these detections in appropriate tables in Appendix D or create separate tables for radionuclides.

57) **Section D-3.3, Tritium Detections, page D-6**

Permittees' Statement: "None of the tritium activities measured in the monitoring wells exceed the EPA MCL of 20,000 pCi/L."

NMED Comment: The Permittees incorrectly list 20,000 pCi/L as the EPA MCL for tritium. This concentration is an average annual concentration of tritium assumed to produce a dose of 4 mrem/year, which is the EPA MCL for beta particle and photon radioactivity. If two or more radionuclides are present, the sum of their annual dose from beta particle and photon radioactivity must not exceed the MCL of 4 mrem/year. Therefore, if tritium coexists with other beta- and/or photon-producing radionuclides, the allowable tritium concentration will be less than 20,000 pCi/L. Revise this statement accordingly.

58) **Tables D-3.0-1 through D-3.0-6b, pages D-17 through D-47**

NMED Comment: For each Table, specify in the Table caption whether the Table represents all analytical data collected since well construction or data collected within a specific timeframe.

59) **Table D-3.0-1, Statistical Summary of Organic Analytes and High Explosives Detected in Groundwater Samples Collected from Wells R-23, R-23i, R-39, R-41, R-49, R-55, and R-57, through October 31, 2010, page D-17**

NMED Comment: The PQL for methylene chloride in the Table (10 µg/L) is different from the same PQL in the 2010 Interim Facility-Wide Groundwater Monitoring Plan, EP2010-0231 (5 µg/L). Reconcile this discrepancy.

60) **Tables D-3.0-3 and D-3.0-4, pages D-26 through D-40**

NMED Comment: Provide PQLs for all analytes in the Tables.

61) **Tables D-3.0-5a through D-3.0-6b, pages D-41 through D-47**

NMED Comment: Change the table captions from "Sampling Events . . ." to "Number of Sampling Events . . . ."

62) **Table D-3.0-7, Average and Maximum Tritium Activities in Groundwater Collected from Monitoring Network Wells Specific to MDA G, through October 2010, page D-48**

NMED Comment: Define the acronym "MDA" in the column header.

63) **Section E-2.1, Regional Aquifer Monitoring Wells near MDA G, page E-9**

NMED Comment: Correct section numbering in Appendix E. There is another Section E-2.1, Regional Aquifer Water-Table Maps, on page E-15. In addition, Section E-2.0, Summary, on page E-14 comes after Section E-2.1, Regional Aquifer Monitoring Wells near MDA G. Revise the Appendix accordingly.

64) **Section E-2.1, Regional Aquifer Monitoring Wells near MDA G, pages E-12 and E-14**

NMED Comment: Provide numerical values for barometric efficiency for each screen at R-55 and R-57.

65) **Section E-2.0, Summary, page E-15**

Permittees' Statement: "The design of these wells includes at least one well screen that is placed in relatively high permeable sediments in close proximity to the regional water table (section E-2.1.1)."

NMED Comment: Section E-2.1.1 does not exist. Revise the Appendix accordingly.

66) **Section E-2.0, Summary, page E-15**

Permittees' Statement: "Hydrogeologic data also suggest that the screened regional-aquifer zones at the monitoring wells near MDA G are either unconfined or partially confined."

NMED Comment: This statement is contradicted by information in Table E-2.1-1 that lists four screens with confined conditions for existing wells near MDA G.

67) **Section E-2.0, Summary, page E-15**

Permittees' Statement: "The cross-well hydraulic responses between R-57, R-49, and R-39 during the performed pumping tests demonstrate that the well screens are in good hydraulic communication with the aquifer and will be expected to provide early detection of potential contaminants originating from MDA G."

NMED Comment: Hydraulic responses during pumping tests were noticed between R-57 screen 2, R-39, and R-49 screen 2, all of which are located within unconsolidated Totavi and Puye sediments. There was no hydraulic communication with or between the upper screens at R-49 and R-57, which are located within the Cerros del Rio volcanics. The potential contaminants present at MDA G below the Cerros del Rio volcanics are expected to be detected by the well screens located within the unconsolidated Totavi and Puye sediments. However, these well screens might not detect potential early-stage contamination that occurs in regional aquifer closer to the water table, within the Cerros del Rio volcanics. Revise this statement to consider these factors.

68) **Section E-2.3, Preliminary Water-Table Map Based on July–September 2010 Data, pages E-17 and E-18**

Permittees' Statement: "In the area directly beneath MDA G, the regional water table is located within the Cerros del Rio lavas (Figure E-2.3-1)."

NMED Comments: The Permittees refer to Figure E-2.3-1. The correct reference is Figure E-1.1-8.

The Permittees acknowledge uncertainties regarding the direction of groundwater flow near the northeast corner of MDA G and the level of hydraulic connectivity between well R-41 and the rest of the regional aquifer. The water table map in Figure E-2.3-1, which represents one of conceptual models of groundwater flow near MDA G, implies that groundwater pathways from the northern part of MDA G will not be monitored by any of the existing wells downgradient of MDA G. In addition, if well R-41 is not hydraulically connected to the regional aquifer and the water table map in Figure E-2.3.-1 represents actual groundwater flow regime, most of potential groundwater contaminants from MDA G might escape detection.

Additional information on groundwater flow directions and hydrogeology near the northeast corner of MDA G is necessary to assure reliable groundwater monitoring for MDA G and to determine the functionality of well R-41. Present a work plan for the installation of one or more regional aquifer monitoring wells near the northeast corner of MDA G, with a focus on verifying geology, hydraulic properties and groundwater flow direction in that area, and on complementing the existing monitoring well network. The work plan must be submitted to NMED in accordance with the dates provided at the end of this NOD.

69) **Figure E-1.1-1, Map showing location of perched-intermediate and regional wells (red circles) in the vicinity of TA-54, page E-23**

NMED Comment: Create an additional cross-section, tracing east-west and crossing through wells R-32 and R-55. Include this cross-section as a new figure in Attachment E.

70) **Figure E-1.1-5, Alkali-silica diagram showing chemical classification of Cerros del Rio volcanic rocks in the vicinity of TA-54. Gray arrow shows the eruption sequence from oldest to youngest rocks, page E-27**

NMED Comment: The gray arrow described in the Figure caption is missing.

71) **Figure E-1.1-6, Structure contour map for the base of Cerros del Rio volcanic rocks in the vicinity of TA-54, page E-28**

NMED Comment: The 5700 ft contour line for the base of Cerros del Rio volcanics (Tb4) near well R-39 is not in agreement with the contact elevation at well R-39. In addition, the structure contour map of the base of Tb4 does not correspond to the base of Tb4 on the geologic cross-section in Figure E-1.1-4. Revise the Report to reconcile these discrepancies.

72) **Figure E-1.1-7, Structure contour map for the top of Cerros del Rio volcanic rocks in the vicinity of TA-54, page E-29**

NMED Comment: This Figure shows three different numerical values for the contact elevation of the top of Tb4 at well R-39. Revise the figure to remove the erroneous numbers and correct the contour lines if required.

73) **Figure E-1.1-8, Hydrostratigraphy at the regional water table and estimated thickness of Cerros del Rio lavas beneath the regional water table, page E-30**

NMED Comment: The figure shows Tschicoma dacite flow (Tvt2b) at the regional water table beneath the southeast end of TA-54. This information is inconsistent with other geologic maps, cross-sections and text in the Report, all of which consistently shows or describes Tb4 at that location. Reconcile the discrepancy.

74) **Table E-2.1-1, Hydrogeologic Characteristics of the Monitoring Wells in the Area Near MDA G, page E-33**

NMED Comment: Correct discrepancies between this table and the text in Section E-2.1 (pages E-9 to E-14). For example, hydrodynamic conditions for screens R-21 and R-41#2 are described in the table as confined and unconfined, respectively, while the same conditions are described in Section E-2.1 as unconfined or partially confined for R-21 and confined or unconfined for R-41#2. Also, the footnote under the Table appears to be related to Table E-2.1-2.

75) **Table E-2.1-2, Water-Level Transients Observed in the Regional Monitoring Wells Near TA-54, page E-34**

NMED Comment: Amend the Table caption to state that the table represents data in response to pumping of supply wells PM-2 and PM-4.

76) Sections G-3.2.1, bullet #7, page G-3, G-3.3.1, bullet #6, page G-4, G-3.4.1, bullet #8, page G-7, and G-3.6.1, bullet #31, page G-12

Permittees' Statement: "It will take up to 24 mo to complete readiness reviews and construction of the cover, and the cover will be irrigated for 1 yr to establish vegetation."

NMED Comment: Costs for comparison of technology alternatives must be based on the specifications outlined in Section 10.0, Design Criteria to Meet Cleanup Objectives. In Section 10.3 (General Operation and Maintenance Requirements), page 84, the Permittees state, "[i]rrigation is needed during the 2 yr following construction to aid in the germination and establishment of the vegetative cover." Revise the cost estimates for the vegetative cover to match the design criteria and ensure that all assumptions used for estimating costs match the design specifications outlined in the text of the Report.

77) Sections G-3.4.1, Assumptions, page G-5, bullets #5 and #6 and G-3.8.1, Assumptions, page G-14, bullets #5 and #6

Permittees' Statement: "Facility cost estimates are scaled based on capital costs for the Hanford Site Environmental Restoration Disposal Facility (ERDF)."

"Total capital costs for ERDF are estimated to be approximately $6B and assume a waste production rate of approximately 3000 yd3/day. Assuming MDA G waste analysis, segregation, size-reduction, and treatment facilities will process approximately 902,815 yd3 (waste) / 30 yr * 250 work days/yr = 120 yd3/d. This is approximately 4% of the throughput needed for ERDF. Using this value, the facility capital cost is estimated to be $6B * 4% = $240M."

NMED Comment: The Permittees' method of computing costs for this technology is questionable. Scaling the total cost of a six billion dollar project down based on a waste processing estimate of less than five percent of the original project's waste production rate is not logical. Revise the Report to present a more reasonable basis for the costs associated with this technology.

The Permittees must address all comments herein and submit a revised CME Report by **August 31, 2011**. All submittals (including maps) must be in the form of two paper copies and one electronic copy in accordance with Section XI.A of the Order. In addition, the Permittees must submit a redline-strikeout version that includes all changes and edits to the CME Report (electronic copy) with the response to this NOD. All comments herein that are applicable to MDA L and MDA H should also be addressed in future submittals for those areas.

A work plan for installation of one or more regional aquifer monitoring wells near the northeast corner of MDA G must also be submitted to NMED no later than **August 31, 2011** and the well(s) completed no later than **April 30, 2011** (*see* Comment 68).

Please contact Ben Wear at (505) 476-6041 should you have any questions.

Sincerely,

James P. Bearzi
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File: Reading and LANL '11, TA 54 (MDA G)