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February 23, 2011

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RE: NOTICE OF DISAPPROVAL
CORRECTIVE MEASURES EVALUATION REPORT FOR MATERIAL DISPOSAL AREA L, SOLID WASTE MANAGEMENT UNIT 54-006, AT TECHNICAL AREA 54, REVISION 1
LOS ALAMOS NATIONAL LABORATORY (LANL)
EPA ID #NM0890010515
HWB-LANL-08-001

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) L, Solid Waste Management Unit 54-006, at Technical Area 54, Revision 1* (Report), dated October 2010 and referenced by LA-UR-10-6506/EP2010-0386. 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.

1) 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 L, and have evaluated and rated these technologies against the criteria in Section VII.D.4 of the Order. This method 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. While the remedy alternative 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 L. While it is important to review all viable technologies against site specific criteria, it is not necessary or appropriate to include technologies in the screening that are specific to situations that are not directly relevant to MDA L. For example, electrokinetic and electroacoustic soil treatment technologies are not applicable to MDA L because they are specific to the treatment of soils, which are of minimal concern at MDA L. These technologies should therefore not be included in the screening process or as a part of any remedy alternative. A large amount of time and energy was spent describing and eliminating 31 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 viable remedy alternatives that are applicable to the site being addressed.

While NMED recognizes some value in addressing the pit and impoundments separately from the shafts for the alternatives evaluation, the Permittees have not developed rational combinations of alternatives that could address shafts separately from pits and impoundments. For example, the complete removal of Pit A and Impoundments B, C, and D should be assessed in combination with containment of the shafts and treatment of the vadose zone VOC plume. This alternative would result in complete removal of the larger

disposal units at MDA L, as well as a much smaller cover area required for the shafts. An additional benefit would be greater implementability due to fewer engineering concerns related to constructing a cover on impoundments with possible weak bearing characteristics. In addition, a suspected volatile organic compound (VOC) source would be removed.

Revise the Report to remove technologies from the screening process that are not applicable to MDA L. Develop remedy alternatives that are applicable to MDA L, 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.

2) **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, 7, 8, 9, 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 Section 6.2.2.3 (Physical Treatment Technologies, Electroacoustic Treatment), page 39, the Permittees state, "In situ electroacoustic soil decontamination is an emerging technology used to decontaminate soils containing organic chemicals." This technology does not appear in the FRTR listing of in situ physical/chemical technologies and it is not defined or described in the text. Although this technology is not appropriate to include in the screening for MDA L (See Comment 1), the technology must be defined and explained in considerably more detail if it is retained (other than stating it is "an emerging technology").

b) In Section 7.3.4.2 (Attainment of Media Cleanup Standards), page 52, the Permittees state, "This technology complies with the EPA guidance for attaining media cleanup standards when waste is left in place. Additionally, it meets the requirements for an alternative RCRA cover. The ET cover attains media cleanup standards." Insufficient detail is provided regarding how an evapotranspiration (ET) cover meets requirements for a RCRA cover or how it attains cleanup standards.

c) In Section 7.3.4.4 (Compliance with Applicable Waste Management Standards), page 53, the Permittees state, "A properly designed ET cover will meet the RCRA performance standards for alternative closure; therefore, this technology complies with applicable waste management standards." Insufficient detail is provided to show

how the ET cover will comply with closure/post-closure care requirements or applicable waste management standards.

d) In Sections 7.3.5 (Technology PI-3c: Construction of a Biotic Barrier) and 7.4.5 (Technology S-3c: Construction of a Biotic Barrier), the Permittees state that, "[a] preliminary design concept includes a 1-ft thick layer of cobbles with a minimum 6 in. diameter." No design basis is provided for the biotic barrier. This is especially important as it relates to the cover thickness, which is the primary driver of both effectiveness and cost.

e) In Sections 7.3.5.1 and 7.4.5.1 (Protection of Human Health and the Environment), the Permittees state that "[a] biotic barrier of sufficient thickness will provide protection against erosion, direct contact, and biointrusion. The biobarrier will minimize the potential burrowing of the animal of most concern at the site, gophers, as well as the intrusion of woody roots from plants such as shrubs, piñon, and juniper. The CSM demonstrates that exposure through contaminant migration from infiltration is not a pathway of concern. This technology is protective of human health and the environment." The Permittees have not provided a demonstration or basis for how the biotic barrier design will provide the asserted protection.

f) In Section 7.3.9 (Technology PI-5a: Waste Excavation with On-Site Disposal), bullets 5, 6, 7 and 8, Section 7.3.10 (Technology PI-5b: Waste Excavation with Off-Site Disposal), bullets 4 and 5, Section 7.4.8 (Technology S-5a: Waste Excavation with On-Site Disposal), bullets 5, 6, 7 and 8, and Section 7.4.9 (Technology S-5b: Waste Excavation with Off-Site Disposal), bullets 4 and 5, the Permittees provide estimates regarding percentages of excavated materials to be processed and disposed in different manners. No basis is provided for the estimated percentages of waste streams from the proposed excavations. Similarly, in Sections E-3.6.1, E-3.7.1, E-3.8.1, E-4.5.1, E-4.6.1, and E-4.7.1 of Appendix E, all titled "Assumptions", these estimates are carried forward as assumptions for cost estimates, again with no basis provided. As a separate matter, the descriptions for Sections 7.3.9 and 7.4.8 are not complete without a conceptual siting of the proposed RCRA landfill or Corrective Action Management Unit (CAMU). Include a table summarizing the waste quantities for each pit, impoundment, and shaft in order to clarify the waste quantities at this site.

g) In Sections 7.3.11 (Technology PI-6: Ex Situ Waste Treatment) and 7.4.10 (Technology S-6: Ex Situ Waste Treatment), the Permittees state that, "[p]otential ex situ waste treatment technologies include the following:
- chemical extraction
- cement stabilization
- debris treatment
- thermal desorption
- vitrification"

The technology for *ex situ* treatment must be specified to accurately estimate the project costs for comparative analysis. If the determination cannot be made at this time due to lack of information, assumptions must be made and explicitly stated to determine effectiveness and cost.

h) Under the Cost criterion, Technology PI-3a vegetative cover was ranked a 4 ($12M) and PI-3b ET cover was ranked a 3 ($14M). It is not clear why these cost rankings are different; the costs are very similar relative to the cost of other technologies (such as in situ Technology PI-4b SVE, also ranked 3 with total cost of $19M). Also, post-construction costs will be very similar for the vegetative and ET covers; it is not clear why the O&M cost for the ET cover (Appendix E, pg. 4 of 42, 2.P13B.3, $5.4M) is more than the O&M cost for the vegetative cover (Appendix E, page 2 of 42, 2.P13A.3, $4.8M). No basis is provided for these rankings.

3) **Previous NOD**

The Permittees did not adequately address several comments from the original NOD dated May 17, 2010. The following are some of the more important comments that received inadequate treatment:

a) NMED's General Comment 1 stated, "[t]he Permittees must be sure to provide adequate supporting information and include documentation that supports each of the line item cost estimates similar to what is required for the MDA G CME Report cost estimates. The cost estimates must include unit cost and volume estimates for each line item including hourly rates for personnel and equipment as well as 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. The Permittees must provide the Cost Estimate appendices with the revised CME Report; NMED cannot complete its review of the CME Report without these data." Provide this information in the next revision of the Report. Comment 9 provides more detailed comments regarding cost tables and Appendix E (Supporting Information for Cost Estimates).

b) NMED's General Comment 9 stated, "[i]n Section 8.2.4 (Implementability), for alternative 2B (engineered ET cover, SVE, monitoring and maintenance), the Permittees state that "[t]his alternative meets RCRA closure and postcare requirements for the interspersed RCRA units in MDA L."" Beyond the above assertion, the Permittees have not described how the alternative meets closure post-closure care requirements defined in 40 CFR 264 Subpart G. Also, NMED's Specific Comment 2 stated, "ET covers perform well in arid and semi-arid climates; however, Los Alamos is located in a wetter environment (northern NM

gets about twice the amount of annual precipitation as southern NM for comparison) and snow 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 impoundments B and D and shafts 1, 13-17, and 19-34. Because the Permittees propose an ET cover as a remedial alternative at MDA L, 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." It is not appropriate to leave this information out of a CME, as it is essential to remedy evaluation (See Order Section VII.D.4.a). Revise all sections where an assertion is made that a particular technology meets RCRA closure and post-closure requirements to include a detailed description and explanation of how the technology meets those requirements.

c) NMED's Specific Comment 6 stated, "[t]he Permittees cannot assume that the vertical extent of contamination ends at the bottom of the pits since VOCs were detected in tuff samples at depths greater than 100 feet below ground surface. The Permittees must be conservative in their soil removal cost estimates. Following confirmation sampling, which must be proposed in the revised CME Report, additional contaminated soil/tuff excavation may be necessary and must be incorporated into the cost estimates. Revise the CME Report to propose confirmation sampling for any alternative that includes excavation." The Permittees' response refers only to the horizontal extent. Address the issue that additional contaminated soil/tuff excavation may be required and consider that in the cost estimates.

4) Groundwater

Through approval of the Investigation Report (July 18, 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 L. While NMED recognizes that that Permittees have recently installed additions to the monitoring well network at TA-54, the Permittees have not completed characterization of potential groundwater contamination at MDA L. 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 Technical Area (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)).

The Permittees have argued that concentrations of VOCs detected in regional groundwater wells (especially R-20) are not attributable to MDA L sources. However, impacts to regional groundwater from MDA L sources cannot be ruled out because:

a) TCE was detected in two soil samples obtained from depths 334 to 350 ft below ground surface (bgs) in the vicinity of the western disposal shafts (Figure 2.5-17).

b) Based on the application of Henry's Law, vapor-phase TCE concentrations are present at up to ten times the value that could result in vapor phase partitioning to ground water at the top of the Cerros del Rio basalts (about 400 ft bgs; Figure B-3.1-4), and equilibrated saturated conditions at the bottom of the Bandelier Tuff that could exceed drinking water standards or groundwater cleanup levels provided in Section VII of the Order.

c) The Cerros del Rio basalt is known to include high porosity zones and macro-scale openings, including high permeability fractures, breccias, and cinder zones. Flow of gases, possibly including VOCs, through the Cerros del Rio basalt is therefore likely.

d) In Section D-3.0 (Results of Groundwater Monitoring, COPC Detections in Monitoring Wells), page D-5, the Permittees state, "[t]herefore, indications are that the largely sporadic detections of VOCs in regional groundwater beneath MDA L (as summarized in Table D-3.0-3 and shown for selected constituents in Figures D-3.0-1 to D-3.0-3) are not associated with the vapor-phase contamination beneath and sourced from MDA L." In the same Section, the Permittees also state, "[f]ormer septic systems at TA-18 are a potential source of VOCs in the canyon. Elevated nitrate concentrations to 65 ft at well R-20 suggest the presence of a driving force for the transport of soluble contaminants in alluvial groundwater into the underlying bedrock at the confluence of Threemile Canyon with Pajarito Canyon." Support for the conclusion that TCE and xylene are not attributable to MDA L disposal is tenuous without evidence from other sources, such as soil gas data from the alleged septic tank disposal. According to Figure D-2.1-1, the apparent groundwater flow direction near MDA L is from R-54 (proximal to MDA L) toward R-20 (where VOCs were detected). Non-linear or heterogeneous distribution of soil gas from MDA L in the fractures, scoria, and possible channels of the Cerro del Rio basalt could explain the presence of VOCs in R-20 instead of other wells more proximal to MDA L.

e) In Section D-4.0 (Analysis of Potential Vapor Diffusion to Groundwater), the Permittees present a calculation related to VOC vapor diffusion. The stated basis for the calculation is that simple diffusion through a porous media with empirical adjustments (for the Bandelier tuff) or through air (for the Cerros del Rio basalt) is an appropriate model for the potential vapor-phase migration of VOCs to the regional groundwater. The simple diffusion model is a reasonable first assumption. Other factors, however, could significantly affect the migration and distribution of VOC vapors in a way that is more complex than simple diffusion, especially in the Cerros del Rio basalt and the Bandelier tuff due to the presence of relatively large voids observed during drilling of the deep boring at MDA L.

The effects of moisture on partitioning of VOCs have been acknowledged in the Report, with the implication that further preferential partitioning of TCE and xylenes (relative to TCA) would result. However, advective movement of soil gas is likely to be a significantly faster process for distribution of VOCs in the subsurface than diffusion, as the rates of lateral and vertical migration of vapors by advective flow would likely be much higher (but less predictable) than estimated by simple diffusion modeling. Conclusions from diffusion models do not rule out wastes at MDA L as a source of VOCs (particularly TCE and xylenes) detected in the regional groundwater.

f) In Section D-4.0, the Permittees state, "[i]n addition to pore space properties such as tortuosity, moisture content also impacts diffusion. This analysis does not account for liquid-phase partitioning in the vadose zone that may retard the vapor transport of some compounds. This retardation will lower the predicted concentration at the water table, and it will also impact the fractionation between compounds with dissimilar Henry's Law constants (Table D-4.0-1). In this analysis, omitting this phenomenon is conservative for the majority of the compounds detected in the groundwater because they have lower Henry's Law constants than TCA. Thus, compared to TCA, they should be retarded to a great extent by liquid-phase partitioning during transport resulting in lower concentration ratios to TCA at the water table than predicted here." Neglecting moisture content effects is not necessarily conservative, given the overall low moisture content of the Bandelier Tuff and the general similarities of Henry's Law Constants between TCE and TCA.

g) The Permittees also state, "[s]ince the maximum concentration of each VOC detected during the third quarter FY2009 to second quarter FY2010 is used to define a source term, it is unrealistic to assume that this has remained constant for the last 35 yr (when disposal operations began). Thus, the time was calibrated using the source concentrations and the maximum concentrations observed between the third quarter FY2009 and second quarter FY2010 for TCA and TCE near the tuff-basalt interface. Implicit in this definition of the source term is the assumption that the ratios between compounds have been constant with time." Since the Henry's Law constants for TCE, PCE, and TCA are relatively similar, NMED agrees there would be little reason for the resulting aqueous concentrations to be significantly different given the assumption that the ratios of use, and therefore disposal at MDA L, were constant over time. However, as previously noted, disposal has occurred at the site since the early 1960's, and the predominant solvent in use at any particular time would likely have changed during LANL history. It is reasonable to assume that TCE was more prevalent at LANL in earlier years, based on historical use of TCE in general. See http://www.dnapl.group.shef.ac.uk/hist.htm for a history of solvent use. Because TCA is considered less toxic than other chlorinated solvents such as TCE, it is likely that TCA came into use later as a replacement for TCE in industrial uses.

The aqueous concentrations detected in well R-20 may well be indicative of MDA L disposal releases if TCE and xylenes were the predominant solvents disposed earlier at MDA L. In such circumstances, these constituents would have had more time to migrate to greater depths and potentially impact groundwater.

h) Asserting that the TCE in regional groundwater could not be attributed to MDA L because TCA is not detected along with the TCE overlooks the possibility that TCE was used as a solvent preferentially to 1,1,1-trichloroethane (TCA) in the earlier years of LANL operations. Also, monitoring results indicate relatively high TCE soil vapor concentrations at the top of the Cerros del Rio basalt. Higher detected TCA concentrations were not observed at the top of the basalt. The deeper TCE detections may in fact indicate earlier historical solvent use rather than the conclusions indicated by the solvent ratio.

i) The Permittees state, "[t]he computational time that best matches the measured concentrations is 10.5 yr." While vapor values presumably representative of the tuff/basalt interface have been used to back-calculate a diffusion time of 10.5 years, no information as to which specific vapor monitoring data were used for this calculation (e.g., which data points, screened intervals, analyte concentrations) was provided. Significant details such as these for the overall vapor diffusion analysis are lacking in the Report.

The Report requires revision to discuss other potential pathways of contamination as discussed above, and the analysis and conclusions need to be modified to reflect these other factors.

5) **Screening versus Evaluation**

The Permittees have not distinguished between "screening" and "evaluation" in the current 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."

For example, in Sections 8.3 (Screening of Technologies for Pit and Impoundments), 8.3.9 (Screening Summary for Pit and Impoundments), 8.4 (Screening of Technologies for the Shafts), 8.4.8 (Summary of Shaft Screening), 8.6.1 (Screening of Alternatives for Pit and Impoundments against the Balancing Criteria), and 8.6.2 (Screening of Alternatives for Shafts against the Balancing Criteria), the Permittees incorrectly refer to the process of "evaluation" as "screening". Screening against the Consent Order threshold criteria was performed previously in Section 7. The Permittees further misuse this term in Tables 8.3-1 (Screening of Technologies for Pit and Impoundments against the Balancing Criteria), 8.4-1 (Screening of Technologies for Shafts against the Balancing Criteria) and 8.5-1 (Screening of Technologies for Vadose Zone Contamination against the Balancing Criteria).

Revise the Report, including titles of Sections and Tables, to properly distinguish between "evaluation" and "screening."

6) Cover Alternatives

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. By way of contrast, this submittal contains an adequate level of information and design criteria to make a remedy selection.

A "vegetative cover" and SVE were recommended as the preferred alternative for MDA L in the Report. The previous version of the Report, *Corrective Measures Evaluation Report for Material Disposal Area L, Solid Waste Management Unit 54-006, at Technical Area 54* dated January 2008 (CME Rev.0), recommended an ET cover as the preferred alternative. It appears that the Permittees have down-graded the selected cover by proposing and defining a vegetative cover as an 18-inch thick soil cover system with generally no other adherence to specific performance criteria. The Permittees have not demonstrated that the proposed one foot (ft) thick compacted soil layer would be sufficient to meet the goal of "low permeability," stated in Section 6.2.2 (In Situ Treatment Technologies). Further, there is some confusion in the Report regarding the performance expectations for the preferred cover system because the Section 10 (Design Criteria To Meet Cleanup Objectives) design criteria seem to be describing an ET 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 an 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 by which the alternative must be evaluated against.

FRTR suggests only two containment technologies: RCRA compliant covers (Subtitle D or C) or alternate/enhanced covers. The proposed 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.0. However, it is substantially less protective than the conventional or alternate cover technologies which are within the same range of costs, and it does not comply with the RCRA Subtitle C requirements for a final cover system. Neither the vegetative cover design nor the ET cover design provides protection against biointrusion which is stated as a primary release mechanism in the site model for MDA L and has been shown to be a significant concern at other LANL sites (e.g., MDA AB).

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 that add 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 as an integral component of a multilayer (i.e., 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).

In Sections 7.3.4 (Technology PI-3b: Construction of an ET Cover) and 7.4.4 (Technology S-3b: Construction of an ET 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. Descriptions are also inconsistent as to whether 3.0 ft or 3.5 ft of fill will be placed below the topsoil.

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

7) **Soil Vapor Extraction Alternatives**

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

a) The locations across MDA L 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).

The Permittees must evaluate a SVE system that not only addresses the "source zone" near the bottom elevation of the shafts, but also a "groundwater protection zone" within the highly permeable Cerro Toledo or Guaje Pumice intervals. The use of continuous active SVE with reduced vacuums at the top of the basalt could be an appropriate application. This would provide the ability to target not only the source of the vapor-phase contaminants, but also downward migrating VOCs to prevent contact with groundwater. The system should incorporate flexibility in its ability to transfer focus based on vapor monitoring results indicating increased source contamination (e.g., drum failure in a shaft or increased contaminant levels at depth via vapor plume migration).

The Permittees must consider a monitoring approach more frequent (e.g., biweekly or monthly) than annual or biennial for performance monitoring during initiation of active SVE. Any future reduction in the frequency of compliance monitoring must be based upon SVE performance results. Continued quarterly compliance monitoring is warranted for a minimum of two years following initiation of active SVE, possibly followed by

semiannual monitoring thereafter. Additional modifications to decrease sampling frequency can be requested based on the results of monitoring during any SVE remediation period.

The preliminary designs presented by the Permittees in Sections 7.3.7, 7.4.7 (Technology [PI-4b/S-4b]: In Situ Source Treatment Using SVE), 7.5.4 (Technology VZ-3b: In Situ Treatment of Vapor Phase VOC Contamination in Vadose Zone Using SVE), 9.1 (Selection of Recommended Corrective Measure), and 10.1 (Design Approach) suggest active SVE for only one month a year for three years. The Permittees have not presented a basis for this timeframe, except for an inaccurate assertion that vapor monitoring results from one borehole indicate that VOC concentrations in the areas of the shafts have not rebounded to pre-pilot test levels. NMED notes that the November 2006 *Summary Report: 2006 In Situ Soil Vapor Extraction Pilot Study at Material Disposal Area L, Technical Area 54, Los Alamos National Laboratory* (2006 SVE Report) records TCA levels rebounding to pre-test levels within a period of several days to two weeks. Also, according to the September 2006 *Periodic Monitoring Report for Vapor Sampling Activities at Material Disposal Area L, Solid Waste Management Unit 54-006, at Technical Area 54, for Fourth Quarter Fiscal Year 2005 Through Third Quarter Fiscal Year 2006* and the October 2008 *Periodic Monitoring Report for Vapor-Sampling Activities at Material Disposal Area L, Solid Waste Management Unit 54-006, at Technical Area 54 for Third Quarter Fiscal Year 2008*, monitoring results for the specific borehole reported as constituting a "trend," borehole 54-02002, showed that levels of PCE, TCA[1,1,1-], and TCE were higher in the second and third quarter 2008 results than in first quarter 2006, which was the last quarter this borehole was sampled and analyzed prior to the SVE pilot study.

Appendix C (Soil-Vapor Transport at Material Disposal Area L: Numerical Modeling in Support of Decision Analysis), presents model results supporting the remedial alternative decision. The model scenario states, "[t]he west SVE system is first run for 30 d at 85 standard cubic feet per minute (scfm), followed by a rest period of 30 d; then, the east SVE system is run for 30 d at 85 scfm followed by a rest of 30 d. This cycle is repeated for 3 yr." However, Section 9.1, Selection of Recommended Corrective Measure, page 92, paragraph 5, contains a proposal for "[s]ix SVE boreholes will then be installed to facilitate active extraction of vapor-phase VOCs from the vadose zone." and, later in the same paragraph, "[t]wo SVE systems will operate concurrently, each for 30 d at an individual extraction borehole, for a total active extraction time period of 3 mo out of each year. Active SVE will be performed in this manner for 3 yr." If modeling is presented in support of a decision on remedial activity, the modeling must represent the proposed remedial alternative, which this does not.

The Permittees may not assume *a priori* that active SVE will cease in three years. Performance criteria must be developed during the Corrective Measures Implementation (CMI) design to propose target conditions when active SVE can be discontinued, including the trigger criteria based on vapor monitoring results that would require re-

starting active SVE during passive periods. Based on limited data collected in the SVE pilot test, it appears that an intermittent active SVE system, similar to what was modeled in Appendix C, may be appropriate, but would require more cycles than the proposed three cycles over three years time. The modeling is based on a 30 days on - 30 days off cycle repeated; NMED agrees that this type of schedule could be appropriate for MDA L.

In Figure 7.3-2 (Proposed SVE extraction borehole locations), page 142, the farthest west SVE well appears to provide coverage for shafts 36 and 37. This extraction point would be more effective if located closer to the presumed VOC source areas (shafts 29 through 34).

Propose a more aggressive active SVE timeframe and schedule based on actual data and provide cost estimates based on the revised timeframe and schedule. Revise the Report to remove reference to discontinuing active SVE after three years unless it can be demonstrated that this timeframe will meet the requirements of the Order; active SVE can only be discontinued upon demonstration that such action is warranted and that performance standards have been met. Utilize actual data to design the recommended system rather than the numeric model described in Appendix C, which does not simulate the proposed design. Either remove Appendix C as support for the selection of the recommended measures alternative or provide simulations that more closely match the proposed remedy selection. Revise the Report to include a preliminary design for installation of a SVE system for all applicable alternatives, including figures detailing system layout and construction details. Add the rationale for the SVE extraction borehole locations, and revise the pore-gas monitoring schedule and adjust cost estimates appropriately.

8) **Rankings**

The rankings in Tables 8.3-1, 8.4-1 and 8.5-1 (Screening of Technologies for [Pit and Impoundments/Shafts/Vadose Zone Contamination] against the Balancing Criteria), pages 228 - 233, lack adequate supporting information, rendering the decision-making process opaque. While NMED noted approximately 25 individual discrepancies within the rankings, spanning the entire range of the Balancing Criteria, adherence to Comment 1 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 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, 8.4-1, 8.5-1, 8.6-1 and 8.6-2).

9) **Cost Estimates**

NMED acknowledges that the Permittees have revised the cost estimates and supporting information from the original CME Report (January 2008). However, within Table 8.2-3

and Table 9.1-1, the cost information must be condensed to better facilitate effective review and evaluation. While Appendix E provides more detail, the current version of Table 8.2-3 (which is 26 pages long) should be utilized as a summary table for that appendix. A separation of technologies within the tables in order to make them more comprehensible (e.g., a blank line between each technology and shading for grand totals of each technology) would be helpful.

In Section E-5.3.1 (Assumptions), page E-14, installation of passive extraction boreholes is included in cost estimates for SVE for the pits and impoundments, as well as the shafts, but not included in cost estimates for SVE for vadose zone.

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

a) Beginning with the very first line item under Vegetative Cover - DC - Fence, page 1 of 42, there is no explanation as to how labor amounts were estimated, what the unit cost of labor is, how the materials costs were estimated or how the equipment costs were estimated.

b) Vegetative Cover - DC - Subsurface VOC Vapor Monitoring, page 1 of 42: The Permittees list SVE – LLW Disposition. There is no definition of this line item. There is no mention of SVE or LLW in Section E-3.2.1 (Assumptions) on page E-3 regarding Technology PI-3a.

c) Vegetative Cover – IC - Contingency, page 2 of 42: Contingency rates are provided as a percentage of some other amount. The costs provided do not correspond to the given percentage of any prior total costs.

d) Vegetative Cover – IOM – Professional Management, page 2 of 42: The Permittees provide no basis for the reduction of costs between time periods "years 0-30" and "years 31-100".

e) On Site – DC – On Site Treatment, page 13 of 42: "Mob/Demob VOC treatment plant" and "Processing VOC soil" are both repeated four times with no explanation.

f) On Site – DC – CAMU/RCRA, page 14 of 42: The Permittees did not provide a basis for the $2.3 million/acre cost.

g) Vadose – DC – Subsurface VOC Vapor Monitoring, page 40 of 42: For "Directional drilling," the Permittees did not provide explanation of assumptions used to estimate the number of hours of labor required for the specific task. Also, no unit costs for labor were provided in this example. From the listed costs, it

appears that there are no subcontractor costs associated with drilling the vapor monitoring boreholes, and it appears that there are equipment costs associated with the drilling. This example indicates that the Permittees are purchasing a drill rig for $4149.46 and utilizing LANL employees to drill five monitoring boreholes in 72.9 hours. It appears that Permittees have estimated Labor, Material, Subcontractor and Equipment costs for a line item, then back-calculated out a unit cost per line item. These are not the unit costs that were requested by NMED in the original NOD to the CME.

h) Vadose – DC – Subsurface VOC Vapor Monitoring, page 40 of 42: For "Pipe, steel, black," the Permittees list labor costs associated with pipe, which is a material. Also, there are equipment costs associated with pipe. The Permittees provide no explanation of the methods and/or assumptions used to develop or estimate these costs.

i) The Permittees have provided inconsistent costs for similar technologies. Specifically, technology PI-4b (In Situ Source Treatment Using SVE), an SVE system utilizing 3 vapor extraction boreholes, is given a PV cost of approximately $19 million, while technology S-4b (In Situ Source Treatment Using SVE), an SVE system utilizing 4 vapor extraction boreholes, is given a cost of approximately $21 million. Technology VZ-3b (In Situ Treatment of Vapor-Phase VOC Contamination in Vadose Zone Using SVE), an SVE system utilizing 6 vapor extraction boreholes, is given a cost of approximately $13.5 million.

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 E, 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, provide this information for each and every line item. Either present these data in a more explanatory and reviewable manner or provide attached explanatory text stating all assumptions, estimations and unit costs for each labor cost, material cost, subs cost and equipment cost for each line item in this attachment.

10) <u>Figures</u>

There are several issues regarding figures, figure labels, and figure legends.

a) Several figures contain identifiers in the legend that are not shown on the figures, and at least one figure contains text in the legend with no identifier.
b) Items within some figures are identified incorrectly based on legend descriptors, i.e., sampling locations identified as disposal shafts.
c) Many of the figures contain contour interval lines that are indistinguishable from one another based on linetype and color (e.g., 10-ft and 100-ft contour lines).

Also, there is no need for 20-ft contour lines on a figure when 10-ft contour lines are being utilized. This is duplicative and makes the topography difficult to interpret.

Take care to ensure that items not shown on figures are not included in the legends and that items shown on the figures are included in the legends, that items on figures are properly identified per legend descriptors, that appropriate contour intervals are utilized and that different contour intervals are distinguishable from one another via linetype and color, and that all figures are technically edited.

Miscellaneous

11) In the November 2010 *Corrective Measures Evaluation Report for Material Disposal Area G, Consolidated Unit 54-013(b)-99, at Technical Area 54, Revision 2*, the Permittees discuss overcoring technology for retrieval of the shaft wastes. However, the Permittees did not discuss this technology in the Report for MDA L. Revise the Report to include a discussion, screening, and evaluation of the overcoring technology for retrieval of shaft wastes at MDA L.

12) There is a significant risk associated with vapor intrusion into buildings or other structures which exist, or may be constructed in the future, at MDA L. 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 to address this risk.

13) The title of Section 8.6.3 (Vadose Zone) should approximate titles of Sections 8.6.1 and 8.6.2. Revise the title of this section to read, "Evaluation of Alternatives for Vadose Zone Contamination against the Balancing Criteria." Inconsistency in titles also appears between Sections 8.39 (Screening Summary for Pit and Impoundments) and 8.4.8 (Summary of Shaft Screening). Ensure that all titles are consistent and accurately reflect the contents of the section.

14) In Sections 8.4.5.4 and 8.4.6.4 (Implementability), the Permittees state, "[e]mpty cylinders in Pit A will be individually examined and analyzed for disposal pathways." These sections are related to shafts, not pits and impoundments. In Figure 9.1-1 (Refined conceptual site model for pit and impoundment waste), the first box below "Primary Release Mechanism" refers to shafts, not pits and impoundments. In Figure 9.1-2 (Refined conceptual site model for shaft waste), the first box below "Primary Release Mechanism" refers to pits and impoundments. Revise these sections and figures to correct the discrepancies. Take care to ensure that subject areas are discussed in the appropriate sections of the Report.

15) In Section 10.1 (Design Approach), the Permittees provide a heading for the Vegetative Cover, but no heading for SVE. Revise the Report to resolve this discrepancy. Take care

to ensure that all headings are consistent and accurately descriptive of subject discussed in the corresponding section.

16) While Table 6.3-1 (Summary of Appropriate Technologies for MDA L), indicates that the biotic barrier technology is not retained for shafts, the technology is included in Table 7.0-1 as a Potential Remedial Action Technology. Also, *ex situ* vitrification is indicated as not retained for pits and impoundments, but is included in Table 7.0-1. Revise the table to resolve these discrepancies. In general, care should be taken to ensure that all text and tables match.

17) Table 7.0-1 (Summary of Potential Remedial Action Technologies), lists "Debris treatment" twice under Ex Situ Treatment for Shafts. Revise the table to correct this error. In general, care should be taken to ensure that all tables are populated correctly with no duplication.

SPECIFIC COMMENTS:

18) **Section 2.0, Background Information, page 3**

Permittees' Statement: "The subsurface disposal units of MDA L, also referred to as SWMU 54-006, along with the Area L landfill units, are interspersed across the northern half of Area L, MDA L consists of 1 inactive subsurface disposal pit (Pit A), 1 inactive subsurface treatment and disposal impoundment (Impoundment C), and 12 inactive disposal shafts (Shafts 2–12 and 18). The Area L landfill consists of 2 inactive surface impoundments (B and D) and 22 inactive disposal shafts (Shafts 1, 13–17, and 19–34). The Area L landfill units received hazardous wastes after July 26, 1982, and are regulated units subject to RCRA closure requirements rather than Consent Order requirements."

NMED Comment: In Appendix B, Historical Investigation Report, of the *Investigation Work Plan for Material Disposal Area L, Solid Waste Management Unit 54-006, at Technical Area 54, Revision 2* (November 2004), under section B-1.1.3 (Uncertainties in the MDA L Inventory), it is indicated that Impoundment C was used from July 1985 to December 1985. Also, in Table B-1 (Dimensions, Dates of Operation and Capacity of Pit and Impoundments at MDA L) of the same report, the period of use for Impoundment C is listed as "7/85-12/86" and the months used listed as 18. While there is a discrepancy between these two sets of dates, either would qualify Impoundment C as a regulated unit subject to RCRA closure and postclosure care requirements under 40 CFR 265 Subpart G. NMED recognizes that a remedy for both the RCRA and non-RCRA disposal units at MDA L, excluding shafts 35 and 36, will be completed under the Consent Order, but any and all references, including text, figures and tables, must be changed to clarify that Impoundment C is a RCRA regulated unit.

19) Section 2.2.5, Regional Aquifer Hydrology, page 10

NMED Comment: The Permittees refer to Figures D-1.0-1 and D-2.0-1 and D-2.0-2 in this Section. However, there are no such figures in Appendix D of the Report. Revise Section 2.2.5 to resolve these discrepancies and ensure that all references made within the Report are accurate.

20) Section 2.2.5, Regional Aquifer Hydrology, page 10

Permittees' Statement: "The degree of hydraulic communication between these zones is (1) relatively poor and (2) spatially variable depending on local hydrogeologic conditions and hydrostratigraphy. The poor hydraulic communication between the two zones does not preclude the possibility that some contaminant migration may occur between the shallow and deep zones. Between the two zones, the hydraulic gradient has a downward vertical component because of water supply pumping in the deep zone, creating the possibility that downward contaminant flow may occur along "hydraulic windows," although these flows have not been directly observed."

NMED Comment: The Permittees do not describe the lithology of the confining layer separating the deep confined and shallow unconfined zones. In addition, NMED understands that water supply well PM-2 is no longer in use. Revise the Report accordingly.

21) Section 2.5, Summary of Previous Investigations, page 12

Permittees' Statement: "MDA L has been the subject of numerous investigation activities. Phase I RFI activities were conducted between 1993 and 1995; follow-on and Consent Order site investigation activities were conducted between 2004 and 2007; two soil-vapor extraction (SVE) pilot studies were conducted in 1996 and 2006; and ongoing pore-gas monitoring activities continue at the site. Investigation activities are summarized in the following sections."

NMED Comment: The first SVE pilot test was conducted in 1995, not 1996. Revise the Report accordingly.

22) Section 2.5.3, Summary of SVE Pilot Studies, page 17

Permittees' Statement: "Active vapor extraction was conducted at SVE-West for 25 d. The extraction air flow rate varied between 95 and 105 standard cubic feet per minute (scfm), with corresponding vacuums of 53 in.-H2O and 60 in.-H2O, respectively. Active vapor extraction was conducted at SVE-East for 22 d. The extraction air flow rate was set to 105 scfm, with a corresponding vacuum of 54.4 in.-H2O."

NMED Comment: Based on the 2006 SVE Report, the corresponding vacuum for the test on SVE-East extraction borehole was 66.7 in.-H2O, not 54.4 in.-H2O. Also, the significant digits reported for each of the vacuum pressures are inconsistent. Revise the Report to resolve these discrepancies.

23) Section 4.6.1, Pit A and Impoundments B, C and D, page 26

Permittees' Statement: "Uncertainty is associated with vapor diffusion through the basalt, thereby potentially impacting groundwater. For this reason, the pathway is considered to be complete."

NMED Comment: While NMED concurs with this conclusion, it appears to contradict the Appendix D analysis (see Comment 4). Revise the text of the Report accordingly.

24) Section 6.2.1.4, Surface Barriers, page 34

Permittees' Statement: "The existing surface barriers at MDA L have provided effective protection."

NMED Comment: If the Permittees include the existing MDA L cover as a portion of the final cover, then additional site-specific information regarding the existing cover will be required in the revised Report, such as cover thickness over waste, index parameters (e.g., grain size, Atterberg limits, and moisture content) of cover materials, in-place permeability, and compaction. Revise the text of the Report to clarify this statement and provide the additional information, as appropriate and applicable.

25) Section 6.2.1.4, Surface Barriers, Biotic Barriers, page 36

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.

26) Section 6.2.2.3, Physical Treatment Technologies, Dynamic Compaction, page 39

Permittees' Statement: "The technology has been successfully demonstrated on landfills where subsidence (settling) over large areas is possible, leading to potentially significant run-on and infiltration of surface water. The area of Pit A and the impoundments is small, and no sign of subsidence is evident since they were closed in the 1980s; nor is there any sign of subsidence around the shafts. Therefore, this technology was not retained for further consideration."

NMED Comment: This paragraph indicates that there are no indications of subsidence at disposal locations. However, for the Multilayer Cover (RCRA Cover) portion of Section 6.2.1.4, second paragraph, the potential for differential settlement is described as "dramatic" and is used as an argument for eliminating consideration of the RCRA cover. Revise the Report to reconcile these apparent inconsistencies.

27) **Section 6.2.2.4, Thermal Treatment Technologies, Vitrification, page 41**

Permittees' Statement: "This technology was retained for further consideration for the pit and impoundments."

NMED Comment: The Permittees retained vitrification as a viable technology for the pits and impoundments, but not for the shafts. Revise this section to provide an explanation of why this technology was not retained for shafts.

28) **Section 6.2.4.3, Chemical Treatment Technologies, Wastewater Treatment, page 44**

Permittees' Statement: "During the installation of any selected corrective measure at MDA L, contaminated wastewater may be generated. Waste streams generated as part of the remediation are not aqueous based and not applicable to this evaluation."

NMED Comment: These two sentences are contradictory. Revise this section to reconcile the contradiction.

29) **Section 6.2.4.4, Physical Treatment Technologies, Alternative Stabilization/ Encapsulation Technologies, page 44**

Permittees' Statement: "Stabilization and encapsulation technologies beyond cement-based techniques have been developed to reduce overall waste volume, address contaminants not well-stabilized by cement chemistry, or achieve greater wasteloading potentials. Because a large percentage of MDA L wastes would not benefit from these technologies, the alternative stabilization/encapsulation technologies were not retained."

NMED Comment: It is not clear if the Permittees are stating that because cement stabilization is expected to be adequate, alternative stabilization techniques are not required. Revise the Report to clarify the statement regarding stabilization and discuss whether or not other stabilization technologies are appropriate for the various wastes at MDA L. Explain why a large percentage of MDA L wastes would not benefit from these technologies.

30) **Section 6.2.4.4, Physical Treatment Technologies, Debris Treatment, page 44**

Permittees' Statement: "A variety of debris treatment technologies could be suitable for MDA L debris. This technology was retained for further consider for the shafts"

NMED Comment: The Permittees appear to have omitted the rest of the sentence. Complete the sentence if it is retained in the revised Report.

31) **Section 6.2.4.5, Thermal Treatment Technologies, Thermal Destruction, page 45**

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.

32) **Section 6.2.4.5, Thermal Treatment Technologies, Vitrification, page 45**

Permittees' Statement: "Vitrification is particularly suited to large homogeneous waste streams, because development costs for waste-specific applications generally far exceed waste minimization paybacks versus cement stabilization for smaller waste streams. For this reason, vitrification was retained for further consideration."

NMED Comment: The last two sentences appear to be contradictory; it does not appear that the MDA L wastes are a homogeneous waste stream. Revise the Report to reconcile or clarify these statements.

33) **Section 7.1, Activities Undertaken before Implementation of Corrective Measures, page 47**

Permittees' Statement: "Storage Pads 36 and 58 are also part of the permitted unit and are located beneath Canopy 62. Each pad is approximately 33 ft by 31.5 ft (1050 ft^2) and has a concrete berm, although neither is currently in use. The canopy provides protection from the weather and will require D&D before the final remedy for MDA L is implemented."

NMED Comment: The Permittees did not address Storage Pad 35, which is indicated on Figure 2.0-1 as located beneath Canopy 62. Revise this section to describe any issues regarding Storage Pad 35, and include a schedule for closure completion of all existing surface structures.

34) **Sections 7.3.7, Technology PI-4b: In Situ Source Treatment Using SVE, page 55**

Permittees' Statement: "Installation of three SVE extraction boreholes (Figure 7.3-2), each to a depth of approximately 200 ft bgs within the lower reaches of unit Qbt 1g."

NMED Comment: Figure 7.3-2 depicts six SVE extraction boreholes, not three. Revise the figure or the text of the Report, or otherwise resolve this discrepancy.

35) **Section 7.3.9, Technology PI-5a: Waste Excavation with On-Site Disposal, page 57-58**

Permittees' Statement: "The original units were excavated with nearly vertical walls with an entry ramp on one side. The remediation activities may excavate in the same manner as well, with nearly vertical slopes (1 ft horizontal to 6 ft vertical) (Figure 7.3-3)."

NMED Comment: Figure 7.3-3 illustrates the excavation areas for only the shafts, not the pit and impoundments. Revise the text or figure accordingly.

36) **Sections 7.4.7, Technology S-4b: In Situ Source Treatment Using SVE, page 67, paragraphs 1 and 2, 7.5.4, Technology VZ-3b: In Situ Treatment of Vapor-Phase VOC Contamination in Vadose Zone Using SVE, page 74, paragraphs 1 and 2,**

Permittees' Statements: "Installation of four SVE extraction boreholes (Figure 7.3-2), each to a depth of approximately 200 ft bgs within the lower reaches of unit Qbt 1g."

"Active vapor extraction will be conducted at each extraction borehole for 30 d. After 30 d of extraction, the SVE system will be moved to another extraction borehole, resulting in a total active extraction time frame of 90 d."

"Installation of six SVE extraction boreholes (Figure 7.3-2), each to a depth of approximately 200 ft bgs within the lower reaches of unit Qbt 1g."

"Active vapor extraction will be conducted at each extraction borehole for 30 d. After 30 d of extraction, the SVE system will be moved to another extraction borehole, resulting in a total active extraction time frame of 90 d."

NMED Comment: Four or six SVE boreholes operating for 30 days each does not equal 90 days of operation. Also, Figure 7.3-2 depicts six SVE extraction boreholes, not four. Revise the text of the Report to clarify the 90 day timeframe and revise the figure to resolve the discrepancy.

37) **Sections 7.5.3.5, Summary, page 73**

Permittees' Statement: "In situ treatment of pore gas does not meet the threshold criteria and is not retained for further consideration."

NMED Comment: This section should refer to "soil gas venting" specifically, not just "in situ treatment of pore-gas." Revise the Report accordingly.

38) Section 8.0, Evaluation of Alternatives Against Remedial Alternative Evaluation Criteria, page 75

Permittees' Statement: "Sixteen corrective measures technologies were found to meet the Consent Order threshold criteria for the three source areas and have been brought forward for further evaluation along with the no-action technology."

NMED Comment: This should indicate 15 technologies carried forward instead of 16 (in addition to the three No Action technologies), per Table 7.6-1 and Pg. 77, Section 8.2.6, 2nd paragraph, 1st sentence. Revise this section accordingly.

39) Sections 8.3.6.1, 8.3.7.1, and 8.4.5.1, Long-Term Reliability and Effectiveness, pages 80, 81 and 86

Permittees' Statement: "This technology transfers the potential impact of the waste to the on-site disposal facility and the roads on which the waste is transported."

NMED Comment: Clarify that the potential impacts to roads is due to potential accidental release and not to direct burial of the waste beneath roads.

40) Section 10.0, Design Criteria to Meet Cleanup Objectives, page 94

Permittees' Statement: "The CSM has been refined to illustrate the impact of the recommended alternative on the release mechanisms and the reduction in exposure potential (incomplete pathways) and future risk reduction. The refined CMSs are presented for the pit and impoundments and disposal shafts in Figures 9.1-1 and 9.1-2, respectively."

NMED Comment: This paragraph is redundant with the second paragraph in section 9.1.6. Also, the second use of the abbreviation CSM is misspelled. Revise the Report accordingly.

41) Section 10.5.4, Community Relations Activities, page 98

Permittees' Statement: "A community-relations program will be implemented to keep stakeholders, including the White Rock community, San Ildefonso Pueblo, Northern New Mexico Citizen Advisory Board, and other parties interested in project activities and progress."

NMED Comment: This statement is confusing, possibly because the end of the sentence may be missing. Revise as appropriate.

42) Section 11.1, Proposed Milestones, page 99

Permittees' Statement: "A Class 2 Permit Modification for closure of the northern-half of the aboveground CSU will be submitted to NMED and approved the CMI plan is implemented."

NMED Comment: NMED assumes that the Permittees intended for this sentence to read, "A Class 2 Permit Modification for closure of the northern-half of the aboveground CSU will be submitted to NMED and approved before the CMI plan is implemented." Revise as appropriate.

43) Figure 4.0-1, Hydrogeologic conceptual site model for MDA L, page 137

In the "Vapor Phase Transport" box, the Permittees state, "[d]iffusion of volatile chemicals accounts for their observed distribution in the unsaturated zone." Vapor monitoring has been conducted only within the Bandelier Tuff; conformance of VOC distribution within the underlying basalt to a diffusion model therefore cannot be verified using the available data. Revise the text of the Report to add "...observed distribution in the unsaturated zone of the Bandelier Tuff."

44) Table 8.2-1, Comparison of Retained Corrective Measure Technologies..., page 200

NMED Comment: In Table 8.2-1, the Permittees list "S-4b, In situ source treatment using sve". Additionally, column VZ-2, Monitored Natural Attenuation, indicates that SVE duration for this technology will be 30-years. There is no SVE associated with natural attenuation. Revise the table to correct this discrepancy. Also, footnotes b and c should indicate that these are estimated time frames. Revise the table to include "estimated" in footnotes b and c.

45) Table 8.2-2, Explanation of Ranking System..., page 201

Permittees' Statement: Column titled 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.

46) Table 8.4-1, Screening of Technologies for Shafts against the Balancing Criteria, page 231

Permittees' Statement: Second entry in table, "Technology S-3b Installation of a vegetative cover with maintenance and monitoring of cover"

NMED Comment: This technology is designated as S-3a, not S-3b. Revise the table accordingly.

47) Table 9.1-1, Summary of Capital and Recurring Cost Estimates for the Preferred Alternative, page 236

NMED Comment: The "Grand Total" column does not appear to correspond to anything. Revise the table to remove this column or provide explanation as to what this column refers.

48) Section B-3.1.1, Mathematical Approach, page B-8, paragraph 4

Permittees' Statement: "Using the relationships described above, Equation B-3.1-6 can be rewritten as

[*equation*], Equation B-3.1-5"

NMED Comment: This statement regarding Equation B-3.1-5 should reference Equation B-3.1-4 instead of Equation B-3.1-6. Revise the text accordingly.

49) Figure B-3.2-3, Soil-Vapor Concentration Time History Plots..., page B-28

NMED Comment: The PCE plot is repeated and the TCE plot is missing. Remove the duplicate plot and insert the appropriate plot for TCE.

50) Table B-3.1-2, Total Contaminant Mass Exceeding Ten Times the Tier 1 Vapor-Phase Screening Level, page B-39

NMED Comment: Two of the three totals for TCE are not summed accurately: line two in the table, 221+24=245, not 243; line four of the table, 63+7=70, not 69. Correct these errors.

51) Section D-2.2, Preliminary Water-Table Map based on July 2010 Data, page D-2

Permittees' Statement: "Furthermore, the preliminary water level at R-54 appears to be about 0.3 ft higher than the water level at R-20 (Figure D-2.2-1), suggesting there may also be a western component to the groundwater flow that may result from water-supply pumping at PM-2. This observation may be related to the spatial extent of Puye sediments below MDA L (Figure D-2.2-2)."

"During R-54 development, the water levels were higher in the lower screen than in the upper screen, suggesting an upward vertical component of the hydraulic gradient, which is contrary to what typically is observed on the Pajarito Plateau. This observation may be a result of a long-term recovery of the hydraulic heads in the deep aquifer zone since supply well PM-2 stopped pumping about 3 yr ago."

NMED Comment: Alternately, the apparent reverse gradient from R-54 towards R-20 could be related to the unusually high saturated thickness of lower permeability Cerros del Rio basalt at well R-20, and different confining conditions at this well. Similarly, upward vertical flow at R-54 could be related to lateral flow under the deeper basalts to the east (i.e., at R-20). Revise the text to consider these possibilities, or provide justification for their rejection.

52) **Figure D-2.2.2, Hydrostratigraphy along the regional water table..., page D-13**

NMED Comment: The arrow and call-out for MDA L appears to be misplaced; instead it should be pointing to the feature between regional wells R-54 and R-56. Revise the figure accordingly.

53) **Section E-3.2.1, Assumptions, page E-3, bullet #4 and Section E-3.3.1, Assumptions, page E-4, bullet #4**

Permittees' Statement: "12 wk to complete construction, irrigation for 1 yr"
and
"16 wk to complete construction, irrigation for 1 yr"

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 97, 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 and ET covers to match the design criteria.

54) **Section E-3.2.1, Assumptions, page E-3**

NMED Comment: Twenty-six percent Professional Management costs were not included in the bullet list, but are included in Section E-4.2.1 and in the costs. Revise this section to resolve this discrepancy.

55) Section E-3.4.1, Assumptions, page E-4, bullet #5 and Section E-4.4.1, Assumptions, page E-10, bullet #5

Permittees' Statements: "Installation of 18 passive extraction 10-in.-diameter boreholes"
and
"Installation of 20 passive extraction 10-in.-diameter boreholes"

NMED Comment: There is no discussion in Sections 7, 8, 9 or 10 regarding installation of specific passive extraction boreholes. Revise Sections 7, 8, 9 and 10 accordingly or revise cost estimates for SVE to match design discussed in the above mentioned sections.

The Permittees must address the comments herein and submit a revised CME Report by **May 1, 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.

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

Sincerely,

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