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Mr. David Cobrain
New Mexico Environment Department
Hazardous Waste Bureau
2905 Rodeo Park Dr. E, Bldg 1
Santa Fe, NM 87505

RE: Draft Technical Review Comments on the Corrective Measures Evaluation Report for Material Disposal Area H, Solid Waste Management Unit 54-004, at Technical Area 54, Los Alamos National Laboratory, Dated December 2010

Dear Mr. Cobrain:

Attached please find draft technical review comments on the "Corrective Measures Evaluation Report for Material Disposal Area H, Solid Waste Management Unit 54-004, at Technical Area 54, provided by Los Alamos National Laboratory, December 2010."

The Material Disposal Area (MDA) H Corrective Measures Evaluation (CME) Report is similar in format and findings to the MDA L CME Report and the Revision 2 MDA G CME Report. Also in similarity to the MDA L and G CME Reports, there are overall deficiencies in the MDA H CME Report. Note that some comments have been included herein, which are identical or similar to previous comments on the MDA L and G CME Reports.

The Permittees have indicated an evapotranspiration (ET) cover as the preferred corrective measure alternative for MDA H. We generally concur that a functional ET cover is a preferred remedial alternative for this site, especially in light of the Section 10 design criteria presented in the MDA H CME Report. However, the suitability of local materials (such as crushed tuff) for an ET cover at MDA H has not yet been demonstrated. Therefore, we require additional safeguards within the CME Report to provide a reasonable alternate remedy in the event that the ET cover cannot be implemented as intended. We generally agree with the specific performance requirements that will be used as the basis of design for the ET cover (Section 10 of the CME Report for MDA H).

Since the ET cover performance has not yet been technically demonstrated, it is imperative that the CME contain an alternative that can be used in the event that the preferred alternative (ET cover) is found to be unworkable during design. The Vegetative Cover (comprised of 18 inch combined thickness of soil) described in the CME Report is not an adequate "second choice" remedy. Instead, a low-permeability cover (such as a RCRA Subtitle C cover) must be included

in the CME Report. Potential disadvantages of the specific low-permeability cover components (that is, geomembranes and clay layers) as argued by Permittees in the technology screening phase can be successfully overcome with appropriate engineering measures. Since it has not yet been demonstrated that an ET cover will perform adequately, a low permeability cover option (such as a standard RCRA Subtitle C cover) must be included in the alternatives assessment of the CME Report.

Attached are general and specific comments on the CME Report for MDA H that are required to be addressed and the CME Report revised accordingly.

If you or any of your staff have questions, please contact me at (801) 451-2864 or via email at paigewalton@msn.com.

Thank you,

Paige Walton

Paige Walton
AQS Senior Scientist and Program Manager

Enclosure

CC: Kent Friesen, Wyoming Environmental (electronic)
Joel Workman, AQS (electronic)

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Draft Technical Review Comments on the Corrective Measures Evaluation Report for Material Disposal Area H, Solid Waste Management Unit 54-004, at Technical Area 54, provided by Los Alamos National Laboratory
Dated December 2010

GENERAL COMMENTS

1. It is agreed that a functional evapotranspiration (ET) cover is the preferred alternative. However, provide demonstration that the proposed cover materials provide adequate water storage, as indicated in the design criteria described in Section 10 of the Corrective Measures Evaluation (CME) Report.
2. It is indicated that the design details for the proposed ET cover will be deferred to the Corrective Measures Implementation (CMI) design. We generally agree with this approach, yet caution that the ET cover design must not be unduly constrained by the CME assumptions. For Material Disposal Area (MDA) H, a conceptual design of an ET cover that was previously provided by LANL (letter to John Keiling in response to the request for public comments on the MDA H remedy, dated January 4, 2008) incorporated a biointrusion barrier, including a perimeter vertical barrier component; this should also be considered in the CMI design. Consideration of a low-permeability layer (such as bentonite clay geosynthetic clay liner, GCL) may also be warranted in the CMI design.
3. Conceptual design assumptions that were used for evaluating the CME alternatives must not be considered as an approved basis for the CMI design. For example, we recognize that assumptions for various parameters like the thickness of the cover soil layers are required for the CME evaluation. However, these CME assumptions cannot be accepted as constraints on the future CMI design.
4. The vegetative cover described in the CME Report has no technical validity, and therefore should be removed from the alternatives evaluation. As currently written, the vegetative cover would be considered the "second best" alternative in the event that an ET cover is not valid. However, we fail to see any valid technical basis for the 18-inch thick vegetative cover, and so it should be eliminated.
5. A low-permeability cover alternative must be evaluated as an alternative. The standard RCRA Subtitle C cover for hazardous waste landfills conforms to the RCRA closure standard. An alternative must be included in the CME Report that better represents a low-permeability cover paradigm. In the event that the preferred ET cover remedy fails, or is found to not be implementable during the CMI design, then the low-permeability cover (and specifically a RCRA Subtitle C cover) would provide the necessary contingency alternative for a landfill cover.
6. Objections raised to low-permeability covers in the technology screening section were not well substantiated. However, the Permittees can use the stated objections in consideration of the "balancing criteria" in the alternatives evaluation, which may result in the lower ranking of the RCRA cover in comparison to the ET cover. Respondents indicated that compacted clay layers would be subject to excess desiccation. However, placement of a compacted clay layer overlain by a geomembrane would minimize desiccation of the compacted clay, in similar manner that an asphalt cover increases the moisture content of underlying soil (which

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was one or Permittees' arguments against the asphalt cover). NMED considers a low-permeability RCRA Subtitle C cover as the "baseline" requirement for a landfill cover against which the alternative cover (i.e., ET cover) can be compared.

SPECIFIC COMMENTS

1. **Pg. 18, Section 4.4 Secondary Release Mechanisms.** In the top partial paragraph on this page, in the first full sentence, the second occurrence of "adsorbing" should actually be "nonsorbing."

2. **Pg. 19, Section 4.6 Receptors and Risks**. In the last bullet, we generally agree with the assessment that potential disturbance of the MDA H waste could lead to higher risk to receptors than other pathways via natural or undisturbed conditions.

3. **Pg. 24-25, Section 6.2.1.1 Vertical Barriers.** LANL must re-evaluate the arguments against each type of vertical barrier (Slurry Wall/Grout Curtain, Rock-Grout Mixing, etc.) regarding the potential adverse affects on the heat-, moisture-, and vibration-sensitive wastes at MDA H. We generally agree that vertical barriers are not required at MDA H based on the characterization of environmental impacts at the site, the lack of lateral migration, and the low concentrations of vapor volatile organic compounds (VOCs). But the argument that vibrations and disturbances (such as from a slurry wall) would compromise the waste (due to vibration, and air or moisture infiltration) seems too extreme for this case. Similar logic should have prevented drilling of additional disposal shafts during the operational period of MDA H. We generally agree with LANL's previous concerns regarding grout injection emplacements within or near the waste. However, it is entirely conceivable that a slurry wall could be installed some distance from the waste (i.e., at the site perimeter) without disturbing the waste. See also the next comment concerning vibrations during construction of Section 6.2.1.4 cover systems at the ground surface.

4. **Pgs. 27-29, Section 6.2.1.4 Surface Barriers**. How will LANL mitigate the surface vibrations from construction equipment during the installation of soil covers? Is there some assurance or special safety analysis required to ensure that the recommended technology will not result in adverse impacts due to waste instability? The prevention of vibrations and waste disturbance was used to eliminate numerous other subsurface technologies; how will these hazards be addressed during cover installation? This comment may also need to be addressed on Pg. 35, Section 7.1 Activities Undertaken Before Implementation of Corrective Measures.

5. **Pg. 27, Section 6.2.1.4 Surface Barriers**. In the first paragraph, second sentence, the following document was cited as guidance for cover design, but was apparently not referenced before in the CME reports for MDAs L and G. Is this document a prescriptive standard or requirement for covers at LANL, and are ET covers (versus low-permeability covers) a requirement in this document? This referenced document was not reviewed in conjunction with the MDA H CME Report; if it will be cited or used in the CMI stage; please provide NMED with a copy.

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Dwyer, S.F., R.E. Rager, and J. Hopkins, April 2007. "Cover System Design Guidance and Requirements Document," Los Alamos National Laboratory document LA-UR-06-4715, Los Alamos, New Mexico. (Dwyer et al. 2007, 096232).

6. **Pg. 27-28, Section 6.2.1.4, Multilayer Cover (RCRA Cover).** The RCRA cover was not retained for MDA H based on the same arguments previously provided for MDAs G and L: differential settlement (particularly of geosynthetic components like geomembranes) and potential clay desiccation. However, the RCRA cover should be retained for the alternative evaluation as a representative low-permeability cover that conforms to RCRA closure standards. Engineering controls for both settlement (by adding internal tensile strength with a geotextile or geogrid layer) and desiccation (by covering clay layers with a geomembrane) can be implemented for a RCRA cover. Respondents should retain a low-permeability cover technology for cost evaluation, in addition to the ET cover concept. The ET cover should not be a presumptive remedy at this technology screening phase.

7. **Pg. 28, Section 6.2.1.4, Vegetative Cover.** We recognize that the description of a Vegetative Cover has been slightly modified in this document by clarifying "The vegetative cover's ET capacity is limited due to the design thickness of the cover". Also, as in previous CME reports for MDA G and L, the vegetative cover is described as having a lower layer with less permeability than the upper layer, with the purpose of "inhibiting surface water from seeping into the waste zone." So now it appears that the Vegetative Cover is a low-cost hybrid between an ET cover and a low-permeability cover. However, it does not satisfy the requirements of either cover paradigm. Similar to our comments on MDAs G and L, Permittees should eliminate the vegetative cover technology, and retain both a conventional cover that complies with the RCRA Subtitle C requirements for a final cover system, as well as an alternate cover (such as the ET cover).

8. **Pg. 28, Section 6.2.1.4, Evapotranspiration Cover.** This statement in the last sentence of the first paragraph is not correct: "...these covers do not incur subsidence and desiccation." Instead, it could be stated that the performance of an ET cover is less likely to be compromised by subsidence and desiccation, compared to other low-permeability covers. At MDA H, the potential for differential subsidence across a 6-ft diameter shaft that has been plugged with concrete should be manageable with appropriate engineering measures. Regarding the second sentence of the second paragraph, we agree that the water storage capacity is a primary distinction between ET covers and the RCRA and vegetative cover; however, the actual benefit of this distinction has not been demonstrated.

9. **Pg. 28, Section 6.2.1.4, Biotic Barrier**. In the second sentence, we suggest dropping "pea gravel" from this sentence, since this material would not be an effective stand-alone component of a biotic barrier.

10. **Pg. 29, Section 6.2.1.4, Flexible Membrane Liner.** In the third sentence, differential settling is again cited as a problem with the application of this technology. It is not clear why differential settling would be expected at MDA H, given limited areal extent of the shafts, the

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plugging of the shafts with concrete, and (presumably) the careful placement of potentially reactive waste materials within the shafts.

11. **Pg. 33, Section 6.2.2.4, Jet Grouting Stabilization**. In the first paragraph, third sentence, suggest adding "reduce" or "eliminate" prior to "overburden subsidence".

12. **Pg. 33-34, Section 6.2.3 Excavation/Removal Technology**. Overall we agree with the determination in this Section, but suggest adding that sparks, friction, heat, physical impact, pinching, etc. are not the risk, but in a sense the pathway. The risk or "adverse interactions" is actually the instability of the waste materials, described in Appendix C as pyrophoricity, deflagration, and detonation. Please clarify.

13. **Pg. 38, Section 7.3.3, Technology S-3a Vegetative Cover**. We recognize that the text has been modified slightly from the MDA G and LCME Reports to indicate that this cover "provides limited ET capacity due to the design thickness of the cover," and includes addition of a moisture monitoring system and native vegetation as cover components. Therefore, this now appears to be a "light" version of the ET Cover technology. The description of this Vegetative Cover should be dropped, and a RCRA subtitle C cover should be retained instead. It has not been demonstrated how an 18-inches thick soil cover could meet the requirements for an alternative cover (2nd paragraph, 1st sentence), or provide protection against infiltration of moisture (Sections 7.3.3.1 and 7.3.3.3) better than a RCRA cover.

14. **Pg. 40, Section 7.3.4, Technology S-3b, Evapotranspiration Cover.** In the first full paragraph, Dwyer 2007 is referenced as the basis for the conceptual design, but this document was not included as an appendix, as it was in the Revision 1 version of the MDA G CME Report. We assume that this reflects the approach of deferring specific design consideration to a future CMI design task. The four bullets above this paragraph are beneficial because they reflect design considerations; however, we question if pea gravel can be used as an effective biointrusion barrier.

15. **Table 8.3-3 Screening of Technologies against the Balancing Criteria.** We generally agree with the relative rankings of the technologies provided. A RCRA Subtitle C cover should be included as well, recognizing that it would likely score lower than the ET cover in the category of long-term reliability and effectiveness.

16. **Figure 9.0-1 Refined Conceptual Site Model.** This figure suggests that the pathways from the biointrusion/erosion and biointrusion/leaching primary release mechanisms would be broken by the recommended ET cover. However, it is evident that the ET cover alternative as described in pg. 39, Section 7.3.4 would not break these pathways, since it only includes 3.5 ft of infiltration layer and 1.5 ft of topsoil/gravel admixture, and not a biobarrier. We recognize from pg. 48, Section 10.1 (Design Approach) 4th bullet that determination of a need for biointrusion barrier is deferred to the CMI design phase; however, this design consideration cannot be assumed to eliminate the biointrusion-related pathways in Figure 9.0-1. Please reconcile, such as by adding a footnote to Figure 9.0-1. This comment further

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supports the approach of evaluating two cover systems for MDA H: a low-permeability RCRA Subtitle C cover, and an ET cover with biointrusion barrier.

17. **Pg. 48, Section 10.1 Design Approach**. This section is generally sound and provides a good basis for the upcoming CMI design. The design precipitation event must also consider snowfall, which may be an important distinction between this site and ET covers constructed elsewhere, such as at Sandia. This section provides the detailed information required (based on current understanding) to justify selection of the ET cover, which can be subsequently developed in the CMI design.

18. **Pg. 48-49, Section 10.2 Preliminary Design Criteria and Rationale**. This section is also appropriate and provides additional details to consider for the upcoming CMI design.

19. **Pg. 50, Section 10.4 Additional Engineering Data Required.** It appears that the last sentence should be incorporated into the last bullet; please reconcile.

20. **Appendix C Characteristics of Disposed Waste at MDA H**. This appendix provides a good summary of relevant waste characteristics and greatly helps justify the distinction between this CME and the CME process for MDAs G and L.

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