

TASU



BILL RICHARDSON
Governor

DIANE DENISH
Lieutenant Governor

NEW MEXICO
ENVIRONMENT DEPARTMENT

Hazardous Waste Bureau

2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303
Phone (505) 476-6000 Fax (505) 476-6030
www.nmenv.state.nm.us



RON CURRY
Secretary

JON GOLDSTEIN
Deputy Secretary

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

August 31, 2009

David Gregory
Federal Project Director
Los Alamos Site Office
Department of Energy
3747 West Jemez Road, Mail Stop A316
Los Alamos, NM 87544

David McInroy
Remediation Services Deputy Project Director
Los Alamos National Laboratory
Environmental Programs, MS M992
Los Alamos, NM 87545

**RE: NOTICE OF DISAPPROVAL
PHASE II INVESTIGATION REPORT FOR MATERIAL DISPOSAL AREA C,
SOLID WASTE MANAGEMENT UNIT 50-009, AT TECHNICAL AREA 50
LOS ALAMOS NATIONAL LABORATORY (LANL),
EPA ID #NM0890010515
HWB-LANL-09-017**

Dear Messrs. Gregory and McInroy:

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) *Phase II Investigation Report for Material Disposal Area C, Solid Waste Management Unit 50-009, at Technical Area 50* (Report), dated May 2009 and referenced by LA-UR-09-2842/EP2009-0215. NMED has reviewed the Report and hereby issues this Notice of Disapproval (NOD).

General Comments:

1. The Permittees identified, subsequent to submittal of this Report, a systematic low bias in tritium pore-gas concentrations. The properties of the silica gel cartridges were not considered when calculating the final tritium results. The Permittees must therefore



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revise the Report to correct all instances where tritium pore-gas values were affected by this bias.

2. To ensure consistency at all sites across the Laboratory, this comment provides direction and clarification as to the procedure(s) that should be used in future reports for comparing site data to background. The following general method is preferred by NMED for evaluating background whether the constituent of concern is naturally occurring or a radionuclide. Additional guidance may be found in *Guidance for Comparing Background and Chemical Concentrations in Soil for CERCLA Sites* (<http://www.epa.gov/oswer/riskassessment/pdf/background.pdf>).
 - a. As an initial screen, the maximum detected site concentration for each medium (soil, sediment, and tuff) should be compared to the appropriate background reference datum. This background datum is defined as the upper tolerance limit (UTL) in the LANL document *Inorganic and Radionuclide Background Data for Soils, Canyon Sediments, and Bandelier Tuff at Los Alamos National Laboratory*. If the site maximum is less than the background UTL for a given medium, then a conclusion may be drawn that the detected site concentrations are representative of background.
 - b. If the initial screen indicates that the maximum detected concentration is greater than the background UTL, and sufficient data are available, a statistical comparison (site attribution analysis) of site concentrations to background should be conducted. The statistical evaluation will provide results to assess whether the site data are significantly different from the background population. It is recommended that the statistical test be based on the distribution of the data sets. While either parametric or nonparametric tests may be used, the most commonly applied test for comparing site data to background is the nonparametric Wilcoxon Rank Sum (WRS) test.
 - c. Additional methods may be used in conjunction with the statistical tests, including box and whisker plots, histograms, and/or geochemical analyses.
 - d. If sufficient data are not available to conduct a robust statistical evaluation, additional site samples may be required to support either the determination of nature and extent or to support human health or ecological risk assessments. However, graphical methods, comparison to the background range(s) of data, and other lines of evidence may be evaluated on a case by case basis.
3. Sections 7.2.1, 7.2.2, 7.2.3, 7.3.1, and 7.3.2 describe the Permittees' conclusions regarding nature and extent of inorganic, organic and radionuclide contamination in tuff and pore-gas. Additionally, these sections reference Appendix F, specifically sections F-3.2, F-3.3, F-e.5, F-3.4, and F-3.6. The information provided in Appendix F appears to be a reiteration of sections 7.2.1, 7.2.2, 7.2.3, 7.3.1, and 7.3.2. The Permittees must revise the Report to remove Appendix F. Any information in Appendix F that is not duplicative of sections 7.2.1, 7.2.2, 7.2.3, 7.3.1, and 7.3.2 must be incorporated into the appropriate section in the main text of the Report.

4. The Permittees state that the vertical and lateral extent of inorganics, organics, and radionuclides in tuff as well as the vertical and lateral extent of VOCs and tritium in pore gas are defined. While some trends showing decreasing concentrations with distance are apparent, this is not the case for VOCs in pore gas in boreholes 50-27437, 50-27444, 50-27445, 50-27446, 50-24783/50-603472, 50-603367, 50-603063, 50-24771/50-603471, 50-603468, 50-24822; the lateral extent for VOCs to the south and east of MDA C; the vertical extent of inorganics in tuff in boreholes 50-603468, 50-603470, 50-24822; and the vertical extent of tritium in pore gas in boreholes 50-27446 and 50-603383. The Permittees state in Section 7.2.1 on page 22 of the Report that inorganics were “infrequently detected, and their concentrations were generally less than twice the BVs.” Again in Section 7.3.1 on page 23 of the Report, the Permittees state that “[t]he lateral extent of VOCs is defined at MDA C because the VOCs detected generally decrease in concentration with increasing distance from the disposal units or the central portion of MDA C.” These broad generalizations do not comport with the data from the aforementioned boreholes. The Permittees must revise the Report, where appropriate, to provide explanation supporting the conclusion that “vertical and lateral extent of contamination is defined” at MDA C, or propose additional work to achieve such determination, or both.

Specific Comments:

5. Executive Summary, page v, paragraph 4:

Permittees’ Comment: “The maximum concentrations of most organic chemicals in pore gas were detected at a depth of approximately 250 ft, with concentrations decreasing sharply below that depth. The highest detected concentrations of tritium were generally at depths of less than 125 ft bgs. Tritium concentrations decreased with depth in most, but especially in, deeper boreholes. The vertical extent of both VOCs and tritium in pore gas is defined.”

NMED Comment: The Permittees’ statement that “[t]he vertical extent of both VOCs and tritium in pore-gas is defined” is inaccurate. The Permittees must revise the text or provide a stronger foundation for the assertion. See General Comment # 4.

6. Section 1.3, Phase II Site Investigation Conducted, page 2, 1st paragraph, bullet three:

Permittees’ Statement: “[e]xtended eight existing boreholes (locations 50-24769, 50-24771, 50-24783, 50-24784, 50-24813, 50-24817, 50-24820, and 50-24822)”

NMED Comment: The Permittees state in the first paragraph of Section 1.3 that *nine* boreholes (locations 50-24769, 50-24771, 50-24783, 50-24784, 50-24813, 50-24817, 50-24820, **50-24821**, and 50-24822) were extended as part of the Phase II investigation. Additionally, the approved Work Plan also states that nine boreholes would be extended as part of the Phase II activities. The Permittees must revise the text to resolve this discrepancy.

7. **Section 3.4.5, Collection of Pore-Gas Samples, page 9, paragraph 3:**

Permittees' Statement: "After a 30-min purge, a pore-gas sample for VOCs analysis was collected in a SUMMA canister."

NMED Comment: The Permittees state in Section 3.4.1, *Drilling*, that "[t]he pore-gas screening sample was collected in a SUMMA canister following a 60-min purge." The Permittees must revise the text to resolve this discrepancy.

8. **Section 5.3, Cleanup Standards, page 18, paragraph 1:**

Permittees' Statement: "Because the current and reasonably foreseeable future land use is industrial, industrial SSLs/SALs are the cleanup levels for MDA C."

NMED Comment: Selection of the cleanup standards that apply to the site in the Report is premature and therefore will not be evaluated until the Corrective Measures Evaluation (CME) is submitted.

9. **Section 7.2.1, Nature and Extent of Contamination in Tuff, Inorganic Chemicals in Tuff, page 22, paragraph 1:**

Permittees' Statement: Concentrations of all TAL metals decreased with depth at locations 50-24784, 50-24820, 50-603060, 50-603061, and 50-603063. In the rest of the Phase II boreholes, concentrations of one or more TAL metals did not show decreasing concentrations with depth. However, they were infrequently detected in the TD sample of borehole 50-603470 at 650 to 653 ft bgs in media TT (Tschicoma Formation) where no BV is available. The overall decreasing concentration with depth to this tuff layer does not indicate contaminant releases."

NMED Comment: The order of magnitude increase in several metals in the Tschicoma Formation (TT) at borehole location 50-603470 may indicate contaminant migration via fracture flow. An "overall" decreasing trend is not sufficient. Based on the concentrations of metals at 650-feet at this location, the Permittees must provide additional information about the TT Formation to evaluate whether or not the detected concentrations of metals are consistent with those found at other locations within the TT Formation.

10. **Section 7.3.1, Nature and Extent of Contamination in Subsurface Pore Gas, Volatile Organic Compounds in Subsurface Pore Gas, page 23:**

Permittees' Statement: "The vertical extent of n-heptane and tetrahydrofuran is not defined at locations 50-24820 and 50-603468, respectively. Both organic chemicals were infrequently detected at the site and were not detected in the deepest sample collected at MDA C at 650 ft at location 50-603470. The lateral extent of VOCs is defined at MDA C because the VOCs detected generally decrease in concentration with increasing distance from the disposal units or the central portion of MDA C."

NMED Comment: Section F-1.3.4, *VOCs in Pore Gas between Pits 2 and 3*, states that vertical extent is defined for n-heptane, contrary to the statement in Section 7.3.1. Section F-1.3.4 goes

on to state that “[t]he vertical extent of the remaining VOCs have not been defined because their concentrations were relatively unchanged with depth or increased with depth in one or more boreholes.” NMED agrees that the vertical extent of several VOCs in pore-gas has not been defined. See General Comment # 4.

11. Section 7.3.2, Nature and Extent of Contamination in Subsurface Pore Gas, Tritium in Subsurface Pore Gas, page 23:

Permittees’ Statement: “Concentrations of tritium decreased with depth at all Phase II boreholes or grouped boreholes, except at location 50-603064 and 50-603383. However, tritium concentrations in boreholes that are deeper than those two boreholes show decreasing concentrations with depth. Therefore, the vertical extent of tritium is defined. The lateral extent of tritium is defined for MDA C as a whole because the concentrations in boreholes outside MDA C are substantially lower than concentrations detected in boreholes located in the central area of MDA C.”

NMED Comment: The objective of the phase II investigation was to define vertical and lateral extent of contamination, particularly in vapor-phase. Vertical extent of tritium, an important tracer, is not defined in boreholes 50-603383 and 50-24783. See General Comment # 4.

12. Section 7.4, Summary of Risk Screening Assessments, page 23, paragraph 3:

Permittees’ Statement: “Several chemicals of potential ecological concern (COPECs) were identified. All of the COPECs were eliminated following evaluations based on one or more lines of evidence, including minimum ESLs, HI analysis, comparisons to background, potential effects to populations, infrequent detection, and comparison to previous field and laboratory canyon investigations.”

NMED Comment: The calculation of risk is premature at this stage of the investigation for MDA C. In any event, the Permittees may not eliminate contaminants of potential concern (COPC) or contaminants of potential ecological concern (COPEC) on the basis of infrequent detection. The Permittees must clarify whether or not they eliminated any COPCs/COPECs due to infrequent detection.

13. Section 8.0, Recommendations, page 24:

Permittees’ Statement: “Because the lateral and vertical extent of contamination are defined, additional drilling and characterization sampling are not recommended for MDA C. Human Health and ecological risk screening assessments indicate that current conditions do not warrant immediate corrective actions to reduce the risk or dose.”

NMED Comment: See General Comment # 4.

14. Figure 4.5-1, Elevations of the top of the regional aquifer beneath the Laboratory, page 39:

NMED Comment: The Permittees must revise this figure to include the locations of regional wells R-17 and R-46.

15. Table 6.3-2, Tritium Detected in Pore Gas in Phase II Boreholes at MDA C, page 95:

NMED Comment: The Permittees state in Section 3.4.5 of the Report that pore-gas samples were obtained at the same depth intervals where tuff samples were collected. Because non-detects are not included in Table 6.3-2, it is difficult for NMED to determine whether or not pore-gas samples were collected at appropriate intervals. NMED acknowledges that Table 3.4-1 (*Tuff and Pore-Gas Samples Collected and Analyses Requested in Phase II Boreholes at MDA C*) provides the depth intervals and analyses requested for each borehole; however, including this information in Table 6.3-2 will facilitate NMED's review of the Report. The Permittees must revise Table 6.3-2 to include the depth intervals for non-detects.

16. Section B-5.4, Total Depth Determination, page B-5:

Permittees' Statement: "The screening sample was submitted for 24-h screening analysis or trichloroethylene (TCE); 1,1,1-trichloroethane (TCA), and tetrachloroethene (PCE) by standard gas chromatographic methods. As specified in the MDA C Phase II Work Plan, drilling would continue in 50-ft intervals until concentrations were below the target levels of 2100 $\mu\text{g}/\text{m}^3$ for TCE and 3800 $\mu\text{g}/\text{m}^3$ for PCE. Screening sample results are listed in Table B-5.4-1."

NMED Comment: The Permittees must revise Table B-5.4-1 to include the 1,1,1-trichloroethane (TCA) screening results. Also, as stated in the approved Work Plan, drilling would continue in 50-ft intervals until concentrations were below the target levels of 2100 $\mu\text{g}/\text{m}^3$ for TCE and 3800 $\mu\text{g}/\text{m}^3$ for PCE. Borehole 50-24771 had a TCE screening result of 5,000 $\mu\text{g}/\text{m}^3$. The Permittees must explain why the borehole was not extended at 50-foot intervals until screening results for TCE were below the target level of 2100 $\mu\text{g}/\text{m}^3$. Additionally, the Permittees must provide this explanation for boreholes 50-603472= 2300 $\mu\text{g}/\text{m}^3$ TCE and 50-603468= 7200 $\mu\text{g}/\text{m}^3$ TCE.

17. Section F-3.0, Nature and Extent of Contamination, page F-7, paragraph 1:

Permittees' Statement: "The COPCs identified at MDA C include a total of 21 inorganic COPCs, 92 organic COPCs (including 16 dioxins and furans), and 15 radionuclide COPCs. Dioxins and furans are not evaluated for extent because they were detected only at very low concentrations that are not indicative of a contaminant release."

NMED Comment: The Permittees must revise the Report to evaluate the extent of dioxins and furans.

18. Section F-3.4, VOCs in Subsurface Vapor, page F-11:

NMED Comment: See General Comment # 4.

19. Section F-3.6, Tritium in Subsurface Vapor, page F-13-F-14:

NMED Comment: See General Comment # 4.

20. Appendix G, Risk Assessments:

NMED Comment: As stated in specific comment # 12, NMED considers calculation of risk to be premature at this stage of the investigation at MDA C. However, a review of the overall methodology and assumptions of the risk assessment was conducted. Several volatile organic compounds (VOCs) were detected in pore gas samples. An evaluation of whether VOC concentrations were sufficient to potentially migrate to groundwater was conducted, but an evaluation of inhalation of vapors migrating from soil into indoor air was not addressed. The evaluation of this pathway is not dependent on depth of contaminant detections in soil, as typically applied in residential and industrial scenarios. Further, neither the NMED soil screening levels nor the regional screening levels account for the vapor intrusion pathway. Application of generic screening levels is adequate if the screening levels account for all potentially complete exposure pathways. At MDA C, the vapor intrusion pathway is complete and must be evaluated. It is suggested that the Johnson and Ettinger model be used to evaluate risk. Results from this analysis should be added to the risks determined from the comparison to the generic screening levels for assessment of overall risk. Inhalation of VOCs by ecological receptors is typically not evaluated in ecological risk assessments due to the lack of inhalation data for the various receptors. Therefore, the inclusion of the vapor intrusion scenario will only apply to the human health risk assessment.

21. Plate 6, Organic Chemicals Detected in Tuff and Pore-Gas in Phase II Boreholes:

NMED Comment: The "Notes" section beneath the legend on each Plate indicates that the data qualifier "NA" represents a pore-gas sample rather than a tuff sample. On Plate 6 there are instances where a pore-gas sample is misrepresented as a tuff sample. For example, borehole 50-603470, the 351-foot interval is correctly labeled with a "NA" because it is a pore-gas sample; however, the 650-foot to 653-foot interval is not labeled as being a pore-gas sample (no "NA"). It is labeled with the "TT" (Tschicoma Formation), incorrectly indicating that this is a tuff sample. The Permittees must revise Plate 6 to resolve all such discrepancies.

The Permittees must address all comments and submit a revised Report no later than October 1, 2009. 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 March 1, 2005 Order on Consent (Order). In addition, the Permittees shall submit a redline-strikeout version (electronic copy) that includes all changes and edits to the Report with the response to this NOD.

Messrs. Gregory and McInroy
August 31, 2009
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Please contact Kathryn Roberts of my staff at (505) 476-6041 should you have any questions.

Sincerely,

A handwritten signature in black ink, appearing to read 'James P. Bearzi', with a stylized flourish at the end.

James P. Bearzi
Chief
Hazardous Waste Bureau

cc: D. Cobrain, NMED HWB
K. Roberts, NMED HWB
S. Yanicak, NMED DOE OB, MS M894
T. Skibitski, NMED DOE OB
L. King, EPA 6PD-N
G. Rael, DOE LASO, MS A316
M. Graham ADEP, MS J591
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