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CERTIFIED MAIL - RETURN RECEIPT REQUESTED

December 8, 2011

George J. Rael
Environmental Operations Manager
Los Alamos Site Office
Department of Energy
3747 West Jemez Road, MS A316
Los Alamos, NM 87544

Michael Graham
Associate Director Environmental Programs
Los Alamos National Security, L.L.C.
P.O. Box 1663, MS 991
Los Alamos, NM 87545

**RE: APPROVAL
PHASE III 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-11-050**

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) *Phase III Investigation Report for Material Disposal Area C, Solid Waste Management Unit 50-009, at Technical Area 50 (IR)*, dated June 2011 and referenced by LA-UR-11-3429/EP2011-0223. NMED has reviewed the IR and hereby issues this Approval with modifications. The Permittees are required to provide a Response Letter which provides information requested in the modifications below.

34972



General Comments:

- 1) The highest measured concentrations of 2-hexanone were recorded in the deepest (600 ft below ground surface [bgs]) port in vapor-monitoring well 50-603467, and the concentrations are between six and nine times greater than the corresponding Tier I screening levels for the 2nd and 3rd quarters of FY2011. The Permittees have not provided any data on the distribution of 2-hexanone below the 600 ft bgs depth; therefore, it is possible that even higher concentrations occur at greater depths. The Permittees have not adequately defined the extent of vapor-phase 2-hexanone contamination which creates uncertainty regarding the potential for that contaminant to reach groundwater. NMED will evaluate future vapor-monitoring results and the Permittees may be required to install groundwater monitoring well R-59 in a downgradient location from vapor-monitoring well 50-603467.

- 2) The Permittees' Tier II analysis is inadequate. The Permittees performed Tier II analysis for specific depths at which the highest concentrations of certain contaminants of interest are currently measured. However, the Permittees neither recognized, nor discussed the fact that Tier II screening levels are depth-dependent. The analysis also only considered diffusion and did not address fracture flow. Both the distance to groundwater and the transport properties of the geologic formations between the contaminant location and the regional aquifer must be considered in order to properly estimate Tier II screening levels.

For example, the Permittees calculated Tier II screening levels for TCE at the depth of approximately 50 ft bgs. From that location, TCE vapors have to migrate through approximately 550 feet of Bandelier tuff, 300 feet of Tschicoma dacite, and 400 feet of Puye formation before they reach groundwater table. However, these calculations are not applicable to TCE vapors that are already near the top of Tschicoma dacite since they do not have to migrate through a thick sequence of Bandelier tuff before reaching groundwater. Tier II screening levels for TCE at the top of Tschicoma dacite will be much lower than those calculated by the Permittees for the location near the top of Bandelier tuff. The same comments apply to Tier II analysis for tritium. Figures F-3.0-1 and F-4.0-1 give an inaccurate impression that Tier II screening levels for TCE and tritium do not change with depth. The Tier II analysis results are not valid as presented.

Specific Comments:

3) Section 3.3.3.1, Collection of Vapor Samples, page 9, second paragraph

NMED Comment: The Permittees state that vapor sampling was performed in accordance with SOP-5074, Sampling of Subatmospheric Air and included 30-min purge before sample collection. However, a revised version of SOP-5074, Sampling of Subsurface Vapor, Rev. 2, is dated September 17, 2010 and, in this revision, the purge time has been reduced from 30 to 10 minutes for boreholes with sand pack filters. The Permittees do not mention the revised SOP-5074, and it is unknown if they followed the revised SOP-5074 for samples collected after September 17, 2010. Section IX.A of the Consent Order requires specific descriptions of the methods and procedures used to collect data. Describe the method used to collect vapor samples during each sampling event in the response letter.

4) Section 6.3, Regional Groundwater Sampling Results, page 18, second paragraph, first sentence

NMED Comment: Correct the listed January 2010 date to January 2011.

5) Figures 4.3-2, 6.2-1, and F-3.1-8

NMED Comment: Well 50-603064 contains nine sampling ports, but on the cross-section figures listed in the heading for this item (5), ten ports are shown for this well. Correct this issue for future submittals.

6) Tables 3.3-2, 3.3-3, 6.2-1, 6.2-2, 6.2-4, 6.2-5, Plates 1 through 4, 7, and 8

NMED Comment: The depth of the next-to-last port at borehole 50-603064 is incorrectly shown as 400 ft. The correct depth of this port, according to the borehole completion log, is 482 ft. Correct this inconsistency in future submittals.

7) Tables 6.1-1, 6.2-1, 6.2-2, 6.2-3, 6.2-4, 6.2-5, and 6.2-6, Analytical Results

NMED Comment: The analytical result tables must include comparative concentrations of each analyte. Table 6.1-1 must include relative screening levels and/or background values for the tuff adjacent to the Tschicoma dacite. Table 6.2-1, 6.2-2, and 6.2-3 must include the Tier I and Tier II screening levels developed through Henry's Law equations. Tables 6.2-4, 6.2-5, and 6.2-6 must include relative screening levels for tritium. Submit corrected tables as replacement pages for the Report.

8) **Table 8.0-1, Recommended Vapor-Monitoring Locations and Frequencies, page 96**

NMED Comment: In the Frequency column, the Permittees erroneously state ‘biannual’ sampling frequency instead of ‘semiannual’. The Permittees also omitted five of the monitoring wells from the Table. NMED has evaluated the Permittees’ recommended locations and frequencies for vapor monitoring and has developed the following table of locations and ports which the Permittees are required to sample on a semiannual basis. The samples must be analyzed for VOCs and tritium. The samples also must be field screened for VOCs, percent oxygen, and percent carbon dioxide.

Location	Port depths designated for semiannual sampling, ft bgs
50-24784	155, 244, 362, 450
50-24813	25, 150, 241, 358, 450, 600
50-24822	25, 142, 235, 351, 450
50-603061	25, 128, 228, 347, 450
50-603062	122, 217, 337, 450
50-603063	25, 128, 228, 347, 450
50-603064	113, 214, 332, 500
50-603383	26, 139, 244, 359, 450
50-603467	143, 244, 360, 500, 600
50-603468/50-613184	142, 233, 354, 403, 500, 600, 664.5
50-603470	83, 203, 278, 351, 450, 600, 650
50-603471/50-613183	90, 209, 288, 360, 450, 550, 642.5
50-603472/50-613182	27, 146, 292, 364, 450, 550, 632.5
50-603503	133, 237, 347, 450
50-613185	145, 235, 350, 450, 600

9) **Section B-5.1, Subsurface Dacite Sampling Methods, pages B-3**

Permittees’ Statement: “Air-rotary drilling was used in Phase III activities. The subsurface dacite samples were collected from the drill cuttings in accordance with SOP-06.26, Core Barrel Sampling for Subsurface Earth Materials.

“Samples were collected from the drill cuttings by placing stainless-steel bowl in the path of the cuttings as they exited the Hurricane 655 Dust Vacuum. The samples were field screened for VOCs and radioactivity and were visually inspected and logged. Following inspection, the sample was passed through a sieve to remove fine material, and the dacite was segregated. The samples were placed in sterile sample containers as required for each analysis, sealed, and labeled. Each sample was labeled with the borehole location number, date, time, depth interval, analyses requested, and sample identification number.”

NMED Comment: SOP 06.26 is specific to core barrel sampling, which was not the method of sampling used to collect dacite samples at MDA C. Also, screening for VOCs in

samples collected from the cuttings stream of an air-rotary drill rig is only appropriate for worker health and safety evaluation. The Permittees must remove references to SOPs that were not followed while collecting samples and must provide an explanation of the purpose of field screening air-rotary drilling cuttings for VOCs in the response letter.

10) Section F-2.2, Tier II Soil-Vapor Screen Based on Transport and Dilution in the Regional Aquifer, page F-3, second paragraph

NMED Comment: The Permittees' statement that "[e]quations F-2.2-1, F-2.2-2, and F-2.2-3 are based on EPA guidance document (EPA 1996, 059902, Equations 37 and 45, respectively)" is not entirely correct. The equation F-2.2-2 is not based on any of the cited EPA equations but can be construed as a numerical representation of the EPA statement (EPA 1996, 059902, page 46) that "[a]quifer thickness also serves as a limit for mixing zone depth." Correct this statement in future submittals.

11) Section F-3.1, page F-6, first paragraph and Section F-3.1.2, page F-8, number 1

NMED Comment: The Permittees' reference to "samples collected during the first quarter FY2010 before the start of Phase III vapor well drilling activities" is incorrect. These samples were collected during the first quarter FY 2011. Correct this typographic error in future submittals.

12) Table F-2.1-2, Screening of VOCs Detected during Second Quarter FY2010 in Vapor at MDA C, page F-35

NMED Comment: The Tier I SV value of 46,500 for trichloroethene is incorrect. The correct value is 46.5. Correct this error in future submittals.

13) Table F-2.2-1, Tier II Analysis of Chemicals Failing the Tier I Analysis, page F-36

NMED Comment: The value of 0.64 in the 'Contaminant flux from the vadose-zone source to the water table under steady-state' for TCE is incorrect. The correct value is 233. Correct this error in future submittals.

14) Table F-3.1-1, MDA C Strata-Specific Properties Affecting Mass Estimates, page F-38

NMED Comment: The hydrologic property values shown in the Table for Tschicomac dacite (Tvt2) do not agree with corresponding values in other publications by the Permittees. For example, the Table shows porosity value of 0.001 for Tvt2, while the same property is given value of 0.3 (over two orders of magnitude greater) in the 2005 *Los Alamos National Laboratory's Hydrogeologic Studies of the Pajarito Plateau: A Synthesis of Hydrogeologic Workplan Activities (1998-2004)* (LA-14263-MS, Table 4-C-2). The Permittees must correct the discrepancy and recalculate mass estimates in the response letter.

15) Table G-3.0-1, Model Parameters Evaluating the Monitoring Network of Regional Aquifer Wells Near MDA C, page G-9

NMED Comment: The porosity values shown in the Table for regional aquifer wells, which are in the Puye Formation (Tpf), do not agree with corresponding values in other publications by the Permittees. For example, the Table shows porosity range for Tpf from 0.05 to 0.15, with the best estimate of 0.1, while the same property is given value of 0.25 in the 2005 *Los Alamos National Laboratory's Hydrogeologic Studies of the Pajarito Plateau: A Synthesis of Hydrogeologic Workplan Activities (1998-2004)* (LA-14263-MS, Table 4-C-2). The Permittees must correct the discrepancy and recalculate the detection efficiency of monitoring wells R-60 and R-46 in the response letter.

16) Table G-5.0-1, Detection efficiency of Monitoring Wells R-60 and R-46

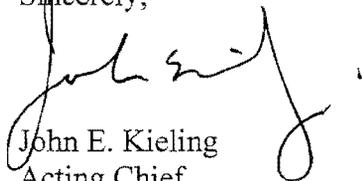
NMED Comment: The calculated average velocities of contaminant transport from potential source areas beneath MDA C to monitoring wells R-60 and R-46, as presented in the table, range from approximately 113 m/yr to 196 m/yr. However, in Section 4.4, page 13, the Permittees state that the groundwater velocity near MDA C is approximately 40 ft/yr. Explain the discrepancy and, if necessary, reevaluate the calculations of detection efficiency for monitoring wells R-60 and R-46 in the response letter.

Messrs. Rael and Graham
December 8, 2011
Page 7

The Permittees must address all modifications herein and submit a Response Letter by **January 13, 2012**. 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.

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

Sincerely,



John E. Kieling
Acting Chief
Hazardous Waste Bureau

cc:

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