Response to the "Notice of Disapproval for the Investigation Work Plan for Sites at Technical Area 49 Inside the Nuclear Environmental Site Boundary, Los Alamos National Laboratory EPA ID No: NM0890010515, HWB-LANL-07-033," Dated December 20, 2007

INTRODUCTION

To facilitate review of this response, the New Mexico Environment Department's (NMED's) comments are included verbatim. The comments are divided into general and specific categories, as presented in the notice of disapproval. Los Alamos National Laboratory's (LANL's or the Laboratory's) responses follow each NMED comment. This response contains data on radioactive materials, including source, special nuclear, and byproduct material. Information on radioactive materials and radionuclides, including the results of sampling and analysis of radioactive constituents, is voluntarily provided to NMED in accordance with U.S. Department of Energy policy.

GENERAL COMMENTS

NMED Comment

1. *Table 4.4-1, Summary of Proposed Boreholes and Sampling, requires revision. The Permittees must provide the subsurface sampling strategy for all SWMUs and AOCs in a table identical to the format of Tables 4.1-1 through 4.5-1 of the Investigation Work Plan for S-Site Aggregate Area (September 2007).*

LANL Response

1. Table 4.4-1 has been reformatted to match the formatting of Tables 4.1-1 through 4.5-1 of the "Investigation Work Plan for S-Site Aggregate Area." Additional information regarding borehole sampling intervals has also been added to Table 4.4-1.

SPECIFIC COMMENTS

NMED Comment

1. *Section 1.0, Introduction, page 1, paragraph 6:*

   The Permittees also state that "[a]lthough this work plan does include subsurface sampling for the SWMU 49-003, it does not propose sampling for the encompassing deferred site, AOC 49-008(c)." These statements arc contradictory. The Permittees must revise the Plan to clarify whether or not subsurface sampling will be conducted at SWMU 49-008(c).

   SWMU 49-008(c) is on Table IV-2 of the March 1, 2005 Order on Consent (Order); SWMU 49-003 is not. The Permittees must revise the Plan to include surface sampling at SWMU 49-003 in Area 11.

LANL Response

1. Solid Waste Management Unit (SWMU) 49-008(c) is a deferred site. No surface sampling is proposed for SWMU 49-008(c). In addition, SWMU 49-003 does not have a surface component; therefore, LANL is not proposing surface sampling for it.

   The text in section 1.0 has been revised to read, "Investigation of surface soil contamination at AOC 49-008(c) is deferred per Table IV-2 of the Consent Order. Therefore, no surface investigation is proposed at AOC 49-008(c); however, subsurface investigation is proposed for this AOC. SWMU 49-003, a subsurface leachfield, is located within the boundary of AOC 49-008(c). Because SWMU 49-003 has no surface component, no surface investigation is proposed in this work plan for this SWMU."

NMED Comment

2. *Section 2.4.1, Area 1: SWMU 49-001(a), Experimental Shafts, Site Description, page 8, paragraph 1:*

   Figure 2.2-1, Area 1 Experimental Shaft Details, depicts two shafts (1-K and 1-0) having depths of 85 feet, rather than a maximum depth of 80 feet. The Permittees must revise the Plan to state that the shafts were drilled at Area 1 to depths ranging from 31 feet to 85 feet, resolve the discrepancy.

LANL Response

2. The text of the work plan has been revised to indicate that the maximum depth of the 22 shafts at Area 1 is 85 ft.

NMED Comment

3. *Section 4.3.1, Surface Sampling, page 31:*

   According to Sections 2.5 through 2.10 of the Plan, previous sampling results indicate that inorganics, as well as radionuclides, are present in surface soils. Pursuant to Section IX.B.2.d, the Permittees must also use X-ray fluorescence (XRF) to field-screen for inorganics.

   The description of the three categories of surface sampling locations proposed within each sampling array is confusing. For example, it is unclear; how many samples will be obtained, the rationale for selection of samples for off-site laboratory analysis, and the rationale for the proposed analytical suites. The Permittees must remove this language from the Plan and provide the surface sampling strategy in a table identical to the format of Tables 4.1-1 through 4.5-1 of the Investigation Work Plan for S-Site Aggregate Area (September 2007).

LANL Response

3. Radionuclides are the primary contaminants of concern at Technical Area (TA) 49 based on past operations and confirmed by the results of Resource Conservation and Recovery Act facility investigation activities. Inorganic chemicals that are present due to historic operational activities could potentially occur with radionuclides because they were used concurrently during historical operations (i.e., experimental activities). Furthermore, concentrations of lead and other metals detected above background values (BVs) have been limited to central portions of each investigation area. Therefore, gross alpha and gross beta screening techniques will be used to target low-level radionuclide activity (see sections 4.3.1.1, 4.3.1.2, and 5.1.3). LANL has evaluated and eliminated x-ray fluorescence

(XRF) as a field-screening method at TA-49. XRF was eliminated because TA-49 lacks widespread, low-level inorganic contamination and because XRF screening data at LANL has historically indicated significant false positives (with respect to detecting the presence of inorganic chemicals above their respective BVs).

The iterative approach proposed for surface sampling will evaluate the extent of contamination using gross alpha and gross beta field screening, and subsequent laboratory analyses will be used to identify the presence of radionuclides as well as any coexisting inorganic contaminants.

LANL provided additional text and added flow charts to clarify the iterative sampling strategy discussed in section 4.3.1. Because of the iterative sampling approach, a predetermined amount of samples cannot be provided, only the minimum is presented.

NMED Comment

4. *Section 4.3.6, Sediment in Drainage Channels, page 34, paragraph 1:*

   In addition to the samples obtained in areas of sediment accumulation, the Permittees must target areas of fine-grained sediment. Furthermore, Figure 4.3-5, Proposed Sediment Sampling Locations displays no transect lines and only one sample location. The Permittees must provide a map which clearly shows the transect lines and sediment sampling locations.

LANL Response

4. In section 4.3.6, LANL added text stating that zones of fine-grained sediment will also be targeted. In addition, LANL revised Figure 4.3-5 to clearly show the transect lines and proposed sediment sampling locations.

   The original text was removed and the following text has been added to section 4.3.6:

   > To provide a snapshot of contaminant distribution within each drainage feature at TA-49, three samples will be collected along a transect perpendicular to the direction of flow at each location. One sample will consist of a composite of three samples collected from sediment within the active channel bed (see callout box in Figure 4.3-5); if a sediment accumulation zone is less than 6 ft wide (perpendicular to flow), only one sample will be collected from the center of the channel sediment (rather than a composite of three samples). The other two samples will be collected from either side of the outer edge of the sediment accumulation zone along the same perpendicular transect. A survey of each drainage channel will be conducted before sampling to identify zones of sediment accumulation near each sampling location. Zones of fine-grained sediment will be targeted. Discrete samples will be collected from each transect location at depths of 0 to 6 in. and 6 to 18 in. to obtain gross alpha and gross beta results and to obtain laboratory analyses for gamma spectroscopy, isotopic americium, isotopic plutonium, isotopic uranium, TAL metals, and PCBs.

NMED Comment

5. *Section 4.3.6, Sediment in Drainage Channels, page 34, paragraph 2:*

   The Permittees must provide a brief description of the sampling strategy for the South Canyons (e.g., sampling intervals, analytical suites) and provide a map showing the locations of surface water samples and their proximity to SWMUs and AOCs at TA-49.

LANL Response

5. A brief summary has been added to the work plan describing the investigation planned under the "South Canyons Investigation Work Plan." A figure has also been added to this work plan to show the reaches proposed for sampling under the "South Canyons Investigation Work Plan."

   The drainage sampling strategy proposed in this work plan will be integrated with data collected by other Laboratory environmental sampling programs, including the "South Canyons Investigation Work Plan." The approved "South Canyons Investigation Work Plan" (LANL 2006, 093713) addresses sources of contamination and the nature and extent of contamination in sediments, surface water of active stream channels, and groundwater beneath canyon floors. The South Canyons investigation includes sampling and analysis of media from the watersheds associated with TA-49 and representative sections of its reaches. For TA-49, the South Canyons investigation has proposed collecting 10 samples per reach in reaches WA-3, A-1, A-2, and AN-1 (Figure 4.3-5). Analytical suites for these reaches include perchlorate, target analyte list metals, cyanide, pesticides, polychlorinated biphenyls, polycyclic aromatic hydrocarbons, semivolatile organic compounds (SVOCs), volatile organic compounds (VOCs), radionuclides, and explosive compounds (LANL 2006, 093713, p. 14). The South Canyons work plan will provide more geomorphic data for TA-49 reaches. The TA-49 work plan proposes sampling alluvial sediment in reaches WA-3, A-1, A-2, and AN-1, and this information will overlap with the South Canyons work Plan to provide a thorough overview of any contaminant migration.

NMED Comment

6. *Section 4.4.2, Areas 1, 3, and 4 (Experimental Shafts): SWMUs 49.001(a), 49-001(e), and 49-001(f), page 37, paragraph 2:*

   NMED concurs with the proposed perimeter borehole locations for Areas 1, 3, and 4. However, the Permittees are reminded that in accordance with Section IV.C.4.c.iii of the Order, the boreholes must be advanced within 25 feet from the perimeter of each of the experimental shaft areas.

LANL Response

6. The text in section 4.4.2 has been revised to include language indicating that the boreholes will be drilled within 25 ft from the perimeter of each experimental shaft area.

NMED Comment

7. *Section 4.4.8, Analysis Plan, page 40, paragraph 1:*

   The Permittees state in the third paragraph of Section 4.4.8 that "[a]ll core samples will be submitted to an analytical laboratory and analyzed for explosive compounds, perchlorate, TAL metals, cyanide, isotopic americium, isotopic plutonium, isotopic uranium, and tritium." NMED understands this statement to mean that core samples will be selected based on the criteria above and those core samples will be submitted to an off-site analytical laboratory for analyses of the components listed above. The Permittees must clarify whether it is their intention to send a subset or all core samples to an off-site analytical laboratory for analysis.

   Additionally, paragraph three of Section 4.4.8 states that "[s]ubsurface samples from Areas 11 and 12 submitted to an analytical laboratory will also be analyzed for VOCs and SVOCs." Based on the previous sampling results for Areas 1, 2, 2A, 2B, 3, and 4, only one sample was obtained for VOC

and SVOC analyses. Furthermore, this sample was considered for acquisition of screening-level data only. The Permittees must therefore submit core samples from all Areas (1, 2, 2A, 2B, 3, 4, 11, and 12) for VOC and SVOC analyses.

LANL Response

7. The text in section 4.4.8 has been clarified to indicate that samples will be submitted for laboratory analysis based on the criteria detailed in the work plan; therefore, only a subset of samples will be submitted for laboratory analysis.

   Historical records do not indicate that organic compounds were used in any areas other than Areas 11 and 12. Therefore, LANL did not propose this analysis in the work plan for areas other than Areas 11 and 12. LANL will, however, collect additional samples for VOC and SVOC analyses from one borehole at each area (Areas 1, 2, 2A, 2B, 3, 4, 11, and 12). One sample will be collected from or immediately below the depth of the nearest shaft and at the total depth (TD) of each hole. Field-screening detections of organic compounds in the core during drilling will result in the collection of additional samples for laboratory analysis.

NMED Comment

8. *Section 4.4.8, Analysis Plan, page 40, paragraph 5:*

   The Permittees must collect vapor-phase samples from all boreholes drilled at Areas 1, 3, 4, 11, 12, and MDA AB. The vapor-phase samples shall be obtained at the same intervals as core samples in accordance with Section 4.4.7 of this Plan. Vapor-phase samples shall be sent for off-site laboratory analysis of VOCs and tritium. The Plan must be revised to reflect this change.

LANL Response

8. Sections 4.4.1.2, 4.4.2, 4.4.4, and 4.4.5 of this work plan originally proposed the following: "[p]ore-gas samples will be collected from each borehole using a single straddle packer in advance of the drill bit during borehole advancement to isolate discrete depths (minimum 10-ft intervals) within the borehole as determined by field screening. These samples will be submitted for analyses of VOCs and tritium." Based upon additional review and discussions with NMED, LANL proposes that vapor-phase samples collected for laboratory analysis of VOCs and tritium will be collected from boreholes *after* the completion of borehole installation and core sampling and screening activities rather than *during* installation. The collection of vapor-phase samples in this manner has also previously been conducted at TA-54 Material Disposal Areas L and G with NMED approval.

   Because historical documentation indicates organic compounds have not been used extensively at TA-49 and only one significant stratigraphic feature is likely to be encountered (surge beds at the base of unit Qbt 4) LANL also proposes that rather than collecting pore-gas samples from minimum 10-ft intervals, vapor-phase samples will be collected from (1) intervals corresponding to elevated organic compound concentrations indicated during headspace screening of core samples; (2) within the interval corresponding to the surge beds (base of unit formation Qbt 4); (3) the interval corresponding to the TD of the closest experimental shaft or subsurface feature; and (4) the TD of each borehole. LANL also proposes that if VOCs are detected in vapor-phase samples at concentrations greater than 10% of screening levels based on equilibrium partitioning with groundwater cleanup levels (maximum contaminant levels [MCLs]), or if tritium is detected in vapor-

phase samples at concentrations greater than the groundwater MCL, each borehole will be completed as a vapor-monitoring well.

Because there are no screening levels for VOCs in pore gas that address the potential for groundwater contamination, screening levels are based on the U.S. Environmental Protection Agency groundwater MCLs or New Mexico Water Quality Control Commission groundwater standards and Henry's law constants that describe the equilibrium relationship between vapor and water concentrations.

Sections 4.4.1.2, 4.4.2, 4.4.4, 4.4.5, 4.4.6, 4.4.7, 4.4.8, and 5.2.3 of this work plan have been amended to reflect proposed changes in the vapor-phase sampling approach. In addition, section 4.4.8 has been revised to state that if VOC contamination is detected at concentrations greater than 10% of screening levels based on equilibrium partitioning with groundwater MCLs, or if tritium is detected in vapor-phase samples at concentrations greater than the groundwater MCL in one vapor-phase sample collected from one of the boreholes at Areas 1, 3, or 4, then all remaining proposed boreholes within the affected area will also be sampled for pore gas.

Section 5.3.4 was also added to the work plan detailing vapor-phase sample collection.

NMED Comment

9. *Section 4.4.9, Groundwater Monitoring, page 41:*

Regional well R-30 must be addressed under the approved South Canyons Investigation Work Plan (IWP). In the approval with modifications dated March 28, 2007, NMED stated "[e]ven though the South Canyons Investigation Report is not due to be submitted until 2011, the Permittees must complete the installation of all intermediate and regional groundwater monitoring wells associated with this work plan no later than March 31, 2008..." In accordance with the approved South Canyons IWP, the Permittees must complete the drilling of R-30 by March 31, 2008. The Well Completion Report is due to NMED 150 days (the 120-day clock for well completion report submittal for regional aquifer wells begins 30 days after well completion) after well completion pursuant to Section IV.A.3.e.iv of the Order.

LANL Response

9. The work plan proposed that R-30 will be drilled following completion of key vadose zone characterization that will guide optimal placement of R-30. This statement was made with prior agreement with NMED and was confirmed in conversations with NMED staff following issuance of this notice of disapproval (NOD). Per that discussion, NMED has requested that LANL document the agreement in a letter, stating that drilling of R-30 will follow the schedule of completion of the vadose zone characterization under this work plan. That letter will follow submittal of this NOD response.

NMED Comment

10. *Section 4.4.9, Groundwater Monitoring, page 41, paragraph 2:*

In order to evaluate the suitability of R-27 as a downgradient groundwater monitoring well, the Permittees must submit a well evaluation report. The Well Evaluation Report for R-27 must be submitted to NMED no later than March 31, 2008.

LANL Response

10. Per discussion with NMED, LANL will include a discussion in the investigation report on the suitability of R-27 and other applicable wells as downgradient monitoring wells. This evaluation will also be used to propose a final location for the placement of R-30, as discussed above LANL's response to NMED Comment #9.

NMED Comment

11. Section 5.2.3, Vapor-Monitoring Well Installation, page 44:

The Permittees must install vapor-monitoring wells if vapor-phase contamination is confirmed by laboratory analysis, rather than by field-screening. The Permittees must revise the text to reflect this change.

LANL Response

11. The text in section 5.2.3 has been revised to clearly define the criteria to be used to determine whether vapor-monitoring wells will be constructed.

NMED Comment

12. Section 5.4.3, Laboratory Analytical Methods, page 47:

The Permittees have not provided Table 4.5-1 in this Plan. The Permittees must revise the text to reference the appropriate table or provide the correct table with the response to this NOD.

LANL Response

12. The text in section 5.4.3 has been revised to cite the correct table, Table 4.4-2.

NMED Comment

13. Section 6.3, Sediment and Surface Water, page 48, paragraph 2:

Figure 2.11-4, Sediment and Sampling Locations at TA-49, does not make a distinction between sediment sampling locations and surface water sampling locations. The Permittees must revise the Figure to differentiate between the two types of sampling locations.

LANL Response

13. Figure 2.11-4 has been revised to distinguish between the different types of media sampled.

REFERENCE

LANL (Los Alamos National Laboratory), September 2006. "South Canyons Investigation Work Plan," Los Alamos National Laboratory document LA-UR-06-5979, Los Alamos, New Mexico. (LANL 2006, 093713)