Response to the Notice of Disapproval for the Investigation Report for Ancho, Chaquehui, and Indio Canyons, Los Alamos National Laboratory, EPA ID No. NM0890010515, HWB-LANL-11-010, Dated April 1, 2011

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.

GENERAL COMMENTS

NMED Comment

1. *NMED's review would be greatly facilitated if certain modifications were made to the presentation of the sampling results. Provide maps for each individual reach showing the distribution and extent of contamination, including all analysis results for inorganics and naturally occurring radionuclides above background values, anthropogenic radionuclides above fallout values, and detected organic compounds. Provide tables containing these results, not just averages or maximums for each reach. Non-detect results utilized for demonstration that extent has been defined should be included in these tables. In addition, include a "Samples Collected and Analyses Requested" table.*

LANL Response

1. In a meeting with NMED May 26, 2011, the Laboratory agreed to include maps for reaches and analyte suites where concentrations of chemicals of potential concern (COPCs) in sediment are greater than human health residential risk screening values. Accordingly, section 7.1.1 of the revised report includes Figure 7.1-6, a map for inorganic COPCs in reach AN-4.

   Section 6.2.1 of the revised report includes Tables 6.2-2, 6.2-3, and 6.2-4, which show concentrations of all COPCs in each sample. Table 6.2-2 includes nondetected results for inorganic chemicals that are above sediment background values (BVs).

   Section 6 of the revised report also includes tables presenting samples collected and analyses performed for sediment (section 6.2, Table 6.2-1), nonstorm-related surface water (section 6.3, Table 6.3-1), and stormwater (section 6.4, Table 6.4-1) in Ancho, Chaquehui, and Indio Canyons. This information was also included in supplemental Appendix C tables (Attachment 1) of the original report.

NMED Comment

2. *Although analyses for dioxins were requested for some surface water samples collected at Ancho, Chaquehui, and Indio Canyons, it does not appear that dioxins/furans were included in the analytical suites for sediment samples, as indicated in Tables C-2.0-1 and C-6.0-1. Due to the nature of activities conducted at Technical Area (TA)-49 (burn site), chemical releases of dioxins/furans are expected to have occurred within Area 6 of TA-49. Although dioxin/furan releases are also expected*

to have occurred during the 1977 La Mesa Fire, laboratory activities have likely contributed to concentrations of dioxins/furans at Ancho, Chaquehui, and Indio Canyons. As such, one of the objectives of this investigation should be to determine if dioxins/furans related to laboratory activities have migrated into the canyons. The lack of data on concentrations of dioxins/furans at reaches sampled within Ancho, Chaquehui, and Indio Canyons constitutes a data gap for the nature and extent of contamination investigations, and the human and ecological risk assessments. Amend the Report to include analytical data for dioxins/furans in canyon sediments, or propose in a separate work plan collection and analysis of such samples.

LANL Response

2. As agreed to in a meeting with NMED May 26, 2011, the Laboratory will prepare a separate work plan to obtain data on concentrations of dioxins and furans in sediment in reaches in the Ancho, Chaquehui, and Indio watersheds downgradient from Laboratory sites where dioxins and furans may have been generated through burning. Because NMED has also requested a review of existing dioxin and furan data and possible collection of additional dioxin and furan data in Potrillo Canyon (NMED 2011, 202186), and because there are also potential dioxin and furan sources in the Water Canyon and Cañon de Valle watershed, the Laboratory will address all potential dioxin and furan sources in all of the south canyons in this work plan. (The south canyons include Ancho, Chaquehui, Fence, Indio, Potrillo, and Water Canyons, Cañon de Valle, and their tributaries.) This work plan will also include collection of samples from background or baseline areas for comparison, including areas affected by the Cerro Grande fire and nonfire-affected areas. This work plan will be due by February 15, 2012, which is the date specified by NMED for a work plan evaluating dioxins and furans in Potrillo Canyon (NMED 2011, 202186). The work plan will include a review and evaluation of available dioxin and furan data, although only limited dioxin and furan data will be available from potential sources in these watersheds by the due date.

NMED Comment

3. The USEPA Regional Screening Level (RSL) for mercury (inorganic salts) was utilized for the residential scenario. Clarify whether analytical results speciate mercury, thus justifying the use of the RSL and toxicity data for mercury salts.

LANL Response

3. Consistent with the NMED-approved South Canyons Investigation Work Plan (LANL 2006, 093713; NMED 2007, 095490) analytical results did not speciate mercury or other metals, and the results in this investigation report are for total mercury. Metals, including mercury, are typically present in soil as inorganic compounds. Divalent inorganic mercury [Hg(II)] is the most common form in the environment and combines with chloride, nitrate, oxide, and sulfate to form mercury salts (United Nations Environment Programme, Mercury Programme, http://www.chem.unep.ch/mercury/Report/Summary of the report.htm). These inorganic salts vary in composition and quantity depending upon the soil and area of the country. Analytical methods do not determine which inorganic salt(s) is present, only the total amount of metal in the soil. Mercury and other inorganic chemicals are generally not present in the elemental form unless an actual spill has occurred or they were disposed of; for mercury, the environmental conditions and bacteria are not present to convert inorganic mercury to methyl mercury. In the case of Ancho, Indio, and Chaquehui Canyons, mercury is expected to be present as inorganic compounds or salts in the soil based on operational histories at the sites. The inorganic mercury soil screening level (SSL) in the data tables

is appropriate because it is the general form of mercury present in the environment, as it corresponds to its natural state. In summary, given the trace levels of mercury measured in sediment and the lack of persistent water in reaches with mercury greater than the BV, the presence of other forms of mercury (elemental or organic) is unlikely.

NMED Comment

4. *The tap water screening level (SL) and ecological screening level (ESL) for chromium III were applied in the risk assessments. In contrast, the soil screening level (SSL) for chromium VI was utilized in the human health risk assessment from exposure to canyon sediments. Clarify whether species-specific laboratory results were obtained for chromium and determine whether screening levels for chromium III or chromium VI should be utilized in the risk assessment.*

LANL Response

4. Consistent with the NMED-approved South Canyons Investigation Work Plan (LANL 2006, 093713; NMED 2007, 095490) chromium was not speciated in this investigation, and results are for total chromium. Because there are no known hexavalent chromium sources in these watersheds and oxidizing conditions to promote the conversion of trivalent to hexavalent chromium are absent, chromium speciation data are not needed. For the human health risk assessment, screening values are available from NMED and the U.S. Environmental Protection Agency (EPA) for chromium III and chromium VI, but there are no screening values for total chromium. The chromium VI screening values are lower than those for chromium III and were used as conservative estimates of effects of total chromium on humans in the screening assessment. Ecological screening levels (ESLs) are available in the ECORISK database for total chromium (LANL 2010, 110846), so these values are used in this investigation report to screen potential ecological risks for this inorganic chemical.

NMED Comment

5. *It is not clear what explosives were included for analyses; results are only provided for triaminotrinitrobenzene (TATB). It is not clear that TATB would represent all potential explosives that could be present in sediments/surface water. Provide a description of all explosives included in the analyses and justify the inclusion or exclusion of specific explosive compounds in the analyses.*

LANL Response

5. Results for all explosive compounds analyzed by method SW-846:8321A, modified to include analytes specified in Table III-1 of the Compliance Order on Consent, were included in Table C-2.0-2, in Attachment 1 of the investigation report. Triaminotrinitrobenzene (TATB) was the only detected explosive compound in Ancho, Chaquehui, and Indio Canyons. A new table, Table C-2.0-4, has been added to Appendix C of the revised report to list all analytes included in the modified method SW-846:8321A. For consistency, Table C-2.0-4 also lists all analytes included in other analytical suites for sediment samples, and another new table, Table C-2.0-5, lists all analytes included in the analytical suites for water samples.

NMED Comment

6. *It appears that surface water data are limited for certain analytes, as analytical suites were not requested of the lab for many of the surface water samples. In particular, dioxin analyses were only requested of the lab for three samples at two locations. Clarify the rationale for requesting dioxin analyses from limited samples. Determine whether adequate analyses were conducted for surface water.*

LANL Response

6. The NMED-approved South Canyons Investigation Work Plan (LANL 2006, 093713; NMED 2007, 095490) did not specify collection and analysis of any surface-water samples from Ancho, Chaquehui, or Indio Canyons, and no samples were collected as a part of this plan's implementation. Therefore, this investigation was consistent with the approved work plan. The surface-water data included in this report were obtained under other programs, including the annual Interim Facility-Wide Groundwater Monitoring Plan (e.g.,LANL 2009, 106115) and the Laboratory's Environmental Surveillance Program. The dioxin data in the referenced samples were obtained for comparison with data collected from other canyons, and these data were included in this report for completeness.

SPECIFIC COMMENTS

NMED Comment

7. ***Section 8.1.4, Results of Screening Comparison for Soil, page 32 and Tables 8.1-1 through 8.1-8, HQs, pages 100-107.***

   The rationale for utilizing a hazard quotient (HQ) of 3.0 as a criterion to determine whether COPCs should be retained for further evaluation in the screening level ecological risk assessment is unclear and not justified. LANL's Screening Level Ecological Risk Assessment Methods Revision 2 (2004) states that an HQ of 0.3 should be used as a criterion for determining ecological COPCs. In addition, NMED's Guidance for Screening Level Ecological Risk Assessments (2008) states that an HQ of 0.3 for individual chemicals or a hazard index (HI) of one (1) should be used for determining whether ecological COPCs should be evaluated further in the ecological risk assessment. It is acknowledged that previous assessments where site-specific biota studies were conducted, such as Los Alamos and Pueblo Canyons (LANL 2004, 087390, p. 8-2); Mortandad Canyon (LANL 2006, 094161, p. 96); Pajarito Canyon (LANL 2009, 106939, p. 64); and Sandia Canyon (LANL 2009, 107453, p. 77) utilized a HQ of 3.0 for determining ecological COPCs. Since a site-specific biota study has not been conducted at Ancho, Chaquehui, and Indio Canyons, revise the ecological risk assessment for consistency with guidance. A hazard index of one (1) should be used as the threshold value for determining whether ecological COPCs should be further evaluated in the ecological risk assessment.

LANL Response

7. The Laboratory has revised the screening level ecological risk assessment (section 8.1) to use a hazard quotient (HQ) of 1 instead of 3 as a screening level, as agreed to in a meeting with NMED on May 26, 2011. Sections 7.1.1, 7.2.2, and Table D-1.2-1 include a revised list of chemicals of potential ecological concern (COPECs).

NMED Comment

8. ***Section 8.1.7, Evaluation of Ancho, Chaquehui, and Indio Canyon COPEC Concentrations for Biota Studies, pages 33-37***

   Concentrations of ecological COPCs were compared to concentrations of COPCs from previous biota studies in other canyons at LANL where associated effects information indicated no unacceptable ecological risks. While this comparison may potentially provide relevant information for Ancho, Chaquehui, and Indio Canyons, it should not take the place of a site-specific biota study or a refined ecological risk assessment using the methods outlined in LANL (2004) and NMED (2008). Refinement of the ecological risk assessment may include the use of area use factors, population area use factors, and/or use of lowest-observed adverse effect levels (LOAELs). Comparisons with previous biota studies at other LANL sites could be included as additional evidence in a weight of evidence analysis, for example, at Ancho, Chaquehui, and Indio Canyons. Revise the ecological risk assessment accordingly.

LANL Response

8. The Laboratory has revised the ecological risk assessment to include comparisons with other biota studies at the Laboratory as additional evidence in a weight of evidence analysis, as suggested by NMED. In addition, lowest effect ecological screening levels (L-ESLs), which are ESLs based on lowest-observed adverse effect levels (LOAELs), have been calculated for COPECs identified using an HQ of 1 and pre-existing ESLs (LANL 2010, 110846). COPECs with HQs greater than 1 based on L-ESLs are evaluated using a weight of evidence evaluation. The weight of evidence evaluation (section 8.1.6 in the revised report) considers area use factors, population area use factors, detection frequency, the range of background concentrations, and comparisons with previous biota studies.

NMED Comment

9. ***Table 6.2-1, Inorganic COPCs in Ancho, Chaquehui, and Indio Canyon Sediment Samples, page 79***

   The residential SSL for chromium is annotated by footnote "e", indicating that the USEPA RSL was used. It appears that this footnote is incorrect as the value listed is from NMED (2009). Revise Table 6.2.1 to display the correct source for the chromium SSL.

LANL Response

9. As noted in this comment, the correct reference for the chromium SSL is NMED (2009, 108070). Former Table 6.2-1 (now Table 6.2-5) has been revised to indicate the correct reference.

NMED Comment

10. ***Table 6.3-1, Inorganic COPCs in Filtered Nonstorm-Related Surface-Water Samples, page 83***

    A water ESL is not listed for chromium. The ECORISK (v.2.5) database lists an ESL of 77 µg/L for chromium and an ESL of 11 µg/L for Chromium VI. Modify Table 6.3-1 to include the water ESL for chromium. It is noted that this omission is not repeated in subsequent tables and does not affect the results of the ecological risk assessment. Revise the table accordingly.

LANL Response

10. The total chromium ESL of 77 µg/L was mistakenly omitted from former Tables 6.3-1 and 6.3-2 (now Tables 6.3-2 and 6.3-3). This value has been added to these tables.

NMED Comment

11. Table 6.4-1, Stormwater Comparison Values, page 93

The human health persistent stormwater comparison value for thallium (6.3 µg/L) presented on Table 6.4-1 is inconsistent with the New Mexico Administrative Code (NMAC) surface water standard (0.47 µg/L) listed in Section 20.6.4.900 (J) presented on the following website: http://www.nmcpr.state.nm.us/nmac/parts/title20/20.006.0004.htm. Resolve this inconsistency and update Table 6.4-1 to include the correct stormwater comparison value for thallium. Determine if the detected concentrations of thallium in stormwater at Ancho, Chaquehui, and Indio Canyons exceed the NMAC surface water standard of 0.47 µg/L.

LANL Response

11. The report mistakenly used the previous version of 20.6.4.900 (J) New Mexico Administrative Code that listed 6.3 µg/L as the value for thallium. The thallium value was subsequently changed to 0.47 µg/L, effective January 14, 2011, following a triennial review (NMED Surface Water Quality Bureau website, http://www.nmenv.state.nm.us/swqb/Standards/). The stormwater comparison value for dissolved thallium in former Table 6.4-1 (now Table 6.4-2) has been revised to 0.47 µg/L, as requested by NMED. Because thallium results in nonstorm-related surface water are above 0.47 µg/L, sections 6.3.2 and 7.2.2 have been revised to include a discussion of thallium.

NMED Comment

12. Table 6.5.1, Ancho, Chaquihui, and Indio Canyons COPC and Stormwater Summary, pages 95-98

Several types of water media were evaluated at Ancho, Chaquehui, and Indio Canyons (i.e., non-storm related surface water, spring water, and stormwater) and compared with different sources of standards. The manner in which the hierarchy of standards is presented and surface water COPCs were screened and identified is difficult to follow. The groundwater screen is not included in the investigation report, and Table 6.5-1 does not indicate which comparison values were applied for each type of media for each analyte. Revise Table 6.5.1 to clearly illustrate the screening values that were used for surface water screening at Ancho, Chaquehui, and Indio Canyons.

LANL Response

12. Table 6.5-1 has been revised by adding information on the screening and comparison values as table footnotes. Table 6.5-1 provides a summary of the sediment and water screening presented in former Tables 6.2-1 to 6.2-3, 6.3-1 to 6.3-10, 6.4-1 to 6.4-2, and section 5 presents the hierarchy of water screening and comparison values, with some revisions to section 5.4 for clarification. The Table 6.5-1 footnotes cross-reference the tables in this investigation report that have previously presented the screening and comparison values.

NMED Comment

13. Table 8.2-4, Residential Risk Ratios Used to Identify Surface-Water COPCs for Human Health Risk Assessment, Noncarcinogens, page116

There is an erroneous footnote in Table 8.2-4. The first time that footnote "a" appears in the table is next to the row heading entitled "Residential SL (µg/L)" indicating that all the values in this row are maximum contaminant levels. Revise the table to display accurate footnotes.

LANL Response

13. The footnotes were in error and have been corrected in the revised report.

NMED Comment

14. Table 8.2-5, Residential Risk Ratios Used to Identify Surface-Water COPCs for Human Health Risk Assessment, Carcinogens, page 117

Detected concentrations of arsenic in surface water were not included in the risk assessment. It is recognized that arsenic was only detected in filtered surface water samples, and Section 8.2.2.3 explains that detections only in unfiltered samples were included for evaluation in the risk assessment. Because arsenic was identified as a COPC in sediment in the human health risk assessment and was retained for further evaluation, detections of arsenic in filtered surface water samples should be included in the risk assessment. Furthermore, some of the detections of arsenic in filtered surface water (2.9 µg/L and 1.88 µg/L; Table 6.3-1) are greater than the NMED (2009) tap water screening level of 0.448 µg/L. Revise the risk assessment to include detections of arsenic in surface water that were obtained from filtered samples.

LANL Response

14. Table 8.2-5 and section 8.2.2.3 of the risk assessment have been revised to include the maximum detected concentrations of inorganic chemicals in either filtered or nonfiltered samples. Thus, concentrations of arsenic detected in filtered samples have been included in the revised risk assessment. Section 7.2.2 has also been revised to include discussion of arsenic in surface water.

REFERENCES

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)

LANL (Los Alamos National Laboratory), May 2009. "2009 Interim Facility-Wide Groundwater Monitoring Plan," Los Alamos National Laboratory document LA-UR-09-1340, Los Alamos, New Mexico. (LANL 2009, 106115)

LANL (Los Alamos National Laboratory), October 2010. "Ecorisk Database (Release 2.5)," on CD, LA-UR-10-6898, Los Alamos National Laboratory, Los Alamos, New Mexico. (LANL 2010, 110846)

NMED (New Mexico Environment Department), March 28, 2007. “Approval with Modifications, South Canyons Investigation Work Plan,” New Mexico Environment Department letter to D. Gregory (DOE-LASO) and D. McInroy (LANL) from J.P. Bearzi (NMED-HWB), Santa Fe, New Mexico. (NMED 2007, 095490)

NMED (New Mexico Environment Department), December 2009. “Technical Background Document for Development of Soil Screening Levels, Revision 5.0,” with revised Table A-1, New Mexico Environment Department, Hazardous Waste Bureau and Ground Water Quality Bureau Voluntary Remediation Program, Santa Fe, New Mexico. (NMED 2009, 108070)

NMED (New Mexico Environment Department), April 14, 2011. “Direction to Modify Investigation Report, Potrillo and Fence Canyons,” New Mexico Environment Department letter to G.J. Rael (DOE-LASO) and M.J. Graham (LANL) from J.P. Bearzi (NMED-HWB), Santa Fe, New Mexico. (NMED 2011, 202186)