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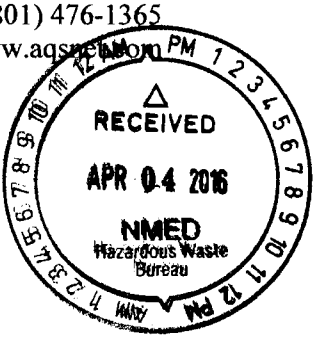

March 25, 2016

DCN: NMED-2016-06

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

RE: Draft Technical Review of the *Supplemental Investigation Report for Upper Mortandad Canyon Aggregate Area*, Los Alamos National Laboratory (LANL), dated December 2015.

Dear Mr. Cobrain:

Attached please find draft technical review comments on LANL's, *Supplemental Investigation Report for Upper Mortandad Canyon Aggregate Area,* LA-UR-15-28015, dated December 2015.

If you have any 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

cc: Siona Briley, NMED (electronic)
Mike Smith, AQS (electronic)
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Enclosure

Draft Deliverable: not a final work product

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DRAFT TECHNICAL REVIEW OF THE SUPPLEMENTAL INVESTIGATION REPORT FOR UPPER MORTANDAD CANYON AGGREGATE AREA LOS ALAMOS NATIONAL LABORATORY (LANL) LOS ALAMOS, NEW MEXICO DECEMBER 2015

GENERAL COMMENTS

1. In Sections 6.4.4.3, and 8.2.4.3 of the Site Investigation Report (SIR), detected nitrates are dismissed as constituents of potential concern (COPCs) because they are "naturally occurring" and that nitrate concentrations "reflect naturally occurring levels of nitrate." Note that nitrates are used as oxidizing agents in some explosives and can be associated with incinerator emissions. The discussions of nitrate in Sections 6.4.4.3 and 8.2.4.3 do not address the potential use of nitrate-containing explosives and nitrate emissions at the sites. The discussions of nitrate for each Solid Waste Management Unit (SWMU) and Area of Concern (AOC) covered by the SIR should be reviewed. Additional lines of evidence supporting the elimination of nitrate as a COPC should be provided where applicable. The information should be based on the potential presence of nitrates in the emissions released from explosives testing and/or incineration at these sites and other recommendations provided in the Soil Screening Guidance (SSG) for identifying COPCs. Ensure that sufficient lines of evidence for elimination are included in each discussion that eliminates nitrates as a COPC.

2. Nature and extent is discussed for each SWMU and AOC addressed in Sections 6.0 through 9.0 of the SIR. However, the lines of evidence presented in many of these discussions do not clearly demonstrate that extent has been fully defined. The discussions of nature and extent provided in the SIR Section 6.4.4.4, do not include reference to the tables, figures, and/or plates that support the assertions made regarding lateral variation and variation with depth in detected COPC concentrations and/or detection limits (for non-detect results) that exceed background values (BVs). For example, the discussion of barium in Section 6.2.4.4 does not effectively demonstrate that the lateral extent of barium contamination has been defined at AOC 03-004(c). One must consult Table 6.2-2 and Figure 6.2-2 to verify the assertion made in the text.

Another issue regarding the discussions of nature and extent found in the SIR is illustrated in the discussion of selenium contamination at AOC 03-004(d) in Section 6.3.4.4. The purpose of the numerical values cited in the nature and extent discussions is not always clear. Section 6.3.4.4 presents the numerical difference between the maximum detected concentration and the residential SSL as well as the numerical difference between the maximum detection limit and the residential SSL. While it is understood from the discussion in Section 1.2 that COPC screening will be used in the determination of extent, the method of presentation of this information in the nature and extent discussions introduces unnecessary confusion into the text. Rather than highlight the numerical difference between a site concentration and the applicable screening level, it is recommended that the results of the screening calculation be cited and compared to NMED target levels (excess lifetime cancer risk of 1E-05 and hazard quotient or hazard index of 1).

Revise the discussions of nature and extent in Sections 6.0 through 9.0 to ensure appropriate references are included to the figures, plates, and tables that support the trends in COPC concentrations noted for each SWMU and AOC. In addition, establish the validity and relevance of the risk screening calculations performed as part of the extent analyses by presenting the results of those calculations and a comparison of the result to the appropriate NMED target level. The results of the comparison should be provide a discussion that illustrates how the numerical difference between COPC concentration and the value of the applicable screening level is used to determine the nature and extent of the contamination associated with a COPC. An interpretation of the results with respect to the reported trends in site concentrations should also be provided.

3. Based on the information currently provided in the SIR, it is not clear that polynuclear aromatic hydrocarbons (PAHs) can be totally dismissed from consideration at the sites addressed in the SIR. Two issues were identified that raise concerns regarding the potential identification of sources of PAHs detected at these sites. Most importantly it is not clear that all sources of PAHs associated with site activities have been identified at AOC 03-007 and AOC 48-001. The discussions of PAHs for both sites associate all detected PAHs with roads, large paved areas in the vicinity of the sites, and runoff from roads and paved areas. The potential for PAHs to be emitted during the explosion experiments detonated at AOC 03-007 and during welding at AOC 48-001 is not been addressed in the text. For completeness, the potential association of PAHs with these AOCs should be considered.

In addition, it appears the SIR does not always identify the potential sources of PAHs not associated with site activities. For example, Section 9.2.4.3 states that three combustion boiler stacks are found in Building 48-1, the location of AOC 48-001. According to USEPA's AP-42, PAHs can be emitted from boilers burning a variety of fuels (e.g. coal, oil, natural gas). As indicated above, the PAHs detected at AOC 48-001 are attributed to roads and large paved areas. Combustion stacks such as the three boiler stacks at Building 48-1 and Consolidated Unit 42-001(a)-99, the former TA42 Incinerator Complex, can disperse PAHs downwind and deposit back to the earth's surface. Thus, PAHs emitted from these two sources may impact sites located downwind. To convey a thorough understanding of PAH contamination in the Upper Mortandad Canyon Aggregate Area, potential sources other than roads and paved areas should be discussed in the SIR.

Revise the discussion of PAHs on pages 36 and 37 of the SIR to address the potential for PAHs to be emitted as a result of the explosion experiments conducted at AOC 03-007. If it is determined that PAHs could have been associated with operations at AOC 03-007, revise the SIR and its appendices to include PAHs in the human health and ecological risk analyses for this AOC. In addition, revise the PAH discussion for AOC 48-001 on pages 117 and 118 to address the potential for materials containing PAHs (e.g. coatings, sealants, adhesives) to be associated with welding activities conducted at this AOC. If PAHs could have been emitted during welding (e.g., naphthalene) revise the SIR and its appendices to include the potentially emitted PAHs in the human health and ecological risk analyses for AOC 48-001.

Also, review the discussions PAHs presented in Sections 6.0 through 9.0 of the SIR and ensure that all potential sources of the PAHs detected at each site are identified.

4. A summary of the human health and ecological risk screening assessments for each SWMU and AOC addressed in the SIR is provided in Section 6.0 through Section 9.0. However, the location of information that supports the reported results is never referenced in these summaries. Revise the summaries of human health and ecological risk screening in Sections 6.0 through 9.0 to include references to the appropriate sections, subsections, and/or tables of Appendix H for additional information regarding how the reported cancer risks, hazard quotients (HQs), and hazard indices (HIs) were determined. For example, Section 6.7.5 should reference Appendix H, Tables H-4.2-48 through H-4.2-60 so stakeholders can access the tabulations of risk and noncancerous hazard for Consolidated Unit 03-49(b)-00.

5. An assessment of the vapor intrusion pathway is presented in Section H-4.3, Vapor-Intrusion Pathway, of Appendix H. Because only soil data are available, the Johnson & Ettinger- based advanced soil model (J&E Soil Model) was used to estimate risk-based soil concentrations for volatile organic compounds (VOCs) at the sites. NMED no longer supports the application of the J&E Soil Model as the primary line of evidence for eliminating or dismissing the vapor intrusion (VI) pathway as a potential exposure source. In fact, Section 2.5 of the SSG notes that USEPA's 2002 vapor intrusion guidance does not support the use of bulk soil data for evaluation of the VI pathway. For those SWMUs and AOCs potentially impacted by vapor intrusion, the J&E Soil Model results should be augmented to include multiple lines of evidence as described in Section 2.5.2 of the SSG. These additional lines of evidence will provide the primary justification for eliminating or dismissing the VI pathway from further consideration while the model results will provide secondary information for the evaluation. Once the VI evaluation is expanded to include additional lines of evidence, the results should be analyzed and conclusions should be drawn regarding the VI pathway at TA-03, TA-42, TA-48, and TA-50 SWMUs and AOCs. Revise the SIR to include such an evaluation for each SWMU and AOC potentially impacted by vapor intrusion.

6. Once the general and specific comments related to the assessment of human health risk and hazard are adequately addressed, Sections H-6.1 of Appendix H, all human health risk summaries in Section 6.0 through Section 9.0, and the discussions in Sections 11.2.1 and 12.0 of the main text should be reviewed and revised as necessary for consistency with the revisions made to the SIR.

7. Once the general and specific comments related to the assessment of ecological risk are adequately addressed, Sections H-5.5 and H-6.2 of Appendix H, all ecological risk summaries in Sections 6.0 through 9.0, and the discussions in Sections 11.2.2 and 12.0 of the main text should be reviewed and revised as necessary for consistency with the revisions made to the SIR and Appendix H.

SPECIFIC COMMENTS

1. The last paragraph of Section 3.2.7, top of page 11, notes that fluoride and total phosphorus were "incorrectly analyzed." In addition, the text indicates that these two inorganic chemicals are not related to any of the sites or activities in the Upper Mortandad Canyon Aggregate Area.

No additional information on these incorrect analyses is provided. The discussion at the top of page 11 should be expanded to indicate if the analyses were performed by mistake (e.g., not requested by the facility) or if the analyses were performed incorrectly by the analytical laboratory. If the analyses were performed incorrectly by the analytical laboratory, a brief discussion should be added to support the assertion that fluoride and total phosphorus are not associated with any site or activity in the Upper Mortandad Canyon Aggregate Area.

2. Section 5.1.1, top of page 15, lists lines of evidence to be used in determining if an inorganic chemical should be eliminated as a COPC. The first item listed is comparison to the maximum background concentration. This line of evidence is also presented in the second bulleted item in Section 5.2. NMED does not consider such comparisons as a valid line of evidence for dismissing detected inorganic compounds as COPCs. The range of values in the background data set is considered in the statistical determination of appropriate background threshold values (e.g., BVs). As indicated in Section 2.7.3 of NMED's SSG, if the maximum concentration of a COPC exceeds the applicable BV, statistical tests should be used to determine if the data set for the COPC is statistically different from the applicable background data set. While it is acknowledged that the maximum background value can be used for comparisons in special cases (e.g., statistically determined BV is significantly greater than the maximum background concentration), Section 5.1.1 (and the SIR in its entirety) should be revised to eliminate comparisons of COPC concentrations to the maximum value in the applicable background data set as a line of evidence for eliminating a detected inorganic compound as a COPC unless conditions exist that preclude the comparison of COPC data to the statistically derived BV.

3. Section 6.2.4.3, page 22, sixth paragraph indicates that manganese is not a COPC because the quantile and slippage tests "indicated concentrations of manganese in tuff are not statistically different from background." However, the same discussion indicates the Gehan test showed that "site concentrations of manganese in tuff are statistically different from background." It is not clear why manganese was not retained as a COPC as it was detected above the applicable background value (BV) and was determined to be statistically different than background by the Gehan test. Revise this discussion to explain why the conservative approach of retaining manganese as a COPC was not followed in this case.

4. Section 6.3.4.3, page 28, second paragraph indicates that cadmium is not a COPC for AOC 03-004(d). The discussion indicates that the detected concentrations exceeded the applicable BV by 0.34 to 0.52 milligrams per kilogram (mg/kg) and thirteen sample detection limits (DLs) exceeded the BV by 0.07 to 0.19 mg/kg. Note that the differences between the detected concentrations and the BV cited in the discussion represent exceedances of 85 to 130 percent. In addition, some DL values were compared to specific values from the background data set, an approach not supported by NMED. There is no indication that a statistical analysis was performed to determine if the site data set for cadmium was statistically different from the background data set. Thus, additional lines of evidence should be provided to support the elimination of cadmium as a COPC for AOC 03-004(d). Revise this discussion to explain why the results of a statistical analysis of the site data set for cadmium and the background data set was not or could not be performed. Provide additional lines of evidence supporting the elimination of cadmium as a COPC at this site as recommended in Section 2.7.3, Identification of COPCs, of NMED's SSG. If such lines of evidence cannot be provided, retain cadmium as a

COPC due to the number of DLs exceeding the applicable BV and the relative magnitude of the differences between the detected cadmium concentrations and the BV. In addition, ensure that other discussions of nature and extent in Sections 6.0 through 9.0 that cite the numerical difference between detected site concentrations and the applicable BV consider the percentage difference between the two values in determining if the detected constituent is a site COPC.

5. Section 6.4.4.3, pages 35 and 36, states that zinc is not a COPC at AOC 03-007 because the quantile and slippage tests "indicated concentrations of zinc in soil are not statistically different concentrations were from background." However, the same discussion indicates the Gehan test showed that zinc statistically different from background. It is also noted that the Gehan, quantile, and slippage tests showed that zinc concentrations in tuff were not statistically different from background. However, it is not clear why zinc in soil was not retained as a COPC as it was detected above the applicable background value (BV) and was determined to be statistically different than background by the Gehan test. Revise this discussion to explain why the conservative approach of retaining zinc in soil as a COPC was not followed in this case.

6. Section 6.5.4.3, page 44, seventh full paragraph, and page 45, third full paragraph indicate that cobalt and manganese are not COPCs because the quantile and slippage tests indicate that the chemical concentrations in tuff are not statistically different from background. However, these same discussions indicate the Gehan test showed that the chemical concentrations were statistically different from background. It is not clear why cobalt and manganese were not retained as COPCs as the chemicals were detected above the applicable BVs and were determined to be statistically different than background by the Gehan test. Revise this discussion to explain why the conservative approach of retaining cobalt and manganese as a COPC was not followed in this case.

7. Appendix H, Section H-4.4.2, Exposure Assessment, pages H-38 and H-39 discuss the subtraction of the of the radiation soil BV for thorium-230 from the total doses obtained (and reported) for the industrial, construction worker, and residential scenarios at AOC 48-001 and SWMUs 48-002(a and b). According to Section 5.1.1, Inorganic Chemical and Radionuclide Background Comparisons, page 15 of the SIR, the BV for radionuclides was considered in identifying COPCs. However, Section 5.1.1 does not address how radionuclide BVs will be considered in the determination of dose under the three exposure scenarios addressed in the human health risk assessment. Such a discussion should be added to the main text of the SIR and/or Appendix H to clarify how radiological BVs are incorporated into the determination of dose to potential receptors. Revise the SIR and/or Appendix H to address this issue.

8. Appendix H, Section H-5.4.5, Population Area Use Factors, pages H-63 through H-67, present the SWMU- and AOC-specific results for adjusted ecological hazard quotients (HQs) and hazard indices (HIs) based on the value of the site-specific population area use factors (PAUFs). The wording used to report the results is awkward and introduces confusion into the presentation. For example, the results for SWMU 48-003 are reported as: "The adjusted HIs for SWMU 48-003 are less than 1 for all receptors. The earthworm had an unadjusted HI equivalent to 1 and the plant had an unadjusted HI of 3." Because the earthworm and plant are also ecological receptors at the site, it is recommended that the result statements be revised to read: "The PAUF adjusted HIs for SWMU 48-003 are less than 1 for all affected receptors. The

dispersion modeling or soil sampling of stack emissions has been performed, the results should be presented and discussed to support the assertion that SWMUs 48-002(a and b) are not impacted by AOC 48-001.

13. Appendix H, Section H-5.4.8, Site Discussions, page H-71 discusses the results of the LOAEL-based and PAUF adjusted HI analyses for the shrew and deer mouse at AOC 48-001. The discussion indicates that if the maximum detected concentration of 2,3,7,8 TCDD is eliminated from the calculation, the 95% UCL is reduced by an order of magnitude and the HQs for the shrew and deer mouse fall below the target level of 1. The discussion also states that 2,3,7,8-TCDD should not be associated with AOC 48-001. However, no lines of evidence supporting an alternate source for the 2,3,7,8-TCDD are offered. The discussion on the elimination of the maximum detected concentration from the 95% UCL calculation should be removed from the text unless it can be demonstrated that the concentration is an outlier. In addition, a discussion of potential sources of the 2,3,7,8-TCDD detected at AOC 48-001 should be added to the text. As part of the discussion, the lines if evidence presented supporting all potential sources should be weighed and the most probable source identified. Revise the discussion of AOC 48-001 to address these issues.

14. Appendix H, Section H-5.4.9, COPECs without ESLs, page H-73, lists carbon tetrachloride among the chemicals for which no toxicity data are available. It is not clear why carbon tetrachloride is included in this list as it does not appear that the chemical was addressed in the supplemental investigation. In addition, some ecological toxicity information (e.g., EPA Region 5 ecological soil screening value of 2.98 mg/kg) is available for carbon tetrachloride. Review this information and revise the list of chemicals accordingly.

MINOR/EDITORAL

1. Appendix H, Section H-4.2.5, SWMMU 03-049(a), page H-22 refers to Table H-4.2-44 and Table H-4.2-47 for radiation exposure to the construction worker and resident, respectively. Table H-4.2-44 lists an exposure point concentration (EPC) of 0.62 pico curies per gram (pCi/g) for Cesium-137 under the construction worker scenario while Table H-4.2-47 lists an EPC of 0.61 pCi/g for the resident. Table H-2.3-14, EPCs for SWMU 03-049(a) for Ecological Risk and Construction Worker and Residential Scenarios, lists the EPC for Cesium-137 as 0.62 pCi/g. Review the information on the EPC for Cesium-137 at SWMU 03-049(a) presented in Appendix H and revise these tables for accuracy and consistency.

2. Appendix H, Section H-4.2.12, Consolidated Unit 42-001(a)-99, page H-25 refers to Table H-4.2-111 and Table H-4.2-114 for radiation exposure to the construction worker and resident, respectively. Both tables list an EPC of 0.0038 pCi/g for tritium under the construction worker and residential scenarios. However, Table H-2.3-30, EPCs for Consolidated Unit 42-001(a)-99 for the Construction Worker and Residential Scenarios, lists the EPC for tritium as 0.0035 pCi/g. Review the information on the EPC for tritium at Consolidated Unit 42-001(a)-99 presented in Appendix H and revise these tables for accuracy and consistency.