Response to the Notice of Disapproval for the Phase II Investigation Report for Middle Los Alamos Canyon Aggregate Area, Los Alamos National Laboratory, EPA ID No. NM0890010515, HWB-LANL-11-022, Dated May 24, 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. 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 (DOE) policy.

GENERAL COMMENTS

NMED Comment

1. *The construction worker scenario was not evaluated in the risk assessments conducted at Middle Los Alamos Canyon Aggregate Area. The risk assessments must demonstrate that residual contamination does not present an unacceptable risk to any potential receptors if LANL is proposing corrective action complete without controls. This includes a future construction worker receptor, whether future construction, demolition and decommissioning, or remediation activities are anticipated. The construction worker receptor must be evaluated at solid waste management units (SWMUs) and areas of concern (AOCs) at Middle Los Alamos Canyon Aggregate Area for the following reasons:*

    - *The foreseeable reasonable future use of sites Middle Los Alamos Canyon Aggregate Area is industrial and/or recreational (Section 4.1). It is reasonable to assume that at some point in the future, intrusive activities may occur in these areas.*
    - *If a SWMU/AOC is proposed for the status of corrective action complete without controls, no land use controls would be instated to prevent future construction activities.*
    - *An evaluation of residential risk does not always equate to an assumption of protectiveness for all receptors. In several cases, the screening levels for metals for a construction worker are more conservative than those for a resident.*

    Modify the risk assessments at Middle Los Alamos Canyon Aggregate Area to include evaluation of the construction worker receptor.

LANL Response

1. No revisions to the risk assessment are necessary. The Compliance Order on Consent (Consent Order) requires only the residential scenario be evaluated for all sites regardless of relevance to a site. All other scenarios (industrial, construction worker, and recreational) are evaluated based on whether one or more scenarios are for the current and reasonably foreseeable future land use as stated in section XI.E.8.

The Laboratory evaluates each site with regards to the current and reasonably foreseeable future land use(s) as directed by the Consent Order and evaluates the risk accordingly. A scenario is not evaluated if that scenario is not relevant to the site in question. The construction worker scenario is not always a current and reasonably foreseeable future land use and therefore should not be required in order to attain corrective action complete without controls.

At Technical Area 2 (TA-02), decontamination and decommissioning (D&D) of the Omega Reactor and all related buildings has already occurred, so no additional D&D activities will take place. In addition, TA-02 is in the bottom of the canyon and will not be developed by the Laboratory or transferred to the county or other private entity. Therefore, it is reasonable to conclude that intrusive activities will not occur in this area at some point in the future and that the evaluation of the construction worker scenario is not warranted for TA-02 sites. The construction worker scenario is also not relevant for TA-26 because the area is not planned for development, but current and reasonably foreseeable future land-use scenarios will be evaluated once extent is defined. TA-21 sites may include the construction worker scenario as a reasonably foreseeable future land use, but applicable land-use scenarios will be evaluated once the nature and extent of contamination have been defined.

Recommending a solid waste management unit (SWMU) or area of concern (AOC) for corrective action complete without controls means that no land-use, institutional, or other type of control will be placed on that area. A SWMU/AOC is not recommended for this status unless it is clear that no controls of any kind are needed now or in the future. Requiring the evaluation of a scenario that is not a current or reasonably foreseeable future land use (other than residential) is not appropriate or warranted under this status. Additionally, evaluation of the construction worker scenario is unnecessary for sites on Laboratory property that will be proposed for corrective action complete with controls because controls to protect construction workers from residual contamination are already in place and enforced through other mechanisms, such as Occupational Safety and Health Administration requirements.

Soil screening levels (SSLs) for only four metals under the construction worker scenario (aluminum, barium, beryllium, and manganese) are less than residential SSLs. The only SSL that could potentially affect risk is that for manganese; the construction worker SSL for manganese is 463 mg/kg, whereas the residential SSL is 10,700 mg/kg. However, it must be noted that the manganese construction worker SSL is essentially the same as background for manganese and therefore does not accurately estimate potential risk to the construction worker. The other SSLs are only slightly less than residential SSLs (aluminum and beryllium) or within an order of magnitude of residential SSLs (barium), and all SSLs are well above concentrations typically detected at Middle Los Alamos Canyon Aggregate Area sites. As a result, it is not appropriate to evaluate the construction worker scenario at all sites, and the potential risk to the construction worker receptor is not more conservative than the potential risk to a residential receptor.

NMED Comment

2. *Dioxins/furans were only included in the analytical suites for a few AOCs/SWMUs at Middle Los Alamos Canyon Aggregate Area. Risk assessments conducted at sites where dioxins/furans were analyzed revealed that detected concentrations of dioxins/furans contributed significantly to the total lifetime excess cancer risk calculations, and at least two sites led to the total lifetime excess cancer risk being above the NMED target risk level of 1E-5. Since detections of dioxins/furans led to significant risks at sites where dioxins/furans were analyzed, dioxins/furans must be included in the sampling and analysis plan for all sites at Middle Los Alamos Canyon Aggregate Area. The lack of data on concentrations of dioxins/furans at AOCs/SWMUs sampled within Middle Los Alamos*

Canyon Aggregate Area constitute a data gap for the nature and extent of contamination investigations and the human and ecological risk assessments. Amend the IR at Middle Los Alamos Canyon Aggregate Area to provide additional analytical data for dioxins/furans.

LANL Response

2. Samples were analyzed for dioxins and furans at 11 sites as part of the Phase I investigation of the Middle Los Alamos Canyon Aggregate Area. The lateral and vertical extent of dioxins and furans were defined for all 11 sites, as presented in the investigation report (IR) and approved by NMED (LANL 2008, 101669.12; NMED 2008, 101702). However, extent was not defined for other COPCs at 3 of the 11 sites. Per NMED direction, risk is not evaluated if extent is not defined; therefore, risk screening was conducted for only 8 of the 11 sites for which there are dioxin and furan data.

   As noted in Comment 3, the toxicity equivalency factor (TEF) for one congener was incorrect, and the associated 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) equivalent concentrations and risks were incorrect. Using the correct TEF, the 2,3,7,8-TCDD exposure point concentrations (EPCs) and risks were recalculated for each of the eight sites. Based on these revisions, the residential cancer risks are equivalent to 1 × 10^{-5} for AOCs 02-004(a,g), are below 1 × 10^{-5} for AOCs 02-004(f) and 02-011(c), and are above 1 × 10^{-5} for AOCs 02-004(b,c,d,e). Also, the residential EPC for 2,3,7,8-TCDD for AOC 02-004(a) was incorrectly overestimated in Table H-4.2-54 as 5.29E-05 mg/kg and should have been 5.29E-06 mg/kg. This value was further revised because of the corrected TEF. As a result, the revised risk calculation for AOC 02-004(a) is now equivalent to 1 × 10^{-5} rather than above 1 × 10^{-5} for the residential scenario (Table H-4.2-55).

   Simply because the site has an excess cancer risk above the NMED target level of 1 × 10^{-5} for the residential scenario does not mean additional sampling for extent is necessary. Although risk is at least partly because of dioxins and furans, as noted above, the extent of dioxins and furans at each site is already defined. Because the current and reasonably foreseeable future land use for the sites in question is a recreational scenario, the elevated residential cancer risk at a site does not require corrective actions or additional investigations. The risk-based decision for the sites will be based on the recreational scenario. As a result, no additional dioxin and furan data will be collected for these sites, and the sites will be recommended for corrective action complete with controls (controls being the land use) once ecological risk is found to be acceptable.

NMED Comment

3. *The toxicity equivalency factor (TEF) of 0.001 utilized in the risk assessments conducted at Middle Los Alamos Canyon Aggregate Area for heptachlorodibenzodioxin[1,2,3,4,6,7,8-] is inconsistent with the TEF of 0.01 listed on the World Health Organization website http://www.who.int/ipcs/assessment/tef_update/en/. As such, the toxic equivalency calculations and cancer risks have been underestimated at sites containing heptachlorodibenzodioxin[1,2,3,4,6,7,8-]. Revise all tables, risk calculations, and conclusions with respect to the corrected TEF for heptachlorodibenzodioxin[1,2,3,4,6,7,8-].*

LANL Response

3. The TEF for 1,2,3,4,6,7,8-heptachlorodibenzodioxin was corrected to 0.01 in the dioxin/furan calculations for the industrial, recreational, and residential scenarios for AOC 02-004(a) in Tables H-4.2-46 and H-4.2-54; for AOCs 02-004(b,c,d) in Tables H-4.2-59 and H-4.2-66; for AOC 02-004(e) in Tables H-4.2-70 and H-4.2-77; for AOC 02-004(f) in Tables H-4.2-81 and H-4.2-88;

for AOC 02-004(g) in Tables H-4.2-92 and H-4.2-99; and for AOC 02-011(c) in Tables H-4.2-233 and H-4.2-238. Additional revisions to these tables were made based on specific comments and/or review of the tables.

At AOC 02-004(a), the total excess cancer risks for the industrial scenario (Table H-4.2-47) and recreational scenario (Table H-4.2-51) did not change as a result of the revised TEF. However, the residential 2,3,7,8-TCDD sum was originally overestimated (Table H-4.2-54). As a result, the total residential excess cancer risk was revised to approximately 1×10^{-5}, which is equivalent to the NMED target risk level of 1×10^{-5} (Table H-4.2-55). Revised human health cancer risk calculations and conclusions are presented in section 6.7.5 of the main text and sections H-4.2.6 and H-4.5.6 of Appendix H and indicate that no potential unacceptable cancer risks exist for the industrial, recreational, and residential scenarios based on the screening-assessment results.

At AOCs 02-004(b,c,d), the total excess cancer risk increased to 5×10^{-6} for the industrial scenario (Table H-4.2-60), increased to 3×10^{-6} for the recreational scenario (Table H-4.2-63), and remained at 2×10^{-5} for the residential scenario (Table H-4.2-67) as a result of the revised TEF. Revised human health cancer risk calculations and conclusions are presented in section 6.8.5 of the main text and sections H-4.2.7 and H-4.5.7 of Appendix H and indicate that no potential unacceptable cancer risks exist for the industrial and recreational scenarios, but a potential unacceptable cancer risk exists for the residential scenario based on the screening-assessment results.

At AOC 02-004(e), the total excess cancer risk increased to 5×10^{-6} for the industrial scenario (Table H-4.2-71), increased to 3×10^{-6} for the recreational scenario (Table H-4.2-74), and increased to 2×10^{-5} for the residential scenario (Table H-4.2-78) as a result of the revised TEF. The residential cancer risk of 2×10^{-5} is slightly above the NMED target risk level of 1×10^{-5}. Revised human health cancer risk calculations and conclusions are presented in section 6.11.5 of the main text and sections H-4.2.8 and H-4.5.8 of Appendix H and indicate no potential unacceptable cancer risks exist for the industrial and recreational scenarios, but a potential unacceptable cancer risk exists for the residential scenario. Because the revised cancer risk for the residential scenario exceeds the NMED target risk level of 1×10^{-5}, the sites and totals listed in section 9.3.1 and the site totals in the Executive Summary have been revised accordingly.

At AOC 02-004(f), the total excess cancer risks remained the same for the industrial scenario (Table H-4.2-82) and recreational scenario (Table H-4.2-85) and increased to 6×10^{-6} for the residential scenario (Table H-4.2-89) as a result of the revised TEF. Revised human health cancer risk calculations and conclusions are presented in section 6.12.5 of the main text and sections H-4.2.9 and H-4.5.9 of Appendix H and indicate that no potential unacceptable cancer risks exist for the industrial, recreational, and residential scenarios based on the screening-assessment results.

At AOC 02-004(g), the total excess cancer risks for the industrial scenario (Table H-4.2-93), recreational scenario (Table H-4.2-96), and the residential scenario (Table H-4.2-100) did not change as a result of the revised TEF. No potential unacceptable cancer risks exist for the industrial, recreational, and residential scenarios based on the screening-assessment results. No revision to the main text or Appendix H text is necessary.

At AOC 02-011(c), the total excess cancer risks increased to 1×10^{-6} for the industrial scenario (Table H-4.2-234), increased to 6×10^{-7} for the recreational scenario (Table H-4.2-236), and increased to 5×10^{-6} for the residential scenario (Table H-4.2-239) as a result of the revised TEF. Revised human health cancer risk calculations and conclusions are presented in section 6.28.5 of the main text and sections H-4.2.25 and H-4.5.25 of Appendix H and indicate that no potential unacceptable cancer risks exist for the industrial, recreational, and residential scenarios based on the screening-assessment results.

Table 10.1-1 was revised as necessary to be consistent with the conclusions presented in section H-4.5 of Appendix H.

NMED Comment

4. *The USEPA Regional Screening Levels (RSLs) for mercury (inorganic salts) were utilized for the residential and industrial scenarios, rather than the NMED (2009) soil screening levels for mercury. Clarify whether analytical results define speciation of mercury, thus justifying the use of the RSLs and toxicity data for mercury salts.*

LANL Response

4. The analytical results, whether for mercury or any other target analyte list metal, are for total metals, and no speciation of the inorganic chemicals results from the analyses. 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. These inorganic salts vary in composition and quantity depending upon soil conditions and chemistry. However, the analytical method determines only the total amount of metal in the soil and does not identify which inorganic salts are present. Mercury and other inorganic chemicals are generally only present in the elemental form if a release or disposal of the metal itself has occurred. Furthermore, the environmental conditions and bacteria are not typically present to convert inorganic mercury to organic compounds, such as methylmercury. Based on the operational history and other conditions at the Middle Los Alamos Canyon Aggregate Area sites, mercury is expected to be present in the soil as inorganic compounds or salts, and the inorganic mercury SSLs in the data tables are the most appropriate SSLs.

NMED Comment

5. *The vapor intrusion pathway was not evaluated at Middle Los Alamos Canyon Aggregate Area. Although no definable plume has been shown to be present (Section H-4.3), volatile organic compounds (VOCs) were included in the lists of analyses requested and were detected at some of the AOCs/SWMUs. The vapor intrusion pathway must be evaluated and therefore, at a minimum provide a qualitative discussion for all sites where VOCs were detected whether or not buildings are present or are expected to be constructed in the future. To qualify for the status of corrective action complete without controls, the risk assessments must address (quantitatively and/or qualitatively) all potential exposure pathways.*

LANL Response

5. Section H-4.3 in Appendix H is a qualitative discussion of the vapor-intrusion pathway for the sites at TA-02 and is similar to the qualitative discussion of the vapor-intrusion pathway provided in previous reports. The sites at TA-26 and TA-21 have not yet been evaluated for risk because the extent of contamination is not defined. However, the vapor-intrusion pathway will be evaluated for the sites where the residential scenario is the basis of the recommended site decision. Because the extent of contamination and/or the risk-screening assessments are not complete for any of the sites, it is proposed that the vapor-intrusion evaluations be presented in the Phase III report for sites as appropriate. The evaluations will either be a qualitative discussion or quantitative analysis of the

vapor-intrusion pathway, depending upon what the data indicate and the relevance of this pathway combined with the risk from soil pathways for each site.

NMED Comment

6. *For many of the Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) discussed in the IR, detection limits (DLs) are higher than background values (BVs) at one or more sample locations or sample intervals for various analytes. In many of these cases, the Permittees conclude that no BVs were exceeded. This occurs in discussions of inorganic constituents found in IR sections that concern nature and extent of contamination. The example below is from Section 6.2.4.4, Nature and Extent of Contamination at AOC 02-003(a), Inorganic Chemicals, on page 21:*

   "Antimony was not detected but had DLs (0.902 mg/kg to 1.17 mg/kg) above the soil BV (0.83 mg/kg) in four samples and had DLs (1.19 mg/kg to 1.32 mg/kg) above the Qbo BV (0.5 mg/kg) in six samples. Because antimony was not detected above BVs, the vertical extent of antimony is defined."

   The last statement is misleading because the analytical laboratory was unable to detect concentrations near the background level. While it may not change the outcome of the demonstration of extent, a more accurate statement would be that the COPC was not detected above the detection limit of the analysis, and that any concentrations detected between the DL and BV were qualified as "non-detect." Revise the IR to clarify these statements.

LANL Response

6. The statement quoted in the comment is a fairly accurate rationale for determining that extent is defined, i.e., nothing was detected above the background value (BV) so there is no evidence of a release. NMED's suggested text is not always appropriate because in many cases there are detected concentrations of an inorganic chemical below its BV. Stating that a chemical of potential concern (COPC) was not detected above the detection limit (DL) is inaccurate as some samples had lower DLs than others. Also, stating that *detected* concentrations between the DL and BV were reported as nondetects is incorrect because nothing was detected between the BV and the elevated DL above the BV. To provide further clarification, the text has been revised as follows (addition in bold).

   > Antimony was not detected but had DLs (0.902 mg/kg to 1.17 mg/kg) above the soil BV (0.83 mg/kg) in four samples and had DLs (1.19 mg/kg to 1.32 mg/kg) above the Qbo BV (0.5 mg/kg) in six samples. Because antimony was not detected above BVs **and all results reported between the BVs and the maximum DL were nondetects**, the vertical extent of antimony is defined.

   Similar text in the nature and extent of contamination sections has been revised throughout the IR.

NMED Comment

7. *The Permittees have utilized an inappropriate reference for the Approval of the Phase II Investigation Work Plan throughout the IR. The first instance of this reference is found in Section 1.1 (General Site Information) on page 1 of the IR. The reference refers to NMED 2009, 106703, which is a document related to Lower Sandia Canyon Aggregate Area. Revise the IR to correct all references to NMED's Approval of the Phase II Investigation Work Plan.*

LANL Response

7. The incorrect references, one for the Middle Los Alamos Canyon Aggregate Area Phase II investigation work plan (LANL 2009, 105073) and the other for the NMED approval of the Phase II investigation work plan (NMED 2009, 105595), have been replaced with the correct references throughout the revised IR. These two references were cited correctly in Appendix B.

NMED Comment

8. *In future submittals, where the Permittees assert that vertical extent has been defined, the deepest "clean" sample, which may be non-detect or below background values (BVs), must be included in the tables of results. In addition to samples exceeding the BVs or fallout values (FVs), the tables must include any non-detect or low-concentration samples that are essential to demonstration that vertical extent has been defined.*

   In addition, shallow samples that have higher contaminant concentrations than deeper samples, but are not shown in the tables because they are collected from a different media with a higher BV, must be included in the tables of results, if essential to demonstration of decreasing concentrations with depth. The example below is from Section 6.2.4.4, Nature and Extent of Contamination at AOC 02-003(a), Inorganic Chemicals, on pages 21-22:

   "Iron was detected above the Qbo BV (3700 mg/kg) in six samples at locations 02-612348 and 02-612389. The highest concentration of 5750 mg/kg was detected at location 02-612389 from 49–50 ft bgs. Iron was detected at a concentration of 7520 mg/kg (below the soil BV of 21,500 mg/kg) at location 02-612348 from 5–7 ft bgs and was detected at a concentration of 9830 mg/kg (below the soil BV of 21,500 mg/kg) at location 02-612389 from 18–19 ft bgs. Iron concentrations decreased with depth at both locations. The vertical extent of iron is defined."

   While the shallow samples are discussed in the text, they are not shown in the Tables. Include these values in the Tables, if essential to demonstration of decreasing concentrations with depth.

LANL Response

8. The data tables provided in the main text of the IR are the analytical results for inorganic chemicals above BVs (detected above the BV, detected with no BV, or not detected but with DLs above the BV), organic chemicals detected, and radionuclides detected or detected above BVs/fallout values (FVs). The summary analytical data tables were prepared in accordance with the Consent Order. In the discussion for vertical extent, all of the data that are essential in demonstrating that the vertical extent has been defined are stated in the respective paragraphs for each analyte. These data are also available in the data appendix (Appendix F) to allow for verification of the descriptions in the report.

   As part of the specific comment responses, the Laboratory has included a summary table for each case where comparative, numerical sample results from Appendix F are essential in demonstrating that vertical extent has been defined. Data from shallow samples that do not appear in the summary analytical data tables in the IR because they are below a respective media-specific BV are included in this response as necessary to further illustrate that vertical extent is defined by decreasing concentrations with depth. In future submittals, the Laboratory will ensure that information needed to understand how vertical extent is defined will be stated in text, including sample concentrations, sample IDs, sample media, depths, and location IDs.

In response to the example described in this NMED comment, iron concentrations at locations 02-612348 and 02-612389, including those below BVs, are presented in Table 1 of this response. The text has been revised to describe the overall decrease in concentrations with depth.

NMED Comment

9. *The statement in the IR quoted in Comment 8 is not accurate. The referenced concentrations did not decrease with depth. The concentrations initially decreased from the Qal media samples to the Qbo media samples, but then increased with depth in the Qbo. Remove all inaccurate statements from the IR. While the concentrations are very low in most cases, and further investigation at these locations is likely unnecessary, the text must be revised to accurately reflect site conditions. Modify the text to indicate that initially concentrations are decreasing but then increase again with depth, and discuss the need to further investigate the vertical extent of contamination relative to the applicable SSL.*

LANL Response

9. In both instances displayed in Table 1 in response to Comment 8, iron decreased with depth; therefore, vertical extent is defined. Although there are intervals where concentrations increased, the overall concentration trend is that concentrations decreased with depth. In these two instances, the concentration in the deepest sample is less than the concentration in the shallowest sample. The overall change is what is relevant to defining extent. This approach is consistent with previous reports that have been approved by NMED. The text has been revised to "concentrations displayed an overall decrease with depth" where appropriate.

   One of the statements quoted in Comment 8, "The highest concentration of 5750 mg/kg was detected at location 02-612389 from 49–50 ft bgs," is inaccurate because the highest concentration detected at location 02-612389 was 9830 mg/kg from 18–19 ft below ground surface (bgs). This statement and similar text have been corrected throughout the IR. Statements concerning highest concentrations in the nature and extent of contamination sections were removed if they were not essential to defining vertical extent.

NMED Comment

10. *At several SWMUs and AOCs, risk estimates have been rounded down and reported with only one significant digit. In addition, the Permittees have concluded that risks slightly above the target risk levels are acceptable. Compliance with the requirements of Order on Consent (Order) Section VIII is determined by NMED. In some cases, sufficient site data, use of conservative assumptions, and other factors may lead to an acceptance of elevated risk. In other cases there may be sufficient uncertainty to conclude that while only slightly elevated, there is concern that excess risk is present and additional investigation and/or corrective actions are required. NMED evaluates risk estimates on a case-by-case basis. Revise the IR to provide a minimum of two significant digits for risk estimates and remove the conclusions regarding acceptable elevated risk levels.*

LANL Response

10. The Laboratory's rounding of all risk results (up or down), not just those that are slightly above target levels, is appropriate and consistent. The following information is provided to support the practice of rounding risk and hazard results to one significant figure.

    - The Laboratory follows standard risk assessment practice in presenting one significant figure to represent the estimated risk. U.S. Environmental Protection Agency (EPA) guidance (EPA 1989, 008021, section 8.2 and Tables 8-2, 8-3, and 8-4) states that only one significant figure should be used when presenting risk. This is true whether risk results are slightly above the target levels, as cited in NMED's comment, or not.
    - Rounding the calculated results to one significant figure does not reduce the amount of information in the result because the risk assessment calculations do not provide adequate precision to meaningfully distinguish results to two significant figures. There is not adequate precision because of the uncertainties in exposure parameters, particularly with screening-level assessments.
    - Given the conservative and protective nature of the risk analysis, particularly for a screening-level assessment, it is adequate to represent the risk with one significant figure.
    - The target levels are a hazard index of 1 and a cancer risk of 1×10^{-5}, which are also presented with one significant figure.

    In summary, given the conservative nature of the screening-level assessment, representing risk with one significant figure is both appropriate and protective of human health and the environment. It is also consistent with EPA guidance and standard practice. Based on the justification provided, no revisions have been made to the risk assessment.

    The Laboratory is not disputing NMED's role in evaluating risk and determining whether there is a concern that excess risk may be present at a site. However, the risk-screening assessments, by nature, are conservative and overestimate risk because generic scenarios are used that typically do not reflect actual exposure conditions, and the SSLs are protective of the receptors by using conservative exposure assumptions. Any uncertainties associated with the estimates of risk are biased in favor of receptor protection (i.e., overestimated) so that risks slightly above target levels do not represent potential unacceptable risks and should be deemed at least equivalent to the target levels.

    In Middle Los Alamos Canyon Aggregate Area, six sites [SWMUs 02-005 and 02-008(a) and AOCs 02-004(a,g), 02-006(e), and 02-008(c)] have total excess cancer risks for the residential scenario slightly below or above the NMED target level of 1×10^{-5}, which are rounded up or down and presented as approximately 1×10^{-5} (i.e., equivalent to the target level). The conclusion that there is no unacceptable risk associated with these slightly elevated cancer risk levels is based on the conservative nature of the risk-screening assessments and the associated overestimation of risk from generic exposure assumptions and unrepresentative EPCs for some COPCs.

    - For SWMUs 02-005 and 02-008(a), the total excess cancer risks are 9.9×10^{-6} and 9.6×10^{-6}, respectively, and are slightly less than the NMED target level. Approximately 27% of the risk at SWMU 02-008(a) is because of the maximum detected concentrations of benzo(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene; use of the maximum concentrations results in an overestimation of the potential cancer risk. The total excess cancer risks also include potential risks from arsenic, which contributes 49% and 66% of the risk, respectively, and do not represent an incremental increase in risk under the residential scenario above the risk from exposure to background concentrations (cancer risks are approximately 5 × 10^{-6} and 6 × 10^{-6}, respectively, compared to background risks ranging from 1.2 × 10^{-5}, based on the upper confidence limit [UCL] for soil, to 2.4 × 10^{-5}, based on maximum soil background concentrations). Therefore, the risks are at least equivalent to 1 × 10^{-5} and do not represent potential unacceptable risks under the residential scenario.

- For the other four sites, the total excess cancer risks range from 1.07 × 10^{-5} [AOC 02-004(g)] to 1.25 × 10^{-5} [AOC 02-006(e)]. Given the conservative nature of the generic exposure assumptions used in the risk-screening assessments and the nature of the EPCs for some of the COPCs, rounding down to 1 × 10^{-5} and concluding the risks are equivalent to 1 × 10^{-5} is appropriate.
    - For AOCs 02-004(a) and 02-006(e) [see discussion of arsenic risk for AOC 02-006(e) in section H-4.4-2], arsenic is also a contributor to the total excess cancer risks (47% and 54%, respectively), which do not represent an incremental increase in risk under the residential scenario above the risk from exposure to background concentrations (arsenic cancer risks are approximately 6 × 10^{-6} and 7 × 10^{-6}, respectively, compared to background risks ranging from 1.2 × 10^{-5}, based on the UCL for soil, to 2.4 × 10^{-5}, based on the maximum soil background concentration). Therefore, because the uncertainty associated with the total excess cancer risks indicates risks are overestimated, it is reasonable to conclude the risks are at least equivalent to 1 × 10^{-5} and do not represent unacceptable risks under the residential scenario.
    - For AOC 02-008(c), the total excess cancer risk is 1.24 × 10^{-5}, based primarily (96%) on the maximum detected concentrations of benzo(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene. The use of the maximum detected concentrations results in an overestimation of the potential cancer risk so it is appropriate to round down to 1 × 10^{-5} and conclude that the risk is at least equivalent to 1 × 10^{-5} and does not represent an unacceptable risk under the residential scenario.
    - For AOC 02-004(g), the total excess cancer risk is 1.07 × 10^{-5}, based primarily (88%) on 2,3,7,8-TCDD, which has a cancer risk of 9.7 × 10^{-6}. Given the conservative nature of the generic exposure assumptions used in the risk-screening assessment and the much lower cancer risks associated with the remaining COPCs, it is reasonable to conclude the risk is equivalent to 1 × 10^{-5} and does not represent an unacceptable risk under the residential scenario.

NMED Comment

11. *Throughout the Nature and Extent Sections of the IR, the Permittees have included interpretations and qualifications of the data. Interpretation of data should not be discussed in the sections presenting analytical results. Section XI.C of the Order (Investigation Report) states, "In general, interpretation of data shall be presented only in the background, conclusions and recommendations sections of the reports. The other text sections of the reports shall be reserved for presentation of facts and data without interpretation or qualification." The examples below are from Section 6.14.4.4, Nature and Extent of Contamination at SWMU 02-005, Inorganic Chemicals, on page 107, Section 6.14.4.4, Nature and Extent of Contamination at SWMU 02-005, Radionuclides, on page 109, and Section 6.15.4.4, Nature and Extent of Contamination at SWMU 02-006(a), Inorganic Chemicals, on page 116, respectively:*

“Because location 02-612380 is located next to a security fence, this zinc concentration, which was only detected at the surface, is likely from the fence rather than a site operation–related source.”

“The presence of plutonium-239/240 at low activities on the south-facing slope is likely related to the operations at TA-21, rather than related to site operation of SWMU 02-005.”

“The arsenic concentration of 17 mg/kg from 49–50 ft bgs at location 02-612641 is not consistent with the pattern of detection of arsenic across the site and is not consistent with known operational history of the site.”

Such statements are irrelevant to the observed nature and extent of contamination and must not be included in these sections. Move interpretive and qualitative statements from all Nature and Extent Sections of the revised IR to the appropriate section and provide supporting information for any conclusions.

LANL Response

11. To comply with Section XI.C of the Consent Order, the Laboratory had previously presented COPC identification and nature and extent evaluations, which are by their very nature interpretive, in a data review appendix. This appendix was created because Section XI.C did not otherwise allow for interpretation of investigation results (i.e., the background section only discusses previous results, and the conclusions section should only summarize information discussed earlier in the document). However, in its notice of disapproval for the Investigation Report for North Ancho Canyon Aggregate Area, dated November 4, 2009, NMED directed the Laboratory to include COPC identification and nature and extent evaluations in the main text of IRs to facilitate review of the documents (NMED 2009, 108143). In its response to this direction, the Laboratory noted that the data evaluations formerly presented in the data review appendix would be presented in the “Site Contamination” section of the IR main text (LANL 2009, 108179).

    The identification of COPCs and the discussion of nature and extent are, by their nature, interpretive and require knowledge of the conceptual site model (e.g., Is the potential source of contamination a surface or subsurface source? What types of contaminants would be expected at the site? Based on topography or other site features, which way would contamination be expected to migrate?). Because environmental samples may contain constituents from a variety of sources, it is necessary to distinguish between constituents that originate from activities at the SWMU or AOC and constituents that do not. The failure to make this distinction results in falsely characterizing releases and risk from the subject site. Furthermore, it is awkward to include a high level of detail and/or new information in the conclusions section of a report that may contradict (or further support) previously presented interpretation; all supporting information should be presented in earlier discussion sections of the report. For clarification, text has been revised as necessary in response to Comments 27, 28, 29, 39, and 50.

SPECIFIC COMMENTS

NMED Comment

12. ***Section 6.2.4.4, Nature and Extent of Contamination at AOC 02-003(a), Inorganic Chemicals, pages 21-22***

    ***Permittees' Statement:** "Iron was detected above the Qbo BV (3700 mg/kg) in six samples at locations 02-612348 and 02-612389. The highest concentration of 5750 mg/kg was detected at location 02-612389 from 49–50 ft bgs. Iron was detected at a concentration of 7520 mg/kg (below the soil BV of 21,500 mg/kg) at location 02-612348 from 5–7 ft bgs and was detected at a concentration of 9830 mg/kg (below the soil BV of 21,500 mg/kg) at location 02-612389 from 18–19 ft bgs. Iron concentrations decreased with depth at both locations. The vertical extent of iron is defined."*

    ***NMED Comment:** See Comments 8 and 9. Revise the IR to correct the discrepancies.*

LANL Response

12. See responses to Comments 8 and 9. Iron concentrations at locations 02-612348 and 02-612389, including those below BVs, are presented in Table 1. The text has been revised to describe the overall decrease in concentrations with depth.

NMED Comment

13. ***Section 6.3.4.4, Nature and Extent of Contamination at AOC 02-003(b), Inorganic Chemicals, page 30***

    ***Permittees' Statement:** "Iron was detected above the Qbo BV (3700 mg/kg) in four samples at location 02-612390 with concentrations ranging from 4700 mg/kg to 5850 mg/kg. Iron was detected at a concentration of 6980 mg/kg (below the soil BV of 21,500 mg/kg) at location 02-612390 from 5–6 ft bgs. Iron concentrations decreased with depth at this location. The vertical extent of iron is defined."*

    ***NMED Comment:** See Comments 8 and 9. Revise the IR to correct the discrepancies.*

LANL Response

13. See responses to Comments 8 and 9. Iron concentrations at location 02-612390, including those below BVs, are presented in Table 2. The text has been revised to describe the overall decrease in concentrations with depth.

NMED Comment

14. ***Section 6.4.4.4, Nature and Extent of Contamination at AOC 02-003(c), Inorganic Chemicals, page 38***

    ***Permittees' Statement:** "Iron was detected above the Qbo BV (3700 mg/kg) in three samples at location 02-612420. The highest concentration of 5530 mg/kg was from 35–37 ft bgs. Iron was detected at a concentration of 6600 mg/kg (below the soil BV of 21,500 mg/kg) at location 02-612420 from 6–7 ft bgs. Iron concentrations decreased with depth at this location. The vertical extent of iron is defined."*

***NMED Comment:** See Comments 8 and 9. Revise the IR to correct the discrepancies.*

LANL Response

14. See responses to Comments 8 and 9. Iron concentrations at location 02-612420, including those below BVs, are presented in Table 3. The text has been revised to describe the overall decrease in concentrations with depth.

NMED Comment

15. Section 6.5.4.4, Nature and Extent of Contamination at AOC 02-003(d), Inorganic Chemicals, page 46

***Permittees' Statement:** "Arsenic was detected above the Qct BV (0.56 mg/kg) in one sample at a concentration of 0.777 mg/kg at location 02-612412 from 9–10 ft bgs. Arsenic was detected at concentrations of 1.04 mg/kg and 0.988 mg/kg (below the soil BV of 8.17 mg/kg) from 0–0.5 ft and 4–5 ft bgs, respectively. Arsenic concentrations decreased with depth at this location. The vertical extent of arsenic is defined."*

***NMED Comment:** See Comments 8 and 9. Revise the IR to address the arsenic concentrations relative to background values.*

LANL Response

15. See responses to Comments 8 and 9. After reviewing the sample descriptions on the sample collection logs for locations 02-600218 and 02-612412, the original media codes for samples RE02-07-6892 (Qct) and RE02-07-933 (Qct) at location 02-600218 and sample RE02-10-21992 (Qal) at location 02-612412 have been corrected to soil, soil, and Qct, respectively. As a result, revised Table 6.5-2 shows that the arsenic concentrations decrease with depth at location 02-612412. Text has been revised to describe the decrease of sample concentrations with depth at collocated locations 02-600218 and 02-612412.

    The media code revisions for the three samples at AOC 02-003(d) resulted in changes to the presentation of analytical data in Tables 6.5-1, 6.5-2, and 6.5-4. The text in sections 6.5.4.3 and 6.5.4.4, Plates 3 and 5, Figures G-4.0-1 through G-4.0-7, and Table G-4 in Appendix G have been revised accordingly.

NMED Comment

16. Section 6.5.4.4, Nature and Extent of Contamination at AOC 02-003(d), Inorganic Chemicals, page 46

***Permittees' Statement:** "Barium was detected above the Qct BV (25.7 mg/kg) in one sample at a concentration of 63.2 mg/kg at location 02-612412 from 9–10 ft bgs. This concentration is slightly lower than the highest concentration of 63.7 mg/kg detected at previously sampled location 02-600218. Also, barium was not detected above BVs in samples as deep as 4.5–5.7 ft bgs at locations 02-01255, 02-600225, 02-600226, and 02-600227 approximately 40 ft downslope of location 02-612412. The vertical extent of barium is defined."*

NMED Comment: *Barium at this location was detected at concentrations over twice the BV. Barium concentrations detected in samples at depths of five feet below ground surface (bgs) obtained from 40 ft away cannot be used to define the vertical extent of contamination related to a sample obtained from a depth of 10 ft bgs. Revise the IR accordingly.*

Based on Table 6.5-2, there is an apparent concentration of constituents in the Qct media at location 02-612412. Provide a discussion pertaining to the detection of several inorganic COPCs at elevated levels at this sampling location and depth in this media.

LANL Response

16. See response to Comment 15. As a result of the media code correction, sections 6.5.4.4, 9.2.1, and 10.1 have been revised to conclude that the vertical extent of barium (this comment), chromium (Comment 17), and zinc (Comment 18) is not defined.

    The part of AOC 02-003(d) located on the slope north of TA-02 is the temporary vent line, referred to as the “garden hose.” The temporary vent line potentially discharged to the surface of the slope. Therefore, surface samples at the site are the best indicator of potential contamination from the vent line. Inorganic chemicals detected in these samples include nitrate and perchlorate, which have no BVs, and mercury, zinc, and uranium, which are slightly above the BVs and nearly always less than maximum soil background concentrations. The appearance of several additional inorganic chemicals at depth coincides with a change in the media from soil to Qct. The Qct BVs calculated for the lower Bandelier Tuff, which includes the Cerro Toledo interval, do not adequately account for variations in the naturally occurring concentrations seen in samples from this unit. This is evident at many sampling locations throughout TA-02 and other sites at the Laboratory.

    Although the inorganic chemicals detected in Qct at AOC 02-003(d) do not appear to be the result of a release from the site, deeper sampling will be proposed to further confirm the media present and evaluate the vertical extent of barium (this comment), chromium (Comment 17), and zinc (Comment 18).

NMED Comment

17. ***Section 6.5.4.4, Nature and Extent of Contamination at AOC 02-003(d), Inorganic Chemicals, page 46***

    Permittees’ Statement: *“Chromium was detected above the Qct BV (2.6 mg/kg) in one sample at a concentration of 17.1 mg/kg at location 02-612412 from 9–10 ft bgs. Chromium concentrations increased with depth at this location and were above those detected at previously sampled location 02-600218. However, chromium was not detected above BVs in samples as deep as 4.5–5.7 ft bgs at locations 02-01255, 02-600225, 02-600226, and 02-600227 approximately 40 ft downslope of location 02-612412. The vertical extent of chromium is defined.”*

    NMED Comment: *Chromium at this location was detected at concentrations over six times the BV. Concentrations detected in samples obtained at shallower depths from locations 40 ft away cannot be used to define the vertical extent of contamination at this sample location. Revise the IR accordingly. Also, see second paragraph of Comment 16.*

LANL Response

17. See response to Comment 16.

NMED Comment

18. ***Section 6.5.4.4, Nature and Extent of Contamination at AOC 02-003(d), Inorganic Chemicals, page 47***

    Permittees' Statement: *"Zinc was detected above the soil BV (48.8 mg/kg) in two samples and above the Qct BV (40 mg/kg) in one sample at location 02-612412. The highest concentration of 78.2 mg/kg was detected from 9–10 ft bgs. Zinc concentrations increased with depth at this location, and the highest concentration was similar to those detected at previously sampled location 02-600218. Zinc was detected at lower concentrations at locations 02-01255, 02-600225, and 02-600226 and was not detected above BVs in the deepest sample from 4.5–5.7 ft bgs at location 02-600227; these locations are approximately 40 ft downslope of location 02-612412. The vertical extent of zinc is defined."*

    NMED Comment: *Zinc at this location was detected at concentrations approximately twice the BV. See Comments 16 and 17. Revise the IR accordingly.*

LANL Response

18. See response to Comment 16.

NMED Comment

19. ***Section 6.7.4.4, Nature and Extent of Contamination at AOC 02-004(a), Inorganic Chemicals, page 65***

    Permittees' Statement: *"Iron was detected above the Qbo BV (3700 mg/kg) in 15 samples at five locations. The highest concentration of 6340 mg/kg was detected at location 02-612346 from 25–26 ft bgs. Iron was detected at concentrations of 8750 mg/kg and 9300 mg/kg (below the soil BV of 21,500 mg/kg) at location 02-612326 from 5–6 ft and 15–16 ft bgs, respectively, and was detected at concentrations of 9360 mg/kg and 6150 mg/kg (below the soil BV of 21,500 mg/kg) at location 02-612328 from 5–6 ft and 15–16 ft bgs, respectively. Iron concentrations decreased with depth at all five locations. The vertical extent of iron is defined."*

    NMED Comment: *See Comments 8 and 9. Revise the IR accordingly.*

LANL Response

19. See responses to Comments 8 and 9. Iron concentrations at locations 02-612326 and 02-612328, including those below BVs, are presented in Table 4. The text has been revised to describe the overall decrease in concentrations with depth.

NMED Comment

20. ***Section 6.7.4.4, Nature and Extent of Contamination at AOC 02-004(a), Inorganic Chemicals, page 65***

    Permittees' Statement: *"Manganese was detected above the soil BV (671 mg/kg) in 1 sample and above the Qbo BV (189 mg/kg) in 13 samples at five locations. The highest concentration of 1860 mg/kg was detected at location 02-612326 from 15–16 ft bgs. Manganese was detected at concentrations of 356 mg/kg and 341 mg/kg (below the soil BV of 671 mg/kg) at location 02-612346* *from 8–9 ft and 15–16 ft bgs, respectively. Manganese concentrations decreased with depth at all five locations. The vertical extent of manganese is defined."*

NMED Comment: *See Comments 8 and 9. Revise the IR accordingly.*

LANL Response

20. See responses to Comments 8 and 9. Manganese concentrations at location 02-612346, including those below BVs, are presented in Table 5. The text has been revised to describe the overall decrease in concentrations with depth.

NMED Comment

21. ***Section 6.8.4.4, Nature and Extent of Contamination at AOC 02-004(b), Inorganic Chemicals, page 76***

    Permittees' Statement: *"Iron was detected above the Qbo BV (3700 mg/kg) in four samples at location 02-612280. The highest concentration of 5400 mg/kg was detected at location 02-612280 from 49–50 ft bgs. Iron was detected at a concentration of 8300 mg/kg (below the soil BV of 21,500 mg/kg) at location 02-612280 from 5–6 ft bgs. Iron concentrations decreased with depth at this location. The vertical extent of iron is defined."*

    NMED Comment: *See Comments 8 and 9. Revise the IR accordingly.*

LANL Response

21. See responses to Comments 8 and 9. Iron concentrations at location 02-612280, including those below BVs, are presented in Table 6. The text has been revised to describe the overall decrease in concentrations with depth.

NMED Comment

22. ***Sections 6.8.5, Summary of Human Health Risk Screening, page 77 and H-4.5-7, AOCs 02-004(b,c,d), page H-43***

    Permittees' Statement: *"The total excess cancer risk for the residential scenario is 2 × 10^{-5}, which is above the NMED target risk level of 1 × 10^{-5} (NMED 2009, 108070). The cancer risk [is elevated] partly because of arsenic and is overestimated. As discussed in the uncertainty analysis in Appendix H (section H-4.4.2), the arsenic EPC is similar to being exposed to a naturally occurring arsenic level, and the risk does not incrementally increase above that which would result from exposure to naturally occurring levels of arsenic. The risk is reduced to approximately 1 × 10^{-5} without arsenic and is equivalent to the NMED target risk level of 1 × 10^{-5} (NMED 2009, 108070)."*

    NMED Comment: *The text concludes that the omission of arsenic from the residential risk calculations at SWMU 02-004(b,c,d) would result in an acceptable level of risk for the resident, and that site concentrations would not pose any potential unacceptable risks for a residential receptor. Arsenic should not be omitted from consideration in the conclusions for the following reasons:*

    - *Arsenic exceeded maximum background concentrations in several samples and site concentrations are statistically different than background;*

- *The residential EPC for arsenic should not be compared to background ranges because it is generally incorrect to compare a 95% upper confidence limit (UCL) to background concentrations;*
- *Concentrations of dioxins/furans posed a greater risk to residential receptors than arsenic;*
- *Since the TEF used for heptachlorodibenzodioxin[1,2,3,4,6,7,8-] was incorrect (as noted in General Comment Number 2), risks from exposure to dioxins/furans have been underestimated. Therefore, exposure to dioxins/furans may pose an unacceptable level of risk to residents, in addition to arsenic exposure.*

Modify the conclusions in Section 6.8.5 and H-4.5.7 to include arsenic in the risk evaluation, and determine if potential unacceptable risks to residential receptors exist at SWMU 02-004 (b,c,d) from exposure to dioxins/furans.

LANL Response

22. The 2,3,7,8-TCDD EPC for AOCs 02-004(b,c,d) was recalculated, and the cancer risk calculations were redone per Comment 3. As a result of the recalculations, the residential cancer risk for 2,3,7,8-TCDD increased from 6×10^{-6} to 1.2×10^{-5}. The total excess cancer risk for the residential scenario for this site also increased to the point where arsenic is a secondary contributor to the residential risk. Even with the elimination of arsenic from the total risk, the residential cancer risk is approximately 2×10^{-5} after rounding up from 1.6×10^{-5}. Therefore, the arsenic discussions in sections 6.8.5 and H-4.5.7 have been deleted because the residential risk is above the NMED target level without arsenic. Revised human health cancer risk calculations and conclusions are presented in section 6.8.5 of the main text and sections H-4.2.7 and H-4.5.7 of Appendix H and indicate that no potential unacceptable cancer risks exist for the industrial and recreational scenarios, but a potential unacceptable cancer risk exists for the residential scenario based on the screening-assessment results. The sites and totals listed in section 9.3.1 and the site totals in the Executive Summary have been revised accordingly.

    The Laboratory disagrees with NMED's contention that arsenic should not be omitted from the final risk estimates. Although the arsenic site data set(s) may be statistically different from the arsenic background data set(s), this does not necessarily indicate an unacceptable incremental increase in risk from arsenic, especially when the arsenic residential SSL is within the range of background concentrations (residential SSL of 3.9 mg/kg and range of arsenic background concentrations from 0.3 mg/kg to 9.3 mg/kg for soil). If the risk from arsenic is not incrementally increased above the risk from exposure to naturally occurring levels of arsenic, it is not an excess cancer risk. As a result, the contribution from arsenic is not included in the final total excess cancer risk estimate.

NMED Comment

23. ***Section 6.8.4.4, Nature and Extent of Contamination at AOC 02-004(f), Inorganic Chemicals, page 76***

    Permittees' Statement: *"Manganese was detected above the Qbo BV (189 mg/kg) in six samples at locations 02-612346 and 02-612347. The highest concentration of 260 mg/kg was detected at location 02-612346 from 49–50 ft bgs. Manganese was detected at concentrations of 356 mg/kg and 329 mg/kg (below the soil BV of 671 mg/kg) at location 02-612346 from 8–9 ft and at location 02-612347 from 5–6 ft bgs, respectively. Manganese concentrations decreased with depth at both locations. The vertical extent of manganese is defined."*

    NMED Comment: *See Comments 8 and 9. Revise the IR accordingly.*

LANL Response

23. "Nature and Extent of Contamination at AOC 02-004(f)" is section 6.12.4.4, not 6.8.4.4 as stated in the comment. See responses to Comments 8 and 9. Manganese concentrations at locations 02-612346 and 02-612347, including those below BVs, are presented in Table 7. The text has been revised to describe the overall decrease in concentrations with depth.

NMED Comment

24. ***Section 6.12.4.4, Nature and Extent of Contamination at AOC 02-004(f), Inorganic Chemicals, page 92***

    Permittees' Statement: *"Iron was detected above the Qbo BV (3700 mg/kg) in six samples at locations 02-612346 and 02-612347. The highest concentration of 6340 mg/kg was detected at location 02-612346 from 25–26 ft bgs. Iron concentrations decreased with depth at both locations. The vertical extent of iron is defined."*

    NMED Comment: *See Comment 9. Revise the IR accordingly.*

LANL Response

24. See response to Comment 9. Iron concentrations at locations 02-612346 and 02-612347, including those below BVs, are presented in Table 8. The text has been revised to describe the overall decrease in concentrations with depth.

NMED Comment

25. ***Section 6.13.4.4, Nature and Extent of Contamination at AOC 02-004(g), Inorganic Chemicals, page 101***

    Permittees' Statement: *"Iron was detected above the Qbo BV (3700 mg/kg) in three samples at location 02-612293. The highest concentration of 5150 mg/kg was detected at location 02-612293 from 35–36 ft bgs. This concentration is comparable to the concentration of 4940 mg/kg detected from 49–50 ft bgs. However, iron was detected at concentrations of 8170 mg/kg and 8990 mg/kg (below the soil BV of 21,500 mg/kg) at location 02-612293 from 5–7 ft and 15–16 ft bgs, respectively. Iron concentrations decreased with depth at this location. The vertical extent of iron is defined."*

    NMED Comment: *See Comments 8 and 9. Revise the IR accordingly.*

LANL Response

25. See responses to Comments 8 and 9. Iron concentrations at location 02-612293, including those below BVs, are presented in Table 9. The text has been revised to describe the overall decrease in concentrations with depth.

NMED Comment

26. ***Section 6.14.4.1, Soil and Rock Sampling, page 103***

    Permittees' Statement: *"Excavation could not be performed at location 02-600561, which is on a steep rocky slope inaccessible by mechanized equipment, because of safety concerns and* *practicability. Instead, deeper and step-out samples were collected to evaluate the extent of PCB contamination at location 02-600561"*

NMED Comment: *Deeper and step-out sampling is not a suitable substitution for removal of contaminated soils. Sample results indicate that this area continues to contain significant contamination levels of PCBs. Sampling also indicates that the Permittees were able to auger by hand to depths over four feet bgs at this location. Therefore, it is reasonable to assume that the area could be excavated by hand and the soils disposed appropriately. Include, in the Phase III Work Plan, a proposal to excavate and dispose of these PCB-contaminated soils or provide justification for technical infeasibility in the revised IR.*

Also, based on the high levels of PCB contamination in this area, there is a high probability that these contaminants have migrated down the drainage below this location. Propose sampling locations down-drainage from this location in the Phase III Work Plan.

LANL Response

26. Although the field crew was able to hand auger to 4 ft at some of the sampling locations near location 02-600561, access was limited to areas between boulders. Sampling was not straightforward on the rocky slope, and excavation was not practicable. Figure 1 of this response shows a photograph of the site, which has been included in the revised IR (as Figure 6.14-2) along with additional justification for the technical infeasibility of a removal action in this area (section 6.14.4.1).

    Polychlorinated biphenyl (PCB) contamination in the area of location 02-600561 does not exceed recreational SSLs and does not pose a potential unacceptable risk to a recreational user. Furthermore, the site is very steep and rocky, does not have any trail access nearby, and is not likely to ever be used recreationally. Given that the extent of PCB contamination in the area around location 02-600561 has been defined and does not pose a potential unacceptable risk under the current and foreseeable future land use, the most appropriate approach is to ensure there is no potential for migration downslope. Very little downslope erosion has occurred as evidenced by the heavy groundcover at the site. This is also supported by the analytical results, which indicate PCBs at less than 1 mg/kg immediately downslope of location 02-600561. Although there is no evidence of erosion, the Laboratory will employ erosion control measures or other best management practices in the area of location 02-600561 during Phase III activities at TA-02. In addition, many of the sites at TA-02 (including SWMU 02-005) are within site monitoring area (SMA) LA-SMA-5.51. The implemented control measure for this SMA is complete containment of runoff, so that any stormwater contamination will not migrate downcanyon.

NMED Comment

27. ***Section 6.14.4.4, Nature and Extent of Contamination at SWMU 02-005, Inorganic Chemicals, page 107***

    Permittees' Statement: *"Because location 02-612380 is located next to a security fence, this zinc concentration, which was only detected at the surface, is likely from the fence rather than a site operation–related source."*

    NMED Comment: *See Comment 11. Remove the interpretive/qualitative statements and modify the IR to discuss the concentrations encountered in relation to the SSLs.*

LANL Response

27. See response to Comment 11. Although the Laboratory believes that the location of the sample relative to the fence is the best explanation for this single elevated concentration of zinc (zinc was not detected above the maximum soil background concentration of 75.5 mg/kg in any other sample from SWMU 02-005), the text in section 6.14.4.4. has been revised as follows:

> Zinc was detected above the soil BV (48.8 mg/kg) in seven samples at five locations but exceeded the maximum soil background concentration (75.5 mg/kg) in only one sample (164 mg/kg from 0–0.5 ft bgs at location 02-612380). Zinc concentrations at location 02-612380 decreased with depth to below BVs. Additionally, the highest detected concentration of zinc at SWMU 02-005 is more than two orders of magnitude less than the residential SSL (23,500 mg/kg). Because there was only one concentration of zinc above the maximum background concentration at SWMU 02-005, and concentrations decreased with depth, the lateral extent of zinc is defined.

NMED Comment

28. Section 6.14.4.4, Nature and Extent of Contamination at SWMU 02-005, Radionuclides, page 109

Permittees' Statement: *"Cesium-137 was detected in four samples at four of the eight locations on the south-facing slope. The highest activity of 0.745 pCi/g was detected at location 02-612382 from 1.5–2.5 ft bgs. Cesium-137 activities decreased with depth or did not show a clear trend with depth at the four locations. Cesium-137 was not detected or not detected above FVs in the lateral samples at the north boundary of the TA-02 core area (section 6.32.2), which is located to the south and downgradient of these locations. TA-21 is located to the north and upgradient of these locations. The presence of cesium-137 at low activities on the south-facing slope may be related to the operations at TA-21, rather than SWMU 02-005."*

NMED Comment: *Cesium-137 activities at all four locations increased with depth. Remove statements that are not supported by the data. Also, see Comment 11. Remove all interpretive and/or qualitative statements from this section.*

LANL Response

28. Cesium-137 was detected at low activities in the deeper samples at four of the eight locations sampled on the south-facing slope during Phase II investigation activities at SWMU 02-005. Cesium-137 was also detected in the shallower samples at all of these locations but was below the FV. Cesium-137 activities decreased with depth at two locations, slightly increased with depth at one location, and were essentially unchanged with depth at the fourth location. Detected cesium-137 activities at SWMU 02-005, including those below the FV, are presented in Table 10.

    All of the cesium-137 activities at SWMU 02-005 are low (an order of magnitude below the residential screening action level). The statement regarding TA-21 has been removed because it does not add to the discussion of the extent of cesium-137 at SWMU 02-005, which is adequately defined. Text in section 6.14.4.4 has been revised to clarify that the lateral extent of cesium-137 at SWMU 02-005 is defined.

NMED Comment

29. Section 6.14.4.4, Nature and Extent of Contamination at SWMU 02-005, Radionuclides, page 109

Permittees' Statement: *"Plutonium-239/240 was detected in eight samples at six locations on the south-facing slope. The highest activity of 0.243 pCi/g was detected at location 02-612379 from 0–0.5 ft bgs. Plutonium-239/240 activities decreased with depth at the five locations. Plutonium-239/240 was detected at an activity of 0.0254 pCi/g at location 02-612384 from 1.5–2.5 ft bgs; however, this activity is only slightly above the MDL (0.018 pCi/g). The presence of plutonium-239/240 at low activities on the south-facing slope is likely related to the operations at TA-21, rather than related to site operation of SWMU 02-005."*

NMED Comment: *Based on Table 6.14-4, plutonium 239/240 was detected at seven locations during the Phase II sampling. The paragraph above is confusing because in the first sentence, six locations are discussed, then in the third sentence, the number is reduced to five. Clarify these discrepancies. Also, see Comment 11. Remove interpretive and/or qualitative statements from this section.*

LANL Response

29. Plutonium-239/240 was detected at seven locations during Phase II sampling. However, one location (02-612407) is not located on the south-facing slope. The statement that "Plutonium-239/240 was detected in eight samples at six locations on the south-facing slope" is correct. The third sentence has been revised to "Plutonium-239/240 activities decreased with depth at five of the six locations on the south-facing slope." The statement regarding TA-21 has been removed because it does not add to the discussion of the extent of plutonium-239/240 at SWMU 02-005, which is adequately defined.

NMED Comment

30. Section 6.15.4.4, Nature and Extent of Contamination at AOC 02-006(a), Inorganic Chemicals, page 116

Permittees' Statement: *"The arsenic concentration of 17 mg/kg from 49–50 ft bgs at location 02-612641 is not consistent with the pattern of detection of arsenic across the site and is not consistent with known operational history of the site. Arsenic was not detected above BVs at the two locations (02-612649 and 02-612642) directly downgradient of location 02-612641."*

NMED Comment: *Location 02-612649 is not directly downgradient of location 02-612641. Correct the statement in the revised IR.*

LANL Response

30. The contour lines shown in Figure 6.15-1 indicate that the site slopes to the east. Location 05-612649 is approximately 70 ft downgradient of location 02-612641, and location 02-612642 is approximately 50 ft downgradient of location 05-612649. The text has been revised to "Arsenic was not detected above BVs at the two locations (02-612649 and 02-612642) downgradient and to the east of location 02-612641".

NMED Comment

31. ***Section 6.15.4.4, Nature and Extent of Contamination at AOC 02-006(a), Inorganic Chemicals, page 116***

    Permittees' Statement: *"Lead was detected above the Qbt 3 BV (11.2 mg/kg) in six samples at two locations. The highest concentration of 67.2 mg/kg was detected at location 02-612648 from 25–26 ft bgs. Lead concentrations decreased with depth at location 02-612468."*

    NMED Comment: *See Comment 9. Revise the IR accordingly.*

LANL Response

31. See response to Comment 9. The text has been revised to "Lead concentrations displayed an overall decrease with depth at location 02-612468."

NMED Comment

32. ***Section 6.15.4.4, Nature and Extent of Contamination at AOC 02-006(a), Inorganic Chemicals, page 116***

    Beryllium was detected above the BV at location 02-612650, but was not discussed in the IR. Provide a discussion and proposed future actions related to the detection of beryllium.

LANL Response

32. As stated in section 6.15.4.3, "Beryllium was detected above the Qbt 3 BV (1.21 mg/kg) in seven samples with a maximum concentration of 2.33 mg/kg. The Gehan and quantile tests indicated site concentrations are not different from background (Figure G-11.0-6, Table G-11). Beryllium is not identified as a COPC in tuff." Because beryllium is not a COPC for SWMU 02-006(a), it is not discussed in the nature and extent section (section 6.15.4.4). No revision to the text is necessary.

NMED Comment

33. ***Section 6.16.4.4, Nature and Extent of Contamination at SWMU 02-006(b), Inorganic Chemicals, page 124***

    Permittees' Statement: *"Iron was detected above the Qbo BV (3700 mg/kg) in four samples at location 02-612374. The highest concentration of 8890 mg/kg was detected at location 02-612374 from 15–16 ft bgs. Iron concentrations decreased with depth at this location. The vertical extent of iron is defined."*

    NMED Comment: *See Comment 9. Revise the IR accordingly.*

LANL Response

33. See response to Comment 9. The text has been revised to "Iron concentrations displayed an overall decrease with depth at this location" (location 02-612374).

NMED Comment

34. ***Section 6.17.4.4, Nature and Extent of Contamination at AOC 02-006(c), Inorganic Chemicals, page 132***

    Permittees' Statement: *"Iron was detected above the Qbo BV (3700 mg/kg) in seven samples at locations 02-612345 and 02-612463. The highest concentration of 10,700 mg/kg was detected at location 02-612463 from 15–16 ft bgs. Iron concentrations decreased with depth at this location, but increased slightly with depth at location 02-612345. Iron concentrations are comparable to others at similar depths across the TA-02 core area. Further sampling for iron is not warranted."*

    NMED Comment: *See Comment 9. Revise the IR accordingly.*

LANL Response

34. See response to Comment 9. The text has been revised to "Iron concentrations displayed an overall decrease with depth at location 02-612463." Iron concentrations at location 02-612345, including those below BVs, are presented in Table 11. Text has been revised to further describe the sample concentrations at location 02-612345.

NMED Comment

35. ***Section 6.17.4.4, Nature and Extent of Contamination at AOC 02-006(c), Inorganic Chemicals, page 132***

    Permittees' Statement: *"Vanadium was detected at concentrations of 7.75 mg/kg and 10.5 mg/kg (below the soil BV of 39.6 mg/kg) at location 02-612345 from 5–6 ft and 15–16 ft bgs, respectively."*

    NMED Comment: *See Comment 8. Revise the IR accordingly.*

LANL Response

35. See response to Comment 8. Vanadium concentrations at location 02-612345, including those below BVs, are presented in Table 12. The text has been revised to "Vanadium concentrations displayed an overall decrease with depth at this location" (location 02-612345).

NMED Comment

36. ***Section 6.17.4.4, Nature and Extent of Contamination at AOC 02-006(c), Organic Chemicals, page 133***

    Permittees' Statement: *"TPH-DRO was detected in five samples at location 02-612345. The highest concentration of 537 mg/kg was detected at location 02-612345 from 5–6 ft bgs. Concentrations of TPH-DRO decreased with depth at this location. The vertical extent of TPH-DRO is defined."*

    NMED Comment: *See Comment 9. Revise the IR accordingly.*

LANL Response

36. See response to Comment 9. The text has been revised to "Concentrations of TPH-DRO displayed an overall decrease with depth at this location" (location 02-612345).

NMED Comment

37. Section 6.19.4.4, Nature and Extent of Contamination at AOC 02-006(e), Inorganic Chemicals, page 141

Permittees' Statement: *"Iron was detected above the Qbo BV (3700 mg/kg) in four samples at location 02-612292. The highest concentration of 7550 mg/kg was detected at location 02-612292 from 15–16.5 ft bgs. Iron concentrations decreased with depth at this location. The vertical extent of iron is defined."*

NMED Comment: *See Comment 9. Revise the IR accordingly.*

LANL Response

37. See response to Comment 9. The text has been revised to "Iron concentrations displayed an overall decrease with depth at this location" (location 02-612292).

NMED Comment

38. Section 6.19.4.4, Nature and Extent of Contamination at AOC 02-006(e), Inorganic Chemicals, page 141

Permittees' Statement: *"Manganese was detected above the Qbo BV (189 mg/kg) in four samples at location 02-612292. The highest concentration of 263 mg/kg was detected at location 02-612292 from 25–26 ft bgs. Manganese concentrations decreased with depth at this location. The vertical extent of manganese is defined."*

NMED Comment: *See Comment 9. Revise the IR accordingly.*

LANL Response

38. See response to Comment 9. The text has been revised to "Manganese concentrations displayed an overall decrease with depth at this location" (location 02-612292).

NMED Comment

39. Section 6.19.4.4, Nature and Extent of Contamination at AOC 02-006(e), Organic Chemicals, page 141

Permittees' Statement: *"These results are not consistent with the patterns of detection of PCBs at other sites, are not consistent with known sources of PCBs at TA-02, and are not consistent with transport properties of PCBs."*

NMED Comment: *See Comment 11. These interpretive and/or qualitative statements are irrelevant to the discussion of nature and extent. Remove interpretive and/or qualitative statements from this section.*

LANL Response

39. See response to Comment 11. These interpretive and/or qualitative statements are relevant to the discussion of the nature of contamination. There is no reasonable explanation for the presence of three different Aroclors from 49–50 ft bgs at location 02-612292. The PCB concentrations detected

from 49–50 ft bgs at location 02-612292 are inconsistent with results from shallow samples at that location. Aroclor-1242 and Aroclor-1260 were not detected in any sample until the bottom of the borehole at 49–50 ft bgs. Aroclor-1254 was detected in only the shallowest of five intervals at 0.0582 mg/kg, approximately an order of magnitude below the concentration detected from 49–50 ft bgs.

Table 13 shows the PCBs detected below 25 ft bgs across the TA-02 core area. PCBs were detected in only four other samples, and the concentrations were lower than or near the estimated quantitation limits (EQLs). The PCB concentrations detected from 49–50 ft bgs at location 02-612292 are not consistent with the patterns of detection of PCBs at other sites, are not consistent with known sources of PCBs at TA-02, and are not consistent with transport properties of PCBs. No revision to the text is necessary.

NMED Comment

40. Section 6.20.3.4, Site Contamination, Inorganic Chemicals, page 162

Permittees' Statement: *"Iron was detected at concentrations of 8180 mg/kg and 6660 mg/kg (below the soil BV of 21,500 mg/kg) at location 02-612388 from 5–6 ft and 15–16 ft bgs, respectively."*

NMED Comment: *See Comment 8. Revise the IR accordingly.*

LANL Response

40. See response to Comment 8. Iron concentrations at location 02-612388, including those below BVs, are presented in Table 14. The text has been revised to describe the overall decrease in concentrations with depth.

NMED Comment

41. Section 6.20.4.4, Site Contamination, Inorganic Chemicals, page 171

Permittees' Statement: *"Aluminum was detected at concentration 6770 mg/kg (below the soil BV of 29,200 mg/kg) at location 02-612393 from 15.5–16.5 ft bgs. "*

NMED Comment: *See Comment 8. Revise the IR accordingly.*

LANL Response

41. See response to Comment 8. Aluminum concentrations at location 02-612393, including those below BVs, are presented in Table 15. The text has been revised to "Aluminum concentrations overall remained unchanged with depth at location 02-612393, and the concentrations are comparable to others at similar depths at the site and across the TA-02 core area."

NMED Comment

42. Section 6.20.4.4, Site Contamination, Inorganic Chemicals, page 171

Permittees' Statement: *"Iron was detected at concentrations of 7400, 8520, and 6600 mg/kg (below the soil BV of 21,500 mg/kg) at location 02-612391 from 5–6 ft bgs; at location 02-612392 from*

5–6 ft bgs; and at location 02-612420 from 6–7 ft bgs, respectively. Iron concentrations decreased with depth at these three locations, and stayed constant with depth at location 02-612393."

NMED Comment: *See Comment 8. Revise the IR accordingly.*

LANL Response

42. See response to Comment 8. Iron concentrations at locations 02-612391, 02-612392, 02-612420, and 02-612393, including those below BVs, are presented in Table 16. The text has been revised to describe the overall decrease in concentrations with depth at locations 02-612391, 02-612392, and 02-612420. The text has been revised to describe the sample concentrations at location 02-612393.

NMED Comment

43. Section 6.20.4.4, Site Contamination, Inorganic Chemicals, page 172

Permittees' Statement: *"Manganese was detected at a concentration of 356 mg/kg (below the soil BV of 671 mg/kg) at location 02-612392 from 5–6 ft bgs. Manganese concentrations decreased with depth at this location."*

NMED Comment: *See Comment 8. Revise the IR accordingly.*

LANL Response

43. See response to Comment 8. Manganese concentrations at location 02-612392, including those below BVs, are presented in Table 17. The text has been revised to describe the overall decrease in concentrations with depth.

NMED Comment

44. Section 6.20.4.5, Summary of Human Health Risk Screening, page 173

Permittees' Statement: *"The total excess cancer risk for the industrial scenario is 6×10^{-76}, which is below the NMED target risk level of 1×10^{-5} (NMED 2009, 108070)."*

NMED Comment: *The risk assessment value of 6×10^{-76} appears to be a typographical error. Correct this error in the revised IR.*

LANL Response

44. The correct value is 6×10^{-7}, and the text has been revised.

NMED Comment

45. Section 6.21.4.4, Nature and Extent of Contamination at SWMU 02-008(a), page 170

Permittees' Statement: *"Location 02-612280, sampled for AOCs 02-004(b,c,d,e) in 2010, was only approximately 25 ft northwest of the site (Figures 6.8-1 and 6.11-1). Results from location 02-612280 are used to evaluate the vertical extent of contamination at SWMU 02-008(a)."*

NMED Comment: *The vertical extent of TAL metals, nitrate, SVOCs, VOCs, cesium-137, plutonium-239/240, uranium-235, and tritium has not been defined at SWMU 02-008(a). Detected concentrations from locations 25 ft away may not be used to define the vertical extent of contamination at this location. Propose sampling to define the vertical extent of TAL metals, nitrate, SVOCs, VOCs, cesium-137, plutonium-239/240, uranium-235, and tritium at SWMU 02-008(a) in the Phase III Work Plan.*

LANL Response

45. Because of the nature of the SWMUs and AOCs within the TA-02 core area, which overlap significantly, the 50-ft boreholes sampled during the Phase II investigation were intended to define the vertical extent of contamination for the TA-02 core area as a whole [excluding SWMUs 02-005 and 02-006(a)]. Within the TA-02 core area, 510 unique locations have been sampled in an area of approximately 6.5 acres. This amounts to over 78 sampling locations per acre, which equates to sampling a 23.5-ft grid over the entire TA-02 core area. Given the frequency with which refusal was encountered during drilling and hand augering because of subsurface cobbles, this is a significantly high sample density. In addition, using data from 25 ft away is not inconsistent with the approach taken (and approved in the work plan) to determine lateral and vertical extent for other sites within the TA-02 core area. Therefore, no additional sampling locations are needed to characterize the vertical extent of contamination at SWMU 02-008(a).

NMED Comment

46. Section 6.22.4.4, Nature and Extent of Contamination at AOC 02-008(c), AOC 02-008(c)(ii), Radionuclides, page 141

Permittees' Statements: *"Uranium-234 was detected above the Qbt 3 BV (1.98 pCi/g) in three samples at location 02-612982. The highest activity of 2.08 pCi/g was detected at location 02-612982 from 35–37 ft bgs. Uranium-234 activities were only slightly above the BV and decreased slightly with depth at this location. The vertical extent of uranium-234 is defined.*

"Uranium-235/236 was detected above the Qbt 3 BV (0.09 pCi/g) in three samples at location 02-612982. The highest activity of 0.143 pCi/g was detected at location 02-612982 from 49–50 ft bgs. This activity is not significantly above the BV and is lower than the activity of 0.236 pCi/g detected at location 02-600625 from 16.5–21 ft bgs, approximately 25 ft north of location 02-612982. The vertical extent of uranium-235/236 is defined.

"Uranium-238 was detected above the Qbt 3 BV (1.93 pCi/g) in three samples at location 02-612982. The highest activity of 2.12 pCi/g was detected at location 02-612982 from 25–26 ft bgs. Uranium-238 activities were only slightly above the BV and decreased slightly with depth at this location. The vertical extent of uranium-238 is defined."

NMED Comment: *Some of the radionuclides discussed in these paragraphs increased in concentration with depth, while others decreased. In either case, the magnitude of change in either direction is slight. There is sufficient uncertainty in concentration trends for radionuclides that additional subsurface evaluation is necessary at this location as part of the future Phase III investigation activities planned for this site. Uranium-235/236 detections in a sample obtained from 25-feet away at a depth of 16.5-21 ft bgs cannot be utilized to define vertical extent of contamination relative to detections at 49-50 ft bgs, as quoted in the second paragraph above. In regard to the paragraph concerning uranium-238 above, see Comment 8. Propose future sampling at this site to define the vertical extent of radionuclide contamination.*

LANL Response

46. After reviewing the sample descriptions on the sample collection logs for location 02-612982, the original media code, Qbt 3, for samples RE02-10-25661, RE02-10-25662, and RE02-10-25663 has been corrected to Qbo. Consequently, the analytical results of inorganic chemicals and radionuclides are now compared to Qbo BVs. This resulted in changes to the the presentation of analytical data in Tables 6.22-5, 6.22-6, and 6.22-8. The text for AOC 02-008(c)(ii) in sections 6.22.4.3 and 6.22.4.4 and Figures 6.22-2 and 6.22-4 have been revised accordingly. Based on the results, the vertical extent of isotopic uranium is defined at AOC 02-008(c)(ii) (section 6.22.4.4). No additional sampling is necessary.

    Although uranium-234 and uranium-238 were removed from the COPC list for AOC 02-008(c)(i,ii), the risk assessments were not affected because these isotopes were not detected above BVs from 0–10 ft bgs; therefore, no revision to Appendix H is necessary.

NMED Comment

47. Section 6.26.4.4, Nature and Extent of Contamination at AOC 02-011(a), AOC 02-011(a)(i), Inorganic Chemicals, page 220

__Permittees' Statement:__ "Iron was detected at a concentration of 7360 mg/kg (below the soil BV of 21,500 mg/kg) at location 02-613571 from 5–6 ft bgs. Iron concentrations decreased with depth at this location."

__NMED Comment:__ See Comment 8. Revise the IR accordingly.

LANL Response

47. See response to Comment 8. Iron concentrations at location 02-613571, including those below BVs, are presented in Table 18. The text has been revised to describe the overall decrease in concentrations with depth.

NMED Comment

48. Section 6.26.4.4, Nature and Extent of Contamination at AOC 02-011(a), AOC 02-011(a)(i), Inorganic Chemicals, pages 220-221

__Permittees' Statement:__ "Manganese was detected at a concentration of 339 mg/kg (below the soil BV of 671 mg/kg) at location 02-613571 from 5–6 ft bgs. Manganese concentrations decreased with depth at this location."

__NMED Comment:__ See Comment 8. Revise the IR accordingly.

LANL Response

48. See response to Comment 8. Manganese concentrations at location 02-613571, including those below BVs, are presented in Table 19. The text has been revised to describe the overall decrease in concentrations with depth.

NMED Comment

49. Section 6.26.4.4, Nature and Extent of Contamination at AOC 02-011(a), AOC 02-011(a)(i), Organic Chemicals, page 221

The Permittees state that lateral and vertical extent of PCBs is defined for both excavation areas except for north of location 02-600385. The lateral and vertical extent of PCBs is not defined to the south of location 02-600385 or to the east of location 02-600386. At both of these locations, PCBs were detected at concentrations above the default soil cleanup value of 1mg/kg and further soil removal is warranted.

In addition, the Permittees did not sample to the west of location 02-600386, stating that a concrete slab prevented sampling. This is not a viable reason for not conducting appropriate sampling. Concrete slabs can be easily cored to access sampling locations or soils can be accessed from the excavation below the base of the concrete. The Permittees must propose to conduct sampling beneath the concrete slab to define the extents of PCB contamination in the Phase III Investigation Work Plan.

LANL Response

49. Location 02-612446 is located to the south of location 02-600385 (Figure 6.26-2). Aroclor-1254 and Aroclor-1260 were detected at location 02-612446, and concentrations increased slightly with depth at this location (Table 6.26-3). However, within the excavation footprints, the concentrations of the confirmation samples were compared with the sample concentrations before excavation to determine vertical extent. In comparison to preexcavation concentrations at location 02-600385, the Aroclor-1254 and Aroclor-1260 concentrations decreased both vertically and laterally to the south. Details of the sample concentrations have been provided in section 6.26.4.4 at AOC 02-011(a)(i). No revision to the text is necessary.

    Location 02-612447 is located to the east of location 02-600386 (Figure 6.26-2). Aroclor-1254 and Aroclor-1260 were detected once each at location 02-612447 (Table 6.26-3), and the concentrations were less than the preexcavated concentrations at location 02-600386. Therefore, Aroclor-1254 and Aroclor-1260 concentrations decreased both vertically and laterally to the east. Details of the sample concentrations have been provided in section 6.26.4.4 at AOC 02-011(a)(i). No revision to the text is necessary.

    Only the Aroclor-1260 concentration in sample RE02-11-320 (3.39 mg/kg) at location 02-613289, the northern step-out location within the excavation for location 02-600385, exceeded the default soil cleanup level of 1 mg/kg (Table 6.26-3). All other confirmation sample concentrations within the excavation for location 02-600386 were below 1 mg/kg (Table 6.26-3). Following additional removal activities at AOC 02-011(a), a risk assessment will be conducted to ensure that the site does not pose a potential unacceptable risk under the current and foreseeable land-use scenario (recreational).

    Location 02-613289 (step-out location north of location 02-600385) is approximately 15 ft west of location 02-600386. Because a large concrete trough prevented extent sampling immediately west of location 02-600386 (Figure 2), location 02-613289 was used to define the extent of contamination to the west. Figure 2 of this response shows the concrete trough and has been added to the revised IR (as Figure 6.26-3). The text for AOC 02-011(a)(i) in section 6.26.4.4 has been revised using location 02-613289 as the step-out location west of location 02-600386. The conclusion has been revised to state that the lateral and vertical extent of Aroclor-1260 are not defined to the west of location 02-600386. This conclusion coincides with that for location 02-600385 [also at AOC 02-011(a)(i)], which states that the lateral and vertical extent of Aroclor-1260 are not defined to the north of location 02-600385. Location 02-613289 is both the step-out location north of location 02-600385 and west of location 02-600386. “Summary of Nature and Extent at AOC 02-011(a)” in section 6.26.4.4 has been revised accordingly.

NMED Comment

50. ***Section 6.26.4.4, Nature and Extent of Contamination at AOC 02-011(a), AOC 02-011(a)(viii), Organic Chemicals, page 227***

    Permittees’ Statement: *“The detections of PCBs in the sample from 49–50 ft bgs at location 02-612292 are not consistent with the patterns of detection of PCBs at other sites, are not consistent with known sources of PCBs at TA-02, and are not consistent with transport properties of PCBs.”*

    NMED Comment: *See Comments 11 and 28. Revise the IR accordingly.*

LANL Response

50. See responses to Comment 11 and Comment 39. No revision to the text is necessary.

NMED Comment

51. ***Section 6.26.4.4, Nature and Extent of Contamination at AOC 02-011(a), AOC 02-011(a)(x), Radionuclides, pages 229-230***

    Uranium-234, uranium-235/236, and uranium-238 concentrations all increased with depth at location 02-612983. No discussion was provided for these constituents. Provide a discussion of the sampling results and proposed Phase III activities to define the extent of contamination. Also, remove language from the Summary section on page 230 stating that the vertical extent of isotopic uranium is defined.

LANL Response

51. After reviewing the sample descriptions on the sample collection logs for location 02-612983, the original media code, Qbt 3, for samples RE02-10-25666, RE02-10-25667, and RE02-10-25668 has been corrected to Qbo. Consequently, the analytical results of inorganic chemicals and radionuclides are now compared to Qbo BVs. This resulted in changes to the presentation of analytical data in Tables 6.26-33 through 6.26-36. The text for AOC 02-011(a)(x) in sections 6.26.4.3 and 6.26.4.4 and Plates 38, 39, and 40 have been revised accordingly. Discussion has been provided regarding the vertical extent of uranium isotopes, which is defined, and no additional characterization activities are necessary.

NMED Comment

52. ***Section 6.29.4.4, Nature and Extent of Contamination at AOC 02-011(d), Inorganic Chemicals, page 248***

    The Permittees infer that the extent of arsenic contamination was defined during the Phase I investigation at AOC 02-011(d), as no additional sampling was conducted during the Phase II investigation to further define the extent of arsenic contamination. It is uncertain whether the extent of arsenic has been adequately defined at AOC 02-011(d) since one detection of arsenic in sediment (8.7 mg/kg) at sample location 02-01247 (Figure 6.29-2) was above the sediment background *comparison value of 3.98 mg/kg. Also, no subsurface samples were collected along the industrial waste line and additional samples may reveal increasing concentrations of arsenic with increasing depth. Additional sampling is warranted at AOC 02-011(d) in order to further define the extent of contamination of arsenic for the following reasons:*

- *The elevated detection of arsenic has led to a residential risk estimate that exceeds the NMED target risk level of $1E^{-5}$ (Section H-4.5.26).*
- *Section H-4.4.2 states that the elevated detection of arsenic is naturally occurring.*
- *Section H-4.5.26 states that there are no unacceptable risks to residents from exposure to soil/sediment at AOC 02-011(d).*

The Permittees must propose to further evaluate the nature and extent of contamination of arsenic at AOC 02-011(d) in the Phase III Investigation Work Plan.

LANL Response

52. Only a surface sample (0–0.5 ft bgs) was collected at location 02-01247 in July 2000. However, two samples (0–0.5 ft and 2–2.5 ft bgs) were collected at location 02-600574 in 2007, approximately 12 ft to the west of location 02-01247. Arsenic was detected at concentrations of 2.26 mg/kg from 0–0.5 ft bgs and 1.68 mg/kg from 2–2.5 ft bgs (both below the soil BV of 8.17 mg/kg) at location 02-600574 (see analytical results in Appendix F). These concentrations are lower than the concentration detected from the surface sample at location 02-01247 (8.7 mg/kg). Therefore, vertical extent of arsenic was defined during the Phase I investigation. No revision to the text is necessary.

    AOC 02-011(d) was the outfall that discharged effluent from the Omega West Reactor equipment building [AOC 02-004(f)]. The line that ran from the equipment building is part of AOC 02-004(f), and subsurface sampling was conducted along the line as part of the investigation at AOC 02-004(f) (section 6.12).

NMED Comment

53. Section 6.29.5, Summary of Human Health Risk Screening, page 249

Permittees' Statement: *"The total excess cancer risk for the residential scenario is 2×10^{-5}, which is above the NMED target risk level of 1×10^{-5} (NMED 2009, 108070). The cancer risk is partly because of arsenic and is overestimated. As discussed in the uncertainty analysis in Appendix H (section H-4.4.2), the arsenic EPC is similar to being exposed to a naturally occurring arsenic level, and the risk does not incrementally increase above that which would result from exposure to naturally occurring levels of arsenic. The risk is reduced to approximately 3×10^{-6} without arsenic, and is below the NMED target risk level of 1×10^{-5} (NMED 2009, 108070).".*

NMED Comment: *See Comment 8. Revise the IR accordingly.*

LANL Response

53. Comment 8 is not relevant to the statement quoted by NMED. It is assumed NMED's comment is related to Comments 22 or 65. See responses to Comments 22 and 65. Although the discussion of arsenic was deleted for AOCs 02-004(b,c,d), the discussion was not deleted for AOC 02-011(d) because it is relevant to the analysis of the uncertainty associated with the risk estimate for this site.

NMED Comment

54. Section 8.6.4, Nature and Extent of Contamination at TA-26, Inorganic Chemicals, pages 286

Permittees' Statement: *"Aluminum concentrations decreased with depth at this location."*

NMED Comment: *Based on Table 8.6-2, aluminum concentrations did not decrease with depth at this location (see Comment 8). Revise the IR accordingly.*

LANL Response

54. See response to Comment 8. Aluminum concentrations at location 26-612297, including those below BVs, are presented in Table 20. Text has been revised to describe the overall decrease in concentrations with depth at location 26-612297.

NMED Comment

55. Section 8.6.4, Nature and Extent of Contamination at TA-26, Inorganic Chemicals, pages 287

Permittees' Statement: *"Barium concentrations decreased with depth at this location."*

NMED Comment: *Based on Table 8.6-2, barium concentrations did not decrease with depth at this location (see Comment 8). Revise the IR accordingly.*

LANL Response

55. See response to Comment 8. Barium concentrations at location 26-612297, including those below BVs, are presented in Table 21. Table 21 shows that barium concentrations remained unchanged with depth. The statement, "Barium concentrations decreased with depth at this location," has been removed from the text. This does not affect the conclusion that lateral and vertical extent of barium are defined because, as stated in text, the Gehan and quantile tests indicated site concentrations are not different than background.

NMED Comment

56. Section 8.6.4, Nature and Extent of Contamination at TA-26, Inorganic Chemicals, pages 287

Permittees' Statement: *"Cobalt concentrations decreased with depth at this location."*

NMED Comment: *Based on Table 8.6-2, cobalt concentrations did not decrease with depth at this location (see Comment 8). Revise the IR accordingly.*

LANL Response

56. See response to Comment 8. Cobalt concentrations at location 26-612297, including those below BVs, are presented in Table 22. Cobalt concentrations displayed an overall decrease with depth. The statement, "Cobalt concentrations decreased with depth at this location," has been removed from the text. This does not affect the conclusion that lateral and vertical extent of cobalt are defined because, as stated in text, the Gehan and quantile tests indicated site concentrations are not different than background.

NMED Comment

57. Section 8.6.4, Nature and Extent of Contamination at TA-26, Inorganic Chemicals, pages 287

> ***Permittees' Statement:*** *"Copper was detected above the Qbt 3 BV (4.66 mg/kg) in seven samples at four locations. The highest concentration of 12 mg/kg was detected in the deepest sample (9–10 ft bgs) at location 26-612301. Copper concentrations decreased with depth at location 26-612297, but increased with depth at locations 26-612300, 26-612301, and 26-612302. The highest copper concentrations detected at locations 26-612300 and 26-612302 are 8.1 mg/kg and 6.9 mg/kg, respectively, which do not appear to be the result of a release because they are not significantly above the maximum tuff background concentration (6.2 mg/kg). Therefore, the vertical extent is defined at locations 26-612300 and 26-612302. However, the vertical extent of copper is not defined at location 26-612301, and the lateral extent of copper is not defined to the southeast at this location."*
>
> ***NMED Comment:*** *The vertical extent of copper contamination has not been defined for locations 26-612300, 26-612301, and 26-612302. Copper concentrations increased with depth at all three locations. Revise the text accordingly and propose additional sampling at each location in the Phase III Investigation Work Plan.*

LANL Response

57. The text in section 8.6.4 has been revised to state that "The lateral and vertical extent of copper are not defined at locations 26-612300 and 26-612301." "Summary of Nature and Extent at TA-26" in section 8.6.4 and section 9.2.3 have also been revised accordingly. The concentrations detected from location 26-612302 are 6.4 mg/kg from 5–6 ft bgs and 6.9 mg/kg from 9–10 ft bgs (Table 8.6-2). Both concentrations are only slightly above the maximum tuff background concentration (6.2 mg/kg) and likely reflect natural variability of the tuff unit. No deeper sampling is warranted at this location.

NMED Comment

58. Section 8.6.4, Nature and Extent of Contamination at TA-26, Inorganic Chemicals, pages 287

> ***Permittees' Statement:*** *"Lead concentrations decreased with depth at both locations."*
>
> ***NMED Comment:*** *Based on Table 8.6-2, lead concentrations did not decrease with depth at these locations (see Comment 8). Revise the IR accordingly.*

LANL Response

58. See response to Comment 8. Lead concentrations at locations 26-612295 and 26-612297, including those below BVs, are presented in Table 23. The text has been revised to describe the overall decrease in concentrations with depth.

NMED Comment

59. Section 8.6.4, Nature and Extent of Contamination at TA-26, Inorganic Chemicals, pages 288

> ***Permittees' Statement:*** *"Magnesium concentrations decreased with depth at both locations."*
>
> ***NMED Comment:*** *Based on Table 8.6-2, magnesium concentrations did not decrease with depth at location 26-612297 (see Comment 8). Revise the IR accordingly.*

LANL Response

59. See response to Comment 8. Magnesium concentrations at location 26-612297, including those below BVs, are presented in Table 24. The text has been revised to describe that magnesium concentrations decreased with depth at location 26-612297.

NMED Comment

60. Section 8.6.4, Nature and Extent of Contamination at TA-26, Inorganic Chemicals, pages 288

> ***Permittees' Statement:*** *"Nickel was detected above the Qbt 3 BV (6.58 mg/kg) in seven samples at four locations. The highest concentration of 22.6 mg/kg was detected at location 26-612294 from 9–10 ft bgs. Nickel concentrations increased with depth at locations 26-612294 and 26-612300 and decreased with depth at locations 26-612297 and 26-612301. The highest nickel concentration detected at location 26-612300 is 8.9 mg/kg, which does not appear to be the result of a release because it is not significantly above the maximum tuff background concentration (7 mg/kg). Therefore, the vertical extent of nickel is defined at location 26-612300. However, the vertical extent of nickel is not defined at location 26-612294, and the lateral extent of nickel is not defined to the west at this location."*
>
> ***NMED Comment:*** *The vertical extent of nickel contamination has not been defined for locations 26-612294, 26-612297, and 26-612300. According to Table 8.6-2, nickel concentrations increased with depth at all three locations (see Comment 8). Revise the text accordingly and propose additional sampling at each location in the Phase III Investigation Work Plan.*

LANL Response

60. Nickel concentrations at location 26-612297, including those below BVs, are presented in Table 25. The text has been revised to describe the overall decrease in concentrations with depth at location 26-612297. For locations 26-612294 and 26-612300, the text in section 8.6.4 has been revised to state that "The lateral and vertical extent of nickel are not defined at locations 26-612294 and 26-612300." "Summary of Nature and Extent at TA-26" in section 8.6.4 and section 9.2.3 have also been revised accordingly.

NMED Comment

61. Section 8.6.4, Nature and Extent of Contamination at TA-26, Inorganic Chemicals, pages 288

> ***Permittees' Statement:*** *"Selenium was detected above the Qbt 3 BV (0.3 mg/kg) in 15 samples and above the soil BV (1.52 mg/kg) in 4 samples at all eight locations. The highest concentration of 5.4 mg/kg was detected at location 26-612300 from 5–6 ft bgs. Selenium concentrations decreased with depth at six of the eight locations, did not change with depth at location 26-612294 at a concentration of 1.6 mg/kg, and increased slightly with depth at location 26-612302 from 1.4 mg/kg to 1.7 mg/kg. These concentrations are lower than previously detected concentrations. Selenium concentrations also decreased laterally from previously sampled locations. The lateral and vertical extent of selenium are defined on the canyon slope."*
>
> ***NMED Comment:*** *Based on Table 8.6-2, selenium was detected above BVs in samples from nine locations, not eight as stated in the text. Table 8.6-2 also shows that selenium concentrations increased with depth at two locations (26-612298 and 26-612302). Revise the IR to correct the discrepancies.*

LANL Response

61. The sample and location totals have been revised to indicate that selenium was detected above the BV at nine locations. Similar revisions have also been made for calcium in section 8.6.4. Selenium concentrations in the deepest samples (9–10 ft bgs) at locations 26-612298 and 26-612302 are 2.3 mg/kg and 1.7 mg/kg, respectively (Table 8.6-2). These concentrations are lower than previously detected concentrations (ranging from 3.04 mg/kg to 13.9 mg/kg) from samples taken in 2007 on the canyon slope at TA-26. Because all 2010 samples were deeper than the 2007 samples and had lower concentrations, the vertical extent of selenium is defined on the canyon slope at TA-26.

NMED Comment

62. Table 7.3-3, Organic Chemicals Detected at AOC 21-028(c), pages 766

The Table is missing a footnote for (i). Provide a footnote for (i) in the revised IR.

LANL Response

62. The footnote labeled “j” should have been labeled “i.” The footnote has been revised.

NMED Comment

63. Table 7.3-4, Radionuclides Detected or Detected above BVs/FVs at AOC 21-028(c), pages 769

The Table is missing a footnote for (e). Provide a footnote for (e) in the revised IR.

LANL Response

63. The footnote has been added.

NMED Comment

64. Table 8.6-4, Radionuclides Detected or Detected above BVs/FVs at TA-26, pages 782

The Table contains a footnote labeled (e), which should be labeled (d). Correct this mistake in the revised IR.

LANL Response

64. The footnote has been revised.

NMED Comment

65. Section H-4.4.2, Exposure Assessment, page H-33

The uncertainty discussions for AOCs 02-006(b), 02-006(e), and 02-011(d) state that elevated levels of arsenic are likely background related based on comparing the 95% UCL of the mean with background comparison values. It is incorrect to compare a mean concentration with a background comparison value. The background value (i.e., 95% upper tolerance limit) is used for point-to-point comparisons. Because the UCL is not a point estimate, it cannot be used as an estimate of an individual site observation for comparison to background threshold values. Remove these discussions *from the text in Section H-4.4.2 and retain arsenic for evaluation in the risk assessment conclusions for AOCs 02-006(b), 02-006(e), and 02-011(d). Determine if additional lines of evidence would suggest that the elevated detections of arsenic are representative of background concentrations.*

LANL Response

65. The Laboratory did not state that the elevated arsenic levels are likely background related and did not compare the UCL to the upper tolerance limit (UTL) for arsenic. The uncertainty analysis states that the exposure to arsenic at a site cannot be distinguished from exposure to naturally occurring levels of arsenic, i.e., the mean exposure is similar to exposure to arsenic background concentrations. The discussion focuses on the fact that the EPC (maximum or mean exposure) is similar to the individual arsenic concentrations measured in uncontaminated areas of the Pajarito Plateau, not the background comparison values (i.e., BVs) or 95% UTLs. As a result, the risk associated with the exposure is not incrementally increased above that from arsenic concentrations found in uncontaminated areas of the Pajarito Plateau. This is particularly true for arsenic because of the naturally high levels found in the soil in New Mexico. Thus, the arsenic risk, when included in the total excess cancer risk, overestimates the site risk and should not be included in the total excess cancer risk calculated for the site.

    The uncertainty analysis discusses aspects of the conservative risk-screening process that over- or underestimate potential risk to receptors and thereby affect site decisions. In the case of the risk-screening assessments, one uncertainty related to the exposure of receptors to concentrations that are not likely to result in adverse impacts is discussed. This overestimation of risk to a receptor exposed either to naturally occurring levels or to an exposure level that cannot be distinguished from naturally occurring levels is described and put in the context of whether an increased risk above background exists. Therefore, the discussion and analysis are appropriate when determining whether or not COPCs are contributing to potential risk at a site. This uncertainty discussion and analysis are not related to whether an inorganic chemical was detected above background and is a COPC, but rather whether COPCs identified represent a potential risk to receptors at the concentration determined to represent exposure at the site. Furthermore, the presence of a concentration or concentrations above the BV(s) that resulted in the identification of a COPC does not mean the level of exposure from the COPC poses an increased risk.

    The EPCs represented by the maximum detected concentrations are a deliberate overestimate of the exposure (and therefore the risk). If the EPC is the same as, or cannot be distinguished from, exposure to naturally occurring levels, then the risk to receptors (if present) is no different than would result from exposure to naturally occurring levels, that is, whatever risk may potentially be present is the same as that found in uncontaminated areas of the Pajarito Plateau. If the EPC is a UCL, then the concentration represents a reasonable estimate of the concentration the receptor is likely to come in contact with over time. If the reasonable estimate of the exposure concentration cannot be distinguished from exposure on average to naturally occurring levels, then any risk to receptors also cannot be distinguished from risk that may be from naturally occurring levels, that is, the potential risk from uncontaminated areas.

    Because arsenic was identified as a COPC, it is included in the risk-screening assessment to derive the total excess cancer risk for the residential scenario as well as the other scenarios. As is standard risk practice, the uncertainty analysis looks at whether the calculated risk is realistic and representative of exposure and site conditions. In the cases of SWMU 02-006(b) and AOCs 02-006(e) and 02-011(d), the calculated risk is overestimated.

For SWMU 02-006(b) and AOC 02-006(e), only one concentration collected from the 0–10 ft depth interval at each site is above a BV. The concentrations at these sites [0.902 mg/kg at SWMU 02-006(b) and 2.7 mg/kg at AOC 02-006(e)] were detected in Qbo tuff above the BV (0.56 mg/kg), while all other concentrations were detected in soil or Qal below the soil BV (8.17 mg/kg). Therefore, 51 of 52 arsenic results at SWMU 02-006(b) and 36 of 37 arsenic results at AOC 02-006(e) used to calculate the UCLs from 0–10 ft bgs are background concentrations. In addition, the Qbo concentrations (detected at 9–15 ft and 9–11 ft bgs, respectively) are similar to or less than the concentrations detected in soil and Qal; the maximum arsenic concentrations detected from 0–10 ft bgs were 3.69 mg/kg and 4.74 mg/kg, respectively. If the concentrations detected in Qbo (0.902 mg/kg and 2.7 mg/kg) are used as the EPCs rather than the calculated UCLs (2.026 mg/kg and 2.635 mg/kg, respectively) for these two sites, the potential residential risks are indistinguishable from risk caused by background and do not result in an incremental increase in risk under the residential scenario. Furthermore, because arsenic in Qbo is not more toxic than arsenic in soil, and the vast majority of the arsenic concentrations are in soil/Qal, a comparison of the site risk from arsenic with the soil background risk from arsenic is appropriate. The arsenic site risks were 5×10^{-6} and 7×10^{-6} for SWMU 02-006(b) and AOC 02-006(e), respectively; the arsenic site risks are comparable to the calculated background risk for arsenic in soil, which ranges from 1.2×10^{-5}, based on a UCL of 4.63 mg/kg, to 2.4×10^{-5}, based on the maximum arsenic soil background concentration. Thus, risk from arsenic cannot be distinguished from, or does not incrementally increase above, that associated with naturally occurring levels. Because there is no incremental increase in risk associated with arsenic above that which the resident would receive from uncontaminated soil, the risk should not be part of the total excess cancer risk estimate for the site.

For AOC 02-011(d), the maximum detected concentration of arsenic (8.7 mg/kg) was the EPC and substantially overestimates the exposure and risk. Arsenic is a COPC primarily because of this one concentration above the sediment BV. No other sample had detected concentrations above BVs. Furthermore, given the location of the sample and the complete disturbance of the site following construction of the facilities and the subsequent D&D in 2003, it is unlikely that the medium sampled in 2000 remains as sediment. Because of regrading of the site, the medium is likely a mixture of soil, sediment, alluvium, tuff, and fill, and the sample result should be compared to soil background rather than to sediment background. The result of this comparison is that the maximum detected arsenic concentration is below the maximum arsenic soil background concentration (9.3 mg/kg), and arsenic would not be a COPC at AOC 02-011(d). In addition, because arsenic in sediment is not more toxic than arsenic in soil, a comparison of the site risk from arsenic with the soil background risk from arsenic is appropriate. The UCL for arsenic at AOC 02-011(d) is 6.31 mg/kg, which results in a risk of 1.6×10^{-5}. The arsenic site risk is comparable to the calculated background risk for arsenic in soil; background risk ranges from 1.2×10^{-5}, based on a UCL of 4.63 mg/kg, to 2.4×10^{-5}, based on the maximum arsenic soil background concentration. Thus, if arsenic is retained as a COPC, the risk from arsenic cannot be distinguished from, or does not incrementally increase above, that associated with naturally occurring arsenic levels. Because there is no incremental increase in risk associated with arsenic above that which the receptor would receive from uncontaminated soil, the risk should not be part of the total excess cancer risk estimate for the site.

NMED Comment

66. Sections H-4.5.10, AOC 02-004(g) and H-4.4.2, Exposure Assessment, pages H-44 and H-33

The risk assessment conducted at AOC 02-004(g) demonstrates that the total dose to residents is 17 mrem/yr. This dose is greater than the DOE target dose limit of 15 mrem/yr. Sections H-4.5.10 and H-4.4.2 explain that the majority of the dose is due to a single sample with a high detection of *cesium-137. The conclusions of the risk assessment state that no unacceptable doses exist for a resident based on the removal of the high detection of cesium-137 from the radionuclide dataset. No reason is provided for why it is justified to remove this detection from the dataset. Rather a more compelling argument would be a spatial evaluation of risk driven by a single detection. However, a residential receptor would be exposed to all surface soil at AOC 02-004(g) and removal of this detection of cesium-137 from consideration in the risk assessment is not justified. Further, radionuclide COPCs are of particular concern at Middle Los Alamos Canyon Aggregate Area based on site history. Provide additional lines of evidence to justify the radiological risk at AOC 02-004(g).*

LANL Response

66. The Laboratory did not remove the elevated activity of cesium-137 from the database or the dose assessment. The total dose calculated for radionuclides is intended to be the total dose above background and is not inclusive of the dose contributed by background/fallout activities. Therefore, it is standard practice to subtract the non-Laboratory related portion of the activity (background or fallout) from the reported activity in order to present the dose related to potential Laboratory operations and not background/fallout. In the case of cesium-137 at AOC 02-004(g), the EPC is the maximum detected activity at the site in a surface soil sample (2.88 pCi/g from 0.0–0.5 ft bgs). As a result, the soil FV for cesium-137 (1.65 pCi/g) applies and is subtracted from the maximum detected activity to provide the activity that may be site related. Subtracting the cesium-137 FV from the maximum detected activity results in an EPC above background of 1.23 pCi/g for cesium-137. This activity results in a cesium-137 dose of 3.2 mrem/yr and a total dose of approximately 12 mrem/yr, which is below the DOE target dose of 15 mrem/yr. Subtraction of background/fallout was not performed for other sites and radionuclides because the doses were already below the 15 mrem/yr target level, or doses were above the target level and subtraction of background/fallout did not make a difference in the total dose being above 15 mrem/yr. Text has been revised to provide clarification.

    Dose assessment procedures are based on the interagency guidance document Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM). The purpose of MARSSIM (available at http://www.epa.gov/radiation/marssim/) is to provide guidance for the release of real and personal property to the public. MARSSIM is a multi-agency document that involves the Nuclear Regulatory Commission, DOE, and EPA and provides clear guidance on background subtraction in Appendix D. This document is also referenced in related DOE Orders, including DOE Order 5400.5 “Radiation Protection of the Public and the Environment.” The Laboratory is required by DOE Order 5400.5 to assess radiation doses to the public incurred from Laboratory operations (past and present). Specifically, DOE Order 5400.5 requires the Laboratory to perform dose assessments for any residual radioactive material, specifically defined as “any radioactive material which is in or on soil, air, equipment or structures as a consequence of past operations or activities.” This definition specifically excludes naturally occurring radioactive materials and global fallout, which, according to the regulations, is background radiation. DOE Order 458.1, the upcoming replacement to DOE Order 5400.5, also specifically excludes background radiation from comparisons of public dose at a facility with regulatory levels. Laboratory procedures for dose assessment comply with DOE Order 5400.5 and direct that background radiation is subtracted out.

NMED Comment

67. Tables H-2.2-1 through H-2.2-56, pages H-71 through H-164

Most of the tables display a negative value for the minimum concentrations (nondetected and some detected concentrations) for radionuclide COPCs. It is not possible to have a negative concentration.

Modify Tables H-2.2-1 through H-2.2-56 accordingly and address this issue either in a footnote or in the text with a corresponding reference in the tables.

LANL Response

67. It is not unusual for nondetect levels of radionuclides to be reported as negative values. It is possible to get negative concentrations for radioactive measurements in soil, especially if the concentrations are very low. Nuclear instrumentation detects all radiation as it passes through a detector and deposits energy. The analysis of samples for radionuclides involves determining the counts per minute for a sample. The source of radiation passing through the detector can come from background sources and/or from a contaminated sample (e.g., soil, air filter, water sample, etc.). Different techniques are used to separate background radiation from sample contamination, such as shielding and energy discrimination of the radiation, but even the best efforts are imperfect. Therefore, even if a sample blank (i.e., no contamination) is used, there is almost always a background count measured. Before analyzing the sample, a blank or background sample is inserted, and the "background count" is measured. The "background count" is then subtracted from the total sample count, which may result in a negative value if the counts for the sample were sufficiently low. Thus, when calculating the net count rate (i.e., sample count minus the background count) of a sample with little or no radioactivity, it is possible to measure a negative activity. As the amount of radioactive material in a sample increases above background levels, the negative net values are more unlikely. An accurate measurement of a sample requires that this background count be subtracted out.

    The negative numbers indicate that the sample had no measureable radioactivity above background levels. The negative values are nondetects as indicated by the associated U qualifier and are reported as presented in the analytical laboratory reports and the Excel data tables in Appendix F (on DVD). Tables H-2.2-14, H-2.2-35, and H-2.2-57 have been revised to include the U qualifier after each negative result. No other revisions or modifications to the tables in Appendix H are necessary.

NMED Comment

68. Table H.2-2-16, EPCs for AOC 02-004(e) for the Residential Scenario, page H-98

There is a typographical error for the EPC for 2,3,7,8-tetrachlorodibenzodioxin (105E-6 mg/kg). The EPC should be 1.05E-6 mg/kg, as shown in Table 6.11-3. Revise Table H.2-2-16 accordingly.

LANL Response

68. The EPC for 2,3,7,8-tetrachlorodibenzodioxin has been revised to 1.05E-06 mg/kg in Table H-2.2-16.

NMED Comment

69. Table H-2.2-19, EPCs for AOC 02-004(g) for the Industrial and Recreational Scenarios, page H-103

The analyte 1,2,3,4,7,8-hexachlorodibenzodioxin is not listed on Table H-2.2-19, and is inconsistent with Table 6.13-3. This does not affect the conclusions of the risk assessment as 1,2,3,4,7,8-hexachlorodibenzodioxin was included for evaluation in the risk assessment. However, modify Table H-2.2-19 to include 1,2,3,4,7,8-hexachlorodibenzodioxin.

LANL Response

69. Hexachlorodibenzodioxin[1,2,3,4,7,8-] and the corresponding values have been added to Table H-2.2-19.

NMED Comment

70. Table H-4.2-59, Dioxin/Furan Calculation for AOC 02-004(b,c,d) for the Industrial and Recreational Scenarios, page H-197

The toxic equivalency calculations are incorrect for the following constituents of potential concern (COPCs):

- *Heptachlorodibenzodioxin[1,2,3,4,6,7,8-]*
- *Hexachlorodibenzodioxin[1.2.3.4.7.8-]*
- *Hexachlorodibenzodioxin[1,2,3,6,7,8-]*
- *Hexachlorodibenzodioxin[1,2,3,7,8,9-]*
- *Octachlorodibenzodioxin[1,2,3,4,6,7,8,9-]*
- *Pentachlorodibenzodioxin[1,2,3,7,8-]*

Therefore, the 2,3,7,8-tetrachlorodibenzodioxin toxic equivalency sum has been underestimated. Modify Table H-4.2-69 accordingly and any other tables in the IR that would be affected.

LANL Response

70. The toxic equivalency calculations for the COPCs listed above were revised in Table H-4.2-59. This revision, in addition to changes per Comments 3 and 71, resulted in an increase in the 2,3,7,8-TCDD sum, which in turn affected the total excess cancer risks for the industrial scenario (Table H-4.2-60) and the recreational scenario (Table H-4.2-63). Revised human health cancer risk calculations and conclusions are presented in section 6.8.5 of the main text and sections H-4.2.7 and H-4.5.7 of Appendix H.

    Toxic equivalency calculations were also revised in Table H-4.2-81. This revision did not affect the total excess cancer risks for AOC 02-004(f) for the industrial scenario (Table H-4.2-82) and recreational scenario (Table H-4.2-85).

NMED Comment

71. Table H-4.2-59, Dioxin/Furan Calculation for AOC 02-004(b,c,d) for the Industrial and Recreational Scenarios, page H-197

The exposure point concentration (EPC) listed for heptachlorodibenzofuran[1,2,3,4,7,8,9-] (6.57E-6 mg/kg) is inconsistent with the EPC of 1.468E-5 mg/kg listed on Table H-2.2-13. Modify Table H-4.2-59 accordingly, and any other tables that would be affected.

LANL Response

71. The EPC listed for 1,2,3,4,7,8,9-heptachlorodibenzofuran was corrected in Table H-4.2-59 to 1.47E-05. This revision, in addition to changes per Comments 3 and 70, also resulted in changes to Tables H-4.2-60 and H-4.2-63. Revised human health cancer risk calculations and conclusions are presented in section 6.8.5 of the main text and sections H-4.2.7 and H-4.5.7 of Appendix H.

NMED Comment

72. Table H-4.2-78, Residential Carcinogenic Screening Evaluation for AOC 02-004(e), page H-208

The residential risk from exposure to dioxins/furans has been underestimated at AOC 02-004(e) due to an incorrect TEF value as explained in General Comment Number 2. As the current risk is estimated to be at the NMED target level of 1E-5, the corrected risk level is likely to be above the NMED target risk level of 1E-5. Utilizing the correct TEF for heptachlorodibenzodioxin[1,2,3,4,6,7,8-], determine if COPCs present at AOC 02-004(a) would pose an unacceptable level of risk to residential receptors.

LANL Response

72. The TEF for 1,2,3,4,6,7,8-heptachlorodibenzodioxin was revised to 0.01 in Table H-4.2-77. As a result, Table H-4.2-78 was also revised. The resulting residential cancer risk of 2×10^{-5} is above the NMED target risk level of 1×10^{-5}. Revised human health cancer risk calculations and conclusions are presented in section 6.11.5 of the main text and in sections H-4.2.8 and H-4.5.8 of Appendix H. Because the revised cancer risk for the residential scenario exceeded the NMED target risk level of 1×10^{-5}, the sites and totals listed in section 9.3.1 and the totals in the Executive Summary have been revised accordingly.

NMED Comment

73. Table H-4.2-97, Residential Noncarcinogenic Screening Evaluation for AOC 02-004(g), page H-218

The residential risk from exposure to dioxins/furans has been underestimated at AOC 02-004(g) due to an incorrect TEF value as explained in General Comment Number 2. As the current risk is estimated to be at the NMED target level of 1E-5, the corrected risk level is likely to be above the NMED target risk level of 1E-5. Utilizing the correct TEF for heptachlorodibenzodioxin[1,2,3,4,6,7,8-], determine if COPCs present at AOC 02-004(g) would pose an unacceptable risk to residential receptors.

LANL Response

73. The TEF for 1,2,3,4,6,7,8-heptachlorodibenzodioxin was revised to 0.01 in Table H-4.2-99. No other revisions to the main text or Appendix H are necessary.

NMED Comment

74. Tables H-4.2-94, H-4.2-97, and H-4.2-101, pages H-216, H-218, and H-220

The EPC listed for 2-methylnaphthalene (0.0178 mg/kg) is inconsistent with the EPC value of 0.0152 mg/kg listed on Tables H-2.2-19 and H-2.2-20. It is noted that the EPC used is greater and *therefore results in a more conservative hazard index, and therefore does not affect the risk assessment. However, modify Tables H-4.2-94, H-4.2-97, and H-4.2-101 to display the correct EPC for 2-methylnaphthalene.*

LANL Response

74. The EPC for 2-methylnaphthalene was revised to 0.0152 mg/kg in Tables H-4.2-94, H-4.2-97, and H-4.2-101.

REFERENCES

EPA (U.S. Environmental Protection Agency), December 1989. "Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part A), Interim Final," EPA/540/1-89/002, Office of Emergency and Remedial Response, Washington, D.C. (EPA 1989, 008021)

LANL (Los Alamos National Laboratory), May 2008. "Investigation Report for Middle Los Alamos Canyon Aggregate Area, Revision 1," Los Alamos National Laboratory document LA-UR-08-2725, Los Alamos, New Mexico. (LANL 2008, 101669.12)

LANL (Los Alamos National Laboratory), February 2009. "Phase II Investigation Work Plan for Middle Los Alamos Canyon Aggregate Area, Revision 1," Los Alamos National Laboratory document LA-UR-09-1206, Los Alamos, New Mexico. (LANL 2009, 105073)

LANL (Los Alamos National Laboratory), December 21, 2009. "Request for Concurrence on Changes to the Format and Content of Investigation Reports Prepared by the Los Alamos National Laboratory," Los Alamos National Laboratory letter (EP2009-0688) to J.P. Bearzi (NMED-HWB) from M.J. Graham (LANL) and D.R. Gregory (DOE-LASO), Los Alamos, New Mexico. (LANL 2009, 108179)

NMED (New Mexico Environment Department), May 23, 2008. "Notice of Approval, Investigation Report for Middle Los Alamos Canyon Aggregate Area," 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 2008, 101702)

NMED (New Mexico Environment Department), March 25, 2009. "Approval, Middle Los Alamos Canyon Aggregate Area Phase II Work Plan, Revision 1," 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 2009, 105595)

NMED (New Mexico Environment Department), November 4, 2009. "Notice of Disapproval, Investigation Report for North Ancho Canyon Aggregate Area," 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 2009, 108143)

Figure 1 Photograph looking north (upslope) at location 02-600561

Figure 2 Photograph of the concrete trough at AOC 02-011(a)(i)

Table 1
Analytical Data for Responses to Comments 8 and 12

Site	Sample ID	Location ID	Depth (ft)	Media	Analyte	Concentration (mg/kg)	BV (mg/kg)	Qualifier
02-003(a)	RE02-10-21768	02-612348	5–7	QAL	Iron	7520	21500	NQ*
02-003(a)	RE02-10-21769	02-612348	15–16	QAL	Iron	4770	21500	NQ
02-003(a)	RE02-10-21770	02-612348	25–26	QBO	Iron	5350	3700	NQ
02-003(a)	RE02-10-21771	02-612348	35–36	QBO	Iron	5390	3700	NQ
02-003(a)	RE02-10-21772	02-612348	49–50	QBO	Iron	5600	3700	NQ
02-003(a)	RE02-10-21904	02-612389	5–6	QAL	Iron	6360	21500	NQ
02-003(a)	RE02-10-21905	02-612389	18–19	QAL	Iron	9830	21500	NQ
02-003(a)	RE02-10-21906	02-612389	25–27	QBO	Iron	4930	3700	NQ
02-003(a)	RE02-10-21907	02-612389	35–36	QBO	Iron	5450	3700	NQ
02-003(a)	RE02-10-21908	02-612389	49–50	QBO	Iron	5750	3700	NQ

Note: Shading denotes value less than the BV.

* NQ = Not qualified, indicating a detect.

Table 2
Analytical Data for Response to Comment 13

Site	Sample ID	Location ID	Depth (ft)	Media	Analyte	Concentration (mg/kg)	BV (mg/kg)	Qualifier
02-003(b)	RE02-10-21911	02-612390	5–6	QAL	Iron	6980	21500	NQ*
02-003(b)	RE02-10-21912	02-612390	15–17	QBO	Iron	4700	3700	NQ
02-003(b)	RE02-10-21913	02-612390	26–27	QBO	Iron	5230	3700	NQ
02-003(b)	RE02-10-21914	02-612390	35–36	QBO	Iron	5010	3700	NQ
02-003(b)	RE02-10-21915	02-612390	49–50	QBO	Iron	5850	3700	NQ

Note: Shading denotes value less than the BV.

* NQ = Not qualified, indicating a detect.

Table 3
Analytical Data for Response to Comment 14

Site	Sample ID	Location ID	Depth (ft)	Media	Analyte	Concentration (mg/kg)	BV (mg/kg)	Qualifier
02-003(c)	RE02-10-22027	02-612420	6–7	QAL	Iron	6600	21500	NQ*
02-003(c)	RE02-10-22028	02-612420	15.5–16.5	QAL	Iron	5040	21500	NQ
02-003(c)	RE02-10-22029	02-612420	26–27	QBO	Iron	4010	3700	NQ
02-003(c)	RE02-10-22030	02-612420	35–37	QBO	Iron	5530	3700	NQ
02-003(c)	RE02-10-22031	02-612420	49–50	QBO	Iron	5320	3700	NQ

Note: Shading denotes value less than the BV.

* NQ = Not qualified, indicating a detect.

Table 4
Analytical Data for Response to Comment 19

Site	Sample ID	Location ID	Depth (ft)	Media	Analyte	Concentration (mg/kg)	BV (mg/kg)	Qualifier
02-004(a)	RE02-10-21661	02-612326	5–6	ALLH	Iron	8750	21500	NQ*
02-004(a)	RE02-10-21662	02-612326	15–16	QAL	Iron	9300	21500	NQ
02-004(a)	RE02-10-21663	02-612326	25–26	QBO	Iron	5620	3700	NQ
02-004(a)	RE02-10-21664	02-612326	35–37	QBO	Iron	6020	3700	NQ
02-004(a)	RE02-10-21665	02-612326	49–50	QBO	Iron	5800	3700	NQ
02-004(a)	RE02-10-21671	02-612328	5–6	ALLH	Iron	9360	21500	NQ
02-004(a)	RE02-10-21672	02-612328	15–16	QAL	Iron	6150	21500	NQ
02-004(a)	RE02-10-21673	02-612328	25–26	QBO	Iron	4860	3700	NQ
02-004(a)	RE02-10-21674	02-612328	35–36	QBO	Iron	5090	3700	NQ
02-004(a)	RE02-10-21675	02-612328	49–50	QBO	Iron	5670	3700	NQ

Note: Shading denotes value less than the BV.

* NQ = Not qualified, indicating a detect.

Table 5
Analytical Data for Response to Comment 20

Site	Sample ID	Location ID	Depth (ft)	Media	Analyte	Concentration (mg/kg)	BV (mg/kg)	Qualifier
02-004(a)	RE02-10-21747	02-612346	8–9	QAL	Manganese	356	671	NQ*
02-004(a)	RE02-10-21748	02-612346	15–16	QAL	Manganese	341	671	NQ
02-004(a)	RE02-10-21749	02-612346	25–26	QBO	Manganese	226	189	NQ
02-004(a)	RE02-10-21750	02-612346	35–36	QBO	Manganese	195	189	NQ
02-004(a)	RE02-10-21751	02-612346	49–50	QBO	Manganese	260	189	NQ

Note: Shading denotes value less than the BV.

* NQ = Not qualified, indicating a detect.

Table 6
Analytical Data for Response to Comment 21

Site	Sample ID	Location ID	Depth (ft)	Media	Analyte	Concentration (mg/kg)	BV (mg/kg)	Qualifier
02-004(b,c,d)	RE02-10-21501	02-612280	5–7	QAL	Iron	8300	21500	NQ*
02-004(b,c,d)	RE02-10-21500	02-612280	15–16	QBO	Iron	4950	3700	NQ
02-004(b,c,d)	RE02-10-21495	02-612280	25–27	QBO	Iron	5290	3700	NQ
02-004(b,c,d)	RE02-10-21490	02-612280	35–36	QBO	Iron	5120	3700	NQ
02-004(b,c,d)	RE02-10-21485	02-612280	49–50	QBO	Iron	5400	3700	NQ

Note: Shading denotes value less than the BV.

* NQ = Not qualified, indicating a detect.

Table 7
Analytical Data for Response to Comment 23

Site	Sample ID	Location ID	Depth (ft)	Media	Analyte	Concentration (mg/kg)	BV (mg/kg)	Qualifier
02-004(f)	RE02-10-21747	02-612346	8–9	QAL	Manganese	356	671	NQ[a]
02-004(f)	RE02-10-21748	02-612346	15–16	QAL	Manganese	341	671	NQ
02-004(f)	RE02-10-21749	02-612346	25–26	QBO	Manganese	226	189	NQ
02-004(f)	RE02-10-21750	02-612346	35–36	QBO	Manganese	195	189	NQ
02-004(f)	RE02-10-21751	02-612346	49–50	QBO	Manganese	260	189	NQ
02-004(f)	RE02-10-21752	02-612347	5–6	QAL	Manganese	329	671	J-[b]
02-004(f)	RE02-10-21753	02-612347	15–16	QAL	Manganese	194	671	J-
02-004(f)	RE02-10-21754	02-612347	25–27	QBO	Manganese	200	189	J-
02-004(f)	RE02-10-21755	02-612347	35–36	QBO	Manganese	227	189	J-
02-004(f)	RE02-10-21756	02-612347	49–50	QBO	Manganese	232	189	J-

Note: Shading denotes value less than the BV.

[a] NQ = Not qualified, indicating a detect.

[b] J- = The analyte was positively identified, and the result is likely to be biased low.

Table 8
Analytical Data for Response to Comment 24

Site	Sample ID	Location ID	Depth (ft)	Media	Analyte	Concentration (mg/kg)	BV (mg/kg)	Qualifier
02-004(f)	RE02-10-21747	02-612346	8–9	QAL	Iron	6260	21500	NQ*
02-004(f)	RE02-10-21748	02-612346	15–16	QAL	Iron	7500	21500	NQ
02-004(f)	RE02-10-21749	02-612346	25–26	QBO	Iron	6340	3700	NQ
02-004(f)	RE02-10-21750	02-612346	35–36	QBO	Iron	5340	3700	NQ
02-004(f)	RE02-10-21751	02-612346	49–50	QBO	Iron	5990	3700	NQ
02-004(f)	RE02-10-21752	02-612347	5–6	QAL	Iron	7340	21500	NQ
02-004(f)	RE02-10-21753	02-612347	15–16	QAL	Iron	6780	21500	NQ
02-004(f)	RE02-10-21754	02-612347	25–27	QBO	Iron	4940	3700	NQ
02-004(f)	RE02-10-21755	02-612347	35–36	QBO	Iron	5850	3700	NQ
02-004(f)	RE02-10-21756	02-612347	49–50	QBO	Iron	5020	3700	NQ

Note: Shading denotes value less than the BV.

* NQ = Not qualified, indicating a detect.

Table 9
Analytical Data for Response to Comment 25

Site	Sample ID	Location ID	Depth (ft)	Media	Analyte	Concentration (mg/kg)	BV (mg/kg)	Qualifier
02-004(g)	RE02-10-21528	02-612293	5–6	QAL	Iron	8170	21500	NQ*
02-004(g)	RE02-10-21529	02-612293	15–16	QAL	Iron	8990	21500	NQ
02-004(g)	RE02-10-21530	02-612293	25–26	QBO	Iron	4640	3700	NQ
02-004(g)	RE02-10-21531	02-612293	35–36	QBO	Iron	5150	3700	NQ
02-004(g)	RE02-10-21532	02-612293	49–50	QBO	Iron	4940	3700	NQ

Note: Shading denotes value less than BV.

* NQ = Not qualified, indicating a detect.

Table 10
Analytical Data for Response to Comment 28

Site	Sample ID	Location ID	Depth (ft)	Media	Analyte	Concentration (pCi/g)	FV (pCi/g)	Qualifier
02-005	RE02-10-21891	02-612379	0–0.5	SOIL	Cesium-137	0.365	1.65	NQ[a]
02-005	RE02-10-21892	02-612379	1.5–2.5	SOIL	Cesium-137	0.163	n/a[b]	NQ
02-005	RE02-10-21881	02-612382	0–0.5	SOIL	Cesium-137	0.535	1.65	NQ
02-005	RE02-10-21882	02-612382	1.5–2.5	SOIL	Cesium-137	0.745	n/a	NQ
02-005	RE02-10-21885	02-612384	0–0.5	SOIL	Cesium-137	0.105	1.65	U[c]
02-005	RE02-10-21886	02-612384	1.5–2.5	SOIL	Cesium-137	0.17	n/a	NQ
02-005	RE02-10-21887	02-612385	0–0.5	SOIL	Cesium-137	0.961	1.65	NQ
02-005	RE02-10-21888	02-612385	1.5–2.5	SOIL	Cesium-137	0.362	n/a	NQ

Note: Shading denotes value less than the FV.

[a] NQ = Not qualified, indicating a detect.

[b] n/a = Not applicable.

[c] U = The analyte was analyzed for but not detected.

Table 11
Analytical Data for Response to Comment 34

Site	Sample ID	Location ID	Depth (ft)	Media	Analyte	Concentration (mg/kg)	BV (mg/kg)	Qualifier
02-006(c)	RE02-10-21742	02-612345	5–6	QAL	Iron	7560	21500	NQ*
02-006(c)	RE02-10-21743	02-612345	15–16	QAL	Iron	7680	21500	NQ
02-006(c)	RE02-10-21744	02-612345	25–26	QBO	Iron	6390	3700	NQ
02-006(c)	RE02-10-21745	02-612345	35–36	QBO	Iron	6290	3700	NQ
02-006(c)	RE02-10-21746	02-612345	49–50	QBO	Iron	8580	3700	NQ

Note: Shading denotes value less than the BV.

* NQ = Not qualified, indicating a detect.

Table 12
Analytical Data for Response to Comment 35

Site	Sample ID	Location ID	Depth (ft)	Media	Analyte	Concentration (mg/kg)	BV (mg/kg)	Qualifier
02-006(c)	RE02-10-21742	02-612345	5–6	QAL	Vanadium	7.75	39.6	NQ*
02-006(c)	RE02-10-21743	02-612345	15–16	QAL	Vanadium	10.5	39.6	NQ
02-006(c)	RE02-10-21744	02-612345	25–26	QBO	Vanadium	2.44	4.59	NQ
02-006(c)	RE02-10-21745	02-612345	35–36	QBO	Vanadium	3.06	4.59	NQ
02-006(c)	RE02-10-21746	02-612345	49–50	QBO	Vanadium	5.75	4.59	NQ

Note: Shading denotes value less than the BV.

* NQ = Not qualified, indicating a detect.

Table 13
PCBs Detected below 25 ft bgs at the TA-02 Core Area

Site	Sample ID	Location ID	Depth (ft)	Media	PCB	Concentration (mg/kg)	EQL (mg/kg)	Qualifier
02-011(a)(x)	RE02-10-25666	02-612983	26–27	QBO	Aroclor-1254	0.0061	0.0047	NQ[a]
02-009(a)	RE02-10-22036	02-612421	28–29	QAL	Aroclor-1260	0.0023	0.0039	J[b]
02-003(c), 02-009(c)	RE02-10-22030	02-612420	35–37	QBO	Aroclor-1254	0.003	0.0043	J
02-003(a), 02-009(d), 02-011(a)(x)	RE02-10-21771	02-612348	35–36	QBO	Aroclor-1260	0.0022	0.0046	J
02-006(e), 02-011(a)(viii)	RE02-10-21525	02-612292	49–50	QBO	Aroclor-1242	0.213	0.023	NQ
02-006(e), 02-011(a)(viii)	RE02-10-21525	02-612292	49–50	QBO	Aroclor-1254	0.334	0.023	NQ
02-006(e), 02-011(a)(viii)	RE02-10-21525	02-612292	49–50	QBO	Aroclor-1260	0.0377	0.023	NQ

Note: Shading denotes value less than the EQL.

[a] NQ = Not qualified, indicating a detect.

[b] J = The analyte was positively identified, and the associated numerical value is estimated to be more uncertain than would normally be expected for that analysis.

Table 14
Analytical Data for Response to Comment 40

Site	Sample ID	Location ID	Depth (ft)	Media	Analyte	Concentration (mg/kg)	BV (mg/kg)	Qualifier
02-009(b)	RE02-10-21895	02-612388	5–6	QAL	Iron	8180	21500	NQ*
02-009(b)	RE02-10-21896	02-612388	15–16	QAL	Iron	6660	21500	NQ
02-009(b)	RE02-10-21897	02-612388	25–26	QBO	Iron	4640	3700	NQ
02-009(b)	RE02-10-21898	02-612388	35–36	QBO	Iron	5390	3700	NQ
02-009(b)	RE02-10-21899	02-612388	47.5–50	QBO	Iron	5310	3700	NQ

Note: Shading denotes value less than the BV.

* NQ = Not qualified, indicating a detect.

Table 15
Analytical Data for Response to Comment 41

Site	Sample ID	Location ID	Depth (ft)	Media	Analyte	Concentration (mg/kg)	BV (mg/kg)	Qualifier
02-009(c)	RE02-10-21928	02-612393	5–6	QAL	Aluminum	708	29200	NQ*
02-009(c)	RE02-10-21929	02-612393	15.5–16.5	QAL	Aluminum	6770	29200	NQ
02-009(c)	RE02-10-21930	02-612393	25–26	QBO	Aluminum	4090	3560	NQ
02-009(c)	RE02-10-21931	02-612393	35–36	QBO	Aluminum	3830	3560	NQ
02-009(c)	RE02-10-21932	02-612393	49–50	QBO	Aluminum	6770	3560	NQ

Note: Shading denotes value less than the BV.

* NQ = Not qualified, indicating a detect.

Table 16
Analytical Data for Response to Comment 42

Site	Sample ID	Location ID	Depth (ft)	Media	Analyte	Concentration (mg/kg)	BV (mg/kg)	Qualifier
02-009(c)	RE02-10-21918	02-612391	5–6	ALLH	Iron	7400	21500	NQ*
02-009(c)	RE02-10-21919	02-612391	15–16	QAL	Iron	6230	21500	NQ
02-009(c)	RE02-10-21920	02-612391	25–26	QBO	Iron	4820	3700	NQ
02-009(c)	RE02-10-21921	02-612391	35–37	QBO	Iron	5140	3700	NQ
02-009(c)	RE02-10-21922	02-612391	49–50	QBO	Iron	5030	3700	NQ
02-009(c)	RE02-10-21923	02-612392	5–6	QAL	Iron	8520	21500	NQ
02-009(c)	RE02-10-21924	02-612392	19–20	QBO	Iron	6050	3700	NQ
02-009(c)	RE02-10-21925	02-612392	25–26	QBO	Iron	5400	3700	NQ
02-009(c)	RE02-10-21926	02-612392	35–37	QBO	Iron	5540	3700	NQ
02-009(c)	RE02-10-21927	02-612392	49–50	QBO	Iron	6030	3700	NQ
02-009(c)	RE02-10-22027	02-612420	6–7	QAL	Iron	6600	21500	NQ
02-009(c)	RE02-10-22028	02-612420	15.5–16.5	QAL	Iron	5040	21500	NQ
02-009(c)	RE02-10-22029	02-612420	26–27	QBO	Iron	4010	3700	NQ
02-009(c)	RE02-10-22030	02-612420	35–37	QBO	Iron	5530	3700	NQ
02-009(c)	RE02-10-22031	02-612420	49–50	QBO	Iron	5320	3700	NQ
02-009(c)	RE02-10-21928	02-612393	5–6	QAL	Iron	5010	21500	NQ
02-009(c)	RE02-10-21929	02-612393	15.5–16.5	QAL	Iron	5950	21500	NQ
02-009(c)	RE02-10-21930	02-612393	25–26	QBO	Iron	5750	3700	NQ
02-009(c)	RE02-10-21931	02-612393	35–36	QBO	Iron	5640	3700	NQ
02-009(c)	RE02-10-21932	02-612393	49–50	QBO	Iron	6240	3700	NQ

Note: Shading denotes value less than the BV.

* NQ = Not qualified, indicating a detect.

Table 17
Analytical Data for Response to Comment 43

Site	Sample ID	Location ID	Depth (ft)	Media	Analyte	Concentration (mg/kg)	BV (mg/kg)	Qualifier
02-009(c)	RE02-10-21923	02-612392	5–6	QAL	Manganese	356	671	J-*
02-009(c)	RE02-10-21924	02-612392	19–20	QBO	Manganese	215	189	J-
02-009(c)	RE02-10-21925	02-612392	25–26	QBO	Manganese	189	189	J-
02-009(c)	RE02-10-21926	02-612392	35–37	QBO	Manganese	157	189	J-
02-009(c)	RE02-10-21927	02-612392	49–50	QBO	Manganese	253	189	J-

Note: Shading denotes value less than or equal to the BV.

* J- = The analyte was positively identified, and the result is likely to be biased low.

Table 18
Analytical Data for Response to Comment 47

Site	Sample ID	Location ID	Depth (ft)	Media	Analyte	Concentration (mg/kg)	BV (mg/kg)	Qualifier
02-011(a)(i)	RE02-11-1525	02-613571	5–6	QAL	Iron	7360	21500	NQ*
02-011(a)(i)	RE02-11-1526	02-613571	15–16	QBO	Iron	4550	3700	NQ
02-011(a)(i)	RE02-11-1527	02-613571	25–26	QBO	Iron	4960	3700	NQ
02-011(a)(i)	RE02-11-1528	02-613571	35–37	QBO	Iron	5980	3700	NQ
02-011(a)(i)	RE02-11-1529	02-613571	49–50	QBO	Iron	5230	3700	NQ

Note: Shading denotes value less than the BV.

* NQ = Not qualified, indicating a detect.

Table 19
Analytical Data for Response to Comment 48

Site	Sample ID	Location ID	Depth (ft)	Media	Analyte	Concentration (mg/kg)	BV (mg/kg)	Qualifier
02-011(a)(i)	RE02-11-1525	02-613571	5–6	QAL	Manganese	339	671	NQ*
02-011(a)(i)	RE02-11-1526	02-613571	15–16	QBO	Manganese	179	189	NQ
02-011(a)(i)	RE02-11-1527	02-613571	25–26	QBO	Manganese	163	189	NQ
02-011(a)(i)	RE02-11-1528	02-613571	35–37	QBO	Manganese	215	189	NQ
02-011(a)(i)	RE02-11-1529	02-613571	49–50	QBO	Manganese	198	189	NQ

Note: Shading denotes value less than the BV.

* NQ = Not qualified, indicating a detect.

Table 20
Analytical Data for Response to Comment 54

Site	Sample ID	Location ID	Depth (ft)	Media	Analyte	Concentration (mg/kg)	BV (mg/kg)	Qualifier
TA-26	RE26-10-21544	26-612297	0–0.5	ALLH	Aluminum	5270	29200	NQ*
TA-26	RE26-10-21545	26-612297	5–6	ALLH	Aluminum	8170	29200	NQ
TA-26	RE26-10-21546	26-612297	9–10	QBT3	Aluminum	7570	7340	NQ

Note: Shading denotes value less than the BV.

* NQ = Not qualified, indicating a detect.

Table 21
Analytical Data for Response to Comment 55

Site	Sample ID	Location ID	Depth (ft)	Media	Analyte	Concentration (mg/kg)	BV (mg/kg)	Qualifier
TA-26	RE26-10-21544	26-612297	0–0.5	ALLH	Barium	86.3	295	NQ*
TA-26	RE26-10-21545	26-612297	5–6	ALLH	Barium	139	295	NQ
TA-26	RE26-10-21546	26-612297	9–10	QBT3	Barium	137	46	NQ

Note: Shading denotes value less than the BV.

* NQ = Not qualified, indicating a detect.

Table 22
Analytical Data for Response to Comment 56

Site	Sample ID	Location ID	Depth (ft)	Media	Analyte	Concentration (mg/kg)	BV (mg/kg)	Qualifier
TA-26	RE26-10-21544	26-612297	0–0.5	ALLH	Cobalt	2.7	8.64	NQ*
TA-26	RE26-10-21545	26-612297	5–6	ALLH	Cobalt	4	8.64	NQ
TA-26	RE26-10-21546	26-612297	9–10	QBT3	Cobalt	3.5	3.14	NQ

Note: Shading denotes value less than the BV.

* NQ = Not qualified, indicating a detect.

Table 23
Analytical Data for Response to Comment 58

Site	Sample ID	Location ID	Depth (ft)	Media	Analyte	Concentration (mg/kg)	BV (mg/kg)	Qualifier
TA-26	RE26-10-21538	26-612295	0–0.5	ALLH	Lead	27.8	22.3	NQ[a]
TA-26	RE26-10-21539	26-612295	5–6	QBT3	Lead	4.2	11.2	NQ
TA-26	RE26-10-21540	26-612295	9–10	QBT3	Lead	2.6	11.2	NQ
TA-26	RE26-10-21544	26-612297	0–0.5	ALLH	Lead	7.5	22.3	J-[b]
TA-26	RE26-10-21545	26-612297	5–6	ALLH	Lead	19.8	22.3	J-
TA-26	RE26-10-21546	26-612297	9–10	QBT3	Lead	13.7	11.2	J-

Note: Shading denotes value less than the BV.

[a] NQ = Not qualified, indicating a detect.

[b] J- = The analyte was positively identified, and the result is likely to be biased low.

Table 24
Analytical Data for Response to Comment 59

Site	Sample ID	Location ID	Depth (ft)	Media	Analyte	Concentration (mg/kg)	BV (mg/kg)	Qualifier
TA-26	RE26-10-21544	26-612297	0–0.5	ALLH	Magnesium	1940	4610	NQ*
TA-26	RE26-10-21545	26-612297	5–6	ALLH	Magnesium	1940	4610	NQ
TA-26	RE26-10-21546	26-612297	9–10	QBT3	Magnesium	1780	1690	NQ

Note: Shading denotes value less than the BV.

* NQ = Not qualified, indicating a detect.

Table 25
Analytical Data for Response to Comment 60

Site	Sample ID	Location ID	Depth (ft)	Media	Analyte	Concentration (mg/kg)	BV (mg/kg)	Qualifier
TA-26	RE26-10-21544	26-612297	0–0.5	ALLH	Nickel	5.7	15.4	NQ*
TA-26	RE26-10-21545	26-612297	5–6	ALLH	Nickel	8.4	15.4	NQ
TA-26	RE26-10-21546	26-612297	9–10	QBT3	Nickel	6.8	6.58	NQ

Note: Shading denotes value less than the BV.

* NQ = Not qualified, indicating a detect.