Response to the Disapproval for the Phase III Investigation Report for Delta Prime Site Aggregate Area at Technical Area 21, Los Alamos National Laboratory, EPA ID No. NM0890010515, HWB-LANL-14-076, Dated March 2, 2016

INTRODUCTION

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

GENERAL COMMENTS

NMED Comment

1. Section H-4.3, Vapor-Intrusion Pathway, page H-17:

Permittees' Statement: *Because only soil data are available for the sites in the DP Site Aggregate Area, the advanced soil model (SL-ADV-REV2-4.xls) was used to calculate risk-based soil concentrations for VOCs at sites, where appropriate.*

NMED Comment: *The 2012 NMED SSG states that the most current guidance on vapor intrusion should be applied, and references the USEPA's 2002 vapor intrusion guidance. However, USEPA's 2002 vapor intrusion guidance does not support the use of bulk soil data for evaluation of the vapor intrusion pathway: assessment must be based on active soil gas and/or groundwater data, as appropriate. For those sites where an evaluation of the vapor intrusion pathway was performed, the comparison of VOC concentrations to the screening levels obtained from the Johnson & Ettinger-based advanced soil model cannot be used as a primary line of evidence in eliminating the vapor intrusion pathway from consideration. It is not clear that a vapor intrusion assessment is applicable at the DP Site Aggregate Area as no buildings exist and demolition and decommissioning of foundations and infrastructure is an ongoing activity at TA-21. In addition, the vapor intrusion pathway is not mentioned in the discussion of the conceptual site model (Section H-3.0 of Appendix H) or depicted on Figure H-3.1-1 Conceptual Site Model for DP Site Aggregate Area, page H-61.*

The Permittees must employ a line of evidence approach to demonstrate that the vapor intrusion pathway is likely incomplete (e.g., no buildings exist and none will be constructed in the future) for the DP Site Aggregate Area. If multiple lines of evidence demonstrate that no buildings will be constructed, a vapor intrusion assessment is not required. Alternatively, if the pathway is determined to be potentially complete, the Permittees must propose to collect additional data (e.g., soil gas data) for use in an assessment of the air intrusion pathway. If, in the future, the land use status of the DP Site Aggregate Area changes such that buildings are to be constructed, the vapor intrusion assessment may be required.

Bulk soil data can be used in a qualitative sense to determine delineation of a vapor source or in determining if soil has been impacted and additional evaluation (e.g., soil gas) is needed. Conversely, it must not be assumed that non-detect results of volatile compounds in soil equates to an absence of a vapor source. Additional information on assessing the vapor intrusion pathway is available in Section 2.5 and subsections of NMED's 2015 SSG. Please revise Attachment H, Section H-4.3 to either include lines of evidence demonstrating that a vapor intrusion assessment is not required or if the pathway is potentially complete, propose additional soil gas data collection to use in a qualitative assessment of the vapor intrusion pathway.

LANL Response

1. A vapor intrusion assessment is applicable to the residential scenario even if no buildings exist at Technical Area 21 (TA-21). The scenario assumes a residence is placed on a site and the pathway is evaluated accordingly, whether or not a building is constructed. The pathway is shown in Figure H-3.1-1, Conceptual site model for DP Site Aggregate Area: surface and subsurface soil to volatilization to air to inhalation to residential.

   Section H-4.3 of Appendix H has been revised to include additional evaluation of the vapor intrusion pathway. The pathway has been further evaluated for the residential scenario for sites or parts of sites located on the mesa top using multiple lines of evidence. In addition, the screening tables have been revised to include only the volatile organic compounds detected on the mesa top, and the screening values and the results have been revised to present the analysis in the units of mg/kg, not µg/kg.

NMED Comment

2. *The Report indicates that contamination at outfall areas associated with Solid Waste Management Unit (SWMU) 21-024(b), SWMU 21-027(a), SWMU 21-022(h) (part of Consolidated Unit (CU) 21-022(h)-99), and CU 21-026(a)-99 were not remediated due to their location on steep slopes (i.e., lack of exposure) and the dangers associated with personnel and equipment access for removal of contaminated material from these areas. According to the text, this issue was addressed in the Phase III work plan that was approved by NMED. The text also mentions that remediation was not carried out at the outfall for Area of Concern (AOC) C-21-027. This location was not addressed in the Phase III work plan. It is likely that these contaminated outfall areas could pose a threat to environmental receptors and NMED has concerns regarding how potential human receptors will be prevented from accessing the contaminated outfalls. These concerns are addressed in the Specific Comments 1, 10, 26b, and 27 below.*

   The Report does not address the current state of the source of contamination at the outfalls; it is not known whether the sources continue to release contamination to these areas or if the sources have been controlled or eliminated. In addition, the Permittees do not propose a plan for remediation of the outfall at AOC C-21-027. Revise the Report to indicate the status of AOC C-21-027 and to indicate if each source of contamination at each outfall remains an active source or if each source has been controlled or eliminated.

LANL Response

2. Risk-screening assessments were not conducted for Area of Concern (AOC) C-21-027 in the Phase II investigation report because nature and extent of contamination were not defined. Therefore, the Phase III work plan only proposed additional sampling to define nature and extent at this site and not remediation. As shown on Plate 1 and described in the approved Phase III work plan (LANL 2011, 203659; NMED 2011, 203825), the area of contamination at the AOC is on the steep slope/cliff portion next to Consolidated Unit 21-006(c)-99 and Solid Waste Management Unit (SWMU) 21-027(a). Because the contaminated outfall areas are small (<0.01 ha), the limited area of contamination does not impact the wildlife populations and soil invertebrate and plant communities as a whole. The steep slope/cliff portions of the sites do not result in exposure to human receptors for several reasons, including the steepness of the slope/cliff, the unstable surface, the lack of safe and reasonable access, and the absence of any trail. Public access to these sites as well as to TA-21 as a whole is restricted because the area remains U.S. Department of Energy (DOE) property and is fenced and posted with signage. In addition, the area along the mesa edge above Los Alamos Canyon is fenced. Therefore, access to and the likelihood of human exposure to contamination on the steep slope/cliff portions of the sites at TA-21 is very low.

   Section 6.1.3 has been revised to state that none of the outfalls or other sites are active sources that continue to release contamination. All operations at TA-21 have ceased and almost all of the buildings have been removed to the foundations, some areas have been remediated, and septic tanks are not receiving any discharges; all sumps and septic tanks are disconnected from their sources, some tanks either have been removed, some have been filled and left in place, or some have been emptied and left in place.

   Section 6.14 states that AOC C-21-027 is a former cooling tower and in section 6.14.1 that the cooling tower surface and subsurface structures were removed in 1994 and 1995. Therefore, this AOC is not an active source.

SPECIFIC COMMENTS

NMED Comment

1. Executive Summary, page v:

Permittees' Statement: *Human health risk-screening assessments were conducted for the entire site for each consolidated unit, individual SWMU, or individual AOC as well as for the mesa-top portion of the sites at CU 21-026(a)-99, SWMUs 21-022(h), 21-024(b), and 21-027(a), and AOC C-21-027. These five sites were evaluated in this manner because the steep slope/cliff portions of the sites are inaccessible and therefore do not result in exposure to human receptors. The basis for the no exposure condition are (1) the areas are on a steep slope/cliff, with 45- to 90-degree slopes; (2) the areas consist of unstable, highly weathered, fractured bedrock with approximately 15% to 30% soil, filling fractures and voids between rocks; (3) there is no access to the slope/cliff portions of the sites; (4) there is no trail or path for someone to traverse if he or she were to gain access to the slope/cliff; and (5) there are major safety concerns regarding any activity on the slope/cliff because of the steepness, the unstable bedrock, and the lack of any trail.*

NMED Comment: *The Permittees provide five reasons supporting the "no exposure" assertion. These five items are also presented in Section 7.2.1, Human Health Risk-Screening Assessments, and Section H-6.1, Human Health Risk, of Appendix H as support for the conclusions drawn from*

the results of the screening of potential risks to human receptors. It is known that samples were collected in the vicinity of these unsafe areas as part of the TA-21 DP site investigations. None of the discussions indicate if there are controls in place such as fencing, signage, or security patrols, to ensure that exposure to current human receptors (e.g., industrial and construction workers) does not occur. In addition, it remains unclear how exposures to future residential receptors is prevented, if one is willing to ignore the safety issues associated with the steep slopes. Revise the discussions in the Report as needed to include information on any controls in place at the five sites impacted by existing contamination on steep slopes to prevent exposure to current and future human receptors.

Furthermore, the Report does not address the potential for migration of contamination at these locations or how these locations will be monitored or controlled to prevent contamination of a wider area and/or areas more accessible to human receptors and more supportive of ecological receptors. Revise the Report to describe how un-remediated contamination located on steep slopes/cliffs will be monitored and/or controlled to prevent downslope migration of contaminants.

LANL Response

1. The report has been revised to include information on controls in place to prevent exposure to current and future human receptors (Executive Summary and sections 7.2.1 and H-6.1). The report also summarizes how unremediated contamination located on steep slopes/cliffs will be or is monitored and/or controlled to prevent downslope migration of contaminants (Executive Summary and section 7.1).

   The steep slope/cliff portions of the sites do not result in exposure to human receptors for several reasons, including the steepness of the slope/cliff, the unstable surface, the lack of safe and reasonable access, and the absence of any trail (see photographs in Attachment 1 to this response). In addition, fencing is in place to restrict access to these areas. Although samples were collected in the vicinity of the unsafe areas as part of the DP Phase III investigations, this activity was performed using fall protection training and techniques, which involved training workers to procedures as well as the use of active fall protection systems, including fall restraint and fall arrest (anchorage, body harness, and a connecting system). Workers are not and will not be exposed to these areas because of the protection systems required for access, the access restrictions in place, and work is not planned nor being conducted in these areas. Public access to these sites as well as to TA-21 as a whole is restricted because the area remains DOE property and is fenced and posted, with access roads fenced and gated to prevent access to the eastern end of DP Mesa. In addition, the area along the mesa edge above Los Alamos Canyon is fenced. Therefore, access to and the likelihood of human exposure to contamination on the steep slope/cliff portions of the sites at TA-21 is very low.

   The access restrictions and controls preventing exposure to the contaminated outfalls on the steep slope/cliff portions of the sites will remain as long as TA-21 is DOE property. If TA-21 (i.e., the mesa top) is transferred from DOE, the presence of access restrictions to the steep slope/cliff, whether contaminated or not, would remain in the form of passive controls (e.g., fencing and signage) because the surrounding land (i.e., the slope/cliff) would remain DOE property. These controls are in place in other areas where DOE property is next to private property, such as within the townsite along the south facing slope of Los Alamos Canyon.

   Los Alamos and DP Canyons are included in the Los Alamos/Pueblo Watershed Sediment Transport Mitigation Project (LANL 2015, 600438; LANL 2016, 601434). As part of this project, the Laboratory has undertaken several activities to reduce flood energy and associated sediment

transport. Because contaminants migrate with sediment entrained in runoff, reducing sediment transport will thus reduce contaminant transport, which is the primary objective of these activities. Monitoring of storm water and sediment is included to assess the performance of sediment-control measures. Controls applicable to sites in the DP Site Aggregate Area include a grade-control structure installed in DP Canyon at the east end of TA-21 and the Los Alamos Canyon low-head weir installed in Los Alamos Canyon below the confluence with DP Canyon at the Laboratory boundary. The grade-control structure has been installed to encourage channel aggradation, thus reducing the potential for erosion of contaminated sediment deposits in adjacent banks during floods. Channel aggradation in reach DP-2 should also encourage the spreading of floodwaters, thereby reducing peak discharge because of transmission loss within the reach and enhancing sediment deposition. Lower flood peaks should also reduce the erosion of contaminated sediment deposits downcanyon of the DP grade-control structure.

The Los Alamos Canyon low-head weir and associated sediment detention basins have also been installed approximately 2.5 mi downcanyon from TA-21, which facilitates a reduction in flows and accumulates sediment from upper and middle Los Alamos and DP Canyons. Storm water quality monitoring is conducted at storm water sampler locations below several outfalls and drainage areas from TA-21 and several gage stations within the Los Alamos Canyon watershed. Sampling locations include a gage in DP Canyon next to TA-21, a gage in DP Canyon downgradient of the grade-control structure, gages in Los Alamos Canyon upstream and downstream of the confluence with DP Canyon, and gages in Los Alamos Canyon upstream and downstream of the low-head weir. Monitoring results are reported annually to NMED (e.g., LANL 2016, 601433). Run-on and runoff controls have also been installed at sites as part of storm water controls required under the Laboratory's National Pollutant Discharge Elimination System Individual Permit (the Permit). The Permit regulates those SWMUs and AOCs having the potential to release contaminants to surface water via storm water runoff. These controls are designed to decrease and divert storm water flow at individual SWMUs and AOCs and include straw wattles, berms, curbing, retention basins, rock check dams, and vegetated areas. Seven of the SWMUs addressed by the Phase III investigation report are regulated under the Permit: SWMUs 21-006(b), 21-022(h), 21-024(c), 21-024(d), 21-024(l), 21-024(n), and 21-027(a).

NMED Comment

2. Executive Summary, page vi:

Permittees' Statement: *Residential Scenario: There are potential unacceptable risks under the residential scenario for the entire site at six sites (three consolidated units and three individual SWMUs and AOC). The contamination causing the potential risks at four of these sites is on the slope/cliff portion of the sites to which there is no exposure to a resident. When only the mesa-top portions of these sites are evaluated, there are no potential unacceptable risks under the residential scenario. There are no potential unacceptable risks for the entire site and for the mesa-top portion only at one individual SWMU and for the entire site at four sites (one consolidated unit [with two SWMUs] and three individual SWMUs). There are no potential unacceptable doses under the residential scenario at any site.*

NMED Comment: *The summary discussion of the results of the human health risk-based screening assessments only addresses a portion of the risks and the description of the sites associated with each type of result addressed in the text does not agree with other text descriptions. NMED recommends that the first bulleted item on page vi be revised for clarity to read:*

"There are potential unacceptable risks under the residential scenario at six of the ten sites evaluated herein (three consolidated units, two individual SWMUs, and an AOC); thus, no potential unacceptable risk exists at the four remaining sites (one consolidated unit, one SWMU within a second consolidated unit, and two individual SWMUs). At four of the six sites where unacceptable risks are reported, the contamination causing the potential risks is located on the slope/cliff portion of the sites. When only the mesa-top portion of these four sites is evaluated, no potential unacceptable risks are found for the residential scenario. At the fifth site subjected to a mesa-top evaluation, SWMU 21-024(b), no potential unacceptable risks for the mesa-top portion or for the entire site were identified."

LANL Response

2. The paragraph in the Executive Summary summarizing the residential scenario has been revised.

NMED Comment

3. Section 4.2, Screening Levels, page 11:

Permittees' Statement: *The human health risk-screening assessments (Appendix H) were performed on inorganic and organic COPCs using NMED soil screening levels (SSLs) for the industrial, construction worker, and residential scenarios (NMED 2012, 219971). When an NMED SSL for a COPC was not available, SSLs were obtained from EPA regional tables (http://www.epa.gov/earth1r6/6pd/rcra_c/pd-n/screen.htm) (adjusted to a risk level of 10^{-5} for carcinogens).*

NMED Comment: *The Permittees state that USEPA regional screening levels were used for COPCs that did not have a NMED SSL. While a link was provided to access the regional screening values, a reference to the date of the version of USEPA RSLs used in the Report was not provided. Revise Section 4.2 to provide the date of the version of the RSLs used in the phase III human health risk-based screening assessment.*

Note that the USEPA RSLs for May 2014 (and January 2015) are based on updated exposure parameter values (e.g., body weight of 80 kilograms for adult receptors) recommended in USEPA Office of Solid Waste and Emergency Response (OSWER) Directive 9200.1-120. The soil screening levels (SSLs) in the 2012 version of NMED's SSG are based on USEPA's previously recommended exposure parameter values (e.g., body weight of 70 kilograms for adult receptors). A new version of NMED's SSG, dated July 2015, is now available and the listed SSLs are based on the exposure parameter values recommended in OSWER Directive 9200.1-120. The Permittees may wish to reexamine the human health screening results from the DP Site Phase II Investigation Report that were not revised in the Phase III Report analysis to take advantage of the exposure parameter values recommended in the OSWER directive. Use of the July 2015 version of the SSG may mitigate or perhaps eliminate some of the issues associated with exceedances of NMED target risks and hazard indices (HIs) noted in the Report.

Please also revise the USEPA URLs in the report where necessary to ensure that the provided links direct the reader to the correct web page.

LANL Response

3. Section 4.2 has been revised to include the date of the version of the U.S. Environmental Protection Agency (EPA) regional screening levels used (May 2014). The web address for the EPA regional screening level tables has also been updated in this section as well as throughout the report. In addition, EPA regional screening levels and construction worker soil screening levels (SSLs) for several chemicals of potential concern (COPCs) have been corrected in the data tables and in Appendix H. The human health screening results have not been revised using later NMED guidance (July 2015).

NMED Comment

4. Section 5.1 Identification of COPCs, page 13:

Permittees' Statement: *The COPCs for the DP Site Aggregate Area sites were previously identified in the Phase I or Phase II investigation reports and were not reevaluated in this report.*

NMED Comment: *For clarity, references must be provided for the Phase I and Phase II investigation reports. Please revise Section 5.1 to include references and citations for the Phase I and Phase II investigation reports.*

LANL Response

4. The references for the Phase I and Phase II reports have been added to section 5.1, Identification of COPCs.

NMED Comment

5. Section 6.2.4.1 Soil, Rock, and Sediment Sampling, CU 21-003-99 and SWMU 21-024(c), page 17:

Permittees' Statement: *Two samples were collected from two locations to address extent issues remaining following the previous investigation.*

NMED Comment: *Appendix G of the Report indicates that four samples were collected from three locations at CU 21-003-99 and SWMU 21-024(c), rather than two samples from two locations. Please revise Section 6.2.4.1, page 17 to resolve the discrepancy.*

LANL Response

5. Section 6.2.4.1 has been revised to present the correct number of samples and locations.

NMED Comment

6. Table 6.4-3 Organic Chemicals Detected at SWMUs 21-022(h) and 21-022(j), page 216:

NMED Comment: *Data values in the columns for diethylphthalate and fluoranthene do not line up with the correct sample and location IDs. For instance, location 21-614567 at depth 1.5-2 ft bgs should correspond to data values 0.113 mg/kg for diethylphthalate and 0.0165 mg/kg for fluoranthene. Revise Table 6.4-3 and ensure that all data values match corresponding sample and location IDs.*

LANL Response

6. Columns for diethylphthalate and fluoranthene in Table 6.4-3 have been corrected.

NMED Comment

7. Section 6.4.4.5 Summary of Human Health Risk Screening, Industrial Scenario, SWMU 21-022(h), page 28:

Permittees' Statement: *The total excess cancer risk for the industrial scenario for the entire site is 1×10^{-5}, which is equivalent to the NMED target risk level of 1×10^{-5} (NMED 2012, 219971).*

NMED Comment: *Table H-4.2-11 Industrial Carcinogenic Screening Evaluation for SWMU 21-022(h), page H-153 of the Report, shows the calculated value for the total excess cancer risk to be 2×10^{-5} (actual value is $1.69 \times 10^{-5)}$, which exceeds the NMED target risk of 1×10^{-5} (NMED 2012, 219971) and is contradictory to the Permittees' statement. Please revise Section 6.4.4.5 to resolve the discrepancy.*

LANL Response

7. The industrial cancer risk for SWMU 21-022(h) for the entire site was initially calculated as 2×10^{-5} as presented in Table H-4.2-11 and in section H-4.2.2. The risk was further evaluated in the uncertainty analysis in section H-4.4.2, (pp. H-22 and H-23), resulting in a revised cancer risk of 1×10^{-5}. This revised cancer risk is the result of calculating 95% upper confidence limits (UCLs) for some of the major COPCs rather than using the maximum detected concentrations. The revised cancer risk is presented in sections H-4.5.2 and 6.4.4.5 as the site risk.

NMED Comment

8. Section 6.5.4.5 Summary of Human Health Risk Screening, CU 21-023(a)-99, pages 32-33:

Permittees' Statement: *Based on the screening-assessment results, no potential unacceptable risks or doses exist for the industrial and construction worker scenarios for the entire site.*

NMED Comment: *The assertion that no unacceptable risk exists for the industrial scenario is currently unsupported in the Report. Please revise the second paragraph on page 33 of Section 6.5.4.5 to clarify that risk/dose screening assessments for the industrial scenario for the entire site were not conducted for CU 21-023(a)-99 because samples were not collected from the 0.0-1.0 ft depth interval.*

LANL Response

8. Section 6.5.4.5 has been revised to indicate that the industrial scenario was not evaluated because samples were not collected from the 0.0–1.0-ft depth interval.

NMED Comment

9. Section 6.6.4.1 Soil, Rock, and Sediment Sampling, SWMU 21-024(b), page 34:

Permittees' Statement: *One sample was collected from one location beneath the outlet connection to the former septic tank from 5.5–6.0 ft bgs and analyzed for plutonium-239/240 at an off-site fixed laboratory.*

NMED Comment: *Appendix G of the Report indicates that sample 21-601090 was collected from 5.5-6.5 ft bgs and analyzed for both plutonium-238 and plutonium-239/240. Although this information is provided voluntarily, NMED requests that Section 6.6.4.1 be revised to resolve the discrepancy.*

LANL Response

9. Section 6.6.4.1 has been revised to indicate the samples collected were analyzed for isotopic plutonium.

NMED Comment

10. Section 6.6.4.5 Summary of Human Health Risk Screening, SWMU 21-024(b), pages 36-37:

Permittees' Statement: *Based on the human health risk-screening assessments, no potential unacceptable risks or doses exist for the industrial, construction worker, and residential scenarios for the mesa top and for the entire site.*

NMED Comment: *The discussion of the risk analysis results for the industrial, construction worker, and residential exposure scenarios on page 37 of the Report concludes that no potential unacceptable risks or doses exist for the entire site or mesa top. Based on the current discussion, it is not clear how there is no potential unacceptable risks to human receptors over the entire site when an excavation in the outfall area was planned but not performed and Pu-239 at location 21-600512 was detected at 131 pCi/g which exceeds both the residential and construction worker screening action levels (SALs) (79 and 120 pCi/g respectively). Please revise Section 6.6.4.5 to explain how there is no potential for unacceptable risk over the entire site at SWMU 21-024(b) when there is contamination present at the site.*

LANL Response

10. Although the proposed excavation of the outfall area was not conducted, the remediation on the mesa top at SWMU 21-024(b) to remove elevated activities of americium-241 and plutonium-239/240 beneath the septic tank inlet line north of DP Road, at the inlet connection to the former septic tank, and at the outlet connection to the former septic tank was completed. As a result of the remediation, the majority and highest of the elevated americium-241 and plutonium-239/240 activities were removed (Appendix G, Excavated Samples). Therefore, the 95% UCLs calculated from the remaining sampling data were 1.18 pCi/g and 39.5 pCi/g for americium-241 and plutonium-239/240, which resulted in individual doses of 0.36 mrem/yr and 12.5 mrem/yr, respectively, and a total dose of 14 mrem/yr (Table H-4.2-42). Although the maximum activity of plutonium-239/240 remaining exceeds the residential screening action level (SAL) (79 pCi/g), it is not practical to use this activity as the exposure point concentration (EPC), nor is it recommended by EPA. The 95% UCL is a much more realistic EPC and represents the average exposure across the site. For the receptor to receive an unacceptable dose from the maximum activity, he or she

would have to spend the entire exposure period on that spot, at 2.0−3.0 ft below ground surface (bgs). No revision to the text is warranted.

NMED Comment

11. Section 6.9.4.1 Soil, Rock, and Sediment Sampling, SWMU 21-024(k), page 46:

Permittees' Statement: *Six samples were collected from three locations to characterize a portion of SWMU 21-024(k) waste line not removed during the Phase II investigation because it was located in the same pipe trench as the vacuum waste line between buildings 21-166 and 21-167. This line was removed during this current investigation.*

NMED Comment: *Disposal of the waste line removed from SWMU 21-024(k) during the Phase III investigation is not addressed in Appendix D, Management of Investigation-Derived Waste, Section D-2.0 Waste Streams, page D-1. Please revise the Report to provide information addressing the disposal of the waste line removed from SWMU 21-024(k) during the Phase III investigation.*

LANL Response

11. The waste line removed at SWMU 21-024(k) was included with the remediation waste stream generated during the Phase III investigation. The text in Appendix D has been revised to describe the components of this waste stream and the types of materials comprising each stream. The text and Table D-2.0-1 have also been revised to correct the types of containers used and the locations where waste was disposed of.

NMED Comment

12. Section 6.10.4.1 Soil, Rock, and Sediment Sampling, CU 21-024(l)-99, page 51:

Permittees' Statement: *Soil was removed at location 21-27250 to a depth of 4.0 ft bgs. Confirmation samples were not necessary as data are present from 4.0–5.0 ft bgs at this location. Soil was removed at location 21-27251 to a depth of 4.5 ft bgs. Confirmation samples were not necessary as data are present from 4.5–5.5 ft bgs at this location.*

NMED Comment: *The two excavation location numbers at CU 21-024(l)-99 identified by the Permittees in Section 6.10.4.1 are different than the excavation location numbers indicated in Appendix G of the Report. Appendix G shows the location numbers to be 21-27520 and 21-27521. Please revise Section 6.10.4.1, page 51 to resolve the discrepancy.*

LANL Response

12. Section 6.10.4.1 has been revised to include the correct location IDs from which soil was removed.

NMED Comment

13. Section 6.10.4.5 Summary of Human Health Risk Screening, CU 21-024(l)-99, page 53:

Permittees' Statement: *Consolidated Unit 21-024(l)-99 was remediated to remove elevated concentrations of benzo(a)pyrene. Excavation was conducted at two locations to 4.0 ft and 4.5 ft bgs, as described in the approved Phase III work plan (LANL 2011, 203659, Table 1;*

NMED 2011, 203825). No additional samples were collected during the 2011 cleanup. The human health risk-screening assessments for Consolidated Unit 21-024(l)-99 were revised to reflect the removal of contaminated media and previous sampling data.

***NMED Comment:** Modifications to the previous sampling data due to removal of contaminated media at the site are not identified or discussed in the Report. Thus, it is unclear what data were used to calculate the excess cancer risk, HI, and radiation dose results presented in Section 6.10.4.5. Please revise Section 6.10.4.5 to include additional information regarding the previous sampling data used to generate the results reported in the text.*

LANL Response

13. As noted in section 6.10.4.1, excavation was conducted at locations 21-27520 and 21-27521 to 4.0 ft and 4.5 ft bgs (samples from 2.0−3.0 ft and 2.5−3.5 ft bgs, respectively, were excavated) to remove elevated concentrations of benzo(a)pyrene. No additional samples were collected during the 2011 cleanup. The human health risk-screening assessments for Consolidated Unit 21-024(l)-99 were revised to reflect the removal of contaminated media at the two locations (data from excavated samples were not included in the risk assessment). Table 6.10-1 presents the samples remaining at Consolidated Unit 21-024(l)-99, including sampling data from the applicable depth intervals used to conduct the risk-screening assessments. The text in section 6.10.4.5 has been revised accordingly.

NMED Comment

14. Section 6.12.4.5 Summary of Human Health Risk Screening, Industrial Scenario, CU 21-026(a)-99, page 61:

***Permittees' Statement:** The total excess cancer risk for the industrial scenario for the entire site is approximately 1 x 10^{-5}, which is equivalent to the NMED target risk level of 1 x 10^{-5}.*

and

Based on the screening-assessment results, no potential unacceptable risks or doses exist for the industrial, construction worker, and residential scenarios on the mesa top. There are also no potential unacceptable risks or doses for the industrial and construction worker scenarios for the entire site. There is a potential unacceptable cancer risk for the residential scenario for the entire site.

***NMED Comment:** Table H-4.2-74 Industrial Carcinogenic Screening Evaluation, for CU 21-026(a)-99, page H-193 of the Report, shows the calculated value for the total excess cancer risk to be 3 x 10^{-5} (actual value is 2.9 x 10^{-5}), which exceeds the NMED target risk of 1 x 10^{-5} (NMED 2012, 219971). Please revise the Industrial Scenario on page 61 to present the correct value for total excess cancer risk for the entire site. NMED recommends that the summary paragraph of Section 6.12.4.5 be revised to read:*

***"**Based on the screening-assessment results, no potential unacceptable risks or doses exist for the industrial, construction worker, and residential scenarios on the mesa top. There are also no potential unacceptable risks or doses for the construction worker scenarios for the entire site. There is a potential unacceptable cancer risk for the industrial and residential scenarios for the entire site. However, the elevated PAH concentrations are on the slope/cliff portion of the site where there is no human exposure to the contamination."*

LANL Response

14. The industrial cancer risk for Consolidated Unit 21-026(a)-99 was initially calculated as 3×10^{-5} as presented in Table H-4.2-74 and section H-4.2.8. The risk was further evaluated in the uncertainty analysis in section H-4.4.2 (p. H-23), resulting in a revised cancer risk of 1×10^{-5}. This revised cancer risk value is the result of further assessing the EPCs for some COPCs, including calculating 95% UCLs rather than using the maximum detected concentrations and using the industrial EPA regional screening value for arsenic (30 mg/kg). The revised cancer risk is presented in sections H-4.5.8 and 6.12.4.5 as the site risk. No revision to the summary paragraph in section 6.12.4.5 is warranted.

NMED Comment

15. Section 6.13.4.3 Soil, Rock, and Sediment Sampling Analytical Results, SWMU 21-027(a), pages 63-65:

a) Permittees' Statement: *Excavation was proposed on the mesa top at one location adjacent to former building 21-003, at the ponding area south of former building 21-003, and at the outlet connection to the former septic tank on the mesa top.*

and

Soil was removed on the mesa top at one location adjacent to former building 21-003 and at the ponding area south of former building 21-003 from approximately 4.0–4.5 ft bgs.

NMED Comment: *In the NMED approved Phase III work plan the Permittees proposed to excavate four areas on the mesa top; at the inlet line to Building 21-003 (location 21-601226), at the inlet line to the ponding area (location 21-601225), at the ponding area (location 21-601229), and at the inlet line to the outfall (location 21-601228). Please revise Section 6.13.4.3 and Section 6.13.4.5 to fully describe the number and location of sites excavated and the composition and volume of materials removed.*

b) Permittees' Statement: *Seventeen samples were analyzed for dioxins/furans to determine the depth and area of excavation on the mesa top and to laterally delineate the area above SSLs around the outfall. Table 6.13-3 summarizes the analytical results for detected organic chemicals. Plate 30 shows the spatial distribution of detected organic chemicals.*

and

Seventeen samples were analyzed for isotopic plutonium to determine the depth and area of excavation on the mesa top and to laterally delineate the area above SALs around the outfall.

NMED Comment: *Table 6.13-1 on page 346 and Appendix G of the Report indicate that nine samples were collected and analyzed at SWMU 21-027(a) during the Phase III investigation. Please revise Section 6.13.4.3 and all associated tables to resolve the discrepancy.*

LANL Response

15a. The comment refers to section 6.13.4.1, not section 6.13.4.3. Sections 6.13.4.1 and 6.13.4.5 have been revised to better describe the areas excavated, the locations included, and the type and volume of material removed.

15b. The text in section 6.13.4.3 for organic chemicals and radionuclides has been revised to indicate nine samples were collected and analyzed during the Phase III investigation. The tables do not need to be revised.

NMED Comment

16. Section 6.13.4.4 Nature and Extent of Contamination, Radionuclides, SWMU 21-027(a), page 66:

a) Permittees' Statement: *Plutonium-239/240 was not detected in the sample collected from 4.0–5.0 ft bgs at location 21-614575 in the ponding area, and plutonium-238 was detected at 0.529 pCi/g at this location, which is immediately adjacent to and downslope from location 21-601229.*

NMED Comment: *Table 6.13-4, page 359 and Appendix G of the Report indicate that at location 21-614575 Plutonium-239/240 was detected at a concentration of 0.529 pCi/g. Plutonium-238 was not detected at location 21-614575. Please revise Section 6.13.4.4 to resolve the discrepancy.*

LANL Response

16. Section 6.13.4.4 has been revised to present the correct analytical results for plutonium-239/240 and plutonium-238.

NMED Comment

17. Section 6.13.4.5 Summary of Human Health Risk Screening, SWMU 21-027(a), pages 66-68:

a) Permittees' Statement: *Risk/dose screening assessments under the industrial scenario on the mesa top only were not conducted for SWMU 21-027(a) because samples were not collected from the 0.0–1.0-ft depth interval on the mesa top.*

and

Based on the screening-assessment results, no potential unacceptable risks or doses exist for the industrial, construction worker, and residential scenarios on the mesa top.

NMED Comment: *The Permittees state that no potential unacceptable risks exist for the mesa top under the industrial exposure scenario at SWMU 21-027(a). However, information supporting this assertion is not provided in Section 6.13.4.5. Revise the discussion for the industrial scenario on pages 67 and 68 to include the results of the excess cancer risk calculation to clearly demonstrate that no potential unacceptable risk exists for the mesa top. In addition, please identify and provide a reference citation for the document that contains the human health risk analysis of the mesa top for the industrial scenario.*

LANL Response

17. Section 6.13.4.5 has been revised to indicate the industrial scenario was not evaluated because samples were not collected from the 0.0–1.0-ft depth interval.

NMED Comment

18. Section 6.14.4.5 Summary of Human Health Risk Screening, Residential Scenario, AOC C-21-027, page 74:

Permittees' Statement: *The total excess cancer risk for the residential scenario for the mesa top is approximately 1 x 10^{-5}, which is equivalent to the NMED target risk level of 1 x 10^{-5}.*

NMED Comment: *Table H-4.2-122 Residential Carcinogenic Screening Evaluation for AOC C-21-027 Mesa Top, page H-224 of the Report, reports the calculated value for the total excess cancer risk as 2 x 10^{-5}. Please revise the discussion entitled Residential Scenario to state that the excess cancer risk for the Residential Scenario is 2 x 10^{-5}. In addition, NMED recommends that the last paragraph of Section 6.14.4.5, page 74 be revised to read:*

"Based on the screening-assessment results, no potential unacceptable risks or doses exist for the industrial and construction worker scenarios on the mesa top. There are also no potential unacceptable HIs and doses under the industrial and construction worker scenarios for the entire site. There are potential unacceptable cancer risks for the industrial scenario for the entire site and the residential scenario for the entire site and the mesa top. Note that except for residential risk on the mesa top, the elevated dioxin and furan concentrations are on the slope/cliff portion of the site where human exposure is unlikely."

LANL Response

18. The residential cancer risk for AOC C-21-027 on the mesa top was initially calculated as 2 × 10^{-5} as presented in Table H-4.2-122 and discussed in section H-4.2.10. The risk was further evaluated in the uncertainty analysis in section H-4.4.2 (p. H-24), resulting in a revised cancer risk of 1 × 10^{-5}. This revised cancer risk value is the result of further assessing the EPCs for some COPCs, including calculating 95% UCLs rather than using the maximum detected concentrations. The revised cancer risk is presented in sections H-4.5.10 and 6.14.4.5 as the site risk. No revision to the summary paragraph in section 6.14.4.5 is warranted.

NMED Comment

19. Section H-5.3.1 Consolidated Unit 21-003-99 and SWMU 21-024(c), pages H-36 and H-43:

a) Permittees' Statement: *Potential ecological risks associated with aluminum are based on soil pH. Aluminum is retained only in soil with a pH lower than 5.5, in accordance with EPA guidance (EPA 2003, 085645). Aluminum was eliminated as a COPEC and was not evaluated further because the mean soil pH for the DP Site Aggregate Area is 7.9.*

NMED Comment: *The source of the stated value of pH is not identified in the text. Please revise Section H-5.3.1 and all other impacted discussions in Appendix H to include a reference citation for the source of the bulk pH value for the DP Site Aggregate Area. Also, include the referenced document in Section H-7.0, References.*

b) Permittees' Statement: *The HQs and HIs for each COPEC and receptor combination are presented in Table H-5.3-3. The HI analysis indicates the robin (all feeding guilds), kestrel (intermediate carnivore), deer mouse, shrew, earthworm, and plant have HIs greater than 1, and the kestrel (top carnivore) and cottontail have HIs equivalent to 1. The COPECs and receptors are discussed in the uncertainty section.*

and

The HIs for Consolidated Unit 21-003-99 and SWMU 21-024(c) are equivalent to 1 for the robin (insectivore)…

NMED Comment: *The two statements regarding the HIs for the robin at CU 21-003-99 and SWMU 21-024(c) appear to be inconsistent because the first statement indicates that the HI for the robin is greater than 1 and the second statement indicates that the HI for the robin is equivalent to 1. Please revise Section H-5.3.1to resolve the apparent discrepancy.*

LANL Response

19a. The pH data used to determine the average soil pH is provided in Appendix G (Acidity or Alkalinity of a solution). Text referencing Appendix G has been added to section H-5.3.

19b. The first statement is from the minimum ecological screening level (ESL) and hazard index (HI) analysis and references the correct tables, while the second statement is from the next step in the ecological screening process and refers to the adjusted HI analysis using the population area use factors and references the relevant table in the ecological uncertainty analysis. The text in all of the adjusted HI analyses has been revised to include adjusted and/or unadjusted to further distinguish between the results being discussed.

NMED Comment

20. Section H-5.3.8 Consolidated Unit 21-026(a)-99, pages H-38 and H-45:

Permittees' Statement: *The HQs and HIs for each COPEC and receptor combination are presented in Table H-5.3-17. The HI analysis indicates all the receptors, except the red fox, have HIs greater than 1. The COPECs and receptors are discussed in the uncertainty section.*

and

The HIs for Consolidated Unit 21-026(a)-99 are equivalent to 1 for the robin (omnivore)…

NMED Comment: *The two statements regarding the HIs for the robin (omnivore) at CU 21-026(a)-99 appear to be inconsistent because the first statement indicates that the HI for the robin is greater than 1 and the second statement indicates that the HI for the robin is equivalent to 1. Please revise Section H-5.3.8 to resolve the discrepancy.*

LANL Response

20. See response to 19b.

NMED Comment

21. Section H-5.4.5 Population Area Use Factors, Consolidated Unit 21-026(a)-99, page H-42:

Permittees' Statement: *The adjusted HIs for Consolidated Unit 21-026(a)-99 are less than 1 for all receptors, except for the robin (insectivore), which has an HI of 2. The earthworm and plant have unadjusted HIs of 50 and 7, respectively (Table H-5.4-18).*

NMED Comment: *A review of Table H-5.4-18, Adjusted HIs for CU 21-026(a)-99, page H-279, indicates that the adjusted HI for the American Robin (avian omnivore) is 1.25. Please revise Section H-5.4.5 to resolve the discrepancy.*

LANL Response

21. Section H-5.4.5 for Consolidated Unit 21-026(a)-99 has been revised to indicate the robin (omnivore) HI is equivalent to 1.

NMED Comment

22. Section H-5.4.8 Chemicals without ESLs, page H-47:

a) Permittees' Statement: *Benzyl alcohol was detected in one sample at Consolidated Unit 21-003-99 and SWMU 21-024(c) from 0.0–5.0 ft bgs at a concentration of 0.232 mg/kg. The EPA regional residential SSL for benzyl alcohol is 6200 mg/kg, indicating that potential toxicity is low. Because of the potential low toxicity and the infrequent detection, benzyl alcohol is eliminated as a COPEC.*

NMED Comment: *The Permittees eliminate benzyl alcohol from further consideration in the ecological risk screening assessment due to frequency of detection and potential low toxicity. However, the potential for low toxicity is based on the value of the USEPA residential RSL. Based on the information currently presented in Section H-5.4.8, benzyl alcohol should be retained as a constituent of potential ecological concern (COPECs) and subjected to further evaluation. Revise Section H-5.4.8 of the Report to provide additional lines of evidence for exclusion of benzyl alcohol from further consideration in the ecological risk screening assessment. Those lines of evidence must establish the source of the benzyl alcohol detected at CU 21-003-99 and SWMU 21-024(c) and identify a suitable surrogate for estimating the ecological toxicity of benzyl alcohol.*

b) Permittees' Statement: *Butylbenzene(sec-) was detected in four samples at Consolidated Unit 21-003-99 and SWMU 21-024(c) from 0.0–5.0 ft bgs with a maximum concentration of 0.000485 mg/kg. The minimum ESL for benzene (24 mg/kg for the deer mouse) is used to screen the sec-butylbenzene concentration and results in a maximum HQ of 0.00002. Because the HQs are less than 0.3, sec- butylbenzene is not retained as a COPEC.*

NMED Comment: *In Section H-5.4.8 the Permittees use the minimum ecological screening level (ESL) for benzene to eliminate sec-butylbenzene, chlorobenzene, ethylbenzene, and 1,2,4-trimethylbenzene from further consideration in the ecological risk screening assessment. However, these paragraphs do not explain why benzene is a suitable surrogate for the ecotoxicity of the four eliminated COPECs. Please revise Section H-5.4.8 to include lines of evidence that establish benzene as an appropriate surrogate for the ecotoxicity of sec-butylbenzene, chlorobenzene, ethylbenzene, and 1,2,4-trimethylbenzene.*

c) Permittees' Statement: *Calcium was detected above soil and Qbt 2,3,4 BVs (6120 mg/kg and 2200 mg/kg) in 29 soil samples and 125 tuff samples at 13 sites from 0.0–5.0 ft bgs, with a maximum concentration of 42,800 mg/kg. As discussed in section H-4.2, calcium at the maximum concentrations is not a health issue for an adult or a child. Therefore, calcium is not retained as a COPEC at any site.*

NMED Comment: *The Permittees dismiss calcium as a COPEC based on its toxicity to humans, however, human toxicity is not a defensible line of evidence for eliminating a COPEC. Based on this information, calcium should be retained for further evaluation. Please revise Section H-5.4.8 to provide lines of evidence (e.g., use of an appropriate surrogate) that adequately characterize the ecotoxicity of calcium. Once adequate lines of evidence are established, they may be used to eliminate calcium as a COPEC.*

d) Permittees' Statement: *Dimethylphenol(2,4-) was detected in one sample at Consolidated Unit 21-026(a)-99 from 0.0–5.0 ft bgs at a concentration of 0.063 mg/kg. The minimum ESL for phenol (0.79 mg/kg for the plant) is used to screen the chlorobenzene concentration and results in an HQ of 0.08. Because this HQ is less than 0.3, 2,4-dimethylphenol is not retained as a COPEC.*

NMED Comment: *The Permittees use the minimum ESL for phenol to eliminate 2,4-dimethylphenol from further consideration in the ecological risk screening assessment. However, the discussion in the seventh paragraph doesn't explain why phenol is a suitable surrogate for the ecotoxicity of the eliminated COPEC. Please revise Section H-5.4.8 to provide lines of evidence that establish phenol as an appropriate surrogate for the ecotoxicity of 2,4-dimethyl phenol.*

LANL Response

22a. Benzyl alcohol has ESLs in the ECORISK Database, release 3.2. Text and tables have been revised accordingly to include benzyl alcohol in the screening.

22b. The text states that surrogates used in the screening process are based on structural similarity. Additional text has been added to state they must also have ESLs in the database. All the compounds listed in the comment are benzene-based and the database includes ESLs for benzene.

22c. Text has been added to section 5.4.8 explaining why human health screening values can be used to evaluate chemicals of potential ecological concern (COPECs) without ESLs when no surrogate or other toxicity information is available. This added text has been included in previous reports and was inadvertently omitted in the Phase III investigation report. In addition, text has been added to explain that calcium is an essential nutrient and was infrequently detected above the maximum soil background concentration and notes that later NMED guidance has a residential screening level of 13,000,000 mg/kg, indicating the levels detected in the soil are not toxic.

22d. As noted in the response to Comment 22b above, surrogates used in the screening process are based on structural similarity and must also have ESLs in the database. Originally, phenol was used as a surrogate for this reason. However, further evaluation concluded that 2-methylphenol is a better surrogate based on structural similarity. The text in section H-5.4.8 has been revised accordingly.

NMED Comment

23. Section H-5.4.8 Chemicals without ESLs, page H-48:

a) NMED Comment: *The second, fourth, fifth, and sixth paragraphs of Section H-5.4.8, Chemicals without ESLs, page H-48, eliminate iron, nitrate, perchlorate, and 1,1,2-trichloro-1,2,2-trifluoroethane, respectively, from further consideration in the screening ecological risk assessment. Iron, and 1,1,2-trichloro-1,2,2-trifluoroethane were eliminated due to frequency of detection and potential low toxicity. Nitrate and perchlorate were eliminated solely on low toxicity. However, the potential for low toxicity for all four eliminated COPECs is based on the value of the USEPA residential RSL. Based on the information currently presented in Section H-5.4.8, none of the four COPECs should be eliminated from the ecological risk assessment and should be subjected to further evaluation. Please revise Section H-5.4.8, page H-48 to provide additional lines of evidence for the exclusion of iron, nitrate, perchlorate, and 1,1,2-trichloro-1,2,2-trifluoroethane from further consideration in the screening ecological risk assessment. For iron and 1,1,2-trichloro-1,2,2-trifluoroethane, those lines of evidence must establish the source of the detections of these COPECs. For iron, a suitable surrogate for estimating its ecotoxicity should be provided. For nitrate, perchlorate, and 1,1,2-trichloro-1,2,2-trifluoroethane, lines of evidence must establish the ecotoxicity of these three COPECs. If the Permittees cannot provide additional lines of evidence for eliminating iron, nitrate, perchlorate, and 1,1,2-trichloro-1,2,2-trifluoroethace as COPECs, these COPECs must be considered in the screening ecological risk assessment.*

b) *The third paragraph on page H-48, Section H-5.4.8 uses the minimum ESL for toluene to eliminate 4-isopropyltoluene from further consideration in the screening-level ecological risk assessment. However, the discussion in the third paragraph does not establish that toluene is a suitable surrogate for the ecotoxicity of the eliminated COPEC. Please revise Section H-5.4.8, page H-48 to include lines of evidence that establish toluene as an appropriate surrogate for the ecotoxicity of 4-isopropyltoluene.*

LANL Response

23a. See responses to Comment 22 above. Iron, nitrate, perchlorate, and 1,1,2-trichloro-1,2,2-trifluoroethane have no surrogates. Text in section H-5.4.8 has been added to further explain why these elements and chemicals are not COPECs.

23b. The text states that surrogates used in the screening process are based on structural similarity and must also have ESLs in the database. The compound listed in the comment is toluene-based and the database includes ESLs for toluene.

NMED Comment

24. Section H-5.5.1 Receptor Lines of Evidence, Plant, page H-49:

a) Permittees' Statement: *For SWMU 21-022(h), the contamination driving the potential risk is localized around the outfall so the vast majority of the area does not present a potential risk to the plant and the results indicate the potential ecological risks are overestimated. Field observations made during the site visit found no indication of ecological adverse effects from COPECs. The area in and around the outfall is on a steep slope/cliff, with 45- to 90-degree slopes and consists of unstable, highly weathered, fractured bedrock with approximately 20%*

soil, filling fractures and voids between rocks. This area would not serve as an area where plants are well established and the HIs do not indicate potential risks to the plants.

NMED Comment: *This line of evidence is not supported by documented observations of the outfall at SWMU 21-022(h). Please revise Section H-5.5.1, page H-49 to indicate whether a lack of established plant life has been observed and documented at the outfall. If so, ensure that a reference citation for the location of the supporting information is provided. If not, remove this line of evidence from the discussion.*

b) Permittees' Statement: *For Consolidated Unit 21-023(a)-99, the majority of the selenium is located in the northern portion of the consolidated unit. This area constitutes approximately 0.025 ha or 40% of the site area (consisting of 0.015 ha area on the east side of former building 21-003 and 0.01 ha area on the west side of former building 21-003). The limited area of selenium contamination indicates the plant community as a whole is not impacted. In addition, the lead EPC is overestimated and biased high by the maximum detected concentration (1270 mg/kg), which is also in the northern portion of the consolidated unit, indicating the potential ecological risk to the plant community is overestimated. Other EPCs, ESLs, and LOAEL-based ESLs are similar to background; the maximum detected concentrations for both COPECs are within the range of soil and tuff background concentrations, respectively.*

NMED Comment: *The Permittees state that the maximum detected concentrations for both selenium and lead are within the range of soil and tuff background concentrations. The Permittees must strengthen this line of evidence by providing a table of the maximum detected concentrations and corresponding soil and tuff background concentrations for CU 21-023(a)-99. A reference for the background values must also be provided. If the information cannot be provided, this line of evidence must be eliminated from the discussion.*

LANL Response

24a. The text in section H-5.5.1 has been revised to describe the area further, and aerial photographs of the outfall area are included as Attachment 1. The photographs showing the rugged and bare rock landscape and the sparse vegetation and soil along the cliff face and around the outfall area support the description originally presented in the approved Phase III work plan and included verbatim in the investigation report. The description provided in the text and presented again in the comment was from visual observation of the outfall area by personnel collecting samples at SWMU 21-022(h) and, as such, is an accurate and reasonable depiction of the site. The photographs clearly indicate the limited amount of soil present (approximately 20% soil, filling fractures and voids between rocks), which in turn limits or prohibits the amount and type of vegetation present on the slope. As is expected of a rocky landscape and limited soil, plants do not cover a large area and are limited to pockets of grasses and small shrubs.

24b. The EPCs, ESLs, and lowest observed adverse effect level– (LOAEL-) based ESLs similar to background are those for barium and manganese, not selenium and lead. The text in section H-5.5-1 has been revised to indicate barium and manganese concentrations are within the range of soil and/or tuff background concentrations, the maximum background concentrations for each are included, and the background document is referenced.

NMED Comment

25. Section H-5.5.1 Receptor Lines of Evidence, Earthworm (Invertebrate) page H-50:

a) Permittees' Statement: *For SWMU 21-022(h), the contamination driving the potential risk is localized around the outfall so the vast majority of the area does not present a potential risk to the earthworm. The LOAEL based earthworm ESL for mercury (0.5 mg/kg) is only 0.4 mg/kg above the soil BV (0.1 mg/kg) and the EPC (0.606 mg/kg) is only 0.5 mg/kg above the BV, indicating the potential ecological risk to the earthworm is overestimated.*

NMED Comment: *Based on the numerical results for the ESL and exposure point concentration (EPC) provided in the discussion it appears that additional evaluation of the potential impact to earthworms at SWMU 21-022(h) is warranted. It is not clear how the magnitude of the exceedances of the mercury background value (BV) by the mercury ESL and EPC relates to the potential ecological risk to the earthworm. Both the ESL and EPC exceed the mercury BV. Additionally, the hazard quotient (HQ) is 1.2 (EPC/ESL) indicating that additional evaluation is needed. Please revise Section H-5.5.1, page H-50 to include information establishing the relationship between the magnitude of the exceedance of the appropriate mercury background value and the potential adverse impact to earthworms at SWMU 21-022(h). If this information cannot be provided, please eliminate this line of evidence from the discussion.*

b) Permittees' Statement: *Field observations made during the site visit found no indication of ecological adverse effects from COPECs. The area in and around the outfall is on a steep slope/cliff, with 45- to 90-degree slopes and consists of unstable, highly weathered, fractured bedrock with approximately 20% soil, filling fractures and voids between rocks. This area would not serve as an area where soil invertebrates are well established and the HIs do not indicate potential risks to the earthworms.*

NMED Comment: *This line of evidence is not adequately supported by documented observations (e.g., photos) of the area. Please revise the discussion of Earthworms, Section H-5.5.1, page H-50 to indicate whether data exist that support the assertion that the area of contamination on the slope/cliff does not support soil invertebrates. If so, ensure that a reference citation for the location of the supporting information is provided. If not, please remove this line of evidence from the discussion.*

LANL Response

25a. The text in sections H-5.4.7 and H-5.5.1 has been revised. The text regarding the magnitude of the exceedances of the mercury ESL and EPC above background in sections H-5.4.7 and H-5.5.1 has been deleted.

25b. The text in section H-5.5.1 has been revised to describe the area further, and aerial photographs of the outfall area are included as Attachment 1. The photographs showing the rugged and bare rock landscape and the sparse vegetation and soil along the cliff face and around the outfall area support the description originally presented in the approved Phase III work plan and included verbatim in the investigation report. The description provided in the text and presented again in the comment was from visual observation of the outfall area by personnel collecting samples at SWMU 21-022(h) and, as such, is an accurate and reasonable depiction of the site. The photographs clearly indicate the limited amount of soil present (approximately 20% soil, filling fractures and voids between rocks), which in turn limits or prohibits the amount and type of

vegetation present on the slope. As is expected of a rocky landscape and limited soil, plants do not cover a large area and are limited to pockets of grasses and small shrubs. Because the soil and vegetation conditions strongly affect the presence of soil invertebrates, particularly earthworms, the area has few, small, and intermittent places where these receptors could be present, if at all.

NMED Comment

26. Section H-5.5.1 Receptor Lines of Evidence, Deer Mouse (Omnivore) page H-51:

a) Permittees' Statement: *In addition, the Laboratory has conducted small-mammal trapping and analysis of whole organisms as well as small-mammal community and population measurements at other Laboratory sites. Concentrations in whole-body samples were well below the concentrations detected in the soil, had fewer congeners detected than in the soil samples, and were below the deer mouse ESL for 2,3,7,8-TCDD. No adverse effects were found on local small-mammal populations based on species richness, capture rate, species diversity, sex ratios, and adult body weights (Bennett and Robinson 2011, 262508; Fresquez et al. 2013, 262507).*

NMED Comment: *The Permittees describe small-mammal trapping and analysis and community and population measurements performed at sites other than SWMU 21-027(a). This work is described in more detail in the discussion of SWMU 21-027(a) included in Section H-5.4.7, Site Discussions. Please revise Section H-5.5.1 Receptor Lines of Evidence, Deer Mouse (Omnivore) page H-51 to reference the discussion of the small mammal studies conducted by the Permittees that is provided in Section H-5.4.7. In addition, the discussion must be expanded to establish the relationship between the small mammals analyzed and community and population measurements made at other sites and the deer mice and actual small mammals associated with SWMU 21-027(a). If a relationship cannot be established between the analyses and measurements and small mammal populations associated with the site, this line of evidence must be removed from the discussion.*

b) Permittees' Statement: *The presence of dioxins and furans in soil does not determine exposure and risk to receptors. Dioxins and furans are relatively unavailable for uptake by plants and animals because these compounds are tightly bound to soil particles, are immobile, and insoluble. Abiotic constituents, compound aging, and other associated soil factors may influence soil bioavailability (e.g., bioavailability appears to decrease with aging based on comparisons of laboratory spiked soil and soil contaminated in situ) (Umbreit et al. 1986, 262512). This condition is supported by the low uptake and lack of impacts to biota at sites where dioxin and furan congeners have been detected. The difference between the toxicity represented by the ESLs and the lack of adverse effects may be related to the low bioavailability of dioxins and furans in soil. As a result, dioxins and furans at this SWMU do not present a potential risk to small mammals.*

NMED Comment: *The Permittees address the bioavailability of 2,3,7,8-TCDD TEQ and assert that the difference between the toxicity represented by the ESL and the lack of adverse effects may be related to the low bioavailability of 2,3,7,8-TCDD TEQ in soil, and conclude that 2,3,7,8-TCDD TEQ does not present a potential risk to small mammals at SWMU 21-027(a). Lines of evidence supporting this assertion have been provided in the discussion of SWMU 21-027(a) presented on page H-46 of Section H-5.4.7, Site Descriptions. Please revise Section H-5.5.1 Receptor Lines of Evidence, Deer Mouse (Omnivore), page H-51 to include a*

reference to the discussion of 2,3,7,8-TCDD TEQ bioavailability on page H-46 of Section H-5.4.7.

c) ***Permittees' Statement:*** *For AOC C-21-027, the deer mouse HI is based on the maximum equivalent concentration of 2,3,7,8-TCDD. However, the maximum concentration overestimates the exposure and potential risk to receptors. If a 95% UCL is calculated, the adjusted HI analysis using the LOAEL-based ESL results in an HI of approximately 1 or less for the deer mouse.*

NMED Comment: *The Permittees statement is confusing as it would be expected that a 95% UCL would have been used (instead of the maximum detected concentration) if data of sufficient quantity and quality were available to perform such a calculation. Please revise Section H-5.5.1 Receptor Lines of Evidence, Deer Mouse (Omnivore), page H-51 to indicate why a 95% UCL was not calculated for 2,3,7,8-TCDD TEQ using ProUCL for use in the screening-level ecological risk assessment. If the data meet the quality and quantity requirements of ProUCL, Appendix H must be revised to use the 95% UCL for the 2,3,7,8-TCDD TEQ EPC rather than the maximum detected concentration. If the maximum detected concentration is used, page H-51must be revised to state that the results of the screening ecological risk assessment indicate that further evaluation of 2,3,7,8-TCDD TEQ is required at AOC C-21-027. In addition, please indicate that further evaluation could include collection of additional data so that a 95% UCL can be calculated for 2,3,7,8-TCDD TEQ.*

d) ***Permittees' Statement:*** *These lines of evidence support the conclusion that no potential ecological risk to the deer mouse exists at the DP Site Aggregate Area.*

NMED Comment: *The current text does not provide adequate support for this assertion. Once adequate responses to these technical review comments are developed, the Permittees must reassess this assertion and determine if it should remain in Section H-5.5.1.*

LANL Response

26a. Section H-5.5.1, Receptor Lines of Evidence, Deer Mouse (Omnivore), (p. H-51) has been revised to reference the discussion of the small mammal studies in section H-5.4.7. Section H-5.4.7 has been revised to include the following text.

> Small mammals are ubiquitous across the Pajarito Plateau. Small mammals typically captured in and around the Laboratory are the deer mouse, brush mouse, pinyon mouse, silky pocket mouse, western harvest mouse, white-throated woodrat, and the Mexican woodrat. The small mammal trapping and studies conducted by the Laboratory across the Pajarito Plateau include sites at TA-16, TA-39, TA-36, Los Alamos Canyon, Pueblo Canyon, Acid Canyon, Guaje Canyon, Mortandad Canyon, Sandia Canyon, and TA-54 Area G. The samples from these sites/areas consisted primarily of deer mouse and brush mouse at TA-16 (Fresquez et al. 2013, 262507); deer mouse, pinyon mouse, and western harvest mouse at TA-36 (Fresquez 2011, 262506); deer mouse at TA-39 (Fresquez 2011, 262506); deer mouse, brush mouse, and pinyon mouse in Los Alamos and Pueblo Canyons (Robinson and Bennett 2003, 082663); deer mouse and brush mouse in Acid Canyon and Guaje Canyon (Robinson and Bennett 2003, 082663); deer mouse and brush mouse in Mortandad Canyon (LANL 2006, 094161); deer mouse, brush mouse, and western harvest mouse in Sandia Canyon (LANL 2009, 107453); and deer mouse, pinyon mouse, and brush mouse at TA-54, Area G (Biggs et al. 1997, 062344; Fresquez et al. 2005, 601464). Other small mammals captured at some or all of these areas/sites also

included woodrats, voles, and other mice included in the list above but less frequently. These capture data indicate the widespread occurrence of the small mammal species, particularly the deer mouse, pinyon mouse, and brush mouse, across the Pajarito Plateau, including DP Mesa and TA-21. Exposure pathways include direct contact with soil, food chain uptake, and incidental soil ingestion. The exposure pathways and receptors present at terrestrial sites are similar across the Laboratory.

The vegetation across the Pajarito Plateau transitions from ponderosa pine in the west to piñon-juniper to the east as elevations decrease. Among these predominant vegetation types are also some mixed conifer, shrubs, and grasses as well as developed areas within the Laboratory boundaries and the townsite. The dominant types of vegetation at the various sites and areas where small mammal trapping studies have been conducted include ponderosa pine, gambel oak, and grasses at TA-16; piñon-juniper with interspersed ponderosa pine and gambel oak at TA-36 and TA-39; ponderosa pine with a scattering of piñon-juniper in Pueblo Canyon; ponderosa pine, mixed conifer, and piñon-juniper along with gambel oak and shrubs in Mortandad and Sandia Canyons; ponderosa pine and mixed conifer with some piñon-juniper interspersed in Acid Canyon and Los Alamos Canyon; and ponderosa pine with juniper and grasses in Guaje Canyon. TA-21 is developed with large grassy areas and few trees, but includes ponderosa pine interspersed with piñon-juniper and gambel oak. Area G is similar in elevation and development to DP Mesa with vegetation consisting of a few ponderosa pines and grassy areas. Soil also varies across the Pajarito Plateau but has similar origins with the principal parent material being the Bandelier Tuff. As described in section 2.1.1 of the report, soil at TA-21 is typical of that across the Pajarito Plateau and is generally poorly developed, derived from Bandelier Tuff bedrock, shallow, well drained particularly on the mesa tops and south-facing slopes, and formed in a semiarid climate. The commonality of vegetation and soil along with climate and habitat contributes to the ubiquitous occurrence of the small mammals across the region, both on the mesa tops and in the canyons. The similarity of soil across the Pajarito Plateau also contributes to the widespread capability of the soil matrix to adsorb and tightly bind compounds over time, resulting in low bioavailability for uptake.

26b. Section H-5.5.1, Receptor Lines of Evidence, Deer Mouse (Omnivore), has been revised to include a reference to the discussion on page H-46 of section H-5.4.7.

26c. As noted in section H-5.4.7 (p. H-47), the maximum 2,3,7,8-TCDD- [tetrachlorodibenzo-p-dioxin–] equivalent concentration was used initially because only seven samples were collected in the 0.0–5.0-ft depth interval. As part of the uncertainty analysis, the potential risk has been further evaluated to determine if a more representative EPC can be calculated because the potential risk is overestimated by the maximum concentration. Because ProUCL calculated 95%UCLs based on the seven samples and seven 2,3,7,8-TCDD-equivalent concentrations for this site, the values were incorporated into the screening assessment as part of the further evaluation. As presented in the uncertainty discussion (p. H-48), the LOAEL-based adjusted HIs were calculated using these 95% UCLs, which resulted in HIs of approximately 1 or less for the deer mouse (Tables H-5.4-36 and H-5.4-37). These results demonstrate that the use of the maximum concentration overestimates the potential risk to the deer mouse (and the other receptors) and that the average concentration indicates no risk to this receptor. No further evaluation is warranted including collecting additional samples.

26d. Based on the comment responses and the information and analyses presented in the report, the statement regarding no potential risk to the deer mouse is unchanged.

NMED Comment

27. Section H-6.1 Human Health Risk, page H-53:

Permittees' Statement: *The human health risk-screening assessments were conducted on the entire site for the remaining consolidated units, SWMUs, and AOC as well as on the mesa-top portion of the site for Consolidated Unit 21-026(a)-99, SWMUs 21-022(h), 21-024(b), and 21-027(a), and AOC C-21-027. These five sites were evaluated using this approach because the slope/cliff portions of the sites do not result in exposure to human receptors (LANL 2011, 203659; NMED 2011, 203825).*

NMED Comment: *The Permittees provide several lines of evidence to support performance of the mesa top analyses. Please revise the Report to include a discussion of any controls such as signage, fencing, and/or security patrols in place to guarantee that the likelihood of human exposure to contaminated areas on steep hills and cliffs is low.*

LANL Response

27. Text has been added to section H-6.1, Human Health Risk, regarding controls to limit human exposure to contamination on the steep slope/cliff portions of the sites.

The steep slope/cliff portions of the sites do not result in exposure to human receptors for several reasons, including the steepness of the slope/cliff, the unstable surface on the slope, the lack of safe and reasonable access, and the absence of any trail access (see photographs in Attachment 1). In addition, fencing is in place to restrict access to these areas. Workers are not and will not be exposed to these areas given the protection systems required for access, the access restrictions in place, and work is not planned nor being conducted in these areas. The TA-21 site on DP Mesa remains DOE property and is fenced and posted including along the mesa edge above Los Alamos Canyon, with access roads fenced and gated to prevent access to the eastern end of DP Mesa. Therefore, access to and the likelihood of human exposure to contamination on the steep slope/cliff portions of the sites at TA-21 are very low.

NMED Comment

28. Section H-6.2 Ecological Risk, page H-55:

Permittees' Statement: *Based on evaluations of the minimum ESLs, HI analyses, potential effects to populations (individuals for T&E species), and LOAEL analyses, no potential ecological risks to the earthworm, plant, American robin, American kestrel, deer mouse, montane shrew, desert cottontail, red fox, and Mexican spotted owl exist at the DP Site Aggregate Area sites evaluated in this appendix.*

NMED Comment: *Based on NMED's comments, this assertion is not adequately supported in the report. Once adequate responses to the technical review comments are developed, the Permittees must reassess this assertion and determine if it should remain in Section H-6.2 or be revised to reflect the responses and the results of any further evaluations undertaken as part of the responses.*

LANL Response

28. Based on the comment responses and the information and analyses presented in the report, the statement regarding no potential risk to receptors is unchanged.

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Fresquez, P.R., May 2011. "Chemical Concentrations in Field Mice Collected from Open-Detonation Firing Sites TA-36 Minie and TA-39 Point 6 at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-11-10614, Los Alamos, New Mexico. (Fresquez 2011, 262506)

Fresquez, P.R., L. Hansen, and C. Hathcock, 2013. "Chemical Concentrations in Field Mice/Voles Collected from an Open-Burn Site at Technical Area 16 at Los Alamos National Laboratory: Revision 1," Los Alamos National Laboratory document LA-UR-13-20040, Los Alamos, New Mexico. (Fresquez et al. 2013, 262507)

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LANL (Los Alamos National Laboratory), April 2016. “2015 Monitoring Report for Los Alamos/Pueblo Watershed Sediment Transport Mitigation Project,” Los Alamos National Laboratory document LA-UR-16-22705, Los Alamos, New Mexico. (LANL 2016, 601433)

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Robinson, R., and K. Bennett, 2003. “Summer and Fall Small Mammal Sampling in Pueblo, Guaje, Acid, and Los Alamos Canyons, 2002,” Los Alamos National Laboratory report LA-14047, Los Alamos, New Mexico. (Robinson and Bennett 2003, 082663)

Attachment 1

Photographs of the SWMU 21-022(h) Outfall Area

Figure 1 High aerial photograph of SWMU 21-022(h) outfall area (inside box)

Figure 2 Slope/cliff face at the SWMU 21-022(h) outfall area (arrow)

Figure 3 Slope/cliff face at the SWMU 21-022(h) outfall area (arrow) looking east

Figure 4 Slope/cliff face at the SWMU 21-022(h) outfall area (arrow) looking west

Figure 5 Close up of slope/cliff face at the SWMU 21-022(h) outfall area (inside box)