



June 29, 2022

Arturo Duran
U.S. Department of Energy
Environmental Management
Los Alamos Field Office
1200 Trinity Drive, Suite 400
Los Alamos NM 87544

Re: **APPROVAL**
SUPPLEMENTAL INVESTIGATION REPORT FOR SITES AT TECHNICAL AREA 49 OUTSIDE THE
NUCLEAR SITE BOUNDARY, REVISION 1
LOS ALAMOS NATIONAL LABORATORY
EPA ID #NM0890010515
HWB-LANL-16-036

Dear Mr. Duran,

The New Mexico Environment Department (NMED) has received the United States Department of Energy (DOE) and the United States Department of Energy (DOE) Environmental Management Los Alamos Field Office (EM-LA) *Submittal of the Supplemental Investigation Report for Sites at Technical Area 49 Outside the Nuclear Site Boundary, Revision 1* (Revision) dated and received May 24, 2022 (referenced by EM2022-0109).

Background:

The TA-49 Outside the NES Boundary includes three sites: Area of Concern (AOC) 49-002, Solid waste Management Unit (SWMU) 49-004, and SWMU 49-005(a). These sites were originally investigated in 2009-2010, as part of the Phase I Investigation Report. Following Force Majeure events and the revision of the Order on Consent, NMED granted DOE's extension requests to submit the Supplemental Investigation Report in 2016 instead of 2011.

This Revision replaces *Supplemental Investigation Report for Sites at Technical Area 49 Outside the Nuclear Site Boundary* (SIR) dated August 9, 2016 (referenced by ADEM-16-5190/LA-UR-16-25264). NMED provided draft comments on the SIR in December 2021, and the DOE responded in March, April, and May of 2022 to resolve NMED's comments.

NMED has reviewed the DOE responses and the Revision and finds that NMED's draft comments have been either adequately addressed or will be addressed in the forthcoming Phase II Investigation Report (Phase II IR). For the Phase II IR, additional sampling is warranted for AOC 49-002 and SWMU 49-004. The DOE must provide a revised Phase II IR work plan which proposes to collect additional borehole samples at AOC 49-002

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and proposes to collect samples for dioxins and furans analysis which may be present at SWMU 49-004.

NMED hereby approves the Revision, NMED comments and DOE responses are attached with this letter. Please contact Siona Briley of my staff, at (505) 690-5160, should you have any questions or concerns.

Sincerely,

Rick Shean

Digitally signed by
Rick Shean
Date: 2022.06.29
12:14:39 -06'00'

Rick Shean

Chief

Hazardous Waste Bureau

Attachment: NMED Comments and DOE Responses

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File: 2022 LANL, TA-49, Approval of SIR for Sites at TA-49 Outside the Nuclear Environmental Site (NES) Boundary,
LANL-16-036

**Response to the Draft New Mexico Environment Department Comments for the
Supplemental Investigation Report for Sites at Technical Area 49 Outside the
Nuclear Environmental Site Boundary,
Dated December 13, 2021**

INTRODUCTION

To facilitate review of this response, the New Mexico Environment Department's (NMED's) comments are included verbatim (in italics). The U.S. Department of Energy (DOE) Environmental Management Los Alamos Field Office responses follow each NMED comment.

GENERAL COMMENTS

Nature and Extent of Contamination

NMED Comment

1. *In Section 5.2, the Permittees state that comparisons of sample results to soil screening levels/screening action levels (SSLs/SALs) are used in determining whether the extent of contamination has been defined. According to the text, the comparisons are performed after determining whether extent is defined by decreasing concentrations vertically and laterally and that sample concentrations are below estimated quantitation limits (EQLs) or detection limits (DLs). It is agreed that no further sampling for extent is warranted if the applicable SSL/SAL is significantly greater (orders of magnitude) than the maximum chemical of potential concern (COPC) concentration; in these cases, the comparison to the SSL/SAL may be used as a single line of evidence. However, if concentrations increase with depth and/or distance but do not display any obvious trends, and within 10% or slightly above 10% of the SSL/SAL, additional lines of evidence are required. This includes comparison to background if an inorganic.*

Other lines of evidence are required to be addressed in the report and may include:

- *Sufficient number of samples have been collected to determine nature and extent, but results are predominately non-detect (discussion of sample number versus detections).*
- *There is no history to suggest the constituent is directly related to site activities or a dominant waste stream. If there is site history to suspect that the constituent is present due to site activities (such as lead at a firing site), then it is possible that the constituent could be present from historical activities at low levels (in the high range of background). In these cases, the constituent still must be carried forward as a constituent of potential concern (COPC) and retained in the risk assessment (it will likely not be a risk driver) or if it is not retained as a COPC, risks associated with it must be presented in the uncertainty section.*
- *Spatial analyses do not show a pattern or trend indicating contamination.*

DOE Response

1. As described in section 5.2 of the "Supplemental Investigation Report for Sites at Technical Area 49 Outside the Nuclear Environmental Site Boundary" (LANL 2016, 601698), the determination of

whether extent of contamination is defined is based on spatial concentration trends (e.g., concentrations decreasing with depth or laterally). The comparison with soil screening levels (SSLs)/screening action levels (SALs) is not used to determine whether extent is defined. Rather, if extent is not defined, comparison with SSLs/SALs is used as a line of evidence to determine whether additional sampling to define extent is warranted. In general, if the maximum concentration is sufficiently less than the SSL/SAL (e.g., less than 10%), additional lines of evidence may not be needed. Otherwise, additional lines of evidence are used to determine whether additional sampling is warranted. Note that evaluation of site history is used as a line of evidence to determine whether a detected constituent is a chemical of potential concern (COPC) rather than whether extent is defined or additional sampling is warranted.

The report sections evaluating nature and extent of contamination will be reviewed and revised as appropriate based on the criteria in NMED's comment.

NMED Comment

2. *In Section 6.0, the discussion provided by the Permittees for each solid waste management unit (SWMU) or area of concern (AOC), does not demonstrate that the nature and extent have been defined by decreasing patterns of contamination away from the likely source of contamination or other applicable lines of evidence as described in the Section 4.9 of the 2019 NMED Soil Screening Guidance (SSG). These issues are especially prevalent for Section 6.4.4.4, Nature and Extent of Soil and Rock Contamination, for SWMU 49-005(a) and exist to a lesser degree in the extent discussions for AOC 49-002 and SWMU 49-004.*

While it is acknowledged that the maximum background value can be used for comparisons in special cases (e.g., statistically determined BV is significantly greater than the maximum background concentration), in accordance with the agreements made during the 2/14/17 meeting, comparison to the maximum background concentration must be used in conjunction with additional lines of evidence to include:

- *Statistically determined BV is significantly greater than the maximum background concentration.*
- *Statistical tests cannot be performed because of insufficient data or a high percentage of non-detections.*
- *Sufficient number of samples have been collected to determine nature and extent, but results are predominately non-detect (discussion of sample number versus detections).*
- *There is no history to suggest the constituent is directly related to site activities or a dominant waste stream. If there is site history to suspect that the constituent is present due to site activities (such as lead at a firing site), then it is possible that the constituent could be present from historical activities at low levels (in the high range of background). In these cases, the constituent still must be carried forward as a COPC and retained in the risk assessment (it will likely not be a risk driver) or if it is not retained as a COPC, risks associated with it must be presented in the uncertainty section.*
- *Spatial analyses do not show a pattern or trend indicating contamination.*
- *The site concentration is significantly lower than the corresponding soil screening level (SSL).*

- *The maximum detected result is statistically determined to be an outlier (note, sufficient samples must be collected to show a point is an outlier and not indicative of a hotspot).*

The Permittees approach is not consistent with the 2019 NMED SSG; and is potentially misleading for determining maximum values, since the extent may not be defined due to potential data gaps. The Permittees must revise discussions of nature and extent presented in Section 6.0 to present a comprehensive characterization of COPC concentration trends at each site (also see discussion 2.b below) and justify the comparison of sample values to soil screening levels or BVs in lieu of decreasing trends.

DOE Response

2. As noted in comment 1, section 5.2 of the report describes the process used to determine whether extent is defined or additional sampling is warranted. This process does not include comparison with maximum background concentrations. As described in section 5.1.1 of the report, comparison with maximum concentrations in the background data set may be used as a line of evidence to determine whether a detected constituent is a COPC. In accordance with the process described in section 5.1.1, the primary criterion for determining whether an inorganic constituent is a COPC is the result of statistical comparisons between site data and background data. Other lines of evidence are used only if statistical tests cannot be performed.

Comments similar to comment 2 concerning comparison with maximum background concentrations were received for other supplemental investigation report (SIRs). Those SIRs were revised based on NMED-approved comment responses. Section 5.1.1 of this report will be revised for consistency with the text in these approved SIRs, including replacing comparison with maximum background concentrations with comparison with the upper end of the background data set. The text in section 6 describing identification of COPCs will be reviewed and if site data are compared with the upper end of the background data set, one or more of the criteria will be cited in the report as a basis for this comparison (e.g., less than eight soil samples were collected, so statistical tests could not be performed). The text regarding identification of certain inorganic COPCs will be revised as appropriate to clarify or provide additional lines of evidence in support of eliminating some inorganic chemicals as COPCs.

Note that the process described in section 5.1.1 is the process developed in 2012 for reevaluating data in investigation reports. This process was used when the SIR was written in 2016 and is consistent with other SIRs prepared at that time and approved by NMED. This process may not be consistent with NMED's 2019 soil screening guidance (SSG) (NMED 2019, 700550), but the 2019 SSG is not relevant to a document prepared in 2016.

NMED Comment

3. *In Section 6.0 the Permittees provide numeric comparisons to the site concentrations and background value (BV) or soil screening level (e.g., the screening level is 25 times greater than the detected COPC concentration) without citing the purpose of this comparison. Revise the text to present site concentrations to NMED target levels (i.e., soil screening levels, lifetime cancer risk, and hazard index value (HI)) along with primary lines of evidence (e.g., concentration trends, and potential data gaps) used by the Permittee to determine if the nature and extent are defined for that COPC.*

DOE Response

3. As noted in the response to comment 1, the purpose of comparing site concentrations with SSLs is described in section 5.2, i.e., to determine if additional sampling to define extent is warranted. The report will be revised to provide a reference to section 5.2 in the introduction to each subsection in section 6 where extent of contamination is evaluated.

NMED Comment

4. *The SIR did not include the additional Qbt 4 background samples necessary to establish an appropriate background data set for Qbt 4, as committed to by the Permittees in Response to Notice of Disapproval for the Investigation Report for Sites at Technical Area 49 Outside of the Nuclear Environmental Site Boundary (2010 Investigation Report) dated August 12, 2010. Background data for Qbt 4 is necessary to establish background values for concentrations of aluminum, cobalt, and manganese detected at SWMUs/AOCs, whose inclusion or exclusion as COPCs may impact the overall human health risk or ecological risk, in particular at the site SWMU-49-004.*

DOE Response

4. The response to the notice of disapproval for the 2010 investigation report (LANL 2010, 110654.4) committed to collecting Qbt 4 background samples and conducting a background study separate from the Technical Area 49 (TA-49) investigations, for which a Qbt 4 background study work plan would be submitted to NMED for review and approval. The background study work plan was submitted to NMED in December 2010 (LANL 2010, 111504) and approved by NMED in January 2011 (NMED 2011, 111680). Los Alamos National Laboratory (LANL) performed the background study and submitted the Qbt 4 background study report to NMED in September 2011, (LANL 2011, 206327), which NMED disapproved in October 2011 (NMED 2011, 207293), and LANL submitted a response to NMED's notice of disapproval in November 2011 (LANL 2011, 208338). NMED approved the background study report in December 2011 with modifications that applied to the Phase II investigation report for sites at TA-49 inside the nuclear environmental site boundary (NMED 2011, 208826). The approved report concluded that the current Qbt 2,3,4 background values (BVs) are appropriate for comparison with analytical results from unweathered Qbt 4 for the purpose of defining extent and identifying COPCs. No revision to the report is necessary.

NMED Comment

5. *A summary of the human health and ecological risk screening assessments for each SWMU and AOC is addressed in Sections 6.0-7.0. However, the location of information that supports the reported results is never referenced in these summaries. Revise the summaries of human health and ecological risk screening in Sections 6.0 through 7.0 to include references to the appropriate sections, subsections, and/or tables of Appendix I for additional information regarding how the reported cancer risks, hazard quotients (HQs), and hazard indices (HIs) were determined. For example, Section 6.2.5 should reference Appendix I, Tables I-4.2-1 through I-4.2-6 so stakeholders can quickly access the tabulations of risk and noncancerous hazard for Area of Concern (AOC) 49-002.*

DOE Response

5. The text in the report summarizing the conclusions of the human health and ecological risk assessments is consistent with other SIRs previously approved by NMED. No revision to the report is needed, but the comment will be considered when preparing future investigation reports.

NMED Comment

6. NMED notes that in Volume II of NMED 2019 Guidance document, there exists a tiered approach for performing screening level ecological risk assessments (SLERA) in the state of New Mexico. Section 4.0, Tier 2 SLERA, Volume II of the 2019 NMED Guidance offers refinements to the initial screening calculations through the application of bio-uptake and bioaccumulation modeling to predict contaminant of potential ecological concern (COPEC) concentrations in plants and animal/invertebrate matter and plant uptake factors to predict COPEC plant concentrations. It is unclear whether the Permittees considered these factors in the screening level ecological risk assessment performed for the ten sites addressed in this SIR. Revise section 4.3 to clarify whether these factors were used; and if they were not, revise all these applicable sections, attachments, and tables to include these refinements into subsequent ecological risk analyses in lieu of qualitative lines of evidence used by the Permittees but not recognized as valid by NMED (e.g., comparison of exposure point concentrations to the maximum background concentration).

DOE Response

6. The comment references NMED's soil screening guidance for ecological risk assessments document published in 2017 (NMED 2017, 602274), which is after the ecological risk assessment was completed in 2016. LANL has created its own ecological screening methods with the first version in 1998 (Kelly et al. 1998, 057916) and the latest version in 2018 (LANL 2018, 602965). NMED has approved the LANL screening level ecological risk assessment (SLERA) method and was integrally involved in the development of the original 1998 LANL SLERA approach. The LANL SLERA method includes bioaccumulation into the calculations of the chemical and radionuclide ecological screening levels (ESLs). The general equations are in the LANL SLERA document Revision 4 (LANL 2015, 600982) and the factors used are in the ECORISK database (LANL 2015, 600921). Both of these have been approved by NMED (NMED 2016, 601533; NMED 2016, 601696). No revision to the report is needed.

NMED Comment

7. The sites at Technical Area 49 (TA-49) Outside the Nuclear Site Boundary are potentially impacted by volatile organic compounds. The sites were evaluated based on data collected in 2009-2010. Concerns have been raised at LANL about volatile organic compound (VOC) collection methods. In the September 30, 2011 Notice of Disapproval of the Phase II Investigation Work Plan, Three Mile Canyon Aggregate Area, NMED required the Permittees to describe in detail the methods that will be used to collect the samples for VOC analysis. The purpose of the requirement is to ensure that the loss of VOCs during sample collection is minimized. In their October 2011 response, the Permittees stated that standard operating procedures (SOPs) were being revised to address the potential loss of VOCs during sampling. It was further stated that after the SOPs were revised, a work plan addendum would be submitted to NMED for review and approval before the Phase II investigation work plan was implemented.

Because the same methods used in the Threemile Canyon Aggregate Area investigation were used to investigate TA-49 Outside the Nuclear Site Boundary, the Permittees must evaluate the validity of VOC sample data presented in the Report and collect additional samples.

DOE Response

7. As noted in Appendix B, section B-5.4, samples for volatile organic compound (VOC) analysis were transferred to sample containers immediately after collection to minimize the loss of VOCs during the sample-collection process. This procedure is consistent with collection of samples for VOC analysis in other investigation reports approved by NMED after 2011.

For sites at TA-49 outside the nuclear environmental site boundary having the potential for VOC contamination, pore-gas data were used to supplement VOC soil data. Area of Concern (AOC) 49-002 is an underground experimental calibration chamber and two associated shafts with no history of VOC use, and pore-gas samples were not collected at this site. Solid Waste Management Unit (SWMU) 49-004 and SWMU 49-005(a) are landfills that could potentially have received waste containing VOCs. As a result, pore-gas samples were collected at these sites to supplement VOC soil data. The results of the soil and pore-gas samples are consistent, with very low levels of VOCs being detected in each, indicating low potential for VOC contamination and no need for additional VOC sampling.

SPECIFIC COMMENTS

NMED Comment

8. Section 5.1.1 Identification of COPCs, pages 16-17

Section 5.1.1 lists lines of evidence to be used in determining if an inorganic chemical should be eliminated as a constituent of potential concern (COPC). The comparison to the maximum background concentration is listed as a line of evidence to be used to screen out a COPC. The NMED does not consider such comparisons as a valid line of evidence for dismissing detected inorganic compounds as COPCs. Note that Section 2.7.3 of the NMED SSG does not state that comparison to maximum background is an acceptable line of evidence. The range of values in the background data set is considered in the statistical determination of appropriate background threshold values (e.g., background values (BVs)). As indicated in Section 2.7.3 of the SSG, if the maximum concentration of a COPC exceeds the applicable BV, statistical tests must be used to determine if the data set for the COPC is statistically different from the applicable background data set. While it is acknowledged that the maximum background value may be used for comparisons in special cases:

- *Statistically determined BV is significantly greater than the maximum background concentration,*
- *Sufficient number of samples have been collected to determine nature and extent, but results are predominately non-detect and there is no history to suggest the constituent is directly related to site activities or a dominant waste stream, or*
- *The maximum detected result is statistically determined to be an outlier (note, sufficient samples must be collected to show a point is an outlier and not indicative of a hotspot).*

Section 5.1.1 (and the Report in its entirety) should be revised to eliminate comparisons of COPC concentrations to the maximum value in the applicable background data set as a line of evidence for eliminating a detected inorganic chemical as a COPC unless one (or more) of the special cases in the bulleted items above exists; thus, precluding the comparison of COPC data to the statistically derived BV. In such cases, lines of evidence supporting the comparison of COPC data to the maximum

background value should be provided to demonstrate that one or more of the special cases exists in the area being evaluated.

DOE Response

8. As noted in the response to general comment 2, similar comments concerning comparisons with maximum background concentrations during COPC identification were received for previous SIRs. The text in section 5.1.1 of these SIRs was revised in accordance with NMED-approved comment responses and the revised SIRs were approved by NMED. Section 5.1.1 of this report will be revised for consistency with the text in these approved SIRs, including replacing comparison with maximum background concentrations with comparison with the upper end of the background data set. The text in section 6 describing identification of COPCs will be reviewed and if site data are compared with the upper end of the background data set, one or more of the criteria will be cited in the report as a basis for this comparison (e.g., less than eight soil samples were collected, so statistical tests could not be performed). The text regarding identification of certain inorganic COPCs will be revised as appropriate to clarify or provide additional lines of evidence in support of eliminating some inorganic chemicals as COPCs.

NMED Comment

9. **Section 6.2.4.3 Soil, Rock, and Sediment Sampling Analytical Results, AOC 49-002, pages 25-26**

Cadmium has been excluded as a COPC based on the magnitude of exceedance to the BV; this comparison was based on the top two or three concentrations in the BV data set instead of the mean or median of the BV data set. Additionally, the detection limit (DL) values for cadmium are greater than the BV values, which add a level of uncertainty to the analysis. As stated previously, this is not a valid line of evidence for determining if a constituent should be retained as a COPC. The discussion must be revised to indicate if additional analyses were performed to determine if the site data set is statistically different from the background data set. This section must also be revised to include additional lines of evidence supporting the exclusion; if the additional lines of evidence cannot be provided, cadmium should be retained as a COPC.

DOE Response

9. Statistical tests were not performed for cadmium in soil because the background data set contains too few detections, not because the site data contain too few detections. As noted in section 6.2.4.3, cadmium was detected below BV in 36 samples. The text will be revised to clarify the basis for not performing statistical tests. Note the lines of evidence presented in section 6.2.4.3 for eliminating cadmium as a COPC are the same as those used in previous SIRs approved by NMED.

NMED Comment

10. **Section 6.2.4.4 Nature and Extent of Contamination, AOC 49-002, page 26**

- a. *The discussion for aluminum notes that concentrations increased with depth, but that the residential and industrial soil screening levels were approximately 7.7 times and 128 times the maximum concentration, respectively. Without accompanying lines of evidence, a comparison of detected concentrations and detection limits that are above the applicable BVs, as well as the residential and industrial soil screening levels, is not a sufficient line of evidence for concluding*

that the extent is defined. The uncertainty associated with such comparisons is too great unless evidence that concentrations are trending downward or unchanged is also provided. Revise the discussions of lines of evidence for aluminum to state that concentrations are decreasing or unchanging with depth. If such evidence cannot be provided, revise the text to propose additional sampling to defining the extent of aluminum contamination at AOC 49-002.

- b. While antimony was only detected above the soil BV in one sample, the detection limit was above the soil BV and tuff BV in 69 additional samples. The discussion also states: "The residential and industrial soil screening levels were approximately 2.3 times and 37 times the maximum concentration and industrial soil screening levels were approximately 5.5 times and 91 times the maximum DL, respectively." NMED notes, that without accompanying lines of evidence, the comparison of detected concentrations and detection limits that are above the applicable BVs to residential and industrial soil screening levels is not a sufficient line of evidence for concluding that the extent of contamination is defined. Remove this comparison and revise the discussion of antimony to include evidence that concentrations are decreasing or unchanging laterally for antimony. If such evidence cannot be provided, revise the text to propose additional sampling for defining the extent of antimony contamination at AOC 49-002.*

DOE Response

10. a. Section 6.2.4.4 will be revised to include additional lines of evidence for concluding additional sampling for vertical extent of aluminum is not warranted, including the frequency and magnitude of detections in other samples.
- b. Section 6.2.4.4 will be revised to provide additional lines of evidence for concluding additional sampling for extent of antimony is not warranted, including evaluation of spatial trends and the frequency and magnitude of detections and detection limits.

NMED Comment

11. Section 6.2.6, Summary of Ecological Risk Screening, AOC 49-002, page 28

The Permittees state that no potential ecological risks to the earthworm, plant, American robin, deer mouse, and montane shrew exist at AOC 49-002; this statement is inconsistent with HIs presented in Sections I-5.3.1, I-5.4.5.1, and Table I-5.4-2, which were all calculated to be greater than 1. For instance, in Section I-5.4.5 the Permittees report that the adjusted HI for the robin (omnivore/insectivore diet scenario) was 2 and 3 respectively; 3 for the shrew, and 7 for the deer mouse. The unadjusted HI was reported to be 3 for the earthworm, and 2 for the plant. Revise the statement to clarify that the adjusted and unadjusted HIs were greater than 1, but less than 1 for the aforementioned biota under the lowest-observed-adverse-effect level (LOAEL)-based environmental screening levels (ESLs) as described in Attachment I, Section I-5.4.7.1 and Table I-5.4-9.

DOE Response

11. The summary of ecological risk screening presented in the text in section 6.2.6 is based on the interpretation of ecological risk screening results presented in Appendix I, section I-5.5. This section of the report is intended to present the overall conclusions of the ecological risk screening results, not to provide details concerning how those conclusions were reached. The latter are presented in the site-specific discussions in Appendix I. This approach is consistent with previous investigation reports and SIRs approved by NMED. No revision to the report is necessary.

NMED Comment

12. Section 6.3.4.4, Nature and Extent of Contamination, SWMU 49-004, page 34

NMED notes that while antimony was not detected above the applicable BVs, the detection limit was above the soil BV for eight samples and the tuff BV in twelve samples. The Permittees also state "The residential and industrial soil screening levels were approximately 4.8 times and 80 times the maximum DL." Without accompanying lines of evidence, comparison of DLs that are above the applicable BVs to residential and industrial soil screening levels is not sufficient for concluding that extent is defined. The uncertainty associated with such comparisons is too great unless evidence that concentrations are trending downward or unchanged is also provided. Revise the discussion of antimony in Section 6.3.4.4 to include evidence that concentrations are decreasing or unchanging laterally and with depth. If such evidence cannot be provided, revise the text to propose additional sampling for defining the extent of antimony contamination at SWMU 49-004.

DOE Response

12. Section 6.3.4.4 will be revised to provide additional lines of evidence for concluding additional sampling for extent of antimony is not warranted, including evaluation of spatial trends and the frequency and magnitude of detection limits.

NMED Comment

13. Section 6.3.6, Summary of Ecological Risk Screening, SWMU 49-004, page 40

The Permittees state that no potential ecological risks to the earthworm, plant, American robin, deer mouse, and montane shrew exist at SWMU 49-004, this statement is inconsistent with the HIs presented in Sections I-5.3.2, I-5.4.5.2, and I-5.4.7.2, which were all calculated to be greater than 1 for the aforementioned biota. Revise the statement to clarify that the HI was greater than 1 for the aforementioned biota under the adjusted/unadjusted ESLs, and LOAEL-based ESLs as described in Sections I-5.3.2, I-5.4.5.2, I-5.4.7.2, and Table I-5.4-11; but that based on an analysis of background values and field observations, the Permittees conclude that there is a minimal potential ecological risk. Revise this section to also include a description of field observation criteria used to determine healthy or impacted vegetation or provide documentation (e.g., photos, NVDI analyzed satellite imagery, etc.) to support this conclusion.

DOE Response

13. See response to specific comment 11. No revision to the report is necessary.

NMED Comment

14. Section 6.4.4.3, Soil, Rock, and Sediment Field-Screening Results, SWMU 49-005(a), page 42

The Permittees state that cyanide is not a COPC. However, cyanide had five DLs above the soil BV and nine DLs above the tuff BV at SWMU 49-005(a). The discussion also states: "The DLs were only 0.01 mg/kg to 0.09 mg/kg above the BV." However, the uncertainty associated with DLs above the applicable BVs for the majority of samples dictates that the conservative approach is to retain cyanide as a COPC. Revise the discussion of cyanide in Section 6.4.4.3 to indicate that cyanide is retained as

a COPC. Alternately, provide additional lines of evidence (e.g., site history) supporting the exclusion of cyanide as a COPC at SWMU 49-005(a).

DOE Response

14. Section 6.4.4.3 will be revised to provide additional lines of evidence for concluding cyanide is not a COPC, including evaluation of spatial trends and the frequency and magnitude of detection limits and site history.

NMED Comment

15. Section 6.4.6, Summary of Ecological Risk Screening, SWMU 49-005(a), page 47

The Permittees state that no potential ecological risks to the earthworm, plant, American robin, deer mouse, montane shrew, and kestrel exist at SWMU 49-005(a), this statement is inconsistent with the HIs presented in Sections I-5.3.3 the kestrel, robin, shrew, deer mouse, and plant, for the HIs presented in Section I-5.4.7.3 for the plant and earthworm. Revise the statement to clarify which biota have risk greater/or less than 1 HI and reference the sections in Attachment I this information can be cross-referenced to.

DOE Response

15. See response to specific comment 11. No revision to the report is necessary.

NMED Comment

16. Appendix B-5.9 Decontamination of Sampling Equipment, page B-4

Provide documentation justifying the use of Fastastik® for the decontamination of equipment (e.g., SW-846 citation).

DOE Response

16. Fantastik has been used for dry decontamination since before the TA-49 outside the nuclear environmental site boundary investigation in 2010, and its use has been described in reports previously approved by NMED. DOE notes that the effectiveness of the decontamination fluid is evaluated through collection and analysis of equipment rinsate blanks.

NMED Comment

17. Appendix I, Section I-4.3, AOC 49-002, page I-12

The Permittees state that “because samples for AOC 49-002 were not analyzed for VOCs, the vapor intrusion pathway was not evaluated”. Revise this section to justify not sampling for VOCs and provide additional pathway at this site or provide a narrative of the sequence of events leading to this deviation and a plan to perform VOC sampling in phase II of this SIR and the Permittees commitment to evaluate AOC 49-002 in a manner similar to SWMUs 49-004, and 49-005(a). Clarify that all VOC gas sampling will be conducted in adherence with the latest VOC SOP at the laboratory.

DOE Response

17. As described in the response to comment 7, analysis of samples for VOCs was not part of the approved work plan for this site based on the history of site operations. Thus, there was no deviation from the approved work plan (LANL 2008, 102215; NMED 2008, 100465). The text in section I-4.3 will be revised to clarify that samples for AOC 49-002 were not analyzed for VOCs based on site history.

NMED Comment

18. Appendix I, Section I-5.3.4, page I-20

This section describes the analysis of the air pathway for burrowing animals (based on the pocket gopher) and references Table I-5.2-8, Burrow Air Screening, for a listing of the results of the analysis. However, neither Section I-5.3.4 nor Table I-5.2-8 identifies the source(s) of the Gopher Burrow Air ESLs used in the analysis. Revise Section I-5.3.4 to identify the source(s) of the ESLs used in the evaluation of the burrow air pathway. Also, provide a footnote for Table I-5.2-8 that identifies the source(s) of the Gopher Burrow Air ESLs.

DOE Response

18. The equation and exposure factors for calculating gopher burrow air ESLs are in the LANL SLERA document, Revision 4 (LANL 2015, 600982), and all parameters used to calculate gopher burrow air ESLs are in the ECORISK database (LANL 2015, 600921). The requested footnote will be added to Table I-5.2-8.

NMED Comment

19. Appendix I, Section I-5.4.4, pages I-21 and I-22

The Permittees discussion indicates that the American Kestrel (avian top carnivore) is used as the surrogate receptor for the threatened and endangered species (Mexican spotted owl) associated with TA-49. The discussion further indicates that the application of the area use factors (AUFs) for the Mexican spotted owl resulted in adjusted HIs ranging from 0.00004 to 0.004. However, the analyses performed for the three sites were not found in Appendix I of the Outside SIR. Revise Appendix I to include the analyses associated with the assessment of potential risk to the Mexican spotted owl [using the American Kestrel (avian top carnivore)] as a surrogate.

DOE Response

19. This section references Table I-5.4-4, which provides the site area and the area use factor for the Mexican spotted owl. The text references the hazard index (HI) for the kestrel (flesh diet) for each site. For greater clarity Table I-5.4-4 will be revised to include two additional columns that provide the kestrel HI and the estimated owl area-adjusted HI.

NMED Comment

20. Appendix I, Sections I-5.4.7.1 through 2, page I-23

In these sections, the Permittees mention an “adjusted HI analysis” while discussing AOC 49-002 and SWMU 49-004, respectively. This introduces confusion into the discussion as the adjustment referred to in the quoted phrase is not clearly defined. Based on the wording used in Section I-5.4.5, Population Area Use Factors, it appears that the adjusted HI analysis refers to a PAUF-adjusted HI analysis that is based on the LOAEL ESL. Revise “adjusted HI analysis” to instead refer to a “PAUF-adjusted HI analysis” to clarify the types of analyses being discussed in Section I-5.4.7.

DOE Response

20. The text in section I-5.4.7 will be revised to replace “adjusted HI analysis” with “PAUF-adjusted HI analysis.”

NMED Comment

21. Appendix I, Section I-5.4.7.2, SWMU 49-004, page I-23

The Permittees’ description in the second paragraph indicates that the potential risk to plants due to exposure to barium is overestimated. The following lines of evidence are presented in support of these assertions:

- *The EPC for barium is less than the maximum soil background concentration and is slightly above the average soil background concentration.*
- *The maximum soil concentrations are below the maximum soil background concentration and all tuff concentrations are below the soil BV.*
- *The plant LOAEL-based ESL for barium is 260 mg/kg, which is less than the soil BV and below the maximum soil background concentration.*
- *The EPC indicates exposure to barium across the site is similar to the background and the screening level.*

NMED does not recognize the comparison of the EPC to the maximum and average background concentrations and the comparison of maximum soil concentrations to the maximum soil background concentration as valid lines of evidence for discounting calculated risk. Table I-5.3-4 demonstrates that barium is a COPC for SWMU 49-004 and Section 6.3.4.3 of the Outside SIR indicates that the site data set for barium is statistically different from the background data set. Thus, sampling results indicate barium contamination exists at SWMU 49-004 and could potentially impact ecological receptors such as plants. Revise Section I-5.4.7.2 to state that barium contamination at SWMU 49-004 could potentially produce risks above background levels (actual risk should fall between the risk predicted using a NOAEL-based ESL and a LOAEL-based ESL). The text should also be revised to state that based on the methodology employed, the estimated risk is expected to be a conservative estimate compared to the actual risk. Note that these same issues with barium exist in the second paragraph of Section I-5.4.7.3, SWMU 49-005(a). Thus, Section I-5.4.7.3 must also be revised.

DOE Response

21. The lines of evidence presented to demonstrate the site does not pose an unacceptable risk to ecological receptors is consistent with the approach used in 2016 when the report was prepared. This approach was used in other reports prepared during that period that were subsequently approved by NMED. DOE notes that lines of evidence used to evaluate the ecological risk results have changed since 2016. Based on input from NMED regarding comparing the exposure point concentration with background threshold, such comparisons now involve the sample results compared with the medium-specific BVs. In addition, comparisons with the lowest observed adverse effect level are emphasized for an evaluation of the potential for adverse ecological effects. This approach has been used in reports prepared in 2020 such as the Chaquehui Canyon Aggregate Area investigation report (N3B 2020, 701046). NMED has reviewed and commented upon these reports. Understanding how frequently and by what magnitude samples are greater than BV helps put any conclusions of potential ecological risk into context. No revision to the report is needed.

NMED Comment

22. Appendix I, Section I-5.4.7.2, SWMU 49-004, pages I-23 and I-24

In the third paragraph, the Permittees' discussion indicates that the potential risk to environmental receptors from exposure to lead and selenium at the site is overestimated.

The following lines of evidence are presented in support of these assertions:

- *The EPC for lead is below the soil BV, less than the maximum soil background concentration, slightly above the maximum Qbt 2,3,4 background concentration, and slightly above the average soil background concentration.*
- *The robin (omnivore and insectivore) LOAEL-based ESLs are 33 mg/kg and 28 mg/kg, respectively, which are equivalent to or slightly above the maximum soil background concentration.*
- *The EPC for selenium is below the soil BV and the maximum soil background concentration.*
- *The selenium LOAEL-based ESLs range from 0.99 mg/kg (shrew) to 1.7 mg/kg (robin [omnivore]), which are below or similar to the soil BV and/or the maximum soil background concentration.*
- *The maximum selenium concentration at the site is 1.9 mg/kg, which was reported in 2 of 150 samples and is only 0.2 mg/kg above the maximum soil background concentration; all other detected concentrations are below the soil BV.*
- *The EPCs indicate exposure to lead and selenium across the site is similar to the screening levels which are greater than the established background values.*

As previously stated in general comments, NMED does not recognize the comparisons of the EPC to the maximum and average background concentrations and the comparison of maximum soil concentrations to the maximum soil background concentration as valid lines of evidence for discounting calculated risk. Likewise, comparisons of ESLs to soil background values are not considered valid lines of evidence for dismissing risk when the site data set for the chemical in question has been demonstrated to be statistically different from the background data set.

Table I-5.3-4 demonstrates that lead and selenium are COPCs for SWMU 49-004 and Section 6.3.4.3

of the Outside SIR indicates that the site data sets for lead and selenium are statistically different from the background data sets.

Thus, sampling results indicate that lead and selenium contamination is present at SWMU 49-004 and could potentially impact ecological receptors. Revise Section I-5.4.7.2 to state that lead and selenium contamination at SWMU 49-004 could potentially produce risks above background levels. The text should also state that based on the methodology employed, the estimated risk from exposure to lead and selenium is expected to be a conservative estimate of the actual risk. Note that these same issues with selenium exist in the second paragraph of Section I-5.4.7.3, SWMU 49-005(a). Thus, Section I-5.4.7.3 must also be revised.

DOE Response

22. As noted in the response to comment 21, lines of evidence used to evaluate the ecological risk results are consistent with those used in 2016, when the report was prepared, but have subsequently changed. No revision to the report is needed.

EDITORIAL COMMENTS

NMED Comment

23. Section 6.3.4.3, Soil, rock and Sediment Sampling Analytical Results, SWMU 49-004 page 33

Permittees' Statement: Vanadium was detected above Qbt 2,3,4 BV (17 mg/kg) in four samples with a maximum concentration of 22.1 mg/kg. the Gehan test indicated side concentrations of vanadium in tuff are statistically different from the background (Table H-3). However, the quantile and slippage tests indicated site concentrations of vanadium in soil are statistically different from the background (Figure H-34 and Table H-3).

NMED Comment: The Permittees compare the statistical test results of tuff to soil samples, to eliminate vanadium as a COPC. It appears that this may be a typographical error since statistical tests for vanadium were not conducted for the soil samples. Revise the statement to resolve the discrepancy.

DOE Response

23. The text in section 6.3.4.3 will be revised to say the quantile and slippage tests indicated site concentrations of vanadium in tuff are not statistically different from background. Vanadium was not detected above BV in soil and it was not necessary to run statistical tests for soil.

NMED Comment

24. Section 6.3.4.4, Nature and Extent of Contamination, SWMU 49-004, page 34

Permittees' Statement: Concentrations increased with depth at location 49-608467. The residential and industrial SSLs were approximately 2.2 times (42,900 mg/kg below the SSL) and 37 times the maximum concentration at location 49-608885.

NMED Comment: Concentrations increased with depth at 49-608967 rather than 49-608467, revise the statement accordingly. NMED also notes that location 49-608885 does not exist at SWMU 49-004

and that the maximum concentration presented occurs at location 49-608967 instead, please revise accordingly.

DOE Response

24. The text in section 6.3.4.4 will be revised to say that concentrations increased with depth at location 49-608967 rather than 49-608467. The text will also be revised to refer to the maximum concentration being detected at location 49-608967 rather than 49-608885.

NMED Comment

25. Appendix I, Section I-5.4.5.3, SWMU 49-005(a), page I-23

The discussion in this section states that the HI for the plant is 4. However, Table I-5.4-7, Adjusted HIs for SWMU 49-005(a), and verification calculations indicate the PAUF-adjusted HI for the plant is 4.7 which should have been rounded to 5. Revise the discussion in Section I-5.4.5.3 to indicate that the analysis resulted in an HI of 5 for the plant.

DOE Response

25. The text in section I-5.4.5.3 will be revised to state that unadjusted HI for the plant is 5. Note that the HIs for plants are not adjusted for population area use factors (PAUFs) because there is no home range value for plants.

REFERENCES

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- LANL (Los Alamos National Laboratory), January 2008. "Investigation Work Plan for Sites at Technical Area 49 Outside the Nuclear Environmental Site Boundary, Revision 1," Los Alamos National Laboratory document LA-UR-08-0449, Los Alamos, New Mexico. (LANL 2008, 102215)
- LANL (Los Alamos National Laboratory), September 2010. "Response to the Notice of Disapproval for the Investigation Report for Sites at Technical Area 49 Outside the Nuclear Environmental Site Boundary," Los Alamos National Laboratory document LA-UR-10-6035, Los Alamos, New Mexico. (LANL 2010, 110654.4)
- LANL (Los Alamos National Laboratory), December 2010. "Work Plan for Determining Background Concentrations of Inorganic Chemicals in Unit 4 of the Bandelier Tuff," Los Alamos National Laboratory document LA-UR-10-8111, Los Alamos, New Mexico. (LANL 2010, 111504)
- LANL (Los Alamos National Laboratory), September 2011. "Bandelier Tuff Unit 4 Background Study Report," Los Alamos National Laboratory document LA-UR-11-5179, Los Alamos, New Mexico. (LANL 2011, 206327)

- LANL (Los Alamos National Laboratory), November 2011. "Response to the Notice of Disapproval for the Bandelier Tuff Unit 4 Background Study Report," Los Alamos National Laboratory document LA-UR-11-6647, Los Alamos, New Mexico. (LANL 2011, 208338)
- LANL (Los Alamos National Laboratory), October 2015. "Screening-Level Ecological Risk Assessment Methods, Revision 4," Los Alamos National Laboratory document LA-UR-15-27577, Los Alamos, New Mexico. (LANL 2015, 600982)
- LANL (Los Alamos National Laboratory), October 2015. "ECORISK Database (Release 3.3)," on CD, LA-UR-15-27397, Los Alamos National Laboratory, Los Alamos, New Mexico. (LANL 2015, 600921)
- LANL (Los Alamos National Laboratory), August 2016. "Supplemental Investigation Report for Sites at Technical Area 49 Outside the Nuclear Environmental Site Boundary," Los Alamos National Laboratory document LA-UR-16-25264, Los Alamos, New Mexico. (LANL 2016, 601698)
- LANL (Los Alamos National Laboratory), April 2018. "Screening-Level Ecological Risk Assessment Methods, Revision 5.1," Los Alamos National Laboratory document LA-UR-18-22418, Los Alamos, New Mexico. (LANL 2018, 602965)
- N3B (Newport News Nuclear BWXT-Los Alamos, LLC), September 2020. "Investigation Report for Chaquehui Canyon Aggregate Area," Newport News Nuclear BWXT-Los Alamos, LLC, document EM2020-0305, Los Alamos, New Mexico. (N3B 2020, 701046)
- NMED (New Mexico Environment Department), February 14, 2008. "Approval with Modifications, Investigation Work Plan for Sites at Technical Area 49 Outside the Nuclear Environmental Site Boundary," 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, 100465)
- NMED (New Mexico Environment Department), January 12, 2011. "Notice of Approval, Work Plan to Determine Background Concentrations in Unit 4 of the Bandelier Tuff," New Mexico Environment Department letter to G.J. Rael (DOE-LASO) and M.J. Graham (LANL) from J.P. Bearzi (NMED-HWB), Santa Fe, New Mexico. (NMED 2011, 111680)
- NMED (New Mexico Environment Department), October 11, 2011. "Notice of Disapproval, Bandelier Tuff Unit 4 Background Study Report," New Mexico Environment Department letter to G.J. Rael (DOE-LASO) and M.J. Graham (LANL) from J. Kielling (NMED-HWB), Santa Fe, New Mexico. (NMED 2011, 207293)
- NMED (New Mexico Environment Department), December 14, 2011. "Approval with Modification, Bandelier Tuff Unit 4 (Qbt 4) Background Study Report," New Mexico Environment Department letter to G.J. Rael (DOE-LASO) and M.J. Graham (LANL) from J. Kielling (NMED-HWB), Santa Fe, New Mexico. (NMED 2011, 208826)

NMED (New Mexico Environment Department), June 7, 2016. "Approval, Screening-Level Ecological Risk Assessment Methods, Revision 4," New Mexico Environment Department letter to D. Hintze (DOE-EM) and M.T. Brandt (LANL) from J.E. Kieling (NMED-HWB), Santa Fe, New Mexico. (NMED 2016, 601533)

NMED (New Mexico Environment Department), August 5, 2016. "Review, Ecorisk Database, Release 3.3," New Mexico Environment Department letter to D. Hintze (DOE-EM-LA) and M. Brandt (LANL) from J.E. Kieling (NMED-HWB), Santa Fe, New Mexico. (NMED 2016, 601696)

NMED (New Mexico Environment Department), March 2017. "Risk Assessment Guidance for Site Investigations and Remediation, Volume 2, Soil Screening Guidance for Ecological Risk Assessments," Hazardous Waste Bureau and Ground Water Quality Bureau, Santa Fe, New Mexico. (NMED 2017, 602274)

NMED (New Mexico Environment Department), June 19, 2019. "Risk Assessment Guidance for Site Investigations and Remediation, Volume 1, Soil Screening Guidance for Human Health Risk Assessments," February 2019 (Revision 2, 6/19/19), Hazardous Waste Bureau and Ground Water Quality Bureau, Santa Fe, New Mexico. (NMED 2019, 700550)

**Response to the Draft New Mexico Environment Department Draft Comments on U.S. Department of Energy Draft Responses for the Supplemental Investigation Report for Sites at Technical Area 49 Outside the Nuclear Environmental Site Boundary
Dated April 7, 2022**

INTRODUCTION

To facilitate review of this response, the New Mexico Environment Department's (NMED's) comments are included verbatim (in italics). The U.S. Department of Energy (DOE) Environmental Management Los Alamos Field Office responses follow each NMED comment. The comment numbers referenced below correspond to NMED's original comments provided to DOE on December 13, 2021, and DOE's responses on March 15, 2022.

NMED Comment

1. *The response provided indicates that the report will be reviewed and revised as appropriate based on NMED's comments. Please note that NMED cannot fully evaluate the responses and make a determination of adequacy at this time since revised language has not been provided.*

However, the response indicates that in general, if the maximum concentration is sufficiently less than the SSL/SAL (e.g., less than 10%), additional lines of evidence may not be needed. This topic was discussed in length at the February 2, 2017 Supplemental Investigation Report (SIR) meeting. A value of 10% was not agreed upon, but rather, the outcome of the 2017 meeting was that if the site concentration is significantly lower than the SSL (e.g., orders of magnitude) it was agreed that this comparison was sufficient as a single line of evidence. Note that the agreement was orders (plural) of magnitude, not 10%. The DOE's Response must be revised to clarify and be consistent with the agreements made in the February 2017 meeting.

DOE Response

1. As discussed with NMED on March 23, 2022, the redline version of this supplemental investigation report (SIR) will be sent to NMED on April 25, 2022, when the document is submitted for internal peer review. As indicated previously, not all of the specific text changes are available as the revision has not been completed.

DOE has received responses to seven SIRs with essentially the same comment as NMED Comment #1 regarding section 5.2 of the reports. DOE has consistently responded to this comment and indicated the report sections evaluating nature and extent of contamination will be reviewed and revised as appropriate based on the criteria in NMED's comment. In no cases did the criteria in NMED's seven previous comments specifically refer to "orders" of magnitude. The comment previously submitted by NMED for these seven SIRs included the following statement:

The Permittee considers that no further sampling for extent is warranted if the applicable SSL/SAL is at least an order of magnitude greater than the maximum COPC concentration. While the above approach is not recommended in the NMED Soil Screening Guidance (SSG), as agreed during the February 14, 2017 meeting, the approach may be applied as a single line of evidence to determine that no further sampling is warranted for the COPC in question if the caveats listed below are met and sufficient justification for the applied methodology (including references) is provided in the discussion.

For all seven DOE responses, NMED approved the response to this comment. All seven SIRs were subsequently approved by NMED with these changes incorporated. Table 1 includes the list of responses and the date NMED approved the corresponding SIR. This technical approach of using the soil screening level (SSL)/screening action level (SAL) comparison as a single line of evidence (based on at least an order of magnitude), has been applied to these seven SIRs and to all investigation reports (IRs) submitted after the February 14, 2017, meeting. Table 2 includes the reports that implemented this approach and the current NMED document status.

NMED's current position, based on Comment #1, is contrary to NMED's previous comments and subsequent approval of this approach in SIRs and IRs. DOE is concerned that NMED's new interpretation of the agreement in the February 14, 2017, meeting not only impacts this SIR, but potentially impacts all previously submitted SIRs and IRs that implemented this approach and were approved by NMED. The question about order versus orders of magnitude is not consistent with NMED comments on the seven previously submitted and approved SIRs. Therefore, to maintain consistency, the current technical approach will continue to be implemented in future IR submittals, and as indicated in the original response to this comment, the report sections evaluating nature and extent of contamination will be reviewed and revised as appropriate based on the criteria in NMED's comment. The revisions made to the nature and extent discussions will be consistent with those made in SIRs previously approved by NMED. No additional changes to the text or the technical approach are warranted.

NMED Comment

4. *The DOE's proposed response does not address the NMED's comment. The response indicated that the additional Qbt 4 background data was not necessary for determining nature and extent of contamination. However, the original comment was on the need of the additional background data for identifying COPCs carried forward into the risk assessments. Of particular concern was SWMU 49-004. The response must be revised to address selection of COPCs for the risk assessment.*

DOE Response

4. The issue of background values (BVs) for the upper Bandelier Tuff units (Qbt 2,3,4) potentially not being representative of Bandelier Tuff unit 4 (Qbt 4) was identified in the investigation report for the Technical Area 49 sites inside the nuclear environmental site (NES) boundary (LANL 2010, 110656.17). There were multiple instances in that investigation where inorganic chemicals were not detected above BVs in surface soil samples but were detected above BV in Qbt 4 samples immediately underlying the soil samples. As a result, the vertical extent of contamination was not defined at these sample locations, indicating the need to perform additional sampling to define vertical extent. A geochemical evaluation of the Qbt 4 data using scatter plots presented in the investigation report (LANL 2010, 110656.17) indicated that most of these results appeared to be naturally occurring and not a result of site contamination. Therefore, a background study was recommended to determine if BVs for Qbt 4 were elevated with respect to the Qbt 2,3,4 BVs. The results of the background study (LANL 2011, 206327) showed that almost all of the inorganic chemical results for Qbt 4 background samples were less than the Qbt 2,3,4 BVs and background concentrations in Qbt 4 did not appear to be elevated with respect to Qbt 2,3,4 BVs. The additional sampling recommended in the Qbt 4 background study was, therefore, directed at identifying the cause of the elevated Qbt 4 results (e.g., weathering of the upper tuff) rather than establishing Qbt 4 BVs.

NMED's original comment stated that background data for Qbt 4 is necessary to establish background values for concentrations of aluminum, cobalt, and manganese detected at solid waste management units (SWMUs)/areas of concern (AOCs), whose inclusion or exclusion as chemicals of potential concern (COPCs) may impact the overall human health risk or ecological risk, in particular at the site SWMU-49-004. DOE notes that aluminum and cobalt were retained as COPCs at SWMU 49-004 and did not result in unacceptable human health or ecological risk. Manganese was not retained as a COPC at SWMU 49-004 because site concentrations in soil were not statistically different from background. Manganese was not detected above the Qbt 2,3,4 BV at SWMU 49-004. Based on these results, Qbt 4 BVs would not change the conclusions with respect to human health and ecological risk at SWMU 49-004.

NMED Comment

- 14. The DOE's statement that no ecological risk is present is inconsistent with the data. At a minimum, the text must be revised to indicate that low or minimal risk is present; "no" risk is not acceptable.*

DOE Response

14. NMED comment #14 was not associated with ecological risk. The comment was about providing lines of evidence that cyanide is not a COPC at SWMU 49-005(a). The following text change will be incorporated with the assumption that the reference to NMED comment #14 was a typographical error and the comment intended to be referenced was NMED comment #11.

The text in section 6.2.6 will be revised to indicate there are no potential unacceptable ecological risks instead of no potential ecological risk. The text in section 6.2.6 will be revised as follows:

"Based on the evaluations of the minimum ESLs, HI analyses, potential effects to populations (individuals for threatened and endangered [T&E] species), and LOAEL analyses, no potential unacceptable ecological risks to the earthworm, plant, American robin, American kestrel, deer mouse, montane shrew, desert cottontail, red fox, and Mexican spotted owl exist at AOC 49-002."

NMED Comment

- 15. The DOE's statement that no ecological risk is present is inconsistent with the data. At a minimum, the text must be revised to indicate that low or minimal risk is present; "no" risk is not acceptable.*

DOE Response

15. The text in section 6.4.6 will be revised to indicate there are no potential unacceptable ecological risks instead of no potential ecological risk. The text in section 6.4.6 will be revised as follows:

"Based on the evaluations of the minimum ESLs, HI analyses, potential effects to populations (individuals for T&E species), LOAEL analyses, and the relationship of exposure point concentrations and screening levels to background, no potential unacceptable ecological risks to the earthworm, plant, American robin, American kestrel, pocket gopher, deer mouse, montane shrew, desert cottontail, red fox, and Mexican spotted owl exist at SWMU 49-005(a)."

REFERENCES

The following reference list includes documents cited in this plan. Parenthetical information following each reference provides the author(s), publication date, and ERID, ESHID, or EMID. ERIDs were assigned by Los Alamos National Laboratory's (the Laboratory's) Associate Directorate for Environmental Management (IDs through 599999); ESHIDs were assigned by the Laboratory's Associate Directorate for Environment, Safety, and Health (IDs 600000 through 699999); and EMIDs are assigned by Newport News Nuclear BWXT-Los Alamos, LLC (IDs 700000 and above)

LANL (Los Alamos National Laboratory), September 2010. "Investigation Report for Sites at Technical Area 49 Inside the Nuclear Environmental Site Boundary, Revision 1," Los Alamos National Laboratory document LA-UR-10-6032, Los Alamos, New Mexico. (LANL 2010, 110656.17)

LANL (Los Alamos National Laboratory), September 2011. "Bandelier Tuff Unit 4 Background Study Report," Los Alamos National Laboratory document LA-UR-11-5179, Los Alamos, New Mexico. (LANL 2011, 206327)

Table 1
Status of Previously Submitted SIR Responses to NMEDs Comment #1

SIR Response Document	Comment Number	SIR Approval Date
Response to Draft New Mexico Environment Department Comments on the Supplemental Investigation Report for Threemile Canyon Aggregate Area, Dated January 30, 2018	3	8/28/2018
Response to Draft New Mexico Environment Department Comments on the Supplemental Investigation Report for S-Site Aggregate Area, Dated October 29, 2018	2	10/25/2019
Response to Draft New Mexico Environment Department Comments on the Supplemental Investigation Report for the Potrillo and Fence Canyons Aggregate Area, Dated May 13, 2019	2	10/16/2020
Response to Draft New Mexico Environment Department Comments on the Supplemental Investigation Report for Cañon de Valle Aggregate Area Technical Area 14, Dated July 2, 2019	3	11/18/2020
Response to Draft New Mexico Environment Department Comments on the Supplemental Investigation Report for Upper Mortandad Canyon Aggregate Area, Dated March 19, 2020	3	9/9/2020
Revised Response to Draft New Mexico Environment Department Comments on the Supplemental Investigation Report for Upper Cañada del Buey Canyon Aggregate Area, Dated May 26, 2020	3	3/4/2021
Response to Draft New Mexico Environment Department Comments on the Supplemental Investigation Report for Lower Sandia Canyon Aggregate Area, Dated January 27, 2021	2	8/5/2021

Table 2
Previously Submitted Reports Incorporating the SIR Response to NMED Comment #1

Report Title	Date Submitted to NMED	NMED Document Status
Investigation Report for the Former Los Alamos Inn Property Sites within the Upper Los Alamos Canyon Aggregate Area, Revision 1	5/25/2017	Approved 6/6/2017
Supplemental Investigation Report for Threemile Canyon Aggregate Area, Revision 1	7/31/2018	Approved 8/28/2018
Phase II Investigation Report for Middle Los Alamos Canyon Aggregate Area, Revision 2	9/27/2018	Pending Review
Investigation Report for DP Site Aggregate Area Sites at DP East, Revision 1	12/19/2018	Approved 12/28/2018
Supplemental Investigation Report for S-Site Aggregate Area, Revision 1	4/25/2019	Approved 10/25/2019
Supplemental Investigation Report for Potrillo and Fence Canyons Aggregate Area, Revision 1	7/31/2019	Approved 10/16/2020
Supplemental Investigation Report for Cañon de Valle Aggregate Area, Technical Area 14, Revision 1	2/3/2020	Approved 11/18/2020
Addendum to the Phase II Investigation Report for Middle Los Alamos Canyon Aggregate Area, Revision 1	4/9/2020	Pending review
Supplemental Investigation Report for Upper Mortandad Canyon Aggregate Area, Revision 1	6/29/2020	Approved 9/9/2020
Supplemental Investigation Report for Upper Cañada del Buey Aggregate Area, Revision 1	9/16/2020	Approved 3/4/2021
Investigation Report for Chaquehui Canyon Aggregate Area	9/30/2020	Approved 9/29/2021
Phase II Investigation Report for Upper Los Alamos Canyon Aggregate Area, Revision 1	3/5/2021	Approved 3/23/2021
Supplemental Investigation Report for Lower Sandia Canyon Aggregate Area, Revision 1	5/27/2021	Approved 8/5/2021
Phase II Investigation Report for Chaquehui Canyon Aggregate Area	8/31/2021	Pending review
Investigation Report for South Ancho Canyon Aggregate Area	9/29/2021	Pending review
Investigation Report for Lower Water/Indio Canyons Aggregate Area	9/30/2021	Pending review
Addendum to the Investigation Report for Chaquehui Canyon Aggregate Area for Material Disposal Area K, at Technical Area 33	10/28/2021	Pending review

Response to the New Mexico Environment Department Draft Comments on U.S. Department of Energy Draft Responses for the Revised Supplemental Investigation Report for Sites at Technical Area 49 Outside the Nuclear Environmental Site Boundary
Dated May 10, 2022

INTRODUCTION

To facilitate review of this response, the New Mexico Environment Department's (NMED's) comments are included verbatim (in italics). The U.S. Department of Energy (DOE) Environmental Management Los Alamos Field Office responses follow each NMED comment. The comment numbers referenced below in NMED's comments correspond to NMED's original comments provided to DOE on December 13, 2022, and DOE's responses on March 15, 2022.

NMED Comment

1. *NMED finds DOE's proposed response is sufficient for the following comments numbered 1, 2, 3, 4, 5, 6, 7, 8, 9, 10(a), 10(b), 11, 12, 13, 16, 17, 18, 19, 20, 21, 22, 23, 24, and 25.*

DOE Response

1. Comment noted.

NMED Comment

2. *NMED Comment on items 14 and 15:*

As noted previously, NMED disagrees with the statements in the report (Sections 6.2.6 and 6.3.6 and Appendix I Section I-6-2) and that no ecological risk is present, as the results of the ecological risk assessment provided in Appendix I showed final hazard indices (HIs) greater than one at several sites and for multiple receptors. Appendix I does contain discussions of lines of evidence to conclude that the elevated HIs do not indicate potential unacceptable risk. However, the main text of the report (Sections 6.4.6 and 7.2.2) was revised to state that no potential unacceptable ecological risks are present.

While minor difference in the language, Appendix I indicates that risks are minimal while the main text still indicates no risk, which is incongruous with the calculations in Appendix I. NMED agrees that with respect to impacts on ecological populations, reproductive endpoints are the most concerning, and if the HI is below 10, there is minimal impact to the population, but some potential may be present (see references below). The main text must be revised for consistency with Appendix I. Sections 6.4.6 and 7.2.2 must be revised to indicate that the "potential for unacceptable risk is minimal."

References:

Menzie, C.A., J. Cura, J. Freshman, and S. Svirsky, 1993. Application of Ecological Risk Assessment to Hazardous Waste Site Remediation. Water Environment Federation, Workshop Proceedings, USEPA Science Advisory Board.

Tannenbaum, Lawrence V., Mark S. Johnson, and Matthew Bazar, 2003. Application of the Hazard Quotient method in Remedial Decisions: A Comparison of Human and Ecological Risk Assessments. Environmental Health Risk Assessment Program, Health Effects Research Program, U.S. Army Center for Health Promotion and Preventive Medicine, 5158 Blackhawk Road, Aberdeen Proving Ground, Aberdeen, Maryland 21010-5403. Human and Ecological Risk Assessment: Vol. 9, No. 1, pp. 387-401 (2003).

Tannenbaum, Lawrence V., 2004. A Critical Assessment of the Ecological Risk Assessment Process: A Review of Misapplied Concepts. Integrated Environmental Assessment and Management — Volume 1, Number 1—pp.66–72.

DOE Response

2. The text in sections 6.4.6 and 7.2.2 will be revised to state that based on the results of the ecological risk assessment, the potential for unacceptable ecological risks is minimal.