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September 29, 2021

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

RE: APPROVAL
INVESTIGATION REPORT FOR CHAQUEHUI CANYON AGGREGATE AREA
LOS ALAMOS NATIONAL LABORATORY
EPA ID#NM0890010515
HWB-LANL-20-070

Dear Arturo Duran:

The New Mexico Environment Department (NMED) has received the United States Department of Energy's (DOE) (the Permittee) *Investigation Report for Chaquehui Canyon Aggregate Area* (IR) dated and received on September 30, 2020 and is referenced by EM2020-0305. NMED reviewed the IR and provided draft comments on May 3, 2021. DOE submitted the responses to NMED's comments via email on June 16, 2021. Comments and responses were further discussed on July 15, 2021, during the Aggregate Area Project and Status teleconference between DOE and NMED. Based on the July 15 meeting, DOE provided responses to NMED comments. NMED received DOE's revised response to NMED Draft Comments on September 9, 2021. DOE resolved all NMED comments. The NMED comments and DOE responses are provided as an attachment to this letter.

The IR was submitted to fulfill Fiscal Year 2020 Milestone #15 of the Appendix B of the 2016 Compliance Order on Consent. NMED hereby issues approval of the Investigation Report for Chaquehui Canyon Aggregate Area.

If you have any questions regarding this letter, please contact Mitchell Schatz (505) 690-5910.

Sincerely,

Ricardo Maestas Digitally signed by Ricardo Maestas
Date: 2021.09.29 10:03:43 -06'00'

Ricardo Maestas
Acting Chief
Hazardous Waste Bureau

Attachment

1) DOE Responses and NMED Draft Comments

cc:

N. Dhawan, NMED HWB
M. Schatz, NMED HWB
L. King, EPA Region 6
S. Yanicak, NMED DOE-OB
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File: 2021 LANL, Approval, Investigation Report for Chaquehui Canyon AA
LANL-20-070

Second Response to New Mexico Environment Department Draft Comments for Investigation Report for Chaquehui Canyon Aggregate Area (September 2020), Dated May 3, 2021

INTRODUCTION

The New Mexico Environment Department (NMED) submitted draft comments on the "Investigation Report for Chaquehui Canyon Aggregate Area" to the U.S. Department of Energy (DOE) on May 3, 2021. The DOE Environmental Management Los Alamos Field Office submitted a response to NMED on June 16, 2021. NMED submitted a response to DOE's response on July 14, 2021. To facilitate review of this second DOE response, NMED's comments and responses and DOE's previous responses are included verbatim. All information associated with analysis of radionuclides is voluntarily provided to NMED in accordance with DOE policy.

GENERAL COMMENTS

NMED Comment

1. *Several sites require additional sampling to characterize site contamination. Typically, a risk assessment is not provided until nature and extent is fully defined. Completing a risk assessment with an incomplete dataset can lead to misleading conclusions about risk. It is recommended for future reports that all risk assessments be removed from the report for sites where nature and extent has not been fully characterized.*

DOE Response

1. The executive summary of the Investigation Report for Chaquehui Canyon Aggregate Area (N3B 2020, 701046) states "This investigation report evaluates the nature and extent of contamination and potential human health and ecological risks for 43 solid waste management units (SWMUs) and areas of concern (AOCs) in the Chaquehui Canyon Aggregate Area at Los Alamos National Laboratory (LANL or the Laboratory)." The risk assessments reflect the risk based on all currently available data. Risk assessments were performed to evaluate the potential risk to human health or the environment at each site in order to inform recommendations for the sites. The risk assessments not only assisted in determining if additional sampling was warranted; they also identified if site cleanups were required. Based on the results presented in the investigation report (IR), 18 sites were recommended for additional sampling to define the extent of contamination. In addition, the IR recommended removal of contaminated soil at 8 sites that posed an unacceptable risk under the industrial scenario (as well as to ecological receptors at 6 of these sites). As stated in section 8.1, the data collected during the Phase II investigation "will be used to confirm the extent of contamination has been defined and to revise the human health and ecological risk-screening assessments for these sites, if necessary." The purpose of performing risk assessments for sites for which extent was not defined or additional sampling was warranted was to determine if risk exists at each site and to propose the necessary cleanups if warranted. This approach is consistent with the risk-based process developed in accordance with the 2012 Framework Agreement and used to develop the aggregate area supplemental investigation reports (SIRs). Conclusive statements supporting corrective action complete were made only for those sites not needing additional investigation or cleanup. Therefore, no change to the text in the IR is necessary and future reports will also follow this process.

NMED Response

1. *NMED does not agree that risk assessments should be included in the investigation report when nature and extent has not been completed as the results are not relevant and may present a skewed perception of the site. The Chaquehui Canyon Aggregate Area is an Investigation Report (IR), not a Supplemental Investigation Report (SIR). A fundamental difference between the IR and a SIR is that nature and extent has been identified to some degree in an SIR whereas the IR presents the initial investigation. As part of the 2012 Tiger Team discussions regarding site characterization and risk assessments, DOE pointed out the language in Federal Register 19444, "Carefully designed and implemented RFIs are critical to accurately characterize the nature, extent, direction, rate, movements, and concentration of releases at a given site; this information is needed to determine potential risk to human health and the environment…." And further states, "For example, delineating the extent of contamination it may not be necessary to delineate to background concentrations in all cases. In some cases, information adequate to support cleanup decisions can be obtained through delineating to risk-based concentrations." In the case Chaquehui Canyon, neither the nature and extent of contamination is defined, nor is contamination defined to risk-based levels, as concentrations exceed screening levels. While it is acknowledged that a preliminary risk assessment may provide useful internal information in understanding the potential impacts to a site, a preliminary assessment should only be considered an internal tool only and not to be included in the report. This issue of including risk assessments in an IR before nature and extent has been defined has been previously discussed and it was agreed that inclusion of a risk assessment prior to defining nature and extent is not relevant or appropriate in an IR. As just one example of DOE adhering to this agreement, from the Upper Los Alamos Canyon Investigation Report, "The extent of contamination has not been completely defined at 22 of the 47 sites investigated. Additional sampling is needed to define the vertical and/or lateral extent of one or more contaminants at each of these sites. Once additional data are available and extent is defined, human health and ecological risk screening assessments will be conducted to determine if those sites pose a potential unacceptable risk to human health or the environment." Revise the report to exclude the risk assessments until nature and extent of contamination has been defined.*

Second DOE Response

1. Per discussion with NMED on July 15, 2021, it was agreed that risk assessments will be removed from the IR for sites where nature and extent are not defined. In general, the risk assessment for a site will not be included in an IR if nature and extent have not been defined. However, a preliminary risk assessment will be performed for each site to provide useful internal information in understanding the potential impacts to a site. The risk assessments reflect the risk based on all currently available data and not only assist in determining if additional sampling is warranted but also help identify if site cleanups are required.

   The risk assessments for the following sites will be removed from the IR: SWMUs 33-001(a), 33-001(b), 33-001(c), 33-001(d), 33-001(e), 33-002(a), 33-002(b), 33-002(c), 33-002(d), 33-002(e), 33-004(a), 33-004(i), 33-006(a), 33-007(c), 33-008(c), 33-011(a), 33-011(d), and 33-012(a). In addition, the vapor-intrusion pathway for these sites will not be evaluated until the nature and extent of contamination are defined.

NMED Comment

2. *Throughout the Report (Nature and Extent section) the DOE used comparison of total chromium, a naturally occurring ratio of trivalent chromium [Cr(III)] to hexavalent chromium [Cr(VI)], data to the Cr(III) residential soil screening level (SSL)(117,000 mg/kg) to determine whether additional sampling is warranted. Since data was analyzed for total chromium and not Cr(III), the use of Cr(III) SSL is unacceptable. Section 4.2, Screening Levels, indicated the use of total chromium screening levels were appropriate for the conditions at the sites in the Report. In the 2019 NMED Risk Assessment Guidance for Site Investigations and Remediation (SSG), it states "if site history does not indicate a known source for chromium (VI), the data (soil and/or groundwater) should be analyzed for total chromium" (section 5.1, Use of Chromium Screening Levels). NMED agrees that based on site history in the Report, there is not a source of chromium (VI), therefore, the use of total chromium data is acceptable for risk assessment purposes. All analytical data for total chromium should be compared to the total chromium SSLs values. However, the DOE has used appropriate total chromium SSLs in the risk evaluations. Revise the Report to eliminate the comparison of total chromium to residential SSLs for Cr(III).*

DOE Response

2. This comment is essentially the same as Comment 1 in NMED's May 26, 2020, comments on the SIR for Upper Cañada del Buey Aggregate Area (LANL 2016, 601745; Schatz 2020, 700923). DOE's response to comments was submitted to NMED on July 31, 2020, and included the following response to that comment:

   > Soil screening levels (SSLs) are used both to evaluate risk and in the evaluation of nature and extent to determine whether additional sampling is warranted. The use of the trivalent chromium [Cr(III)] residential SSL for evaluating nature and extent of total chromium is consistent with the results of a chromium background study conducted by Los Alamos National Laboratory in 2017 to determine the prevalence of hexavalent chromium in soil, sediment, and tuff samples where there was no evidence of previous releases of chromium. The study was conducted in accordance with a work plan approved by the New Mexico Environment Department (NMED) (LANL 2017, 602400; NMED 2017, 602418). The "Chromium Background Study Report" (LANL 2017, 602650) concluded that naturally occurring chromium is predominantly in the trivalent form and that the trivalent SSL is appropriate for data comparisons used to evaluate the extent of contamination at sites with no known chromium releases. The report also concluded that total chromium SSLs, rather than Cr(III) SSLs, will continue to be used for risk-screening comparisons to evaluate total chromium data at sites where there is no previous indication that hexavalent chromium was used and released. The chromium background study was approved by NMED in October 2017 (NMED 2017, 602678).
   >
   > Section 4.2, Screening Levels, will be revised to provide a reference to the chromium background study as justification for the use of Cr(III) SSLs for evaluating nature and extent of total chromium at sites with no known or suspected sources of hexavalent chromium.

   DOE's response to comments was approved by NMED on August 3, 2020, and the revised SIR incorporating the above revision was approved by NMED on March 4, 2021. The language in the above revision was included in the IR for Chaquehui Canyon Aggregate Area to provide the basis for using trivalent chromium SSLs. No revisions to the investigation report are needed.

NMED Response

2. *The response to the comment is adequate and consistent with the 2017 Chromium Background Study Report. It is noted that the recommendations outlined in the DOE report also present the use of the residential trivalent chromium screening level over the total chromium screening level. For the human health risk assessment, the total chromium screening levels were applied. As the use of the total chromium screening levels over those for trivalent chromium is a more conservative approach, modification of the risk assessments for chromium are not required.*

Second DOE Response

2. Comment noted. No response is necessary.

NMED Comment

3. Section 5.2, Extent of Contamination:

The text states that, "if the COPC concentrations are sufficiently below the SSL/SAL (e.g., the residential and/or industrial SSL/SAL is 10 times [an order of magnitude]) or more than all concentrations), the COPC does not pose a potential unacceptable risk and no further sampling for extent is warranted." As discussed in the 2017 Technical Meeting, in cases where chemical of potential concern (COPC) concentrations increase with depth or laterally, comparison to the maximum detected concentration to the SSL for the current and future land use scenario to define the extent of contamination may be acceptable. DOE discusses that if the SSL is an order of magnitude or greater than the maximum detected concentration the determination of no further sampling being warranted is made even if concentrations are increasing vertically or laterally. DOE's belief was that the approach they are using to eliminate unnecessary additional sampling is protective of human health and the environment and that from a risk perspective, is an appropriate approach. NMED agreed that in most cases the method is appropriate, as long as sufficient additional information and lines of evidence are provided in the discussion. Further, it was agreed that If the site concentration is significantly lower than the SSLs (e.g., orders of magnitude), it was agreed that this comparison was sufficient as a single line of evidence. However, in some cases, additional evaluation of the COPC is required. DOE concurred that in some cases additional evaluation of the COPC is justified and that additional sampling may be warranted even if the maximum detected concentration is an order of magnitude below the SSL. NMED stated that they agree that additional sampling may not be warranted in cases where the following criteria are met: there is no history of contaminant release due to site activities, contaminant concentrations do not increase significantly with depth or laterally and appear to be isolated cases (do not indicate a trend), there is no downstream component of contaminant migration, and concentrations are an order of magnitude or more below the SSL. Clarify the text accordingly.

DOE Response

3. The process whereby soil screening levels (SSLs)/screening action levels (SALs) are used to determine whether additional sampling is warranted if extent is not defined is the same process used with the SIRs and has been approved by NMED. If the maximum detected chemical of potential concern (COPC) concentration is greater than 10% of the residential SSL/SAL, additional lines of evidence may be used to determine if additional sampling is warranted, including comparison with industrial SSLs/SALs, evaluation of the magnitude of the difference between the residential SSL/SAL and background value (BV)/fallout value, risk posed by the COPC, and comparison of the maximum

concentration where extent is not defined with SSLs/SALs. The nature and extent sections of the report will be reviewed to verify that sufficient lines of evidence have been provided where maximum detected concentrations are greater than 10% of the residential SSL, and additional lines of evidence will be provided if needed.

NMED Response

3. *The response to the comment appears adequate pending review of the revised text. DOE indicates that the nature and extent sections of the report will be reviewed to verify that sufficient lines of evidence have been provided where maximum detected concentrations are greater than 10% of the residential SSL, and additional lines of evidence will be provided if needed.*

Second DOE Response

3. Comment noted. No response is necessary.

SPECIFIC COMMENTS

NMED Comment

4. ***Section 6.13.4.4, Nature and Extent of Soil and Rock Contamination, Inorganic Chemicals, pg 95–98:***

   DOE Statement: *Vanadium was detected above the sediment BV in one sample at a concentration of 32.2 mg/kg. Concentrations increased with depth at location 33-60403 and increased downgradient. The residential SSL was approximately 12 times the maximum concentration. Further sampling for extent of vanadium is not warranted.*

   NMED Comment: *Vanadium increased downgradient and vertically at this site. As stated in Comment # 2, NMED agrees that additional sampling may not be warranted in cases where the following criteria are meet: there is no history of contaminant release due to site activities, contaminant concentrations do not increase significantly with depth or laterally and appear to be isolated cases (do not indicate a trend), there is no downstream component of contaminant migration and concentrations are an order of magnitude or more below the SSL. Clarify the text so that the criteria's listed above were met to justify that further sampling for extent is not warranted. This is applicable throughout the document.*

DOE Response

4. As described in the response to General Comment 3, additional lines of evidence may be provided as a basis for no further sampling to define extent in cases where the maximum concentration is greater than 10% of the residential SSL. The discussion of vanadium in section 6.13.4.4 will be revised as follows:

   Vanadium was detected above the sediment BV in one sample at a concentration of 32.2 mg/kg. Concentrations increased with depth at location 33-60403 and increased downgradient. The residential SSL was approximately 12 times and the industrial SSL was approximately 203 times the maximum concentration. The residential HQ for vanadium is 0.035 and vanadium does not

pose an unacceptable residential risk (Appendix H, Table H-4.2-72). Further sampling for extent of vanadium is not warranted.

NMED Response

4. *DOE response to comment and provided text is acceptable.*

Second DOE Response

4. No response is necessary.

NMED Comment

5. ***Section 6.21.5, Summary of Human Health Risk Screening, pg. 147:***

   DOE Statement: *Based on the risk-screening assessment results, there are no potential unacceptable risks or doses for the industrial scenario at SWMU 33-005(b). However, there are potential unacceptable noncarcinogenic risks for the construction worker scenario and carcinogenic risks for the residential scenario. There are no potential unacceptable noncarcinogenic risks for the residential scenario or potential unacceptable carcinogenic risks for the construction worker scenario, and no unacceptable dose for all scenarios.*

   NMED Comment: *Section 8.3.2, Corrective Action Complete with Controls, DOE states: Six sites have been found to pose no potential unacceptable risks to human health under the construction worker and industrial scenarios or to ecological receptors, and the nature and extent of contamination for these sites is defined and/or no further sampling for extent is warranted (Table 8.1-1). In Section 6.21.5 it states there is a potential unacceptable noncarcinogenic risk for the construction worker and in Section 8.3.2, it states there is not a potential unacceptable risk to human health under the construction worker scenario. These conflicting statements regarding risk to a construction worker must be resolved and text revised accordingly.*

DOE Response

5. According to NMED guidance, exceedances of risk thresholds defines a potential unacceptable risk. As a result, the text in section 6.21.5 will be revised to state that there is no unacceptable noncarcinogenic risk for the construction worker scenario as the hazard index (HI) is equivalent to 1 (0.95).

NMED Response

5. *DOE response to comment and provided text is acceptable.*

Second DOE Response

5. No response is necessary.

NMED Comment

6. Appendix H, Section H-4.2, Results of Human Health Screening Evaluation, pages H-22–H-39:

Several of the sites have been retained for additional investigation to define extent or will have removals conducted. As such, the results of the risk assessments as presented in this section may be misleading, if additional data are obtained. For each site where sampling and/or removals are proposed, the section should be revised to indicate that the present results for the risk assessment are preliminary and the results are subject to change when the investigations and/or removals are completed. As noted in Sections 8.1 and 8.2, the risk assessment will be revised if necessary following additional field activities and/or remediation.

DOE Response

6. As indicated in DOE's response to General Comment 1, risk assessments reflect the risk based on all currently available data. Risk assessments were performed to evaluate the potential risk to human health or the environment at each site in order to inform recommendations for the sites. As stated in Section 8.1, the data collected during the Phase II investigation "will be used to confirm the extent of contamination has been defined and to revise the human health and ecological risk-screening assessments for these sites, if necessary." Because the text in section 8.1 clearly identifies the sites recommended for additional sampling and/or cleanup, and that the associated risk assessments will be revised as necessary in the Phase II investigation report, no change to the text in Appendix H is necessary.

NMED Response

6. As discussed in General Comment No.1, inclusion of the risk assessment where nature and extent has not been defined is not acceptable and the risk should be removed in these cases. Revise the report to remove all risk assessments where additional sampling is required to define nature and extent.

Second DOE Response

6. See the second response to General Comment 1.

NMED Comment

7. Appendix H, Section H-4.3, Vapor-Intrusion Pathway, page H-40:

The text states that no VOCs were detected at SWMUs 33-001(e), 33-004(h), 33-004(j), 33-006(a), 33-010(h), or 33-011(a) and thus the vapor intrusion pathway was considered incomplete. However, in reviewing the detected organics for these sites, several organics were detected that are considered volatile and may have associated inhalation toxicity. For 33-004(h), Table 6.16-3 indicates that benzo(a)anthracene, fluorene, 1-methylnapthalene, 2-methylnaphthalene and naphthene were detected. For 33-004(j) and 33-006(a), Tables 6.18-3 and 6.23-3 show Aroclor-1254, Arochor-1260, and benzo(a)anthracene as being detected. The text must be revised to provide the criteria used to determine whether an organic was considered detected as a site for inclusion in the vapor intrusion pathway. Estimated values must be addressed. The vapor intrusion pathway must be modified to include all VOCs that meet the criteria of volatility and have inhalation toxicity. The text must also discuss detected VOCs that are volatile but were not included due to lack of inhalation toxicity.

DOE Response

7. The approach for evaluating the vapor-intrusion pathway in the IR for Chaquehui Canyon Aggregate Area is the same approach as used in aggregate area SIRs. All SIR revisions submitted to date have been approved by NMED. Based on the numerous vapor-intrusion comments received from NMED on the Chaquehui Canyon Aggregate Area IR, DOE reviewed the IR approach to evaluating vapor-intrusion pathways based on the NMED's soil screening guidance document (NMED 2019, 700550). The approach in the Chaquehui Canyon Aggregate Area will be revised to better define the process for evaluating the vapor-intrusion pathway. Specifically, the following changes will be implemented:

   - The vapor-intrusion pathway will be evaluated only for those sites where the vapor-intrusion pathway is potentially complete, rather than for all sites. Vapor intrusion will not be evaluated if structures are not present or likely to be present or for sites where there is no shallow soil contamination resulting in vapor sources (e.g., volatile organic compounds [VOCs] are not found at significant levels within 10 ft of the base of the foundation).

   - The qualitative evaluation will continue to be used for those sites meeting the criteria contained in section 2.5.2.2 of the soil screening guidance document (NMED 2019, 700550). Unless pore-gas sampling was specified in the approved investigation work plan for a site, the qualitative evaluation will be conducted using bulk soil data rather than pore-gas data.

   - The qualitative evaluation will include all site-specific COPCs that are volatile and toxic (i.e., all COPCs having a Henry's Law constant of 1×10^{-5} atm-m^3/mol or greater, a molecular weight of approximately 200 g/mol or less, and that are known to pose a potential cancer risk or noncancer hazard through the inhalation pathway). Nondetected organic compounds are not considered COPCs and will not be evaluated.

   - In the event a site does not meet the criteria for performing a qualitative evaluation (e.g., a complete vapor-intrusion pathway exists), a quantitative evaluation will be recommended and pore gas sampling will be included in the Phase II investigation. The steps outlined in the soil screening guidance (NMED 2019, 700550) for initial screening using NMED vapor-intrusion screening levels will be conducted, lines of evidence will be presented, and recommendations for additional sampling or mitigation will be included in the Phase II IR.

   A table will be added to Appendix H that summarizes the vapor-intrusion pathway designation by SWMU and AOC (see Table H-4.3-1). The text in Section H-4.3 will be revised and the specific sites discussed in this section will be updated based on this updated approach as follows:

   H-4.3 Vapor-Intrusion Pathway

   NMED soil screening guidance requires an evaluation of the vapor-intrusion pathway (NMED 2019, 700550). Residential receptors and commercial/industrial workers could be exposed to volatile compounds vaporized from subsurface media (soil gas and/or groundwater) through pore spaces in the vadose zone and building foundations (or slabs) into indoor air. For each site investigated, one of the following three designations was made for the vapor-intrusion pathway: (1) incomplete pathway and no action required, (2) potentially complete pathway and a qualitative evaluation required, or (3) complete pathway and quantitative evaluation required. A summary of the vapor-intrusion pathway designations for each site is included in Table H-4.3-1. Because only bulk soil data are available for these sites, NMED vapor-intrusion screening levels are not applicable for the evaluation.

Incomplete Pathway: No Action Required

The vapor-intrusion pathway is designated as "incomplete" if one of the following conditions are met and will not be evaluated further:

(1) There is(are) no building(s) located near the site and buildings are reasonably expected to be absent in the future;

(2) Volatile and toxic compounds are not detected, meaning all the results were 100% nondetections; or

(3) The site has no history of containing volatile and toxic compounds and VOC sampling was not conducted during the investigation.

Potentially Complete Pathway: Qualitative Evaluation

The vapor-intrusion pathway is designated as "potentially complete" if the following conditions are met;

(1) Detections of volatile and toxic compounds are minimally detected (e.g., once or twice) in site media (soil, tuff);

(2) There is(are) no suspected source(s) for volatile and toxic compounds; and

(3) Concentrations are decreasing with depth.

A qualitative evaluation of the vapor-intrusion pathway will be used for the sites meeting the above criteria. Unless pore-gas sampling was specified in the approved investigation work plan for the site, the qualitative evaluation will be made using bulk soil data rather than pore-gas data. The qualitative evaluation will include all site-specific chemicals of potential concern (COPCs) which are volatile and toxic (i.e., all COPCs having a Henry's Law constant of 1×10^{-5} atm-m^3/mol or greater, a molecular weight of approximately 200 g/mol or less, and that are known to pose a potential cancer risk or noncancer hazard through the inhalation pathway). Nondetected organic compounds are not considered COPCs and will not be evaluated.

Complete Pathway; Quantitative Evaluation

The vapor-intrusion pathway is designated as "complete" for a specific building or collection of buildings when the following five conditions are met:

(1) A subsurface source of vapor-forming chemicals is present underneath or near the building(s) (e.g., VOCs are found at significant levels within 10 ft of the base of the foundation);

(2) Vapors form and have a route along which to migrate (be transported) toward the building;

(3) The building(s) is(are) susceptible to soil gas entry, which means openings exist for the vapors to enter the building and driving 'forces' (e.g., air pressure differences between the building and the subsurface environment) exist to draw the vapors from the subsurface through the openings into the building(s);

(4) One or more vapor-forming chemicals composing the subsurface vapor source(s) is(are) present in the indoor environment; and

(5) The building(s) is(are) occupied by one or more individuals when the vapor-forming chemical(s) is(are) present indoors.

In the event a complete vapor-intrusion pathway exists, a quantitative evaluation will be recommended and pore-gas sampling will be included in the Phase II investigation. The steps outlined in the soil screening guidance (NMED 2019, 700550) for initial screening using NMED vapor intrusion screening levels will be conducted, lines of evidence presented, and recommendations for additional sampling or mitigation will be included in the Phase II investigation report.

As shown in Table H-4.3-1, most sites do not have nearby buildings. The vapor-intrusion pathway is incomplete for these sites and no action is needed.

VOCs were minimally detected at SWMUs 33-004(h) and 33-016 and AOC C-33-003 and there are nearby buildings. The vapor-intrusion pathway is potentially complete for these sites and was evaluated for all COPCs that are volatile and toxic.

VOCs were minimally detected at SWMUs 33-004(a), 33-004(i), 33-011(d), 33-012(a), and 33-017 and there are nearby buildings. The vapor-intrusion pathway is potentially complete for these sites. These sites are recommended for Phase II sampling and/or remediation and the vapor-intrusion pathway will be evaluated after the Phase II sampling and/or remediation.

Table H-4.3-1
Summary of Vapor-Intrusion Pathway Designations

SWMU/AOC	Brief Description	Vapor-Intrusion Pathway Designation	Comments
SWMU 33-001(a)	Disposal Pit 1 (MDA E)	Incomplete, no action required	No nearby buildings.
SWMU 33-001(b)	Disposal Pit 2 (MDA E)	Incomplete, no action required	No nearby buildings.
SWMU 33-001(c)	Disposal Pit 3 (MDA E)	Incomplete, no action required	No nearby buildings.
SWMU 33-001(d)	Disposal Pit 4 (MDA E)	Incomplete, no action required	No nearby buildings.
SWMU 33-001(e)	Soil Contamination from Underground Chamber and Shaft (MDA E)	Incomplete, no action required	No nearby buildings.
SWMU 33-002(a)	Septic System (MDA K)	Incomplete, no action required	No nearby buildings.
SWMU 33-002(b)	Sump (MDA K)	Incomplete, no action required	No nearby buildings.
SWMU 33-002(c)	Sump (MDA K)	Incomplete, no action required	No nearby buildings.
SWMU 33-002(d)	Drainline and Outfall from Former Building 33-86 (MDA K)	Incomplete, no action required	No nearby buildings.
SWMU 33-002(e)	Drainline and Outfall from Former Building 33-86 (MDA K)	Incomplete, no action required	No nearby buildings.
SWMU 33-004(a)	Septic System	Potentially complete	VOCs minimally detected near buildings. Will be reevaluated following Phase II remediation and sampling.

Table H-4.3-1 (continued)

SWMU/AOC	Brief Description	Vapor-Intrusion Pathway Designation	Comments
SWMU 33-004(b)	Septic System	Incomplete, no action required	No nearby buildings.
SWMU 33-004(d)	Septic System	Incomplete, no action required	No nearby buildings.
SWMU 33-004(g)	Drainline and Outfall associated with Building 33-16	Incomplete, no action required	No nearby buildings.
SWMU 33-004(h)	Drainline and Outfall associated with Building 33-20	Potentially complete	VOCs minimally detected near buildings.
SWMU 33-004(i)	Drainline and Outfall associated with Building 33-39	Potentially complete	Will be reevaluated following Phase II remediation and sampling.
SWMU 33-004(j)	Outfall from Building 33-26	Incomplete, no action required	No nearby buildings.
SWMU 33-004(m)	Septic Tank and Leach Field	Incomplete, no action required	No nearby buildings.
SWMU 33-005(a)	Soil Contamination from Former Septic System	Incomplete, no action required	No nearby buildings.
SWMU 33-005(b)	Soil Contamination from Former Drainline	Incomplete, no action required	No nearby buildings.
SWMU 33-005(c)	Soil Contamination from Former Waste Line and Leach Field	Incomplete, no action required	No nearby buildings.
SWMU 33-006(a)	Firing Site	Incomplete, no action required	No nearby buildings.
SWMU 33-007(b)	Firing Sites	Incomplete, no action required	No nearby occupied buildings.
SWMU 33-007(c)	Firing Sites	Incomplete, no action required	No nearby buildings.
SWMU 33-008(a)	Landfill	Incomplete, no action required	No nearby buildings.
SWMU 33-008(c)	Landfill	Incomplete, no action required	No nearby buildings.
SWMU 33-009	Surface Disposal Site	Incomplete, no action required	No nearby buildings.
SWMU 33-010(c)	Surface Disposal Site	Incomplete, no action required	No nearby buildings.
SWMU 33-010(f)	Surface Disposal Site (MDA K)	Incomplete, no action required	No nearby buildings.
SWMU 33-010(g)	Surface Disposal Site	Incomplete, no action required	No nearby buildings.
SWMU 33-010(h)	Surface Disposal Site	Incomplete, no action required	No nearby buildings.
SWMU 33-011(a)	Soil Contamination from Former Storage Area	Incomplete, no action required	No nearby buildings.
AOC 33-011(b)	Storage Area	Incomplete, no action required	No nearby buildings.
SWMU 33-011(c)	Storage Area	Incomplete, no action required	No nearby buildings.
SWMU 33-011(d)	Storage Area	Potentially complete	Will be reevaluated following Phase II sampling.
SWMU 33-011(e)	Storage Area	Incomplete, no action required	No nearby buildings.

Table H-4.3-1 (continued)

SWMU/AOC	Brief Description	Vapor-Intrusion Pathway Designation	Comments
SWMU 33-012(a)	Drum Storage Area	Complete	Will be reevaluated following Phase II remediation and sampling.
SWMU 33-014	Burn Site	Incomplete, no action required	No nearby buildings.
SWMU 33-015	Incinerator	Incomplete, no action required	No nearby buildings.
SWMU 33-016	Sump	Potentially complete	VOCs minimally detected.
SWMU 33-017	Operational Release	Complete	Will be reevaluated following Phase II remediation and sampling.
AOC C-33-001	Former Transformer	Complete	Will be reevaluated following Phase II remediation and sampling.
AOC C-33-003	Soil Contamination	Potentially complete	VOCs minimally detected.

NMED Response

7. *The proposed bullets deviate significantly from the NMED Soil Screening Guidance (SSG) and USEPA guidance for vapor intrusion. Below are issues with the responses and proposed text as provided. The vapor intrusion evaluation must be revised for consistency with the NMED SSG.*

    - *The first bullet states that the vapor intrusion pathway will only be evaluated for sites with the pathway is potential complete but not at all sites. All sites must be evaluated with respect to the vapor intrusion pathway. If volatile and toxic compounds are not detected in soil, soil gas and/or groundwater, meaning all the results were 100% non-detects, then the vaporintrusion pathway is considered incomplete. However, the risk assessment must include a brief discussion/statement of this determination. If addition, the vapor intrusion pathway is complete, a quantitative analysis must be conducted. the Revise the text to include determinations of both an incomplete and a complete pathway.*

    - *The first bullet indicates that vapor intrusion will not be evaluated if structures are not present. If this line of evidence is used, this constitutes a land use control and complete without controls cannot be granted. The 2017 USEPA OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air, outlines that buildings may be actual or potential and that the conceptual site model should not eliminate hypothetical future land uses. As such, to obtain closure with no controls, future land use must be considered and evaluated.*

    - *The first bullet further indicates that vapor intrusion will be considered incomplete if VOCs are not present in shallow soil. However, as the data are bulk soil and not soil gas, the evaluation of the bulk soil data does not provide any indication of whether there is subsurface contamination and/or groundwater contamination resulting in vertically migrating vapors. The evaluation of the vapor intrusion pathway must consider all potential sources ofcontamination that could contribute to this pathway.*

- *Table H-4.3-1 proposes a summary of the vapor-intrusion pathway designations. Where investigation is incomplete and additional site characterization is proposed, a designation of the vapor intrusion pathway cannot be made. This applies to SWMUs 33-001(a-e), SWMUs 33-002(a-e), SWMU 33-007(c), SWMU 33-011(a), and SWMU 33-002(d). The designation should be changed to indicate that this pathway will be determined once nature and extent has been fully defined. Revise the table accordingly.*

- *Table H-4.3-1 indicates that several sites are slated for closure without control sites with the justification is that there are no nearby buildings. As noted in comments regarding the bulleted items of the response, lack of a current building is not an acceptable line of evidence to exclude the vapor intrusion pathway. In order for these sites to be listed as incomplete, it must also be shown that 100% of soil was non-detect for VOCs and there is no history of waste/activities that contained volatile and toxic compounds. It is noted that VOCs were detected at most of these sites and as such, the vapor intrusion pathway is potentially complete. Revise accordingly.*

- *Several sites on Table H-4.3-1 are slated for closure with controls. However, the justification of an incomplete vapor intrusion pathway is that there are currently no nearby buildings. Either the vapor intrusion pathway must be addressed according to the NMED SSG and the text outlined in the response for Section H-4.3, or controls will include restrictions on future buildings due to uncertainties regarding vapor intrusion.*

Second DOE Response

7. NMED's response to DOE's response states the proposed approach DOE outlined deviates significantly from the NMED soil screening guidance (SSG) and the EPA guidance for vapor intrusion. As stated in Section 2.5 of NMED's "Risk Assessment Guidance for Investigations and Remediation," Volume I (NMED 2019, 700550), per EPA guidance, this pathway must be evaluated if (1) there are compounds present in subsurface media that are sufficiently volatile and toxic, and (2) there are existing or planned buildings where exposure could occur (EPA, 2002c is cited; however, the EPA's "OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air" [EPA 2015, 701569] is the most current guidance). The Executive Summary of the EPA guidance specifically states that, among other criteria, the vapor-intrusion pathway is only referred to as "complete" if buildings exist that are occupied by one or more individuals when the vapor-forming chemical(s) are present indoors. The guidance further states that the vapor-intrusion pathway is "incomplete" if these conditions are absent and reasonably expected to be absent in the future.

   However, based upon NMED's original comment, the NMED SSG requires an evaluation of the vapor-intrusion pathway (NMED 2019, 700550). The approach described in DOE's first response will be modified. For sites where no volatile and toxic compounds are detected, a statement will be included to indicate that the pathway is considered incomplete for that reason. The vapor-intrusion pathway will be either qualitatively or quantitatively evaluated at all sites that are not 100% nondetects for compounds that meet the NMED definition of volatility (i.e., having a Henry's Law constant of 1×10^{-5} atm-m^3/mol or greater and a molecular weight of approximately 200 g/mol or less). The NMED SSG also indicates that compounds must have inhalation toxicity criteria in order to be quantitatively evaluated for vapor intrusion. The absence of toxicity criteria for some compounds will be noted as specified below.

NMED's original General Comment 7 and Specific Comments 9 through 31 list several COPCs that NMED identified as volatile and toxic chemicals that should have been evaluated for the vapor-intrusion pathway. These COPCs included several polycyclic aromatic hydrocarbons [benzo(a)anthracene, fluorene, 1-methylnapthalene, 2-methylnaphthalene, naphthene, and pyrene], Aroclor-1254, and Aroclor-1260. Not all of the COPCs identified in the comments meet the criteria for volatility. Benzo(a)anthracene and naphthalene will be evaluated because these COPCs meet both the volatility and the toxicity criteria. Compounds like fluorene, 1-methylnapthalene, 2-methylnaphthalene, acenaphthene, anthracene, fluoranthene, phenanthrene, and pyrene, which meet the criteria for volatility but do not have inhalation toxicity criteria, will be identified if they are present, but further evaluation will not be conducted. The molecular weights of Aroclor-1254 and Aroclor-1260 are 326.44 g/mol and 395.33 g/mol, respectively. Therefore, these COPCs do not meet the criteria for volatility and do not present a vapor-intrusion risk.

For sites where structures are not present or occupied and are not reasonably anticipated to be present or occupied in the future, the text will indicate this and include multiple lines of evidence regarding the potential for future vapor intrusion. These lines of evidence may include the following as applicable to the site, as well as any other evidence that the vapor-intrusion pathway is not reasonably expected to be complete in the future:

- minimal detections,
- COPCs were estimated at concentrations below the report detection limits,
- the depth of the detections (e.g., depths shallower than 5 ft below ground surface [bgs] are not suitable for soil gas sample collection because of the influence of ambient air [EPA 2015, 701569] and would likely require removal for building construction),
- concentrations decrease with depth,
- concentrations do not represent adequate mass to present a vapor intrusion risk,
- VOC sources are not associated or do not exist at the site,
- distance from structures to COPC detections, and
- topography and soil type as they pertain to building construction (e.g., sites on the slope of a canyon alongside a drainage channel or sites with fill that would not be competent for building construction).

The text in section H-4.3 will be modified as follows, and Table H-4.3-1 will be modified to be consistent with the text, designating which sites still require investigation to determine the nature and extent of contamination.

H-4.3 Vapor-Intrusion Pathway

NMED's "Risk Assessment Guidance for Site Investigations and Remediation," Volume I, requires an evaluation of the vapor-intrusion pathway (NMED 2019, 700550). Residential receptors and commercial/industrial workers could be exposed to volatile compounds vaporized from subsurface media (soil gas and/or groundwater) through pore spaces in the vadose zone and building foundations (or slabs) into indoor air.

As stated in Section 2.5 of NMED's Risk Assessment Guidance (NMED 2019, 700550), per EPA guidance, the vapor intrusion pathway must be evaluated if (1) there are compounds present in subsurface media that are sufficiently volatile and toxic, and (2) there are existing or planned buildings where exposure could occur (EPA, 2002c is cited; however, the EPA's "OSWER

Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air" [EPA 2015, 701569] is the most current guidance). The Executive Summary of the EPA guidance (EPA 2015, 701569) specifically states that, among other criteria, the vapor-intrusion pathway is only referred to as "complete" if buildings exist that are occupied by one or more individuals when the vapor-forming chemical(s) are present indoors. The guidance further states that the vapor-intrusion pathway is "incomplete" if these conditions are absent and reasonably expected to be absent in the future.

For each site investigated, one of the following three designations was made for the vapor-intrusion pathway: (1) incomplete pathway and no action required, (2) potentially complete pathway and a qualitative evaluation required, or (3) complete pathway and quantitative evaluation required. A summary of the vapor-intrusion pathway designations for each site is included in Table H-4.3-1. Because only bulk soil data are available for these sites, NMED vapor-intrusion screening levels are not applicable for the evaluation.

Incomplete Pathway: No Action Required

The vapor-intrusion pathway is designated as "incomplete" and will not be evaluated further if one of the following conditions are met.

- Volatile and toxic compounds are not detected, meaning all the results were 100% nondetections.
- The site has no history of containing volatile and toxic compounds, and VOC sampling was not conducted during the investigation.
- There are no buildings located near the site, and buildings are reasonably expected to be absent in the future (NMED 2019, 700550; EPA 2015, 701569). Qualitative lines of evidence will be provided to address the potential for this pathway to be complete in the future.

Text will be included for each site indicating the specific basis for the incomplete determination.

Potentially Complete Pathway: Qualitative Evaluation

The vapor-intrusion pathway is designated as "potentially complete" if the following conditions are met.

- Detections of volatile and toxic compounds are infrequent (e.g., once or twice) in site media (soil, tuff).
- There are no suspected sources for volatile and toxic compounds.
- Concentrations are decreasing with depth.

A qualitative evaluation of the vapor-intrusion pathway will be used for the sites meeting the above criteria. Unless pore-gas sampling was specified in the approved investigation work plan for the site, the qualitative evaluation will be made using bulk soil data rather than pore-gas data. The qualitative evaluation will include all site-specific COPCs that are volatile and toxic (i.e., all COPCs having a Henry's Law constant of 1×10^{-5} atm-m^3/mol or greater, a molecular weight of approximately 200 g/mol or less, and that are known to pose a potential cancer risk or noncancer hazard through the inhalation pathway). Multiple lines of evidence will be described and used to determine whether further evaluation is necessary. Compounds that meet the criteria for volatility but do not have inhalation toxicity criteria will be identified as present, but further evaluation will

not be conducted. Nondetected organic compounds are not considered COPCs and will not be evaluated.

Complete Pathway; Quantitative Evaluation

The vapor-intrusion pathway is designated as "complete" for a specific building or collection of buildings when the following five conditions are met.

- A subsurface source of vapor-forming chemicals is present underneath or near the building(s) (e.g., VOCs are found at significant levels within 10 ft of the base of the foundation).
- Vapors form and have a route along which to migrate (be transported) toward the building(s).
- The building(s) are susceptible to soil gas entry, which means openings exist for the vapors to enter the building and driving "forces" (e.g., air pressure differences between the building and the subsurface environment) exist to draw the vapors from the subsurface through the openings into the building(s).
- One or more vapor-forming chemicals composing the subsurface vapor source(s) are present in the indoor environment.
- The building(s) are occupied by one or more individuals when the vapor-forming chemical(s) are present indoors.

In the event a complete vapor-intrusion pathway exists, a quantitative evaluation that includes further investigation and soil gas sampling and/or remediation may be recommended. The steps outlined in the soil screening guidance (NMED 2019, 700550) for initial screening using NMED vapor-intrusion screening levels will be conducted, lines of evidence presented, and recommendations for additional sampling or mitigation will be included in the investigation report.

As shown in Table H-4.3-1, most sites do not have nearby buildings. The vapor-intrusion pathway is incomplete for these sites and no action is needed.

VOCs were minimally detected at SWMUs 33-004(h) and 33-016 and AOC C-33-003, and there are nearby buildings. The vapor-intrusion pathway is potentially complete for these sites and was evaluated for all COPCs that are volatile and toxic.

VOCs were minimally detected at SWMUs 33-004(a), 33-004(i), 33-011(d), 33-012(a), and 33-017, and there are nearby buildings. The vapor-intrusion pathway is potentially complete for these sites. These sites are recommended for Phase II sampling and/or remediation, and the vapor-intrusion pathway will be evaluated after the Phase II sampling and/or remediation.

NMED Comment

8. Appendix H, Section H-3.1, Receptors and Exposure Pathways, page H-5:

DOE Statement: *Exposure pathways to subsurface contamination below 5.0 ft (ecological) or 10.0 ft (human health) are not complete unless contaminated soil or tuff has been excavated and brought to the surface.*

NMED Comment: *Ecological exposure to depth of up to 10 feet below ground surface (ft bgs) are plausible for burrowing receptors, receptors that use burrows and deep root-ed plants. Further,*

Volume II of the NMED Soil Screening Guidance (and Table 2-6 of Volume I) specifies that depths up to 10 ft bgs must be evaluated for these receptors. It is noted that under the forthcoming revision to the NMED Soil Screening Guidance, the soil exposure interval for burrowing receptors is to be modified to a depth of six feet bgs. Therefore, no revision at this time is needed.

DOE Response

8. As indicated in section 4.3, ecological risk-screening assessments were conducted using ecological screening levels (ESLs) obtained from the ECORISK Database, Version 4.1 (LANL 2017, 602538) in accordance with N3B SOP-ER-2009, "Performing Human and Ecological Risk Screening Assessments." The IR is consistent with the following sections in N3B-SOP-ER-2009:

   - Section 6.3.3, "For media exposure, DEFINE the depth intervals to be included in the risk screening assessments based on the following exposure scenarios.
     - ❖ For the industrial and recreational exposure scenarios, use depths of 0–1 ft below ground surface (bgs) (surface; nonintrusive exposure assumed).
     - ❖ For the construction worker exposure scenario, use depths of 0–10 ft bgs (default depth unless site-specific information available).
     - ❖ For the residential exposure scenario, use depths of 0–10 ft bgs.
     - ❖ For the ecological risk screening assessment, use depths of 0–5 ft bgs.
   - Section 6.5, "OBTAIN applicable ecological screening levels (ESLs) from the most recent version of the ECORISK Database for each COPC for the 0–5-ft depth interval."

   In addition, The Screening-Level Ecological Risk Assessment Methods (SLERA) Revision 5.1 (LANL 2018, 602965) has been approved for use by NMED. The investigation report follows the guidance from the following section:

   - SLERA Revision 5.1-Section 3.4.1: "Even though tuff and bedrock are not generally considered accessible media to ecological receptors (LANL 2002, 073791), these media are evaluated for ecological risk for purposes of conservatism. For purposes of wildlife exposure, soil is generally assumed to represent the 0.0–5.0-ft interval, but site-specific scoping should present a rationale and justification for the depth interval assumed to represent surface soil."

   Therefore, 0–5 ft bgs will continue to be used for ecological risk based on N3B SOP-ER-2009 and the NMED-approved SLERA (LANL 2018, 602965).

NMED Response

8. *DOE response to comment is acceptable and consistent with upcoming changes to the NMED SSG.*

Second DOE Response

8. No response is necessary.

NMED Comment

9. Appendix H, Section H-4.3.1 through H-4.3.4, SWMUs 33-001(a) - (d), pages H-40 – H-42:

The conclusion for each of these sites is that the vapor intrusion pathway, while potentially complete, does not require addition evaluation. However, the recommendation as outlined in Table 8.1-1 is that addition sampling to determine extent of the disposal pits associated with these SWMUs. Pit 1 contains polonium-beryllium contaminated targets and may also contain spent projectiles, uranium components, beryllium, and explosive test shot debris. Pit 2 contained explosive test shot debris and spent explosive devices. Pit 3 contained beryllium dust immersed in kerosene and explosive test shot debris. Pit 4 also contained spent explosive devices and miscellaneous radioactive material. Based on the descriptions and the limited detections of VOCs outside each of the pits, it is unlikely that VOCs will be a significant driver. However, the vapor intrusion pathway will require re-evaluation upon completion of the characterization sampling. Revise the text accordingly.

DOE Response

9. The following statement will be added to the text: SWMUs 33-001(a)–(d) do not have sample data within the material disposal area and there are no nearby buildings; therefore, the vapor-intrusion pathway is incomplete and will not be evaluated further.

NMED Response

9. See discussion on Comment No. 7

Second DOE Response

9. See second response to Specific Comment 7.

NMED Comment

10. Appendix H, Section H-4.3.6 through H-4.3.9, SWMUs 33-002(a) – (e), pages H-43 – H-45

The conclusion for each of these sites is that the vapor intrusion pathway, while potentially complete, does not require addition evaluation. However, nature and extent of contamination is not defined. As noted in Section 8.1, additional sampling is only needed for tritium. As the follow-on sampling does not include organics, and the current data sufficiently define nature and extent with respect to organics, the additional sampling will not impact the vapor intrusion pathway evaluation. However, the text must be clarified accordingly.

DOE Response

10. The following statement will be added to the text: SWMUs 33-002(a)–(e) have no nearby buildings; therefore, the vapor-intrusion pathway is incomplete and will not be evaluated further.

NMED Response

10. See discussion on Comment No. 7

Second DOE Response

10. See second response to Specific Comment 7.

NMED Comment

11. Appendix H, Section H-4.3.10, SWMU 33-004(a), page H-45 – H-46

The discussion of the vapor intrusion scenario only addresses acetone and toluene. However, several other VOCs were detected in site soils, as shown in Table 6.12-3 and on Plate 6. Aroclor-1254, Aroclor-1260, and benzo(a)anthracene meet the criteria for volatility and have inhalation toxicity. Pyrene, while meeting the criteria for volatility does not have inhalation toxicity. The evaluation of the vapor intrusion pathway should be revised to include all VOCs, to include Aroclor-1254, Aroclor-1260, and benzo(a)anthracene, that meet the criteria for volatility and have inhalation toxicity. In addition, the text must discuss that while pyrene is volatile, it was excluded due to lack of inhalation toxicity.

Further, the text states that the vapor intrusion pathway is potentially complete but no additional evaluation is necessary. As noted in the site description of SWMU 33-004(a), the site included drains associated with several shops. In addition, while the data from the 1993 investigation were not included in this evaluation as the data were screening data, numerous VOCs were detected. While there may be no present-day sources for VOCs for the septic system, the background information combined with the fact that soil removals and additional sampling is needed to defined extent indicates that the vapor intrusion pathway will require re-evaluation upon completion of sampling and/or corrective actions. Revise the report to clarify that the pathway will be re-evaluated upon completion of site investigation and remedial actions.

DOE Response

11. SWMU 33-004(a) has minimally detected VOCs near buildings and the vapor-intrusion pathway will be reevaluated following the Phase II remediation and sampling at this site.

NMED Response

11. See discussion on Comment No. 7

Second DOE Response

11. See second response to Specific Comment 7.

NMED Comment

12. Appendix H, Section H-4.3-11, SWMU 33-004(b), pages H-46 and H-47

The text indicates that only one VOC was detected at this site. However, as summarized in Table 6.13-3 several other organics that are considered volatile were also detected, to include Aroclor, benzo(a)anthracene, naphthene, fluorene, and pyrene. While no inhalation data are available for fluorene and pyrene, there are inhalation toxicity data for Aroclor, benzo(a)anthracene, and naphthene. The vapor intrusion pathway must be modified to include all VOCs that meet the criteria of volatility and have inhalation toxicity. The text must also discuss detected VOCs that are volatile but were not included due to lack of inhalation toxicity.

DOE Response

12. The following statement will be added to the text: SWMU 33-004(b) has no nearby buildings; therefore, the vapor-intrusion pathway is incomplete and will not be evaluated further.

NMED Response

12. See discussion on Comment No. 7

Second DOE Response

12. See second response to Specific Comment 7.

NMED Comment

13. Appendix H, Section H-4.3-12, SWMU 33-004(d), page H-47

The text indicates that only four VOCs were minimally detected at this site. However, as summarized in Table 6.12-3, several other organics that are considered volatile were also minimally detected, to include Aroclor, benzo(a)anthracene, fluorene, and pyrene. The vapor intrusion pathway should be modified to include all VOCs that meet the criteria of volatility and have inhalation toxicity. The text should also discuss detected VOCs that are volatile but were not included due to lack of inhalation toxicity.

DOE Response

13. The following statement will be added to the text: SWMU 33-004(d) has no nearby buildings; therefore, the vapor-intrusion pathway is incomplete and will not be evaluated further.

NMED Response

13. See discussion on Comment No. 7

Second DOE Response

13. See second response to Specific Comment 7.

NMED Comment

14. Appendix H, Section H-4.3-13, SWMU 33-004(g), page H-48

The text indicates that two VOCs were minimally detected at this site: chloromethane and naphthalene. However, Table 6.15-3 does not list naphthalene. It appears that Table 6.15-3 is not complete. Table 6.15-3 lists other organics that are considered volatile were also detected, to include Aroclor and possibly others, if the table is not complete. The vapor intrusion pathway must be modified to include all VOCs that meet the criteria of volatility and have inhalation toxicity. The text must also discuss detected VOCs that are volatile but were not included due to lack of inhalation toxicity.

DOE Response

14. The following statement will be added to the text: SWMU 33-004(g) has no nearby buildings; therefore, the vapor-intrusion pathway is incomplete and will not be evaluated further. Naphthalene will be added to Table 6.15-3.

NMED Response

14. See discussion on Comment No. 7

Second DOE Response

14. See second response to Specific Comment 7.

NMED Comment

15. Appendix H, Section H-4.3-14, SWMU 33-004(i), pages H-48 and H-49

The text indicates that three VOCs were minimally detected at this site. Table 6.17-3 lists other organics that are considered volatile were also detected, to include Aroclor and possibly others, if the table is not complete. The vapor intrusion pathway must be modified to include all VOCs that meet the criteria of volatility and have inhalation toxicity. The text must also discuss detected VOCs that are volatile but were not included due to lack of inhalation toxicity.

DOE Response

15. SWMU 33-004(i) has minimally detected VOCs near buildings and the vapor-intrusion pathways will be reevaluated following the Phase II remediation and sampling at this site.

NMED Response

15. See discussion on Comment No. 7

Second DOE Response

15. See second response to Specific Comment 7.

NMED Comment

16. Appendix H, Section H-4.3-16, SWMU 33-005(a), pages H-50

The text indicates that three VOCs were minimally detected at this site. Table 6.20-3 lists other organics that are considered volatile were also detected, to include fluorene, 1-methylnaphthalene, 2-methylnaphtalne, and pyrene. The vapor intrusion pathway must be modified to include all VOCs that meet the criteria of volatility and have inhalation toxicity. The text must also discuss detected VOCs that are volatile but were not included due to lack of inhalation toxicity.

DOE Response

16. The following statement will be added to the text: SWMU 33-005(a) has no nearby buildings; therefore, the vapor-intrusion pathway is incomplete and will not be evaluated further.

NMED Response

16. See discussion on Comment No. 7

Second DOE Response

16. See second response to Specific Comment 7.

NMED Comment

17. Appendix H, Section H-4.3-17, SWMU 33-005(b), pages H-50 and H-51

The text indicates that three VOCs were minimally detected at this site. Table 6.21-3 lists other organics that are considered volatile were also detected, to include benzo(a)anthracene, fluorene, 1-methylnaphthalene, 2-methylnaphtalne, and pyrene. The vapor intrusion pathway must be modified to include all VOCs that meet the criteria of volatility and have inhalation toxicity. The text must also discuss detected VOCs that are volatile but were not included due to lack of inhalation toxicity.

DOE Response

17. The following statement will be added to the text: SWMU 33-005(b) has no nearby buildings; therefore, the vapor-intrusion pathway is incomplete and will not be evaluated further.

NMED Response

17. See discussion on Comment No. 7

Second DOE Response

17. See second response to Specific Comment 7.

NMED Comment

18. Appendix H, Section H-4.3-18, SWMU 33-005(c), page H-51

The text indicates that three VOCs were minimally detected at this site. Table 6.22-3 lists other organics that are considered volatile were also detected, to include benzo(a)anthracene, fluorene, 1-methylnaphthalene, 2-methylnaphtalne, and pyrene. The vapor intrusion pathway must be modified to include all VOCs that meet the criteria of volatility and have inhalation toxicity. The text must also discuss detected VOCs that are volatile but were not included due to lack of inhalation toxicity.

DOE Response

18. The following statement will be added to the text: SWMU 33-005(c) has no nearby buildings; therefore, the vapor-intrusion pathway is incomplete and will not be evaluated further.

NMED Response

18. See discussion on Comment No. 7

Second DOE Response

18. See second response to Specific Comment 7.

NMED Comment

19. Appendix H, Section H-4.3-19, SWMU 33-007(b), page H-52

The text indicates that two VOCs were minimally detected at this site. Table 6.24-3 lists other organics that are considered volatile were also detected, to include Aroclor-1254, Aroclor-1260, benzo(a)anthracene, and pyrene. The vapor intrusion pathway must be modified to include all VOCs that meet the criteria of volatility and have inhalation toxicity. The text must also discuss detected VOCs that are volatile but were not included due to lack of inhalation toxicity.

DOE Response

19. The following statement will be added to the text: SWMU 33-007(b) has no nearby occupied buildings; therefore, the vapor-intrusion pathway is incomplete and will not be evaluated further.

NMED Response

19. See discussion on Comment No. 7

Second DOE Response

19. See second response to Specific Comment 7.

NMED Comment

20. Appendix H, Section H-4.3-20, SWMU 33-007(c), pages H-52 and H-53

The text indicates that seven VOCs were detected at this site. Table 6.25-3 lists other organics that are considered volatile were also detected, to include Aroclor-1254 and Aroclor-1260. The vapor intrusion pathway must be modified to include all VOCs that meet the criteria of volatility and have inhalation toxicity. The text must also discuss detected VOCs that are volatile but were not included due to lack of inhalation toxicity.

DOE Response

20. The following statement will be added to the text: SWMU 33-007(c) has no nearby buildings; therefore, the vapor-intrusion pathway is incomplete and will not be evaluated further.

NMED Response

20. See discussion on Comment No. 7

Second DOE Response

20. See second response to Specific Comment 7.

NMED Comment

21. Appendix H, Section H-4.3-21, SWMU 33-008(a), pages H-53 and H-54

The text indicates that five VOCs were detected at this site. Table 6.26-3 lists other organics that are considered volatile were also detected, to include Aroclor-1254, Aroclor-1260, benzo(a)anthracene, fluorene, 1-methylnaphthalene, 2-methylnaphthalene, and pyrene. The vapor intrusion pathway must be modified to include all VOCs that meet the criteria of volatility and have inhalation toxicity. The text must also discuss detected VOCs that are volatile but were not included due to lack of inhalation toxicity.

DOE Response

21. The following statement will be added to the text: SWMU 33-008(a) has no nearby buildings; therefore, the vapor-intrusion pathway is incomplete and will not be evaluated further.

NMED Response

21. See discussion on Comment No. 7

Second DOE Response

21. See second response to Specific Comment 7.

NMED Comment

22. Appendix H, Section H-4.3-22, SWMU 33-008(c), pages H-54 and H-55

The text indicates that 17 VOCs were detected at this site. Table 6.27-3 lists other organics that are considered volatile were also detected, to include Aroclor-1254, Aroclor-1260, benzo(a)anthracene, fluorene, 1-methylnaphthalene, 2-methylnaphthalene, and pyrene. The vapor intrusion pathway must be modified to include all VOCs that meet the criteria of volatility and have inhalation toxicity. The text must also discuss detected VOCs that are volatile but were not included due to lack of inhalation toxicity.

DOE Response

22. The following statement will be added to the text: SWMU 33-008(c) has no nearby buildings; therefore, the vapor-intrusion pathway is incomplete and will not be evaluated further.

NMED Response

22. See discussion on Comment No. 7

Second DOE Response

22. See second response to Specific Comment 7.

NMED Comment

23. Appendix H, Section H-4.3-23, SWMU 33-010(f), pages H-55 and H-56

The text indicates that one VOC was detected at this site. Table 6.30-3 also shows Aroclor-1254 as being present. The vapor intrusion pathway must be modified to include all VOCs that meet the criteria of volatility and have inhalation toxicity. The text must also discuss detected VOCs that are volatile but were not included due to lack of inhalation toxicity.

DOE Response

23. The following statement will be added to the text: SWMU 33-010(f) has no nearby buildings; therefore, the vapor-intrusion pathway is incomplete and will not be evaluated further.

NMED Response

23. See discussion on Comment No. 7

Second DOE Response

23. See second response to Specific Comment 7.

NMED Comment

24. Appendix H, Section H-4.3-24, AOC 33-011(b), page H-56

The text indicates that one VOC was detected at this site. Table 6.34-3 also shows benzo(a)anthracene, and naphthalene as being detected (estimated). The vapor intrusion pathway must be modified to include all VOCs that meet the criteria of volatility and have inhalation toxicity. The text must also discuss detected VOCs that are volatile but were not included due to lack of inhalation toxicity.

DOE Response

24. The following statement will be added to the text: AOC 33-011(b) has no nearby buildings; therefore, the vapor-intrusion pathway is incomplete and will not be evaluated further.

NMED Response

24. See discussion on Comment No. 7

Second DOE Response

24. See second response to Specific Comment 7.

NMED Comment

25. Appendix H, Section H-4.3-27, SWMU 33-011(d), page H-57

The text indicates that two VOCs were detected at this site. Table 6.36-3 also shows benzo(a)anthracene, fluorene, 1-methylnaphthalene, 2-methylnaphthalene, and pyrene as being detected (estimated). The vapor intrusion pathway must be modified to include all VOCs that meet the criteria of volatility and have inhalation toxicity. The text must also discuss detected VOCs that are volatile but were not included due to lack of inhalation toxicity.

DOE Response

25. SWMU 33-011(d) has minimally detected VOCs near buildings and the vapor-intrusion pathway will be reevaluated following the Phase II remediation and sampling at this site.

NMED Response

25. See discussion on Comment No. 7

Second DOE Response

25. See second response to Specific Comment 7.

NMED Comment

26. Appendix H, Section H-4.3-28, SWMU 33-012(a), page H-58

The text indicates that three VOCs were detected at this site. Table 6.38-3 also shows Aroclor-1254, Aroclor-1260, benzo(a)anthracene, fluorene, 1-methylnaphthalene, 2-methylnaphthalene, and pyrene as being detected. The vapor intrusion pathway must be modified to include all VOCs that meet the criteria of volatility and have inhalation toxicity. The text must also discuss detected VOCs that are volatile but were not included due to lack of inhalation toxicity.

DOE Response

26. SWMU 33-012(a) has minimally detected VOCs near buildings and the vapor-intrusion pathway will be reevaluated following the Phase II remediation and sampling at this site.

NMED Response

26. See discussion on Comment No. 7

Second DOE Response

26. See second response to Specific Comment 7.

NMED Comment

27. Appendix H, Section H-4.3-29, SWMU 33-014, pages H-58 and H-59

The text indicates that one VOC was detected at this site. Table 6.39-3 also shows Aroclor-1254 and pyrene as being detected. The vapor intrusion pathway must be modified to include all VOCs that meet the criteria of volatility and have inhalation toxicity. The text must also discuss detected VOCs that are volatile but were not included due to lack of inhalation toxicity.

DOE Response

27. The following statement will be added to the text: SWMU 33-014 has no nearby buildings; therefore, the vapor-intrusion pathway is incomplete and will not be evaluated further.

NMED Response

27. See discussion on Comment No. 7

Second DOE Response

27. See second response to Specific Comment 7.

NMED Comment

28. Appendix H, Section H-4.3-30, SWMU 33-015, page H-59

The text indicates that one VOC was detected at this site. Table 6.40-3 also shows Aroclor-1254, Aroclor-1260, benzo(a)anthracene, and pyrene as being detected. The vapor intrusion pathway must be modified to include all VOCs that meet the criteria of volatility and have inhalation toxicity. The text must also discuss detected VOCs that are volatile but were not included due to lack of inhalation toxicity.

DOE Response

28. The following statement will be added to the text: SWMU 33-015 has no nearby buildings; therefore, the vapor-intrusion pathway is incomplete and will not be evaluated further.

NMED Response

28. See discussion on Comment No. 7

Second DOE Response

28. See second response to Specific Comment 7.

NMED Comment

29. Appendix H, Section H-4.3-31, SWMU 33-016, pages H-59 and H-60

The text indicates that one VOC was detected at this site. Table 6.41-3 also shows benzo(a)anthracene and pyrene as having one result. The vapor intrusion pathway must be modified to include all VOCs that meet the criteria of volatility and have inhalation toxicity. The text must also discuss detected VOCs that are volatile but were not included due to lack of inhalation toxicity.

DOE Response

29. SWMU 33-016 has minimally detected VOCs and the IR will be revised to discuss all VOCs that meet the criteria of volatility.

NMED Response

29. See discussion on Comment No. 7

Second DOE Response

29. See second response to Specific Comment 7.

NMED Comment

30. Appendix H, Section H-4.3-32, SWMU 33-017, pages H-60 and H-61

The text indicates that five VOCs were detected at this site. Table 6.42-3 also shows Aroclor-1254, Aroclor-1260, benzo(a)anthracene, fluorene, 1-methylnapthalene, 2-methylnaphthalene, and pyrene were detected. The vapor intrusion pathway must be modified to include all VOCs that meet the criteria of volatility and have inhalation toxicity. The text must also discuss detected VOCs that are volatile but were not included due to lack of inhalation toxicity.

DOE Response

30. SWMU 33-017 has minimally detected VOCs near buildings and the vapor-intrusion pathway will be reevaluated following the Phase II remediation and sampling at this site.

NMED Response

30. See discussion on Comment No. 7

Second DOE Response

30. See second response to Specific Comment 7.

NMED Comment

31. Appendix H, Section H-4.3-33, AOC C-33-003, page H-61

The text indicates that seven VOCs were detected at this site. Table 6.44-3 also shows benzo(a)anthracene, fluorene, 1-methylnapthalene, 2-methylnaphthalene, and pyrene as being detected. The vapor intrusion pathway must be modified to include all VOCs that meet the criteria of volatility and have inhalation toxicity. The text must also discuss detected VOCs that are volatile but were not included due to lack of inhalation toxicity.

DOE Response

31. AOC C-33-003 has minimally detected VOCs and the IR will be revised to discuss all VOCs that meet the criteria of volatility.

NMED Response

31. See discussion on Comment No. 7

Second DOE Response

31. See second response to Specific Comment 7.

NMED Comment

32. Appendix H, Section H-4.5.2, Exposure Evaluation, pages H-63 through H-69

The following comments are noted for this section:

- *SWMU 33-002(a). The total dose is not provided, include for completeness. Further, additional sampling is recommended to characterize subsurface tritium contamination; the results of this sampling could change the total doses for each receptor. Revise the text to address the uncertainty with the total dose as currently determined.*
- *SWMW 33-002(b), 33-002(c) and 33-002(d). Addition, sampling is recommended to characterize subsurface tritium contamination; the results of this sampling could change the total doses for each receptor at each site. Revise the text to address the uncertainty with the total doses as currently determined and presented in the text.*
- *SWMU 33-004(a) is recommended for additional sampling to characterize extent along with soil removals. Upon completion of remediation, the risks must be re-evaluated. The current risks as presented are thus likely overestimated based on the final actions. Clarify the text to include this information.*
- *SWMU 33-004(h), 33-004(i), 33-015, and 33-017. Revise the text to include the total dose for each receptor.*
- *SWMU 33-017. The site is proposed for soil removals. Upon completion of remediation, the risks must be re-evaluated. The current risks as presented are thus likely overestimated based on the final actions. Clarify the text to include this information.*

DOE Response

32. SWMU 33-002(a): Section H-4.5.2 evaluates only potentially unacceptable risk or dose and there is no unacceptable dose for this site, so no change to the text in section H-4.5.2 is necessary. Total dose is provided for all sites in section H-4.6.

    SWMW 33-002(b), 33-002(c) and 33-002(d): If the data from the additional sampling result in a potentially unacceptable dose for these SWMUs, the dose will be revised in the Phase II IR as noted in section 8.1.

    SWMU 33-004(a): Section H-4.5.2 is an evaluation of the current exposure and will be reevaluated in the Phase II IR after additional sampling and soil removal is completed.

    SWMU 33-004(h), 33-004(i), 33-015, and 33-017: Section H-4.5.2 evaluates only potentially unacceptable risk or dose and there is no unacceptable dose for these sites, so no change to the text in section H-4.5.2 is necessary. Total dose is provided for all sites in section H-4.6.

    SWMU 33-017: Section H-4.5.2 is an evaluation of the current exposure and will be reevaluated in Phase II IR after additional sampling and soil removal is completed.

NMED Response

32. *See discussion on Comment No. 1.*

Second DOE Response

32. For SWMUs 33-002(a), 33-002(b), 33-002(c), and 33-002(d), nature and extent are not defined, and the risk assessments will be removed from the investigation report.

    For SWMU 33-004(a), nature and extent are not defined, and the risk assessments will be removed from the investigation report.

    For SWMU 33-004(i), nature and extent are not defined, and the risk assessments will be removed from the investigation report.

    For SWMUs 33-004(h), 33-015, and 33-017, section H-5.4.2 evaluates only potentially unacceptable risk or dose, and there is no unacceptable dose for these sites, so no change to the text in section H-4.5.2 is necessary.

    For SWMU 33-017, section H-4.5.2 is an evaluation of the current exposure and the site will be reevaluated in the Phase III IR after soil removal and additional sampling is completed.

NMED Comment

33. Appendix H, Section H-5.3, Ecological Risk-Screening Evaluation, page H-94

The text states that hazard quotients (HQs) greater than 0.3 are used to identify COPECs requiring additional evaluation. However, during the February 2017 risk assessment technical meeting between NMED and DOE, the uncertainty for selecting an initial screening HQ of 0.3 was discussed. It was also discussed that for the first-tier screening, a HQ of 0.3 might be appropriate if less than three COPECs were present at a site and that for the second-tier screening, a more conservative value of 0.1 must be applied. DOE agreed that for all future reports, a HQ of 0.1 would be used for screening

COPECs and indicated that the LANL Ecological Risk Assessment Guidance would be revised accordingly. Revise the ecological screening assessments using an HQ of 0.1 for screening COPECs.

DOE Response

33. DOE's approach is consistent with the SIRs NMED has approved as well as NMED's February 14, 2017, meeting notes on this topic:

> Ecological Risk-Screening Assessment Methods: Permittees use a two-fold screening approach that NMED does not agree with, specifically, Permittees do not provide justification for the use of a value of 0.3 for the LOAEL assessment. NMED agreed that the process Permittees use for first tier screening is acceptable but for second tier a more conservative value of 0.1 must be applied. The less conservative approach of using 0.3 would not be appropriate if more than three COPCs are present at a site. Permittees agree to use 0.1 in future reports. For the reports already submitted to NMED the issue will be addressed by NMED in comments. The Permittees also agreed to revise the Ecological Risk Assessment Guidance to include the LOAEL screening of COPECs.

DOE is using guidance from the following section of N3B-SOP-ER-2009, "Performing Human and Ecological Risk Screening Assessments," Section 6.5[8]:

> A LOAEL analysis is conducted using ESLs calculated based on a LOAEL rather than a no observed adverse effect level. The LOAEL analysis is conducted for COPECs that contribute to an unadjusted or PAUF-adjusted HQ greater than 0.1 and a receptor HI greater than 1.

In order to clarify the ecological risk screening process, the following sections of the report will be revised as follows:

> **H-5.3 Ecological Risk Screening Evaluation**
>
> The ecological screening evaluation identifies chemicals of potential ecological concern (COPECs) and is based on the comparison of exposure point concentrations ([EPCs] 95% upper confidence limits [UCLs], maximum detected concentrations, or maximum detection limits) with ecological screening levels (ESLs). The EPCs used in the assessments for the Chaquehui Canyon Aggregate Area are presented in Tables H-2.3-1 through H-2.3-97. An ecological risk-screening assessment was not conducted for SWMU 33-001(b), 33-001(c), or 33-001(e) because samples were collected from depths greater than 5 ft and no complete exposure pathways to ecological receptors were present.
>
> The ESLs were obtained from the ECORISK Database, Version 4.1 (LANL 2017, 602538) and are presented in Table H-5.3-1. The ESLs are based on similar species of the test population derived from a variety of toxicity studies and converted to a no observed adverse-effect level (NOAEL). Lowest observed adverse effect level– (LOAEL-) based ESLs (also referred to as L-ESLs) are used in the uncertainty analysis for the ecological screening. Information relevant to the calculation of ESLs and L-ESLs, including concentration equations, dose equations, bioconcentration factors, transfer factors, and toxicity reference values (TRVs), are presented in the ECORISK Database, Version 4.1 (LANL 2017, 602538).
>
> The screening evaluation begins with calculating a hazard quotient (HQ) by dividing the EPC by the minimum ESL for a given COPC. Hazard quotients greater than 0.3 in the minimum ESL table

are used to identify COPECs requiring additional evaluation (LANL 2017, 602538). Once COPECs are identified, the next step is performed to determine receptors potentially at risk by calculating ratio of the COPEC-specific EPC to receptor-specific NOAEL-based ESLs (receptor HQ). Individual NOAEL-based HQs for a receptor are then summed to derive a hazard index (HI) for each ecological receptor. An HI greater than or equal to 1 indicates that further assessment is needed for that receptor. Consistent with COPEC identification, the HQ values greater than 0.3 are highlighted in the receptor HQ-HI tables. All COPECs are further evaluated for all receptors in uncertainty analysis section H-5.4.5 using population area use factor– (PAUF-) adjusted NOAEL-based ESLs. Only wildlife have population adjustments because home range information is available for these receptors. To understand which receptors require additional evaluation the HQs greater than 0.1 and the HIs greater than or equal to 1 are highlighted in the PAUF-adjusted HI tables. COPCs without NOAEL-based ESLs are retained as COPECs and discussed further in section H-5.4.8. The HQ and HI analysis is a conservative indication of potential adverse effects and is designed to minimize the potential of overlooking possible COPECs at the site.

H-5.4.5 Population Area Use Factors

Following the initial screening evaluation in section H-5.3, COPECS are further evaluated using PAUFs, which are described below, to ensure that exposure to multiple COPECs at a site will not lead to potential adverse impacts on a given receptor population. The PAUFs calculated for the NOAEL-based ESLs (section H-5.4.5) may also be used to adjust the LOAEL-based ESLs (section H-5.4.7).

EPA guidance is to manage the ecological risk to populations rather than to individuals, with the exception of threatened and endangered (T&E) species (EPA 1999, 070086). One approach to address the potential effects on populations at these Chaquehui Canyon Aggregate Area sites is to estimate the spatial extent of the area inhabited by the local population that overlaps with the contaminated area. The population area for a receptor is based on the individual receptor HR and its dispersal distance. Bowman et al. (2002, 073475) estimate that the median dispersal distance for mammals is 7 times the linear dimension of the HR (i.e., the square root of the HR area). If only the dispersal distances for the mammals with HRs within the range of the screening receptors are used (Bowman et al. 2002, 073475), the median dispersal distance becomes 3.6 times the square root of the HR (R^2=0.91). If it is assumed that the receptors can disperse the same distance in any direction, the population area is circular and the dispersal distance is the radius of the circle. Therefore, the population area can be derived by $\pi(3.6\sqrt{HR})^2$ or approximately 40HR.

The PAUFs are calculated by dividing the site area by the population area of each receptor. The HQs are adjusted by multiplying by the PAUFs. HIs are recalculated using the PAUF-adjusted HQs. If the PAUF is above 1, the HQs are not adjusted for that receptor. The HQs for the generic plant and earthworm are not adjusted by PAUFs because these receptors do not have HRs. The adjusted HQs are summed for each receptor to calculate the adjusted HIs. PAUFs are greater than 1 for the deer mouse at SWMUs 33-010(g) and 33-017 and are therefore not used to adjust the deer mouse HI at these sites.

The HRs for the robin, deer mouse, shrew, mountain cottontail, and gray fox were determined using the data in EPA's wildlife exposure factors handbook (EPA 1993, 059384). The HRs were either for specific environments or averages of different environments presented in the respective exposure parameter/population dynamic tables (EPA 1993, 059384). LANL (2017, 602649, Table 3.3-1) presents how the EPA data were used to derive the HRs for each receptor. The HRs were used to calculate the population areas for each receptor as described in the previous paragraph.

If the PAUF-adjusted HI for any receptor is greater than 1, then that receptor and any COPECs with HQ greater than 0.1 are further evaluated using a LOAEL-based ESL analysis and PAUF-adjusted LOAEL-based ESL analysis described in section H-5.4.6.

H-5.4.6 LOAEL Analysis

A LOAEL-based ESL HQ-HI analysis was performed if the HQ-HI analysis using PAUF-adjusted NOAEL-based ESLs resulted in a receptor with an HI greater than or equal to 1 and the COPEC for the respective receptor had an HQ greater than 0.1. The LOAEL-based ESLs were used to address the HIs and reduce the associated uncertainty and conservativeness of the NOAEL ESLs used in the initial screening evaluations in section H-5.3. The LOAEL-based ESLs were calculated based on toxicity information in the ECORISK Database, Version 4.1 (LANL 2017, 602538) and are presented in Table H-5.4-80. First, LOAEL-based ESL receptor HQ-HI calculations were completed. Any HI values greater than or equal to 1 and any HQ values greater than 0.1 are highlighted in the HI analysis using LOAEL-based ESL tables. If one or more wildlife receptors are identified in the HI analysis using LOAEL-based ESL tables, then a final step involving population-adjusted HI values is completed. The results of the PAUF-adjusted LOAEL-based ESL HQ-HI analysis are presented in the adjusted HI analysis using LOAEL-based ESL tables. HI values greater than or equal to 1, and any HQ values greater than 0.1, are highlighted. The PAUFs used for the LOAEL analyses are the same as those described in section H-5.4.5.

NMED Response

33. DOE response to comment is acceptable.

Second DOE Response

33. No response is necessary.

NMED Comment

34. Appendix H, Table H-5.3-1

Clarify the table by adding a footnote that indicates the ESLs for each receptor are the NOAEL/NOEC ESLs from EcoRisk.

DOE Response

34. The footnote in Table H-5.3-1 will be revised as follows:

"ESLs are based on NOAELs and were obtained from the ECORISK Database, Version 4.1 (LANL 2017, 602538)."

The text describing Table H-5.3-1 will also be revised as noted below:

The ESLs were obtained from the ECORISK Database, Version 4.1 (LANL 2017, 602538) and are presented in Table H-5.3-1. The ESLs are based on similar species of the test population derived from a variety of toxicity studies and converted to a no observed adverse-effect level (NOAEL). Lowest observed adverse effect level– (LOAEL-) based ESLs (also referred to as L-ESLs) are used in the uncertainty analysis for the ecological screening. Information relevant to the calculation of ESLs and L-ESLs, including concentration equations, dose equations,

bioconcentration factors, transfer factors, and toxicity reference values (TRVs), are presented in the ECORISK Database, Version 4.1 (LANL 2017, 602538).

NMED Response

34. DOE response to comment is acceptable.

Second DOE Response

34. No response is necessary.

NMED Comment

35. Appendix H, Section H-5.4.6, LOAEL Analysis

As part of the lowest observed adverse effect level (LOAEL) analysis, the HQs are calculated using the LOAEL-based ESLs. For those chemicals/receptors that exceed an HQ of 0.1, the PAUF was applied to derive an adjusted HQ. While the text is clear that this approach is taken using the NOAEL ESLs, the text does not discuss this approach for the LOAEL analysis. In order to ensure clarity in how the adjusted LOAEL-based HQs were calculated, the text must be revised to either reference Section H-5.4.5 and indicate a similar approach is taken, or add additional text discussing the use of PAUF. In addition, the text must clarify that the PAUFs derived for the NOAEL adjustments are applicable to the LOAEL adjusted HQs.

DOE Response

35. The text will be revised to reference section H-5.4.5 and to indicate a similar approach taken for the LOAEL analysis. DOE will also clarify that PAUFs are applicable to both the NOAEL and LOAEL. Refer to comment response 33 for the revised text.

NMED Response

35. DOE response to comment is acceptable.

Second DOE Response

35. No response is necessary.

NMED Comment

36. Appendix H, Section H-5.4.7.1, Site Discussions, pages H-115 through H-129

In the discussions of the LOAEL-based adjusted HQs and hazardous indices (His), the text discusses the application of the population area use factors (PAUFs). Thus, the text is clear on how the HQs and His were adjusted. However, none of the site discussions for the LOAEL analyses address application of the PAUFs. For transparency in understanding the LOAEL analyses, the site discussions must be revised to include discussion of the PAUF.

DOE Response

36. In section H-5.4.7.1, the use of PAUF-adjusted LOAEL-based ESLs is discussed if a wildlife receptor LOAEL-based ESL HI (not including earthworm or generic plant receptors) is greater than 1. The PAUF-adjusted LOAEL-based ESL analysis is not performed for wildlife receptors if their respective HIs are less than 1. Thus, PAUF-adjusted LOAEL-based ESL analyses may not be performed for every SWMU.

    For example, section H-5.4.7.11, SWMU 33-004(i), mentions both type of analyses. The LOAEL-based ESL analysis is described in the following sentence: "The HI analysis using LOAEL-based ESLs yielded HIs of 31 for robin (omnivore), 60 for the robin (insectivore), 0.34 for the earthworm, and 1.3 for the generic plant."

    The robin (omnivore and insectivore) had LOAEL-based HIs greater than 1; therefore, the adjusted analysis is described in the next sentence: "The adjusted HI analysis using LOAEL-based ESLs yielded HIs of 0.14 for the robin (omnivore) and 0.27 for the robin (insectivore)."

    To increase transparency, the latter sentence will be changed to: "The PAUF-adjusted HI analysis using-LOAEL-based ESLs yielded . . . ." This text will be updated to all applicable subsections within section H-5.4.7.

NMED Response

36. The comment requested the actual PAUF value that is used be listed in the text. Revise to include the values for each PAUF that are applied.

Second DOE Response

36. The population area use factor (PAUF) is discussed in section H-5.4.5 as described in Specific Comment 33. Furthermore, the text in each section H-5.4.5.X cites the tables with the PAUF values used to calculate the PAUF adjusted values. Each section H-5.4.7.X discusses the uncertainty surrounding the final LOAEL or PAUF-adjusted LOAEL HIs dependent upon the receptor at risk. Because the PAUF values are already discussed and cited in prior sections, each PAUF value will not be added to the text and instead will remain in the tables.

MINOR EDITORIALS

NMED Comment

37. Section 6.39.4.4, Nature and Extent of Soil and Rock Contamination, Inorganic Chemicals, pg. 267–268

DOE Statement: Selenium was detected above the soil and Qbt 2,3,4 BVs in two soil samples and eight tuff samples with a maximum concentration of 1.84 mg/kg. Concentrations increased with depth at location 33-60483; did not change substantially with depth at locations 33-60482, 33-60484, 33-60486, and 33-60488; and decreased with depth at locations 33-60485, 33-60487, and 33-60489 (concentrations in the shallow samples at locations 33-60484, 33-60485, 33-60486, 33-60487, 33-60488, and 33-60489 were 0.96 mg/kg, 1.06 mg/kg, 1.12 mg/kg, 1.46 mg/kg, 0.943 mg/kg, and 1.45 mg/kg, respectively, and below the soil BV [Appendix E, Pivot Tables]). Concentrations

decreased laterally. The residential SSL was approximately 212 times the maximum concentration. The lateral extent of selenium is defined, and further sampling for vertical extent is not warranted.

NMED Comment: Appendix E, excel Table for 33-014 shows that the concentration did not change substantially with depth at location 33-60489. Also, the concentration at the shallow sample location (0.0-0.5 ft) for 33-60489 was 1.05 mg/kg and not 1.45 mg/kg. Correct the typographical error.

DOE Response

37. The typographical error in section 6.39.4.4, Nature and Extent of Soil and Rock Contamination, Inorganic Chemicals, will be corrected to read as follows in the revised IR: "Concentrations increased with depth at location 33-60483; did not change substantially with depth at locations 33-60482, 33-60484, 33-60486, and 33-60488; and decreased with depth at locations 33-60485, 33-60487, and 33-60489 (concentrations in the shallow samples at locations 33-60484, 33-60485, 33-60486, 33-60487, 33-60488, and 33-60489 were 0.96 mg/kg, 1.06 mg/kg, 1.12 mg/kg, 1.46 mg/kg, 0.943 mg/kg, and 1.05 mg/kg, respectively, and below the soil BV [Appendix E, Pivot Tables])."

NMED Response

37. DOE response to comment is acceptable.

Second DOE Response

37. No response is necessary.

NMED Comment

38. Section 6.42.4.4 Nature and Extent of Soil and Rock Contamination, Inorganic Chemicals, pg. 285–286

DOE Statement: The residential trivalent chromium SSL was approximately 2660 times the maximum concentration.

NMED Comment: The residential trivalent chromium SSL is 3750 times the maximum concentration. Correct typographical error

DOE Response

38. The typographical error in section 6.42.4.4, Nature and Extent of Soil and Rock Contamination, Inorganic Chemicals, will be corrected to read as follows in the revised IR: "The residential trivalent chromium SSL is 3750 times the maximum concentration."

NMED Response

38. DOE response to comment is acceptable.

Second DOE Response

38. No response is necessary.

NMED Comment

39. Table 6.25-3, Organic Chemicals Detected at SWMU 33-007(c), pg. 612

The values listed under toluene for Construction Worker, Industrial and Residential SSLs are incorrectly listed in the table. Correct the typographical errors.

DOE Response

39. The typographical errors in Table 6.25-3, Organic Chemicals Detected at SWMU 33-007(c), will be revised with the correct Construction Worker, Industrial, and Residential SSLs in the revised IR.

NMED Response

39. DOE response to comment is acceptable.

Second DOE Response

39. No response is necessary.

NMED Comment

40. Table 6.30-2, Inorganic Chemicals Above BVs at SWMU 33-010(f), pg. 649

The values for Construction Worker, Industrial, and Residential SSLs do not match the values on the first page of this table. Correct the typographical errors.

DOE Response

40. The typographical errors in Table 6.30-2, Inorganic Chemicals above BVs at SWMU 33-010(f), will be revised with the correct construction worker, industrial, and residential SSLs in the revised IR.

NMED Response

40. DOE response to comment is acceptable.

Second DOE Response

40. No response is necessary.

NMED Comment

41. Table 6.36-2, Inorganic Chemicals Above BVs at SWMU 33-011(d), pg. 670

The value for Chromium under the Residential SSL is listed at 96063 mg/kg. The correct value for Chromium is 96.6 mg/kg. Correct the typographical error.

DOE Response

41. The typographical error in Table 6.36-2, Inorganic Chemicals above BVs at SWMU 33-011(d), will be corrected with the correct residential SSL for chromium, 96.6 mg/kg, in the revised IR.

NMED Response

41. DOE response to comment is acceptable.

Second DOE Response

41. No response is necessary.

REFERENCES

Bowman, J., J.A.G. Jaeger, and L. Fahrig, 2002. "Dispersal Distance of Mammals is Proportional to Home Range Size," *Ecology,* Vol. 83, No. 7, pp. 2049-2055. (Bowman et al. 2002, 073475)

EPA (U.S. Environmental Protection Agency), December 1993. "Wildlife Exposure Factors Handbook," Vol. I of II, EPA/600/R-93/187a, Office of Research and Development, Washington, D.C. (EPA 1993, 059384)

EPA (U.S. Environmental Protection Agency), October 7, 1999. "Issuance of Final Guidance: Ecological Risk Assessment and Risk Management Principles for Superfund Sites," OSWER Directive No. 9285.7-28 P, Office of Solid Waste and Emergency Response, Washington, D.C. (EPA 1999, 070086)

EPA (U.S. Environmental Protection Agency), June 2015. "OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air," OSWER Publication 9200.2-154, Office of Solid Waste and Emergency Response, Washington, D.C. (EPA 2015, 701569)

LANL (Los Alamos National Laboratory), September 4, 2002. Personal communication between K. Olson, K. Bostick, R. Mirenda, M. Nagy, P. Schumann, and M. Tardiff, Environmental Restoration Project, Los Alamos, New Mexico. (LANL 2002, 073791)

LANL (Los Alamos National Laboratory), August 2016. "Supplemental Investigation Report for Upper Cañada del Buey Aggregate Area," Los Alamos National Laboratory document LA-UR-16-26150, Los Alamos, New Mexico. (LANL 2016, 601745)

LANL (Los Alamos National Laboratory), May 22, 2017. "Chromium Background Study Work Plan," Los Alamos National Laboratory document LA-UR-17-23664, Los Alamos, New Mexico. (LANL 2017, 602400)

LANL (Los Alamos National Laboratory), September 2017. "Chromium Background Study Report," Los Alamos National Laboratory document LA-UR-17-28239, Los Alamos, New Mexico. (LANL 2017, 602650)

LANL (Los Alamos National Laboratory), September 2017. "Screening-Level Ecological Risk Assessment Methods, Revision 5," Los Alamos National Laboratory document LA-UR-17-28553, Los Alamos, New Mexico. (LANL 2017, 602649)

LANL (Los Alamos National Laboratory), October 2017. "ECORISK Database (Release 4.1)," on CD, LA-UR-17-26376, Los Alamos National Laboratory, Los Alamos, New Mexico. (LANL 2017, 602538)

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), June 1, 2017. "Approval [for the] Chromium Background Study Work Plan," New Mexico Environment Department letter to D. Hintze (DOE-EM-LA) and B. Robinson (LANL) from J.E. Kieling (NMED-HWB), Santa Fe, New Mexico. (NMED 2017, 602418)

NMED (New Mexico Environment Department), October 12, 2017. "Approval, Chromium Background Study Report," New Mexico Environment Department letter to D. Hintze (DOE-NA-LA) and B. Robinson (LANL) from J.E. Kieling (NMED-HWB), Santa Fe, New Mexico. (NMED 2017, 602678)

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)

Schatz, M., May 26, 2020. NMED Draft Comments for SIR for Upper Cañada del Buey AA. E-mail message to A. Duran (EM-LA) from M. Schatz (NMED), Santa Fe, New Mexico. (Schatz 2020, 700923)