LANL - TA-16

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Date: May 14, 2004
Refer to: ER2004-0264

RECEIVED
MAY 2004
NMED Hazardous Waste Bureau

Mr. John Young, Corrective Action Project Leader
Permits Management Program
NMED – Hazardous Waste Bureau
2905 Rodeo Park Drive East
Building 1
Santa Fe, NM 87505-6303

SUBJECT: SUBMITTAL OF RESPONSE TO REQUEST FOR SUPPLEMENTAL INFORMATION (RSI) FOR MATERIAL DISPOSAL AREA P SITE CLOSURE CERTIFICATION REPORT, LOS ALAMOS NATIONAL LABORATORY EPA ID No: NM0890010515, HWB-LANL-03-019

Dear Mr. Young:

Enclosed are two copies of the LANL Risk Reduction and Environmental Stewardship–Remediation Services (RRES–RS) Project's response to your RSI for the Material Disposal Area P Site Closure Certification Report. The Department of Energy Los Alamos Site Operations Office received the RSI on April 14, 2004.

If you have any questions, please contact William Criswell at (505) 665-5886 or Lance Woodworth at (505) 665-5820.

Sincerely,

David McInroy, Deputy Project Director
Remediation Services
Los Alamos National Laboratory

Sincerely,

David Gregory, Federal Project Director
Department of Energy
Los Alamos Site Operations

DM/DG/KV/th

Enclosure: Response to RSI (ER2004-0251)
Certification

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CERTIFICATION

CERTIFICATION BY THE RISK REDUCTION AND ENVIRONMENTAL STEWARDSHIP–REMEDIATION SERVICES (RRES–RS) PROJECT TECHNICAL REPRESENTATIVES

Document Title: **RESPONSE TO THE REQUEST FOR SUPPLEMENTAL INFORMATION FOR THE MATERIAL DISPOSAL AREA P SITE, CLOSURE CERTIFICATION REPORT, OCTOBER 2003**

I certify under penalty of law that these documents and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violation.

Name: _____ Date: 5/13/04

David McInroy, Deputy Project Director
Remediation Services
Los Alamos National Laboratory

or

_____ Date: _____

Beverly A. Ramsey, Division Leader
Risk Reduction and Environmental Stewardship Division
Los Alamos National Laboratory

_____ Date: 5/13/04

David Gregory, Federal Project Director
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Herman LeDoux,
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RESPONSE TO THE REQUEST FOR SUPPLEMENTAL INFORMATION FOR THE MATERIAL DISPOSAL AREA P SITE, CLOSURE CERTIFICATION REPORT, OCTOBER 2003

This submittal is the response by the Los Alamos National Laboratory (LANL or the Laboratory) to the "Request for Supplemental Information for Material Disposal Area P Site Closure Certification Report, Los Alamos National Laboratory, EPA ID No: NM0890010515, HWB-LANL-03-019," issued by the New Mexico Environment Department (NMED) on April 12, 2004. The Material Disposal Area (MDA) P Site Closure Certification Report, LA-UR-03-8046, was submitted by LANL to NMED in October 2003.

This response follows the organization of the NMED's Request for Supplemental Information (RSI), with general and specific comments and responses to those comments. The NMED RSI comments are provided verbatim, with LANL's responses following each comment. Many of the comments are addressed entirely with the responses provided. In some cases, revisions to the report are needed to address the comment. Where changes to the report are minimal, suggested text revisions have been provided as part of the response, or revised pages are attached as part of the response. In cases where the NMED comment requires substantive revision, LANL states that it will revise and submit the revised text to NMED at the conclusion of the review process.

General Comments

NMED Comment

1. *The risk assessment evaluates two areas: the biological zone and the exposed tuff area. The biological zone is described as undisturbed areas or reclaimed areas of tuff covered with two to five feet of topsoil. It is not clear as to what the risk assessment actually evaluates related to the biological zone. Typically, closure risk assessments are conducted on site levels without the inclusion of institutional controls. In the case of Material Disposal Area P (MDA P), the institutional control is topsoil. Provide the following clarifications:*

   - *Indicate if the topsoil that covers the reclaimed areas is clean soil that was imported from off-site or if the soil was non-contaminated soil removed from MDA P and set-aside for reclamation.*
   - *Indicate if the surface soil samples used in the risk assessment represent the topsoil.*
   - *Discuss if the topsoil is not native to MDA P and was brought in from another area, and the analytical results used in the risk assessment represent the topsoil concentrations, how representative the risk assessment is relative to assessing the actual conditions of MDA P prior to remediation and re-vegetation (i.e., installation of institutional controls).*

LANL Response

1. The response to this comment distinguishes between the "MDA P footprint" (the MDA P unit only) and the entirety of the "MDA P Site" [MDA P, Flash Pad 387, and Solid Waste Management Unit (SWMU) 16-016(c)-99]. The requested clarifications for each point in the above comment are as follows:

   - The topsoil that covers the reclaimed areas is neither clean soil that was imported from off site nor uncontaminated soil removed from MDA P. The topsoil that is present within the MDA P Site

is either true native topsoil or operational fill (i.e., non-native soil that was brought in during active site operations).

There are no "reclaimed" areas within the MDA P footprint. The MDA P footprint is almost entirely within the exposed tuff zone, from which all native topsoil and operational fill were removed. No soil excavated from within the MDA P footprint was set aside for reclamation, and no clean soil has been brought in for reclamation of the MDA P footprint. All soil from within the MDA P footprint was excavated and disposed of off site at appropriate, permitted disposal facilities.

Within the MDA P Site, both undisturbed and reclaimed areas exist in the biological zone. The undisturbed areas are covered by true native topsoil. The reclaimed areas are covered by true native topsoil or operational fill that was regraded to inhibit erosion. During Phase I closure implementation, clean fill had been brought in from a local commercial borrow source solely for the purpose of constructing staging areas for debris. All of the clean fill was removed and is currently staged outside of the MDA P Site, but within TA-16 near V-site, for use during reclamation once the closure is approved. The clean fill was never sampled as part of the Phase II confirmation sampling and was therefore not included in the risk assessments. As stated above, no soil excavated from within the MDA P footprint was retained, and no clean fill was brought in specifically for purposes of reclamation and institutional controls within the MDA P Site.

- The surface soil samples used in the risk assessment are either true native topsoil or operational fill.

  The surface soil samples used in the risk assessment consisted of the true native topsoil and operational fill described in the first part of the response to this comment. The operational fill samples used in the risk assessment do not represent clean fill, but rather, non-native soil that was brought in during active site operations. Both the true native topsoil and the operational fill were potentially contaminated by activities conducted during the operational phase of MDA P as well as the other SWMUs within the MDA P Site boundary. The analytical results used in the risk assessment represent current site conditions. No institutional controls have been implemented, so the samples of native topsoil and operational fill reflect the residual contamination following closure and corrective action activities.

- Because the clean fill brought to the MDA P Site during closure was not left in place or sampled, the risk assessment evaluates the current site conditions prior to installation of institutional controls. Therefore, the samples of true native topsoil and operational fill used in the risk assessment represent the residual contamination following closure and corrective action activities.

  The first and second bullets of this response provide clarification concerning the true native topsoil and operational fill that was sampled. The clean fill described in the first bullet was removed and never sampled. The remaining material is true native topsoil and operational fill that was in place when the sites were operational. Therefore, the samples collected represent site conditions following closure and corrective action activities, and the risk assessment evaluates the current site conditions prior to installation of institutional controls.

NMED Comment

2. *Essential nutrients (i.e., calcium, sodium, magnesium, potassium, and iron) were eliminated from the human health risk assessment. While studies have indicated that calcium, sodium, and potassium are relatively non-toxic, studies have shown there to be an upper intake limit for iron and*

magnesium. The United States Department of Agriculture (USDA) Food Safety and Inspection Service and the National Academy of Science (NAS) Food and Nutrition Board have developed upper intake levels (ULs) which should applied in determining a soil screening level (SSL) that should be used in assessing essential nutrients toxicity. If site concentrations of magnesium and iron are below the SSL, they may be eliminated from further consideration in the risk assessment. Revise the report accordingly.

LANL Response

2. Iron was retained in the human health screening evaluation (Appendix A, Section 3.2.1, pages 8 and 9; Table 3.2.4-1 and section 2.4.3, page 63). Potential risk from iron was evaluated in the human health risk assessment using a screening action level (SAL) of 23000 mg/kg (NMED 2000, 68554). A discussion of potential human health risk associated with iron was presented in sections 2.5.3.1.1 (pages 79 and 82) and 2.5.3.1.2(a) (page 85), and Tables 2.5-2 and 2.5-6. Appendix A, sections 4.2.2, 4.2.3, and 4.2.4.1 (pages 17, 18, 19), and Tables 4.2.2-1, 4.2.2-2, 4.2.2-3, and 4.2.3-5 also present and discuss the human health screening assessments with iron. Therefore, no revision to the report for evaluation of iron is necessary.

   Currently, there is no human health toxicity factor for magnesium, which is listed in the Environmental Protection Agency's (EPA's) Risk Assessment Guidance for Superfund (RAGS) section 5.9.4, page 5-23 (EPA 1989, 08021), as an essential nutrient. As stated in RAGS, "Chemicals that are (1) essential nutrients, (2) present at low concentrations (i.e., only slightly elevated above naturally occurring levels), and (3) toxic only at very high doses (i.e., much higher than those that could be associated with contact at the site) need not be considered further in the quantitative risk assessment." Further, RAGS states "...only essential nutrients present at low concentrations (i.e., only slightly elevated above background) should be eliminated to help ensure that chemicals present at potentially toxic concentrations are evaluated in the quantitative risk assessment." None of the magnesium concentrations exceed the maximum tuff background concentration (2820 mg/kg) by more than two times, and in all cases, the concentrations were below the soil background value (BV) (4610 mg/kg) (LANL 1998, 59730). Therefore, there is no reason to evaluate magnesium toxicity at MDA P and no revision to the report is necessary.

NMED Comment`

3. *The risk assessment does not address risks to human health through exposure to contaminants in Cañon de Valle. The report states on more than one occasion that migration of surface water due to run-off and large precipitation events has occurred and that this water eventually drains into Cañon de Valle. Although run-off control measures are currently in place, the text in the report does not convey that the controls have been one hundred percent (100%) effective, and that there has never been a breach of the control mechanisms. The report does not provide justification that off-site migration has not occurred, and therefore, the potential for contamination in Cañon de Valle from site contaminants must be addressed in the report. Revise the closure report to provide discussion on the potential nature and extent of contamination in Cañon de Valle from contaminant transport from MDA P and how human health risks associated with exposure to these constituents will be evaluated. At a minimum, the report must indicate that the human health risks associated with exposure to contaminants in Cañon de Valle will be addressed in a separate report.*

LANL Response

3. The report will be revised to indicate that the human health risks associated with Cañon de Valle have been evaluated and presented in the "Phase III RFI Report for SWMU 16-021(c)-99" (LANL 2003, 77965) and in the "Response to Notice of Deficiency (NOD) for Phase III RFI Report for

SWMU 16-021(c)-99" (LANL 2004, 85426). As presented in the table below, the cumulative incremental lifetime cancer risk (ILCR) to a trail user in Cañon de Valle from potential exposures to all chemicals of potential concern (COPCs) in sediment and surface water is below the 1×10^{-5} target cancer risk level specified by the NMED. Noncancer hazards are below a hazard index (HI) of 1.0 for the trail user.

Cañon de Valle Alluvial Area Trail User Risks

Exposures	Estimated Cancer and Noncancer Risks
Total CTE ILCR	6E-07
Total RME ILCR	2E-05
CTE HI	7E-03
RME HI	6E-02

CTE = Central Tendency Estimate ILCR = Incremental Lifetime Cancer Risk
HI = Hazard Index RME = Reasonable Maximum Exposure

NMED Comment

4. *For the ecological risk assessment, a screening evaluation was conducted first. For those constituents that did not pass the screening evaluation, additional analysis was conducted. For the biological zone, only barium and high explosive (HE) and RDX were carried forward. However, an actual evaluation of ecological risks within the biological zone was not conducted, but rather an evaluation of potential risks in Cañon de Valle were discussed and used as surrogates. It is not clear why this approach was taken. The biological zone at MDA P and Cañon de Valle are different environments and are affected by different source mechanisms. Two distinct evaluations must be conducted: one for the biological zone using MDA P data and one for Cañon de Valle. Revise the closure report to include an evaluation of the actual risks to receptors to MDA P soil.*

LANL Response

4. This approach was taken pursuant to discussions with NMED in April 2002 during which the parties' representatives (Ken Bostick, Paul Schumann, Richard Mirenda, Vickie Maranville, and Kirby Olson) agreed that a screening ecological risk assessment would be conducted for the MDA P Site. The parties also agreed that the Cañon de Valle baseline risk assessment data [conducted as part of the Phase III Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) for SWMU 16-021(c)-99 (the TA-16-260 Outfall)] would be used to evaluate potential ecological effects in the canyon from MDA P as well as to represent potential ecological effects within the MDA P Site. In addition, the parties also agreed that, if no adverse ecological effects related to MDA P were found in the Cañon de Valle investigation, no additional ecological data would be necessary for the MDA P closure report. If effects were found, then additional studies on site would be considered. Finally, the parties agreed that the reasons for using the Cañon de Valle ecological risk assessment would be presented within the closure report. The reasons are presented in section 2.5.3.4, pages 94, 95, 96, section 2.5.3.4.3, pages 102 and 103, and section 2.5.3.5, page 105. Additional discussions are presented in Appendix A.

   The rationale for this approach was that the MDA P Site has been disturbed by closure activities to the point where few, if any, receptors are currently present within the boundaries of MDA P. The exposed tuff zone is devoid of any habitat or food sources and the biological zone consists mainly of grasses and other plants typical of disturbed areas. While some receptors may forage in the

biological zone, it is unlikely that sufficient numbers of animals could be collected to adequately investigate ecological effects. Exposure pathways for terrestrial receptors are the same for MDA P and Cañon de Valle (primarily soil ingestion, food web transfer and root uptake) as documented in the respective ecological scoping checklists for these areas [the MDA P checklist is included in Appendix A, Attachment 1 and the Cañon de Valle checklist is part of the "Phase II RFI report for SWMU 16-021(c)-99" (LANL 1998, 59891)]. Although the "source mechanisms" may be different between the two areas, contaminants and contaminant concentrations in Cañon de Valle are similar to the MDA P contaminants and contaminant concentrations described in section 2.5.3.4.3, page 103 and Tables 2.5-14 and 2.5 -15, as well as in Appendix A, section 5.7 and Tables 5.7-1 and 5.7-2.

The MDA P Site and Cañon de Valle have similar receptors that will use the MDA P Site as the habitat recovers from the closure activities. The one exception is the shrew, which requires free water as part of its habitat and may be present in the canyon bottom, but not on the MDA P Site. Both areas are also part of the foraging habitat for the Mexican spotted owl. Data were collected on small mammal population dynamics and contaminant body burdens in Cañon de Valle that were used to evaluate whether contaminant concentrations, which are similar between the MDA P Site and Cañon de Valle, would contribute to changes in small mammal populations and potentially affect the Mexican spotted owl through consumption of the small mammal prey species. The dominant species, deer mice and brush mice, are generalists with respect to habitat and are likely to occupy the biological zone of the MDA P site as well as the canyon bottom. The terrestrial system baseline ecological risk assessment results for the canyon below MDA P provides a reliable indication of potential adverse ecological effects for the MDA P Site.

As stated in section 2.5.3.4, page 94, the contaminant signatures and inventories in Cañon de Valle are the worst-case condition because MDA P and other sources of contamination to the canyon have either been remediated or eliminated. As a result, the contaminant concentrations will decline and inventories will dissipate over time due to the hydrologic processes in the canyon, thereby further decreasing the potential for adverse ecological effects from residual contamination. The ecological risk assessment results for Cañon de Valle, which has similar chemicals of potential ecological concern (COPECs), similar COPEC concentrations, similar exposure, and similar receptors, indicate no adverse ecological impacts on the biota in the vicinity of MDA P. A separate ecological baseline investigation of the MDA P Site is not warranted per the approach agreed upon by LANL and NMED. No revision to the report is necessary.

NMED Comment

5. *It appears that the ecological risk assessment for Cañon de Valle was conducted using only data from the overbank soil deposits. It is not clear how a complete assessment using only this data was conducted. The risk assessment must include all complete exposure pathways. Revise the risk assessment to clarify all the data that was used in the assessment of Cañon de Valle and discuss all the exposure pathways evaluated.*

LANL Response

5. The ecological screening assessment was conducted using soil and sediment data collected from overbank, floodplain, and active channel geomorphic units and water data from surface water, springs, and alluvial groundwater. The overbanks, which represent 25% of the canyon floor, are influenced by contaminant transport and deposition, are the geomorphic units that contain the post-1942 contaminant inventories, and generally contain the highest concentrations of contaminants.

As a result, the data used in the ecological screening assessment overestimates the potential exposure and risk to ecological receptors. This discussion is provided in section 2.5.3.4, pages 94, 95, and 96, as well as in Appendix A, sections 5.2.1 and 5.2.2, pages 25 through 27. Because the purpose of the ecological screening assessment was to evaluate the need for the field investigations, the overestimation of potential risk is appropriate.

The terrestrial ecological field investigations covered the canyon bottom; traps for small mammals encompassed the areas of highest contaminant concentrations (overbank soils) as well as areas beyond the overbank deposits (floodplain). The field investigations by their nature include all potential pathways for exposure since the animals collected are naturally exposed through soil ingestion, food web transfer, dermal contact, and inhalation of dust. The contaminant body burden data reflect all potential exposure pathways because the whole animals were analyzed, not individual tissues. The aquatic field investigations collected data on the effects of contaminants in surface water, springs, and active channel sediments on the benthic macroinvertebrate community in the stream and conducted toxicity tests on the channel sediments and site water.

Section 5.3 of Appendix A presents the Ecological Risk Assessment Approach. Section 5.3.1, Scope of the Assessment, states the following:

The assessment considers terrestrial effects for the former facility and aquatic and terrestrial effects in the canyon. The data used to support this assessment are:

- Post-excavation Phase II confirmation sample data for the MDA P Site;
- Sediment profile data collected in 1996 for the active channel in Cañon de Valle;
- Overbank samples collected for the fluvial geomorphology characterization in 1999;
- Water samples collected from April 1994 to March 1999;
- Small mammal population and contaminant body burden data collected in 2001;
- Sediment toxicity testing results collected in 2001; and
- Synoptic benthic macro-invertebrate community data collected in 1996 and 1997.

Because the contaminant concentrations in the overbank sediments and soil in Cañon de Valle were found to be similar to the contaminant concentrations at MDA P (section 2.5.3.4.3, pages 102 and 103), the potential for adverse effects is also similar. The receptors and exposure pathways are similar in both areas, so whole animal body burdens and effects on population dynamics are also comparable. NMED concurred with the use of these assumptions for evaluating ecological risk at MDA P during the April 2002 discussions mentioned in response to General Comment 4.

Section 5.4, Assessment Endpoints, identifies the key features of the canyon that were evaluated with the measures of effects. These include the terrestrial and aquatic systems in the canyon and are described in Section 5.4.1, Terrestrial Study Design and 5.4.2, Aquatic Study Design.

The bases of the ecological risk evaluations for Cañon de Valle are the data from these measures of effects. The small mammal population surveys and contaminant body burdens integrate the consequences resulting from all exposure pathways of small mammals to contaminants in the canyon, regardless of the relative importance of the pathway. The same is true for the benthic macroinvertebrate surveys and toxicity testing with *Chironomus tentans*. The integration of all

exposure pathways is the primary rationale for using empirical field studies to measure adverse effects for the ecological risk assessment. No revision to the report is necessary.

NMED Comment

6. *Discussion of the soil, sediment, and surface water investigations downstream of the site must be included in the report. A comment regarding this was made by NMED in the March 17, 2000 supplemental information request (specific comment #1) for Sampling and Analysis Plan for MDA P. In response to the request, Permittees had stated that details of responsibilities for follow-on activities in Cañon de Valle will be reported in the closure report (August 10, 2000). The Permittees must provide this information.*

LANL Response

6. Ongoing soil, sediment, and surface water investigations downstream of MDA P are being conducted in Cañon de Valle under the following programs.

- **Corrective action in Cañon de Valle**

  Soil, sediment, and surface water investigations downstream of MDA P have been ongoing as part of corrective action for SWMU 16-021(c)-99, the TA-16-260 Outfall. Data collected thus far in the corrective action process in Cañon de Valle are presented in the "Phase III RFI Report for SWMU 16-021(c)-99" (LANL 2003, 77965) and in the "Response to Notice of Deficiency for Phase III RFI Report for SWMU 16-021(c)-99", (LANL 2004, 85426). The Phase III RFI report focuses on investigations of the surface water, alluvial groundwater, canyon sediment, and springs in Cañon de Valle.

  The Phase III RFI is integral to the Corrective Measures Study (CMS) process, through which soil, sediment, surface water, and alluvial groundwater investigations continue in Cañon de Valle. Details of the CMS process are provided in the "CMS Plan for Potential Release Site 16-021(c)" (LANL 1998, 62413) and the "Addendum to CMS Plan for Potential Release Site 16-021(c)" (LANL 1999, 64873). The CMS plan separates the evaluation of transport pathways and selection of remedies into an alluvial CMS and regional groundwater CMS. The alluvial system CMS report (LANL 2004, 85531), submitted by LANL to NMED in November 2003, is a companion document to the Phase III RFI report (LANL 2003, 77965). The regional groundwater CMS, which will be ongoing for several years and will be reported on in the CMS report for the regional groundwater system (currently due in May 2007), will focus on deep perched intermediate and regional groundwater.

  In addition to corrective action for SWMU 16-021(c)-99, sediment and groundwater investigations are planned as part of corrective action for the TA-16-340 Complex (the Fish Ladder), which historically discharged waste to a small tributary of Cañon de Valle. This investigation will address contamination downstream of the MDA P site. The Risk Reduction and Environmental Stewardship-Remediation Services (RRES-RS) project is responsible for these activities.

- **Corrective action in lower Cañon de Valle**

  Additional sediment, surface water, alluvial groundwater, and biota characterization activities in Cañon de Valle will be conducted by the Canyons Investigation team. The investigation activities will be detailed in the South Canyons Investigation Work Plan which is scheduled to be delivered to the NMED by September 30, 2006. The investigations will be reported in the Water Canyon/Cañon

de Valle Investigation Report, which is scheduled to be completed by December 31, 2010. The canyons investigations will assess present-day risk to human health and ecological systems and evaluate the potential for transport of contaminants that could cause future human health and ecological risks. The investigations will also address the sources, fate, and transport of contaminants in Cañon de Valle and evaluate the need for additional characterization sampling and remedial actions above and below MDA P. The RRES-RS project is responsible for these activities.

- **Surface water monitoring in Cañon de Valle**

  Surface water monitoring in Cañon de Valle is ongoing under the requirements of LANL's National Pollutant Discharge Elimination System (NPDES) Multi-Sector General Permit (MSGP)-2000, which regulates stormwater discharges from industrial activities. The MSGP-2000 also requires the development and implementation of storm water pollution prevention plans (SWPPPs) for industrial activities. The Water Quality and Hydrology (WQH) Group is responsible for these activities.

NMED Comment

7. *The Sampling and Analysis Plan for MDA P submitted in August 1999, indicated that a surface water monitoring station was to be installed directly below MDA P in Cañon de Valle during the summer of 1999. The report does not include any discussion on data collected from the monitoring station. Provide the information on the proposed monitoring station and include the discussion on data, if any collected, so far.*

LANL Response

7. The surface water monitoring station referenced in the comment, Station E256 (Cañon de Valle below MDA P), was installed in the fall of 2001 and went into operation in late January 2002. In addition to storm flows, this station is known to have some base flow information, primarily from Burning Ground Spring. Raw flow data indicates about 40 days of flow per year.

   The WQH Group has not collected runoff samples for contaminant analyses from Station E256 because the runoff from the upper watershed of Cañon de Valle is now being contained within the TA-16 borrow pit located to the west of S-Site Road. Without the runoff from the upper watershed, runoff from areas downstream of the borrow pit (such as MDA P) is usually insufficient to reach the trip level of the station. As a result, there is little run-on/runoff source for this particular station to monitor. Discharges from Burning Ground Spring are the only sources of runoff that are recorded [there are two records of flows above the existing trip level (0.3 ft.) that may have been storm or snow melt flows]. The flow data are provided in the annual flow reports submitted to NMED, the Department of Energy (DOE), the pueblos, and other stakeholders.

   Other stations in Cañon de Valle include Station E253 (Cañon de Valle above SR-501) upstream of MDA P and Station E262 (Cañon de Valle above Water) downstream of MDA P, for which flow and other data are available and provided in the annual flow reports mentioned above and in discharge monitoring reports.

   Surface water data from Cañon de Valle both upstream and downstream of MDA P is also available as part of the stream profiles presented in Section 3 of the "Phase III RFI Report for SWMU 16-021(c)-99", LA-UR-03-5248, September 2003 (LANL 2003, 77965).

NMED Comment

8. *To facilitate the review, a separate table presenting contaminant data from boreholes should have been included. A similar table should also have been included in the report entitled "Bedrock Fracture Characterization at Material Disposal Area P Site: Phase II Closure Investigation Report (referenced by LA-UR-02-7200 and ER 2003-0467). No response required.*

LANL Response

8. No response.

Specific Comments

NMED Comment

1. Executive Summary, Pages iii and iv

- *The approved closure plan indicated that the Permittees would make an equivalency demonstration for clean closure at MDA P. Include a statement giving reasons why equivalency demonstration is no longer considered a requirement for the site.*
- *Include a statement that a separate report will be submitted supporting NFA for SWMU 16-016(c)-99*

LANL Response

1. The text of the Executive Summary will be revised to include the following, in response to each point in the above comment:

    - "At the time that the closure plan for MDA P was submitted and approved, it was believed that a clean closure equivalency demonstration was necessary. However, LANL and NMED have determined and agreed that this additional step to demonstrate clean closure is not required because of conforming changes to the regulations that made interim status closure requirements equally as stringent as those for permitted hazardous waste management units."
    - "Because of the differences in programmatic requirements between corrective action and closure, a separate VCA completion report for SWMU 16-016(c)-99 was submitted to NMED to support a request for NFA. This report is titled 'Voluntary Corrective Action Completion Report for Solid Waste Management Unit 16-016(c)-99 at Technical Area 16' (LANL 2003, 85530) and was submitted to NMED on November 26, 2003."

NMED Comment

2. Section 1.4.3, SWMU 16-016 (c)-99, Page 13

Provide the time frame for the storage of barium nitrate on Flash Pad 386 i.e., the period during which barium nitrate pile existed. Provide the dates for installation of erosion control features at the site.

LANL Response

2. The barium nitrate was stored on Flash Pad 386 from the 1950s to the early 1970s when it was removed. The former barium nitrate pile site, SWMU 16-016(c), was remediated through the voluntary corrective action (VCA) implemented for consolidated SWMU 16-016(c)-99 concurrently with the MDA P RCRA closure. Operational erosion control features were installed in the fall of 1998, prior to commencement of major Phase I removal activities. These features were continuously modified and upgraded as the Phase I removal progressed. Permanent site erosion control features were installed as part of the VCA implementation and MDA P Site stabilization at the conclusion of Phase I activities in 2001. Installation and maintenance of best management practices (BMPs) at this site are managed by the WQH Group under the MDA P and S-Site SWPPPs. These plans require maintenance and regular inspection (quarterly) of BMPs. These

inspections are carried out and reported in accordance with the requirements of the NPDES MSGP-2000.

Installation of erosion control features as part of site stabilization is detailed in sections 2.2.7 and 2.2.8, pages 37 and 38 of the closure certification report, as well as in the "Material Disposal Area P Site: Phase I Closure Implementation Report" (LANL 2002, 76054) and the "Voluntary Corrective Action Completion Report for Solid Waste Management Unit 16-016(c)-99 at Technical Area 16," (LANL 2003, 85530).

NMED Comment

3. ***Section 2.3.5.3.1, Eastern Regime-Data Summary and Discussion, Page 42.***

- *Peak concentrations of nitrates detected in the near surface and around 40 ft bgs could be an indication that contaminants have migrated in the subsurface. Nitrates are soluble and highly mobile and barium nitrate is a constituent of potential concern (COPC) at the site.*

- *The results of geochemical analysis reported do not concur with the contaminant data. For example, geochemical anion/cation analysis data for borehole 526 indicate that barium was detected at 116 mg/kg in one surface sample (at 0.3 ft) and was below 1 mg/kg in most of the other samples collected at depth. However, the contaminant data presented in the report for borehole 526 indicates that barium was detected at 1800 mg/kg in the surface sample and was detected at 413 mg/kg at 55 ft bgs. Explain the discrepancy.*

LANL Response

3. Each point of the comment is addressed as follows:

- The report acknowledges that nitrates could have been transported to the subsurface from dissolved barium nitrate (p. 40, sec. 2.3.3.1). The nitrates that were observed around 40 ft below ground surface (bgs) could have been from barium nitrate dissolution; like barium, nitrate was detected in the accumulation zone (especially at about 40 ft in boreholes 526 and 554). The Bedrock Fracture Characterization at Material Disposal Area P Site: Phase II Closure Investigation Report (LANL 2003, 77423) pp. 29-30 contains a more detailed discussion of subsurface nitrate at MDA P. The Phase II report noted that it is also possible that deeper nitrate could be naturally occurring. The profile data from the three boreholes (526, 554, and 273) indicate that any impacts from barium nitrate dissolution within the MDA P subsurface appear to be minor and localized, based on the small and spatially heterogeneous nitrate and barium inventories.

- There is no discrepancy in the data because the data were collected for different purposes. The geochemical data were obtained using a deionized water leaching method (ER-SOP-04.05, Rev. 0, Leaching of Soil and Rock Samples for Anions) by the Earth and Environmental Science (EES)-6 laboratory, while the contaminant data were obtained from a total digestion method based on EPA's SW-846 methods (EPA 1997, 57589) by an off-site analytical laboratory. Because of this difference, the geochemical data and the contaminant data are not directly comparable and the geochemical data tend to underestimate concentrations relative to the contaminant data. The goal of the cation geochemical data collection was to identify and delineate the zone of accumulation in context with the geophysical data and were not intended to accurately quantify the amount of barium in the tuff. The cation geochemical data were intended to complement the anion geochemical and geophysical data to help interpret what has happened

in the MDA P subsurface. These data were not used in any of the site characterizations or risk assessments.

NMED Comment

4. ***Section 2.3.5.3.3, Flash Pad 387-Data Summary and Discussion, Page 44, Figure 2.3-5, Page 51***

High electromagnetic (EM) conductivity was observed at 35–45 ft below surface and at 65–90 ft below surface in borehole 273. High EM conductivity was also observed at 120–130 ft below ground surface in borehole 273. A corresponding peak in sodium concentration was also observed at that depth in borehole 273. Discuss the significance of high EM conductivity at this depth in the borehole.

LANL Response

4. The high EM conductivity observed at 120–130 ft in borehole 273 is attributed to a higher inventory of conductive salts, as was the case for the shallower EM conductivity zones (30 to 90 ft bgs). The high sodium concentration at 120 ft, the lack of core recovery, and the high permeability behavior observed during the attempted flow test in this zone is consistent with this being either an extension of or an additional accumulation zone in borehole 273.

NMED Comment

5. ***Section 2.4.2.2, Borehole Samples, Page 55***

The statement "No organic chemicals are detected below 1 ft bgs in boreholes 516, 554, and 273" is incorrect. HMX and RDX were detected at 35 ft bgs in borehole 554. Additionally, organic chemicals were detected in borehole vapor samples collected from borehole 554 at depths of 76-78 ft. Vapor samples were not collected in boreholes 516 and 273 to determine for the presence of organic chemicals. Several organic chemical compounds were detected in all three boreholes sampled for organic vapors (i.e. boreholes 526, 554, and 557).

LANL Response

5. The statement in the comment will be corrected to read: "No organic chemicals are detected in core samples below 1 ft bgs in boreholes 516 and 273." This statement is intended to describe the results for the core samples, not the volatile organic compound (VOC) vapor samples. LANL recognizes that trace levels of VOCs were detected at depth as part of the vapor sampling. See response to the 3rd point in Specific Comment 13.

Boreholes 516 and 273 were not originally intended to be sampled as part of the MDA P Site investigation. Borehole 273 was intended, per agreement with NMED (LANL 2001, 70272; NMED 2001, 85632), to serve as a very deep borehole for geophysics, not for characterization within the MDA P footprint. Borehole 516 was an exploratory borehole in a fracture zone to a depth of only 32 ft bgs specifically to examine the potential for successful coring within the fracture zone. Borehole 557 was an exploratory borehole in a fracture zone that provided an additional location for vapor sampling within both the MDA P footprint and a fracture zone.

NMED Comment

6. ***Section 2.4.3, Confirmation Sampling Results, Pages 62–68***

Several organic chemicals were eliminated as a COPC based upon low detection frequencies. The Environmental Protection Agency (EPA) guidance (Risk Assessment Guidance for Superfund [RAGS], 1989) cited in the closure report allows for the elimination of chemicals from a risk assessment if it is detected infrequently (e.g., less than 5% per 20 samples with prior approval from NMED), not detected in other sampled media, and/or if there is no reason to believe the chemical may be present. However, RAGS clearly states that, "chemicals expected to be present should not be eliminated" from the risk assessment. The closure report provides evidence that these constituents have been historically present at the site, and a review of waste data collected in 1999 and 2000 indicate the presence of these constituents in waste removed from the site. Thus, there is sufficient justification to warrant the inclusion of these constituents in the risk assessment. At a minimum the risks from these constituents should be evaluated separately, and overall risks associated with these COPCs included and excluded be compared. Revise the risk assessment to include all organic constituents that have been historically present on-site, regardless of detection frequency. For the biological zone, the risk assessment should include benzoic acid, 1,4-dichlorobenzene, 1,3-dinitrobenzene, 2,4-dinitrotoluene, 2,6-dinitrotoluene, 3-nitrotoluene, 4-nitrotoluene, and tetryl. For the exposed tuff zone, the risk assessment should include di-n-butyl phthalate, 1,3-dinitrobenzene, 2,4-dinitrotoluene, 2,6-dinitrotoluene, 2-methylnaphthalene, 4-nitrotoluene, and tetryl.

LANL Response

6. The HE will be retained as COPCs based on site history and the report will be revised to reflect this change. The elimination of the other organic COPCs listed, based on a frequency of detection less than 5% (1,4-dichlorobenzene, di-n-butyl phthalate, and 2-methylnapthalene), is warranted because they are not expected to be present based on site history. The potential human health and ecological risks for all organic chemicals listed in the comment are provided in the Supplemental Table for Comment 6 (see Attachment B). Potential human health risks were evaluated by comparing maximum detected COPC concentrations to SALs in both the biological and exposed tuff zones. The final ecological screening levels (ESLs) were also compared to the maximum detected concentrations in the biological zone. ESL comparisons were not done for the exposed tuff zone per agreement with NMED and EPA Region 6, which found that the exposed tuff zone does not require a quantitative ecological risk assessment because there are no complete pathways in the exposed tuff zone (LANL 2002, 73791).

   For human health, none of the maximum detected concentrations exceeded the SALs. For the ecological receptors, the maximum detected concentrations did not exceed the final ESLs, except for 1,3-dinitrobenzene (0.11 mg/kg vs. ESL of 0.00021 mg/kg), based on ESLs from ECORISK Database version 1.4 (LANL 2002, 72802). However, the final ESL for 1,3-dinitrobenzene has been updated to 0.16 mg/kg in ECORISK versions 1.5 (LANL 2002, 73702) and 2.0 (LANL 2003, 80117), which is three orders of magnitude higher than the previous value. Based on the latter final ESL, the maximum detected concentration for 1,3-dinitrobenzene in the biological zone results in a hazard quotient (HQ) of 0.7. The maximum detected concentration for 2,6-dinitrotoluene in the biological zone was less than the final ESL and also results in an HQ of 0.7 The rest of the organic chemicals had HQs below 0.3 ESL. Therefore, inclusion of these organic chemicals within the risk assessments would not change the final results.

NMED Comment

7. ***Table 2.4-7, Page 64 and Appendix A, Table 3.2.1-1.***

The background soil value listed for aluminum and vanadium is 29,900 mg/kg and 36.6 mg/kg respectively. This appears to be a typographic error, as the soil background value should be 29,200 mg/kg for aluminum and 39.6 mg/kg for vanadium, as noted in Table 6.0-1 of the document "Inorganic and Radionuclide Background Data for Soil, Canyon Sediments, and Bandelier Tuff," LANL 1998. Revise the tables accordingly.

LANL Response

7. Tables 2.4-7 and 3.2.1-1 have been revised per the comment and are provided as attachments to this RSI response (see Attachment A).

NMED Comment

8. ***Section 2.4.3, Confirmation Sampling Results, Table 2.4-11, pages 67–68.***

The table does not include references to which compounds were eliminated based upon the less than 5% detection frequency. Revise the table to include this notation (similar to table 2.4.10).

LANL Response

8. Table 2.4-11 has been revised per the comment and is provided as an attachment to this RSI response (see Attachment A).

NMED Comment

9. ***Section 2.5.3.1.1, Screening Results, Page 85***

The report states that the operational PRG of 2000 mg/kg for barium was exceeded in four grid cells. According to the data provided on a CD entitled "Material Disposal Area P Site Closure Certification Report", the PRG of 2000 mg/kg for barium was exceeded in 10 grid cells (i.e. in grid cells 006, 232, 370, 454, 491, 551, 592, 630, 670 and 742). Additionally, Figure 3.1-1; map of MDA P Area Phase II confirmation samples does not depict any samples collected from grid number 006. Clarify the discrepancy and make appropriate revisions.

LANL Response

9. The operational preliminary remediation goal (PRG) for barium was exceeded in 10 grid cells instead of the four identified in the text, based on comparison of the operational PRG to confirmatory analytical results. The grid cells acknowledged in the report as having exceeded the operational PRG were 006, 232, 742, and 670, which are all in the biological zone. The remaining six grid cells noted in the NMED comment were all in the exposed tuff zone, was and were inadvertently excluded from the comparison. (Note that grid cell 370 listed in the comment should actually be grid cell 371.) The text will be revised to reflect the additional grid cells.

Location ID 16-20006 (sample ID 0816-01-0289) is not located in grid 006. This location and sample were actually collected from grid 189 at a depth of 0-0.5 ft; no samples were collected from grid 006. Figure 3.1-1, MDA P Area Phase II Confirmation Samples, provided with the Closure

Certification Report does not indicate the discrepancy for Location ID 16-20006. Rather than revise the figure and potentially confuse the reader, the Laboratory proposes adding text to the report explaining the location ID discrepancy in sections 2.4.2.1, Confirmation Samples and 2.4.3, Confirmation Sampling Results. The discrepancy will also be part of the revision to Appendix B, pp. B-6 and B-7 noted in Specific Comment 26.

NMED Comment

10. ***Section 2.5.3.3.1, Screening Results, Page 89***

Version 1.4 of the ECORISK database was used. Provide justification for not using version 1.5, which was released in September 2002. In addition, several COPCs were eliminated from the assessment, as the data provided in ECORISK was less than background and thus, deemed not appropriate for use. Discuss why other sources for ecological toxicity data were not used in these cases.

LANL Response

10. The ecological screening assessment was conducted in the late summer of 2002 using version 1.4 of the ECORISK Database (LANL 2003, 72802) that was released in March of 2002. Version 1.5 (LANL 2002, 73702) was released in the end of September 2002, after the ecological screening assessment was completed and during the writing of the MDA P Closure Report. It was not feasible to conduct another ecological screening assessment with the newer database version and still meet the schedule for delivery of the document. However, use of Version 1.5 would have produced essentially the same result.

    The ECORISK database is a compilation of the available peer reviewed literature for over a hundred chemicals. Version 1.4 includes 1228 references that are used to establish ESLs for combinations of chemicals and receptors. The gathering, reviewing, and incorporation of additional peer reviewed literature on toxicological studies is a continuing process and is the primary reason for the annual updates to the ECORISK database. As applicable studies are incorporated, new or updated toxicity reference values (TRVs) and ESLs are added to the database. The conceptual approach to calculating ESLs in versions 1.4 and 1.5 is to bias towards producing protective values such that the lowest no observed adverse effect level (NOAEL) is used or the minimum lowest observed adverse effect level (LOAEL) is used along with the application of uncertainty factors.

    The toxicity information used to calculate ESLs is literature based and reflects results of laboratory studies. The values used are often low and sometimes less than naturally occurring or environmentally measured concentrations. As a result, the ESLs for inorganic chemicals can be below the background concentrations and are protectively biased to the point of not being useful. In the case of MDA P, eight metals had ESLs below background (antimony, barium, chromium, cobalt, selenium, silver, vanadium, and zinc). Barium is carried forward as a COPEC due to ESLs that are greater than the BV and an exposure concentration above ESLs for several receptors. The other metals came forward from the background comparison because of large maximum concentrations that influenced the statistical distribution tests. A comparison of the 95% upper confidence level (UCL) concentrations to the BVs for the remaining seven metals shows ratios of 0.16 to 1.1, indicating that the 95% UCLs for these seven metals across the MDA P Site are similar to background. Based upon this information, the concentrations of these seven metals in the biological zone do not result in adverse ecological effects.

NMED Comment

11. ***Section 2.5.3.3.2, Problem Formulation, Page 89***

The text states that chemicals with seven or fewer detections in soil above the soil background value are rendered inaccessible to receptors. This is not a valid statement. First, 100% of the site was not sampled, and secondly, the lower detection frequency above background does not render the chemicals inaccessible, rather it lowers the potential for exposure but does not eliminate it. Revise the text to remove the discussion on these chemicals being inaccessible to receptors due to low frequency of detection above background. In addition, there is reasonable evidence to conclude that these chemicals are present at the site due to site activities. The exclusion of these chemicals as COPCs based upon the low frequency of detections is not valid (unless the statistical analyses concludes otherwise) and does require prior approval from NMED. Revise the risk assessment to address risk associated with exposure to these constituents.

LANL Response

11. Inorganic chemicals were not removed from the ecological assessment based on low frequency of detection in soil, but were eliminated because ESLs are below background values, the exposure point concentrations (95% UCLs) are similar to background concentrations, and exposure is similar to background, as stated in the text following the statement mentioned in the comment. The text referred to in the comment was provided to place the screening results in the context of ecologically meaningful estimates of potential risk. The text reads "All of the inorganic COPCs, except for barium, have seven or fewer detections in soil above the soil BV, indicating that the residual concentrations of inorganic chemicals in the biological zone are in tuff and are inaccessible to receptors." The text does not state that chemicals with seven or fewer detections in the soil above the soil background value are rendered inaccessible to receptors as stated in the comment. The statement of inaccessibility in tuff is supported by the agreement among NMED, EPA Region 6, and LANL that the exposed tuff zone does not require a quantitative ecological risk assessment, including generation and review of HQs, because there are no complete pathways in the exposed tuff zone (LANL 2002, 73791). Because the majority of all detections greater than background in the biological zone are in the tuff (few detections greater than background are in soils), the residual concentrations of inorganic chemicals in the biological zone are largely inaccessible to ecological receptors, lowering but not eliminating exposure, as indicated by the comment. These criteria were used to determine that barium was the only inorganic COPC requiring additional investigation. Therefore, no revision to the text is necessary and the discussion is relevant to whether the inorganic chemicals are retained as COPECs or not.

NMED Comment

12. ***Section 2.5.3.3.2, Problem Formulation, Page 93***

The report states that bis[2-ethylhexyl]phthalate was detected in eight samples, but the data provided on a CD entitled "Material Disposal Area P Site Closure Certification Report" shows that bis[2-ethylhexyl]phthalate was detected in 15 samples (i.e. at locations 16-20196, 16-20232, 16-20233, 16-20277E, 16-20300, 16-20404, 16-20477, 16-20513, 16-20549, 16-20551, 16-20558, 16-20630, 16-20670, 16-20702T and 16-20742). Clarify the discrepancy.

LANL Response

12. Bis[2-ethylhexyl]phthalate was detected at each location listed in the comment. However, only eight locations (16-20196, 16-20232, 16-20233, 16-20277E, 16-20300, 16-20549, 16-20670, and 16-20742) are in the biological zone and were evaluated in the ecological risk assessment. The other seven locations (16-20404, 16-20477, 16-20513, 16-20551, 16-20558, 16-20630, and 16-20702T) are located in the exposed tuff zone and were only used in the human health risk assessment. ESL comparisons were not done for the exposed tuff zone per agreement with NMED and EPA Region 6, which found that the exposed tuff zone does not require a quantitative ecological risk assessment because there are no complete pathways in the exposed tuff zone (LANL 2002, 73791).

NMED Comment

13. ***Section 3.3, Discussion of Groundwater Transport Pathways at MDA P, Page 108–110***

- *In addition to the factors identified as controlling the downward transport of contaminants, ponding and disturbed/undisturbed mesa top shall be considered, because they have been demonstrated to be important factors in controlling the downward movement of contaminants. As a result of the recent remediation activities, at present, ponding conditions may not exist at the site, but regular inspections should be done to ensure that it is maintained in the future.*

- *There is no conclusive evidence presented in the report that supports the statement that there was little impact to Cañon de Valle from MDA P due to overland flow. Stormwater runoff samples collected in 1998 from interceptor trenches located between MDA P and Cañon de Valle clearly indicated contaminants associated with the barium nitrate pile had migrated down a natural drainage towards Cañon de Valle (Sampling and Analysis Plan for Material Disposal Area P, August 1999, page 15). Best management practices that were in place in 1998 were probably not in place in 1950s, when the barium nitrate pile was present. However, due to the similar nature of the contaminants upstream and downstream of MDA P, it may be difficult to distinguish the different sources of contamination in Cañon de Valle. The mechanisms of addressing existing contamination in Cañon de Valle should be discussed here.*

- *The statement that VOC pore gas sampling results show a decrease in concentration with depth (Table 2.4-6) is not correct, on the contrary many of the concentrations increase with depth and the vertical extent may not have been determined since samples were only taken at two depths per borehole.*

- *Barium, RDX and HMX were detected in boreholes 554, 557 and 526 at depth indicating that contamination has moved in the subsurface. Sample results contradict the statement "The data also indicate that concentrations of contaminants have not accumulated in the subsurface beneath MDA P." Barium was detected at 413 mg/kg in borehole 526 at about 55 ft, the last depth sampled. RDX and HMX were also detected at this depth. Barium was detected at 715 mg/kg at about 19 ft and at 406 mg/kg at about 37 ft, RDX was detected at 3.9 mg/kg at about 19 ft depth in borehole 557.*

- *Include a statement that a separate VCA Report for SWMU 16-016(c)-99 will be submitted supporting NFA recommendation.*

LANL Response

13. Responses to each point presented in the comment above are as follows:

- As stated in the text, fast preferential transport via fractures has been found to be an important transport mechanism at locations *other than* MDA P on the TA-16 mesa where long-term ponded surface water conditions were a factor. As a result of closure activities, ponding does not occur at MDA P now, nor will it occur in the future. The site has been engineered to prevent ponding, promote runoff, and inhibit infiltration. Run-on and overland flow are directed away from the site using natural and engineered landscape features, as described in Sections 1.4 and 2.2.7. The measures taken to prevent ponding at MDA P, combined with the complete removal of hazardous wastes and waste residues above levels that are protective of human health and the environment, meet the RCRA closure objective of controlling, minimizing, or eliminating the post-closure escape of hazardous waste or waste residues via surface or groundwater pathways. Furthermore, the site is managed in accordance with the MDA P and S-Site SWPPPs, which require maintenance and regular inspection (quarterly) of BMPs. Thus, inspections are addressed by LANL's WQH Group under the NPDES MSGP-2000.

  With regard to disturbed mesas causing increased subsurface flow, the primary concern results from two conditions. The first is asphalt paving and the other is the creation of intentional ponds (e.g., waste lagoons) or unintentional ponding. Asphalt can be a problem because such paving has been shown to cause a large increase in the water content below the paving. Asphalt paving under the right configuration can also focus runoff, creating unintentional temporary ponded conditions in areas adjacent to the paving. However, the problems with asphalt do not apply to MDA P because there has been and is no paving on the site. As discussed above, the site has been engineered to prevent ponded conditions from developing so this is not a concern for the disturbed mesa top areas.

- The text will be modified to say that there was little impact to Cañon de Valle from MDA P due to overland flow *relative to the impacts of the TA-16-260 outfall*. As stated on page 109, historical sediment and geomorphological studies and sampling in Cañon de Valle indicate little impact from MDA P due to overland flow. The document also states that there probably was some contamination that resulted from MDA P. The mechanisms of addressing contamination in Cañon de Valle are discussed as part of the soil, sediment, and surface water investigations listed in the response to General Comment 6.

- LANL will remove the statement in the text.

  The source of the VOCs has been completely removed as part of closure implementation, and there are no hazardous waste residues remaining at the site that pose an unacceptable risk to human health and the environment. Thus, further sampling to define the extent of the trace VOC pore gas concentrations parts-per-billion by volume is not warranted.

- The statement that "data also indicate that concentrations of contaminants have not accumulated in the subsurface beneath MDA P" will be modified to say the following:

  "The data also indicate that *substantial inventories* of contaminants have not accumulated in the subsurface at MDA P".

  Earlier discussion in this section and elsewhere acknowledged that there has been some migration of contaminants into the shallow subsurface at MDA P and in a limited number of cases

down to the accumulation zone (30 to 90 ft). However, concentrations of contaminants typically decrease strongly from the surface with depth.

- The requested statement will be included in Section 4.0, Conclusions, rather than in Section 3.3. The statement will be the same as that provided in the response to Specific Comment 1.

NMED Comment

14. ***Appendix A, Section 3.3, Page 13***

The risk assessment is based upon a depth of exposure of zero to five ft, and the 95% UCL was determined from concentrations within this range. It is unclear why a range of zero (0) to five (5) ft was assumed an appropriate exposure pathway. EPA defines surface soil as 0 to 0.5 feet and subsurface soil as below 0.5 ft. Typically, a risk assessment will evaluate exposure to surface and subsurface soil separately, not combined as in the closure report. It appears that the development of one 95% UCL to represent all soil is not a conservative approach and most likely underestimates the actual risks that could be received through exposure to surface soil. This assumption is based upon the fact that concentrations decrease with depth. Revise the risk assessment to include an assessment for surface soil (0 to 0.5 or 0 to 1 foot) and one for subsurface soil (below 0.5 or 1 ft).

LANL Response

14. This approach does not underestimate the actual risks of exposure to surface soil. The risk assessment evaluates the chronic reasonable maximum exposure (RME) for a resident and assumes that a receptor will be exposed to surface and subsurface contamination combined, not the worst-case exposure conditions suggested by the comment. Standard risk assessment practice is to assess the risk over a depth profile because the area can be disturbed and a resident may be chronically exposed to contaminants at a depth below the surface. Standard depth for a residence is 10 ft bgs. The 0 to 5-ft depth interval is conservative because concentrations below 5 ft are much less than shallower concentrations (the highest concentrations are in the top few feet). The calculation of the 95% UCL using soil, fill and tuff data is appropriate because of the potential for exposure across media. The 95% UCLs are conservative and protective because concentrations below 5 ft were not included in the calculations, which would serve to dilute the exposure concentrations if included. As a result, the exclusion of deeper samples results in a higher 95% UCL for the COPCs, does not underestimate potential exposure, and represents the RME for the residential scenario. Therefore, the risk assessments do not need to be revised to include an assessment for surface soil (0–0.5 or 0–1 ft) and one for subsurface soil (below 0.5 or 1 ft).

NMED Comment

15. ***Appendix A, Section 4.2.3, Page 17***

The text states, "For the biological zone, a single detection of barium in grid 189 was measured and results in an HQ of 1.3. However, this barium concentration was within the other concentration evaluated in the residential lots." It is not clear what meaning these sentences are trying to convey. It appears that the elevated HQ is typical of the rest of the site, and therefore, unacceptable risks would prevail across all residential lots, which contradicts the conclusion of the report. Clarify the text.

LANL Response

15. The text was intended to indicate that (1) the barium concentration at grid 189, although above the barium soil screening level, was less than the maximum barium concentration for the site (6980 mg/kg) and (2) the maximum concentration of barium at grid 189 was not a potential risk to human health (an HQ of 1.3 is equivalent to 1). Grid 189 was not evaluated in the report as part of the residential lot assessment; it was evaluated as part of the whole site assessment.

    Grid 189 was not included in the residential lot evaluation for the biological zone in the report because there are a limited number of samples within the area of this grid. The exposure area inclusive of grid 189 included adjacent grids without sample data, which is in contrast to the calculation of 95% UCLs for the other lots evaluated (Figure 4.2.3-1). As a result, the exposure area needed to be twice the size of the other lots evaluated in order for there to be sufficient data to calculate the 95% UCL for this "lot". The 95% UCL for barium calculated for the grid 189 "lot" using the grids with sample data in closest proximity to grid 189 (grid locations 191, 153, and 223) in addition to the samples collected from grid 189 (including the sample designated as location 16-20006) is 2,645 mg/kg. The dataset included 8 samples, four from grid 189 [sample IDs 0816-01-0289 (location 16-20006), 0816-01-0147, 0816-01-0148, 0816-01-0247], one from grid 191 (sample ID 0816-01-0046), one from grid 153 (sample ID 0816-01-0262), and two from grid 223 (sample IDs 0816-01-082 and 0816-01-0083). This barium concentration is similar to the barium concentrations in the residential lots for the exposed tuff and biological zones: 3,834 mg/kg and 1,584 mg/kg, respectively, and less than the maximum 95% UCL for the lots. This 95% UCL results in an HQ for barium of 0.5. Based on this evaluation, grid 189 does not pose a potential risk and does not need to be included in the risk assessments for the residential lots.

NMED Comment

16. ***Appendix A, Section 4.2.3, Page 17***

It is not clear how the residential lots were chosen. It is also not clear how many lots were evaluated. Based on Figure 1.5-2, it appears that only two lots were evaluated. The primary focus for this evaluation also appears to be barium and noncarcinogenic risks. However, the report does not discuss potential exposure to organics and other carcinogens. If the worst-case location for noncarinogenic risks was evaluated, then the worst-case location for potential carcinogenic risks should have also been evaluated. Revise the text to indicate how many lots were evaluated, the methodology for selection of the lots, and the representativeness of the evaluation for potential exposure to organics and carcinogenic risks.

LANL Response

16. The text in section 4.2.3 summarizes the information requested.

    (1) How many lots were evaluated – "A residential lot was selected for both the biological and exposed tuff zones."

    (2) The methodology for selection of the lots – "A residential lot was selected for both the biological zone and the exposed tuff zone to be consistent with locations of high barium concentrations (see Figure 4.2.3-1) because barium was the primary risk driver for both zones."

    (3) The representativeness of the evaluation for potential exposure to organics and carcinogenic risks – "There is some residual HE left on the site (primarily RDX and HMX). However, because concentrations of the HE COPC are below the SALs when evaluating MDA P as a whole, the

additional analysis focused on barium as the primary COPC for human health." Note that none of the HE samples had maximum concentrations that exceeded a 10^{-5} cancer risk level.

The organic COPCs and carcinogenic risk were evaluated for each lot in each zone (Tables 2.5-5 and 2.5-7). The residential lot in the biological zone included the highest RDX concentration detected across the whole site so this assessment was also the worst case potential carcinogenic risk. The residential lot for the exposed tuff zone did not include the maximum RDX concentration in this zone (10.8 mg/kg), which would only slightly increase the cancer risk for this lot (maximum cancer risk using maximum RDX concentration is $3x10^{-6}$). The concentrations of bis(2-ethyhexyl)phthalate, 2,4,6-trinitrotoluene, DDT, chromium, and Aroclor-1260, the other carcinogenic COPCs for the site (Table 2.5-3), all have 95% UCLs below their SALs (10^{-6} risk level) and do not significantly contribute to carcinogenic risk. The cancer risks for the residential lots were $4x10^{-6}$ for the biological zone and $1.2x10^{-6}$ for the exposed tuff zone.

NMED Comment

17. ***Appendix A, Section 4.2.5, Page 21***

NMED target cancer risk level is 10^{-5} not 10^{-6} as noted in paragraph 3. This appears to be a typographical error. Revise the statement.

LANL Response

17. The presentation of the NMED target cancer risk of 10^{-6} was a typographical error. The text will be corrected to read 10^{-5}.

NMED Comment

18. ***Appendix A, Section 5.3.2.3, Page 29***

Barium and HMX were not included in the screening assessment, as the ECORISK version 1.4 did not contain toxicological criteria for the respective constituents. Risk assessments rarely rely on only one source for toxicological criteria. While it is noted that avian and invertebrate toxicity data may in fact not be available, other sources and studies for avian toxicological criteria should be reviewed to determine whether toxicity data is available. Revise accordingly.

LANL Response

18. The document did not state that barium and HMX were not included in the screening assessment, as the ECORISK version 1.4 (LANL 2002, 72802) did not contain toxicological criteria for the respective constituents. Barium and HMX were included in the screening assessment in Tables 2.5-8 and 2.5-9. For barium, an ESL is not available for the earthworm, while for HMX there are no avian ESLs. This is because no applicable peer reviewed studies have been found for these chemicals and receptors. As noted in the response to Specific Comment 10, The ECORISK Database Version 1.4 (LANL 2002, 72802) includes 1228 references that are used to develop ecological screening levels. The gathering, reviewing, and incorporation of additional peer reviewed literature on toxicological studies is a continuing process and is the primary reason for the annual updates to the ECORISK database. Every effort is made to obtain applicable peer reviewed literature, especially for chemicals and receptors that lack TRV information and ESLs. As applicable studies are incorporated, new or updated TRVs and ESLs are added to the database.

Unfortunately, the literature is limited in the available information for some chemicals. At the time that this assessment was performed, TRVs were not available in the literature to support the calculation of avian ESLs for HMX and RDX. The final statement in Section 5.3.2.3 is, "The possible terrestrial effects from barium and HMX, the generic aquatic community results, and the lack of information for HE in terrestrial and aquatic receptors indicates that an empirical study to assess adverse effects in Cañon de Valle is needed." This summary statement supports the use of empirical studies to assess adverse effects. Consequently, the effects of all COPECs are addressed through empirical studies, even when ESLs are not available. Therefore, no revision to the text is necessary.

NMED Comment

19. ***Appendix A, Section 5.6.3, Page 40***

The conclusion of the risk assessment indicates that there is no adverse impact to Cañon de Valle from migration of contaminants from MDA P. However, risk assessments conducted on Cañon de Valle for other sites within Technical Area (TA) 16, specifically in conjunction with Solid Waste Management Unit (SWMU) 16-021(c)-99, which is slightly upgradient of MDA P have indicated otherwise. This SWMU 16-021(c)-99 ecological risk assessment provides a lengthy discussion on the results of toxicity testing that had been conducted to determine whether the concentrations in sediments have impacted the benthic macro-invertebrate community. The results of the study showed a decrease in the numbers of species and potential toxicological impacts. In addition, the report implies that these results may be due more to the loss of habitat due to drought conditions than to contaminant loading into the surface water. However, the report further indicates that if there are pockets of sediment causing adverse effects on the aquatic community, the benthic community would most likely avoid these areas. If the stream is in fact being highly impacted by drought, then this would equate to a decrease in area of available habitat. Given these conditions, the benthic community would be more likely to be pushed into areas of unfavorable habitat due to competition. This would result in multiple stresses on the organisms. It appears that under the current drought conditions, the preservation of habitat is critical to the health of the stream community and that even small impacts by site contaminants could be detrimental. Revise the report to address these issues.

LANL Response

19. The Cañon de Valle ecological risk assessment did not indicate a decrease in the number of species in the benthic macroinvertebrate community. The total number of benthic macroinvertebrate species in Cañon de Valle was 31 compared to a range of 25 to 42 for the three reference canyons. Sensitive species are also present, with the total number of sensitive species being slightly lower than the reference canyons. The difference is due to the lack of the scraper community and the size of the stream (Appendix A, section 5.6.2, page 39). The lack of the scraper community is not contaminant related, but is due to the lack of habitat (not a loss of habitat) for these organisms. The feeding strategy for this community is to harvest periphytic algae and associated organisms from mineral and organic surfaces. The Cañon de Valle streambed is composed of unsorted coarse and fine sand with localized emergent vegetation. Larger stable surfaces that would support the propagation of periphytic algae are largely absent from this stream. Therefore, the habitat within the stream channel limits the establishment of the scraper community. In addition, the size of the stream, Cañon de Valle being a small first order stream, results in a smaller benthic macroinvertebrate community. First order streams are generally known for large variations in their species assemblages. In conjunction with these factors is the general ephemeral

nature of parts of the Cañon de Valle stream, which restricts the proliferation of the benthic macroinvertebrate community. None of these factors are related to contaminant effects in sediments or water.

The one location that exhibited toxicity to *Chironomus tentans* in one of two toxicity tests is located at the sanitary wastewater system consolidation (SWSC) Cut, which is upcanyon (about 0.4 mile) from MDA P (Appendix A, section 5.6.2, page 39). The results from the other two aquatic toxicity testing locations, one upstream and one downstream of the toe of the MDA P hillslope, were not statistically different from the toxicity testing results of the reference site in Starmer's Gulch. A discussion of the SWSC Cut toxicity testing site was not included in the MDA P closure report ecological risk assessment for three reasons. The toxicity testing site immediately upstream from MDA P provides a better indication of aquatic conditions above MDA P for making decisions regarding the net effects of the MDA P Site, the inflow of Burning Ground Spring defines the flow regime near MDA P, especially during the drought, and the channel between the SWSC Cut site and Burning Ground Spring has been dry for most of the drought, disconnecting contaminant transport from the SWSC Cut location from the vicinity of the MDA P Site.

Persistent surface water flow in the canyon between the SWSC Cut and the inflow of Burning Ground Spring has been interrupted and currently only flows following storm events and snowmelt. The reaches adjacent to MDA P, which are the focus of the ecological risk assessment in the closure report, are fed by Burning Ground Springs, which is still flowing. Benthic macroinvertebrate surveys and sediment/water toxicity testing data from this reach do not show any significant adverse ecological effects. The benthic macroinvertebrates in the area of the SWSC Cut would be more likely to be pushed into the area above and below MDA P reaches because it has been found to be more favorable habitat, i.e., sustained flow during the drought and toxicity testing results not different from the reference site. Contrary to the NMED comment, the stream reach adjacent to MDA P appears to be an important refuge for the benthic macroinvertebrate community during the drought. When drought conditions are less severe and the extent of water in the canyon increases this reach would be a source of organisms for re-colonization of the stream.

The results of the Cañon de Valle ecological risk assessment indicate that there is no evidence of adverse ecological impacts in the area of MDA P, either from drought or contamination. The drought has not caused the interruption of Burning Ground Spring, which is the source of water for the portion of the canyon around MDA P; the sediment and water in this area does not adversely affect the aquatic community; and small mammals are not impacted within this area or the rest of the canyon investigated. It appears that under the current drought conditions, the habitat has been preserved and the health of the stream community maintained in this portion of the canyon.

The Laboratory proposes revising the text of section 2.5.3.5, Ecological Assessment Summary to include the above response.

NMED Comment

20. ***Appendix A, Figure 3.3.2-8, Iron samples above background level***

There appears to be a typographical error, sample # 0816-01-0027 is depicted at two different locations on the map. Revise the figure depicting the correct sample IDs and locations.

LANL Response

20. Sample ID 0816-01-0027 is depicted twice on the figure. A revised Figure 3.3.2-8 will be provided.

NMED Comment

21. ***Appendix A, Attachment 2, Page Att. 2-11***

The detected value of silver (2.9 mg/kg) is not depicted on Figure B-2a. Revise the figure to include the detected value for silver.

LANL Response

21. Figure B-2a depicts antimony concentrations, and the detected antimony value of 2.9 mg/kg is shown on the figure. The silver box plots are Figures B-16a and B-16b. There is no silver concentration in soil of 2.9 mg/kg. No revision to Figure B-2a is necessary.

NMED Comment

22. ***Appendix A, Attachment 2, Page Att. 2-25***

Silver was detected above background values both in soil and tuff as shown in Table 2.4-7. However, Figure B-16a, Box and Whisker Background Comparison for silver in Biological Zone, does not depict plots for silver in soil. Revise the figure to include detected values of silver in soil.

LANL Response

22. For each inorganic chemical that has a site data set and a background data set, box plots of each data set are placed side by side to visually compare the distributions and qualitatively evaluate whether the data sets are similar or different. Silver has a BV of 1 mg/kg, which is the nominal detection limit for this inorganic chemical, but does not have a background data set for soil. As a result, construction of box-and-whisker comparison plots, as well as statistical comparisons of the silver soil data, are not possible. Therefore, box plots for silver in soil are not included in Figure B-16a. Silver in soil was retained as a COPC because it was detected and had detection limits above the background value of 1.0 mg/kg. No revision to the figure is necessary.

NMED Comment

23. ***Appendix A, Tables 4.2.2-1, 4.2.2-2, 4.2.3-1, and 4.2.3-2***

Attachment 2 of Appendix A discusses the statistical methods that were used to determine the 95% UCLs. However, two tests for lognormal distributions are discussed. It is not clear which test (either the Land's H or MVUE) was applied for estimating the 95% UCL in cases of lognormal distributions, as the table does not note which test was applied. For all normal distributions it was assumed that the Student T test was used and for non-parametric, the Bootstrap method. Clarify which tests were used for each constituent when the distribution was normal/lognormal.

LANL Response

23. Tables 4.2.2-1, 4.2.2-2, 4.2.3-1, and 4.2.3-2 have been revised to indicate by footnotes which test was used to calculate the 95% UCLs for lognormal, normal, and nonparametric distributions. The revised tables are provided as attachments to this RSI Response (see Attachment A). In summary, Student's t-test was used for normal distributions, the H-statistic was used for some lognormal distributions (standard bootstrapping was used for other lognormal distributions if the 95% UCL exceeded the maximum detected concentration), and standard bootstrapping was used for all

nonparametric distributions. The minimum varied unbiased estimates (MVUE), which is part of the Chebyshev test, was not used to calculate 95% UCLs for lognormal distributions. Therefore, discussion of the MVUEs and the Chebyshev test will be deleted and the text in Appendix B, section 4.2, will be revised accordingly.

NMED Comment

24. ***Appendix A, Table 4.2.2-3***

The 2003/2004 EPA Region 6 SALs for residential soil were reviewed and compared against the SALs listed in Table 4.2.2-3. Consideration was given for the data of the report versus dates of updated toxicity data. Two comments on the table are noted:

- *There is a large discrepancy between the SAL for cobalt as listed in the table (4,500 mg/kg) and in the Region 6 SAL table (900 mg/kg). Review of toxicity data does not indicate that there have been any updates. Verify the SAL for cobalt.*
- *Clarify that Arochlor-1254 was used as a surrogate for Arochlor-1260.*

LANL Response

24. The hierarchy used for obtaining soil screening levels was the NMED soil screening levels (NMED 2000, 68554), followed by EPA Region 6 medium-specific soil screening levels (EPA 2001, 71466). NMED published version 2 of their soil screening levels in 2004 (NMED 2004, 85615), but these values were not available when the MDA P risk analysis was performed.

The cobalt SAL of 4,500 mg/kg is correct per NMED (2000, 68554) based on noncarcinogenic effects. The EPA Region 6 medium-specific soil screening levels were not checked because an NMED soil screening level was available. However, the 2001 version of EPA Region 6 human health medium-specific soil screening levels (EPA 2001, 71466) lists cobalt as a noncarcinogen with a soil screening level of 3400 mg/kg. If the revised EPA Region 6 value was used (900 mg/kg) (EPA 2002, 73691 and EPA 2003, 81724), the overall impact on the risk assessment would be negligible. The maximum cobalt concentration at the site is 151 mg/kg and the 95 % UCL of the mean is 4.21 mg/kg, which results in a cancer risk of $2x10^{-7}$ and $5x10^{-9}$, respectively. NMED's soil screening level in the 2004 version of their soil screening level document is 1500 mg/kg and still bases the value on noncarcinogenic hazard, not carcinogenic risk (NMED 2004, 85615). The reason for this is that a 10^{-5} risk level would correspond to 9000 mg/kg based on the EPA Region 6 value, which is higher than the noncancer screening level and not used in the assessment.

Aroclor-1254 was not used as a surrogate for Aroclor-1260. The SAL provided in Table 4.2.2-3 (1.1 mg/kg) is the soil screening level for Aroclor-1260 presented in "Technical Background Document for Development of Soil Screening Levels" (NMED 2000, 68554).

NMED Comment

25. ***Appendix A, Table 4.2.2-4 and 4.2.3-6***

Both beryllium and cobalt are carcinogenic via inhalation, and as such, carcinogenic effects should be evaluated. Revise the tables and risk assessment to include beryllium and cobalt.

LANL Response

25. The hierarchy used for obtaining soil screening levels was first the NMED soil screening levels (NMED 2000, 68554), followed by EPA Region 6 medium-specific soil screening levels (EPA 2001, 71466). NMED published version 2 of their soil screening levels in 2004 (NMED 2004 85615), but these values were not available when the MDA P risk analysis was performed.

    With respect to the cobalt SAL, see the response to number 24 above.

    Beryllium is listed as a noncarcinogen per NMED (2000, 68554) as well as in NMED's 2004 version of their soil screening document (NMED 2004, 85615) and in EPA Region 6 medium-specific soil screening levels (EPA 2001, 71466, EPA 2002, 73691, EPA 2003, 81724). This indicates that the carcinogenic screening value is higher than the noncarcinogenic value of 150 mg/kg. In looking at the NMED and EPA Region 6 spreadsheets, the residential screening values for beryllium as a carcinogen are 11000 mg/kg and 1100 mg/kg, respectively (10^{-5} and 10^{-6} risk levels). However, if the carcinogenic value is used (1100 mg/kg per EPA 2002, 73691), the overall impact on the risk assessment is negligible. The maximum beryllium concentration at the site was 3.3 mg/kg and the 95 % UCL of the mean was 0.83 mg/kg, which results in a cancer risk of $3x10^{-9}$ and $8x10^{-10}$, respectively.

    No revisions to the tables or text are necessary.

NMED Comment

26. ***Appendix B, Pages B-6 and B-7***

The nomenclature for sampling ID numbers noted in the report is incorrect. Using the example given in the report, for sample ID 0816-01-0322, 0322 is supposed to indicate that sample was taken from grid 322, this does not appear to be correct. Instead the last three digits of location ID appear to be indicating the grid number, for example, for location ID 16-20624, 624 appears to be the grid number. Clarify and revise the text.

LANL Response

26. The comment is correct. LANL will revise the text in this section to include the correct nomenclature.

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Attachment A

Revised Tables

Table 2.4-7 Revised
Summary of Inorganic Chemical Results for the Biological Zone

Analyte	Media	Number of Analyses	Number of Detects	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Background Value (mg/kg)
Aluminum	Soil	71	71	2,630	19,900	29,200
Aluminum	Tuff	73	73	766	32,700	7,340
Antimony	Soil	71	17	[0.09][a]	2.9	0.83
Antimony	Tuff	73	3	[0.14]	1.2	0.5
Arsenic	Soil	71	66	[0.12]	4.8	8.17
Arsenic	Tuff	73	61	[0.12]	3.8	2.79
Barium	Soil	71	71	18.7	6,630	295
Barium	Tuff	73	73	9.3	2,920	46
Beryllium	Soil	71	71	0.27	1.8	1.83
Beryllium	Tuff	73	73	0.23	1.9	1.21
Cadmium	Soil	71	24	[0.01]	1.4	0.4
Cadmium	Tuff	73	33	[0.02]	0.80	1.63
Chromium	Soil	71	70	1.6	39.4	19.3
Chromium	Tuff	73	69	0.51	15.6	7.14
Cobalt	Soil	71	71	0.69	44.7	8.64
Cobalt	Tuff	73	70	0.41	41.3	3.14
Copper	Soil	71	71	0.68	36.8	14.7
Copper	Tuff	73	73	0.004	32.4	4.66
Iron	Soil	71	71	4,580	19,900	21,500
Iron	Tuff	73	73	6.47	22,500	14,500
Lead	Soil	71	71	3.8	61.5	22.3
Lead	Tuff	73	73	1.25	24.2	11.2
Manganese	Soil	71	71	30.9	1,290	671
Manganese	Tuff	73	73	44.7	456	482
Mercury	Soil	71	36	[0.2]	0.07	0.1
Mercury	Tuff	73	14	[0.0028]	0.061	0.1
Nickel	Soil	71	69	[1.3]	10.5	15.4
Nickel	Tuff	73	62	0.79	12.6	6.58
Selenium	Soil	71	33	[0.10]	0.48	1.52
Selenium	Tuff	73	48	0.13	0.74	0.3
Silver	Soil	71	16	[0.019]	15.8	1
Silver	Tuff	73	15	[0.035]	4.6	1

Table 2.4-7 Revised (continued)

Analyte	Media	Number of Analyses	Number of Detects	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Background Value (mg/kg)
Thallium	Soil	71	30	[0.013][a]	[1.2]	0.73
Thallium	Tuff	73	25	[0.012]	1.2	1.1
Vanadium	Soil	71	70	[0.380]	29.3	39.6
Vanadium	Tuff	73	70	0.0038	26.4	17
Zinc	Soil	71	67	[9.4]	912	48.8
Zinc	Tuff	73	73	0.027	150	63.5

[a] Numbers in brackets are undetected results and the value reported is the estimated detection limit.

Table 2.4-11 Revised
Summary of Organic Chemical Results for the Exposed Tuff Zone

Analyte	Number of Analyses	Number of Detects	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)
Amino-2,6-dinitrotoluene[4-]	143	20	0.049	0.55
Amino-4,6-dinitrotoluene[2-]	143	23	[0.00025][a]	0.882
Bis(2-ethylhexyl)phthalate	137	7	0.08	0.62
Carbon Disulfide	5	1	[0.005]	0.01
Di-n-butylphthalate [b]	137	1	0.13	[0.43]
Dinitrobenzene[1,3-] [b]	143	1	0.044	[0.33]
Dinitrotoluene[2,4-]	280	2	0.036	[0.43]
Dinitrotoluene[2,6-]	280	1	[0.08]	[0.43]
HMX	143	76	[0.08]	5.74
Methylnaphthalene[2-] [b]	137	1	0.058	[0.43]
Nitrotoluene[4-]	143	1	[0.08]	[0.33]
RDX	143	107	0.054	10.8
Tetryl	143	1	[0.08]	[0.33]
Toluene	5	2	0.001	[0.026]
Trinitrobenzene[1,3,5-]	143	8	0.047	0.36
Trinitrotoluene[2,4,6-]	143	10	0.029	0.48

[a] Numbers in brackets are undetected results and the value reported is the estimated detection limit.

[b] Detected in less than 5% of the samples, eliminated as a COPC.

Table 3.2.1-1 Revised

Frequency of Detected Inorganic Chemicals Above Background-Biological Zone

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (mg/kg)	BV (mg/kg)	Frequency of Detects above BV	Frequency of Nondetects above BV
Aluminum	Soil	71	71	2,630 to 19,900	29,200	0/71	0/71
Aluminum	Tuff	73	73	766 to 32,700	7,340	6/73	0/73
Antimony	Soil	71	17	[0.09] to 2.90	0.83	1/71	23/71
Antimony	Tuff	73	3	[0.14] to 1.20	0.5	1/73	41/73
Arsenic	Soil	71	66	[0.12] to 4.80	8.17	0/71	0/71
Arsenic	Tuff	73	61	[0.12] to 3.80	2.79	4/73	0/73
Barium	Soil	71	71	18.7 to 6,630	295	28/71	0/71
Barium	Tuff	73	73	9.30 to 2,920	46	45/73	0/73
Beryllium	Soil	71	71	0.27 to 1.80	1.83	0/71	0/71
Beryllium	Tuff	73	73	0.23 to 1.90	1.21	7/73	0/73
Cadmium	Soil	71	24	[0.01] to 1.40	0.4	1/71	4/71
Cadmium	Tuff	73	33	[0.02] to 0.80	1.63	0/73	0/73
Chromium	Soil	71	70	1.6 to 39.4	19.3	1/71	0/71
Chromium	Tuff	73	69	0.51 to 15.6	7.14	8/73	0/73
Cobalt	Soil	71	71	0.690 to 44.7	8.64	4/71	0/71
Cobalt	Tuff	73	70	0.41 to 41.3	3.14	9/73	0/73
Copper	Soil	71	71	0.68 to 36.8	14.7	6/71	0/71
Copper	Tuff	73	73	0.004 to 32.4	4.66	19/73	0/73
Iron	Soil	71	71	4,580 to 19,900	21,500	0/71	0/71
Iron	Tuff	73	73	6.47 to 22,500	14,500	4/73	0/73
Lead	Soil	71	71	3.80 to 61.5	22.3	5/71	0/71
Lead	Tuff	73	73	1.25 to 24.20	11.2	8/73	0/73
Manganese	Soil	71	71	30.90 to 1,290	671	1/71	0/71
Manganese	Tuff	73	73	44.7 to 456	482	0/73	0/73
Mercury	Soil	71	36	[0.2] to 0.07	0.1	0/71	0/71
Mercury	Tuff	73	14	[0.0028] to 0.0610	0.1	0/73	0/73
Nickel	Soil	71	69	[1.3] to 10.5	15.4	0/71	0/71
Nickel	Tuff	73	62	0.79 to 12.6	6.58	8/73	0/73
Selenium	Soil	71	33	[0.10] to 0.480	1.52	0/71	0/71
Selenium	Tuff	73	48	0.13 to 0.74	0.3	21/73	2/73
Silver	Soil	71	16	[0.019] to 15.8	1	7/71	3/71
Silver	Tuff	73	15	[0.035] to 4.60	1	2/73	1/73
Thallium	Soil	71	30	[0.0130] to [1.2]	0.73	0/71	3/71
Thallium	Tuff	73	25	[0.012] to 1.2	1.1	1/73	1/73
Vanadium	Soil	71	70	[0.380] to 29.3	39.6	0/71	0/71
Vanadium	Tuff	73	70	0.0038 to 26.4	17	2/73	0/73

Table 3.2.1-1 Revised (concluded)
Frequency of Detected Inorganic Chemicals Above Background-Biological Zone

Analyte	Media	Number of Analyses	Number of Detects	Concentration Range (mg/kg)	BV (mg/kg)	Frequency of Detects above BV	Frequency of Nondetects above BV
Zinc	Soil	71	67	[9.4] to 912	48.8	7/71	0/71
Zinc	Tuff	73	73	0.027 to 150	63.5	2/73	0/73

BV = Background value.
COPC = Chemical of potential concern.
mg/kg = Milligram(s) per kilogram.
[ ] = Non-detect.

Table 4.2.2-1 Revised
Summary Statistics for the MDA P Site COPCs Used for the Human Health Risk Screening Assessment

Analyte	Number of Analyses	Distribution Type	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Mean Concentration (mg/kg)	Standard Deviation (mg/kg)	95% UCL (mg/kg)
Inorganic Chemicals							
Aluminum	259	Non-Parametric [a]	803	32,700	5,634	4,090	6,049
Antimony	259	Non-Parametric	0.046	2.9	0.390	0.229	0.414
Barium	259	Non-Parametric	3.05	6,980	452	821	535
Beryllium	259	Non-Parametric	0.23	3.3	0.786	0.472	0.834
Chromium	259	Non-Parametric	0.22	39.4	4.90	3.6	5.25
Cobalt	259	Non-Parametric	0.27	151	4.21	10.9	5.34
Copper	259	Non-Parametric	0.47	36.8	6.1	6.39	6.71
Iron	259	Lognormal [b]	4,050	22,500	10,044	2,944	10,335
Lead	259	Non-Parametric	1.2	144	8.52	11.2	9.67
Mercury	259	Non-Parametric	0.001	0.22	0.018	0.018	0.02
Nickel	259	Lognormal	0.65	12.6	4.12	2.41	4.5
Perchlorate	51	Non-Parametric	0.004	0.075	0.025	0.017	0.029
Selenium	259	Non-Parametric	0.05	1.4	0.23	0.16	0.25
Silver	259	Non-Parametric	0.001	15.8	0.42	1.13	0.54
Vanadium	259	Non-Parametric	0.19	29.3	8.90	6.11	9.52
Zinc	259	Non-Parametric	4.7	912	43.3	58.2	49.0
Organic Chemicals							
Acetone	10	Non-Parametric	0.012	0.215	0.06	0.08	0.1
Amino-2,6-dinitrotoluene[4-]	262	Non-Parametric	0.04	0.98	0.15	0.09	0.15
Amino-4,6-dinitrotoluene[2-]	262	Non-Parametric	1.25E-07	1.1	0.15	0.12	0.16
Aroclor-1260	7	Non-Parametric	0.018	0.06	0.025	0.016	0.034
Bis(2-ethylhexyl)phthalate	259	Non-Parametric	0.08	0.62	0.19	0.04	0.2
Carbon Disulfide	5	Non-Parametric	0.003	0.01	0.004	0.003	0.006
DDT[4,4'-]	7	Non-Parametric	0.0009	0.008	0.002	0.003	0.003

Table 4.2.2-1 Revised (continued)

Analyte	Number of Analyses	Distribution Type	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Mean Concentration (mg/kg)	Standard Deviation (mg/kg)	95% UCL (mg/kg)
HMX	262	Non-Parametric	0.04	16	0.75	1.9	0.95
RDX	262	Non-Parametric	0.04	37	1.47	3.97	1.89
Toluene	10	Lognormal	0.0006	0.013	0.003	0.004	0.008
Trinitrobenzene[1,3,5-]	262	Non-Parametric	0.04	0.7	0.13	0.06	0.14
Trinitrotoluene[2,4,6-]	262	Non-Parametric	0.03	1.2	0.14	0.11	0.16

[a] Standard bootstrapping method was used to calculate 95% UCLs for all non-parametric distributions.

[b] H-statistic was used to calculate 95% UCL for all lognormal distributions.

Table 4.2.2-2 Revised
Summary Statistics for the Biological Zone COPCs Used for the Ecological Risk Screening Assessment

Analyte	Number of Analyses	Distribution Type	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Mean Concentration (mg/kg)	Standard Deviation (mg/kg)	95% UCL (mg/kg)
Inorganic Chemicals							
Aluminum	137	Lognormal [a]	1,340	32,700	6,321	4,447	7,014
Antimony	137	Non-parametric [b]	0.046	2.90	0.3716	0.28	0.410
Barium	137	Lognormal	9.7	6,630	443	786	656
Chromium	137	Lognormal	0.520	39.4	5.37	3.98	5.95
Cobalt	137	Non-parametric	0.27	44.7	3.42	5.39	4.18
Copper	137	Non-parametric	0.680	36.8	6.64	6.87	7.60
Iron	137	Lognormal	4,050	22,500	9,814	2,999	10,226
Lead	137	Non-parametric	1.5	61.5	9.36	7.5	10.4
Nickel	137	Lognormal	0.650	12.6	4.19	2.47	4.65
Selenium	137	Non-parametric	0.050	0.74	0.22	0.13	0.24
Silver	137	Non-parametric	0.01	15.8	0.49	1.53	0.70
Vanadium	137	Non-parametric	0.19	29.3	9.27	6.39	10.2
Organic Chemicals							
Acetone	5[c]	Normal[d]	0.012	0.014	0.013	0.00096	0.014
Amino-2,6-dinitrotoluene[4-]	139	Non-parametric	0.04	0.98	0.16	0.11	0.18
Amino-4,6-dinitrotoluene[2-]	139	Non-parametric	0.04	1.1	0.16	0.13	0.18
Aroclor-1260	3[c]	NA[e]	0.020	0.061	0.34	NA	0.061
Bis(2-ethylhexyl)phthalate	136	Non-parametric	0.110	0.28	0.19	0.019	0.20
DDT[4,4]	3[c]	NA	0.001	0.008	0.001	NA	0.0079
HMX	139	Non-parametric	0.040	16	0.98	2.48	1.33
RDX	139	Non-parametric	0.040	37	1.65	5.18	2.37
Toluene	5[c]	Non-parametric	0.001	0.003	0.003	0.001	0.003

Table 4.2.2-2 Revised (continued)

Analyte	Number of Analyses	Distribution Type	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Mean Concentration (mg/kg)	Standard Deviation (mg/kg)	95% UCL (mg/kg)
Trinitrotoluene[2,4,6-]	139	Non-parametric	0.034	1.2	0.17	0.14	0.18

[a] H-statistic was used to calculate 95% UCL for all lognormal distributions.

[b] Standard bootstrapping method was used to calculate 95% UCLs for all non-parametric distributions.

[c] Too few observations to calculate 95% UCL or standard deviation.

[d] Student's-t method used to calculate 95% UCLs for normal distributions.

[e] NA = Not applicable.

Table 4.2.3-1 Revised
Summary Statistics for the Biological Zone 5,400 ft^2 Residential Lot COPCs

Analyte	Number of Analyses	Distribution Type	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Mean Concentration (mg/kg)	Standard Deviation (mg/kg)	95% UCL (mg/kg)
Inorganic Chemicals							
Aluminum	NA[a]	NA	NA	NA	NA	NA	NA
Antimony	NA	NA	NA	NA	NA	NA	NA
Barium	8	Lognormal[b]	16.9	3,850	897	1,255	1,584
Beryllium	NA	NA	NA	NA	NA	NA	NA
Chromium	NA	NA	NA	NA	NA	NA	NA
Cobalt	NA	NA	NA	NA	NA	NA	NA
Copper	8	Lognormal[b]	0.96	28.9	7.8	9.03	12.7
Iron	NA	NA	NA	NA	NA	NA	NA
Lead	8	Lognormal[c]	2.9	30.3	8.69	9.4	21.8
Mercury	NA	NA	NA	NA	NA	NA	NA
Nickel	NA	NA	NA	NA	NA	NA	NA
Perchlorate	ND[d]	NA	NA	NA	NA	NA	NA
Selenium	8	Non-parametric[e]	0.12	0.64	0.22	0.17	0.31
Silver	8	Non-parametric	0.09	1.6	0.42	0.48	0.69
Vanadium	NA	NA	NA	NA	NA	NA	NA
Zinc	8	Lognormal[c]	17.6	90.5	38.3	22.5	58.6
Organic Chemicals							
Acetone	ND	NA	NA	NA	NA	NA	NA
Amino-2,6-dinitrotoluene[4-]	9	Non-parametric	0.088	0.98	0.33	0.33	0.51
Amino-4,6-dinitrotoluene[2-]	9	Non-parametric	0.074	1.1	0.35	0.38	0.55
Bis(2-ethylhexyl)phthalate	8	Lognormal[b]	0.16	0.28	0.21	0.03	0.23
Carbon Disulfide	ND	NA	NA	NA	NA	NA	NA
DDT[4,4'-]	ND	NA	NA	NA	NA	NA	NA
HMX	9	Lognormal[b]	0.16	16	4.52	6.74	8.03
RDX	9	Lognormal[b]	0.14	37	9.77	15.3	17.7
Toluene	ND	NA	NA	NA	NA	NA	NA
Trinitrobenzene[1,3,5-]	ND	NA	NA	NA	NA	NA	NA

Table 4.2.3-1 Revised (continued)

Analyte	Number of Analyses	Distribution Type	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Mean Concentration (mg/kg)	Standard Deviation (mg/kg)	95% UCL (mg/kg)
Trinitrotoluene[2,4,6-]	9	Non-parametric	0.145	0.45	0.21	0.12	0.27

[a] Maximum concentration in the biological zone residential lot less than background value.

[b] Standard bootstrapping used to calculate 95% UCL because the maximum concentration was less than the UCL for the lognormal distribution using the H-statistic.

[c] H-statistic was used to calculate 95% UCL.

[d] ND = 100% undetected.

[e] Standard bootstrapping method was used to calculate 95% UCLs for all non-parametric distributions.

Note: NA = Not Applicable.

Table 4.2.3-2 Revised
Summary Statistics for the Exposed Tuff Zone 5,400 ft^2 Residential Lot

Analyte	Number of Analyses	Distribution Type	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Mean Concentration (mg/kg)	Standard Deviation (mg/kg)	95% UCL (mg/kg)
Inorganic Chemicals							
Aluminum	9	Lognormal [a]	2,230	13,500	5,397	4,177	10,415
Antimony	9	Non-parametric [b]	0.34	0.52	0.47	0.05	0.5
Barium	9	Lognormal [a]	865	6,980	2,109	1,944	3,834
Beryllium	9	Lognormal [a]	0.43	2	1.04	0.59	1.75
Chromium	9	Lognormal [a]	2.2	9.3	5.01	2.69	7.75
Cobalt	9	Non-parametric	2.1	151	20	49.1	45.6
Copper	9	Lognormal [a]	1.8	7.4	4.57	1.99	6.85
Iron	9	Non-parametric	9,730	20,600	13,970	4,740	16,404
Lead	NA[c]	NA	NA	11.2	NA	NA	NA
Mercury	NA	NA	NA	0.063	NA	NA	NA
Nickel	9	Lognormal [d]	0.8	8.7	4.39	2.51	5.68
Perchlorate	ND[e]	NA	NA	0.73	NA	NA	NA
Selenium	9	Lognormal [a]	0.125	0.54	0.28	0.15	0.49
Vanadium	9	Lognormal [a]	5.4	18	9.82	4.73	14.4
Zinc	9	Lognormal [a]	18.15	66.1	36.3	15.0	50.7
Organic Chemicals							
Acetone	ND	NA	NA	NA	NA	NA	NA
Amino-2,6-dinitrotoluene[4-]	9	Non-parametric	0.099	0.55	0.2	0.14	0.27
Amino-4,6-dinitrotoluene[2-]	9	Non-parametric	0.056	0.88	0.21	0.26	0.34
Aroclor-1260	ND	NA	NA	NA	NA	NA	NA
Bis(2-ethylhexyl)phthalate	ND	NA	NA	NA	NA	NA	NA
Carbon Disulfide	ND	NA	NA	NA	NA	NA	NA
DDT[4,4'-]	ND	NA	NA	NA	NA	NA	NA
HMX	9	Lognormal [a]	0.27	2.23	0.84	0.63	1.59
RDX	9	Lognormal [a]	0.92	7.06	3.02	1.9	5.63

Table 4.2.3-2 Revised (continued)

Analyte	Number of Analyses	Distribution Type	Minimum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Mean Concentration (mg/kg)	Standard Deviation (mg/kg)	95% UCL (mg/kg)
Toluene	ND	NA	NA	NA	NA	NA	NA
Trinitrobenzene[1,3,5-]	ND	NA	NA	NA	NA	NA	NA
Trinitrotoluene[2,4,6-]	9	Non-parametric	0.03	0.16	0.12	0.05	0.15

[a] H-statistic was used to calculate 95% UCL.

[b] Standard bootstrapping method was used to calculate 95% UCLs for all non-parametric distributions.

[c] Maximum concentration in the exposed tuff zone residential lot less than the background value.

[d] Standard bootstrapping used to calculate 95% UCL because the maximum concentration was less than the UCL for the lognormal distribution using the H-statistic.

[e] ND = 100% undetected.

Note: NA = Not applicable.

Attachment B

Supplemental Table for Specific Comment 6

Supplemental Table, Comment 6
Comparison of Maximum Detected Concentrations to Risk Screening Levels for Organic Chemicals Detected in Less Than 5% of Phase II Confirmation Samples

Analyte	Maximum Detected Concentration - Biological Zone (mg/kg)	Maximum Detected Concentration - Exposed Tuff Zone (mg/kg)	SAL (mg/kg)[a]	0.1 SAL (mg/kg)[a]	Final ESL (mg/kg)	Final Receptor
benzoic acid	0.27	---	100,000	10,000	7.30	Deer Mouse
1,4-dichlorobenzene	0.0097	---	3.60	NA	1.20	Earthworm
1,3-dinitrobenzene	0.11	0.044	6.1	0.61	**0.00021**	Robin (invertevore)
2,4-dinitrotoluene	0.096	0.053	120	12.0	1.00	Deer Mouse
2,6-dinitrotoluene	0.45	0.39	61	6.1	0.65	Deer Mouse
3-nitrotoluene	0.14	---	410	41.0	5.30	Deer Mouse
4-nitrotoluene	0.14	0.11	410	41.0	9.40	Deer Mouse
tetryl	0.12	0.093	610	61.0	2.00	Deer Mouse
di-n-butyl phthalate[b]	---	0.13	6,000	600	NE	NE
2-methylnaphthalene	0.04	0.058	71.9[c]	7.19[c]	0.2[c]	Vagrant Shrew

NA denotes not applicable, analyte is a carcinogen.

NE denotes not evaluated, analyte was only detected in the exposed tuff zone and as a result only evaluated for human health risk.

--- denotes analyte was 100% non-detect for zone.

Bold indicates value is exceeded by a maximum concentration.

[a] Reference Hierarchy:

- *"Technical Background Document for Development of Soil Screening Levels, Revision 2.0"*, New Mexico Environment Department, February 2004.
- *"Region 6 Human Health Medium-Specific Screening Levels, December 2003" (EPA 2003, 81724)*

[b] Analyte is not evaluated for ecological risk because it was only detected in the exposed tuff zone.

[c] Naphthalene used as a surrogate.