Response to the Notice of Disapproval for the Investigation Report for Area of Concern 01-007(k) in the Upper Los Alamos Canyon Aggregate Area, Los Alamos National Laboratory, EPA ID No. NM0890010515, HWB-LANL-14-018, Dated August 21, 2014

INTRODUCTION

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

GENERAL COMMENTS

NMED Comment

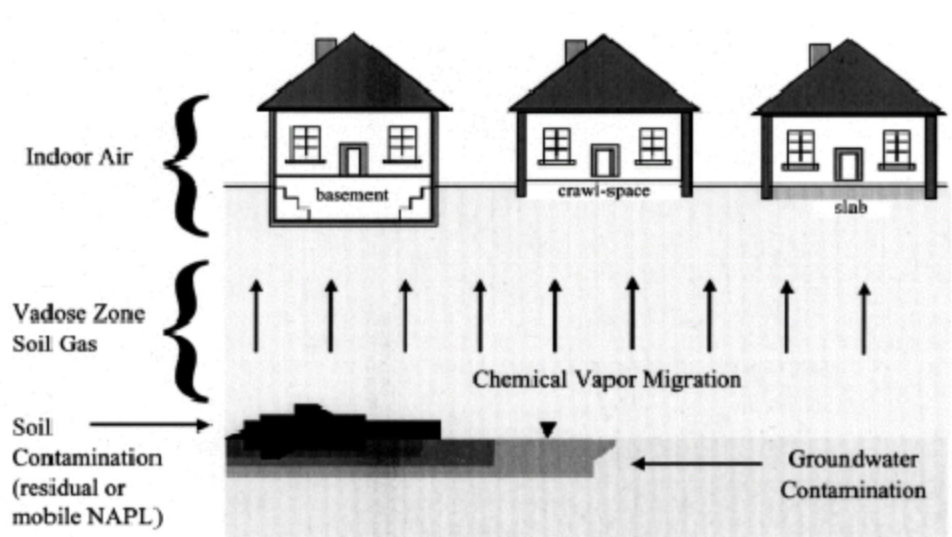
1. *For the vapor intrusion pathway, it was noted that soil data were used to calculate risks and hazards to receptors in indoor air in Tables G-4.3-1 and G-4.3-2. According to US Environmental Protection Agency's (EPA) (2002)* OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils *(Subsurface Vapor Intrusion Guidance), use of bulk soil data is not currently recommended because of the "large uncertainties associated with measuring concentrations of volatile contaminants introduced during soil sampling, preservation, and chemical analysis, as well as the uncertainties associated with soil partitioning calculations". Use of active soil-gas data is recommended to estimate indoor air concentrations and to assess risks and hazards from exposure to indoor air. However, it is noted that volatile organic compounds (VOCs) were not abundantly detected during the initial investigation of Area of Concern (AOC) 01-007(k) as noted in the* Investigation Report for Upper Los Alamos Aggregate Canyon, Revision *(February 2010). Because acetone and methylene chloride were the only VOCs previously detected, there was not sufficient concern to suspect a source for VOCs and to require active soil gas for this investigation. The forthcoming revision to the NMED Soil Screening Guidance includes a tiered approach for assessing VOCs and the need to conduct a quantitative assessment. Since there is no suspected source for continued release of acetone and methylene chloride, and the concentrations are decreasing with depth, the vapor intrusion pathway is potentially complete and the discussion and use of the bulk soil model are sufficient as a qualitative discussion for this pathway. Note that for future vapor intrusion investigations where the vapor intrusion pathway has been identified as a complete pathway, the use of active soil-gas data will be required.*

LANL Response

1. As NMED notes in its comment, use of bulk soil data is not currently recommended in the draft 2002 U.S. Environmental Protection Agency (EPA) guidance on evaluating vapor intrusion. Because the draft guidance was published in 2002, the relevance of the term "current guidance" is ambiguous and was the case when NMED directed the Laboratory to evaluate the pathway starting in 2009–2010. In addition, the Johnson and Ettinger model provides spreadsheets for calculating soil screening concentrations of volatile organic chemicals (VOCs) detected in soil. When it was initially directed to

address this pathway, the Laboratory contacted the NMED risk assessor to ascertain how best to apply the guidance and the Johnson and Ettinger model to sites where only soil data were available. The NMED risk assessor stated that the Johnson and Ettinger model soil concentration spreadsheets was the most appropriate approach and the screening concentrations generated by the spreadsheet should be compared with the soil concentrations of each VOC detected. This is the approach the Laboratory has used for the past 4 or 5 yr. To address some of the uncertainties associated with using the soil data, the Laboratory has been conservative in its screening by looking only at the residential exposure and using the maximum detected VOC concentrations. Most solid waste management units and areas of concern (AOCs) at the Laboratory do not represent a source of VOCs, nor is a vapor plume associated with the sites, which would warrant soil pore-gas sampling. Therefore, for the vast majority of sites, no suspected source exists for continued release of VOCs, and concentrations either decrease with depth and/or are below estimated quantitation limits. As a result, the discussion and use of the bulk soil model are sufficient as a qualitative analysis for this pathway.

The vapor-intrusion pathway is primarily for sites where an evident VOC release has occurred and a vapor plume is present and acts as a continual source of VOCs at sufficient concentrations to migrate through the soil and into a structure. As described in section II (p. 4) of the draft guidance (EPA 2002, 094114), "Vapor intrusion is the migration of volatile chemicals from the subsurface into overlying buildings. Volatile chemicals in buried waste and/or contaminated groundwater can emit vapors that may migrate through subsurface soils and into indoor air spaces of overlying buildings…." This is further evidenced by the conceptual site model EPA provides in its draft guidance document (EPA 2002, 094114, section II, p. 5) and shown below. Section V of the draft guidance (EPA 2002, 094114, p. 22) recommends "considering a generic conceptual site model for vapor intrusion consisting of a groundwater and/or vadose zone source of volatile vapors that diffuse upwards through unsaturated soils towards the surface." For sites where a source is not present, the collection and use of active soil-gas data are not necessary or warranted. The continued evaluation of the soil data, as presented in the investigation report for AOC 01-007(k) and other previous aggregate area reports, is adequate for most sites at the Laboratory and the nature, frequency, and magnitude of contamination reported.



SPECIFIC COMMENTS

NMED Comment

1. ***Section 4.1, Current and Future Land Use, page 11:***

   The Permittees' state that residential scenario is evaluated for comparison purposes per the Consent Order. However, the site is located on private property, residential use is a reasonable foreseeable future land use, and had to be evaluated since the land use will be not under the Permittees' control. No response to this comment is required.

LANL Response

1. The text in section 4.1 has been revised to indicate the residential scenario is evaluated because it is a reasonably foreseeable future land use for the site.

NMED Comment

2. ***Section 4.2, Screening Levels, page 11:***

   Text in Section 4.2 discusses the use of the trivalent chromium soil screening level (SSL) for total chromium results. It is agreed that the use of the trivalent chromium SSL is acceptable when there is no source for hexavalent chromium. Note that NMED will be providing an SSL for total chromium and guidance on how to address chromium in risk assessments in the forthcoming revision of Risk Assessment Guidance for Site Investigations and Remediation *(NMED 2012). No response to this comment is required.*

LANL Response

2. Comment noted.

NMED Comment

3. ***Section 5.1, Identification of COPCs, pages 12-13:***

   The Permittees state that some constituents of concern may be eliminated from the data analyses and risk assessments, if they are from non-site related sources. This approach would be acceptable if the Permittees can make a clear demonstration using historical site information and/or by collecting site specific background data from locations not impacted by the site activities. However, cleanup may still be necessary, in which case it would be incumbent on the Permittee to seek financial relief from the responsible party that the Permittee identifies as the source of contamination. Also See Comment #9.

LANL Response

3. As a result of a meeting between Laboratory and NMED personnel on July 31, 2014, the text referred to in the comment has been deleted from section 5.1. A comprehensive and appropriate presentation of this information and site history is provided in section 6.2.4.3, Organic Chemicals, to demonstrate why certain chemicals detected at the site are not site-related (see changes tracked in text).

The Permittees cannot be required to clean-up constituents from non-site-related sources. Neither the New Mexico Hazardous Waste Act nor the Resource Conservation and Recovery Act provide authority to order cleanup of constituents that were not treated, stored, or disposed of by a regulated entity. Further, neither act provides a mechanism for actions for contribution or cost recovery against a third party. Finally, as is often the case with naturally occurring and anthropogenic background constituents, the responsible party approach does not apply.

NMED Comment

4. Section 5.1.1, Inorganic Chemical and radionuclide background Comparisons, page 14:

To identify chemicals of potential concern (COPC), the Permittees state that "[t]he sampling results are compared with the [background value] BV and the maximum background concentration for the appropriate media". However, it should be noted that according to 2012 NMED risk assessment guidance, if the maximum detected concentration from a site is greater than the background reference value and too few samples and/or positive detections are available to conduct a statistical comparison and additional data are not proposed, then the constituent must be retained as a COPC. Comparison to the range of background is not sufficient grounds alone to eliminate a COPC. Step 3 of the NMED site attribution analysis does allow for additional lines of evidence to support elimination of a constituent as a COPC. Site history is listed as a line of evidence that may be used; however, sufficient site history must be available to justify why the constituent would not be present due to historical activities. Consistent with EPA guidance (Risk Assessment Guidance for Superfund Volume I Human Health Evaluation Manual (Part A), 1989)*, if there is historical evidence to suggest that the constituent could be present at the site, then the constituent must be retained as a COPC.*

LANL Response

4. As stated at the meeting between the Laboratory and NMED personnel on July 31, 2014, the Laboratory disagrees with NMED's statement that comparison with the maximum background concentration when too few samples and/or positive detections are available to conduct statistical comparisons is not appropriate and is not part of the 2012 NMED risk assessment guidance (NMED 2012, 219971). The guidance states, "Site-to-background point-by-point comparisons will be conducted for site data sets containing fewer than eight samples and fewer than five detected observations" (p. 32). The Laboratory believes this is the same as the comparison with the maximum background concentration. In addition, the Laboratory considers the comparison to the maximum background concentration as a line of evidence (Step 3 of NMED's guidance) for eliminating inorganic chemicals as chemicals of potential concern (COPCs), where appropriate. Based on the July 31, 2014, meeting, the text in section 6.2.4.3 for antimony, cadmium, and cyanide has been revised as follows:

> Antimony was not detected above the soil and Qbt 2,3,4 BVs (0.83 mg/kg and 0.5 mg/kg) but had DLs (0.57 mg/kg to 1.23 mg/kg) above the BVs in 43 samples (90% of samples); 5 samples collected in 2008 had DLs below the BVs. The 43 DLs were also above the maximum soil and Qbt 2,3,4 background concentrations (1 mg/kg and 0.4 mg/kg). Based on these lines of evidence, antimony is retained as a COPC.
>
> Cadmium was not detected above the soil BV (0.4 mg/kg) but had DLs (0.503 mg/kg to 0.615 mg/kg) above the BV in 11 soil samples. The DLs were only 0.103 mg/kg to 0.215 mg/kg above the soil BV and were approximately 2 mg/kg to 2.1 mg/kg below

the maximum soil background concentration (2.6 mg/kg). Cadmium was not detected in the 11 soil samples and was not detected above BVs in the 48 samples (detected in 5 samples below the Qbt 2,3,4 BV). The detected concentrations of cadmium (0.014 mg/kg to 0.107 mg/kg) are well below all BVs and indicate that cadmium, when present, is below BVs. If an assumption is made that all the DLs above the soil BV are detects, the quantile and slippage tests indicate the data sets are not statistically different (p-values = 0.135 and 1, respectively). Based on these lines of evidence, cadmium is not a COPC.

Cyanide was not detected above the Qbt 2,3,4 BV (0.5 mg/kg) but had DLs (0.58 mg/kg to 0.61 mg/kg) above the BV in 4 tuff samples. The DLs were only 0.08 mg/kg to 0.12 mg/kg above the Qbt 2,3,4 BV. The other 44 samples had DLs (0.11 mg/kg to 0.3 mg/kg) below the soil and Qbt 2,3,4 BVs. Cyanide was not detected in any of the 48 samples. The data indicate that cyanide is not present at the site above BVs. Based on these lines of evidence, cyanide is not a COPC.

NMED Comment

5. ***Section 6.2.3, Summary of Previous Investigations, page 18:***

   The text states that previous sampling had not been conducted at AOC 01-007(k). This statement is incorrect since sampling was conducted at this site in 2008. The results of the 2008 investigations were included in the Investigation Report for Upper Los Alamos Aggregate Canyon, Revision 1, *February 2010 (IR). NMED subsequently issued a Certificate of Completion with Controls on September 10, 2010 for AOC 01-007(k). The characterization of the site was considered incomplete pending removal of structures located on the site. The presence of existing structures was considered adequate controls for the site at that time. The Permittees collected additional samples in 2013 because the Los Alamos Inn had been demolished. The Permittees did not submit a work plan with proposed additional sampling locations for NMED's approval. Revise the text to clarify that additional investigations were conducted in 2013 to complete characterization of the site with the intent to change the status from corrective action complete with controls to corrective action complete without controls.*

LANL Response

5. The text in section 6.2.3 has been revised to clarify that additional investigations were conducted in 2013 with the intent of changing the status from corrective action complete with controls to corrective action complete without controls. The text now reads as follows:

   > Sampling was conducted at AOC 01-007(k) in 2008 as part of the initial Upper Los Alamos Canyon Aggregate Area investigations. The results of the 2008 investigations were included in the Investigation Report for Upper Los Alamos Canyon Aggregate Area, Revision 1. NMED subsequently issued a certificate of completion with controls on September 10, 2010, for AOC 01-007(k). Site characterization was considered incomplete pending the removal of structures located on the site. The presence of existing structures was considered adequate controls for the site at that time. Subsequently, the structures were demolished and additional samples were collected in 2013 to complete the characterization of the site with the intent of changing its status from corrective action complete with controls to corrective action complete without controls.

The data presented and analyzed in this report include all previous data as well as 2013 data.

NMED Comment

6. Section 6.2.4.3, Soil, Rock, and Sediment Sampling Analytical Results, page 20:

Cadmium was not retained as a COPC because it was not detected above the soil background concentration of 0.4 mg/kg. However, the detection limits were above the background value and below the maximum soil background concentration of 2.6 mg/kg. The Permittees must conduct a hypothesis test to verify that site concentrations are not different than background and address it in the uncertainty analyses.

LANL Response

6. Based on the July 31, 2014, meeting, the text in section 6.2.4.3 has been revised for cadmium. See response to Specific Comment 4 for the revised text.

The standard statistical tests for comparing site data with background data are hypothesis tests. Hypothesis tests were not conducted for cadmium in soil because there are no detected concentrations of cadmium to compare with background concentrations; all soil results are nondetects. If one assumes the detection limits (DLs) above the background value (BV) are detects, then hypothesis tests can be run to determine whether a statistical difference exists between the two data sets. The modification to reported DLs was applied to all nondetect values greater than the soil BV (i.e., the site soil DLs and three background DLs were treated as detects). When this modification was applied, the quantile test (p-value = 0.1347) and slippage test (p-value = 1) found the data sets were not statistically different. The Gehan test was not performed because the Laboratory background set contains greater than 50% nondetects, thus preventing the required condition of 50% detects of both site and background from being met. The results of these tests are included in section 6.2.4.3 (see response to Specific Comment 4) to support the conclusion that cadmium is not a COPC. The text, however, was not included in the uncertainty analysis because the hypothesis test is related to COPC identification and not to risk assessment.

NMED Comment

7. Section 6.2.4.3, Soil, Rock, and Sediment Sampling Analytical Results, page 21:

Text in Section 6.2.4.3 states that nitrate was not retained as a COPC because it is naturally occurring, although a site-to-background comparison was not conducted as background levels for nitrate have not been established. Nitrate was previously detected at low levels in AOC 01-007(k) and was retained as a COPC and included in the risk screens. While nitrates are naturally occurring, they are also indicative of sewage (e.g., old IMHOFF tanks, historic broken or leaking septic lines from buildings and structures that have been demolished). As noted in Section 6.1.2 of the current report, "potential contaminants at former TA-01 may have been released into the environment from septic systems, the industrial waste line, drainlines, and storm water drainages that occurred as a result of normal site operations (e.g., discharges from outfalls) and accidental spills or releases. No documentation exists to estimate the volumes or rates of the flow of the effluent from septic system outlet pipes, industrial waste line, drainlines, or storm water drainages to outfalls." In looking at both the current report and the 2010 report for this area, historical evidence suggests a potential source(s) for nitrates and there is reason to suspect they could be site related; stating concentrations are likely background without any discussion of how the past activities described in Section 6.1.2 support this conclusion does not provide sufficient rationale to exclude nitrates as a COPC. As such, and for *consistency with the 2010 investigation for AOC 01-007(k), nitrates must be retained as a COPC. Revise the report accordingly.*

LANL Response

7. NMED quotes the following text from section 6.1.2 of the report:

> Potential contaminants at former TA-01 may have been released into the environment from septic systems, the industrial waste line, drainlines, and storm water drainages that occurred as a result of normal site operations (e.g., discharges from outfalls) and accidental spills or releases. No documentation exists to estimate the volumes or rates of the flow of the effluent from septic system outlet pipes, industrial waste line, drainlines, or storm water drainages to outfalls.

However, the Laboratory's statement pertains to former TA-01 as a whole and not to AOC 01-007(k) specifically. Based on site history, there is no evidence to indicate AOC 01-007(k) is a potential source for nitrate. Physics laboratories were used to conduct experiments involving uranium-235, uranium-238, radium-226, carbon-14, polonium-210, and tritium. In addition, the nitrate concentrations detected (0.365 mg/kg to 3.1 mg/kg) do not indicate a release. However, for consistency with the 2010 investigation for AOC 01-007(k), nitrate is retained as a COPC and the report has been revised accordingly.

NMED Comment

8. Section 6.2.4.3, Soil, Rock, and Sediment Sampling Analytical Results, page 21:

The Permittees state that "[a]s discussed in section 5.1, the PAHs detected at this site [benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, chrysene, fluoranthene, and pyrene] are not related to site operations and are present from sources other than releases from the AOC and therefore are not assessed as COPCs." However, benzo(a)pyrene was not detected at the site according to Table 6.2-3. Revise the text accordingly.

LANL Response

8. The text in section 6.2.4.3 has been revised.

NMED Comment

9. Section 6.2.4.3, Soil, Rock, and Sediment Sampling Analytical Results, page 21:

Detected polyaromatic hydrocarbons (PAHs) (benzo(a)anthracene, benzo(b)fluoranthene, chrysene, fluoranthene, and pyrene) were eliminated as COPCs based on the presumption that PAHs are common in urban runoff, or are related to other naturally occurring or anthropogenic background sources, as discussed in Section 5.1, Identification of COPCs. It is not acceptable to eliminate PAHs as COPCs based on the rationale provided. If the PAHs are not related to site activities, then it must be demonstrated by comparing site concentrations to site-specific background values. It is acknowledged that the PAHs were detected sporadically and at low levels. However, unless it can be shown that they are not site related in a site-to-background analysis, then they must be retained as COPCs in the risk assessments. Revise the risk assessment accordingly.

LANL Response

9. As a result of a meeting between Laboratory and NMED personnel on July 31, 2014, the text in section 6.2.4.3, Organic Chemicals*,* has been revised to present comprehensive and appropriate lines of evidence why the polycyclic aromatic hydrocarbons (PAHs) detected at the site are not site-related. The lines of evidence include general information on sources of PAHs, site history, site condition (the area is partially covered by asphalt, as shown in Figures 1 and 2 of this response), and the basis for the site's designation as an AOC. In the case of this AOC and most other sites evaluated by the Laboratory under the Compliance Order on Consent (Consent Order), collection of site-specific background data is not practical, nor is this the only way to show that detected chemicals are not site-related. The collection of site-specific background data at this site is not practical because the buildings have been gone for over 50 yr and the site is in the middle of asphalt-paved parking areas, which is a source of PAHs. In addition, the area of bare soil (the building footprint of the former Los Alamos Inn) contains small and large chunks of old asphalt and is another source of PAHs. Step 3 of NMED's 2012 guidance states that site history can be used as a line of evidence, and this is what the Laboratory has presented in the revised text.

    The primary objectives of the Consent Order, which implements the corrective action requirements of Sections 3004(u) and (v) and 3008(h) of the Resource Conservation and Recovery Act (RCRA), are to (1) define the nature and extent of historical releases from SWMUs and AOCs; (2) identify and fully evaluate, where needed, alternatives for corrective measures; and (3) implement such corrective measures. As noted above and presented in the investigation report, DOE/LANS have determined that the PAHs detected in samples collected as part of this investigation are not from releases related to historical site operations at AOC 01-007(k). Therefore, for the Laboratory to revise the risk assessments to include the PAHs in the AOC 01-007(k) investigation report (Appendix G) would not follow the RCRA corrective action process as implemented by the Consent Order. However, to document that the potential risks contributed by the PAHs detected at this AOC do not substantially or meaningfully contribute to any potential human health and ecological risks, the Laboratory has provided risk-screening tables for the industrial, construction worker, and residential scenarios as well as the minimum ecological screening level comparison with the PAHs included (Tables 1 through 7). The calculations show no change in the industrial cancer risk or hazard index (HI), the construction cancer risk increased from 7×10^{-9} to 9×10^{-9} with no change to the HI, the residential cancer risk increased from 3×10^{-7} to 4×10^{-7} with no change to the HI, and none of the PAHs were identified as chemicals of potential ecological concern (hazard quotients were less than 0.3). This substantiates there is no impact to human health or the environment at this AOC.

NMED Comment

10. Table G-2.3-2, EPCs for AOC 01-007(k) for the Ecological Risk, page G-28:

The number of detects listed for lead (3) and uranium-235/236 (2) appears to be incorrect. It is acknowledged that this typographical error does not affect the results. However, modify Table G-2.3-2 to display the correct number of detects for lead (34) and uranium-235/236 (7).

LANL Response

10. Table G-2.3.2 has been revised.

NMED Comment

11. Table G-4.2-6, Construction Worker Radionuclide Screening Evaluation for AOC 01-007(k), page G-35:

The construction worker screening action level (SAL) listed for uranium-235/236 (150 picocuries per gram, pCi/g) is not consistent with the SAL of 100 pCi/g listed in Los Alamos National Laboratory's (2012) Derivation and Use of Radionuclide SALs, Revision 2*. Revise Table G-4.2-6 accordingly. It is noted that this does not affect the overall results of the risk assessment.*

LANL Response

11. Table G-4.2-6 has been revised.

NMED Comment

12. Appendix G, Attachment G-2, Vapor Intrusion Model Spreadsheets:

In the "DATAENTER" tab of the vapor intrusion spreadsheets, clarify the source of these input values: 'soil dry bulk density', 'soil total porosity', and 'soil water filled porosity'. It is not clear whether they are site-specific or if they are based on a default soil type; include the rationale for the selection of these values.

LANL Response

12. The input values for soil dry–bulk density and soil water–filled porosity are site-specific in that they are values for Qbt 3 (Stimac et al. 2002, 073391; Springer 2005, 098534). The values used are the upper end of the ranges for these parameters. The value for soil total porosity (0.439) was obtained from EPA's draft guidance for evaluating the vapor-intrusion pathway (EPA 2002, 094114, Appendix G, Table G-4), assuming silt-loam soil. By comparison, the soil total porosity for Qbt 3 (the upper end of the range) is 0.47 (Springer 2005, 098534).

REFERENCES

EPA (U.S. Environmental Protection Agency), November 2002. "OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance)," EPA530-D-02-004, Washington, D.C. (EPA 2002, 094114)

NMED (New Mexico Environment Department), February 2012 (updated June 2012). "Risk Assessment Guidance for Site Investigations and Remediation," Hazardous Waste Bureau and Ground Water Quality Bureau Voluntary Remediation Program, Santa Fe, New Mexico. (NMED 2012, 219971)

Springer, E.P., 2005. "Statistical Exploration of Matrix Hydrologic Properties for the Bandelier Tuff, Los Alamos, New Mexico," *Vadose Zone Journal,* Vol. 4, pp. 505–521. (Springer 2005, 098534)

Stimac, J.A., D.E. Broxton, E.C. Kluk, S.J. Chipera, and J.R. Budahn, July 2002. "Stratigraphy of the Tuffs from Borehole 49-2-700-1 at Technical Area 49, Los Alamos National Laboratory, New Mexico," Los Alamos National Laboratory report LA-13969, Los Alamos, New Mexico. (Stimac et al. 2002, 073391)

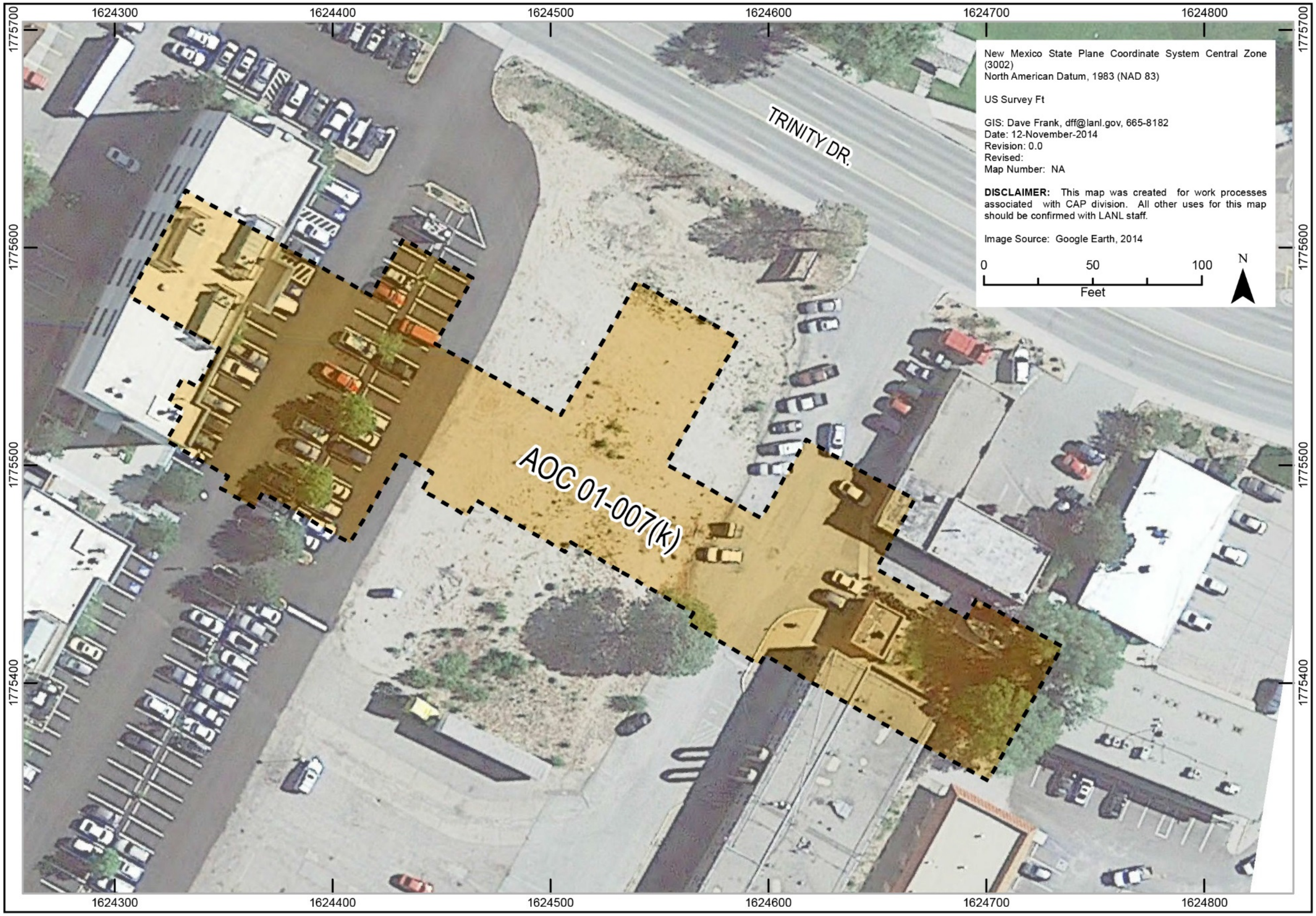


Figure 1 Aerial view of current site condition with AOC 01-007(k) (former buildings U and W footprint) superimposed

Figure 2 View of current site condition from ground level looking south/southwest

Table 1
Industrial Carcinogenic Screening Evaluation for AOC 01-007(k)

COPC	EPC (mg/kg)	Industrial SSL[a] (mg/kg)	Excess Cancer Risk
Aroclor-1248	0.0415	8.26	5.02E-08
Aroclor-1254	0.0339	8.26	4.40E-08
Aroclor-1260	0.0132	8.26	1.60E-08
Benzo(a)anthracene	0.0163	23.4	6.97E-09
Benzo(b)fluoranthene	0.0115	23.4	4.91E-09
Bis(2-ethylhexyl)phthalate	0.154	1370	1.12E-09
Butylbenzylphthalate	0.746	9100[b]	8.20E-10
Chrysene	0.0122	2340	5.21E-11
Methylene chloride	0.02	4700	4.26E-11
		Total Excess Cancer Risk	**1E-07**

[a] SSLs from NMED (2012, 219971).

[b] EPA regional screening level (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

Table 2
Industrial Noncarcinogenic Screening Evaluation for AOC 01-007(k)

COPC	EPC (mg/kg)	Construction Worker SSL[a] (mg/kg)	HQ
Antimony	1.23(U)	454	0.0027
Chromium	8.46	1,700,000[b]	0.000005
Copper	56.1	45,400	0.0012
Lead	15.5	800	0.019
Mercury	0.258	341	0.00076
Nickel	7.23	22,500	0.00032
Nitrate	1.19	1820000	0.00000065
Perchlorate	0.00202	795	0.0000025
Selenium	1.15(U)	5680	0.0002
Zinc	158.5	341,000	0.00046
Acetone	0.00229	868,000	0.0000000026
Di-n-butyl phthalate	0.404	68,400	0.0000059
Fluoranthene	0.0166	24400	0.00000068
Pyrene	0.0177	18300	0.00000097
		HI	**0.02**

[a] SSLs from NMED (2012, 219971).

[b] EPA regional screening level (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

Table 3
Construction Worker Carcinogenic Screening Evaluation for AOC 01-007(k)

COPC	EPC (mg/kg)	Construction Worker SSL[a] (mg/kg)	Excess Cancer Risk
Aroclor-1248	0.0415	75.8	5.47E-09
Aroclor-1260	0.0132	75.8	1.74E-09
Benzo(a)anthracene	0.0163	213	7.65E-10
Benzo(b)fluoranthene	0.0115	213	5.40E-10
Butylbenzylphthalate	0.746	47600[b]	1.57E-10
Chrysene	0.0122	20600	5.92E-12
		Total Excess Cancer Risk	**9E-09**

[a] SSLs from NMED (2012, 219971).

[b] EPA regional screening level (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

Table 4
Construction Worker Noncarcinogenic Screening Evaluation for AOC 01-007(k)

COPC	EPC (mg/kg)	Construction Worker SSL[a] (mg/kg)	HQ
Antimony	1.23(U)	124	0.0099
Chromium	7.28	465,000[b]	0.000016
Copper	20.8	12,400	0.0017
Lead	18.6	800	0.023
Mercury	0.102	92.9	0.0011
Nickel	6.19	6190	0.001
Nitrate	0.747	496000	0.0000015
Perchlorate	0.00166	217	0.0000076
Selenium	0.557	1550	0.00036
Zinc	55.02	92,900	0.00059
Acetone	0.00318	221,000	0.000000014
Aroclor-1254	0.00461	4.36	0.0011
Benzoic acid	0.47	952,000[c]	0.00000049
Bis(2-ethylhexyl)phthalate	0.386	4760	0.000081
Diethylphthalate	0.139	191,000	0.00000073
Di-n-butyl phthalate	0.262	23,800	0.000011
Fluoranthene	0.0166	8910	0.0000019
Methylene chloride	0.00543	1120	0.0000048
Pyrene	0.0177	6880	0.0000026
		HI	**0.04**

[a] SSLs from NMED (2012, 219971).

[b] SSL for chromium(III) (NMED 2012, 219971).

[c] Construction worker SSL calculated using toxicity value from EPA regional screening tables (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm) and equation and parameters from NMED (2012, 219971).

Table 5
Residential Carcinogenic Screening Evaluation for AOC 01-007(k)

COPC	EPC (mg/kg)	Residential SSL[a] (mg/kg)	Excess Cancer Risk
Aroclor-1248	0.0415	2.22	1.87E-07
Aroclor-1260	0.0132	2.22	5.95E-08
Benzo(a)anthracene	0.0163	1.48	1.10E-07
Benzo(b)fluoranthene	0.0115	1.48	7.77E-08
Bis(2-ethylhexyl)phthalate	0.386	347	1.11E-08
Butylbenzylphthalate	0.746	2600[b]	2.87E-09
Chrysene	0.0122	148	8.24E-10
		Total Excess Cancer Risk	**4E-07**

[a] SSLs from NMED (2012, 219971).

[b] EPA regional screening level (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

Table 6
Residential Noncarcinogenic Screening Evaluation for AOC 01-007(k)

COPC	EPC (mg/kg)	Residential SSL[a] (mg/kg)	HQ
Antimony	1.23(U)	31.3	0.039
Chromium	7.28	117,000[b]	0.000062
Copper	20.8	3130	0.0066
Lead	18.6	400	0.047
Mercury	0.102	23.5	0.0043
Nickel	6.19	1560	0.004
Nitrate	0.747	125000	0.000006
Perchlorate	0.00166	54.8	0.00003
Selenium	0.557	391	0.0014
Zinc	55.02	23,500	0.0023
Acetone	0.00318	66,600	0.000000048
Aroclor-1254	0.00461	1.12	0.0041
Benzoic acid	0.47	240,000[c]	0.000002
Diethylphthalate	0.139	48,900	0.0000028
Di-n-butyl phthalate	0.262	6110	0.000043
Fluoranthene	0.0166	2290	0.0000072
Methylene chloride	0.00543	409	0.000013
Pyrene	0.0177	1720	0.00001
		HI	**0.1**

[a] SSLs from NMED (2012, 219971).

[b] SSL for chromium(III) (NMED 2012, 219971).

[c] EPA regional screening level (http://www.epa.gov/region06/6pd/rcra_c/pd-n/screen.htm).

Table 7
Minimum ESL Comparison for AOC 01-007(k)

COPC	EPC	ESL	Receptor	HQ
Inorganic Chemicals (mg/kg)				
Antimony	1.23(U)	0.05	Plant	**24.6**
Chromium	8.23	28	Robin (insectivore)	0.29
Copper	28.2	15	Robin (insectivore)	**1.88**
Lead	19.4	14	Robin (insectivore)	**1.39**
Mercury	0.0891	0.013	Robin (insectivore)	**6.85**
Nickel	6.81	9.7	Montane shrew	**0.7**
Selenium	0.557	0.52	Plant	**1.07**
Zinc	91.5	48	Robin (insectivore)	**1.91**
Organic Chemicals (mg/kg)				
Acetone	0.00883	1.2	Deer mouse	0.0074
Arcolor-1248	0.0415	0.0072	Montane shrew	**5.76**
Aroclor-1254	0.0339	0.041	Robin (insectivore)	**0.83**
Aroclor-1260	0.0132	0.14	Red fox	0.094
Benzo(a)anthracene	0.0163	0.8	Robin (herbivore)	0.02
Benzo(b)fluoranthene	0.0115	18	Plant	0.00064
Bis(2-ethylhexyl)phthalate	0.154	0.02	Robin (insectivore)	**7.7**
Butylbenzylphthalate	0.746	90	Montane shrew	0.0083
Chrysene	0.0122	2.4	Montane shrew	0.0051
Di-n-butyl phthalate	0.404	0.011	Robin (insectivore)	**36.7**
Fluoranthene	0.0166	10	Earthworm	0.0017
Methylene chloride	0.00643	2.6	Deer mouse	0.0025
Pyrene	0.0177	10	Earthworm	0.0018
Radionuclides (pCi/g)				
Plutonium-239/240	0.038	47	Earthworm	0.00081
Tritium	0.098	36,000	Plant	0.0000027
Uranium-235/236	0.0213	55	Earthworm	0.00039

Notes: Bolded values indicate HQs greater than 0.3 and COPCs retained as chemicals of potential ecological concern.