EMID-702678

DEPARTMENT OF ENERGY
Environmental Management Los Alamos Field Office (EM-LA)
Los Alamos, New Mexico 87544

EMLA-23-BF142-2-1

April 5, 2023

Mr. Rick Shean
Acting Bureau Chief
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505-6303

Dear Mr. Shean:

Subject: Request for Certificates of Completion for One Solid Waste Management Unit (SWMU 31-001) and Three Areas of Concern [AOCs 00-030(eS), 00-030(f), and 00-030(h)] in the Pueblo Canyon Aggregate Area

Reference(s):
1. Los Alamos National Laboratory, September 2010. "Phase II Investigation Report for Pueblo Canyon Aggregate Area," Los Alamos National Laboratory document LA-UR-10-6411, Los Alamos, New Mexico
2. New Mexico Environment Department letter, J.P. Bearzi to G.J. Rael and M.J. Graham, "Notice of Approval with Modifications, Pueblo Canyon Aggregate Area Phase II Investigation Report," dated December 23, 2010
3. New Mexico Environment Department, November 2022. "Risk Assessment Guidance for Site Investigations and Remediation, Volume 1, Soil Screening Guidance for Human Health Risk Assessments," Hazardous Waste Bureau and Ground Water Quality Bureau, Santa Fe, New Mexico

In accordance with Section XXI of the 2016 Compliance Order on Consent (Consent Order), the U.S. Department of Energy (DOE) is requesting certificates of completion without controls for the following areas of concern (AOCs) and solid waste management unit (SWMU) within the Pueblo Canyon Aggregate Area, which fall under the Consent Order's Historical Sites Completion Campaign:

- AOC 00-030(eS), Septic Tank
- AOC 00-030(f), Septic Tank
- AOC 00-030(h), Former Septic tank (near the Immaculate Heart of Mary Catholic Church's parking lot)
- SWMU 31-001, Soil Contamination from former Septic Tank

All four sites were recommended for corrective action complete without controls in the "Phase II Investigation Report for Pueblo Canyon Aggregate Area" (hereafter the Phase II IR) (Reference 1). The Phase II IR concluded that the nature and extent of contamination are defined at SWMU 31-001 and at AOCs 00-030(eS), 00-030(f), and 00-030(h). In addition, the Phase II IR concluded that the above-mentioned AOCs and SWMU pose no potential

unacceptable risks or doses to human health under the recreational and residential scenarios and pose no potential unacceptable risk to ecological receptors.

The Phase II IR (Reference 1) was approved with modifications in the New Mexico Environment Department's (NMED's) "Notice of Approval with Modifications, Pueblo Canyon Aggregate Area Phase II Investigation Report" letter dated December 23, 2010 (Reference 2). The approval with modifications indicated that the vapor-intrusion pathway into indoor air under a residential scenario needed to be evaluated for all sites in order to qualify for corrective action complete without controls. The approval with modifications further indicated that AOC 00-030(f) did not qualify for corrective action complete without controls because the exposure point concentration for manganese exceeded the construction worker soil screening level. Also, the approval with modifications noted that the human health risk evaluation for AOC 00-030(h) did not include the results from one sample location with elevated polycyclic aromatic hydrocarbons (PAHs) and that the site would not meet the requirements for corrective action complete without controls if those results had been included.

This request for certificates of completion responds to the issues identified by NMED in their approval with modifications (Reference 2).

Enclosure 1 presents evaluations of the vapor-intrusion pathway into indoor air under a residential scenario for AOCs 00-030(eS), 00-030(f), and 00-030(h), and SWMU 31-001, as requested in the approval with modifications (Reference 2). Enclosure 1 indicates AOCs 00-030(eS), 00-030(f), and 00-030(h) meet the conditions in NMED's "Risk Assessment Guidance for Site Investigations and Remediation, Volume 1, Soil Screening Guidance for Human Health Risk Assessments" for qualitative evaluation of the vapor-intrusion pathway (Reference 3). The qualitative evaluations in Enclosure 1 show the vapor-intrusion pathway is potentially complete for these sites, but no further evaluation to quantify potential risk is needed. Enclosure 1 indicates the vapor-intrusion pathway is not potentially complete at SWMU 31-001 and further evaluation of the pathway at this site was not required. The evaluations in Enclosure 1, therefore, meet the conditions specified in NMED's approval with modifications to qualify for corrective actions complete without controls (Reference 2).

Enclosure 2 presents a human health risk screening evaluation of AOC 00-030(f) for the construction worker scenario. The results of this evaluation indicate no unacceptable risk under the construction worker scenario for this site.

Enclosure 3 presents an updated human health risk screening evaluation for AOC 00-030(h) based on all sampling data collected for this site. The risk evaluation presented in Enclosure 3 shows that AOC 00-030(h) does not pose an unacceptable noncarcinogenic risk under the residential scenario. Although the evaluation indicates potential unacceptable carcinogenic risk due to PAHs, the evaluation concludes that the PAHs are not present as a result of past site operations or releases from AOC 00-030(h). Section XXI.G of the Consent Order identifies conditions under which DOE may request a certificate of completion without controls for a site that exceeds residential risk targets for contaminants that are not attributable to the site. In order to make such a request, DOE must provide the following information:

1. The request must indicate those contaminants for which an acceptable risk level under a residential scenario was reached during corrective action activities at the site.

2. The request must indicate those contaminants for which an acceptable risk level under a residential scenario was not reached during corrective action activities at the site.

3. The request must indicate how DOE will notify the current property owner (if property is not owned by DOE) of the certificate of completion without controls, including any contaminant(s) identified at the site in number 2 above. NMED must be provided with a copy of this notification.

Enclosure 3 indicates those contaminants for which acceptable risk under the residential scenario was reached during corrective action (item 1 above) and those contaminants for which acceptable risk was not reached during corrective action (item 2 above). AOC 00-030(h) poses an acceptable carcinogenic risk level under a residential scenario for all contaminants except five PAHs. PAHs contributing to unacceptable carcinogenic risk at AOC 00-030(h) include benzo(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; dibenz(a,h)anthracene; and indeno(1,2,3-cd)pyrene.

With respect to item 3 above, AOC 00-030(h) is located on property owned by the Archdiocese of Santa Fe Real Estate Corporation. Upon receipt of the certificate of completion without controls, DOE will submit a written notification to the property owner. The notification will provide a summary of the human-health risk screening evaluation results and will include a copy of this request for certificate of completion and a copy of the certificate of completion.

If you have any questions, please contact Christian Maupin at (505) 695-4281 (christian.maupin@em-la.doe.gov) or Cheryl Rodriguez at (505) 414-0450 (cheryl.rodriguez@em.doe.gov).

Sincerely,

ARTURO DURAN

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Date: 2023.04.04 11:44:37 -06'00'

Arturo Q. Duran
Compliance and Permitting Manager
U.S. Department of Energy
Environmental Management
Los Alamos Field Office

Enclosures(s): Two hard copies with electronic files
1. Evaluation of Vapor-Intrusion Pathway for Areas of Concern 00-030(eS), 00-030(f), and 00-030(h) and Solid Waste Management Unit 31-001 (EM2023-0140)
2. Evaluation of Construction Worker Risk for Area of Concern 00-030(f) in the Pueblo Canyon Aggregate Area (EM2023-0140)
3. Evaluation of Human Health Risk for Area of Concern 00-030(h) in the Pueblo Canyon Aggregate Area (EM2023-0140)
4. Attachment 1 – ProUCL input and output files for Area of Concern 00-030(h)

cc (letter and enclosure[s] emailed):
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Enclosure 1

Evaluation of Vapor-Intrusion Pathway for
Areas of Concern 00-030(eS), 00-030(f), and
00-030(h) and Solid Waste Management Unit 31-001

Enclosure 1
Evaluation of Vapor-Intrusion Pathway for
Areas of Concern 00-030(eS), 00-030(f), and 00-030(h) and Solid Waste Management Unit 31-001

The New Mexico Environment Department's (NMED's) approval with modifications for the "Phase II Investigation Report for Pueblo Canyon Aggregate Area" (hereafter the Phase II IR) (NMED 2010, 111493) requires an evaluation of the vapor-intrusion pathway in order to make a determination that corrective action is complete without controls. NMED's "Risk Assessment Guidance for Site Investigations and Remediation Volume 1, Soil Screening Guidance for Human Health Risk Assessments" (NMED 2022, 702484) allows the evaluation to be qualitative for a potentially complete pathway if the following criteria are met:

- Volatile and toxic compounds are minimally detected.
- Concentrations are below NMED's vapor-intrusion screening levels for soil-gas and/or groundwater and no suspected source(s) exist for volatile and toxic compounds.
- Concentrations are decreasing with depth (for soil).

The vapor-intrusion pathway was evaluated for volatile and toxic organic chemicals detected at Areas of Concern (AOCs) 00-030(eS), 00-030(f), and 00-030(h). Volatile and toxic chemicals include those having a Henry's law constant of approximately 1×10^{-5} atm-m^3/mol or greater, a molecular weight of approximately 200 g/mol or less, and known to pose a potential cancer risk or noncarcinogenic hazard through the inhalation pathway (NMED 2022, 702484).

All samples collected at Solid Waste Management Unit (SWMU) 31-001 are located on a canyon slope and this location is not suitable for placement of a structure. Therefore, the vapor-intrusion pathway is incomplete and was not evaluated for this site. All of the remaining three sites are located within the Los Alamos townsite, and structures are present or potentially present. Therefore, the vapor-intrusion pathway is potentially complete for these sites. Based on consideration of the above criteria, the vapor-intrusion pathway was evaluated qualitatively. Because only bulk soil data are available for these sites, the vapor-intrusion screening levels are not applicable for the evaluation. The qualitative evaluations consider the magnitude, frequency, and vertical distribution of detections, as well as the site status with respect to contaminant sources.

AOC 00-030(eS)

AOC 00-030(eS) consists of a former septic tank, originally referred to as structure 4A (LANL 1996, 056432), that was located on private property south of Canyon Road at the Chapel Apartments. The tank was installed between 1943 and 1947 (LANL 1996, 056432). Reportedly, structure 4A served residences and may have been connected to former Technical Area 01 (TA-01) (LANL 1992, 007667). The tank ceased operating when the central wastewater treatment plant (WWTP) (SWMU 00-019) became operational in 1947 (LANL 1996, 056432). Available evidence indicates that the tank was removed when the Chapel Apartments were built in 1949 (LANL 1996, 056432). The site is currently a paved parking lot and the nearest occupied building is approximately 30 ft from the site. The vitrified-clay pipe downgradient of the tank and the steel outlet pipe located in Pueblo Canyon were still in place as of the 2010 Phase II investigation.

A total of 17 samples from 6 locations at AOC 00-030(eS) were analyzed for organic chemicals. Sample locations and results are presented in the Phase II IR (LANL 2010, 110864, Figure 6.2-3 and Table 6.2-3). Locations 00-03741, 00-25487, and 00-25488 are in a canyon-side drainage not suitable for placement of a structure and results from these locations were not used in the vapor-intrusion evaluation. Eleven volatile and toxic chemicals [acetone; benzo(a)anthracene; chloroform; 1,1-dichloroethene; isopropylbenzene; 4-isopropyltoluene; 4-methyl-2-pentanone; methylene chloride; naphthalene; toluene; and 1,3-xylene+1,4-xylene] were detected in samples from mesa-top locations at AOC 00-030(eS).

Acetone; chloroform; 1,1-dichloroethene; isopropylbenzene; and methylene chloride were detected in two of nine mesa-top samples with maximum concentrations of 0.064 mg/kg, 0.000604 mg/kg, 0.000896 mg/kg, 0.00603 mg/kg, and 0.0154 mg/kg, respectively. Concentrations of acetone and isopropylbenzene decreased with depth. All detected concentrations of chloroform and 1,1-dichloroethene were less than the estimated quantitation limit (EQL). The maximum concentration of methylene chloride was detected at 4.0 ft to 4.5 ft bgs and methylene chloride was not detected in any samples collected deeper than 4.5 ft bgs (as deep as 13 ft bgs).

Benzo(a)anthracene; 4-isopropyltoluene; 4-methyl-2-pentanone; naphthalene; and 1,3-xylene+1,4-xylene were detected in one of nine mesa-top samples at concentrations of 0.601 mg/kg, 0.000637 mg/kg, 0.00228 mg/kg, 0.107 mg/kg, and 0.000328 mg/kg, respectively. Concentrations of benzo(a)anthracene, 4-isopropyltoluene, 4-methyl-2-pentanone, and naphthalene decreased with depth. The detected concentration of 1,3-xylene+1,4-xylene was at a depth of 1.0 to 1.5 ft bgs, and 1,3-xylene+1,4-xylene was not detected in samples collected deeper than 1.5 ft bgs (as deep as 13 ft bgs). All detected concentrations of 4-isopropyltoluene; 4-methyl-2-pentanone; and 1,3-xylene+1,4-xylene were less than the EQL.

Toluene was detected in four of nine mesa-top samples with a maximum concentration of 0.00257 mg/kg. Concentrations of toluene decreased or did not change with depth. The maximum concentration of toluene was detected at 4.0 to 4.5 ft bgs and toluene was not detected in any samples collected deeper than 4.5 ft bgs (as deep as 13 ft bgs).

The site description does not indicate that solvents were used at this site. In addition, the septic tank has been removed and the site is inactive. Therefore, no sources of volatile and toxic chemicals are present.

The vapor-intrusion pathway is potentially complete based on NMED guidance (NMED 2022, 702484), but based on consideration of the criteria presented above (frequency and magnitude of detections, absence of sources, vertical distribution of concentrations) no additional quantitative evaluation is necessary.

AOC 00-030(f)

AOC 00-030(f) is a septic system (also referred to as structure 5 in historical reports) consisting of two septic tanks located on private property south of Canyon Road and north of Rose Street, near the United Church school building (LANL 1992, 007667). A 1943 engineering drawing labels the tanks Septic Tank No. 2 (LANL 1996, 056432). The tanks connected with sewer lines in the “Apartment Area” and handled sanitary waste from a school, a post exchange, and some of the original Ranch School buildings; it did not receive waste from TA-01 operations (LANL 1996, 056432). The tanks ceased operating when the Central WWTP (SWMU 00-019) became operational in 1947 (LANL 1992, 007667; LANL 1996, 056432). Currently, the tanks are still partially in place and are located beneath existing sidewalks and a retaining wall, which are adjacent to a building in a heavily developed area.

A total of 22 samples from 9 locations at AOC 00-030(f) were analyzed for organic chemicals. Sample locations and results are presented in the Phase II IR (LANL 2010, 110864, Table 6.3-3 and Plate 5). Locations PU-611433, PU-611434, PU-611435, and PU-611436 are on a canyon slope not suitable for placement of a structure and results from these locations were not used in the evaluation. Five volatile and toxic chemicals (acetone, benzo(a)anthracene, carbon disulfide, naphthalene, and toluene) were detected in samples from mesa-top locations at AOC 00-030(f).

Acetone, benzo(a)anthracene, and carbon disulfide were each detected in 1 of 14 mesa-top samples at concentrations of 0.00287 mg/kg, 0.149 mg/kg, and 0.00166 mg/kg respectively. Concentrations of acetone, benzo(a)anthracene, and carbon disulfide decreased with depth. Detected concentrations of acetone and carbon disulfide were below EQLs.

Naphthalene and toluene were detected in 3 of 14 mesa-top samples with maximum concentrations of 0.101 mg/kg and 0.000632 mg/kg, respectively. Concentrations of naphthalene decreased with depth. All detected concentrations of toluene were less than the EQL, and toluene was not detected at the deepest depth interval sampled (12.0 to 12.5 ft bgs).

The site description does not indicate that solvents were used at this site. In addition, the septic tanks have been partially removed and the site is inactive. Therefore, no sources of volatile and toxic chemicals are present.

The vapor-intrusion pathway is potentially complete based on NMED guidance (NMED 2022, 702484), but based on consideration of the criteria presented above (frequency and magnitude of detections, absence of sources, vertical distribution of concentrations) no additional quantitative evaluation is necessary.

AOC 00-030(h)

AOC 00-030(h) is a septic tank (structure 7) located on private property north of Canyon Road beneath the asphalt-paved west parking lot of the Immaculate Heart of Mary Catholic Church (3600 Canyon Road) approximately 60 ft from the church building (LANL 1996, 053799). Constructed of reinforced concrete, the septic tank system was 30 ft long × 20 ft wide × 12 ft deep (LANL 1996, 053799). It consisted of two chambers, a concrete baffle between the chambers, and a 6-ft × 2-ft splash box at the inlet line (LANL 1996, 053799). The septic tank probably served the areas between Canyon Road and Trinity Drive (LANL 1996, 053799; LANL 1996, 062416). Buildings within this area were associated with the special engineering detachment, which included the Fort Leonard Wood housing units, dormitories, military barracks, west mess hall, supply room, gymnasium, post office, and recreational buildings (LANL 1996, 053799). Trenches excavated across the path of the outfall in 2006 confirmed that the outlet line drained north toward Acid Canyon. The tank was used from 1945 to 1947, when the Central WWTP (SWMU 00-019) became operational (LANL 1996, 053799). The septic tank was removed in 1996 during voluntary corrective action activities (LANL 1996, 062416).

A total of 42 samples from 29 locations at AOC 00-030(h) were analyzed for organic chemicals. Sample locations and results are presented in the Phase II IR (LANL 2010, 110864, Table 6.6-3 and Plate 8). Locations 00-04811, 00-04812, 00-02456, 00-25457, 00-25458, PU-611540, PU-611893, PU-612249, PU-612250, PU-612251, and PU-612254 are on a canyon side or in a drainage that are not suitable locations for placement of a structure. Therefore, results from these locations were not used in the evaluation. Thirteen volatile and toxic chemicals [acetone; benzo(a)anthracene; chlorobenzene, 1,4-dichlorobenzene; ethylbenzene; 4-isopropyltoluene; methylene chloride; naphthalene; toluene; trichloroethene; trichlorofluoromethane; 1,2,4-trimethylbenzene; and 1,3-xylene+1,4-xylene] were detected in samples from mesa-top locations at AOC 00-030(h).

Acetone was detected in 6 of 24 mesa-top samples with a maximum concentration of 0.083 mg/kg. Only 1 depth was sampled at most locations where acetone was detected. The maximum concentration was detected at location 00-04816. Acetone concentrations decreased with depth at location 00-04816 and acetone was not detected in the 2 deepest samples collected at this location, which are also deeper than the sample depths at all locations where only 1 depth was sampled.

Benzo(a)anthracene was detected in 11 of 32 mesa-top samples with a maximum concentration of 7.5 mg/kg. The maximum concentration was detected at location PU-612252 at a depth of 0.5 to 1.0 ft bgs and concentrations decreased with depth at this location. Concentrations decreased with depth at 1 other location and increased with depth at 3 locations and only one depth was sampled at 4 locations. The deepest sample, having a detection of benzo(a)anthracene, was collected from a depth of 10.5 to 11.0 ft bgs at location 00-04807 (0.047 mg/kg). Benzo(a)anthracene was not detected in 7 deeper samples collected from depths ranging from 11.0 to 18.5 ft bgs.

Chlorobenzene was detected in 2 of 24 mesa-top samples with a maximum concentration of 0.005 mg/kg. The maximum concentration was detected in the sample from 6.5 to 7.0 ft at location 00-04807, and chlorobenzene was not detected in the deeper sample from this location (10.5 to 11.0 ft bgs).

Dichlorobenzene[1,4-] was detected in 1 of 32 mesa-top samples at a concentration of 0.002 mg/kg. Dichlorobenzene[1,4-] was detected in the sample from 10.5 to 11.0 ft at location 00-04807 and was not detected in 5 deeper samples collected from depths ranging from 13.5 to 18.5 ft bgs.

Ethylbenzene; 4-isopropyltoluene; and 1,2,4-trimethylbenzene were detected in 1 of 24 mesa-top samples at concentrations of 0.002 mg/kg, 0.0094 mg/kg, and 0.002 mg/kg, respectively. Concentrations of ethylbenzene; 4-isopropyltoluene; and 1,2,4-trimethylbenzene decreased with depth.

Methylene chloride was detected in 2 of 24 mesa-top samples with a maximum concentration of 0.007 mg/kg. Only 1 depth was sampled at both locations where methylene chloride was detected. The detected concentrations were from 13.0 to 13.5 ft bgs. Methylene chloride was not detected in 2 deeper samples collected from 16.0 to 16.5 ft bgs and from 18.0 to 18.5 ft bgs.

Naphthalene was detected in 4 of 32 mesa-top samples with a maximum concentration of 0.74 mg/kg. The maximum concentration was detected at location PU-612252 and concentrations decreased with depth at this location. Concentrations increased with depth at 1 other location, and only 1 depth was sampled at 2 locations. The deepest sample having a detection of naphthalene was collected from a depth of 9.5 to 10.0 ft bgs at location 00-04808 (0.07 mg/kg). Naphthalene was not detected in 9 deeper samples collected from depths ranging from 10.0 to 18.5 ft bgs.

Toluene was detected in 7 of 24 mesa-top samples with a maximum concentration of 0.009 mg/kg. The maximum concentration was detected at location 00-04810 and concentrations decreased with depth.

Concentrations decreased with depth at 2 locations, including location 00-04810 where the maximum concentration was detected, increased with depth at 1 location, and only 1 depth was sampled at 3 locations. The deepest sample having a detection of toluene was collected from a depth of 11.5 to 12.0 ft bgs. Toluene was not detected in 6 deeper samples collected from depths ranging from 13.5 to 18.5 ft bgs.

Trichloroethene was detected in 11 of 24 mesa-top samples with a maximum concentration of 0.009 mg/kg. Only 1 depth was sampled at most locations where trichloroethene was detected. The deepest sample with a detection was from 11.5 to 12 ft bgs at location 00-04805, and trichloroethene was not detected in deeper samples from 13.5 ft bgs collected at adjacent locations 00-04813 and 00-04814.

All detections of trichloroethene were in 1996 Resource Conservation and Recovery Act (RCRA) facility investigation (RFI) samples and trichloroethene was not detected in any of the 2006 or 2010 investigation samples.

Trichlorofluoromethane was detected in 2 of 24 mesa-top samples with a maximum concentration of 0.002 mg/kg. Trichlorofluoromethane was detected in samples from 6.5 to 7.0 ft bgs and 10.5 to 11.0 ft bgs at location 00-04807 and concentrations did not change with depth. Trichlorofluoromethane was not detected in 6 deeper samples collected from depths ranging from 11.5 to 18.5 ft bgs.

Xylene[1,3-]+1,4-xylene was detected in 7 of 24 mesa-top samples with a maximum concentration of 0.012 mg/kg. The maximum concentration was detected at location 00-04810, and concentrations decreased with depth at this location. Concentrations increased with depth at 1 other location and only 1 depth was sampled at 3 locations. The maximum depth where 1,3-xylene+1,4-xylene was detected was 11.5 to 12.0 ft bgs and it was not detected in the deepest sample at 18.0 to 18.5 ft bgs. All detections of 1,3-xylene+1,4-xylene were in 1996 RFI samples and 1,3-xylene+1,4-xylene was not detected in any of the 2006 or 2010 investigation samples.

The site description does not indicate that solvents were used at this site. In addition, the septic tank has been removed and the site is inactive. Therefore, no sources of volatile and toxic chemicals are present.

The vapor-intrusion pathway is potentially complete based on NMED guidance (NMED 2022, 702484), but based on consideration of the criteria presented above (frequency and magnitude of detections, absence of sources, vertical distribution of concentrations) no additional quantitative evaluation is necessary.

Summary

Volatile and toxic chemicals at AOCs 00-030(eS), 00-030(f), and 00-030(h) were generally detected infrequently and at low concentrations. Concentrations decreased with depth on a sitewide basis at most sampling locations. The magnitude, frequency, and vertical distribution of detections is not representative of a continuing source of volatile and toxic chemicals for intrusion into buildings and is consistent with the historical removal of sources of contamination at the sites. Based on these evaluations, the vapor-intrusion pathway at AOCs 00-030(eS), 00-030(f), and 00-030(h) is potentially complete based on NMED guidance (NMED 2022, 702484), and no additional quantitative evaluation is necessary.

References

LANL (Los Alamos National Laboratory), May 1992. “RFI Work Plan for Operable Unit 1071,” Los Alamos National Laboratory document LA-UR-92-810, Los Alamos, New Mexico. (LANL 1992, 007667)

LANL (Los Alamos National Laboratory), March 1996. “Voluntary Corrective Action Completion Plan for Potential Release Sites 0-030(d,h,i,j,k,n,o,p), Town Site Septic Tank Systems,” Los Alamos National Laboratory document LA-UR-96-936, Los Alamos, New Mexico. (LANL 1996, 053799)

LANL (Los Alamos National Laboratory), June 1996. “RFI Report for Potential Release Sites, 0-030(eN,eS,f),” Los Alamos National Laboratory document LA-UR-96-2135, Los Alamos, New Mexico. (LANL 1996, 056432)

LANL (Los Alamos National Laboratory), September 1996. “Voluntary Corrective Action Completion Report for Potential Release Sites 0-030(h,i,n,o,p), Group 0-3 Septic Tanks,” Los Alamos National Laboratory document LA-UR-96-3351, Los Alamos, New Mexico. (LANL 1996, 062416)

LANL (Los Alamos National Laboratory), September 2010. “Phase II Investigation Report for Pueblo Canyon Aggregate Area,” Los Alamos National Laboratory document LA-UR-10-6411, Los Alamos, New Mexico. (LANL 2010, 110864)

NMED (New Mexico Environment Department), December 23, 2010. “Notice of Approval with Modifications, Pueblo Canyon Aggregate Area Phase II Investigation Report,” New Mexico Environment Department letter to G.J. Rael (DOE-LASO) and M.J. Graham (LANL) from J.P. Bearzi (NMED-HWB), Santa Fe, New Mexico. (NMED 2010, 111493)

NMED (New Mexico Environment Department), November 2022. “Risk Assessment Guidance for Site Investigations and Remediation, Volume 1, Soil Screening Guidance for Human Health Risk Assessments,” Hazardous Waste Bureau and Ground Water Quality Bureau, Santa Fe, New Mexico. (NMED 2022, 702484)

Enclosure 2

Evaluation of Construction Worker Risk for
Area of Concern 00-030(f) in the Pueblo Canyon Aggregate Area

Enclosure 2
Evaluation of Construction Worker Risk for
Area of Concern 00-030(f) in the Pueblo Canyon Aggregate Area

Area of Concern (AOC) 00-030(f) was investigated by Los Alamos National Laboratory (LANL) under the Compliance Order on Consent (Consent Order) as part of the Pueblo Canyon Aggregate Area investigation. The results of this investigation were documented by LANL in the "Investigation Report for Pueblo Canyon Aggregate Area" (LANL 2008, 103243.34) and the Phase II Investigation Report for Pueblo Canyon Aggregate Area (hereafter the Phase II IR) (LANL 2010, 110864). The Phase II IR concluded that the nature and extent of contamination were defined for this AOC, that it posed no unacceptable risk to human health for the industrial and residential scenarios, and that it posed no unacceptable risk to ecological receptors. The New Mexico Environment Department (NMED) approved the Phase II IR with modifications on December 23, 2010 (NMED 2010, 111493). The approval with modifications indicated that AOC 00-030(f) did not qualify for corrective action complete without controls because the exposure point concentration (EPC) for manganese exceeded the construction worker soil screening level (SSL) and, therefore, would result in a construction worker hazard quotient greater than the NMED target of 1. An evaluation of human-health risk at AOC 00-030(f) under the construction worker scenario is provided below in order to determine whether this site poses a potentially unacceptable risk under the construction worker risk and whether the site can be recommended for corrective action complete without controls.

Because the residential and construction worker scenarios both consider exposure in the depth interval 0 to 10 ft below ground surface (bgs), the chemicals of potential concern (COPCs) and EPCs presented in the Phase II IR for the residential scenario (LANL 2010, 110864), Appendix I, Table I-2.2-9) were used for the construction worker scenario. The results of the human-health screening evaluation for the construction worker scenario for AOC 00-030(f) are in Tables 1 through 3.

The total excess cancer risk for AOC 00-030(f) for the construction worker scenario is 5×10^{-7}, which is less than the NMED target risk level of 1×10^{-5} (NMED 2022, 702484). The construction worker hazard index (HI) is 1, which is equivalent to the NMED target HI of 1 (NMED 2022, 702484). EPCs for radionuclide COPCs are less than screening action levels (SALs) (LANL 2015, 600929) and the estimated total dose for the construction worker scenario is 0.3 mrem/yr.

The construction worker noncarconogenic risk at AOC 00-030(f) is primarily from manganese (hazard quotient = 1.03). Manganese was detected within the depth range of 0.0 to 10.0 ft bgs in 19 of 19 samples (8 samples collected from soil and 11 collected from unit Qbt 3 of the Bandelier Tuff), and concentrations ranged from 128 to 1160 mg/kg (128 to 242 mg/kg in soil and 266 to 1160 mg/kg in Qbt 3). All soil results were below the soil background value (BV) (671 mg/kg) (LANL 1998, 059730). Six of 11 Qbt 3 results (266 to 433 mg/kg) were below the Qbt 2,3,4 BV (482 mg/kg).

The maximum manganese concentration was detected in sample CAPU-10-12606 collected from 0.8 to 1.8 ft bgs at location PU-611435. The medium for this sample was identified as Qbt 3 and the results were compared with the Qbt 2,3,4 BV and Qbt 2,3,4 background data during the COPC identification process. Statistical tests indicated site concentrations of manganese in tuff were statistically different from background and manganese was identified as a COPC. The borehole log for this location is presented in Figure 1 and shows fill with organic material (roots, twigs, and bark) from 0.0 to 1.3 ft bgs and the top of the Qbt 3 tuff unit at 1.3 ft bgs. Therefore, the sample collection interval of 0.8 to 1.8 ft bgs includes both fill and Qbt 3, and the sample description provided on the sample collection log for this sample (LANL 2010, 110864, Appendix G) indicates the sample as a mixture of colluvium and tuff. Identification of the sample medium as Qbt 3 for purposes of background comparisons may be overly conservative.

The Qbt 2,3,4 BV was calculated using data from samples of unweathered tuff (LANL 1998, 059730) and may not be representative of samples collected at or immediately beneath the soil/tuff interface, which would consist of weathered tuff. The presence of organic material in this sample interval may be associated with reducing conditions that could be associated with elevated manganese concentrations. All manganese results above BV at AOC 00-030(f) are from shallow Qbt 3 samples (3.5 ft bgs or less) and the borehole logs identify the presence of organic material at all locations. Because all Qbt 3 results above the Qbt 2,3,4 BV are equivalent to or less than the maximum soil background concentration (1100 mg/kg) and all but one of the results is less than the soil BV, the results are likely representative of natural background conditions rather than indicative of a contaminant release. Manganese was identified as a COPC based on comparison of results from samples, possibly containing soil and weathered tuff and affected by reducing conditions, with background data for unweathered tuff. Manganese was not identified as a COPC in soil (i.e., it was not detected above the BV in soil) and should not be considered a COPC for AOC 00-030(f).

Inclusion of manganese as a COPC overestimates the risk to a construction worker at AOC 00-030(f). The construction worker HI without manganese is 0.2, which is less than the NMED target HI of 1 (NMED 2022, 702484).

References

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LANL (Los Alamos National Laboratory), September 2015. “Derivation and Use of Radionuclide Screening Action Levels, Revision 4,” Los Alamos National Laboratory document LA-UR-15-24859, Los Alamos, New Mexico. (LANL 2015, 600929)

NMED (New Mexico Environment Department), December 23, 2010. “Notice of Approval with Modifications, Pueblo Canyon Aggregate Area Phase II Investigation Report,” New Mexico Environment Department letter to G.J. Rael (DOE-LASO) and M.J. Graham (LANL) from J.P. Bearzi (NMED-HWB), Santa Fe, New Mexico. (NMED 2010, 111493)

NMED (New Mexico Environment Department), November 2022. “Risk Assessment Guidance for Site Investigations and Remediation, Volume 1, Soil Screening Guidance for Human Health Risk Assessments,” Hazardous Waste Bureau and Ground Water Quality Bureau, Santa Fe, New Mexico. (NMED 2022, 702484)

Pueblo Canyon Aggregate Area AOC 00-030(f)							
Borehole ID: PU-611435		**TA:** AOC 00-030(f)		**Drill Depth:** 1.8 ft		**Total Pages:** 1 of 1	
Drillers: S. Muggleton and A. Stocker				**Start Date:** 3/1/2010		**End Date:** 6/28/2010	
Drilling Equipment/Method: 3-in. ID, stainless-steel hand auger bucket							
Sampling Equipment: 3-in. ID, stainless-steel hand auger bucket					**Logged By:** S. Muggleton		
Background Values (3/01/10):		**PID=** 0.2 ppm		**α=**7 dpm	**β/γ=** 909 dpm		
Background Values (6/28/10):		**PID=** 0.0 ppm		**α=**40 dpm	**β/γ=** 660 dpm		

DEPTH (ft bgs)	RECOVERY (ft/ft)	FIELD SCREENING RESULTS: PID (ppm)/gross-alpha, -beta, -gamma (dpm)	SAMPLE ID	LITHOLOGICAL DESCRIPTION	LITHOLOGICAL UNIT	NOTES
0	1.8/1.8	PID= 19		**Fill Material:** 0-1.3': Dark reddish brown (5YR 3/2) organic (roots, twigs and bark) with colluvial material consisting of poorly sorted, sand to pebbles of various lithologies (eg., granite, dacite, and quartzite).	F	Contact of fill and Qbt3 is at1.3' bgs.
1		α= <MDA	CAPU-10-12606			Sample interval is 0.8' – 1.8' bgs.
2	1.0/1.0	β/γ= <MDA	CAPU-10-12609		Qbt3	Field duplicate interval is 0.8'-1.8' bgs.
3		PID= 24.1	RE00-10-22624			Sample interval is 2.3' – 3.3' bgs.
4		α= <MDA				
5		β/γ= <MDA				
6				**Unit 3 of the Tschirege Member of the Bandelier Tuff:**		
7				AFT: Light brown (7.5YR 6/3), slightly to		
8				moderately well welded, crystal-rich, pumice		
9				and lithics present. Lithics are dacitic in		
10				composition, subangular and up to 50 mm.		
11				AFT: Light brown (7.5YR 6/3), poorly to		
12				moderately well welded, non-weathered.		
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Figure 1 Borehole log for sample location PU-611435 [source: (LANL 2010, 110864, Appendix C)]

Table 1
Construction Work Carcinogenic Screening Evaluation for AOC 00-030(f)

COPC	EPC[a] (mg/kg)	Construction Worker SSL[b] (mg/kg)	Cancer Risk
Beryllium	0.889	2710	3.28E-09
Chromium	22	468[c]	4.70E-07
Aroclor-1254	0.0135	85.3	1.58E-04
Aroclor-1260	0.00969	85.3	1.14E-09
Benzo(a)anthracene	0.244	240	1.02E-08
Benzo(a)pyrene	0.184	173	1.06E-08
Benzo(b)fluoranthene	0.331	240	1.38E-08
Benzo(k)fluoranthene	0.124	2310	5.37E-10
BHC[alpha-][d]	0.001	29.7	3.37E-10
Chlordane[alpha-]	0.0028	623[e]	4.49E-11
Chlordane[gamma-]	0.00255	623[e]	4.09E-11
Chrysene	0.29	23,100	1.26E-10
DDD[4,4'-][f]	0.041	778	5.27E-10
DDE[4,4'-]	0.0371	549	6.76E-10
DDT[4,4'-]	0.102	659	1.55E-09
Dibenz(a,h)anthracene	0.0549	24	2.29E-08
Heptachlor epoxide	0.0016	27[g]	5.93E-10
Indeno(1,2,3-cd)pyrene	0.118	240	4.92E-09
Methylene chloride	0.0013	89,600	1.45E-13
		Total Excess Cancer Risk	**5E-07**

[a] EPCs from LANL (LANL 2010, 110864, Appendix I, Table I-2.2-9).

[b] SSLs from NMED (NMED 2022, 702484) unless otherwise noted.

[c] SSL for total chromium.

[d] BHC = Benzene hexachloride.

[e] Chlordane used as surrogate based on structural similarity.

[f] DDT[4,4'-] = dichlorodiphenyltrichloroethane[4,4'].

[g] Construction worker SSLs were calculated using toxicity value from U.S. Environmental Protection Agency regional screening tables (https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables), and the equation and parameters from NMED (NMED 2022, 702484).

Table 2
Construction Worker Noncarcinogenic Screening Evaluation for AOC 00-030(f)

COPC	EPC[a] (mg/kg)	Construction Worker SSL[b] (mg/kg)	HQ[c]
Antimony	1.07	142	7.54E-03
Beryllium	0.889	148	6.01E-03
Chromium	22	134[d]	1.64E-01
Cyanide (total)	0.185	12.1	1.53E-02
Lead	17.6	800	2.20E-02
Manganese	476	464	1.03E+00
Mercury	0.0721	77.1	9.35E-04
Nitrate	2.6	566,000	4.59E-06
Perchlorate	0.00209	248	8.43E-06
Selenium	1.77	1750	1.01E-03
Acenaphthene	0.0632	15,100	4.19E-06
Acetone	0.017	242,000	7.02E-08
Anthracene	0.0623	75,300	8.27E-07
Aroclor-1254	0.0135	4.91	2.75E-03
Benzo(a)pyrene	0.184	15	1.23E-02
Benzo(g,h,i)perylene	0.116	7530[e]	1.54E-05
Benzoic acid	0.35	1,100,000[f]	3.18E-07
BHC[alpha-][g]	0.001	2150	4.65E-07
Chlordane[alpha-]	0.0028	153[h]	1.83E-05
Chlordane[gamma-]	0.00255	153[h]	1.67E-05
DDT[4,4'-][i]	0.102	162	6.30E-04
Fluoranthene	0.442	10,000	4.42E-05
Fluorene	0.054	10,000	5.40E-06
Heptachlor epoxide	0.0016	4.6[f]	3.48E-04
Isopropyltoluene[4-]	0.00082	2740[j]	2.99E-07
Methoxychlor[4,4'-]	0.0089	1300[f]	6.85E-06
Methylene chloride	0.0013	1210	1.07E-06
Methylnaphthalene[2-]	0.0598	1000	5.98E-05
Naphthalene	0.101	159	6.35E-04
Phenanthrene	0.233	8070	2.89E-05
Pyrene	0.393	7530	5.22E-05

Table 2 (continued)

COPC	EPC[a] (mg/kg)	Construction Worker SSL[b] (mg/kg)	HQ[c]
Toluene	0.000771	14,000	5.51E-08
Trimethylbenzene[1,2,4-]	0.0017	600[f]	2.83E-06
Xylene[1,3-]+Xylene[1,4-]	0.000364	798[k]	4.56E-07
		HI	**1**

[a] EPCs from LANL (LANL 2010, 110864, Appendix I, Table I-2.2-9).

[b] SSLs from NMED (NMED 2022, 702484), unless otherwise noted.

[c] HQ = Hazard quotient.

[d] SSL for total chromium.

[e] Pyrene used as a surrogate based on structural similarity.

[f] Construction worker SSLs were calculated using toxicity value from U.S. Environmental Protection Agency regional screening tables (https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables), and the equation and parameters from NMED (NMED 2022, 702484).

[g] BHC = Benzene hexachloride.

[h] Chlordane used as surrogate based on structural similarity.

[i] DDT[4,4'-] = Dichlorodiphenyltrichloroethane[4,4'].

[j] Isopropylbenzene used as surrogate based on structural similarity.

[k] Xylenes used as surrogate based on structural similarity.

Table 3
Construction Worker Radionuclide Screening Evaluation for AOC 00-030(f)

COPC	EPC[a] (pCi/g)	Construction Worker SAL[b] (pCi/g)	Dose (mrem/yr)
Americium-241	0.701	230	7.62E-02
Cesium-137	0.31	37	2.09E-01
		Total Dose	**0.3**

[a] EPCs from LANL (LANL 2010, 110864, Appendix I, Table I-2.2-9).

[b] SALs from LANL (LANL 2015, 600929).

Enclosure 3

Evaluation of Human Health Risk
for Area of Concern 00-030(h) in the
Pueblo Canyon Aggregate Area

Enclosure 3
Evaluation of Human Health Risk for
Area of Concern 00-030(h) in the Pueblo Canyon Aggregate Area

INTRODUCTION

Area of Concern (AOC) 00-030(h) was investigated by Los Alamos National Laboratory (LANL or the Laboratory) under the Compliance Order on Consent (Consent Order) as part of the Pueblo Canyon Aggregate Area investigation. The results of this investigation were documented by LANL in the "Investigation Report for Pueblo Canyon Aggregate Area" (LANL 2008, 103243.34). Based on these results, contaminated soil was excavated and removed from the site as part of the Phase II investigation. The results of the Phase II investigation were documented in the "Phase II Investigation Report for Pueblo Canyon Aggregate Area" (hereafter the Phase II IR) (LANL 2010, 110864). The Phase II IR concluded that the nature and extent of contamination were defined for this AOC, that it posed no unacceptable risk to human health under the recreational and residential scenarios, and that it posed no unacceptable risk to ecological receptors. Based on these conclusions, the Phase II IR recommended AOC 00-030(h) for corrective action complete without controls.

The results from the two samples collected at one location (location PU-612252) were not included in the risk evaluation presented in the Phase II IR because they were deemed to be nonrepresentative of site conditions. Specifically, the sample location was near the former drainline associated with AOC 00-030(h) but the samples were stratigraphically higher than the drainline and not representative of soil potentially impacted by site releases. The samples from this location contained elevated concentrations of polycyclic aromatic hydrocarbons (PAHs), which were believed to be associated with runoff from an adjacent asphalt parking area.

The New Mexico Environment Department (NMED) approved the Phase II IR with modifications on December 23, 2010 (NMED 2010, 111493). The approval with modifications indicated that the results from samples collected at location PU-612252 should have been included in the risk evaluation and that the site would not meet the requirements for corrective action complete without controls if these results had been included.

Section XXI.G of the 2016 Compliance Order on Consent (Consent Order) establishes conditions under which a certificate of completion without controls may be requested by the U.S. Department of Energy for a site where residential risk targets are exceeded. An updated human-health risk evaluation for AOC 00-030(h) including the results from location PU-612252 is presented below. This evaluation supports a request for certificate of completion without controls under Section XXI.G of the Consent Order.

This assessment was performed using the results of soil sampling at AOC 00-030(h) presented in the Phase II IR.

RISK-SCREENING ASSESSMENT

The Phase II IR evaluated human-health risk for the recreational and residential scenarios. The risk-screening assessment presented below is similar to that presented in the Phase II IR, except that, as directed in NMED's approval with modifications, it includes the results from the two samples collected at location PU-612252. The following sections address exposure point concentrations (EPCs), the results of the risk-screening assessment, and an evaluation of the results.

Exposure Point Concentrations

EPCs are based on concentrations of chemicals of potential concern (COPCs) detected in the depth interval 0 to 1 ft below ground surface (bgs) for the recreational scenario and 0 to 10 ft bgs for the residential scenario. Every constituent detected in the samples from location PU-612252 was detected in samples from other locations so the inclusion of data from location PU-612252 does not result in any additions to the COPCs in the Phase II IR, and none of the constituents detected at location PU-612252 were eliminated as COPCs. Therefore, the COPCs identified in the Phase II IR were used in EPC calculations. If there are eight or more samples having five or more detections, the 95% upper confidence limit (UCL) of the mean concentration is used as the EPC. If there are too few samples or detections to calculate a UCL, the EPC is the maximum detected concentration, or the maximum detection limit if there are no detections.

For the recreational scenario, only four samples were collected in the interval 0 to 1 ft bgs, so UCLs could not be calculated. EPCs for the recreational scenario are presented in Table 1. For the residential scenario, more than eight samples were collected for all analyses so UCLs were calculated if there were five or more detections. UCLs were calculated using the Environmental Protection Agency (EPA) ProUCL software package, version 5.2 (EPA 2022, 702275). EPCs for the residential scenario are in Table 2. ProUCL input and output files are provided in Attachment 1 (on CD).

Risk and Dose Screening Results

Carcinogenic and noncarcinogenic risk and dose were evaluated for the recreational and residential scenarios. SSLs for the recreational scenario are those developed by the Laboratory (N3B 2020, 701072). SSLs for the residential scenario were taken from NMED's "Risk Assessment Guidance for Site Investigations and Remediation" (NMED 2022, 702484), if available. If NMED's guidance did not contain an SSL for a particular COPC, then the U.S. Environmental Protection Agency's (EPA's) regional screening levels (https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables) were used. In cases where neither NMED nor EPA SSLs were available, SSLs for surrogate chemicals having structural similarity were used. Dose from radionuclide COPCs was evaluated using screening action levels (SALs) developed by the Laboratory (LANL 2015, 600929).

Risk was evaluated by calculating the total excess cancer risk of carcinogenic COPCs, the hazard index (HI) of noncarcinogenic COPCs, and the total dose of radionuclide COPCs. For carcinogenic chemicals, the risk due to each chemical was a calculated quotient of the EPC divided by the SSL and multiplied by 1×10^{-5}. The sum of the individual chemical carcinogenic risks was compared with the NMED target cancer risk level of 1×10^{-5} (NMED 2022, 702484). For noncarcinogenic chemicals, a hazard quotient (HQ) was generated for each COPC by dividing the EPC by the SSL. The HQs were summed to generate an HI. The HI was compared with the NMED target HI of 1 (NMED 2022, 702484). COPCs having both carcinogenic and noncarcinogenic SSLs were evaluated for both exposure endpoints. The dose for each radionuclide was calculated as the EPC divided by the SAL and multiplied by 25 mrem/yr, and the individual radionuclide doses were summed to obtain the total dose. The results of the assessment are in Tables 3 and 4 for the recreational scenario and Tables 5, 6, and 7 for the residential scenario.

The total excess cancer risk for the recreational scenario is 2×10^{-5}, which is greater than the NMED target risk level of 1×10^{-5} (NMED 2022, 702484). The recreational HI is 0.1, which is less than the NMED target HI of 1 (NMED 2022, 702484). The EPC for lead is less than the back-calculated SSL based on lead blood levels (1120 mg/kg) (N3B 2020, 701072), resulting in an HQ of 0.03 for the recreational scenario. No radionuclide COPCs were identified in the depth interval 0.0 to 1.0 ft bgs.

The total excess cancer risk for the residential scenario is 4×10^{-5}, which is greater than the NMED target risk level of 1×10^{-5} (NMED 2022, 702484). The residential HI is 0.3, which is less than the NMED target HI of 1 (NMED 2022, 702484). The EPC for lead is less than the back-calculated SSL based on lead blood levels (400 mg/kg) (NMED 2022, 702484), resulting in an HQ of 0.07 for the residential scenario. EPCs for radionuclide COPCs were less than residential SALs and the estimated total dose for the residential scenario is 0.7 mrem/yr.

Evaluation of Results

The risk screening evaluation results for AOC 00-030(h) show that the carcinogenic risk exceeds the NMED target of 1×10^{-5} for both the recreational and residential scenarios. The largest contribution to carcinogenic risk is from PAHs, particularly benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene. The carcinogenic risks without these five PAHs are 3×10^{-7} for the recreational scenario and 1×10^{-6} for the residential scenario. As shown by the risk evaluation results from the Phase II IR, most of the risk is associated with the results from the samples collected at location PU-612252. The risk evaluations in the Phase II IR did not include the results from location PU-612252, and the resulting carcinogenic risks were 3×10^{-6} for the recreational scenario and 1×10^{-5} for the residential scenario.

The Phase II IR noted that location PU-612252 is a surface location upgradient of the former outfall and was not included in the Pueblo Canyon Aggregate Area investigation work plan but was sampled because of a deviation to the proposed soil excavation and at the direction of NMED (LANL 2010, 110864, p. I-11). The Phase II IR also noted the sample from this location is not representative of any Laboratory operations and was influenced by years of stormwater runoff from the Immaculate Heart of Mary Catholic Church asphalt parking lot (LANL 2010, 110864, p. I-11).

PAHs are a class of semivolatile organic compounds (SVOCs) frequently detected as a result of environmental sampling but generally were not released from the SWMUs or AOCs being investigated. Thus, PAHs unrelated to site activities are often detected in samples analyzed for the presence of site-related SVOCs.

PAHs are known to be widely distributed in the environment from a number of sources, both natural (such as forest fires) and anthropogenic (such as combustion of fossil fuels, oil drips off motor vehicles, vehicle tires, coal tar pitch, and weathering or eroding of asphalt pavement) (Kose et al. 2008, 219977; Teaf 2008, 219976). PAHs from these sources generally occur as complex mixtures, not as single compounds. Individual PAH compounds can be manufactured for research purposes, and some PAHs (e.g., anthracene, fluorene, naphthalene, and pyrene) are used in dye production, the manufacture of synthetic fibers, and in plastics and pesticides.

The principal sources of PAHs in soil along parking lots, roads, and highways are vehicular exhaust and emissions, the wearing of tires, and asphalt. PAH-containing materials, such as asphalt and rubber particles, do not easily dissolve in water, preventing migration, except as suspended particles in storm water. PAH concentrations in excess of soil cleanup levels may result from common anthropogenic sources such as runoff from asphalt parking lots.

AOC 00-030(h) is a former septic tank and was identified as an AOC because of potential for hazardous or radioactive contaminants to have been present in the wastewater discharged to the tank. The septic tank likely served the areas between Canyon Road and Trinity Drive (LANL 1996, 053799) (LANL 1996, 062416). Buildings within this area were associated with the special engineering detachment, which included the Fort Leonard Wood housing units, dormitories, military barracks, west mess hall, supply room, gymnasium, post office, and recreational buildings (LANL 1996, 053799). The tank was used from

1945 to 1947, when the Central wastewater treatment plant (SWMU 00-019) became operational (LANL 1996, 053799). There is no known use of PAHs in the facilities served by this septic tank.

During the 2010 Phase II investigation at AOC 00-030(h), soil was excavated along the expected location of the drain line between the septic tank and the outfall into Acid Canyon, and in Acid Canyon below the outfall. Sample location PU-612252 is on the western periphery of the excavation, upgradient of the outfall location. The locations of the samples and excavations are shown in Figure 6.4-1 in the Phase II IR (LANL 2010, 110864, p. 81). Near-surface samples (0.5 to 1.0 ft bgs and 1.5 to 2.0 ft bgs) were collected at location PU-612252 to characterize the material being left in place following excavation. However, these near-surface sample results are not representative of potential contamination from Laboratory operations because the samples were collected from a location having a higher elevation than the former drain line, which was a gravity-flow, buried line that daylighted into the Acid Canyon downslope (north) of the canyon edge. Based on the Phase I sampling results, the outfall is thought to be located near sampling location 00-04811.

Location PU-612252 is located downgradient of the asphalt-paved, church parking lot and PAHs at this location are likely the result of runoff from the parking lot. PAH concentrations in the shallow sample at location PU-612252 were approximately an order-of-magnitude higher than the highest concentrations detected at other locations and were approximately one to two orders of magnitude higher than the concentrations detected in the deeper sample at location PU-612252. Thus, the source of the PAHs resulting in unacceptable risk appears to be related to surface runoff rather than discharges from the septic tank.

CONCLUSIONS

The human health risk-screening assessment indicates no unacceptable noncarcinogenic risk or dose under the recreational and residential scenarios but does indicate potential unacceptable carcinogenic risk under the recreational and residential exposure scenarios. However, evaluation of the risk screening results indicates the unacceptable risk is due to PAHs present at elevated concentrations in one sample. The PAHs in this sample appear to result from runoff from a nearby asphalt-paved parking lot and not from historical site-related releases from AOC 00-030(h). Therefore, releases from AOC 00-030(h) do not appear to result in unacceptable human health risk.

Section XXI.G of the Consent Order identifies conditions under which DOE may request a certificate of completion without controls for a site that exceeds residential risk targets for contaminants not attributable to the site. In order to make such a request, DOE must provide the following information:

1) The request must indicate those contaminants for which an acceptable risk level under a residential scenario was reached during corrective action activities at the site.

2) The request must indicate those contaminants for which an acceptable risk level under a residential scenario was not reached during corrective action activities at the site.

3) The request must indicate how DOE will notify the current property owner (if property not owned by DOE) of the certificate of completion without controls, including any contaminant(s) identified in number 2 above at the site. NMED must be provided with a copy of this notification.

As described above, the unacceptable risk is associated with PAHs that are not attributable to AOC 00-030(h). Therefore, pursuant to Section XXI.G of the Consent Order, AOC 00-030(h) is eligible for a certificate of completion without controls, even though there is potential unacceptable risk under the residential scenario.

With respect to item 1) above, contaminants for which an acceptable risk level under a residential scenario was reached during corrective action activities at the site include metals (antimony, barium, copper, lead, mercury, selenium, thallium, uranium, and zinc); nitrate; perchlorate; Aroclor-1260; SVOCs other than PAHs [bis(2-ethylhexyl)phthalate, butylbenzylphthalate, dibenzofuran, 2,4-dimethylphenol, di-n-butylphthalate, di-n-octylphthalate, and 1,2,4-trimethylbenzene]; volatile organic chemicals (acetone, chlorobenzene, chloroform, cis-1,2-dichloroethene, ethylbenzene, 4-isopropyltoluene, methylene chloride, toluene, trichloroethene, trichlorofluoromethane, and 1,3-xylene+1,4-xylene); pesticides (alpha-chlordane, gamma-chlordane, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, and dieldrin); noncarcinogenic PAHs [acenaphene, anthracene, benzo(g,h,i)perylene, fluoranthene, fluorene, 2-methylnaphthalene, naphthalene, phenanthrene, pyrene]; benzo(k)fluoranthene; chrysene; and naphthalene.

With respect to item 2) above, during corrective action activities at the site, contaminants for which an acceptable risk level under a residential scenario was not reached include five carcinogenic PAHs benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene.

Item 3) above is addressed in the request for certificates for completion.

Although Section XXI.G of the Consent Order does not specifically address unacceptable risk under the recreational scenario, unacceptable risk under the recreational scenario results from the same PAHs that result in unacceptable risk under the residential scenario. Therefore, the conditions of Section XXI.G of the Consent Order would also address unacceptable recreational risk at AOC 00-030(h).

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Table 1
EPCs for AOC 00-030(h) for the Recreational Scenario

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Antimony	4	0	0.424 (U)	1.13 (U)	n/a*	1.13(U)	Maximum detection limit
Calcium	4	4	1950	5180	n/a	5180	Maximum detected concentration
Copper	4	4	3.97	59.9	n/a	59.9	Maximum detected concentration
Lead	4	4	16.5	36	n/a	36	Maximum detected concentration
Nitrate	1	1	1.39	1.39	n/a	1.39	Maximum detected concentration
Selenium	4	0	0.57 (U)	1.61 (U)	n/a	1.61(U)	Maximum detection limit
Zinc	4	4	58.6	249	n/a	249	Maximum detected concentration
Organic Chemicals (mg/kg)							
Acenaphthene	4	3	0.0377 (U)	1.4	n/a	1.4	Maximum detected concentration
Anthracene	4	4	0.0203	2.2	n/a	2.2	Maximum detected concentration
Benzo(a)anthracene	4	3	0.0366 (U)	7.5	n/a	7.5	Maximum detected concentration
Benzo(a)pyrene	4	4	0.125	8.5	n/a	8.5	Maximum detected concentration
Benzo(b)fluoranthene	4	4	0.243	14	n/a	14	Maximum detected concentration
Benzo(g,h,i)perylene	4	4	0.111	5.2	n/a	5.2	Maximum detected concentration
Benzo(k)fluoranthene	4	1	0.0366 (UJ)	5	n/a	5	Maximum detected concentration
Bis(2-ethylhexyl)phthalate	4	4	0.0853	0.583	n/a	0.583	Maximum detected concentration
Butylbenzylphthalate	4	1	0.101	0.407 (U)	n/a	0.101	Maximum detected concentration
Chlordane[alpha-]	4	1	0.00249	0.039 (U)	n/a	0.00249	Maximum detected concentration
Chlordane[gamma-]	4	1	0.00251	0.039 (U)	n/a	0.00251	Maximum detected concentration
Chrysene	4	4	0.166	11	n/a	11	Maximum detected concentration
DDD[4,4'-]	4	1	0.0042	0.0163 (U)	n/a	0.0042	Maximum detected concentration
DDT[4,4'-]	4	1	0.0147 (UJ)	0.083	n/a	0.083	Maximum detected concentration
Dibenz(a,h)anthracene	4	3	0.0351	2	n/a	2	Maximum detected concentration
Dibenzofuran	4	2	0.0818	0.59	n/a	0.59	Maximum detected concentration
Dieldrin	4	1	0.0147 (U)	0.028	n/a	0.028	Maximum detected concentration

Table 1 (continued)

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Organic Chemicals (mg/kg) (continued)							
Dimethylphenol[2,4-]	4	1	0.046	0.407 (U)	n/a	0.046	Maximum detected concentration
Di-n-octylphthalate	4	2	0.114	0.038 (U)	n/a	0.285	Maximum detected concentration
Fluoranthene	4	4	0.196	16	n/a	16	Maximum detected concentration
Fluorene	4	3	0.0377 (U)	1.2	n/a	1.2	Maximum detected concentration
Indeno(1,2,3-cd)pyrene	4	4	0.0978	5.7	n/a	5.7	Maximum detected concentration
Methylnaphthalene[2-]	4	3	0.033	0.29	n/a	0.29	Maximum detected concentration
Naphthalene	4	3	0.0377 (U)	0.74	n/a	0.74	Maximum detected concentration
Phenanthrene	4	4	0.107	11	n/a	11	Maximum detected concentration
Pyrene	4	4	0.286	15	n/a	15	Maximum detected concentration

* n/a = Not applicable.

Table 2
EPCs for AOC 00-030(h) for the Residential Scenario

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Antimony	20	0	0.112 (U)	1.13 (U)	n/a*	1.13 (U)	Maximum detection limit
Barium	29	29	19	442	Gamma	121	95% Adjusted Gamma
Calcium	29	29	417	6500	Normal	2720	95% Student's-t
Copper	29	29	1.3	59.9	Lognormal	11.0	95% Percentile Bootstrap
Lead	29	29	3.91	94	Lognormal	23.0	95% Percentile Bootstrap
Mercury	29	27	0.0062 (J)	0.94	Nonparametric	0.127	95% KM (t)
Nitrate	10	4	1.05 (U)	10.3	n/a	10.3	Maximum detected concentration
Perchlorate	10	1	0.000768	0.00254 (U)	n/a	0.000768	Maximum detected concentration
Selenium	29	0	0.53 (U)	1.9 (U)	n/a	1.9 (U)	Maximum detection limit

Table 2 (continued)

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg) (continued)							
Thallium	29	5	0.072 (U)	1.3 (U)	Normal	0.174	95% KM (t)
Uranium	9	9	3	3.5	Normal	3.36	95% Student's-t
Zinc	29	29	26	249	Nonparametric	70.4	95% Student's-t
Organic Chemicals (mg/kg)							
Acenaphthene	33	13	0.026	1.4	Nonparametric	0.174	95% KM (t)
Acetone	19	6	0.005 (U)	0.0649	Normal	0.0195	95% KM (t)
Anthracene	33	18	0.0179	2.2	Lognormal	0.267	95% Percentile Bootstrap
Aroclor-1260	19	1	0.0036 (U)	0.19 (U)	n/a	0.0065	Maximum detected concentration
Benzo(a)anthracene	33	17	0.0354	7.5	Lognormal	0.843	95% Percentile Bootstrap
Benzo(a)pyrene	33	23	0.0228	8.5	Lognormal	0.991	95% Percentile Bootstrap
Benzo(b)fluoranthene	33	23	0.0356 (U)	14	Lognormal	1.55	95% Percentile Bootstrap
Benzo(g,h,i)perylene	33	24	0.0234	5.2	Lognormal	0.621	95% Percentile Bootstrap
Benzo(k)fluoranthene	33	13	0.0143	5	Gamma	0.888	95% KM Adjusted Gamma
Bis(2-ethylhexyl)phthalate	33	9	0.0806	83.7	Nonparametric	7.15	95% KM (t)
Butylbenzylphthalate	33	2	0.101	24.1	n/a	24.1	Maximum detected concentration
Chlordane[alpha-]	29	2	0.000736 (U)	0.039 (U)	n/a	0.00249	Maximum detected concentration
Chlordane[gamma-]	29	2	0.000736 (U)	0.039 (U)	n/a	0.00251	Maximum detected concentration
Chlorobenzene	19	1	0.000976 (U)	0.006 (U)	n/a	0.005	Maximum detected concentration
Chloroform	19	1	0.000378 (J)	0.006 (U)	n/a	0.000378	Maximum detected concentration
Chrysene	33	21	0.0323	11	Lognormal	1.24	95% Percentile Bootstrap
DDD[4,4'-]	29	11	0.00023	0.02 (U)	Normal	0.0067	95% KM (t)
DDE[4,4'-]	29	15	0.0019 (U)	1.1	Lognormal	0.126	95% Percentile Bootstrap
DDT[4,4'-]	29	20	0.0019 (UJ)	0.81	Approximate Gamma	0.177	95% KM Adjusted Gamma
Dibenz(a,h)anthracene	33	12	0.0351	2	Nonparametric	0.226	95% KM (t)
Dibenzofuran	33	6	0.037	0.59	Nonparametric	0.114	95% KM (t)

Table 2 (continued)

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Organic Chemicals (mg/kg) (continued)							
Dichloroethene[cis-1,2-]	19	2	0.000976(U)	0.006(U)	n/a	0.002	Maximum detected concentration
Dimethylphenol[2,4-]	33	1	0.046	0.425 (U)	n/a	0.046	Maximum detected concentration
Di-n-butylphthalate	33	1	0.35 (U)	3.97	n/a	3.97	Maximum detected concentration
Di-n-octylphthalate	33	2	0.114	0.427 (U)	n/a	0.285	Maximum detected concentration
Dieldrin	29	5	0.0011	0.028	Lognormal	0.00404	95% Percentile Bootstrap
Ethylbenzene	19	1	0.000976 (U)	0.006 (U)	n/a	0.002	Maximum detected concentration
Fluoranthene	33	24	0.0356 (U)	16	Lognormal	1.84	95% Percentile Bootstrap
Fluorene	33	14	0.0159	1.2	Lognormal	0.151	95% Percentile Bootstrap
Indeno(1,2,3-cd)pyrene	33	24	0.017	5.7	Lognormal	0.652	95% Percentile Bootstrap
Isopropyltoluene[4-]	19	3	0.000914	0.0094	n/a	0.0094	Maximum detected concentration
Methylene chloride	19	1	0.00203	0.043 (U)	n/a	0.00203	Maximum detected concentration
Methylnaphthalene[2-]	33	6	0.0074	0.41 (U)	Gamma	0.0684	95% KM Adjusted Gamma
Naphthalene	33	8	0.0356 (U)	0.74	Lognormal	0.0955	95% Percentile Bootstrap
Phenanthrene	33	22	0.0296	11	Lognormal	1.28	95% Percentile Bootstrap
Pyrene	33	24	0.0356 (U)	15	Lognormal	1.75	95% Percentile Bootstrap
Toluene	19	6	0.000353	0.009	Normal	0.00221	95% KM (t)
Trichloroethene	19	9	0.000976 (U)	0.009	Normal	0.00416	95% KM (t)
Trichlorofluoromethane	19	1	0.000976 (U)	0.006 (U)	n/a	0.002	Maximum detected concentration
Trimethylbenzene[1,2,4-]	19	1	0.000976 (U)	0.006 (U)	n/a	0.002	Maximum detected concentration
Xylene[1,3-]+Xylene[1,4-]	10	1	0.000336 (J)	0.00248 (U)	n/a	0.000336	Maximum detected concentration
Radionuclides (pCi/g)							
Cesium-137	19	2	-0.01 (U)	0.187	n/a	0.187	Maximum detected concentration
Plutonium-238	19	2	-0.0136 (U)	0.0204	n/a	0.0204	Maximum detected concentration
Plutonium-239/240	19	12	-0.0147 (U)	2.51	Gamma	0.962	95% KM Adjusted Gamma

Note: ProUCL data files that were used to calculate the Exposure Point Concentrations are included on the enclosed CD.

* n/a = Not applicable.

Table 3
Recreational Carcinogenic Screening Evaluation for AOC 00-030(h)

COPC	EPC (mg/kg)	Recreational SSL[a] (mg/kg)	Cancer Risk
Benzo(a)anthracene	7.5	88.8	8.45E-07
Benzo(a)pyrene	8.5	8.88	9.57E-06
Benzo(b)fluoranthene	14	88.8	1.58E-06
Benzo(k)fluoranthene	5	888	5.63E-08
Bis(2-ethylhexyl)phthalate	0.583	1770	3.29E-09
Butylbenzylphthalate	0.101	13,100	7.71E-11
Chlordane[alpha-]	0.00249	102[b]	2.44E-10
Chlordane[gamma-]	0.00251	102[b]	2.46E-10
Chrysene	11	8880	1.24E-08
DDD[4,4'-]	0.0042	104	4.04E-10
DDT[4,4'-]	0.083	114	7.28E-09
Dibenz(a,h)anthracene	2	8.88	2.25E-06
Dieldrin	0.028	1.55	1.81E-07
Indeno(1,2,3-cd)pyrene	5.7	88.8	6.42E-07
Naphthalene	0.74	1930	3.83E-09
Total Excess Cancer Risk			**2E-05**
Total Excess Cancer Risk without Shaded COPCs			**3E-07**

Note: Shading indicates COPCs resulting in potentially unacceptable risk.

[a] SSLs from N3B (N3B 2020, 701072).

[b] Chlordane used as surrogate based on structural similarity.

Table 4
Recreational Noncarcinogenic Screening Evaluation for AOC 00-030(h)

COPC	EPC (mg/kg)	Recreational SSL[a] (mg/kg)	HQ
Antimony	1.13	248	4.56E-03
Copper	59.9	24,800	2.42E-03
Nitrate	1.39	991,000	1.40E-06
Selenium	1.61	3100	5.19E-04
Zinc	249	186,000	1.34E-03
Acenaphthene	1.4	17,300	8.09E-05
Anthracene	2.2	86,300	2.55E-05
Benzo(a)pyrene	8.5	86.3	9.85E-02
Benzo(g,h,i)perylene	5.2	8630[b]	6.03E-04
Bis(2-ethylhexyl)phthalate	0.583	6570	8.87E-05
Butylbenzylphthalate	0.101	65,700	1.54E-06

Table 4 (continued)

COPC	EPC (mg/kg)	Recreational SSL[a] (mg/kg)	HQ
Chlordane[alpha-]	0.00249	229[c]	1.09E-05
Chlordane[gamma-]	0.00251	229[c]	1.10E-05
Dibenzofuran	0.59	489	1.21E-03
Dieldrin	0.028	16.4	1.71E-03
Dimethylphenol[2,4-]	0.046	6570	7.00E-06
Di-n-octylphthalate	0.285	3280	8.69E-05
Fluoranthene	16	11,500	1.39E-03
Fluorene	1.2	11,500	1.04E-04
Methylnaphthalene[2-]	0.29	1150	2.52E-04
Naphthalene	0.74	3220	2.30E-04
Phenanthrene	11	8630	1.27E-03
Pyrene	15	8630	1.74E-03
		HI	**0.1**

[a] SSLs from N3B (N3B 2020, 701072).

[b] Pyrene used as surrogate based on structural similarity.

[c] Chlordane used as surrogate based on structural similarity.

Table 5
Residential Carcinogenic Screening Evaluation for AOC 00-030(h)

COPC	EPC (mg/kg)	Residential SSL[a] (mg/kg)	Cancer Risk
Aroclor-1260	0.0065	2.43	2.67E-08
Benzo(a)anthracene	0.843	1.53	5.51E-06
Benzo(a)pyrene	0.991	1.12	8.85E-06
Benzo(b)fluoranthene	1.55	1.53	1.01E-05
Benzo(k)fluoranthene	0.888	15.3	5.80E-07
Bis(2-ethylhexyl)phthalate	7.15	380	1.88E-07
Butylbenzylphthalate	24.1	2900[b]	8.31E-08
Chlordane[alpha-]	0.00249	17.7[c]	1.41E-09
Chlordane[gamma-]	0.00251	17.7[c]	1.42E-09
Chloroform	0.000378	5.90	6.41E-10
Chrysene	1.04	153	6.80E-08
DDD[4,4'-]	0.0067	22.2	3.02E-09
DDE[4,4'-]	0.126	15.7	8.03E-08
DDT[4,4'-]	0.177	18.7	9.47E-08
Dibenz(a,h)anthracene	0.226	0.153	1.48E-05
Dieldrin	0.00404	0.333	1.21E-07

Table 5 (continued)

COPC	EPC (mg/kg)	Residential SSL[a] (mg/kg)	Cancer Risk
Ethylbenzene	0.002	75.1	2.66E-10
Indeno(1,2,3-cd)pyrene	0.652	1.53	4.26E-06
Methylene chloride	0.00203	766	2.65E-11
Naphthalene	0.0852	22.6	3.77E-08
Trichloroethene	0.00416	15.5	2.68E-09
Total Excess Cancer Risk			**4E-05**
Total Excess Cancer Risk without Shaded COPCs			**1E-06**

Note: Shading indicates COPCs resulting in potentially unacceptable risk.

[a] SSLs from NMED (NMED 2022, 702484) unless otherwise noted.

[b] SSL from EPA regional tables (https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables).

[c] Chlordane SSL used as surrogate based on structural similarity.

Table 6
Residential Noncarcinogenic Screening Evaluation for AOC 00-030(h)

COPC	EPC (mg/kg)	Residential SSL[a] (mg/kg)	HQ
Antimony	1.13	31.3	3.61E-02
Barium	121	15,600	7.76E-03
Copper	11.0	3130	3.51E-03
Mercury	0.215	23.5	9.15E-03
Nitrate	10.3	125,000	8.24E-05
Perchlorate	0.000768	54.8	1.40E-05
Selenium	1.9	391	4.86E-03
Thallium	0.174	0.782	2.23E-01
Uranium	3.36	234	1.44E-02
Zinc	77.4	23,500	3.29E-03
Acenaphthene	0.288	3480	8.28E-05
Acetone	0.0195	66,300	2.94E-07
Anthracene	0.277	17,400	1.59E-05
Benzo(g,h,i)perylene	0.625	1740[b]	3.59E-04
Bis(2-ethylhexyl)phthalate	19.2	1230	1.56E-02
Chlordane[alpha-]	0.00249	35.3[c]	7.05E-05
Chlordane[gamma-]	0.00251	35.3[c]	7.11E-05
Chlorobenzene	0.005	378	1.32E-05
Chloroform	0.000378	306	1.24E-06
DDT[4,4'-]	0.177	36.2	4.89E-03
Dibenzofuran	0.114	78[d]	1.46E-03
Dichloroethene[cis-1,2-]	0.002	156	1.28E-05

Table 6 (continued)

COPC	EPC (mg/kg)	Residential SSL[a] (mg/kg)	HQ
Dieldrin	0.00408	3.08	1.32E-03
Dimethylphenol[2,4-]	0.046	1230	3.74E-05
Di-n-butylphthalate	3.97	6160	6.44E-04
Di-n-octylphthalate	0.285	630[d]	4.52E-04
Ethylbenzene	0.002	3930	5.09E-07
Fluoranthene	1.86	2320	8.02E-04
Fluorene	0.154	2320	6.64E-05
Isopropyltoluene[4-]	0.0094	2360[e]	3.98E-06
Methylene chloride	0.00203	409	4.96E-06
Methylnaphthalene[2-]	0.0684	232	2.95E-04
Naphthalene	0.0994	162	6.14E-04
Phenanthrene	1.33	1850	7.19E-04
Pyrene	1.78	1740	1.02E-03
Toluene	0.00221	5230	4.23E-07
Trichloroethene	0.00416	6.77	6.14E-04
Trichlorofluoromethane	0.002	1230	1.63E-06
Trimethylbenzene[1,2,4-]	0.002	780[d]	2.56E-06
Xylene[1,3-]+Xylene[1,4-]	0.000336	871[f]	3.86E-07
		HI	**0.3**

[a] SSLs from NMED (NMED 2022, 702484), unless otherwise noted.

[b] Pyrene used as surrogate based on structural similarity.

[c] Chlordane used as surrogate based on structural similarity.

[d] SSL from EPA regional tables (https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables).

[e] Isopropylbenzene used as surrogate based on structural similarity.

[f] Xylenes used as surrogate based on structural similarity.

Table 7
Residential Radionuclide Screening Evaluation for AOC 00-030(h)

COPC	EPC (pCi/g)	Residential SAL* (pCi/g)	Dose (mrem/yr)
Cesium-137	0.187	12	3.90E-01
Plutonium-238	0.0204	84	6.07E-03
Plutonium-239/240	0.962	79	2.80E-01
		Total Dose	**0.7**

* SALs from LANL (LANL 2015, 600929).

Attachment 1

ProUcl Data Files
(on CD included with this document)