**DEPARTMENT OF ENERGY**

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

EMLA-2020-1061-02-001

Bureau Chief
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New Mexico Environment Department
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NOV 22 2019

Subject: Response to Disapproval, Request for Certificates of Completion for SWMUs in the Delta Prime Site Aggregate Area

On June 18, 2015, the U.S. Department of Energy (DOE) submitted a request for certificates of completion (COCs) for twelve solid waste management units (SWMUs) and two areas of concern (AOCs) in Delta Prime Site Aggregate Area (ADESH-15-085). The New Mexico Environment Department (NMED) submitted a response to this request on January 19, 2016, approving COCs for ten SWMUs and AOCs, but denying COCs for SWMUs 21-027(c) and 21-027(d) (HWB-LANL-15-032). On December 19, 2018, DOE submitted a response to NMED's January 19, 2016, denial of COCs for SWMUs 21-027(c) and 21-027(d) (EM-LA-40AD-00368). On June 24, 2019, NMED disapproved the COC request for these two sites and identified additional information needed for NMED to determine whether corrective action is complete (HWB-LANL-18-068). The purpose of this letter is to provide an update to DOE's December 19, 2018, request that includes the additional information specified by NMED.

SWMU 21-027(c), Outfall from Former Building 21-6

SWMU 21-027(c) is a 4-in. vitrified clay pipe that exited a former machine shop and cafeteria (building 21-6) and discharged south on DP Mesa. This site was investigated in 2007 as part of the Phase I investigation of the Delta Prime Site Aggregate Area (DPSAA). The results of the investigation indicated that lateral and vertical extent were not defined for lead, several organic chemicals, and several radionuclides, and additional sampling to define extent of contamination was proposed in the Phase II investigation work plan for DPSAA. Phase II sampling was performed in 2009, and the results were presented in the "Phase II Investigation Report for Delta Prime Site Aggregate Area, Revision 1" (Los Alamos National Laboratory document LA-UR-10-6478, October 2010). The Phase II investigation report concluded that nature and extent were defined for all chemicals of potential concern and that the site did not pose an unacceptable risk to human health and ecological receptors. Sampling for this site was only performed on the mesa top, and the maximum concentration of lead was detected in two samples collected at the edge of the mesa above a steep slope. Data from samples collected from Reach LA-2W in Los Alamos Canyon downgradient of the site were, therefore, used to define the lateral extent of lead.

Based on the conclusions in the Phase II investigation report, DOE requested a COC without controls for SWMU 21-027(c) on June 18, 2015. NMED responded in a January 19, 2016, letter that Reach LA-2W does not provide data acceptable for use in determining the extent of lead contamination specifically related to SWMU 21-027(c). NMED also noted they cannot evaluate the site for corrective action

complete until the nature and extent of contamination is defined for the site and it is demonstrated that the site does not pose an unacceptable risk to human health and the environment. DOE's December 19, 2018, submittal included an evaluation of extent of lead contamination based on the investigation data collected at SWMU 21-027(c). NMED's June 24, 2019, disapproval letter indicated that lateral extent of lead contamination was not defined and recommended that existing sediment data from Los Alamos Canyon upgradient and downgradient of SWMU 21-027(c) be used to define the lateral extent of contamination. Enclosure 1 provides an update to the evaluation of the extent of lead contamination at this site previously submitted to NMED and includes sediment data from Los Alamos Canyon upgradient and downgradient of SWMU 21-027(c) (other than from Reach LA-2W). Enclosure 1 also summarizes the results of the risk screening evaluations performed for this site. Revisions to the information submitted on December 19, 2018, are shown in redline-strikeout. Enclosure 2 consists of a map showing sediment sampling locations in Los Alamos canyon upgradient and downgradient of the site.

SWMU 21-027(d), Soil Contamination from Former Drainline

SWMU 21-027(d) is an outfall from a fuel storage tank secondary containment system located on the slope below Material Disposal Area (MDA) B and adjacent to MDA V. A voluntary corrective measure was conducted at the site in 1999 and approved by NMED in 2002. Further investigation of SWMU 21-027(d) was to have been included in the investigation of MDA V but was not included in the MDA V investigation report. Data from MDA V investigations relevant to 21-027(d) were provided in the June 18, 2015, request for COC.

In the January 19, 2016, denial, NMED indicated that the data provided in the request were not complete and did not include results from samples collected from the upper approximately 60 ft of the drainage below the outfall. NMED also noted that the site could not be evaluated for a COC until DOE demonstrated that the nature and extent of contamination is defined for all of SWMU 21-027(d) and the site does not pose an unacceptable risk to human health and the environment. An evaluation of nature and extent and human health risk was provided in DOE's December 19, 2018, request. The request noted that ecological risk for the area encompassing SWMU 21-027(d) had been evaluated as part of Consolidated Unit 21-018(a)-99 in the MDA V investigation report. NMED's June 24, 2019, disapproval letter indicated that ecological risk for SWMU 21-027(d) needed to be evaluated separately. Enclosure 3 provides an update to the evaluation of nature and extent and risk for this site previously submitted to NMED and includes an evaluation of ecological risk for SWMU 21-027(d). Revisions to the information submitted on December 19, 2018, are shown in redline-strikeout.

Based on the information provided in Enclosures 1, 2, and 3, DOE concludes that nature and extent of contamination are defined or no further sampling is warranted for SWMUs 21-027(c) and 21-027(d) and that the sites do not pose an unacceptable risk to human health under the residential and construction worker scenarios and do not pose an unacceptable risk to ecological receptors. Therefore, in accordance with Section XXI of the Compliance Order on Consent, DOE is requesting COCs without controls for SWMUs 21-027(c) and 21-027(d).

If you have any questions, please contact Kent Rich at (505) 257-7384 (kent.rich@em-la.doe.gov) or Cheryl Rodriguez at (505) 257-7941 (cheryl.rodriguez@em.doe.gov).

Sincerely,



Arturo Q. Duran
Compliance and Permitting Manager
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Enclosures:

1. Evaluation of Data for Solid Waste Management Unit 21-027(c) (EM2019-0418)
2. Plate 3, DP Canyon and Los Alamos Canyon Geomorphology, Reaches DP-1W, DP-1C, DP-1E, DP-2, LA-1C, and LA-1E (Los Alamos and Pueblo Canyons Investigation Report, LA-UR-04-2714)
3. Evaluation of Data for Solid Waste Management Unit 21-027(d) (EM2019-0419)

CC (letter and enclosure[s] emailed):

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ENCLOSURE 1

Evaluation of Data for Solid Waste Management Unit 21-027(c)

The 2010 "Phase II Investigation Report for Delta Prime Site Aggregate Area at Technical Area 21, Revision 1" (LANL 2010, 110772.33) concluded that the nature and extent of contamination were defined at Solid Waste Management Unit (SWMU) 21-027(c) and that the site did not pose an unacceptable human health risk under the industrial, construction worker, or residential scenarios and did not pose an unacceptable risk to ecological receptors. The conclusion in the Phase II investigation report regarding lateral extent of lead contamination relied on results from samples collected from Reach LA-2W in Los Alamos Canyon downgradient of the site. The Phase II investigation report was not approved by the New Mexico Environment Department (NMED); the only deficiency NMED identified for SWMU 21-027(c) was the use of data from Reach LA-2W to define lateral extent of lead (NMED 2010, 110959).

In January 2012, after completion of the Phase II investigation, NMED and the U.S. Department of Energy (DOE) entered into a framework agreement for realignment of environmental priorities at Los Alamos National Laboratory (LANL the Laboratory). Under the framework agreement, NMED and DOE agreed to review characterization efforts undertaken to date pursuant to the Compliance Order on Consent to identify those sites where the nature and extent of contamination have been adequately characterized. The framework agreement also stipulated the use of U.S. Environmental Protection Agency (EPA) guidance in this process, except in cases where EPA guidance was not supported by sound science. Pursuant to the framework agreement, the Laboratory reviewed its data evaluation process with respect to EPA guidance and the framework agreement principles and concluded that this process could be revised to complete site characterization more efficiently, while providing full protection of human health and the environment. Specifically, the process for evaluating data to define extent of contamination was revised to provide a greater emphasis on risk/dose reduction, consistent with EPA guidance. Data on spatial distribution of lead at SWMU 21-027(c) were re-evaluated using this process to determine whether additional sampling for lead is warranted.

A total of 39 samples (36 soil and 3 tuff) were collected from 18 locations at SWMU 21-027(c) and analyzed for target analyte list metals. Table 1 presents the results of lead detected above background values (BVs) at SWMU 21-027(c). The locations and analytical results of inorganic chemicals detected above BVs are shown in Figure 1 (Figure 6.24-1 of the Phase II investigation report). Lead was detected above the soil and Qbt 2,3,4 BVs (22.3 mg/kg and 11.2 mg/kg, respectively) in 14 soil samples and 3 tuff samples with a maximum concentration of 120 mg/kg. Concentrations did not change substantially with depth at locations 21-27402 and 21-27414 (4.8 mg/kg and 1 mg/kg, respectively) and decreased with depth at all other locations. Concentrations increased laterally to the south (downgradient) at locations 21-27412 and 21-605234, where the maximum concentration was detected.

The residential soil screening level (SSL) is approximately 3.3 times the maximum concentration, the industrial and construction worker SSLs are approximately 6.7 times the maximum concentration, and the recreational SSL is approximately 9.2 times the maximum concentration. Locations 21-27412 and 21-605234 are at the edge of a cliff and collection of samples further to the south (downgradient) was not possible. Lead was not detected above BV in samples collected at locations 21-27408 (36 ft north of location 21-27412), 21-27409 (33 ft north of location 21-605234), 21-27411 (38 ft west of location 21-27412), and 21-27417 (10 ft east of location 21-605234). Thus, the area of elevated lead concentrations is bounded and limited. Although lead contamination to the south of locations 21-27412 and 21-605234 has not been characterized, the potential for exposure to contamination in this area is very low given the steep topography. Therefore, the existing sample locations from the Phase I and Phase II locations are sufficient to characterize the accessible portion of the site. The Phase II investigation report (LANL 2010, 110772.33) demonstrates no unacceptable human-health risk from lead

for the industrial, construction worker, and residential scenarios with hazard quotients of 0.06, 0.05, and 0.1, respectively (Phase II investigation report, Appendix H, Tables H-4.2-196, H-4.2-199, and H-4.2-202), and no unacceptable risk to ecological receptors (Phase II investigation report, Appendix H, Tables H-5.4-60 and H-5.4-88). ~~Because the site risk from lead contamination is low, further sampling is unlikely to change the conclusion that lead does not pose an unacceptable risk. Further sampling for extent of lead, therefore, is not warranted.~~

Although the site poses no unacceptable human-health risk, NMED's June 24, 2019, disapproval letter indicated extent of lead contamination is not defined and recommended existing sediment data from Los Alamos Canyon upgradient and downgradient of SWMU 21-027(c) be used to define the lateral extent of contamination. Although the sediment data from Reach LA-2W presented in the Phase II investigation report were determined not to be appropriate for defining lateral extent, other data were available from reaches closer to SWMU 21-027(c).

Plate 3 from the "Los Alamos and Pueblo Canyons Investigation Report" (LANL 2004, 87390) (Enclosure 2) shows the sediment sampling locations, along with the location of SWMU 21-027(c). Not all sample locations shown in Plate 3 include samples analyzed for lead, but lead data are available from location LA-00151 located upgradient of SMWU 21-027(c) in Reach LA-1C and locations LA-00158, LA-00160, and LA-00162 located downgradient of SWMU 21-027(c) in Reach LA-1E. Concentrations of lead detected in samples from these locations are shown in Table 2. These results show lead concentrations in sediment samples upgradient and downgradient from SWMU 21-027(c) to be below or equivalent to background. Based on these results, lateral extent of lead downgradient of SWMU 21-027(c) is defined.

The Phase II investigation report concluded that there was no unacceptable human health risk under the industrial, construction worker, and residential scenarios and no unacceptable risk to ecological receptors. As demonstrated above, lead concentrations in sediments downgradient of the site are below or equivalent to background and additional sampling is not warranted. Therefore, the conclusions of the Phase II investigation report regarding human health and ecological risk remain valid.

References

LANL (Los Alamos National Laboratory), September 22, 1998. "Inorganic and Radionuclide Background Data for Soils, Canyon Sediments, and Bandelier Tuff at Los Alamos National Laboratory," Los Alamos National Laboratory document LA-UR-98-4847, Los Alamos, New Mexico. (LANL 1998, 059730)

LANL (Los Alamos National Laboratory), April 2004. "Los Alamos and Pueblo Canyons Investigation Report," Los Alamos National Laboratory document LA-UR-04-2714, Los Alamos, New Mexico. (LANL 2004, 087390)

LANL (Los Alamos National Laboratory), October 2010. "Phase II Investigation Report for Delta Prime Site Aggregate Area at Technical Area 21, Revision 1," Los Alamos National Laboratory document LA-UR-10-6478, Los Alamos, New Mexico. (LANL 2010, 110772.33)

LANL (Los Alamos National Laboratory), September 2017. "Technical Approach for Calculating Recreational Soil Screening Levels for Chemicals, Revision 5," Los Alamos National Laboratory document LA-UR-17-27660, Los Alamos, New Mexico. (LANL 2017, 602581)

NMED (New Mexico Environment Department), October 19, 2010. "Direction to Modify Phase II Investigation Report for Delta Prime Site Aggregate Area, Technical Area 21, Revision 1,"

New Mexico Environment Department letter to G.J. Rael (DOE-LASO) and M. Graham (LANL) from J.P. Bearzi (NMED-HWB), Santa Fe, New Mexico. (NMED 2010, 110959)

NMED (New Mexico Environment Department), March 2017. "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 2017, 602273)

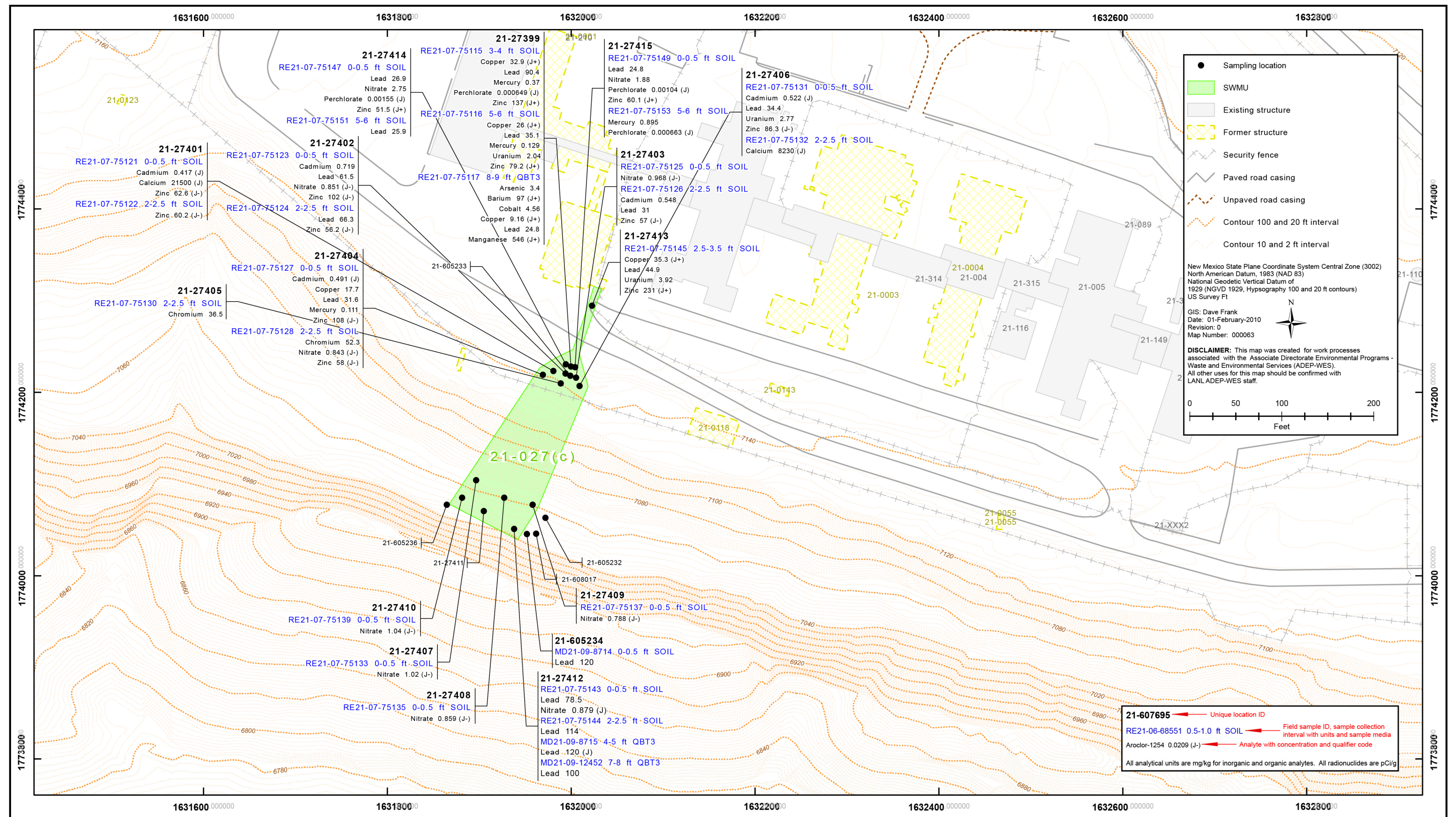


Figure 1 Inorganic chemicals detected or detected above BVs at SWMU 21-027(c)

Table 1
Concentrations of Lead above BVs at SWMU 21-027(c)

Sample ID	Location ID	Depth (ft)	Media	Lead
Qbt 2,3,4 BV^a				11.2
Soil BV^a				22.3
Recreational SSL^b				1110
Construction Worker SSL^c				800
Industrial SSL^c				800
Residential SSL^c				400
RE21-07-75115	21-27399	3.0–4.0	SOIL	90.4
RE21-07-75116	21-27399	5.0–6.0	SOIL	35.1
RE21-07-75117	21-27399	8.0–9.0	QBT3	24.8
RE21-07-75123	21-27402	0.0–0.5	SOIL	61.5
RE21-07-75124	21-27402	2.0–2.5	SOIL	66.3
RE21-07-75126	21-27403	2.0–2.5	SOIL	31
RE21-07-75127	21-27404	0.0–0.5	SOIL	31.6
RE21-07-75131	21-27406	0.0–0.5	SOIL	34.4
RE21-07-75143	21-27412	0.0–0.5	SOIL	78.5
RE21-07-75144	21-27412	2.0–2.5	SOIL	114
MD21-09-8715	21-27412	4.0–5.0	QBT3	120 (J)
MD21-09-12452	21-27412	7.0–8.0	QBT3	100
RE21-07-75145	21-27413	2.5–3.5	SOIL	44.9
RE21-07-75147	21-27414	0.0–0.5	SOIL	26.9
RE21-07-75151	21-27414	5.0–6.0	SOIL	25.9
RE21-07-75149	21-27415	0.0–0.5	SOIL	24.8
MD21-09-8714	21-605234	0.0–0.5	SOIL	120

Notes: Results are in mg/kg.

^a BVs are from LANL (1998, 059730).

^b SSLs are from LANL (2017, 602581).

^c SSLs are from NMED (2017, 602273).

Table 2
Concentrations of Lead in Sediment Samples

Sample ID	Location ID	Depth (cm)	Media	Reach	Lead
Sediment BV^a					19.7
Recreational SSL^b					1110
Construction Worker SSL^c					800
Industrial SSL^c					800
Residential SSL^c					400
04LA-97-0255	LA-00151	0–18	Sediment	LA-1C	18
04LA-97-0256	LA-00151	18–29	Sediment	LA-1C	10.2
04LA-97-0257	LA-00151	29–37	Sediment	LA-1C	9.1
04LA-97-0272	LA-00158	0–34	Sediment	LA-1E	14.3
04LA-97-0273	LA-00158	34–48	Sediment	LA-1E	13.2
04LA-97-0572	LA-00160	0–27	Sediment	LA-1E	20
04LA-97-0279	LA-00162	32–47	Sediment	LA-1E	12.5

Notes: Results are in mg/kg.

^a BVs are from LANL (1998, 059730).

^b SSLs are from LANL (2017, 602581).

^c SSLs are from NMED (2017, 602273).

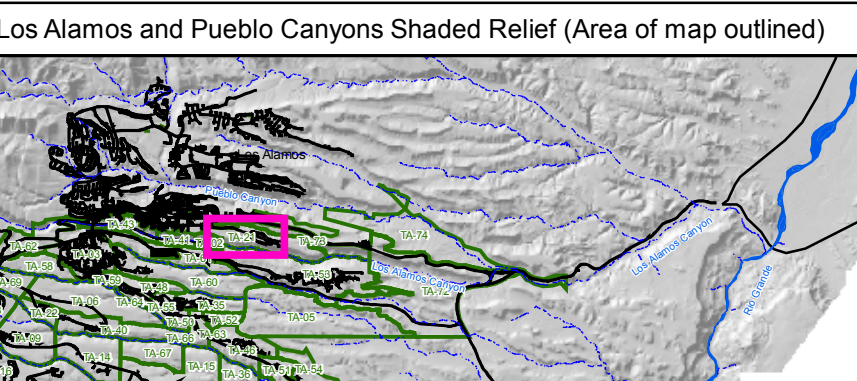
Enclosure 2

*DP Canyon and Los Alamos Canyon Geomorphology,
Reaches DP-1W, DP-1C, DP-1E, DP-2, LA-1C, and LA-1E*

Plate 3. DP Canyon and Los Alamos Canyon
Geomorphology, Reaches
DP-1W, DP-1C, DP-1E,
DP-2, LA-1C, and LA-1E

- ▲ Canyons sample location
 - Persistent surface water sampling location
 - Alluvial groundwater well
 - Intermediate-depth groundwater well
 - Regional groundwater well
 - ▲ Gaging station
 - Surveillance sediment station
 - Contour, 10 ft
 - Contour, 20 ft
 - Contour, 100 ft
 - Dirt road
 - Paved road
 - - - Reach boundary
 - SWMU or AOC
 - Structure
 - Technical area boundary
- Geomorphology**
- boulder
 - c1
 - c1b
 - c1 cobble bar
 - c2
 - c3
 - c3a
 - c3b

Los Alamos and Pueblo Canyons
Investigation Report
LA-UR-04-2714



Cartography by: Doug Watter
GISLab Map: m200001
GISLab Proj#: 13457
Date: April 7, 2004

State Plane Coordinate System, New Mexico Central Zone,
1983 North American Datum, Units: Feet
Grid displays New Mexico State Plane coordinates in feet.

1:1,200
0 50 100 200 300
0 15 30 60 90
Feet
Meters

Los Alamos

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ENCLOSURE 3

Evaluation of Data for Solid Waste Management Unit 21-027(d)

The June 18, 2015, request for certificate of completion for Solid Waste Management Unit (SWMU) 21-027(d) (LANL 2015, 600502) evaluated nature and extent of contamination and potential risk using data collected from the investigation of SWMU 21-023(c) that were within the footprint of SWMU 21-027(d). Results for the investigation of SWMU 21-023(c) were presented in the 2007 investigation report for Material Disposal Area (MDA) V (LANL 2007, 098942). The New Mexico Environment Department (NMED) denial of the certificate of completion request (NMED 2016, 601146) noted that the data presented in the request did not include samples from the upper part of the SWMU 21-027(d) drainage and did not demonstrate that the nature and extent of contamination is defined for all of SWMU 21-027(d) and that the site does not pose an unacceptable threat to human health and the environment.

The U.S. Department of Energy (DOE) and Newport News Nuclear BWXT – Los Alamos, LLC (N3B) reviewed historical information related to the site to better define the location of the SWMU 21-027(d) outfall and identified existing sample locations appropriate for characterization of the site. Figure 1 shows the locations of the SWMU 21-023(c) and SWMU 21-027(d) outfalls as well as locations for samples collected during the 1992 Resource Conservation and Recovery Act Facility Investigation (RFI) for SWMU 21-027(d), the 1999 voluntary corrective measure for SWMU 21-027(d), the 1992–1993 RFI for SWMU 21-023(c), and the 2005–2006 investigation for SWMU 21-023(c). Sample locations near and downgradient of the SWMU 21-027(d) outfall were selected to evaluate nature and extent of contamination and risk. These sample locations include locations 21-01329 through 21-01334, 21-11098 through 21-11104, 21-24578, 21-25414 through 21-25423, and 21-25622 through 21-25625. The samples collected at these locations and the analyses requested are presented in Table 1. Data from these samples were evaluated to identify chemicals of potential concern (COPCs), nature and extent of COPCs, ~~and~~ potential human health risk for the residential scenario, and potential risk to ecological receptors.

Identification of COPCs

Inorganic Chemicals

A total of 36 samples (30 soil and 6 sediment) were analyzed for target analyte list (TAL) metals, 30 soil samples were analyzed for nitrate and total cyanide, and 22 soil samples were analyzed for perchlorate. Table 2 presents the inorganic chemicals detected or detected above background values (BVs).

Antimony was detected above the soil BV (0.83 mg/kg) in one sample at a concentration of 1.34 mg/kg and was not detected above the sediment BV (0.83 mg/kg) but had detection limits (DLs) (4.8 mg/kg to 5.2 mg/kg) above the BV in six samples. Antimony is retained as a COPC.

Cadmium was detected above the soil and sediment BVs (0.4 mg/kg for both) in 2 soil samples and 6 sediment samples with a maximum concentration of 1.4 mg/kg and was not detected above the soil BV but had DLs (0.504 mg/kg to 0.578 mg/kg) above the BV in 20 samples. Cadmium is retained as a COPC.

Chromium was detected above the soil BV (19.3 mg/kg) in 1 sample at a concentration of 21.7 mg/kg. The concentration was only 2.4 mg/kg above the BV and was equivalent to or below the 3 highest concentrations in the soil background data set (21 mg/kg, 26 mg/kg, and 36.5 mg/kg). Chromium was detected below BV in 35 other samples. Chromium is not a COPC.

Cobalt was detected above the sediment BV (4.73 mg/kg) in two samples with a maximum concentration of 5.7 mg/kg. Cobalt is retained as a COPC.

Copper was detected above the soil BV (14.7 mg/kg) in one sample at a concentration of 22.6 mg/kg. The concentration is greater than the maximum concentration in the soil background data set (16 mg/kg). Copper is retained as a COPC.

Cyanide was detected above the soil BV (0.5 mg/kg) in one sample at a concentration of 5.78 mg/kg. Cyanide is retained as a COPC.

Lead was detected above the soil and sediment BVs (22.3 mg/kg and 19.7 mg/kg) in three soil samples and two sediment samples with a maximum concentration of 39.1 mg/kg. Lead is retained as a COPC.

Mercury was detected above the soil BV (0.1 mg/kg) in eight samples with a maximum concentration of 0.765 mg/kg. Mercury is retained as a COPC.

Nitrate was detected in 24 samples with a maximum concentration of 3.17 mg/kg. Nitrate is naturally occurring, and the concentrations likely reflect naturally occurring levels. In addition, SWMU 21-027(d) was part of a secondary containment system for a fuel storage tank and is not a source of nitrate. Nitrate is not a COPC.

Perchlorate was detected in nine samples with a maximum concentration of 0.00491 mg/kg. Perchlorate is retained as a COPC.

Selenium was not detected above the soil and sediment BVs (1.52 mg/kg and 0.3 mg/kg) but had DLs (0.32 mg/kg to 1.84 mg/kg) above the BVs in 28 soil samples and 6 sediment samples. Selenium is retained as a COPC.

Silver was detected above the soil BV (1 mg/kg) in five samples with a maximum concentration of 24.5 mg/kg. Silver is retained as a COPC.

Thallium was not detected above the soil BV (0.73 mg/kg) but had a DL (1.04 mg/kg) above the BV in 1 sample. The DL was only 0.31 mg/kg above the BV, was similar to the 2 highest concentrations in the thallium background data set (0.9 mg/kg and 1 mg/kg), and was similar to the 15 highest DLs in the background data set (all 1 mg/kg). Thallium was not detected or detected above BV in 35 other samples (detected below BV in 18 samples). Thallium is not a COPC.

Zinc was detected above the soil BV (48.8 mg/kg) in five samples with a maximum concentration of 105 mg/kg. Zinc is retained as a COPC.

Organic Chemicals

A total of 36 samples (30 soil and 6 sediment) were analyzed semivolatile organic compounds (SVOCs), 6 sediment samples were analyzed for volatile organic compounds (VOCs), 8 soil samples were analyzed for polychlorinated biphenyls (PCBs), and 7 sediment samples were analyzed for total petroleum hydrocarbons-diesel range organics (TPH-DRO). Table 3 presents the detected organic chemicals.

Organic chemicals detected at SWMU 21-027(d) include anthracene, Aroclor-1242, Aroclor-1254, Aroclor-1260, benzo(a)pyrene, benzo(b)fluoranthene, benzoic acid, bis(2-ethylhexyl)phthalate, chrysene, fluoranthene, 2-methylnaphthalene, naphthalene, pentachlorophenol, phenanthrene, pyrene, and TPH-DRO. Detected organic chemicals are retained as COPCs.

Radionuclides

A total of 43 samples (30 soil and 13 sediment) were analyzed for americium-241 and isotopic plutonium, 36 samples (30 soil and 6 sediment) were analyzed for strontium-90 and tritium, and 30 soil samples were analyzed for gamma-emitting radionuclides and isotopic uranium. Table 4 presents the radionuclides detected or detected above BVs/fallout values (FVs).

Americium-241 was detected above the soil and sediment FVs (0.013 pCi/g and 0.04 pCi/g) in nine soil and seven sediment samples and was detected below 1 ft below ground surface (bgs) in eight soil samples with a maximum activity of 11.2 pCi/g. Americium-241 is retained as a COPC.

Cesium-137 was detected below 1 ft bgs in seven soil samples with a maximum activity of 0.419 pCi/g. Cesium-137 is retained as a COPC.

Plutonium-238 was detected above the soil and sediment FVs (0.023 pCi/g and 0.006 pCi/g) in ~~two~~one soil and four sediment samples and was detected below 1 ft bgs in one soil sample with a maximum activity of ~~0.303~~0.0423 pCi/g. Plutonium-238 is retained as a COPC.

Plutonium-239/240 was detected above the soil and sediment FVs (0.054 pCi/g and 0.068 pCi/g) in 14 soil and 13 sediment samples and was detected below 1 ft bgs in 13 soil samples with a maximum activity of 8.59 pCi/g. Plutonium-239/240 is retained as a COPC.

Tritium was detected in 22 samples with a maximum activity of 0.4 pCi/g. Tritium is retained as a COPC.

Uranium-234 was detected above the soil BV (2.59 pCi/g) in three samples with a maximum activity of 6.51 pCi/g. Uranium-234 is retained as a COPC.

Uranium-235/236 was detected above the soil BV (0.2 pCi/g) in two samples with a maximum activity of 0.32 pCi/g. Uranium-235/236 is retained as a COPC.

Uranium-238 was detected above the soil BV (2.29 pCi/g) in three samples with a maximum activity of 5.67 pCi/g. Uranium-238 is retained as a COPC.

Nature and Extent of Contamination

Inorganic Chemicals

Inorganic COPCs at SWMU 21-027(d) include antimony, cadmium, cobalt, copper, cyanide, lead, mercury, perchlorate, selenium, silver, and zinc.

Antimony was detected above the soil BV in one sample at a concentration of 1.34 mg/kg and was not detected above the sediment BV but had DLs (4.8 mg/kg to 5.2 mg/kg) above the BV in six samples. Concentrations decreased with depth at location 21-25416 and decreased downgradient. The residential SSL was approximately 6 times the maximum DL and the industrial SSL was approximately 100 times the maximum DL. Further sampling for extent of antimony is not warranted.

Cadmium was detected above the soil and sediment BVs in 2 soil samples and 6 sediment samples with a maximum concentration of 1.4 mg/kg, and was not detected above the soil BV but had DLs (0.504 mg/kg to 0.578 mg/kg) above the BV in 20 samples. Only one depth was sampled at locations 21-01329, 21-01330, 21-01331, 21-01332, 21-01333, and 21-01334; concentrations decreased with depth at location 21-25623; and concentrations decreased downgradient. The residential SSL was

approximately 50 times the maximum concentration and 122 times the maximum DL. Further sampling for extent of cadmium is not warranted.

Cobalt was detected above the sediment BV in two samples with a maximum concentration of 5.7 mg/kg. Only one depth was sampled at locations 21-01329 and 21-01331 and concentrations decreased downgradient. The residential SSL was approximately 4 times the maximum concentration and the industrial SSL was approximately 68 times the maximum concentration. Lateral extent of cobalt is defined and further sampling for vertical extent is not warranted.

Copper was detected above the soil BV in one sample at a concentration of 22.6 mg/kg. Concentrations decreased with depth and decreased laterally. The lateral and vertical extent of copper are defined.

Cyanide was detected above the soil BV in one sample at a concentration of 5.78 mg/kg. Concentrations increased with depth at location 21-25624 and decreased laterally. The residential SSL was approximately 2 times the maximum concentration and the industrial SSL was approximately 11 times the maximum concentration. Lateral extent of cyanide is defined and further sampling for vertical extent is not warranted.

Lead was detected above the soil and sediment BVs in three soil samples and two sediment samples with a maximum concentration of 39.1 mg/kg. Concentrations increased with depth at location 21-25622, only one depth was sampled at locations 21-01331 and 21-01333, concentrations decreased with depth at locations 21-25623 and 21-25624, and concentrations decreased downgradient. The residential SSL was approximately 10 times the maximum concentration and the industrial SSL was approximately 20 times the maximum concentration. Lateral extent of lead is defined and further sampling for vertical extent is not warranted.

Mercury was detected above the soil BV in eight samples with a maximum concentration of 0.765 mg/kg. Concentrations increased with depth at locations 21-25418, 21-25624, and 21-25625; decreased with depth at all other locations, and decreased downgradient. The residential SSL was approximately 31 times the maximum concentration. Lateral extent of mercury is defined and further sampling for vertical extent is not warranted.

Perchlorate was detected in nine samples with a maximum concentration of 0.00491 mg/kg. Concentrations increased with depth at locations 21-25419 and 21-25423, decreased with depth at all other locations, and decreased downgradient. The residential SSL was approximately 11,000 times the maximum concentration. Lateral extent of perchlorate is defined and further sampling for vertical extent is not warranted.

Selenium was not detected above the soil and sediment BVs but had DLs (0.32 mg/kg to 1.84 mg/kg) above the BVs in 28 soil samples and 6 sediment samples. The residential SSL was approximately 212 times the maximum DL. Further sampling for extent of selenium is not warranted.

Silver was detected above the soil BV in five samples with a maximum concentration of 24.5 mg/kg. Concentrations increased with depth at locations 21-25624 and 21-25625, decreased with depth at location 21-25623, and decreased downgradient. The residential SSL was approximately 16 times the maximum concentration. Lateral extent of silver is defined and further sampling for vertical extent is not warranted.

Zinc was detected above the soil BV in five samples with a maximum concentration of 105 mg/kg. Concentrations increased with depth at location 21-25625, decreased with depth at locations 21-25623 and 21-25624, and decreased downgradient. The residential SSL was approximately 224 times the maximum concentration. Lateral extent of zinc is defined and further sampling for vertical extent is not warranted.

Organic Chemicals

Organic COPCs at SWMU 21-027(d) include anthracene, Aroclor-1242, Aroclor-1254, Aroclor-1260, benzo(a)pyrene, benzo(b)fluoranthene, benzoic acid, bis(2-ethylhexyl)phthalate, chrysene, fluoranthene, 2-methylnaphthalene, naphthalene, pentachlorophenol, phenanthrene, pyrene, and TPH-DRO.

Anthracene was detected in one sample at a concentration of 0.00918 mg/kg. Concentrations decreased with depth and decreased downgradient. The lateral and vertical extent of anthracene are defined.

Aroclor-1242 was detected in one sample at a concentration of 0.0065 mg/kg. Concentrations increased with depth at location 21-25623 and decreased downgradient. The residential SSL was approximately 374 times the maximum concentration. The lateral extent of Aroclor-1242 is defined and further sampling for vertical extent is not warranted.

Aroclor-1254 was detected in three samples with a maximum concentration of 0.0033 mg/kg. Concentrations increased with depth at location 21-25625, did not change substantially with depth (0.0008 mg/kg) at location 21-25622, decreased with depth at location 21-25623, and increased downgradient. The residential SSL was approximately 345 times the maximum concentration. Further sampling for extent of Aroclor-1254 is not warranted.

Aroclor-1260 was detected in six samples with a maximum concentration of 0.0281 mg/kg. Concentrations increased with depth at location 21-25624, did not change substantially with depth (0.0001 mg/kg) at location 21-25622, decreased with depth at location 21-25623, and decreased downgradient. The residential SSL was approximately 86 times the maximum concentration. Lateral extent of Aroclor-1260 is defined and further sampling for vertical extent is not warranted.

Benzo(a)pyrene was detected in one sample at a concentration of 0.0339 mg/kg. Concentrations decreased with depth and decreased downgradient. The lateral and vertical extent of benzo(a)pyrene are defined.

Benzo(b)fluoranthene was detected in four samples with a maximum concentration of 0.0234 mg/kg. Concentrations increased with depth at locations 21-25418 and 21-25419, decreased with depth at location 21-25415, and decreased downgradient. The residential SSL was approximately 65 times the maximum concentration. Lateral extent of benzo(b)fluoranthene is defined and further sampling for vertical extent is not warranted.

Benzoic acid was detected in one sample at a concentration of 0.0659 mg/kg. Concentrations increased with depth at location 21-25625 and increased downgradient. The residential SSL was approximately 3,790,000 times the detected concentration. Further sampling for extent of benzoic acid is not warranted.

Bis(2-ethylhexyl)phthalate was detected in two samples with a maximum concentration of 0.0921 mg/kg. Concentrations increased with depth at location 21-25420, decreased with depth at location 21-25422, and decreased downgradient. The residential SSL was approximately 4120 times the maximum concentration. Lateral extent of bis(2-ethylhexyl)phthalate is defined and further sampling for vertical extent is not warranted.

Chrysene was detected in three samples with a maximum concentration of 0.0189 mg/kg. Concentrations increased with depth at locations 21-25418 and 21-25419, decreased with depth at location 21-25415, and decreased downgradient. The residential SSL was approximately 8100 times the maximum concentration. Lateral extent of chrysene is defined and further sampling for vertical extent is not warranted.

Fluoranthene was detected in 11 samples with a maximum concentration of 0.27 mg/kg. Concentrations increased with depth at location 21-25419; did not change substantially with depth (0.001 mg/kg to 0.035 mg/kg) at locations 21-25622, 21-25624, and 21-25625; decreased with depth at all other locations, and increased downgradient. The residential SSL was approximately 8600 times the maximum concentration. Further sampling for extent of fluoranthene is not warranted.

Methylnaphthalene[2-] was detected in two samples with a maximum concentration of 0.0495 mg/kg. Concentrations increased with depth at location 21-25624, decreased with depth at location 21-25623, and decreased downgradient. The residential SSL was approximately 4690 times the maximum concentration. Lateral extent of 2-methylnaphthalene is defined and further sampling for vertical extent is not warranted.

Naphthalene was detected in two samples with a maximum concentration of 0.0237 mg/kg. Concentrations increased with depth at location 21-25624, decreased with depth at location 21-25623, and decreased downgradient. The residential SSL was approximately 49,000 times the maximum concentration. Lateral extent of naphthalene is defined and further sampling for vertical extent is not warranted.

Pentachlorophenol was detected in one sample at a concentration of 0.212 mg/kg. Concentrations increased with depth at location 21-25416 and decreased downgradient. The residential SSL was approximately 46 times the detected concentration. Lateral extent of pentachlorophenol is defined and further sampling for vertical extent is not warranted.

Phenanthrene was detected in three samples with a maximum concentration of 0.0175 mg/kg. Concentrations increased with depth at location 21-25625, decreased with depth at locations 21-25622 and 21-25623, and decreased downgradient. The residential SSL was approximately 99,000 times the maximum concentration. Lateral extent of phenanthrene is defined and further sampling for vertical extent is not warranted.

Pyrene was detected in nine samples with a maximum concentration of 0.0253 mg/kg. Concentrations increased with depth at locations 21-25418 and 21-25419, did not change substantially with depth (0.0004 mg/kg) at location 21-25625, decreased with depth at all other locations, and decreased downgradient. The residential SSL was approximately 69,000 times the maximum concentration. Lateral extent of pyrene is defined and further sampling for vertical extent is not warranted.

TPH-DRO was detected in one sample at a concentration of 19 mg/kg. Only one depth was sampled at location 21-11100 and concentrations decreased downgradient. The residential SSL was approximately 53 times the detected concentration. Lateral extent of TPH-DRO is defined and further sampling for vertical extent is not warranted.

Radionuclides

Radionuclide COPCs at SWMU 21-027(d) include americium-241, cesium-137, plutonium-238, plutonium-239/240, tritium, uranium-234, uranium-235/236, and uranium-238.

Americium-241 was detected above the soil and sediment FVs in nine soil and seven sediment samples and was detected below 1 ft bgs in eight soil samples with a maximum activity of 11.2 pCi/g. Activities increased with depth at location 21-25418, only one depth was sampled at locations 21-01329 through 21-01334 and 21-11103, activities decreased with depth at all other locations, and activities decreased downgradient. The residential screening action level (SAL) was approximately 7 times the maximum activity and the industrial SAL was approximately 89 times the maximum activity. Lateral extent of americium-241 is defined and further sampling for vertical extent is not warranted.

Cesium-137 was detected below 1 ft bgs in seven soil samples with a maximum activity of 0.419 pCi/g. Activities increased with depth at locations 21-25418, 21-25419, and 21-25625; decreased with depth at locations 21-25415, 21-25622, 21-25623, and 21-25624; and decreased downgradient (the activities in surface samples at locations 21-25415, 21-25622, 21-25623, and 21-25624 were 0.27 pCi/g, 0.301 pCi/g, 0.461 pCi/g, and 0.435 pCi/g, respectively, and below the soil FV). The residential SAL was approximately 29 times the maximum activity. Lateral extent of cesium-137 is defined and further sampling for vertical extent is not warranted.

Plutonium-238 was detected above the soil and sediment FVs in ~~two-one~~ soil and four sediment samples and was detected below 1 ft bgs in one soil sample with a maximum activity of ~~0.3030~~ 0.423 pCi/g. Activities increased with depth at location 21-25418; only one depth was sampled at locations 21-01329, 21-01331, 21-01332, and 21-01333; activities decreased with depth at locations ~~21-25414 and 21-25622~~, and activities decreased downgradient. The residential SAL was approximately 277 times the maximum activity. Lateral extent of plutonium-238 is defined and further sampling for vertical extent is not warranted.

Plutonium-239/240 was detected above the soil and sediment FVs in 14 soil and 13 sediment samples and was detected below 1 ft bgs in 13 soil samples with a maximum activity of 8.59 pCi/g. Activities increased with depth at locations 21-25414, 21-25415, and 21-25418; only one depth was sampled at locations 21-01329 through 21-01334 and 21-11098 through 21-11104; activities did not change substantially with depth (0.002 pCi/g) at location 21-25625; activities decreased with depth at all other locations, and activities decreased downgradient. The residential SAL was approximately 9 times the maximum activity and the industrial SAL was approximately 140 times the maximum activity. Lateral extent of plutonium-239/240 is defined and further sampling for vertical extent is not warranted.

Tritium was detected in 22 samples with a maximum activity of 0.4 pCi/g. Activities increased with depth at locations 21-24578, 21-25419, and 21-25622; only one depth was sampled at locations 21-01329 through 21-01334; activities did not change substantially with depth (0.002 pCi/g) at location 21-25423; activities decreased with depth at all other locations, and activities decreased downgradient. The residential SAL was approximately 4250 times the maximum activity. Lateral extent of tritium is defined and further sampling for vertical extent is not warranted.

Uranium-234 was detected above the soil BV in three samples with a maximum activity of 6.51 pCi/g. Activities decreased with depth at locations 21-25623 and 21-25624 and decreased downgradient. The lateral and vertical extent of uranium-234 are defined.

Uranium-235/236 was detected above the soil BV in two samples with a maximum activity of 0.32 pCi/g. Activities decreased with depth at location 21-25623 and decreased downgradient. The lateral and vertical extent of uranium-235/236 are defined.

Uranium-238 was detected above the soil BV in three samples with a maximum activity of 5.67 pCi/g. Activities decreased with depth at locations 21-25623 and 21-25624 and decreased downgradient. The lateral and vertical extent of uranium-238 are defined.

Summary of Nature and Extent

The lateral and vertical extent of inorganic, organic, and radionuclide COPCs is defined or no further sampling for extent is warranted at SWMU 21-027(d).

Human-Health Risk Screening Evaluation

Human health risk for the residential scenario was screened using the maximum detected concentration of each COPC as the exposure point concentration (EPC). Although the current land use is industrial, the residential scenario was evaluated to determine whether the site could be recommended for corrective action complete without controls. The residential SSLs are less than construction worker SSLs for all COPCs, so the acceptable risk under the residential scenario also demonstrates protection of construction workers. Use of the maximum concentration as the EPC is also more conservative than using the upper confidence limit of the mean concentration as the EPC.

Risk screening results for carcinogenic, noncarcinogenic, and radionuclide COPCs and TPH-DRO are presented in Tables 5 through 8, respectively. The total excess cancer risk for the residential scenario is 8×10^{-7} , which is less than the NMED target risk level of 1×10^{-5} (NMED 2017, 602273). The residential hazard index (HI) is 1, which is equivalent to the NMED target HI of 1 (NMED 2017, 602273). The total dose is 9 mrem/yr, which is less than the target dose of 25 mrem/yr as authorized by DOE Order 458.1. The HI for TPH-DRO for the residential scenario is 0.02, which is less than the NMED target HI of 1 (NMED 2017, 602273).

The MDA V investigation report included a human health screening evaluation of the indoor air pathway for pore gas vapor intrusion ~~and an ecological risk screening assessment~~ (LANL 2007, 098942, Appendix H). ~~Both of these~~ This evaluation ~~s was were~~ conducted for Consolidated Unit 21-018(a)-99 as a whole rather than for the individual SWMUs and AOC composing the consolidated unit. Because SWMU 21-027(d) lies within the consolidated unit investigation footprint associated with the data used in ~~these~~ this evaluation ~~s~~, the results of ~~these~~ se evaluations ~~s~~ should also be applicable to SWMU 21-027(d). The MDA V investigation report concluded Consolidated Unit 21-018(a)-99 poses no unacceptable risk from vapor intrusion (LANL 2007, 098942, p. H-17) ~~and poses no potential risk to ecological receptors (LANL 2007, 098942, p. H-32). These~~ This same conclusions ~~are is~~ applicable to SWMU 21-027(d).

Ecological Risk Screening Evaluation

ProUCL was used to determine 95% upper confidence limits (UCLs) for chemicals and radionuclides detected in the depth range 0.0 to 5.0 ft bgs. ProUCL input and output files are provided in Attachment 1. UCLs were used as EPCs for those constituents having eight or more samples with five or more detections. EPCs for ecological receptors at SWMU 21-027(d) are presented in Table 9. The EPCs were compared to the minimum of the receptor-specific ecological screening levels (ESLs) for each chemical to identify chemicals of potential ecological concern (COPECs). The results of the minimum ESL comparison are shown in Table 10. Cadmium, copper, cyanide, lead, mercury, selenium, silver, zinc, benzoic acid, bis(2-ethylhexyl)phthalate, and pentachlorophenol are retained as COPECs because the hazard quotients (HQs) were greater than 0.3. The HQs and HIs for each COPEC and receptor combination are presented in Table 11. The HI analysis indicates that the kestrel (both feeding guilds), robin (all feeding guilds), shrew, deer mouse, earthworm, and plant have HIs greater than 1. The HI for the cottontail was equivalent to 1 and the HI for the gray fox was less than 1.

The HQs and HIs for each receptor having an HI greater than 1 were adjusted using population area use factors (PAUFs). The area of SWMU 21-027(d) is approximately 0.17 ha. The PAUF was estimated by dividing the site area by the population area of each receptor population (Table 12). The HQs and HIs were recalculated using the PAUFs. The HIs for the plant and earthworm are not adjusted by PAUFs because these receptors do not have home ranges. The adjusted HIs for SWMU 21-027(d) are less than 1 for all receptors (Table 13). The plant had an unadjusted HI of 4 due primarily to lead, selenium, and zinc, and the earthworm had an unadjusted HI of 5, due primarily to mercury, selenium, and zinc (Table 13). To address the HIs greater than 1 and reduce the associated uncertainty, analyses were conducted

using ESLs derived from lowest observed adverse effect levels (LOAELs) rather than no observed adverse effects levels. The LOAEL-based ESLs were calculated based on toxicity information in the ECORISK Database, Release 4.1 (LANL 2017, 602538) and are presented in Table 14. The HI analysis using LOAEL-based ESLs resulted in HIs of 0.5 for the earthworm and 0.7 for the plant (Table 15).

Based on evaluations of the minimum ESLs, HI analyses, potential effects to populations (individuals for threatened and endangered [T&E] species), and LOAEL analyses, no potential ecological risks to the earthworm, plant, robin, kestrel, deer mouse, montane shrew, desert cottontail, gray fox, and Mexican spotted owl exist at SWMU 21-027(d).

Summary of Human Health and Ecological Risk Screening Assessments

SWMU 21-027(d) does not present an unacceptable risk to human health under the residential and construction worker scenarios and does not present an unacceptable risk to ecological receptors.

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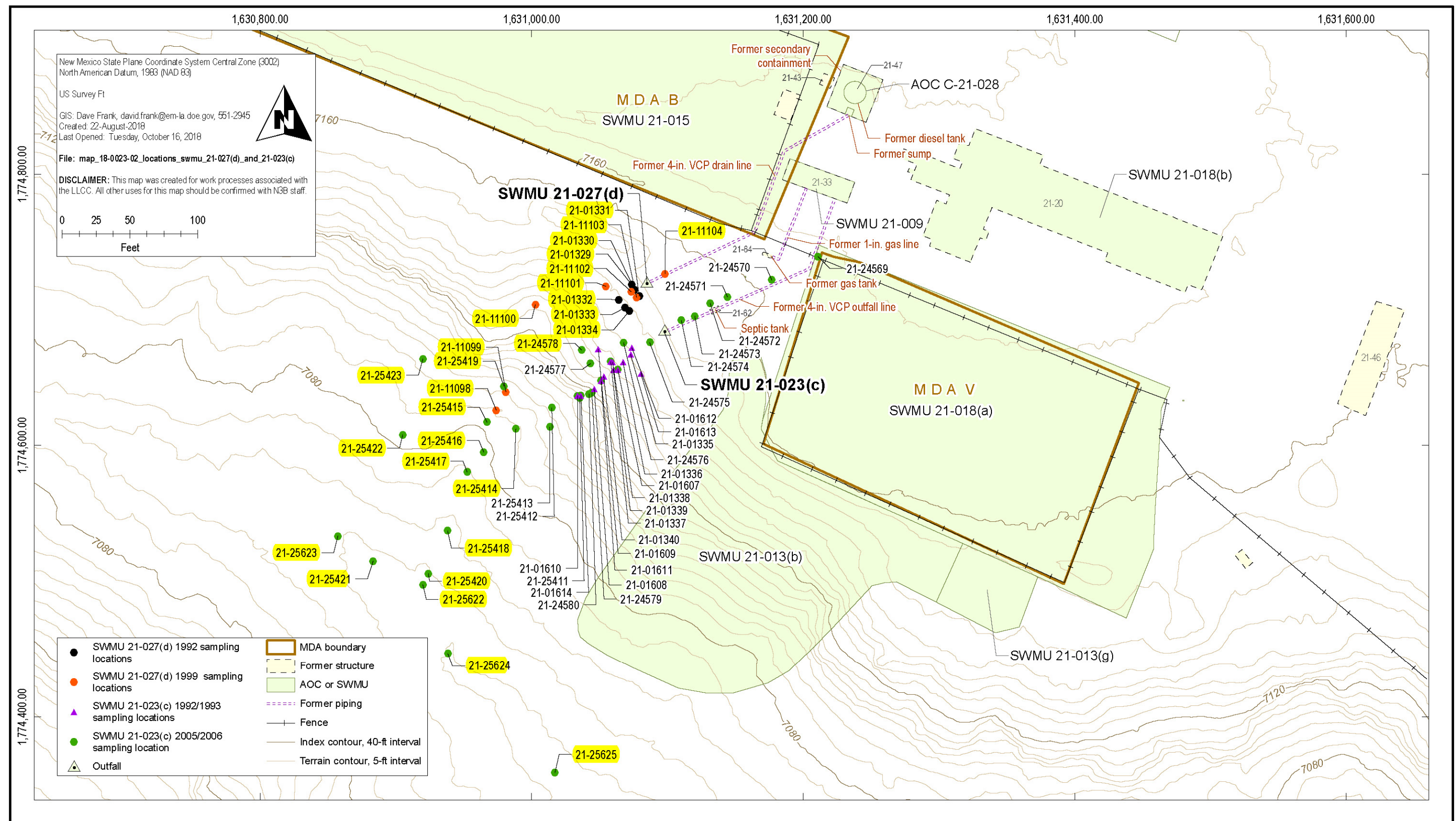


Figure 1 Sampling locations (yellow) used for SWMU 21-027(d)

Table 1
Samples Collected and Analyses Requested for SWMU 21-027(d)

Sample ID	Location ID	Depth (ft)	Media	Americium-241	Nitrate	Gamma-Emitting Radionuclides	Tritium	Isotopic Plutonium	Isotopic Uranium	TAL Metals	PCBs	Perchlorate	Strontium-90	VOCs	SVOCs	Cyanide (Total)	TPH-DRO
AAA0615	21-01329	0–0.5	Sediment	13099 ^a	— ^b	—	13099-1	13099	—	13101	—	—	13099	13101	13101	—	—
AAA0616	21-01330	0–0.5	Sediment	13099	—	—	13099-1	13099	—	13101	—	—	13099	13101	13101	—	—
AAA0617	21-01331	0–0.5	Sediment	13099	—	—	13099-1	13099	—	13101	—	—	13099	13101	13101	—	—
AAA0619	21-01332	0–0.5	Sediment	13099	—	—	13099-1	13099	—	13101	—	—	13099	13101	13101	—	—
AAA0620	21-01333	0–0.5	Sediment	13099	—	—	13099-1	13099	—	13101	—	—	13099	13101	13101	—	—
AAA0621	21-01334	0–0.5	Sediment	13099	—	—	13099-1	13099	—	13101	—	—	13099	13101	13101	—	—
MD21-99-0210	21-11098	0–0.3	Sediment	6204R	—	—	—	6204R	—	—	—	—	—	—	—	—	6203R
MD21-99-0211	21-11099	0–0.3	Sediment	6204R	—	—	—	6204R	—	—	—	—	—	—	—	—	6203R
MD21-99-0212	21-11100	0–0.3	Sediment	6204R	—	—	—	6204R	—	—	—	—	—	—	—	—	6203R
MD21-99-0213	21-11101	0–0.3	Sediment	6204R	—	—	—	6204R	—	—	—	—	—	—	—	—	6203R
MD21-99-0214	21-11102	0–0.3	Sediment	6204R	—	—	—	6204R	—	—	—	—	—	—	—	—	6203R
MD21-99-0215	21-11103	0–0.3	Sediment	6204R	—	—	—	6204R	—	—	—	—	—	—	—	—	6203R
MD21-99-0216	21-11104	0–0.3	Sediment	6204R	—	—	—	6204R	—	—	—	—	—	—	—	—	6203R
MD21-05-60011	21-24578	0.0–0.5	Soil	4169S	4168S	4169S	4169S	4169S	4169S	4168S	—	4168S	4169S	—	4167S	4168S	—
MD21-05-60012	21-24578	1.5–2.0	Soil	4169S	4168S	4169S	4169S	4169S	4169S	4168S	—	4168S	4169S	—	4167S	4168S	—
MD21-06-66264	21-25414	0–0.5	Soil	4187S	4186S	4187S	4187S	4187S	4187S	4186S	—	4186S	4187S	—	4187S	4186S	—
MD21-06-66265	21-25414	1.5–2	Soil	4187S	4186S	4187S	4187S	4187S	4187S	4186S	—	4186S	4187S	—	4187S	4186S	—
MD21-06-66267	21-25415	0–0.5	Soil	4187S	4186S	4187S	4187S	4187S	4187S	4186S	—	4186S	4187S	—	4187S	4186S	—
MD21-06-66268	21-25415	1.5–2	Soil	4187S	4186S	4187S	4187S	4187S	4187S	4186S	—	4186S	4187S	—	4187S	4186S	—
MD21-06-66270	21-25416	0–0.5	Soil	4187S	4186S	4187S	4187S	4187S	4187S	4186S	—	4186S	4187S	—	4187S	4186S	—
MD21-06-66271	21-25416	1.5–2	Soil	4187S	4186S	4187S	4187S	4187S	4187S	4186S	—	4186S	4187S	—	4187S	4186S	—
MD21-06-66273	21-25417	0–0.5	Soil	4187S	4186S	4187S	4187S	4187S	4187S	4186S	—	4186S	4187S	—	4187S	4186S	—
MD21-06-66274	21-25417	1.5–2	Soil	4187S	4186S	4187S	4187S	4187S	4187S	4186S	—	4186S	4187S	—	4187S	4186S	—
MD21-06-66276	21-25418	0–0.5	Soil	4187S	4186S	4187S	4187S	4187S	4187S	4186S	—	4186S	4187S	—	4187S	4186S	—
MD21-06-66277	21-25418	1.5–2	Soil	4187S	4186S	4187S	4187S	4187S	4187S	4186S	—	4186S	4187S	—	4187S	4186S	—
MD21-06-66280	21-25419	0–0.5	Soil	4187S	4186S	4187S	4187S	4187S	4187S	4186S	—	4186S	4187S	—	4187S	4186S	—
MD21-06-66279	21-25419	1.5–2	Soil	4187S	4186S	4187S	4187S	4187S	4187S	4186S	—	4186S	4187S	—	4187S	4186S	—
MD21-06-66282	21-25420	0–0.5	Soil	4187S	4186S	4187S	4187S	4187S	4187S	4186S	—	4186S	4187S	—	4187S	4186S	—
MD21-06-66283	21-25420	1.5–2	Soil	4187S	4186S	4187S	4187S	4187S	4187S	4186S	—	4186S	4187S	—	4187S	4186S	—
MD21-06-66285	21-25421	0–0.5	Soil	4547S	4547S	4547S	4547S	4547S	4547S	4547S	—	4547S	4547S	—	4547S	4547S	—
MD21-06-66286	21-25421	1.5–2	Soil	4547S	4547S	4547S	4547S	4547S	4547S	4547S	—	4547S	4547S	—	4547S	4547S	—

Table 1 (continued)

Sample ID	Location ID	Depth (ft)	Media	Americium-241	Nitrate	Gamma-Emitting Radionuclides	Tritium	Isotopic Plutonium	Isotopic Uranium	TAL Metals	PCBs	Perchlorate	Strontium-90	VOCs	SVOCs	Cyanide (Total)	TPH-DRO
MD21-06-66288	21-25422	0–0.5	Soil	4547S	4547S	4547S	4547S	4547S	4547S	4547S	—	4547S	4547S	—	4547S	4547S	—
MD21-06-66289	21-25422	1.5–2	Soil	4547S	4547S	4547S	4547S	4547S	4547S	4547S	—	4547S	4547S	—	4547S	4547S	—
MD21-06-66291	21-25423	0–0.5	Soil	4547S	4547S	4547S	4547S	4547S	4547S	4547S	—	4547S	4547S	—	4547S	4547S	—
MD21-06-66292	21-25423	1.5–2	Soil	4547S	4547S	4547S	4547S	4547S	4547S	4547S	—	4547S	4547S	—	4547S	4547S	—
MD21-06-68044	21-25622	0–0.5	Soil	4942S	4941S	4942S	4942S	4942S	4942S	4941S	4940S	—	4942S	—	4940S	4941S	—
MD21-06-68045	21-25622	1.5–2	Soil	4942S	4941S	4942S	4942S	4942S	4942S	4941S	4940S	—	4942S	—	4940S	4941S	—
MD21-06-68046	21-25623	0–0.5	Soil	4942S	4941S	4942S	4942S	4942S	4942S	4941S	4940S	—	4942S	—	4940S	4941S	—
MD21-06-68047	21-25623	1.5–2	Soil	4942S	4941S	4942S	4942S	4942S	4942S	4941S	4940S	—	4942S	—	4940S	4941S	—
MD21-06-68048	21-25624	0–0.5	Soil	4942S	4941S	4942S	4942S	4942S	4942S	4941S	4940S	—	4942S	—	4940S	4941S	—
MD21-06-68049	21-25624	1.5–2	Soil	4942S	4941S	4942S	4942S	4942S	4942S	4941S	4940S	—	4942S	—	4940S	4941S	—
MD21-06-68050	21-25625	0–0.5	Soil	4942S	4941S	4942S	4942S	4942S	4942S	4941S	4940S	—	4942S	—	4940S	4941S	—
MD21-06-68051	21-25625	1.5–2	Soil	4942S	4941S	4942S	4942S	4942S	4942S	4941S	4940S	—	4942S	—	4940S	4941S	—

^a Analytical request number.

^b — = Analysis not requested.

Table 2
Inorganic Chemicals above BVs at SWMU 21-027(d)

Sample ID	Location ID	Depth (ft)	Media	Antimony	Cadmium	Chromium	Cobalt	Copper	Cyanide	Lead	Mercury	Nitrate	Perchlorate	Selenium	Silver	Thallium	Zinc
Sediment BV^a				0.83	0.4	10.5	4.73	11.2	0.82	19.7	0.1	na^b	na	0.3	1	0.73	60.2
Soil BV^a				0.83	0.4	19.3	8.64	14.7	0.5	22.3	0.1	na	na	1.52	1	0.73	48.8
Construction Worker SSL^c				142	72.1	134^d	36.7	14,200	12	800	77.1	566,000	248	1750	1770	3.54	106,000
Industrial SSL^c				519	1110	505^d	388	51,900	62.8	800	389	2,080,000	908	6490	6490	13	389,000
Residential SSL^c				31.3	70.5	96.6^d	23.4	3130	11.1	400	23.5	125,000	54.8	391	391	0.782	23,500
AAA0615	21-01329	0–0.5	Sediment	4.9 (U)	1.2	— ^e	5.4	—	—	—	—	—	—	0.32 (U)	—	—	—
AAA0616	21-01330	0–0.5	Sediment	4.8 (U)	1.4	—	—	—	—	—	—	—	—	0.32 (U)	—	—	—
AAA0617	21-01331	0–0.5	Sediment	5.2 (U)	1.4	—	5.7	—	—	21.1	—	—	—	0.34 (U)	—	—	—
AAA0619	21-01332	0–0.5	Sediment	5.1 (U)	1	—	—	—	—	—	—	—	—	0.33 (U)	—	—	—
AAA0620	21-01333	0–0.5	Sediment	5.2 (U)	0.89	—	—	—	—	23.7	—	—	—	0.34 (U)	—	—	—
AAA0621	21-01334	0–0.5	Sediment	5.2 (U)	0.69	—	—	—	—	—	—	—	—	0.34 (U)	—	—	—
MD21-05-60011	21-24578	0.0–0.5	Soil	—	—	—	—	—	—	—	—	0.528 (J)	0.00491	1.74 (U)	—	—	—
MD21-05-60012	21-24578	1.5–2.0	Soil	—	0.533 (U)	—	—	—	—	—	—	—	0.00408	1.6 (U)	—	—	—
MD21-06-66264	21-25414	0–0.5	Soil	—	0.514 (U)	—	—	—	—	—	0.103	3.17 (J-)	0.0033	1.54 (U)	—	—	—
MD21-06-66265	21-25414	1.5–2	Soil	—	0.542 (U)	—	—	—	—	—	—	1.39 (J-)	0.00176 (J)	1.63 (U)	—	—	—
MD21-06-66267	21-25415	0–0.5	Soil	—	0.543 (U)	—	—	—	—	—	—	2.19 (J-)	0.00161 (J)	1.63 (U)	—	—	—
MD21-06-66268	21-25415	1.5–2	Soil	—	0.577 (U)	—	—	—	—	—	—	—	—	1.73 (U)	—	—	—
MD21-06-66270	21-25416	0–0.5	Soil	1.34 (J-)	0.527 (U)	—	—	—	—	—	0.127	2.91 (J-)	—	1.58 (U)	—	—	—
MD21-06-66271	21-25416	1.5–2	Soil	—	0.554 (U)	—	—	—	—	—	—	0.972 (J-)	—	1.66 (U)	—	—	—
MD21-06-66273	21-25417	0–0.5	Soil	—	0.578 (U)	—	—	—	—	—	—	—	0.000669 (J)	1.73 (U)	—	—	—
MD21-06-66274	21-25417	1.5–2	Soil	—	0.53 (U)	—	—	—	—	—	—	—	—	1.59 (U)	—	—	—
MD21-06-66276	21-25418	0–0.5	Soil	—	0.505 (U)	—	—	—	—	—	—	2.58 (J-)	—	—	—	—	—
MD21-06-66277	21-25418	1.5–2	Soil	—	0.54 (U)	—	—	—	—	—	0.663	1.27 (J-)	—	1.62 (U)	—	—	—
MD21-06-66280	21-25419	0–0.5	Soil	—	0.555 (U)	—	—	—	—	—	—	0.653 (J-)	0.000593 (J)	1.66 (U)	—	—	—
MD21-06-66279	21-25419	1.5–2	Soil	—	0.532 (U)	—	—	—	—	—	—	1.45 (J-)	0.00159 (J)	1.59 (U)	—	—	—
MD21-06-66282	21-25420	0–0.5	Soil	—	0.504 (U)	—	—	—	—	—	—	1.9 (J-)	—	—	—	—	—
MD21-06-66283	21-25420	1.5–2	Soil	—	0.529 (U)	—	—	—	—	—	—	0.683 (J-)	—	1.59 (U)	—	—	—
MD21-06-66285	21-25421	0–0.5	Soil	—	—	—	—	—	—	—	—	1.44	—	1.67 (U)	—	—	—
MD21-06-66286	21-25421	1.5–2	Soil	—	0.548 (U)	21.7	—	—	—	—	—	1.31	—	1.64 (U)	—	—	—
MD21-06-66288	21-25422	0–0.5	Soil	—	0.516 (U)	—	—	—	—	—	—	1.08	—	1.55 (U)	—	—	—
MD21-06-66289	21-25422	1.5–2	Soil	—	0.524 (U)	—	—	—	—	—	—	—	—	1.57 (U)	—	—	—
MD21-06-66291	21-25423	0–0.5	Soil	—	0.515 (U)	—	—	—	—	—	—	1.26	—	1.54 (U)	—	—	—
MD21-06-66292	21-25423	1.5–2	Soil	—	0.523 (U)	—	—	—	—	—	—	—	0.000841 (J)	1.57 (U)	—	1.04 (U)	—
MD21-06-68044	21-25622	0–0.5	Soil	—	—	—	—	—	—	—	—	1.98	—	1.56 (U)	—	—	—

Table 2 (continued)

Sample ID	Location ID	Depth (ft)	Media	Antimony	Cadmium	Chromium	Cobalt	Copper	Cyanide	Lead	Mercury	Nitrate	Perchlorate	Selenium	Silver	Thallium	Zinc
Sediment BV ^a				0.83	0.4	10.5	4.73	11.2	0.82	19.7	0.1	na ^b	na	0.3	1	0.73	60.2
Soil BV ^a				0.83	0.4	19.3	8.64	14.7	0.5	22.3	0.1	na	na	1.52	1	0.73	48.8
Construction Worker SSL ^c				142	72.1	134 ^d	36.7	14,200	12	800	77.1	566,00	248	1750	1770	3.54	106,000
Industrial SSL ^c				519	1110	505 ^d	388	51,900	62.8	800	389	2,080,000	908	6490	6490	13	389,000
Residential SSL ^c				31.3	70.5	96.6 ^d	23.4	3130	11.1	400	23.5	125,000	54.8	391	391	0.782	23,500
MD21-06-68045	21-25622	1.5–2	Soil	—	—	—	—	—	—	24.3	—	1.19	—	1.62 (U)	—	—	—
MD21-06-68046	21-25623	0–0.5	Soil	—	0.846	—	—	22.6	—	39.1	0.765	1.28	—	1.72 (U)	24.5	—	105
MD21-06-68047	21-25623	1.5–2	Soil	—	0.414 (J)	—	—	—	—	—	0.304	0.871 (J)	—	1.62 (U)	10.4	—	54.7
MD21-06-68048	21-25624	0–0.5	Soil	—	—	—	—	—	—	24.3	0.279	1.45	—	1.84 (U)	8.43	—	60.4
MD21-06-68049	21-25624	1.5–2	Soil	—	—	—	—	—	5.78	—	0.429	0.904 (J)	—	1.7 (U)	11.9	—	—
MD21-06-68050	21-25625	0–0.5	Soil	—	—	—	—	—	—	—	—	1.06 (J)	—	1.76 (U)	—	—	52.1
MD21-06-68051	21-25625	1.5–2	Soil	—	—	—	—	—	—	—	0.103	0.98 (J)	—	1.84 (U)	3.08	—	60.9

Notes: Results are in mg/kg.

^a BVs are from LANL (1998, 059730).

^b na = Not available.

^c SSLs are from NMED (2017, 602273). If chemical has both carcinogenic and noncarcinogenic SSLs, the lower of the two is presented.

^d SSLs are for total chromium.

^e — = Not detected or not detected above BV.

Table 3
Organic Chemicals Detected at SWMU 21-027(d)

Sample ID	Location ID	Depth (ft)	Media	Anthracene	Aroclor-1242	Aroclor-1254	Aroclor-1260	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzoic acid	Bis(2-ethylhexyl)phthalate	Chrysene	Fluoranthene	Methylnaphthalene[2-]	Naphthalene	Pentachlorophenol	Phenanthrene	Pyrene	TPH-DRO
Construction Worker SSL ^a				75,300	85.3	4.91	85.3	106	240	1,310,000 ^b	5380	23,100	10,000	1000	5020	34.6	7530	7530	na ^c
Industrial SSL ^a				253,000	10.9	11	11.1	23.6	32.3	3,300,000 ^d	1830	3230	33,700	3370	16,800	44.5	25,300	25,300	3000 ^e
Residential SSL ^a				17,400	2.43	1.14	2.43	1.12	1.53	250,000 ^d	380	153	2320	232	1160	9.85	1740	1740	1000 ^e
MD21-99-0212	21-11100	0–0.3	Sediment	NA ^f	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	19
MD21-06-66267	21-25415	0–0.5	Soil	0.00918 (J)	— ^g	—	—	0.0339 (J)	0.0216 (J)	—	—	0.0138 (J)	0.0189 (J)	—	—	—	—	0.0167 (J)	NA
MD21-06-66271	21-25416	1.5–2	Soil	—	—	—	—	—	—	—	—	—	—	—	—	0.212 (J)	—	—	NA
MD21-06-66273	21-25417	0–0.5	Soil	—	—	—	—	—	—	—	—	—	0.0118 (J)	—	—	—	—	—	NA
MD21-06-66276	21-25418	0–0.5	Soil	—	—	—	—	—	0.0124 (J)	—	—	—	0.0134 (J)	—	—	—	—	0.0116 (J)	NA
MD21-06-66277	21-25418	1.5–2	Soil	—	—	—	—	—	0.0234 (J)	—	—	0.0189 (J)	—	—	—	—	—	0.016 (J)	NA
MD21-06-66279	21-25419	1.5–2	Soil	—	—	—	—	—	0.0222 (J)	—	—	0.0141 (J)	0.0208 (J)	—	—	—	—	0.0228 (J)	NA
MD21-06-66283	21-25420	1.5–2	Soil	—	—	—	—	—	—	—	0.0921 (J)	—	—	—	—	—	—	—	NA
MD21-06-68044	21-25622	0–0.5	Soil	—	—	0.002 (J)	0.0019 (J)	—	—	—	0.0912 (J)	—	0.225 (J)	—	—	—	0.0131 (J)	0.0253 (J)	NA
MD21-06-68045	21-25622	1.5–2	Soil	—	—	0.0028 (J)	0.002 (J)	—	—	—	—	—	0.223 (J)	—	—	—	—	0.0119 (J)	NA
MD21-06-68046	21-25623	0–0.5	Soil	—	—	—	0.0281	—	—	—	—	—	0.236 (J)	0.0495	0.0237 (J)	—	0.0175 (J)	—	NA
MD21-06-68047	21-25623	1.5–2	Soil	—	0.0065	—	0.0073	—	—	—	—	—	—	—	—	—	—	—	NA
MD21-06-68048	21-25624	0–0.5	Soil	—	—	—	0.0044	—	—	—	—	—	0.27 (J)	—	—	—	—	0.0156 (J)	NA
MD21-06-68049	21-25624	1.5–2	Soil	—	—	—	0.0108	—	—	—	—	—	0.235 (J)	0.0309 (J)	0.014 (J)	—	—	—	NA
MD21-06-68050	21-25625	0–0.5	Soil	—	—	—	—	—	—	—	—	—	0.257 (J)	—	—	—	—	0.0173 (J)	NA
MD21-06-68051	21-25625	1.5–2	Soil	—	—	0.0033 (J)	—	—	—	0.0659 (J)	—	—	0.258 (J)	—	—	—	0.0163 (J)	0.0177 (J)	NA

Notes: Results are in mg/kg.

^a SSLs from NMED (2017, 602273) unless otherwise noted. If chemical has both carcinogenic and noncarcinogenic SSLs, the lower of the two is presented.

^b Construction worker SSL calculated using toxicity value from EPA regional screening tables (<https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables>) and equation and parameters from NMED (2017, 602273).

^c na = Not available.

^d SSLs are from EPA regional screening tables (<https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables>).

^e SSL for diesel #2.

^f NA = Not analyzed.

^g — = Not detected.

Table 4
Radionuclides Detected or Detected Above BVs/FVs at SWMU 21-027(d)

Sample ID	Location ID	Depth (ft)	Media	Americium-241	Cesium-137	Plutonium-238	Plutonium-239/240	Tritium	Uranium-234	Uranium-235/236	Uranium-238
Sediment BV/FV^a				0.04	0.9	0.006	0.068	na^b	2.59	0.2	2.29
Soil BV/FV^a				0.013	1.65	0.023	0.054	na	2.59	0.2	2.29
Construction Worker SAL^c				230	37	230	200	1,600,000	1000	130	340
Industrial SAL^c				1000	41	1300	1200	2,400,000	3100	160	710
Residential SAL^c				83	12	84	79	1700	290	42	150
AAA0615	21-01329	0–0.5	Sediment	0.052	— ^d	0.008	0.753	0.0970	—	—	—
AAA0616	21-01330	0–0.5	Sediment	0.067	—	—	1.35	0.0599	—	—	—
AAA0617	21-01331	0–0.5	Sediment	0.141	—	0.025	4.46	0.0689	—	—	—
AAA0619	21-01332	0–0.5	Sediment	0.076	—	0.016	0.868	0.0792	—	—	—
AAA0620	21-01333	0–0.5	Sediment	0.092	—	0.012	1.54	0.0860	—	—	—
AAA0621	21-01334	0–0.5	Sediment	0.064	—	—	1.11	0.0712	—	—	—
MD21-99-0210	21-11098	0–0.3	Sediment	—	NA ^e	—	0.474	NA	NA	NA	NA
MD21-99-0211	21-11099	0–0.3	Sediment	—	NA	—	0.594	NA	NA	NA	NA
MD21-99-0212	21-11100	0–0.3	Sediment	—	NA	—	0.658	NA	NA	NA	NA
MD21-99-0213	21-11101	0–0.3	Sediment	—	NA	—	0.295	NA	NA	NA	NA
MD21-99-0214	21-11102	0–0.3	Sediment	—	NA	—	3.3	NA	NA	NA	NA
MD21-99-0215	21-11103	0–0.3	Sediment	0.266	NA	—	8.45	NA	NA	NA	NA
MD21-99-0216	21-11104	0–0.3	Sediment	—	NA	—	1.72	NA	NA	NA	NA
MD21-05-60011	21-24578	0.0–0.5	Soil	0.0561	—	—	0.417 (J+)	—	—	—	—
MD21-05-60012	21-24578	1.5–2.0	Soil	—	—	—	0.0439	0.0207	—	—	—
MD21-06-66264	21-25414	0–0.5	Soil	11.2	—	0.0386	5.6	0.0165	—	—	—

Table 4 (continued)

Sample ID	Location ID	Depth (ft)	Media	Americium-241	Cesium-137	Plutonium-238	Plutonium-239/240	Tritium	Uranium-234	Uranium-235/236	Uranium-238
Sediment BV/FV^a				0.04	0.9	0.006	0.068	na^b	2.59	0.2	2.29
Soil BV/FV^a				0.013	1.65	0.023	0.054	na	2.59	0.2	2.29
Construction Worker SAL^c				230	37	230	200	1,600,000	1000	130	340
Industrial SAL^c				1000	41	1300	1200	2,400,000	3100	160	710
Residential SAL^c				83	12	84	79	1700	290	42	150
MD21-06-66265	21-25414	1.5–2	Soil	6.47	—	—	7.03	—	—	—	—
MD21-06-66267	21-25415	0–0.5	Soil	—	—	—	0.396	—	—	—	—
MD21-06-66268	21-25415	1.5–2	Soil	—	0.158	—	1.25	—	—	—	—
MD21-06-66270	21-25416	0–0.5	Soil	9.31	—	—	5.36	0.0183	—	—	—
MD21-06-66271	21-25416	1.5–2	Soil	0.555	—	—	0.343	—	—	—	—
MD21-06-66273	21-25417	0–0.5	Soil	1.02	—	—	1.59	—	—	—	—
MD21-06-66274	21-25417	1.5–2	Soil	0.18	—	—	0.375	—	—	—	—
MD21-06-66276	21-25418	0–0.5	Soil	5.56	—	—	4.87	—	—	—	—
MD21-06-66277	21-25418	1.5–2	Soil	9.14	0.225	0.0423	8.59	—	—	—	—
MD21-06-66280	21-25419	0–0.5	Soil	—	—	—	0.967	—	—	—	—
MD21-06-66279	21-25419	1.5–2	Soil	—	0.419	—	0.498	0.0212	—	—	—
MD21-06-66282	21-25420	0–0.5	Soil	4.31	—	—	4.79	0.00641	—	—	—
MD21-06-66283	21-25420	1.5–2	Soil	0.182	—	—	0.288	—	—	—	—
MD21-06-66285	21-25421	0–0.5	Soil	—	—	—	0.408 (J-)	0.15	—	—	—
MD21-06-66286	21-25421	1.5–2	Soil	—	—	—	0.0934	—	—	—	—
MD21-06-66288	21-25422	0–0.5	Soil	—	—	—	0.0815	0.0184	—	—	—
MD21-06-66291	21-25423	0–0.5	Soil	—	—	—	—	0.0182	—	—	—
MD21-06-66292	21-25423	1.5–2	Soil	—	—	—	—	0.0162	—	—	—
MD21-06-68044	21-25622	0–0.5	Soil	3.26	—	0.303	3.87	0.0 0585	—	—	—

Table 4 (continued)

Sample ID	Location ID	Depth (ft)	Media	Americium-241	Cesium-137	Plutonium-238	Plutonium-239/240	Tritium	Uranium-234	Uranium-235/236	Uranium-238
Sediment BV/FV^a				0.04	0.9	0.006	0.068	na^b	2.59	0.2	2.29
Soil BV/FV^a				0.013	1.65	0.023	0.054	na	2.59	0.2	2.29
Construction Worker SAL^c				230	37	230	200	1,600,000	1000	130	340
Industrial SAL^c				1000	41	1300	1200	2,400,000	3100	160	710
Residential SAL^c				83	12	84	79	1700	290	42	150
MD21-06-68045	21-25622	1.5–2	Soil	1.04	0.12	—	1.42	0.074	—	—	—
MD21-06-68046	21-25623	0–0.5	Soil	—	—	—	2.4	0.0979	6.51	0.32	5.67
MD21-06-68047	21-25623	1.5–2	Soil	—	0.166	—	0.831	0.00235	3.56	0.222	3.26
MD21-06-68048	21-25624	0–0.5	Soil	1.42	—	—	4.11	0.4	2.87	—	2.65
MD21-06-68049	21-25624	1.5–2	Soil	0.613	0.188	—	3.43	0.00314	—	—	—
MD21-06-68050	21-25625	0–0.5	Soil	0.314	—	—	0.834	0.052	—	—	—
MD21-06-68051	21-25625	1.5–2	Soil	0.157	0.332	—	0.832	—	—	—	—

Notes: Results are in mg/kg.

^a BVs/FVs are from LANL (1998, 059730).

^b na = Not available.

^c SALs are from LANL (2015, 600929).

^d — = Not detected or not detected above BV.

^e NA = Not analyzed.

Table 5
Residential Carcinogenic Screening Evaluation for SWMU 21-027(d)

COPC	Maximum Detected Concentration (mg/kg)	Residential SSL (mg/kg)*	Excess Cancer Risk
Cadmium	1.4	85,900	1.63E-10
Cobalt	5.7	17,200	3.31E-09
Aroclor-1242	0.0065	2.43	2.67E-08
Aroclor-1254	0.0033	2.43	1.36E-08
Aroclor-1260	0.0281	2.43	1.16E-07
Benzo(a)pyrene	0.0339	1.12	3.03E-07
Benzo(b)fluoranthene	0.0234	1.53	1.53E-07
Bis(2-ethylhexyl)phthalate	0.0921	380	2.42E-09
Chrysene	0.0189	153	1.24E-09
Pentachlorophenol	0.212	9.85	2.15E-07
Total Excess Cancer Risk			8E-07

*SSLs from NMED (2017, 602273).

Table 6
Residential Noncarcinogenic Screening Evaluation for SWMU 21-027(d)

COPC	Maximum Detected Concentration (mg/kg)	Residential SSL (mg/kg) ^a	HQ
Antimony	1.34	31.3	4.28E-02
Cadmium	1.4	70.5	1.99E-02
Cobalt	5.7	23.4	2.44E-01
Copper	22.6	3130	7.22E-03
Cyanide	5.78	11.1	5.21E-01
Lead	39.1	400	9.78E-02
Mercury	0.765	23.5	3.26E-02
Perchlorate	0.00491	54.8	8.96E-05
<u>Selenium</u>	<u>1.84 (U)^b</u>	<u>391</u>	<u>4.71E-03</u>
Silver	24.5	391	6.27E-02
Zinc	105	23,500	4.47E-03
Anthracene	0.00918	17,400	5.28E-07
Aroclor-1254	0.0033	1.14	2.89E-03
Benzoic acid	0.0659	250,000 ^{bc}	2.64E-07
Bis(2-ethylhexyl)phthalate	0.0921	1230	7.49E-05
Fluoranthene	0.27	2320	1.16E-04
Methylnaphthalene[2-]	0.0495	232	2.13E-04
Naphthalene	0.0237	1160	2.04E-05
Pentachlorophenol	0.212	234	9.06E-04
Phenanthrene	0.0175	1740	1.01E-05
Pyrene	0.0253	1740	1.45E-05
HI			1

^a SSLs from NMED (2017, 602273) unless otherwise noted.

^b Maximum detection limit.

^{bc} SSL from EPA regional screening tables (<https://www.epa.gov/regional-screening-levels-rsls-generic-tables>).

Table 7
Residential Radionuclide Screening Evaluation for SWMU 21-027(d)

COPC	Maximum Detected Activity (pCi/g)	Residential SAL (pCi/g)*	Dose (mrem/yr)
Americium-241	11.2	83	3.37E+00
Cesium-137	0.419	12	8.73E-01
Plutonium-238	0.303	84	9.02E-02
Plutonium-239/240	8.59	79	2.72E+00
Tritium	0.4	1700	5.88E-03
Uranium-234	6.51	290	5.61E-01
Uranium-235/236	0.32	42	1.90E-01
Uranium-238	5.67	150	9.45E-01
Total Dose			9

*SALs from LANL (2015, 600929).

Table 8
Residential TPH Screening Evaluation for SWMU 21-027(d)

COPC	Maximum Detected Concentration (mg/kg)	Residential SSL (mg/kg)*	HQ
TPH-DRO	19	1000	1.90E-02
HI			0.02

*SSL for diesel #2 from NMED (2017, 602273).

Table 9
EPCs at SWMU 21-027(d) for Ecological Risk

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Inorganic Chemicals (mg/kg)							
Antimony	34	6	0.111	5.2 (U)	Nonparametric	0.399	95% KM (Chebyshev)
Cadmium	36	16	0.131	1.4	Gamma	0.537	95% Gamma Adjusted KM
Cobalt	36	36	0.351	5.7	Gamma	2.71	95% Adjusted Gamma
Copper	36	36	1.2	22.6	Gamma	6.1	95% Adjusted Gamma
Cyanide	30	5	0.148	5.78	Lognormal	1.11	95% BCA Bootstrap
Lead	36	36	3.62	39.1	Normal	16.6	95% Student's-t
Mercury	30	29	0.0042	0.765	Lognormal	0.191	95% BCA Bootstrap
Perchlorate	22	9	0.000593	0.00491	Normal	0.00208	95% KM (t)
Selenium	36	0	0.32 (U)	1.84 (U)	n/a ^a	1.84 (U)	Maximum detection limit
Silver	36	29	0.0429	24.5	Nonparametric	5.25	95% KM (Chebyshev)
Zinc	36	36	19.9	105	Lognormal	41.4	95% Student's-t
Organic Chemicals (mg/kg)							
Anthracene	30	1	0.00918	0.161 (U)	n/a	0.00918	Maximum detected concentration
Aroclor-1242	8	1	0.00357 (U)	0.083 (U)	n/a	0.0065	Maximum detected concentration
Aroclor-1254	8	3	0.002	0.083 (U)	n/a	0.033	Maximum detected concentration
Aroclor-1260	8	6	0.0019	0.083 (U)	Approximate Normal	0.0149	95% KM (t)
Benzo(a)pyrene	30	1	0.0339	0.161 (U)	n/a	0.0339	Maximum detected concentration
Benzo(b)fluoranthene	30	4	0.0124	0.161 (U)	n/a	0.0234	Maximum detected concentration
Benzoic Acid	30	1	0.659	3.21 (UJ)	n/a	0.659	Maximum detected concentration
Bis(2-ethylhexyl)phthalate	30	2	0.0912	0.803 (U)	n/a	0.0921	Maximum detected concentration
Chrysene	30	3	0.0138	0.161 (U)	n/a	0.0189	Maximum detected concentration
Fluoranthene	30	11	0.0118	0.27	Nonparametric	0.15	95% KM (Chebyshev)
Methylnaphthalene[2-]	30	2	0.0309	0.161(U)	n/a	0.0495	Maximum detected concentration

Table 9 (continued)

COPC	Number of Analyses	Number of Detects	Minimum Concentration	Maximum Concentration	Distribution	EPC	EPC Method
Naphthalene	30	2	0.014	0.161(U)	n/a	0.0237	Maximum detected concentration
Pentachlorophenol	30	1	0.187 (U)	1.61 (U)	n/a	0.212	Maximum detected concentration
Phenanthrene	30	3	0.0131	0.161 (U)	n/a	0.0175	Maximum detected concentration
Pyrene	30	9	0.0116	0.161 (U)	Normal	0.0198	95% KM (t)
TPH-DRO	7	1	4 (U)	19	n/a	19	Maximum detected concentration
Radionuclides (pCi/g)							
Americium-241	43	24	-0.0102 (U)	11.2	Nonparametric	3.17	95% KM (Chebyshev)
Cesium-137	30	19	-0.04 (U)	0.904	Approximate Normal	0.242	95% KM (t)
Plutonium-238	43	6	-0.0165 (U)	0.0443 (U)	n/a	0.0423 ^b	Maximum detected concentration
Plutonium-239/240	43	41	0 (U)	8.59	Gamma	2.81	95% Gamma Adjusted KM
Tritium	36	22	-0.00658 (U)	0.402	Gamma	0.0738	95% Gamma Adjusted KM
Uranium-234	30	30	0.954	6.51	Nonparametric	1.96	95% Student's-t
Uranium-235/236	30	22	0.0497	0.32	Approximate Normal	0.13	95% KM (t)
Uranium-238	30	30	1.04	5.67	Nonparametric	1.91	95% Student's-t

^a n/a = Not applicable.

^b Maximum detected concentration was used because the EPC was negative.

Table 10
Minimum ESL Comparison for SWMU 21-027(d)

COPC	EPC (mg/kg)	ESL (mg/kg)	Receptor	HQ
Inorganic Chemicals				
Antimony	0.399	2.30	Deer Mouse	0.17
Cadmium	0.537	0.27	Shrew	1.99
Cobalt	2.71	13	Plant	0.21
Copper	6.1	14	Insectivorous Robin	0.44
Cyanide (total)	1.11	0.098	Insectivorous Robin	11.3
Lead	16.57	11	Insectivorous Robin	1.51
Mercury (inorganic)	0.19	0.013	Insectivorous Robin	14.6
Perchlorate Ion	0.00208	0.12	Herbivorous Robin	0.017
Selenium	1.84	0.52	Plant	3.54
Silver	5.25	2.60	Insectivorous Robin	2.02
Zinc	41.36	47	Insectivorous Robin	0.88
Organic Chemicals				
Anthracene	0.00918	6.80	Plant	0.0014
Aroclor-1242	0.0065	0.041	Insectivorous Robin	0.16
Aroclor-1254	0.0033	0.041	Insectivorous Robin	0.08
Aroclor-1260	0.0149	0.88	Insectivorous Robin	0.017
Benzo(a)pyrene	0.0339	62	Shrew	0.00055
Benzo(b)fluoranthene	0.0234	18	Plant	0.0013
Benzoic Acid	0.659	1	Shrew	0.66
Bis(2-ethylhexyl)phthalate	0.0921	0.02	Insectivorous Robin	4.61
Chrysene	0.0189	3.1	Shrew	0.0061
Fluoranthene	0.15	10	Earthworm	0.015
Methylnaphthalene[2-]	0.0495	16	Shrew	0.0031
Naphthalene	0.024	1	Plant	0.024
Pentachlorophenol	0.212	0.36	Insectivorous Robin	0.59
Phenanthrene	0.0175	5.5	Earthworm	0.0032
Pyrene	0.0198	10	Earthworm	0.002
Radionuclides				
Americium-241	3.174	190	Earthworm	0.017
Cesium-137	0.242	1400	Herbivorous Robin	0.00017
Plutonium-238	0.0423	820	Earthworm	0.00005
Plutonium-239/240	2.806	870	Earthworm	0.0032
Tritium	0.00738	36000	Plant	0.0000021
Uranium-234	1.957	440	Plant	0.0044
Uranium-235/236	0.13	440	Plant	0.0003
Uranium-238	1.911	400	Plant	0.0048

Note: Bolded values indicate HQs greater than 0.3.

Table 11
HI Analysis for SWMU 21-027(d)

COPEC	EPC (mg/kg)	Gray Fox (mammalian top carnivore)	American Kestrel (avian top carnivore)	American Kestrel (avian intermediate carnivore)	America Robin (avian herbivore)	American Robin (avian omnivore)	American Robin (avian insectivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Deer Mouse (mammalian omnivore)	Earthworm (soil dwelling invertebrate)	Plant (terrestrial autotroph- producer)
Cadmium	0.537	0.001	0.0012	0.41	0.12	0.99	1.85	0.054	1.99	1.07	0.0038	0.017
Copper	6.1	0.0015	0.0055	0.076	0.18	0.31	0.44	0.023	0.15	0.10	0.076	0.087
Cyanide (Total)	1.11	0.00034	1.88	3.08	11.1	11.2	11.3	0.0014	0.0034	0.0034	na*	na
Lead	16.57	0.0045	0.031	0.20	0.92	1.18	1.51	0.053	0.18	0.14	0.01	0.14
Mercury (inorganic)	0.19	0.0025	0.59	3.28	2.84	8.64	14.6	0.0083	0.11	0.063	3.8	0.0056
Selenium	1.84	0.020	0.025	0.50	1.88	2.22	2.59	0.84	2.63	2.24	0.45	3.54
Silver	5.25	0.0012	0.0088	0.40	0.53	1.28	2.02	0.035	0.38	0.22	na	0.0094
Zinc	41.36	0.0043	0.016	0.19	0.13	0.50	0.88	0.023	0.42	0.24	0.34	0.26
Benzoic Acid	0.659	0.00033	na	na	na	na	na	0.14	0.66	0.51	na	na
Bis (2-ethylhexyl)phthalate	0.0921	0.00018	0.0099	0.96	0.0058	2.3	4.61	4.85E-05	0.15	0.084	na	na
Pentachlorophenol	0.212	0.00092	0.0037	0.12	0.0073	0.29	0.59	0.0012	0.26	0.14	0.0068	0.042
HI		0.04	3	9	18	29	40	1	7	5	5	4

Note: Bolded values indicate HQs greater than 0.3 or HI greater than 1.

* na = Not available.

Table 12
PAUFS for Ecological Receptors for SWMU 21-027(d)

Receptor	HR (ha) ^a	Population Area (ha) ^b	PAUF ^c
American kestrel	106	4240	0.00004
American robin	0.42	16.8	0.010
Deer mouse	0.077	3.08	0.055
Vagrant shrew	0.39	15.6	0.011
Desert cottontail	3.1	124	0.0014
Gray fox	1038	41520	4.09E-06

^a Values from EPA (1993, 059384).

^b Population area is equal to the HR times 40 (Ryti et al., 2004, 600901).

^c PAUF is calculated as the area of the site (0.17 ha) divided by the population area.

Table 13
Adjusted HIs for SWMU 21-027(d)

COPEC	EPC (mg/kg)	Gray Fox (mammalian top carnivore)	American Kestrel (avian top carnivore)	American Kestrel (avian intermediate carnivore)	America Robin (avian herbivore)	American Robin (avian omnivore)	American Robin (avian insectivore)	Desert Cottontail (mammalian herbivore)	Montane Shrew (mammalian insectivore)	Deer Mouse (mammalian omnivore)	Earthworm (soil dwelling invertebrate)	Plant (terrestrial autotroph- producer)
Cadmium	0.537	4E-09	5E-08	2E-05	0.0013	0.0099	0.019	8E-05	5E-08	0.059	0.0038	0.017
Copper	6.1	6E-09	2E-07	3E-06	0.0018	0.0031	0.0044	3E-05	0.0015	0.0053	0.076	0.087
Cyanide (Total)	1.11	1E-09	8E-05	1E-04	0.11	0.11	0.11	2E-06	6E-05	2E-04	na*	na
Lead	16.57	2E-08	1E-06	8E-06	0.0092	0.012	0.015	7E-05	1E-06	0.0076	0.01	0.14
Mercury (inorganic)	0.19	1E-08	2E-05	1E-04	0.028	0.086	0.15	1E-05	2E-05	0.0035	3.8	0.0056
Selenium	1.84	8E-08	1E-06	2E-05	0.019	0.022	0.026	1E-03	1E-06	0.12	0.45	3.54
Silver	5.25	5E-09	4E-07	2E-05	0.0053	0.013	0.02	5E-05	4E-07	0.012	na	0.0094
Zinc	41.36	2E-08	6E-07	8E-06	0.0013	0.005	0.0088	3E-05	6E-07	0.013	0.34	0.26
Benzoic Acid	0.659	1E-09	na	na	na	na	na	2E-04	na	0.028	na	na
Bis (2-ethylhexyl)phthalate	0.0921	8E-10	4E-07	4E-05	6E-05	0.023	0.046	7E-08	4E-07	0.0046	na	na
Pentachlorophenol	0.212	4E-09	1E-07	5E-06	7E-05	0.0003	0.0059	2E-06	1E-07	0.0078	0.0068	0.042
HI		2E-07	1E-04	0.0004	0.2	0.3	0.4	0.002	0.1	0.3	5	4

Note: Bolded values indicate HQs greater than 0.1 or HI greater than 1.

* na = Not available.

Table 14
Summary of LOAEL-Based ESLs for Terrestrial Receptors

COPEC	Receptor	LOAEL-Based ESL (mg/kg)*
Lead	Plant	570
Mercury	Earthworm	0.5
Selenium	Earthworm	41
Selenium	Plant	3
Zinc	Earthworm	930
Zinc	Plant	810

* LOAEL-based ESLs from ECORISK Database, Release 4.1 (LANL 2017, 602538).

Table 15
HI Analysis Using LOAEL-based ESLs for SWMU 21-027(d)

COPEC	EPC (mg/kg)	Earthworm (soil dwelling invertebrate)	Plant (terrestrial autotroph-producer)
Lead	16.6	n/a*	0.029
Mercury (inorganic)	0.19	0.38	n/a
Selenium	1.84	0.045	0.61
Zinc	41.4	0.044	0.051
HI		0.5	0.7

Notes: Bolded values indicate HQ greater than 0.1 or HI greater than 1.

* n/a = Not applicable.

Attachment 1

*ProUCL Input and Output Data Files
(on CD included with this document)*

