Response to the Notice of Disapproval for the Investigation Work Plan for Chaquehui Canyon Aggregate Area, Revision 1, Los Alamos National Laboratory, EPA ID No: NM0890010515, HWB-LANL-09-072, Dated January 13, 2011

INTRODUCTION

To facilitate review of this response, the New Mexico Environment Department's (NMED's) comments are included verbatim. The comments are divided into general and specific categories as presented in the notice of disapproval. Los Alamos National Laboratory's (LANL's or the Laboratory's) responses follow each NMED comment.

GENERAL COMMENTS

NMED Comment

1. *In Sections 4.1.1.1 (SWMU 33-002(a), Septic System, Previous Investigations), page 13, 4.1.1.2 (SWMU 33-002(b), Seepage Pit, Previous Investigations), page 16, and 4.1.1.3 (SWMU 33-002(c), Seepage Pit, Previous Investigations), page 19, the Permittees provide lists of particular sampling locations and the respective COPCs for which the vertical extent of contamination was not defined during the Voluntary Corrective Action (VCA). While NMED agrees with the locations and contaminants included in the lists, the Permittees did not include all locations and COPCs for which the vertical extent has not been defined. Specifically, for the sites and sampling locations listed below:*

   a) *For SWMU 33-002(a), the Permittees must add:*
      - *33-01652 – toluene*
      - *33-01696 – acetone*
      - *33-24716 – calcium, naphthalene*
      - *33-24717 – calcium*
      - *33-24719 – 2-methylnaphthalene*
      - *33-24720 – bis(2-ethylhexyl)phthalate*
      - *33-24721 – calcium, tritium*
      - *33-24722 – barium, calcium, fluorene*
      - *33-24723 – calcium, copper*
      - *33-24724 – barium, calcium*
      - *33-24725 – barium*
      - *33-24726 – copper, zinc*
      - *33-25097 – butanone(2-), tetrachloroethene*
      - *33-25098 – di-n-butylphthalate*
      - *33-25110 – Aroclor 1254, tetrachloroethene, TPH-DRO*
      - *33-25112 – tetrachloroethene, tritium*
      - *33-25113 – Aroclor 1254*
      - *33-25114 – tritium*
      - *33-25115 – di-n-butylphthalate*
      - *33-25116 – bromobenzene*

b) For SWMU 33-002(b), the Permittees must add:

- *33-01328 – barium, calcium, copper, lead, selenium*
- *33-25083 – Aroclor 1254, methylene chloride*
- *33-25084 – barium, tritium*
- *33-25087 – Aroclor 1254, fluoranthene, phenanthrene, pyrene*
- *33-25088 – calcium, tritium*
- *33-25092 – copper, acenaphthene, strontium-90*
- *33-25094 – di-n-butylphthalate*
- *33-25095 – benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, fluoranthene, phenanthrene, pyrene, americium-241, tritium*
- *33-25096 – tetrachloroethene*
- *33-25123 – calcium, acetone*
- *33-25124 – tetrachloroethene, toluene, trichloroethene*
- *33-25125 – acetone, tetrachloroethene, toluene, trichloroethene*

c) For SWMU 33-002(c), the Permittees must add:

- *33-01697 – chromium, di-n-butylphthalate*
- *33-24727 – barium, selenium, Aroclor 1254, Aroclor 1260, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, indeno(1,2,3-cd)pyrene, fluoranthene, phenanthrene*
- *33-24728 – calcium, selenium, anthracene, Aroclor 1254, Aroclor 1260, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, chrysene, fluoranthene, indeno(1,2,3-cd)pyrene, phenanthrene, pyrene*
- *33-24729 – selenium, fluorene, methylnaphthalene[2-]*
- *33-25085 – tritium*
- *33-25086 – calcium, benzo(a)anthracene, benzo(a)pyrene, benzo(k)fluoranthene, chrysene, fluoranthene*
- *33-25118 – mercury, TPH-DRO*
- *33-25120 – calcium, selenium*
- *33-25121 – barium, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, fluoranthene, phenanthrene, pyrene*
- 33-25122 – calcium, selenium

Revise the IWP to include the locations and analytes listed above for which vertical extent has not been defined, and revise the IWP to include these COPCs in the analyses conducted on samples collected under this plan.

LANL Response

1. As explained below, vertical extent has been defined for all of the locations and constituents identified in NMED's comment except for americium-241 at one location, tetrachloroethene at one location, trichloroethene at one location, and tritium at five locations. For most locations and constituents referenced in NMED's comment, vertical extent is defined by decreasing concentrations with depth or by nondetection or detection below estimated quantitation limits in the deepest sample(s). Vertical extent may also be defined for other reasons as explained below. In eight cases, vertical extent is not defined. In three of these cases (americium-241 and tritium at location 33-25095 and tetrachloroethene at location 33-25125), the voluntary corrective action (VCA) completion report (LANL 2010, 110352) indicated that vertical extent had not been defined and Revision 1 of the investigation work plan (LANL 2010, 111298.9) proposed additional sampling. In the remaining five cases (trichloroethene at location 33-25125 and tritium at locations 33-25084, 33-25085, 33-25112, and 33-25114), additional sampling will be performed to define vertical extent. As discussed with

NMED, a revised investigation work plan is not being submitted. Table 4.0-1 of the investigation work plan has been revised to indicate the additional proposed sampling for the five cases noted above and is being submitted as replacement pages for the investigation work plan.

SWMU 33-002(a)

- 33-01652 – toluene. Location 33-01652 is a borehole advanced to a depth of 118.33 ft below ground surface (bgs) with samples for volatile organic compound (VOC) analysis collected at depths of 1.0 to 1.5 ft bgs, 3.08 to 4.08 ft bgs, and 12.5 to 12.9 ft bgs. Toluene was detected in the upper two samples, but not in the deepest sample. Vertical extent is defined.
- 33-01696 – acetone. Location 33-01696 was a borehole advanced to a depth of 26.5 ft bgs with samples for VOC analysis collected at depths of 2.33 to 3.0 ft bgs, 8.25 to 8.75 ft bgs, and 12.58 to 13.17 ft bgs. Acetone was detected in the sample from 8.25 to 8.75 ft bgs, but not in the deeper sample from 12.58 to 13.17 ft bgs. Vertical extent is defined.
- 33-24716 – calcium, naphthalene. Calcium concentrations decreased from 13,300 mg/kg at 3.0 to 3.5 ft bgs to 3940 mg/kg at 5.0 to 5.5 ft bgs. Naphthalene was not detected at 3.0 to 3.5 ft bgs and was detected below the estimated quantitation limit at 5.0 to 5.5 ft bgs. Vertical extent of both chemicals is defined.
- 33-24717 – calcium. Calcium concentrations decreased from 13,000 mg/kg at 3.0 to 3.5 ft bgs to 12,600 mg/kg at 5.0 to 5.5 ft bgs. Vertical extent is defined.
- 33-24719 – 2-methylnaphthalene. 2-Methylnaphthalene was detected in the sample collected at 3.0 to 3.5 ft bgs, but not in a deeper sample collected at 5.0 to 5.5 ft bgs. Vertical extent is defined.
- 33-24720 – bis(2-ethylhexyl)phthalate. Bis(2-ethylhexyl)phthalate was detected at the same concentration in samples collected at 3.0 to 3.5 ft bgs and 5.0 to 5.5 ft bgs and both results were below the estimated quantitation limit. Vertical extent is defined.
- 33-24721 – calcium, tritium. Calcium concentrations decreased from 17,100 mg/kg at 3.0 to 3.5 ft bgs to 14,900 mg/kg at 5.0 to 5.5 ft bgs. Tritium was detected at an activity of 116.2 pCi/g at 3.0 to 3.5 ft bgs and was not detected in a deeper sample collected from 5.0 to 5.5 ft bgs. Vertical extent of both chemicals is defined.
- 33-24722 barium, calcium, fluorene. Barium concentrations were 101 mg/kg at 0.0 to 0.5 ft bgs and 102 mg/kg at 2.0 to 2.5 ft bgs. Because these results are essentially equal, concentrations are not increasing with depth and vertical extent is defined. Calcium concentrations decreased from 8740 mg/kg at 3.0 to 3.5 ft bgs to 7630 mg/kg at 5.0 to 5.5 ft bgs. Vertical extent is defined. Fluorene concentrations were 0.0816 mg/kg at 3.0 to 3.5 ft bgs and 0.123 mg/kg at 5.0 to 5.5 ft bgs. Both results are less than the estimated quantitation limit and vertical extent is defined.
- 33-24723 – calcium, copper. Calcium concentrations decreased from 6700 mg/kg at 3.0 to 3.5 ft bgs to 6520 mg/kg at 5.0 to 5.5 ft bgs. Copper concentrations decreased from 37.3 mg/kg at 3.0 to 3.5 ft bgs to 20.9 mg/kg at 5.0 to 5.5 ft bgs. Vertical extent of both chemicals is defined.
- 33-24724 – barium, calcium. Barium concentrations decreased from 339 mg/kg at 2.0 to 2.5 ft bgs to 75.4 mg/kg at 4.0 to 4.5 ft bgs. Calcium concentrations decreased from 10,400 mg/kg at 2.0 to 2.5 ft bgs to 4590 mg/kg at 4.0 to 4.5 ft bgs. Vertical extent of both chemicals is defined.

- 33-24725 – barium. Barium concentrations decreased from 90.4 mg/kg at 8.0 to 8.5 ft bgs to 58.6 mg/kg at 10.0 to 10.5 ft bgs. The result from 8.0 to 8.5 ft bgs is less than the soil background value (BV) and was, therefore, not reported in Table 4.1.2 of the work plan, but was included in Appendix B of the "Historical Investigation Report for Chaquehui Canyon Aggregate Area" (LANL 2009, 107348). Vertical extent is defined.
- 33-24726 – copper, zinc. Copper concentrations decreased from 88 mg/kg at 3.0 to 3.5 ft bgs to 37.8 mg/kg at 5.0 to 5.5 ft bgs. Zinc concentrations decreased from 176 mg/kg at 3.0 to 3.5 ft bgs to 99.2 mg/kg at 5.0 to 5.5 ft bgs. Vertical extent of both chemicals is defined.
- 33-25097 – 2-butanone, tetrachloroethene. 2-Butanone and tetrachloroethene were not detected at 3.0 to 3.5 ft bgs and were detected below estimated quantitation limits at 5.0 to 5.5 ft bgs. Vertical extent of both chemicals is defined.
- 33-25098 – di-n-butylphthalate. Di-n-butylphthalate was not detected at 3.0 to 3.5 ft bgs and was detected below the estimated quantitation limit at 5.0 to 5.5 ft bgs. Vertical extent is defined.
- 33-25110 – Aroclor-1254, tetrachloroethene, total petroleum hydrocarbons-diesel-range organics (TPH-DRO). Aroclor-1254, tetrachloroethene, and TPH-DRO were detected at 3.0 to 3.5 ft bgs but were not detected at 5.0 to 5.5 ft bgs. Vertical extent of these chemicals is defined.
- 33-25112 – tetrachloroethene, tritium. Tetrachloroethene was detected at 5.0 to 5.5 ft bgs but was not detected at 7.0 to 7.5 ft bgs. Vertical extent of tetrachloroethene is defined. Tritium activities increased from 330.88 pCi/g at 5.0 to 5.5 ft bgs to 340.783 pCi/g at 7.0 to 7.5 ft bgs. Vertical extent is not defined for tritium at this location and additional sampling will be performed during the investigation.
- 33-25113 – Aroclor-1254. Aroclor-1254 was detected at 5.0 to 5.5 ft bgs but was not detected at 7.0 to 7.5 ft bgs. Vertical extent is defined.
- 33-25114 – tritium. Tritium activities increased from 520.774 pCi/g at 3.0 to 3.5 ft bgs to 542.635 pCi/g at 5.0 to 5.5 ft bgs. Vertical extent is not defined for tritium at this location and additional sampling will be performed during the investigation.
- 33-25115 – di-n-butylphthalate. Di-n-butylphthalate was detected at 4.0 to 4.5 ft bgs but was not detected at 6.0 to 6.5 ft bgs. Vertical extent is defined.
- 33-25116 – bromobenzene. Bromobenzene was detected at 3.0 to 3.5 ft bgs but was not detected at 5.0 to 5.5 ft bgs. Vertical extent is defined.

SWMU 33-002(b)

- 33-01328 – barium, calcium, copper, lead, selenium. Location 33-01328 is a borehole advanced through the Solid Waste Management Unit (SMWU) 33-002(b) seepage pit to a depth of 117.5 ft bgs. Only the sample from the 10 to 15 ft bgs interval was analyzed for metals. During the 2005 VCA, the seepage pit was excavated and confirmatory samples were collected at two depths below the bottom of the seepage pit at locations 33-25087 and 33-25088. The data from these two confirmatory sampling locations replace the data from location 33-01328 for determining vertical extent beneath the former seepage pit, and no additional sampling is required at location 33-01328. As described in the investigation work plan, vertical extent is not defined for all chemicals at locations 33-25087 and 33-25088. The investigation work plan proposes additional sampling for metals at both locations 33-25087

and 33-25088. Sampling depths at these locations will extend below the depth of the previous sample at location 33-01328.

- 33-25083 – Aroclor-1254, methylene chloride. Aroclor-1254 was not detected at 3.0 to 3.5 ft bgs and was detected below the estimated quantitation limit at 5.0 to 5.5 ft bgs. Methylene chloride was detected at 0.0022 mg/kg at 3.0 to 3.5 ft bgs and 0.0027 mg/kg at 5.0 to 5.5 ft bgs. Both results are less than the estimated quantitation limit. Vertical extent is defined for both chemicals.
- 33-25084 – barium, tritium. Barium concentrations decreased from 119 mg/kg at 3.0 to 3.5 ft bgs to 82.7 mg/kg at 5.0 to 5.5 ft bgs. Vertical extent of barium is defined. Tritium activities increased from 1060 pCi/g at 3.0 to 3.5 ft bgs to 1170 pCi/g at 5.0 to 5.5 ft bgs. Vertical extent is not defined for tritium at this location and additional sampling will be performed during the investigation.
- 33-25087 – Aroclor-1254, fluoranthene, phenanthrene, pyrene. Aroclor-1254, fluoranthene, phenanthrene, and pyrene were detected at 10.0 to 10.5 ft bgs but were not detected at 12.0 to 12.5 ft bgs. Vertical extent of these chemicals is defined.
- 33-25088 – calcium, tritium. Calcium concentrations decreased from 7860 mg/kg at 10.0 to 10.5 ft bgs to 3480 mg/kg at 12.0 to 12.5 ft bgs. Vertical extent is defined. Tritium was detected at 10.0 to 10.5 ft bgs and the sample from 12.0 to 12.5 ft bgs was not analyzed for tritium. Vertical extent of tritium at this location is defined by the results from location 33-25087, which is less than 10 ft away. At location 33-25087, tritium activities decreased from 3000 pCi/g at 10.0 to 10.5 ft bgs to 1560 pCi/g at 12.0 to 12.5 ft bgs.
- 33-25092 – copper, acenaphthene, strontium-90. Copper concentrations decreased from 25.5 mg/kg at 2.0 to 2.5 ft bgs to 6.6 mg/kg at 4.0 to 4.5 ft bgs. Acenaphthene was detected at 2.0 to 2.5 ft bgs but was not detected at 4.0 to 4.5 ft bgs. Strontium-90 activities decreased from 0.45 pCi/g at 2.0 to 2.5 ft bgs to 0.27 pCi/g at 4.0 to 4.5 ft bgs. The result from 4.0 to 4.5 ft bgs is less than the soil fallout value and was, therefore, not reported in Table 4.1.4 of the work plan. The vertical extent of these chemicals is defined.
- 33-25094 – di-n-butylphthalate. Di-n-butylphthalate was not detected at 2.0 to 2.5 ft bgs and was detected below the estimated quantitation limit at 4.0 to 4.5 ft bgs. Vertical extent is defined.
- 33-25095 – benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, fluoranthene, phenanthrene, pyrene, americium-241, tritium. Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, fluoranthene, phenanthrene, and pyrene were not detected at 4.0 to 4.5 ft bgs and were detected below the estimated quantitation limit at 6.0 to 6.5 ft bgs. Vertical extent of these chemicals is defined. Americium-241 was not detected at 4.0 to 4.5 ft bgs and was detected at 0.17,945 pCi/g at 6.0 to 6.5 ft bgs. The investigation work plan states vertical extent of americium-241 is not defined at this location and proposes additional sampling. Tritium activities increased from 712.28 pCi/g at 4.0 to 4.5 ft bgs to 3550.7 pCi/g at 6.0 to 6.5 ft bgs. The investigation work plan states vertical extent of tritium is not defined at this location and proposes additional sampling.
- 33-25096 – tetrachloroethene. Tetrachloroethene was not detected at 4.0 to 4.5 ft bgs and was detected below the estimated quantitation limit at 6.0 to 6.5 ft bgs. Vertical extent is defined.

- 33-25123 – calcium, acetone. Calcium concentrations decreased from 3830 mg/kg at 5.0 to 5.5 ft bgs to 2840 mg/kg at 7.0 to 7.5 ft bgs. Acetone was detected at 0.0037 mg/kg at 5.0 to 5.5 ft bgs and 0.0057 mg/kg at 7.0 to 7.5 ft bgs and both results were below the estimated quantitation limit. Vertical extent of both chemicals is defined.
- 33-25124 – tetrachloroethene, toluene, trichloroethene. Tetrachloroethene concentrations were 0.0087 mg/kg at 4.0 to 4.5 ft bgs and 0.0091 mg/kg at 6.0 to 6.5 ft bgs. Because these results are essentially the same, concentrations are not increasing with depth and vertical extent is defined. Toluene was not detected at 4.0 to 4.5 ft bgs and was detected below the estimated quantitation limit at 6.0 to 6.5 ft bgs. Vertical extent is defined. Trichloroethene concentrations were 0.005 mg/kg at 4.0 to 4.5 ft bgs and 0.006 mg/kg at 6.0 to 6.5 ft bgs. Because these results are essentially the same, concentrations are not increasing with depth and vertical extent is defined.
- 33-25125 – acetone, tetrachloroethene, toluene, trichloroethene. Acetone was not detected at 5.0 to 5.5 ft bgs and was detected below the estimated quantitation limit at 7.0 to 7.5 ft bgs. Vertical extent is defined. Tetrachloroethene concentrations increased from 0.001 mg/kg at 5.0 to 5.5 ft bgs to 0.01 mg/kg at 7.0 to 7.5 ft bgs. The investigation work plan states vertical extent of tetrachloroethene is not defined at this location and proposes additional sampling. Toluene was not detected at 5.0 to 5.5 ft bgs and was detected below the estimated quantitation limit at 7.0 to 7.5 ft bgs. Vertical extent is defined. Trichloroethene concentrations increased from 0.00058 mg/kg at 5.0 to 5.5 ft bgs to 0.006 mg/kg at 7.0 to 7.5 ft bgs. Vertical extent is not defined for trichloroethene at this location. Additional sampling at this location for VOCs is proposed in the investigation work plan.

SWMU 33-002(c)

- 33-01697 – chromium, di-n-butylphthalate. Location 33-01697 is a borehole advanced through the SMWU 33-002(c) seepage pit to a depth of 62.17 ft bgs. Only the sample from the 10 to 12.5 ft bgs interval was analyzed for metals and semivolatile organic compounds (SVOCs). During the 2005 VCA, the seepage pit was excavated and confirmatory samples were collected at two depths below the bottom of the seepage pit at locations 33-25085 and 33-25086. The data from these two confirmatory sampling locations replace the data from location 33-01697 for determining vertical extent beneath the former seepage pit, and no additional sampling is required at location 33-01697. As described in the investigation work plan, vertical extent is not defined for all chemicals at locations 33-25085 and 33-25086. The investigation work plan proposes additional sampling for metals at location 33-25085 and SVOCs at location 33-25086. Sample depths at these locations will extend below the depth of the previous sample at location 33-01697.
- 33-24727 – barium, selenium, Aroclor-1254, Aroclor-1260, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, indeno(1,2,3-cd)pyrene, fluoranthene, phenanthrene. Barium concentrations decreased from 76.9 mg/kg at 4.0 to 4.5 ft bgs to 63.1 mg/kg at 6.0 to 6.5 ft bgs. Selenium was detected at 1.02 mg/kg at 4.0 to 4.5 ft bgs and was not detected at 6.0 to 6.5 ft bgs. Aroclor-1254, Aroclor-1260, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, indeno(1,2,3-cd)pyrene, and phenanthrene were not detected at 4.0 to 4.5 ft bgs and were detected below estimated quantitation limits at 6.0 to 6.5 ft bgs. Fluoranthene was detected at 0.018 mg/kg at 4.0 to 4.5 ft bgs and 0.0181 mg/kg at 6.0 to 6.5 ft bgs. Both results were below the estimated quantitation limit. Vertical extent is defined for all these chemicals.

- 33-24728 – calcium, selenium, anthracene, Aroclor-1254, Aroclor-1260, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, chrysene, fluoranthene, indeno(1,2,3-cd)pyrene, phenanthrene, pyrene. Calcium concentrations decreased from 3610 mg/kg at 3.0 to 3.5 ft bgs to 2900 mg/kg at 5.0 to 5.5 ft bgs. Selenium was not detected at 3.0 to 3.5 ft bgs and was detected at 0.681 mg/kg at 5.0 to 5.5 ft bgs. The detection limit of the upper sample (1.74 mg/kg) is greater than the detected value in the lower sample. Anthracene, Aroclor-1254, Aroclor-1260, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, chrysene, fluoranthene, indeno(1,2,3-cd)pyrene, phenanthrene, and pyrene were detected at 3.0 to 3.5 ft bgs but were not detected at 5.0 to 5.5 ft bgs. Vertical extent is defined for all these chemicals.
- 33-24729 – selenium, fluoranthene, 2-methylnaphthalene. Selenium was not detected at 3.0 to 3.5 ft bgs and was detected at 0.884 mg/kg at 5.0 to 5.5 ft bgs. The detection limit of the upper sample (1.75 mg/kg) is greater than the detected value in the lower sample. Fluoranthene concentrations decreased from 0.254 mg/kg at 3.0 to 3.5 ft bgs to 0.242 mg/kg at 5.0 to 5.5 ft bgs. 2-Methylnaphthalene was detected at 0.0114 mg/kg at 3.0 to 3.5 ft bgs and 0.0116 mg/kg at 5.0 to 5.5 ft bgs. Both results were below the estimated quantitation limit. Vertical extent is defined for all these chemicals.
- 33-25085 – tritium. Tritium was detected at 30.8 pCi/g at 12.0 to 12.5 ft bgs and was not analyzed for in the sample from 10.0 to 12.5 ft bgs. Vertical extent is not defined and additional sampling will be performed during the investigation.
- 33-25086 – calcium, benzo(a)anthracene, benzo(a)pyrene, benzo(k)fluoranthene, chrysene, fluoranthene. Calcium concentrations decreased from 4600 mg/kg at 10.0 to 10.5 ft bgs to 2840 mg/kg at 12.0 to 12.5 ft bgs. Benzo(a)anthracene, benzo(a)pyrene, benzo(k)fluoranthene, and chrysene were not detected at 10.0 to 10.5 ft bgs and were detected below estimated quantitation limits at 12.0 to 12.5 ft bgs. Fluoranthene concentrations at 10.0 to 10.5 ft bgs and 12.0 to 12.5 ft bgs were below the estimated quantitation limit. Vertical extent is defined for all these chemicals.
- 33-25118 – mercury, TPH-DRO. Mercury concentrations decreased from 5.2 mg/kg at 2.0 to 2.5 ft bgs to 0.57 mg/kg at 4.0 to 4.5 ft bgs. TPH-DRO was detected at 75 mg/kg at 2.0 to 2.5 ft bgs and was not detected at 4.0 to 4.5 ft bgs. Vertical extent of both chemicals is defined.
- 33-25120 – calcium, selenium. Calcium concentrations decreased from 3840 mg/kg at 5.0 to 5.5 ft bgs to 2870 mg/kg at 7.0 to 7.5 ft bgs. Selenium concentrations decreased from 0.56 mg/kg at 5.0 to 5.5 ft bgs to 0.42 mg/kg at 7.0 to 7.5 ft bgs. Vertical extent of both chemicals is defined.
- 33-25121 – barium, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, fluoranthene, phenanthrene, pyrene. Barium concentrations were 60.2 mg/kg at 5.0 to 5.5 ft bgs and 59.1 mg/kg at 7.0 to 7.5 ft bgs. Because these results are essentially the same, concentrations are not increasing with depth and vertical extent is defined. Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, fluoranthene, phenanthrene, and pyrene were all detected below the estimated quantitation limit at 5.0 to 5.5 ft bgs and were not detected at 7.0 to 7.5 ft bgs. Vertical extent is defined for all these chemicals.

- 33-25122 – calcium, selenium. Calcium concentrations decreased from 3570 mg/kg at 4.0 to 4.5 ft bgs to 3320 mg/kg at 6.0 to 6.5 ft bgs. Selenium concentrations decreased from 0.81 mg/kg at 4.0 to 4.5 ft bgs to 0.63 mg/kg at 6.0 to 6.5 ft bgs. Vertical extent of both chemicals is defined.

NMED Comment

2. *The Permittees have not included all COPCs in the analyses specified for many of the SWMUs and AOCs. Specifically,*

   a) *Include analysis for tritium for all samples collected from the following areas:*
      - *SWMU 33-010(f)*
      - *SWMU 33-004(a)*
      - *Consolidated Unit 33-005(a)-00*
      - *AOC 33-008(c)*
      - *SWMU 33-012(a)*
      - *SWMU 33-004(b)*
      - *SWMU 33-004(j)*
      - *SWMU 33-006(a)*
      - *SWMU 33-008(a)*
      - *SWMU 33-010(c)*
      - *SWMU 33-010(h)*
      - *SWMU 33-010(g)*
      - *SWMU 33-011(b)*

   b) *Include analysis by gamma spectroscopy for all samples collected from the following areas:*
      - *SWMU 33-010(f)*
      - *SWMU 33-004(b)*

   c) *Include analysis for explosive compounds for all samples obtained from the following areas:*
      - *SWMU 33-004(h)*
      - *AOC C-33-003*

   Revise the IWP to include the analyses specified above for the above-listed sites.

LANL Response

2. Analytical suites for the sites being investigated were selected based on the operational history of the sites. NMED's comment requests the addition of tritium, gamma spectroscopy, and/or explosive compounds to the analytical suites for various sites. The rationale for including or excluding these analyses is discussed below. Analytical suites will be revised to add tritium to four sites, gamma spectroscopy to one site, and explosive compounds to one site. As discussed with NMED, a revised investigation work plan is not being submitted. Table 4.0-1 of the investigation work plan has been revised to indicate the changes to analytical suites and is being submitted as replacement pages for the investigation work plan.

   Tritium

   - SWMU 33-010(f) is located within the Main Site area of Technical Area 33 (TA-33) and tritium was detected in Resource Conservation and Recovery Act (RCRA) facility Investigation (RFI) samples collected in 1993. Tritium will be added to the analytical suites for samples from SWMU 33-010(f).

- SWMU 33-004(a) is located within the Main Site area of TA-33 and tritium was detected in RFI samples collected in 1993 and 1994. Tritium will be added to the analytical suites for samples from SWMU 33-004(a).
- Consolidated Unit 33-005(a)-00 consists of three SWMUs and one area of concern (AOC) associated with former building 33-0021, which was located outside the fenced area that housed tritium operations. This facility was initially used to support the initiator tests conducted at TA-33 and later to perform experiments involving plutonium. It was not associated with the tritium operations at Main Site. Tritium will not be added to the analytical suites for the samples from Consolidated Unit 33-005(a)-00.
- AOC 33-008(c) and SWMU 33-012(a) are located at Main Site and wastes stored and disposed of at these sites may have been contaminated with tritium. Previous samples from these sites were not analyzed for tritium to determine whether tritium was present. Tritium will be added to the analytical suites for the samples from AOC 33-008(c) and SWMU 33-012(a).
- SWMUs 33-004(b), 33-004(j), 33-006(a), 33-008(a), 33-010(c), 33-010(g), and 33-010(h) are all located in the South Site portion of TA-33. South Site was primarily used for initiator experiments involving detonations and projectiles. The only sites at South Site where tritium was known or suspected to have been used are SWMU 33-007(a), which was a gun firing site using projectiles that may have contained tritium; SWMU 33-011(c), which was used to store reservoirs of tritium gas; and consolidated unit 33-001(a)-99, which may have received waste from SWMUs 33-007(a) and 33-011(c). The investigation work plan proposes analysis of samples from these three sites for tritium. Tritium was not known or suspected to have been used at the seven sites identified in NMED's comment. Tritium will not be added to the analytical suites for the samples from SWMUs 33-004(b), 33-004(j), 33-006(a), 33-008(a), 33-010(c), 33-010(g), and 33-010(h).
- SWMU 33-011(b) is located at the National Radio Astronomy Observatory (NRAO) portion of TA-33. Before construction of the NRAO, this site was used to store equipment and materials associated with firing sites, presumably those nearby to the east near Material Disposal Area (MDA) D (these sites are in South Ancho Canyon Aggregate Area). A report of cleanup activities conducted in 1984 (Buhl 1988, 009726) notes that tritium was used at South Site (see previous discussion), but not at former firing sites near MDA D or the NRAO portion of TA-33. Tritium will not be added to the analytical suites for the samples from this site.

Gamma Spectroscopy

- SWMU 33-010(f) is located within the Main Site area of TA-33 and gamma-emitting radionuclides were not detected in RFI samples collected in 1993. Gamma spectroscopy will not be added to the analytical suites for the samples from SWMU 33-010(f).
- SWMU 33-004(b) is an inactive septic system at South Site. Cesium-137 was detected in subsurface tuff samples collected during the 1994 RFI at this site. Gamma spectroscopy will be added to the analytical suites for the samples from this site.

Explosive Compounds

- SWMU 33-004(h) is an outfall from a warehouse formerly used to store materials used in initiator tests. This warehouse was not known to have been used to store explosives. For safety reasons, explosives generally are stored in magazines away from operating facilities and are not stored with other hazardous materials. Explosive compounds will not be added to the analytical suites for the samples from this site.

- AOC C-33-003 is an area that was potentially contaminated when fill was brought in from another site. The fill was brought in from SWMU 33-007(c), which is a former firing site. Because the investigation work plan specifies analysis of samples from SWMU 33-007(c) for explosive compounds, explosive compounds will be added to the analytical suites for the samples from AOC C-33-003.

NMED Comment

3. *In Sections 4.1.1.5 (SWMU 33-002(e), Outfall, Previous Investigations), 4.1.5.2 (Previous Investigations), 4.3.2.2 (Previous Investigations) and 4.3.3.1 (SWMU 33-004(j), Drainline and Outfall, Previous Investigations), the Permittees present misleading statements regarding sample analysis results. For instance, in Section 4.1.1.5, page 21, paragraph 3, the Permittees state, "[t]ritium was the only radionuclide detected or detected above BV/FV." According to the preceding paragraph, tritium was the only radionuclide included in the sample analysis. Similarly, this scenario applies to uranium in Section 4.1.5.2 and cesium-137 in Section 4.3.2.2. In Section 4.3.3.1, the Permittees state, "[n]o organic chemicals were detected, and no radionuclides were detected or detected above BVs/FVs." This statement is similarly misleading because, according to the previous paragraph, cesium-137 was the only radionuclide included in the sample analysis. Revise the IWP to remove these conclusory statements, or provide any omitted information upon which these conclusions are based.*

LANL Response

3. Comment noted. These paragraphs summarize screening-level data obtained during previous site investigations and the statements referenced in NMED's comment did not influence the analytical suites proposed in the investigation work plan. As discussed with NMED, a revised investigation work plan is not being submitted. The changes noted in NMED's comment will be made to any text referenced in the comment that is included in the investigation report.

NMED Comment

4. *In Sections 4.1.6.3 (Proposed Activities) and 4.1.8.3 (Proposed Activities), the Permittees propose to collect one or no sample(s) from beneath the pads. In order to properly characterize the contamination below a pad, a total of five samples are required, four from within the pad footprint near each of the four sides and one from the center of the pad. Revise the IWP to include these samples for all areas where a pad was utilized to store or house materials that contained COPCs and/or support equipment containing COPCs.*

LANL Response

4. The proposed sampling in section 4.1.6.3 is based on the results of the 1993 RFI sampling at SWMU 33-012(a). The RFI sampling showed cadmium, chromium, lead, nickel, and zinc to be present above soil BVs and Aroclor-1254 to be present at 2.3 mg/kg. Although these results are screening-level data, they are indicative of contamination beneath the pad and additional sampling at this location is proposed to determine vertical extent. Given the small size of the pad (20 ft × 20 ft), no additional sampling beneath the pad is deemed necessary. The other proposed samples are intended to define vertical extent adjacent to the pad where metals were detected above soil BVs during the 1993 RFI and to define lateral extent downgradient of these locations. No additional sampling is proposed for this site.

The proposed sampling in section 4.1.8.3 is intended to complete determination of the extent of the contamination identified by previous sampling. The objective of the previous sampling was to identify if polychlorinated biphenyl (PCB) contamination was present as a result of releases occurring before 1992 when the electrical transformer that is AOC C-33-001 was removed and replaced by a non-PCB transformer. The description of the concrete transformer pad at that time referred to oil staining on the pad (LANL 1992, 007671). Therefore, runoff from the pad is the likely pathway for transport of releases from the transformer, and samples were collected around the pad. Aroclor-1260 was detected at concentrations ranging from 0.15 to 11 mg/kg. The investigation work plan proposes additional sampling to determine the lateral and vertical extent of this contamination. Sampling beneath the pad is not proposed because migration through the pad is unlikely and is not a transport pathway.

NMED Comment

5. *In most of the figures and plates included in the IWP, the Permittees include both a 10-ft and a 20-ft contour in the legend. The 20-ft contours are duplicative of and indistinguishable from the 10-ft contours on the figures and plates. This only applies to the 20-ft contours and not to the 2-ft or 100-ft contours. Revise all figures and plates within the IWP to utilize 10-ft contours and remove the 20-ft contour from figure legends.*

LANL Response

5. Comment noted. As discussed with NMED, a revised investigation work plan is not being submitted. The figures and plates to be presented in the investigation report will be revised as indicated in the comment.

NMED Comment

6. *In Tables 4.1-2, 4.1-3, 4.1-4, 4.3-2, 4.3-3, and 4.3-4, the Permittees provide sampling results from past investigations. While the Permittees provide background values for the inorganics and radionuclides, they do not provide the Residential SSLs or SALs. Although the Industrial SSLs/SALs are provided in a separate table, these values must be included in the tables of results for comparison. Revise the sampling result tables listed above to include both Industrial and Residential SSLs/SALs.*

LANL Response

6. Comment noted. As discussed with NMED, a revised investigation work plan is not being submitted. The data tables to be presented in the investigation report will provide residential and industrial soil screening levels/screening action levels.

SPECIFIC COMMENTS

NMED Comment

1. Section 4.1.1.1, SWMU 33-002(a), Septic System, Previous Investigations, page 10

Permittees' Statement: *"Twenty-one samples were analyzed for tritium; 20 samples were analyzed for gamma-emitting radionuclides and uranium; 21 samples were analyzed for metals, uranium, SVOCs, VOCs, PCBs, and HE; and 22 samples were samples were analyzed for VOCs."*

NMED Comment: *The Permittees have provided inconsistent statements regarding the number of samples analyzed for both uranium and VOCs. It is unclear whether 20 or 21 samples were analyzed for uranium. Similarly, it is unclear whether 21 or 22 samples were analyzed for VOCs. Also, "samples were" is repeated in the last part of this statement. Revise the IWP to correct these discrepancies and typographical errors.*

LANL Response

1. The numbers of samples are 20 for uranium and 22 for VOCs. This paragraph summarizes screening-level data obtained during previous site investigations that took place before 1990 and the numbers of samples reported did not influence the analytical suites proposed in the investigation work plan. As discussed with NMED, a revised investigation work plan is not being submitted. The corrections noted above will be made to any text referenced in the comment that is included in the investigation report.

NMED Comment

2. Section 4.1.1.5, SWMU 33-002(e), Outfall, Description and History, page 20:

Permittees' Statement: *"This outfall was created when the SWMU 33-002(b) seepage pit was deactivated and disconnected from the building 33-0086 drainline."*

NMED Comment: *The Permittees have provided no dates regarding the history of this SWMU. Although dates of events connected to this outfall are discussed under Section 4.1.1.2 (SWMU 33-002(b), Seepage Pit), these dates and events should also be included in the outfall description and history. Revise the text in this section to include dates of use.*

LANL Response

2. This outfall was created when the SWMU 33-002(b) seepage pit was deactivated and disconnected from the building 33-0086 drainline in 1959. As discussed with NMED, a revised investigation work plan is not being submitted. The changes noted in NMED's comment will be made to any text referenced in the comment that is included in the investigation report.

NMED Comment

3. Section 4.1.2.1, SWMU 33-004(a), Septic System, Description and History, page 23:

Permittees' Statement: *"SWMU 33-004(a) consists of a septic tank (structure 33-0031), associated drainlines, two seepage pits, and a drain field. The septic tank has a capacity of 1360 gal. and is located 50 ft northeast of building 33-0039 (Figure 4.1-9). This septic tank is in use and serves all*

major buildings at the TA-33 Main Site. Septic tank 33-0031 received sanitary wastewater from a laboratory/office building (33-0019) and a storage building (33-0027)."

NMED Comment: *The Permittees did not include the timeframe that the septic system was utilized. Also, storage building (33-0027) is not shown on Figure 4.1-9. Revise the text and figure of the IWP to correct these discrepancies.*

LANL Response

3. The septic tank (structure 33-0031), which is part of SWMU 33-004(a), was constructed between July 1949 and June 1950 and came online in late June 1950. Building 33-0027 is a guard shack constructed between 1949 and 1950. The building is still in place and currently used as an office. As discussed with NMED, a revised investigation work plan is not being submitted. The changes noted in NMED's comment will be made to any text referenced in the comment that is included in the investigation report. Building 33-0027 will be included in the investigation report figures showing the location of SWMU 33-004(a).

NMED Comment

4. Section 4.1.2.6, SWMU 33-017, Potential Soil Contamination, Description and History, page 30:

Permittees' Statement: *"SWMU 33-017 is potentially impacted by runoff from the paved areas of the TA-33 Main Site complex by deposition from airborne releases from TA-33 Main Site facilities and by operational releases from an area east of building 33-39 used for vehicle maintenance."*

NMED Comment: *The Permittees' designation of "building 33-39" is not consistent with structure identification numbers. NMED assumes that the Permittees are referring to building 33-0039. Also, this sentence requires punctuation for clarification. Revise the IWP to resolve these issues.*

LANL Response

4. The designation "building 33-0039" is correct. As discussed with NMED, a revised investigation work plan is not being submitted. The text to be included in the investigation report to describe this site will use the "building 33-0039" designation.

NMED Comment

5. Section 4.1.3.1, SWMU 33-005(a), Former Septic System, Description and History, page 32:

Permittees' Statement: *"SWMU 33-005(a) consists of the former septic system that served restrooms and change-room lavatories in former building 33-0021 (Figure 4.1-16). Drainlines discharged to a manhole (former structure 33-0074), which drained to a septic tank (former structure 33-0032). The outfall for the septic system was reported to be a few feet south of the septic tank (LANL 1992, 007671, pp. 3-21–3-25)."*

NMED Comment: *While this description in the text specifies that the outfall for the system was to the south, Figure 4.1-16 shows the drain line exiting from the septic tank to the west. Revise the text and/or figure of the IWP to resolve this discrepancy.*

LANL Response

5. The depiction in Figure 4.1-16 is correct. As discussed with NMED, a revised investigation work plan is not being submitted. The text to be included in the investigation report describing this site will also describe the outfall location as shown in the figure.

NMED Comment

6. Section 4.1.7.3, Proposed Activities, page 39:

Permittees' Statement: *"The nature and extent of residual contamination have not been determined for this site. Ten samples will be collected from two depths (0 to 1 ft and 3 to 4 ft beneath the bottom of the sump) from two locations next to the sump and from three locations along the drainline (0 to 1 ft and 3 to 4 ft beneath the bottom of the drainline). In addition, eight samples will be collected from two depths (0 to 1 ft and 2 to 3 ft bgs) at four locations within the outfall and drainage downgradient of the outfall. All sample[s] will be analyzed for metals, VOCs, SVOCs, perchlorate, cyanide, isotopic uranium, and nitrate. In addition, 20% of the samples will be analyzed for PCBs. Proposed sampling locations are shown in Figure 4.1-26. Table 4.0-1 summarizes the proposed sampling locations, depths, and analytical suites."*

NMED Comment: *The Permittees propose to sample next to the sump rather than below it. The sump can either be removed or drilled to allow the Permittees to sample directly below the sump. Revise the IWP to include removal and disposal of the sump or drilling through the base of the sump and sampling directly below the sump.*

LANL Response

6. Because of the small size of the sump (3 ft × 2 ft × 2 ft), sampling locations adjacent to the sump with sampling intervals extending below the bottom of the sump will be sufficient to detect releases from the sump. That is, releases would not necessarily be from the center of the sump and there should be some lateral dispersion of a release beneath the sump. In addition, removal of the sump is not necessary to characterize the site and is beyond the scope of the investigation. As described in the work plan, the sump has been filled with sand and gravel and capped with concrete and removal is not necessary to prevent future releases. No changes are proposed to the sampling approach presented in the work plan.

NMED Comment

7. Section 4.3.4.2, Previous Investigations, page 64:

Permittees' Statement: *"VCA was implemented at SWMU 33-010(g) in 1995. The debris was field screened for radioactivity and metals. Debris smaller than 3 in. in diameter was removed if radioactive screening results were above background levels. A total of 4 yd^3 of nonhazardous/nonradioactive debris and 2 ft^2 of radioactive debris was removed."*

NMED Comment: *The Permittees have used a unit of area (ft^2) to describe a volume. Revise the IWP to resolve this error.*

LANL Response

7. Comment noted. As discussed with NMED, a revised investigation work plan is not being submitted. The text to be included in the investigation report to describe this site will use the correct units for volume.

NMED Comment

8. Section 5.1.2, Geophysical Studies, page 67:

Permittees' Statement: *"Geophysical surveys will be performed at selected sites to identify anomalies that would indicate the location of former waste disposal sites, including SWMU 33-008(a). Geophysical methods will include terrain conductivity (EM-31 or equivalent), high-sensitivity metal detection (EM-61 or equivalent), and GPR."*

NMED Comment: *The Permittees did not define the abbreviation "GPR" within the text or in Appendix A of the IWP. Revise the text and Appendix A of the IWP to include a definition of GPR. Ensure that all acronyms and abbreviations are defined within the text and included in Appendix A.*

LANL Response

8. Comment noted. As discussed with NMED, a revised investigation work plan is not being submitted. The list of acronyms in the investigation report will be revised as indicated in the comment.

NMED Comment

9. Table 2.3-1, Industrial SSLs and SALs, page 157:

The Permittees have only included the Industrial SSLs and SALs in the table. Revise the table to include Residential SSLs and SALs for comparative purposes.

LANL Response

9. See response to General Comment #6.

REFERENCES

Buhl, T., June 28, 1988. "Clean-Up of Two Firing Site Areas at TA-33," Los Alamos National Laboratory, Los Alamos, New Mexico. (Buhl 1988, 009726)

LANL (Los Alamos National Laboratory), May 1992. "RFI Work Plan for Operable Unit 1122," Los Alamos National Laboratory document LA-UR-92-925, Los Alamos, New Mexico. (LANL 1992, 007671)

LANL (Los Alamos National Laboratory), November 2009. "Historical Investigation Report for Chaquehui Canyon Aggregate Area," Los Alamos National Laboratory document LA-UR-09-7402, Los Alamos, New Mexico. (LANL 2009, 107348)

LANL (Los Alamos National Laboratory), July 2010. “Voluntary Corrective Action Completion Report for the Investigation and Remediation of Solid Waste Management Units 33-002(a-c) at Technical Area 33,” Los Alamos National Laboratory document LA-UR-10-4928, Los Alamos, New Mexico. (LANL 2010, 110352)

LANL (Los Alamos National Laboratory), November 2010. “Investigation Work Plan for Chaquehui Canyon Aggregate Area, Revision 1,” Los Alamos National Laboratory document LA-UR-10-7226, Los Alamos, New Mexico. (LANL 2010, 111298.9)

Table 4.0-1
Summary of Proposed Samples and Analyses

Consolidated Unit	Site	Sampling Justification	Number of Locations and Samples	Depth (ft)	Media	TAL Metals (EPA SW-846:6010B/6020)	Cyanide (EPA SW-846:9012A)	Nitrate (EPA 300)	Perchlorate (EPA SW-846:6850)	VOCs (EPA SW-846:8260B)	SVOCs (EPA SW-846:8270C)	Explosive Compounds (EPA SW-846:8321A_MOD)	Dioxins/Furans (EPA SW-846:8280)	PCBs (EPA SW-846:8082)	Isotopic Uranium, (HASL-300)	Isotopic Plutonium (HASL 300)	Tritium	Gamma Spectroscopy (EPA 901.1M)	Americium-241 (HASL-300)	Strontium-90
Main Site																				
33-002(a)-99	SWMU 33-002(a)	Collect 9 samples from VCA locations 33-24718, 33-24720, 33-24721, 33-24722, 33-24723, 33-24724, 33-24725, 33-24726, and 33-25098 at the next deeper interval (5 to 6 ft beneath bottom of former septic system structures) to define the vertical extent of metals.	9 locations, 9 samples	5–6 beneath bottom of former septic system structures	Soil, tuff	X[a]	—[b]	—	—	—	—	—	—	—	—	—	—	—	—	—
	SWMU 33-002(a)	Collect 3 samples from VCA locations 33-24716, 33-24718, and 33-24722 at the next deeper interval (5 to 6 ft beneath bottom of former septic system structures) to define the vertical extent of PCBs.	3 locations, 3 samples	5–6 beneath bottom of former septic system structures	Soil, tuff	—	—	—	—	—	—	—	—	X	—	—	—	—	—	—
	SWMU 33-002(a)	Collect 7 samples from VCA locations 33–24716, 33-24717, 33-24718, 33-24719, 33-24722, 33-24723, and 33-24726 at the next deeper interval (5 to 6 ft beneath bottom of former septic system structures) to define the vertical extent of SVOCs.	7 locations, 7 samples	5–6 beneath bottom of former septic system structures	Soil, tuff	—	—	—	—	—	X	—	—	—	—	—	—	—	—	—
	SWMU 33-002(a)	Collect one sample from VCA location 33-24717 at the next deeper interval (5 to 6 ft beneath bottom of former septic system structures) to define the vertical extent of plutonium-238.	1 location, 1 sample	5–6 beneath bottom of former septic system structures	Soil, tuff	—	—	—	—	—	—	—	—	—	—	X	—	—	—	—
	SWMU 33-002(a)	Collect one sample from VCA location 33-24722 at the next deeper interval (5 to 6 ft beneath bottom of former septic system structures) to define the vertical extent of uranium-235/236.	1 location, 1 sample	5–6 beneath bottom of former septic system structures	Soil, tuff	—	—	—	—	—	—	—	—	—	X	—	—	—	—	—
	SWMU 33-002(a)	Collect 7 samples from VCA locations 33-24717, 33-24718, 33-24724, 33-25098, 33-25112, 33-25114, and 33-25117 at the next deeper interval (5 to 6 ft beneath bottom of former septic system structures) to define the vertical extent of tritium.	7 locations 7 samples	5–6 beneath bottom of former septic system structures	Soil, tuff	—	—	—	—	—	—	—	—	—	—	—	X	—	—	—
	SWMU 33-002(a)	Collect 26 samples from VCA locations 33-25097, 33-25098, 33-25107, 33-25108, 33-25109, 33-25110, 33-25111, 33-25112, 33-25113, 33-25114, 33-25115, 33-25116, and 33-25117 at deeper VCA depth and next deeper interval (2 to 3 ft and 5 to 6 ft beneath bottom of former septic system structures) to define vertical extent of explosive compounds.	13 locations 26 samples	2–3 and 5–6 beneath bottom of former septic system structures	Soil, tuff	—	—	—	—	—	—	X	—	—	—	—	—	—	—	—
	SWMU 33-002(b)	Collect 7 samples from VCA locations 33-25084, 33-25087, 33-25088, 33-25092, 33-25093, 33-25094, and 33-25125 (5 to 6 ft beneath bottom of former seepage pit drainlines and bottom of former seepage pit) to define the vertical extent of metals.	7 locations, 7 samples	5–6 beneath former seepage pit drainlines and former seepage pit	Soil, tuff	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	SWMU 33-002(b)	Collect one sample from VCA location 33-25088 (5 to 6 ft beneath bottom of former seepage pit) to define the vertical extent of PCBs.	1 location, 1 sample	5–6 beneath bottom of former seepage pit	Soil, tuff	—	—	—	—	—	—	—	—	X	—	—	—	—	—	—

Table 4.0-1 (continued)

Consolidated Unit	Site	Sampling Justification	Number of Locations and Samples	Depth (ft)	Media	TAL Metals (EPA SW-846:6010B/6020)	Cyanide (EPA SW-846:9012A)	Nitrate (EPA 300)	Perchlorate (EPA SW-846:6850)	VOCs (EPA SW-846:8260B)	SVOCs (EPA SW-846:8270C)	Explosive Compounds (EPA SW-846:8321A_MOD)	Dioxins/Furans (EPA SW-846:8280)	PCBs (EPA SW-846:8082)	Isotopic Uranium, (HASL-300)	Isotopic Plutonium (HASL 300)	Tritium	Gamma Spectroscopy (EPA 901.1M)	Americium-241 (HASL-300)	Strontium-90
33-002(a)-99 (continued)	SWMU 33-002(b)	Collect one sample from VCA location 33-25095 (5 to 6 ft beneath bottom of former seepage pit drainline) to define the vertical extent of SVOCs.	1 location, 1 sample	5–6 beneath former seepage pit drainline	Soil, tuff	—	—	—	—	—	X	—	—	—	—	—	—	—	—	—
	SWMU 33-002(b)	Collect one sample from VCA location 33-25125 (5 to 6 ft beneath bottom of former seepage pit drainline) to define the vertical extent of VOCs.	1 location, 1 sample	5–6 beneath former seepage pit drainlines	Soil, tuff	—	—	—	—	X	—	—	—	—	—	—	—	—	—	—
	SWMU 33-002(b)	Collect one sample from VCA location 33-25095 (5 to 6 ft beneath bottom of former seepage pit drainline) to define the vertical extent of americium-241.	1 location, 1 sample	5–6 beneath former seepage pit drainline	Soil, tuff	—	—	—	—	—	—	—	—	—	—	—	—	—	X	—
	SWMU 33-002(b)	Collect two samples from VCA locations 33-25093 and 33-25094 (5 to 6 ft beneath bottom of former seepage pit drainlines) to define the vertical extent of strontium-90.	2 locations, 2 samples	5–6 beneath former seepage pit drainlines	Soil, tuff	—	—	—	—	—	—	—	—	—	—	—	—	—	—	X
	SWMU 33-002(b)	Collect 7 samples from VCA locations 33-25082, 33-25083, 33-25084, 33-25092, 33-25093, 33-25094, and 33-25095 (5 to 6 ft beneath bottom of former seepage pit drainlines) to define the vertical extent of tritium.	7 locations, 7 samples	5–6 beneath former seepage pit drainlines	Soil, tuff	—	—	—	—	—	—	—	—	—	—	—	X	—	—	—
	SWMU 33-002(b)	Collect 16 samples from VCA locations 33-25092, 33-25093, 33-25094, 33-25095, 33-25096, 33-25123, 33-25124, and 33-25125 at deeper VCA depth and next deeper interval (2 to 3 ft and 5 to 6 ft beneath bottom of former seepage pit drainlines) to define vertical extent of explosive compounds.	8 locations 16 samples	2–3 and 5–6 beneath bottom of former seepage pit drainlines	Soil, tuff	—	—	—	—	—	—	X	—	—	—	—	—	—	—	—
	SWMU 33-002(c)	Collect six samples from VCA locations 33-24727, 33-25085, 33-25118, 33-25119, 33-25121, and 33-25122 (5 to 6 ft beneath bottom of former seepage pit drainlines and bottom of former seepage pit) to define the vertical extent of metals.	6 locations, 6 samples	5–6 beneath former seepage pit drainlines and former seepage pit	Soil, tuff	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	SWMU 33-002(c)	Collect one sample from VCA location 33-25122 (5 to 6 ft beneath bottom of former seepage pit drainline) to define the vertical extent of perchlorate.	1 location, 1 sample	5–6 beneath former seepage pit drainline	Soil, tuff	—	—	—	X	—	—	—	—	—	—	—	—	—	—	—
	SWMU 33-002(c)	Collect three samples from VCA locations 33-24728, 33-25086, and 33-25119 (5 to 6 ft beneath bottom of former seepage pit drainlines and former seepage pit) to define the vertical extent of plutonium-238.	3 locations, 3 samples	5–6 beneath former seepage pit drainlines and former seepage pit	Soil, tuff	—	—	—	—	—	—	—	—	—	—	X	—	—	—	—
	SWMU 33-002(c)	Collect one sample from VCA location 33-24727 (5 to 6 ft beneath bottom of former seepage pit drainline) to define the vertical extent of strontium-90.	1 location, 1 sample	5–6 beneath former seepage pit drainline	Soil, tuff	—	—	—	—	—	—	—	—	—	—	—	—	—	—	X
	SWMU 33-002(c)	Collect five samples from ACA location 33-24727, 33-25085, 33-25086, 33-25119, and 33-25121 (5 to 6 ft beneath bottom of former seepage pit drainlines and bottom of former seepage pit) to define the vertical extent of tritium.	5 locations 5 samples	5–6 beneath former seepage pit drainlines and former seepage pit	Soil, tuff	—	—	—	—	—	—	—	—	—	—	—	X	—	—	—

Table 4.0-1 (continued)

Consolidated Unit	Site	Sampling Justification	Number of Locations and Samples	Depth (ft)	Media	TAL Metals (EPA SW-846:6010B/6020)	Cyanide (EPA SW-846:9012A)	Nitrate (EPA 300)	Perchlorate (EPA SW-846:6850)	VOCs (EPA SW-846:8260B)	SVOCs (EPA SW-846:8270C)	Explosive Compounds (EPA SW-846:8321A_MOD)	Dioxins/Furans (EPA SW-846:8280)	PCBs (EPA SW-846:8082)	Isotopic Uranium, (HASL-300)	Isotopic Plutonium (HASL 300)	Tritium	Gamma Spectroscopy (EPA 901.1M)	Americium-241 (HASL-300)	Strontium-90
33-002(a)-99 (continued)	SWMU 33-002(c)	Collect one sample from VCA location 33-25086 (5 to 6 ft beneath bottom of former seepage pit) to define the vertical extent of SVOCs.	1 location, 1 sample	5–6 beneath former seepage pit	Soil, tuff	—	—	—	—	—	X	—	—	—	—	—	—	—	—	—
	SWMU 33-002(c)	Collect 10 samples from VCA locations 33-25118, 33-25119, 33-25120, 33-25121, and 33-25122 at deeper VCA depth and next deeper interval (2 to 3 ft and 5 to 6 ft beneath bottom of former seepage pit drainlines) to define vertical extent of explosive compounds.	5 locations, 5 samples	2–3 and 5–6 beneath bottom of former seepage pit drainlines	Soil, tuff	—	—	—	—	—	—	X	—	—	—	—	—	—	—	—
	SWMU 33-002(d)	Collect 15 samples from three depths at five locations at the outfall and in the drainage channel directly east of the outfall to define vertical and lateral extent of contamination.	5 locations, 15 samples	0–1, 2–3, 4–5	Soil, tuff	X	X	X	X	X	X	—	—	X[c]	X	X	X	X	X	X
	SWMU 33-002(e)	Collect nine samples from three depths at three locations at the outfall and in the drainage channel directly east of the outfall to define vertical and lateral extent of contamination.	3 locations, 9 samples	0–1, 2–3, 4–5	Soil, tuff	X	X	X	X	X	X	—	—	X[c]	X	X	X	X	X	X
	SWMU 33-010(f)	After debris removal, collect a total of 30 samples from three depths at five locations within each debris area: one in the center of each area and four step-out locations around the debris area 10 ft out from the center of each area.	10 locations, 30 samples	0–1, 3–4, 5–6	Soil, tuff	X	X	X	X	X	X	—	—	X[c]	—	—	X	—	—	—
	Sitewide subsurface tritium	Advance seven boreholes to the top of the basalt, collect soil, tuff, and pore gas samples at 10-ft intervals; data will be used to determine the extent of the subsurface tritium plume associated with SWMUs 33-002(a–e) and if any boreholes will be completed as vapor-monitoring wells.	7 locations Number of samples TBD	10-ft intervals to top of basalt	Soil, tuff, pore gas	—	—	—	—	—	—	—	—	—	—	—	X	—	—	—
	Site drainage	Collect ten samples from two depths from five locations in the main drainage channel downgradient of Consolidated Unit 33-002(a)-00 to the Chaquehui Canyon tributary drainage channel southeast of the site to determine if contaminants are migrating from the site.	5 locations 10 samples	0–1, 2–3	Soil, tuff	X	X	X	X	X	X	—	—	X[c]	X	X	X	X	X	X
33-004(a)-00	SWMU 33-004(a)	Collect 10 samples from two depths beneath septic system structures at one location west of building 33-0039 where two drainlines come together, one location at septic tank inlet, one location next to the downgradient (south) side of the septic tank, one location at the septic tank outlet, and one location next to the manhole east of the facility fence. Samples to be collected from deeper intervals to determine extent.	5 locations, 10 samples	0–1, 3–4 below structures	Soil, tuff	X	X	X	X	X	X	—	—	X[c]	X	X	X	X	X	—
	SWMU 33-004(a), Seepage pits	Collect 14 samples from two boreholes drilled next to the two active seepage pits.	2 locations, 14 samples	9–10, 19–20, 29–30, 39–40, 49–50, 59–60, 69–70	Soil, tuff	X	X	X	X	X	X	—	—	X[c]	X	X	X	X	—	

Table 4.0-1 (continued)

Consolidated Unit	Site	Sampling Justification	Number of Locations and Samples	Depth (ft)	Media	TAL Metals (EPA SW-846:6010B/6020)	Cyanide (EPA SW-846:9012A)	Nitrate (EPA 300)	Perchlorate (EPA SW-846:6850)	VOCs (EPA SW-846:8260B)	SVOCs (EPA SW-846:8270C)	Explosive Compounds (EPA SW-846:8321A_MOD)	Dioxins/Furans (EPA SW-846:8280)	PCBs (EPA SW-846:8082)	Isotopic Uranium, (HASL-300)	Isotopic Plutonium (HASL 300)	Tritium	Gamma Spectroscopy (EPA 901.1M)	Americium-241 (HASL-300)	Strontium-90
33-004(a)-00 (continued)	SWMU 33-004(a), Drain field	Collect 24 samples at eight locations within the inactive drain field from three depths beneath the bottom of the drain field VCP. Samples to be collected from deeper intervals to determine extent.	8 locations, 24 samples	0–1, 2–3, 4–5 below pipe joints	Soil, tuff	X	X	X	X	X	X	—	—	X[c]	X	X	X	X	—	—
	SWMU 33-004(h)	Collect nine samples from three depths at the three previous RFI locations (33-01051, 33-01052, and 33-01054) at and downgradient of the outfall to determine extent. Data from downgradient drainage samples to be collected for other SWMUs and AOCs in Consolidated Unit 33-004(a)-00 may be used to determine extent for SWMU 33-004(h), if needed.	3 locations, 9 samples	0–1, 2–3, 4–5	Soil, tuff	X	X	X	X	X	X	—	—	X[c]	X	—	—	—	—	—
	SWMU 33-004(i)	Collect 30 samples from three depths at the three previous RFI sampling locations for each outfall area (33-01055, 33-01056, and 33-01057 at north outfall and locations 33-10158, 33-01059, 33-01060 at the south outfall) and at two additional locations in the drainages downgradient of each outfall. Samples to be collected from deeper intervals to determine extent. Data from the five downgradient drainage samples to be collected for other SWMUs and AOCs in Consolidated Unit 33-004(a)-00 may be used to determine extent for SWMU 33-004(i), if needed.	10 locations, 30 samples	0–1, 2–3, 4–5	Soil, tuff	X	X	X	X	X	X	—	—	X[c]	X	—	—	—	—	—
	SWMU 33-011(d)	Collect 15 samples from three depths at five previous RFI locations (33-01081, 33-01566, 33-01567, 33-01571, and 33-01572) beneath asphalt pad where inorganic chemicals were detected greater than 5 times BV to determine vertical extent. Collect 12 samples from three depths at four new step-out locations away from the asphalt pad to determine lateral extent.	5 locations, 15 samples 4 locations, 12 samples	0–1, 2–3, 4–5	Soil, tuff	X	X	X	X	X	X	—	—	X[c]	X	X	X	—	—	—
	SWMU 33-015	Collect 15 samples from three depths at five locations: one location beneath incinerator and four step-out (maximum 10 ft) locations adjacent to the incinerator; collect samples from deeper intervals to determine extent.	5 locations, 15 samples	0–1, 2–3, 4–5	Soil, tuff	X	X	—	—	X	X	—	X	X[c]	—	—	—	—	—	—
	SWMU 33-017	Collect 75 samples from three depths at 25 previous RFI locations with highest detected contaminant concentrations (screening- and decision-level data) within Main Site samples collected from deeper intervals to determine extent. (See Table 4.1-5 for list of 25 previous RFI sampling locations.)	25 locations, 75 samples	0–1, 2–3, 4–5	Soil, tuff	X	X	X	X	X	X	—	—	X	X	X	X	X	—	—
	SWMU 33-017, Drainage	Collect 15 samples from three depths at five locations in the drainage downgradient of Main Site to the stormwater gauging station E340 in the Chaquehui Canyon tributary. NOTE: drainage sample data will be used to characterize extent for other SWMUs and AOCs in and around Consolidated Unit 33-004(a)-00, including AOC 33-008(c).	5 locations, 15 samples	0–1, 2–3, 4–5	Soil, tuff, sediment	X	X	X	X	X	X	—	—	X	X	X	X	X	—	—

Table 4.0-1 (continued)

Consolidated Unit	Site	Sampling Justification	Number of Locations and Samples	Depth (ft)	Media	TAL Metals (EPA SW-846:6010B/6020)	Cyanide (EPA SW-846:9012A)	Nitrate (EPA 300)	Perchlorate (EPA SW-846:6850)	VOCs (EPA SW-846:8260B)	SVOCs (EPA SW-846:8270C)	Explosive Compounds (EPA SW-846:8321A_MOD)	Dioxins/Furans (EPA SW-846:8280)	PCBs (EPA SW-846:8082)	Isotopic Uranium, (HASL-300)	Isotopic Plutonium (HASL 300)	Tritium	Gamma Spectroscopy (EPA 901.1M)	Americium-241 (HASL-300)	Strontium-90
33-005(a)-00	SWMU 33-005(a–c), 33-011(a)	Collect a total of 60 samples from three depths at all 14 previous RFI sampling locations and from 6 new sampling locations along the former SMWU 33-005(b) drainline to determine the vertical extent of residual contamination.	20 locations, 60 samples	2–3, 5–6, 8–9	Soil, tuff	X	X	X	X	X	X	—	—	X[c]	X	X	—	X	—	—
	SWMU 33-005(a–c), 33-011(a), Drainage	Collect 10 samples from two depths at five locations in the drainage downgradient of the consolidated unit sites.	5 locations, 10 samples	0–1, 2–3	Soil, tuff, sediment	X	X	X	X	X	X	—	—	X[c]	X	X	—	X	—	—
	AOC 33-008(c), North Area	Collect 12 samples from two depths from the two former RFI sampling locations (33-01685 and 33-01670) and from four new sampling locations around the site; deeper intervals to define extent.	6 locations, 12 samples	0–1, 5–6	Soil, tuff	X	X	—	—	X	X	—	—	X[c]	X	X	X	X	—	—
	AOC 33-008(c), Culvert Area	Collect 30 samples from three depths from six of the former RFI sampling locations (33-01672, 33-01679, 33-01680, 33-01681, 33-01682, and 33-01684) and from four additional locations downgradient of the area.	10 locations, 30 samples	0–1, 5–6, 9–10	Soil, tuff	X	X	—	—	X	X	—	—	X[c]	X	X	X	X	—	—
	SWMU 33-011(e)	Collect 18 samples from three depths from two previous RFI locations within the former storage area (33-01094 and 33-01085), two new locations within the former storage area, and four locations around the former storage area. Deeper sample intervals will determine extent.	8 locations, 24 samples	0–1, 2–3, 4–5	Soil, tuff	X	X	X	X	X	X	X	—	X	X	—	X	X	—	—
	SWMU 33-012(a)	Collect 21 samples from three depths from three previous RFI locations under the pad (locations 33-01086, 33-01087 and 33-01089), three new locations next to the pad, and one new location downgradient of the pad. Deeper sample intervals will determine extent.	7 locations, 21 samples	0–1, 2–3, 4–5	Soil, tuff	X	X	X	X	X	X	—	—	X	X	—	X	X	—	—
	SWMU 33-016	Collect 10 samples from two depths beneath bottom of sump from two locations adjacent to sump and from three locations along drainline beneath bottom of drainline.	5 locations, 10 samples	0–1, 3–4 beneath sump and drainline	Soil, tuff	X	X	X	X	X	X	—	—	X[c]	X	—	—	—	—	—
		Collect eight samples from two depths at four locations within the outfall and drainage downgradient of the outfall.	4 locations, 8 samples	0–1, 2–3	Soil, tuff, sediment	X	X	X	X	X	X	—	—	X[c]	X	—	—	—	—	—
	AOC C-33-001	Collect 12 samples from two depths from four previous RFI locations around concrete pad (33-01748, 33-01749, 33-01751, and 01752) and two additional downgradient locations to determine extent.	6 locations, 12 samples	0–1, 3–4	Soil, tuff	—	—	—	—	—	—	—	—	X	—	—	—	—	—	—
	AOC C-33-003	Collect 78 samples from three depths from all 10 previous confirmation sampling locations and 16 new sampling locations within and downgradient of both fill areas.	26 locations, 78 samples	0–1, 4–5, into tuff	Soil, tuff	X	X	X	X	X	X	X	—	X[c]	X	—	—	X	—	—

Table 4.0-1 (continued)

Consolidated Unit	Site	Sampling Justification	Number of Locations and Samples	Depth (ft)	Media	TAL Metals (EPA SW-846:6010B/6020)	Cyanide (EPA SW-846:9012A)	Nitrate (EPA 300)	Perchlorate (EPA SW-846:6850)	VOCs (EPA SW-846:8260B)	SVOCs (EPA SW-846:8270C)	Explosive Compounds (EPA SW-846:8321A_MOD)	Dioxins/Furans (EPA SW-846:8280)	PCBs (EPA SW-846:8082)	Isotopic Uranium, (HASL-300)	Isotopic Plutonium (HASL 300)	Tritium	Gamma Spectroscopy (EPA 901.1M)	Americium-241 (HASL-300)	Strontium-90
	AOC C-33-003	Collect six samples from two depths at three locations in the drainage channel downgradient of the southwest fill area next to the water tower. Extent downslope will be determined by data from the 6 sampling locations in the drainage downgradient of SWMU 33-004(d).	3 locations, 6 samples	0–1, 2–3	Soil, tuff, sediment	X	X	X	X	X	X	X	—	X[c]	X	—	—	X	—	—
Area 6																				
	SWMU 33-004(d)	Collect eight confirmation samples from two depths beneath each structure: at one location within septic tank excavation, one location beneath the inlet, one location beneath the outlet, and from one location along the inlet drainline.	4 locations, 8 samples	0–1, 3–4 Beneath structures	Soil, tuff	X	X	X	X	X	X	X	—	X[c]	X	—	—	X	—	—
	SWMU 33-004(d), Drain field	Collect six samples from deeper intervals from two previous RFI locations (33-01183 and 33-01184) in drain field beneath the drainline.	2 locations, 6 samples	4–5, 7–8, 9–10,	Soil, tuff	X	X	X	X	X	X	X	—	X[c]	X	—	—	X	—	—
	SWMU 33-004(d), Outfall and drainage channel	Collect 16 samples from deeper interval from six previous RFI locations (33-01185, 33-01186, 33-01187, 33-01189, 33-01190, and 33-01191) along outlet line, in drain field, and in the drainage channel downgradient of the site. NOTE: Data from the six drainage samples will be used to determine extent for AOC C-33-033.	8 locations, 16 samples	0–1, 2–3	Soil, tuff	X	X	X	X	X	X	X	—	X[c]	X	—	—	X	—	—
33-004(g)-00	SWMU 33-004(g)	Collect 10 samples from two depths at five previous RFI locations at culvert and within outfall area (33-01192 and 33-01196), including a deeper interval to determine extent.	5 locations, 10 samples	0–1, 2–3	Soil, tuff	X	X	X	X	X	X	X	—	X	X	—	—	X	—	—
	SWMU 33-007(c), Former catcher boxes	Collect nine samples from three depths at three locations within footprint of former catcher boxes where treated backfill was emplaced.	3 locations, 9 samples	0–1 and 2–3 into backfill, 0–1 into undisturbed tuff	Soil, tuff	X	X	X	X	X	X	X	—	X[c]	X	—	—	—	—	—
	SWMU 33-007(c), Former catcher boxes	Collect 12 samples from three depths at four step-out locations around former catcher boxes to determine extent.	4 locations, 12 samples	0–1, 2–3, 4–5	Soil, tuff	X	X	X	X	X	X	X	—	X[c]	X	—	—	—	—	—
	SWMU 33-007(c), Cinder cone	Collect samples from three depths at six previous RFI locations (33-01199, 33-01203, 33-01204, 33-01206, 33-01211, and 33-01212) within and around cinder cone to edge of slope to determine extent to north, south, and east. Extent downslope to the west will be determined by SWMU 33-009 sampling.	6 locations, 18 samples	0–1, 2–3, 4–5	Soil, tuff	X	X	X	X	X	X	X	—	X	X	—	—	—	—	—
	SWMU 33-009, Cinder cone slope disposal area	Collect samples from three depths at five locations along each of two transects across slope within and below disposal area to determine extent.	10 locations, 30 samples	0–1, 2–3, 4–5	Soil, tuff	X	X	X	X	X	X	X	—	X	X	—	—	—	—	—
	SWMU 33-009, Drainage	Collect samples from two depths at six locations in the drainage below cinder cone slope to determine extent. Samples may also be used to determine extent from SWMUs 33-004(g) and 33-007(c).	6 locations, 12 samples	0–1, 2–3	Soil, tuff, sediment	X	X	X	X	X	X	X	—	X	X	—	—	—	—	—

Table 4.0-1 (continued)

Consolidated Unit	Site	Sampling Justification	Number of Locations and Samples	Depth (ft)	Media	TAL Metals (EPA SW-846:6010B/6020)	Cyanide (EPA SW-846:9012A)	Nitrate (EPA 300)	Perchlorate (EPA SW-846:6850)	VOCs (EPA SW-846:8260B)	SVOCs (EPA SW-846:8270C)	Explosive Compounds (EPA SW-846:8321A_MOD)	Dioxins/Furans (EPA SW-846:8280)	PCBs (EPA SW-846:8082)	Isotopic Uranium, (HASL-300)	Isotopic Plutonium (HASL 300)	Tritium	Gamma Spectroscopy (EPA 901.1M)	Americium-241 (HASL-300)	Strontium-90
South Site																				
33-001(a)-99	SWMUs 33-001(a–e)	Drill five boreholes to a minimum of 70-ft-depth bgs next to and as close as possible to the outside edge of each disposal pit and the test shaft to determine extent of any releases from MDA E. NOTE: the borehole next to the test shaft may have to be drilled inside the fence.	5 locations, 35 samples	10 ft intervals	Soil, tuff	X	X	X	X	X	X	X	—	X[c]	X	X	X	X	—	—
	SWMU 33-004(b)	Collect six confirmation samples from two depths (0 to 1 ft and 3 to 4 ft below the structures) from three locations: beneath the tank inlet, within the tank excavation, and beneath the tank outlet.	3 locations, 6 samples	0–1, 3–4	Soil, tuff	X	X	X	X	X	X	X	—	X[c]	X	—	—	X	—	—
	SWMU 33-004(b)	Collect four samples from two depths (0 to 1 ft and 3 to 4 ft beneath the drainline) at two locations along the inlet drainline from former building 33-0024. Collect two samples from two depths (0 to 1 ft and 3 to 4 ft bgs) at one location at the outfall.	3 locations, 6 samples	0–1, 3–4	Soil, tuff	X	X	X	X	X	X	X	—	X[c]	X	—	—	X	—	—
	SWMU 33-004(b), Drainage	Collect six samples from two depths from three locations in the drainage downgradient of the outfall.	3 locations, 6 samples	0–1, 2–3	Soil, tuff, sediment	X	X	X	X	X	X	X	—	X[c]	X	—	—	X	—	—
33-004(j)-00	SWMU 33-004(j)	Collect four samples from two depths from two locations: one at the culvert discharge point and one at the outfall.	2 locations, 4 samples	0–1, 2–3	Soil, tuff	X	X	—	—	X	X	X	—	X[c]	X	X	—	X	—	—
	SWMU 33-004(j), Drainage	Collect four samples from two depths from two locations in the drainage downgradient of the site. This same drainage will also be investigated as part of SWMUs 33-006(a), 33-007(b), and 33-010(c).	2 locations, 4 samples	0–1, 2–3	Soil, tuff, sediment	X	X	—	—	X	X	X	—	X[c]	X	X	—	X	—	—
	SWMU 33-006(a), Removal locations	Collect confirmation samples from two depths in bottom of excavation at areas where soils with elevated radioactivity or HE are observed following the removal of firing site debris within the sampling area around the former shot pad.	To be determined	0–1, 2–3	Soil, tuff	X	X	X	X	X	X	X	—	X[c]	X	X	—	X	—	—
	SWMU 33-006(a)	Collect four samples from two depths from two locations within the SWMU 33-006(a) shot pad. Collect 16 samples from two depths from four 10-ft step-out sampling locations around the former shot pad and from four 30-ft step-out sampling locations around the shot pad.	10 locations, 20 samples	0–1, 2–3 0–1, 2–3	Soil, tuff	X	X	X	X	X	X	X	—	X[c]	X	X	—	X	—	—
	SWMU 33-006(a), SWMU 33-010(c), SWMU 33-010(g), SWMU 33-010(h), Drainages	Collect 27 samples from three depths at three locations in each of the three main South Site drainages. Sampling locations will be targeted to the sediment traps within each drainage.	9 locations, 27 samples	0–1, soil-tuff interface, 1 ft into the tuff.	Soil, tuff, sediment	X	X	X	X	X	X	X	—	X[c]	X	X	—	X	—	—
	SWMU 33-007(b), SWMU 33-011(c), North location	At berm 33-0043 [SWMU 33-007(b)], collect eight samples from two depths (0 to 1 ft and 5 to 6 ft below the fill used in the former catcher box location) from four locations in and around the former catcher box location.	4 locations, 8 samples	0–1, 5–6	Soil, tuff	X	X	X	X	X	X	X	—	X[c]	X	X	X	X	—	—

Table 4.0-1 (continued)

Consolidated Unit	Site	Sampling Justification	Number of Locations and Samples	Depth (ft)	Media	TAL Metals (EPA SW-846:6010B/6020)	Cyanide (EPA SW-846:9012A)	Nitrate (EPA 300)	Perchlorate (EPA SW-846:6850)	VOCs (EPA SW-846:8260B)	SVOCs (EPA SW-846:8270C)	Explosive Compounds (EPA SW-846:8321A_MOD)	Dioxins/Furans (EPA SW-846:8280)	PCBs (EPA SW-846:8082)	Isotopic Uranium, (HASL-300)	Isotopic Plutonium (HASL 300)	Tritium	Gamma Spectroscopy (EPA 901.1M)	Americium-241 (HASL-300)	Strontium-90
33-004(j)-00 (continued)	SWMU 33-007(b), SWMU 33-011(c), North location embankment	Collect four samples from two depths at two locations below the bottom of the embankment where projectiles were fired.	2 locations, 4 samples	0–1, 4–5	Soil, tuff	X	X	X	X	X	X	X	—	X[c]	X	X	X	X	—	—
	SWMU 33-007(b), SWMU 33-011(c), North location, drainage	Collect six samples from two depths at three locations within the drainage downgradient of SWMU 33-007(b) (east location).	3 locations, 6 samples	0–1, 3–4	Soil, tuff, sediment	X	X	X	X	X	X	X	—	X[c]	X	X	X	X	—	—
	SWMU 33-007(b), SWMU 33-011(c), Building 33-0025	At building 33-0025 [SWMUs 33-007(b) and 33-011(c)], collect 24 from three depths at eight locations from the footprint of former gun firing site berm 33-0063 and the former unpaved storage area formerly used to stage tritium containers. Ensure samples are collected beneath the engineering fill recently added to the site.	8 locations, 24 samples	0–1, 4–5, 9–10	Soil, tuff	X	X	X	X	X	X	X	—	X[c]	X	X	X	X	—	—
	SWMU 33-007(b), SWMU 33-011(c), Building 33-0025	Collect 4 samples from two depths at two locations in the drainage southwest of building 33-0025 [SWMUs 33-007(b) and 33-011(c)], Samples to be collected in the other South Sites drainages will complete this determination (see Figure 4.3-17).	2 locations, 4 samples	0–1, 3–4	Soil, tuff, sediment	X	X	X	X	X	X	X	—	X[c]	X	X	X	X	—	—
	SWMU 33-008(a)	Collect 12 confirmation samples from two depths from six locations beneath the bottom of the landfill excavation to determine vertical extent.	6 locations, 12 samples	0–1, 4–5	Soil, tuff	X	X	X	X	X	X	X	—	X[c]	X	X	—	X	—	—
		Collect 16 samples from two depths at eight step-out locations (6 ft) locations surrounding the landfill to determine lateral extent.	8 locations, 16 samples	4–5, 9–10	Soil, tuff, sediment	X	X	X	X	X	X	X	—	X[c]	X	X	—	X	—	—
	SWMU 33-010(c)	Collect 18 samples from three depths from two locations within the remediated portion of SWMU 33-010(c) and from four locations around SWMU 33-010(c).	6 locations, 18 samples	0–1, 3–4, 6–7	Soil, tuff	X	X	X	X	X	X	X	—	X[c]	X	X	—	X	—	—
	SWMU 33-010(c)	See description of drainage sampling locations under SWMU 33-006(a) above.	n/a[d]	n/a	n/a	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	SWMU 33-010(h)	Collect 18 samples from three depths from two locations within disposal area and from four locations around SWMU 33-010(h).	6 locations, 18 samples	0–1, 3–4, 6–7	Soil, tuff	X	X	X	X	X	X	X	—	X[c]	X	X	—	X	—	—
	SWMU 33-010(h)	See description of drainage sampling locations under SWMU 33-006(a) above.	n/a	n/a	n/a	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	SWMU 33-014	Collect eight samples from two depths from four locations within the former burn area. In addition, collect eight samples from two depths from four step-out locations around the former burn area.	8 locations, 16 samples	0–1, 2–3	Soil, tuff	X	X	X	X	X	X	X	X	X[c]	X	—	—	—	—	—

Table 4.0-1 (continued)

Consolidated Unit	Site	Sampling Justification	Number of Locations and Samples	Depth (ft)	Media	TAL Metals (EPA SW-846:6010B/6020)	Cyanide (EPA SW-846:9012A)	Nitrate (EPA 300)	Perchlorate (EPA SW-846:6850)	VOCs (EPA SW-846:8260B)	SVOCs (EPA SW-846:8270C)	Explosive Compounds (EPA SW-846:8321A_MOD)	Dioxins/Furans (EPA SW-846:8280)	PCBs (EPA SW-846:8082)	Isotopic Uranium, (HASL-300)	Isotopic Plutonium (HASL 300)	Tritium	Gamma Spectroscopy (EPA 901.1M)	Americium-241 (HASL-300)	Strontium-90
	SWMU 33-010(g)	Collect eighteen samples from two depths from eight locations within the western portion of SWMU 33-010(g) and from one location at the head of the drainage directly downgradient of the western portion of SWMU 33-010(g).	9 locations, 18 samples	0–1, 3–4	Soil, tuff	X	X	X	X	X	X	X	—	X[c]	X	X	—	X	—	—
		Collect twenty samples from two depths from ten locations within the eastern portion of SWMU 33-010(g).	10 locations, 20 samples	0–1, 3–4																
	SWMU 33-010(g)	See description of drainage sampling locations under SWMU 33-006(a) above.	n/a	n/a	n/a	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
NRAO																				
	SWMU 33-004(m)	Collect eight samples from two depths from one location next to the bottom of the east side of the septic tank, one location adjacent to the septic tank inlet, one location adjacent to the septic tank outlet, and from one location adjacent the inlet drain line.	4 locations, 8 samples	0–1, 2–3	Soil, tuff	X	X	X	X	X	X	—	—	X[c]	—	—	—	—	—	—
	SWMU 33-004(m), Leach field	Collect nine samples from three depths at three locations surrounding the leach field.	3 locations, 9 samples	0–1, soil/tuff interface 1 ft into tuff	Soil, tuff	X	X	X	X	X	X	—	—	X[c]	—	—	—	—	—	—
	SWMU 33-004(m), Downgradient drainage	Collect six samples from two depths (0 to 1 ft and 2 o 3 ft bgs) from three locations in the drainage downgradient of the site.	3 locations, 6 samples	0-1, 2-3	Soil, tuff, sediment	X	X	X	X	X	X	—	—	X[c]	—	—	—	—	—	—
	AOC 33-011(b)	Collect 12 samples from two depths from all six previous RFI locations (33-01435, 33-01436, 33-01438, 33-01439, 33-01440, and 33-01441) within the former storage area; deeper intervals will define extent.	6 locations, 12 samples	0–1, 4–5	Soil, tuff	X	X	X	X	X	X	X	—	X[c]	X	X	—	X	—	—
		Collect six samples from two depths from three locations downgradient and west of the site.	3 locations, 6 samples	0–1, 2–3	Soil, tuff, sediment	X	X	X	X	X	X	X	—	X[c]	X	X	—	X	—	—

[a] X = Analysis proposed.

[b] — = Analysis will not be performed.

[c] 20% of samples collected will be analyzed for PCBs.

[d] n/a = Not applicable.

Table 4.1-1
Summary of Decision-Level Samples Collected and Analyses Requested for Previous Investigations at TA-33 Main Site

Sample ID	Location ID	Depth (ft)	Media	Americium-241	Cyanide	Gamma Spectroscopy	High Explosives	Isotopic Plutonium	Isotopic Uranium	Metals	Nitrate	PCBs	Perchlorate	Pesticides/PCBs	Strontium-90	SVOCs	Total Petroleum Hydrocarbons/Diesel Range Organics	Tritium	Uranium	VOCs
SWMU 33-002(a)																				
0333-96-0525	33-01652	1.0–1.5	Soil	—[a]	—	—	—	2293[b]	—	2292, 2293	—	—	—	—	—	2291	—	2293	—	2291
0333-96-0526	33-01652	3.08–4.08	Soil	—	—	—	—	2293	—	2292, 2293	—	—	—	—	—	2291	—	2293	—	2291
0333-96-0546	33-01652	6.0–7.0	Qbt4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2340	—	—
0333-96-0527	33-01652	12.5–12.9	Soil	—	—	—	—	2293	—	2292, 2293	—	—	—	—	—	2291	—	2293	—	2291
0333-96-0528	33-01652	15.08–16.08	Soil	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2293	—	—
0333-96-0529	33-01652	23.42–24.0	Qbt2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2293	—	—
0333-96-0531	33-01652	30.08–31.08	Qbt2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2340	—	—
0333-96-0537	33-01652	61.0–61.83	Qbt2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2340	—	—
0333-96-0534	33-01652	73.42–74.58	Qbt2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2340	—	—
0333-96-0540	33-01652	76.92–77.5	Qbt2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2340	—	—
0333-96-0543	33-01652	92.5–93.5	Qbt4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2340	—	—
0333-96-0547	33-01652	113.0–113.67	Qbt4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2340	—	—
0333-96-0548	33-01652	117.5–118.33	Qbt4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2340	—	—
0333-96-0043	33-01696	2.33–3.0	Soil	—	—	—	—	2167	—	2166, 2167	—	—	—	—	—	2165	—	2167	—	2165
0333-96-0044	33-01696	8.25–8.75	Soil	—	—	—	—	2167	—	2166, 2167	—	—	—	—	—	2165	—	2167	—	2165
0333-96-0045	33-01696	12.58–13.17	Qbt3	—	—	—	—	2167	—	2166, 2167	—	—	—	—	—	2165	—	2167	—	2165
0333-96-0046	33-01696	19.0–19.58	Qbt3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2167	—	—
0333-96-0047	33-01696	24.0–25.0	Qbt2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2167	—	—
0333-96-0048	33-01696	26.0–26.5	Qbt2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2167	—	—
RE33-05-60743	33-24716	3.0–3.5	Qbt3	3419S	3421S	3419S	3420S	3419S	3419S	3421S	3421S	3420S	3421S	—	3419S	3420S	—	3419S	—	3420S
RE33-05-60747	33-24716	5.0–5.5	Qbt3	3419S	3421S	3419S	3420S	3419S	3419S	3421S	3421S	3420S	3421S	—	3419S	3420S	—	3419S	—	3420S
RE33-05-60745	33-24717	3.0–3.5	Qbt3	3419S	3421S	3419S	3420S	3419S	3419S	3421S	3421S	3420S	3421S	—	3419S	3420S	—	3419S	—	3420S
RE33-05-60749	33-24717	5.0–5.5	Qbt3	3419S	3421S	3419S	3420S	3419S	3419S	3421S	3421S	3420S	3421S	—	3419S	3420S	—	3419S	—	3420S
RE33-05-60744	33-24718	3.0–3.5	Qbt3	3419S	3421S	3419S	3420S	3419S	3419S	3421S	3421S	3420S	3421S	—	3419S	3420S	—	3419S	—	3420S
RE33-05-60748	33-24718	5.0–5.5	Qbt3	3419S	3421S	3419S	3420S	3419S	3419S	3421S	3421S	3420S	3421S	—	3419S	3420S	—	3419S	—	3420S
RE33-05-60746	33-24719	3.0–3.5	Qbt3	3419S	3421S	3419S	3420S	3419S	3419S	3421S	3421S	3420S	3421S	—	3419S	3420S	—	3419S	—	3420S
RE33-05-60750	33-24719	5.0–5.5	Qbt3	3419S	3421S	3419S	3420S	3419S	3419S	3421S	3421S	3420S	3421S	—	3419S	3420S	—	3419S	—	3420S
RE33-05-60751	33-24720	3.0–3.5	Qbt3	3419S	3421S	3419S	3420S	3419S	3419S	3421S	3421S	3420S	3421S	—	3419S	3420S	—	3419S	—	3420S
RE33-05-60752	33-24720	5.0–5.5	Qbt3	3419S	3421S	3419S	3420S	3419S	3419S	3421S	3421S	3420S	3421S	—	3419S	3420S	—	3419S	—	3420S
RE33-05-60753	33-24721	3.0–3.5	Qbt3	3419S	3421S	3419S	3420S	3419S	3419S	3421S	3421S	3420S	3421S	—	3419S	3420S	—	3419S	—	3420S
RE33-05-60754	33-24721	5.0–5.5	Qbt3	3419S	3421S	3419S	3420S	3419S	3419S	3421S	3421S	3420S	3421S	—	3419S	3420S	—	3419S	—	3420S
RE33-05-60755	33-24722	3.0–3.5	Qbt3	3419S	3421S	3419S	3420S	3419S	3419S	3421S	3421S	3420S	3421S	—	3419S	3420S	—	3419S	—	3420S