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August 7, 2019

Victoria Branson
Water Quality Program Manager
U.S. Department of Energy
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P.O Box 5400 MS 0184
Albuquerque, New Mexico 87185-5400

Subject: **Data Submittal for Groundwater Monitoring at Sandia National Laboratories/New Mexico Mixed Waste Landfill Conducted by the New Mexico Environment Department DOE Oversight Bureau for FFY 2019 Q-3**

Mrs. Branson:

This letter transmits the subject report as final. The report shows groundwater data results from SNL/NM Mixed Waste Landfill conducted by the New Mexico Environment Department DOE Oversight Bureau during the third quarter of FFY 2019.

The enclosed monitoring results were provided to the U.S Department of Energy in draft form on July 8, 2019 for 30-day review and comment. The final monitoring results are provided to DOE, the State of New Mexico and other federal agencies, the NMED website and interested members of the public. If you have any questions, or if you would like copies of the complete data set, please contact me by phone at (505) 383-2070, by email at chris.armijo1@state.nm.us, or by mail to the address in the above letterhead.

Sincerely,

Chris Armijo
Environmental Scientist
Sandia Oversight Section

Enclosure: (1) Groundwater Monitoring at Sandia National Laboratories/New Mexico Mixed Waste Landfill Conducted by the New Mexico Environment Department DOE Oversight Bureau for FFY 2019 Q-3
(2) Table-1 Total Target Analyte List Metals plus Uranium Results
(3) Table-2 Method Detection Limits for Volatile Organic Compounds
(4) Table-3 Gross Alpha, Gross Beta, Gamma Emitting Isotopes, Radon and Tritium Results

Distribution: David Rast, DOE/SFO
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File: SGE42. Groundwater Monitoring. MWL. FFY 2019 Q-3

DOE Oversight Bureau, New Mexico Environment Department

Groundwater Monitoring at Sandia National Laboratories/New Mexico Mixed Waste Landfill

Conducted by the
New Mexico Environment Department
DOE Oversight Bureau
for FFY 2019 Q-3

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Final Report

8/7/2019

The purpose of this communication is to transmit groundwater quality data collected by the New Mexico Environment Department DOE Oversight Bureau from Mixed Waste Landfill during the third quarter of Federal Fiscal Year 2019.

Acknowledgment:
This material is based upon work supported by the Department of Energy Office of Environmental Management under Award Number *DE-EM0002420*.

Introduction

The New Mexico Environment Department (NMED) DOE Oversight Bureau (DOE-OB or Bureau) has compiled and assessed groundwater data collected during April and May 2019. The Bureau collected groundwater samples from Mixed Waste Landfill (MWL) groundwater monitoring wells MWL-BW2 (plus duplicate), MWL-MW7, MWL-MW8, and MWL-MW9. Groundwater samples were collected using standard Sandia National Laboratories/New Mexico (SNL/NM) sampling procedures and equipment in accordance with the MWL Long-Term Monitoring and Maintenance Plan (LTMMP), Appendix F (Groundwater Sampling and Analysis Plan). Samples were analyzed for total metals plus uranium, volatile organic compounds (VOCs), gamma emitting isotopes, gross alpha and gross beta, radon, and tritium. The Bureau submitted samples for analysis to an independent analytical laboratory under contract with the NMED. No sample concentrations exceeded established U.S. Environmental Protection Agency (EPA) Maximum Contaminant Levels (MCLs) or trigger levels listed in the LTMMP.

Data Assessment

All groundwater samples were collected and analyzed in accordance with U.S. EPA protocols. Data results are compared to applicable MCLs established by the U.S. EPA National Primary Drinking Water Regulations (40 CFR 141), National Primary Drinking Water Standards, EPA, July 2002. Sample results are also compared to Mixed Waste Landfill Groundwater Monitoring Trigger Levels in Table 5.2.4-1 of the SNL/NM Environmental Restoration Operations LTMMP for the MWL, March 2012.

Under the current LTMMP, SNL/NM is required to collect samples from MWL monitoring wells MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9. Samples are analyzed for LTMMP list VOCs, metals (Cd, Cr, Ni, and U), gamma emitting isotopes, gross alpha and beta, radon, and tritium.

Results

Analytical results for total target analyte list (TAL) metals plus uranium are presented in Table-1. Metals concentrations for total uranium, cadmium, chromium, and nickel were below established MCLs and LTMMP trigger levels; all other metals concentrations were below established MCLs. In accordance with the MWL LTMMP, SNL/NM only analyzes groundwater samples for the metals uranium (total), cadmium, chromium, and nickel.

Table-2 summarizes the laboratory method detection limits (MDLs) for the LTMMP listed VOCs. No compounds were detected above their method detection limits (MDLs).

Analytical results for radionuclides are listed in Table-3 and used to screen for potential radiological contamination. Gross alpha activity ranged from 8.4 pico Curies per liter (pCi/L) at MWL-BW2 duplicate to 11 pCi/L at MWL-MW7. Radon-222 activity ranged from 150 pCi/L at MWL-MW7 to 530 pCi/L at MWL-BW2. These results were below the LTMMP trigger level of 15 pCi/L for gross alpha and 1000 pCi/L for radon, respectively. Tritium was not detected in any samples collected from MWL. All radionuclide results were below established EPA MCLs and MWL LTMMP trigger levels, and consistent with previous monitoring results.

Conclusion

Groundwater samples were collected from four (4) MWL monitoring wells (MWL-BW2, MWL-MW7, MWL-MW8, and MWL-MW9) during this semi-annual sampling event. Samples collected by the Bureau and analyzed by an independent laboratory reported concentrations of metals, VOCs and radionuclides below established EPA MCLs and SNL/NM trigger levels listed in the LTMMP. Data results compare well to historical concentrations.

The DOE-OB will continue to monitor groundwater quality at MWL semi-annually and make the data reports available to the public. The analytical data for all past groundwater monitoring conducted by the DOE OB is available on the New Mexico Environment Department website at https://www.env.nm.gov/doeob/.

References

Sandia National Laboratories, New Mexico. Annual Groundwater Monitoring Report, Calendar Year 2018.

Sandia National Laboratories, New Mexico Environmental Restoration Operations. Long-Term Monitoring and Maintenance Plan for the Mixed Waste Landfill, March 2012.

U.S. EPA National Primary Drinking Water Regulations (40 CFR 141), National Primary Drinking Water Standards, EPA, July 2002.

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Table-1
Groundwater Quality Results: Dissolved (Filtered) Target Analyte List Metals plus Uranium
Sandia National Laboratories/New Mexico Mixed Waste Landfill
New Mexico Environment Department DOE Oversight Bureau
April/May 2019

Monitoring Well/ Sample Date	Analyte	Result[a] (mg/L)	Reporting Limit[b] (mg/L)	MDL[c] (mg/L)	MCL[d] (pCi/L)	Trigger Level[d] (mg/L)	Laboratory Qualifier[e]	Analytical Method[f]
MWL-BW2 25-Apr-19	Aluminum	0.045	0.1	0.01	NE	NE	J	SW846:6020
	Antimony	0.00012	0.001	0.00012	0.006	NE	U	SW846:6020
	Arsenic	0.00058	0.002	0.00039	0.01	NE	J	SW846:6020
	Barium	0.1	0.005	0.00056	2	NE		SW846:6020
	Beryllium	0.000054	0.0005	0.000054	0.004	NE	U	SW846:6020
	Cadmium	0.000083	0.002	0.000083	0.005	0.0025	U	SW846:6020
	Calcium	67	1	0.085	NE	NE		SW846:6020
	Chromium	0.00047	0.01	0.00046	0.1	0.043	J	SW846:6020
	Cobalt	0.00011	0.005	0.00011	NE	NE	U	SW846:6020
	Copper	0.00047	0.02	0.00032	NE	NE	J	SW846:6020
	Iron	0.067	0.1	0.0098	NE	NE	J	SW846:6020
	Lead	0.000079	0.002	0.000079	NE	NE	U	SW846:6020
	Magnesium	21	0.1	0.016	NE	NE		SW846:6020
	Manganese	0.0024	0.005	0.00036	NE	NE	J	SW846:6020
	Mercury	0.00006	0.0001	0.00006	0.002	NE	U	SW846:7470A
	Nickel	0.00092	0.02	0.00092	NE	0.05	U	SW846:6020
	Potassium	4.1	1	0.039	NE	NE		SW846:6020
	Selenium	0.0024	0.01	0.00065	0.05	NE	J	SW846:6020
	Silver	0.000029	0.0005	0.000029	NE	NE	U	SW846:6020
	Sodium	57	1	0.022	NE	NE		SW846:6020
	Thallium	0.0000041	0.0001	0.0000041	0.002	NE	U	SW846:6020
	Uranium	0.0067	0.0001	0.0000049	0.03	0.015		SW846:6020
	Vanadium	0.0052	0.005	0.00012	NE	NE		SW846:6020
	Zinc	0.0036	0.1	0.0014	NE	NE	J	SW846:6020

Refer to footnotes at the end of tables.

Table-1
Groundwater Quality Results: Dissolved (Filtered) Target Analyte List Metals plus Uranium
Sandia National Laboratories/New Mexico Mixed Waste Landfill
New Mexico Environment Department DOE Oversight Bureau
April/May 2019

Monitoring Well/ Sample Date	Analyte	Result[a] (mg/L)	Reporting Limit[b] (mg/L)	MDL[c] (mg/L)	MCL[d] (pCi/L)	Trigger Level[d] (mg/L)	Laboratory Qualifier[e]	Analytical Method[f]
MWL-BW2 25-Apr-19 (Duplicate)	Aluminum	0.044	0.1	0.01	NE	NE	J	SW846:6020
	Antimony	0.00012	0.001	0.00012	0.006	NE	U	SW846:6020
	Arsenic	0.00055	0.002	0.00039	0.01	NE	J	SW846:6020
	Barium	0.1	0.005	0.00056	2	NE		SW846:6020
	Beryllium	0.000054	0.0005	0.000054	0.004	NE	U	SW846:6020
	Cadmium	0.000083	0.002	0.000083	0.005	0.0025	U	SW846:6020
	Calcium	69	1	0.085	NE	NE		SW846:6020
	Chromium	0.00046	0.01	0.00046	0.1	0.043	U	SW846:6020
	Cobalt	0.00011	0.005	0.00011	NE	NE	U	SW846:6020
	Copper	0.00053	0.02	0.00032	NE	NE	J	SW846:6020
	Iron	0.083	0.1	0.0098	NE	NE	J	SW846:6020
	Lead	0.000079	0.002	0.000079	NE	NE	U	SW846:6020
	Magnesium	22	0.1	0.016	NE	NE		SW846:6020
	Manganese	0.0027	0.005	0.00036	NE	NE	J	SW846:6020
	Mercury	0.00006	0.0001	0.00006	0.002	NE	U	SW846:7470A
	Nickel	0.00092	0.02	0.00092	NE	0.05	U	SW846:6020
	Potassium	4.1	1	0.039	NE	NE		SW846:6020
	Selenium	0.0028	0.01	0.00065	0.05	NE	J	SW846:6020
	Silver	0.000029	0.0005	0.000029	NE	NE	U	SW846:6020
	Sodium	57	1	0.022	NE	NE		SW846:6020
	Thallium	0.0000041	0.0001	0.0000041	0.002	NE	U	SW846:6020
	Uranium	0.0066	0.0001	0.0000049	0.03	0.015		SW846:6020
	Vanadium	0.0052	0.005	0.00012	NE	NE		SW846:6020
	Zinc	0.0019	0.1	0.0014	NE	NE	J	SW846:6020

Refer to footnotes at the end of tables.

Table-1
Groundwater Quality Results: Dissolved (Filtered) Target Analyte List Metals plus Uranium
Sandia National Laboratories/New Mexico Mixed Waste Landfill
New Mexico Environment Department DOE Oversight Bureau
April/May 2019

Monitoring Well/ Sample Date	Analyte	Result[a] (mg/L)	Reporting Limit[b] (mg/L)	MDL[c] (mg/L)	MCL[d] (pCi/L)	Trigger Level[d] (mg/L)	Laboratory Qualifier[e]	Analytical Method[f]
MWL-MW7 29-Apr-19	Aluminum	0.01	0.1	0.01	NE	NE	U	SW846:6020
	Antimony	0.00012	0.001	0.00012	0.006	NE	U	SW846:6020
	Arsenic	0.0016	0.002	0.00039	0.01	NE	J	SW846:6020
	Barium	0.1	0.005	0.00056	2	NE		SW846:6020
	Beryllium	0.000054	0.0005	0.000054	0.004	NE	U	SW846:6020
	Cadmium	0.000083	0.002	0.000083	0.005	0.0025	U	SW846:6020
	Calcium	56	1	0.085	NE	NE		SW846:6020
	Chromium	0.00051	0.01	0.00046	0.1	0.043	J	SW846:6020
	Cobalt	0.00011	0.005	0.00011	NE	NE	U	SW846:6020
	Copper	0.00087	0.02	0.00032	NE	NE	J	SW846:6020
	Iron	0.0098	0.1	0.0098	NE	NE	U	SW846:6020
	Lead	0.000079	0.002	0.000079	NE	NE	U	SW846:6020
	Magnesium	18	0.1	0.016	NE	NE		SW846:6020
	Manganese	0.00036	0.005	0.00036	NE	NE	U	SW846:6020
	Mercury	0.00006	0.0001	0.00006	0.002	NE	U	SW846:7470A
	Nickel	0.00092	0.02	0.00092	NE	0.05	U	SW846:6020
	Potassium	4.6	1	0.039	NE	NE		SW846:6020
	Selenium	0.00065	0.01	0.00065	0.05	NE	U	SW846:6020
	Silver	0.000029	0.0005	0.000029	NE	NE	U	SW846:6020
	Sodium	46	1	0.022	NE	NE		SW846:6020
	Thallium	0.0000041	0.0001	0.0000041	0.002	NE	U	SW846:6020
	Uranium	0.0073	0.0001	0.0000049	0.03	0.015		SW846:6020
	Vanadium	0.0069	0.005	0.00012	NE	NE		SW846:6020
	Zinc	0.0032	0.1	0.0014	NE	NE	J	SW846:6020

Refer to footnotes at the end of tables.

Table-1
Groundwater Quality Results: Dissolved (Filtered) Target Analyte List Metals plus Uranium
Sandia National Laboratories/New Mexico Mixed Waste Landfill
New Mexico Environment Department DOE Oversight Bureau
April/May 2019

Monitoring Well/ Sample Date	Analyte	Result[a] (mg/L)	Reporting Limit[b] (mg/L)	MDL[c] (mg/L)	MCL[d] (pCi/L)	Trigger Level[d] (mg/L)	Laboratory Qualifier[e]	Analytical Method[f]
MWL-MW8 1-May-19	Aluminum	0.01	0.1	0.01	NE	NE	U	SW846:6020
	Antimony	0.00012	0.001	0.00012	0.006	NE	U	SW846:6020
	Arsenic	0.0005	0.002	0.00039	0.01	NE	J	SW846:6020
	Barium	0.12	0.005	0.00056	2	NE		SW846:6020
	Beryllium	0.000054	0.0005	0.000054	0.004	NE	U	SW846:6020
	Cadmium	0.000083	0.002	0.000083	0.005	0.0025	U	SW846:6020
	Calcium	56	1	0.085	NE	NE		SW846:6020
	Chromium	0.00089	0.01	0.00046	0.1	0.043	J	SW846:6020
	Cobalt	0.00011	0.005	0.00011	NE	NE	U	SW846:6020
	Copper	0.00073	0.02	0.00032	NE	NE	J	SW846:6020
	Iron	0.0098	0.1	0.0098	NE	NE	U	SW846:6020
	Lead	0.000079	0.002	0.000079	NE	NE	U	SW846:6020
	Magnesium	18	0.1	0.016	NE	NE		SW846:6020
	Manganese	0.00063	0.005	0.00036	NE	NE	J	SW846:6020
	Mercury	0.00006	0.0001	0.00006	0.002	NE	U	SW846:7470A
	Nickel	0.00092	0.02	0.00092	NE	0.05	U	SW846:6020
	Potassium	4.6	1	0.039	NE	NE		SW846:6020
	Selenium	0.0012	0.01	0.00065	0.05	NE	J	SW846:6020
	Silver	0.000029	0.0005	0.000029	NE	NE	U	SW846:6020
	Sodium	47	1	0.022	NE	NE		SW846:6020
	Thallium	0.0000041	0.0001	0.0000041	0.002	NE	U	SW846:6020
	Uranium	0.0074	0.0001	0.0000049	0.03	0.015		SW846:6020
	Vanadium	0.0023	0.005	0.00012	NE	NE	J	SW846:6020
	Zinc	0.0034	0.1	0.0014	NE	NE	J	SW846:6020

Refer to footnotes at the end of tables.

Table-1
Groundwater Quality Results: Dissolved (Filtered) Target Analyte List Metals plus Uranium
Sandia National Laboratories/New Mexico Mixed Waste Landfill
New Mexico Environment Department DOE Oversight Bureau
April/May 2019

Monitoring Well/ Sample Date	Analyte	Result[a] (mg/L)	Reporting Limit[b] (mg/L)	MDL[c] (mg/L)	MCL[d] (pCi/L)	Trigger Level[d] (mg/L)	Laboratory Qualifier[e]	Analytical Method[f]
MWL-MW9 30-Apr-19	Aluminum	0.01	0.1	0.01	NE	NE	U	SW846:6020
	Antimony	0.00012	0.001	0.00012	0.006	NE	U	SW846:6020
	Arsenic	0.0032	0.002	0.00039	0.01	NE		SW846:6020
	Barium	0.092	0.005	0.00056	2	NE		SW846:6020
	Beryllium	0.000054	0.0005	0.000054	0.004	NE	U	SW846:6020
	Cadmium	0.000083	0.002	0.000083	0.005	0.0025	U	SW846:6020
	Calcium	56	1	0.085	NE	NE		SW846:6020
	Chromium	0.00046	0.01	0.00046	0.1	0.043	U	SW846:6020
	Cobalt	0.00011	0.005	0.00011	NE	NE	U	SW846:6020
	Copper	0.00084	0.02	0.00032	NE	NE	J	SW846:6020
	Iron	0.039	0.1	0.0098	NE	NE	J	SW846:6020
	Lead	0.000079	0.002	0.000079	NE	NE	U	SW846:6020
	Magnesium	18	0.1	0.016	NE	NE		SW846:6020
	Manganese	0.0015	0.005	0.00036	NE	NE	J	SW846:6020
	Mercury	0.00006	0.0001	0.00006	0.002	NE	U	SW846:7470A
	Nickel	0.00092	0.02	0.00092	NE	0.05	U	SW846:6020
	Potassium	4.5	1	0.039	NE	NE		SW846:6020
	Selenium	0.00066	0.01	0.00065	0.05	NE	J	SW846:6020
	Silver	0.000029	0.0005	0.000029	NE	NE	U	SW846:6020
	Sodium	47	1	0.022	NE	NE		SW846:6020
	Thallium	0.0000041	0.0001	0.0000041	0.002	NE	U	SW846:6020
	Uranium	0.0088	0.0001	0.0000049	0.03	0.015		SW846:6020
	Vanadium	0.0086	0.005	0.00012	NE	NE		SW846:6020
	Zinc	0.0079	0.1	0.0014	NE	NE	J	SW846:6020

Refer to footnotes at the end of tables.

Table-2
Groundwater Quality Results: Method Detection Limits for Volatile Organic Compounds
Sandia National Laboratories/New Mexico Mixed Waste Landfill
New Mexico Environment Department DOE Oversight Bureau
April/May 2019

Analyte	MDL[c] (µg/L)	Analytical Method[f]
Acetone	3	8260B
Benzene	0.3	8260B
Bromodichloromethane	0.3	8260B
Bromoform	0.3	8260B
Bromomethane	0.33	8260B
Butanone[2-]	3	8260B
Carbon Disulfide	0.3	8260B
Carbon Tetrachloride	0.15	8260B
Chlorobenzene	0.3	8260B
Chlorodibromomethane	0.3	8260B
Chloroethane	0.3	8260B
Chloroform	0.3	8260B
Chloromethane	0.3	8260B
Dichlorodifluoromethane	0.3	8260B
Dichloroethane[1,1-]	0.3	8260B
Dichloroethane[1,2-]	0.15	8260B
Dichloroethene[1,1-]	0.3	8260B
Dichloroethene[cis-1,2-]	0.3	8260B
Dichloroethene[trans-1,2-]	0.3	8260B
Dichloropropane[1,2-]	0.3	8260B
Dichloropropene[cis-1,3-]	0.3	8260B
Dichloropropene[trans-1,3-]	0.3	8260B
Ethylbenzene	0.3	8260B
Hexanone[2-]	3	8260B
Methyl-2-pentanone[4-]	3	8260B
Methylene Chloride	0.34	8260B
Styrene	0.3	8260B
Tetrachloroethane[1,1,2,2-]	0.3	8260B
Tetrachloroethene	0.3	8260B
Toluene	0.3	8260B
Trichloroethane[1,1,1-]	0.3	8260B
Trichloroethane[1,1,2-]	0.3	8260B
Trichloroethene	0.5	8260B
Vinyl acetate	0.73	8260B
Vinyl Chloride	0.15	8260B
Xylene (Total)	NA	8260B

Refer to footnotes at the end of tables.

Table-3
Groundwater Quality Results: Gross Alpha, Gross Beta, Gamma Emitting Isotopes, Radon, and Tritium
Sandia National Laboratories/New Mexico: Mixed Waste Landfill Groundwater Monitoring
New Mexico Environment Department DOE Oversight Bureau
April/May 2019

Monitoring Well/ Sample Date	Analyte	Activity[a] (pCi/L)	MDA[b] (pCi/L)	MCL (pCi/L)	Trigger Level[d] (pCi/L)	Laboratory Qualifier[e]	Analytical Method[f]
MWL-BW2 25-Apr-19	Actinium-228	-3.6 ± 5.1	17	NE	NE	U	EPA:901.1
	Americium-241	-6.9 ± 7.8	26	NE	NE	U	EPA:901.1
	Beryllium-7	6.4 ± 5.1	17	NE	NE	U	EPA:901.1
	Bismuth-212	41 ± 9.3	29	NE	NE	NQ	EPA:901.1
	Bismuth-214	1.2 ± 4.3	14	NE	NE	U	EPA:901.1
	Cesium-134	-1.5 ± 0.7	2.4	NE	NE	U	EPA:901.1
	Cesium-137	-1.8 ± 0.67	2.3	NE	NE	U	EPA:901.1
	Cobalt-60	-1.7 ± 0.72	2.5	NE	NE	U	EPA:901.1
	Gross alpha	8.9 ± 1	1.7	15 pCi/L	15 pCi/L	M3	EPA:900.0
	Gross beta	5.5 ± 0.69	1.6	4 mrem/yr	4 mrem/yr	M3	EPA:900.0
	Iodine-131	4.3 ± 1.6	5	NE	NE	U	EPA:901.1
	Lead-212	0.12 ± 2.6	8.7	NE	NE	U	EPA:901.1
	Lead-214	8.5 ± 4	13	NE	NE	U	EPA:901.1
	Potassium-40	-19 ± 20	65	NE	NE	U	EPA:901.1
	Protactinium-234m	170 ± 160	520	NE	NE	U	EPA:901.1
	Radon-222	530 ± 35	36	NE	1000 pCi/L		SM7500-RnB
	Sodium-22	0.19 ± 0.66	2.2	NE	NE	U	EPA:901.1
	Thallium-208	-1.2 ± 1.6	5.4	NE	NE	U	EPA:901.1
	Thorium-234	4.5 ± 28	96	NE	NE	U	EPA:901.1
	Tritium	-72 ± 89	300	NE	4 mrem/yr	U	EPA:906.0

Refer to footnotes at the end of tables.

Table-3
Groundwater Quality Results: Gross Alpha, Gross Beta, Gamma Emitting Isotopes, Radon, and Tritium
Sandia National Laboratories/New Mexico: Mixed Waste Landfill Groundwater Monitoring
New Mexico Environment Department DOE Oversight Bureau
April/May 2019

Monitoring Well/ Sample Date	Analyte	Activity[a] (pCi/L)			MDA[b] (pCi/L)	MCL (pCi/L)	Trigger Level[d] (pCi/L)	Laboratory Qualifier[e]	Analytical Method[f]
MWL-BW2 25-Apr-19 (Duplicate)	Actinium-228	7.5	±	10	33	NE	NE	U	EPA:901.1
	Americium-241	-17	±	24	81	NE	NE	U	EPA:901.1
	Beryllium-7	-3.5	±	12	41	NE	NE	U	EPA:901.1
	Bismuth-212	12	±	21	71	NE	NE	U	EPA:901.1
	Bismuth-214	9.8	±	3.1	9.6	NE	NE	NQ	EPA:901.1
	Cesium-134	-0.63	±	1.4	4.7	NE	NE	U	EPA:901.1
	Cesium-137	-1.8	±	1.5	5.2	NE	NE	U,M	EPA:901.1
	Cobalt-60	-1.9	±	1.5	5.4	NE	NE	U	EPA:901.1
	Gross alpha	8.4	±	0.98	1.7	15 pCi/L	15 pCi/L	M3	EPA:900.0
	Gross beta	5.4	±	0.72	1.8	4 mrem/yr	4 mrem/yr	M3	EPA:900.0
	Iodine-131	2.9	±	4.3	14	NE	NE	U	EPA:901.1
	Lead-212	8	±	2.2	6.9	NE	NE	NQ	EPA:901.1
	Lead-214	1.6	±	6.7	22	NE	NE	U	EPA:901.1
	Potassium-40	-81	±	53	180	NE	NE	U	EPA:901.1
	Protactinium-234m	-260	±	230	820	NE	NE	U	EPA:901.1
	Radon-222	510	±	34	37	NE	1000 pCi/L		SM7500-RnB
	Sodium-22	-0.18	±	1.5	5.2	NE	NE	U	EPA:901.1
	Thallium-208	-4	±	3	10	NE	NE	U	EPA:901.1
	Thorium-234	21	±	48	160	NE	NE	U	EPA:901.1
	Tritium	-85	±	89	300	NE	4 mrem/yr	U	EPA:906.0

Refer to footnotes at the end of tables.

Table-3
Groundwater Quality Results: Gross Alpha, Gross Beta, Gamma Emitting Isotopes, Radon, and Tritium
Sandia National Laboratories/New Mexico: Mixed Waste Landfill Groundwater Monitoring
New Mexico Environment Department DOE Oversight Bureau
April/May 2019

Monitoring Well/ Sample Date	Analyte	Activity[a] (pCi/L)			MDA[b] (pCi/L)	MCL (pCi/L)	Trigger Level[d] (pCi/L)	Laboratory Qualifier[e]	Analytical Method[f]
MWL-MW7 29-Apr-19	Actinium-228	14	±	4.8	15	NE	NE	U	EPA:901.1
	Americium-241	-18	±	17	58	NE	NE	U	EPA:901.1
	Beryllium-7	-18	±	10	35	NE	NE	U	EPA:901.1
	Bismuth-212	3.7	±	17	57	NE	NE	U	EPA:901.1
	Bismuth-214	25	±	3.3	8.9	NE	NE	NQ	EPA:901.1
	Cesium-134	-1.1	±	1.2	4.2	NE	NE	U	EPA:901.1
	Cesium-137	-2.6	±	1.3	4.6	NE	NE	U	EPA:901.1
	Cobalt-60	-0.87	±	1.3	4.4	NE	NE	U	EPA:901.1
	Gross alpha	11	±	1.1	1.6	15 pCi/L	15 pCi/L	M3	EPA:900.0
	Gross beta	4.1	±	0.62	1.7	4 mrem/yr	4 mrem/yr	M3	EPA:900.0
	Iodine-131	-1.4	±	2.6	9	NE	NE	U	EPA:901.1
	Lead-212	15	±	2.2	6	NE	NE	NQ	EPA:901.1
	Lead-214	18	±	2.8	7.7	NE	NE	NQ	EPA:901.1
	Potassium-40	170	±	20	46	NE	NE	NQ	EPA:901.1
	Protactinium-234m	390	±	210	670	NE	NE	U	EPA:901.1
	Radon-222	150	±	14	31	NE	1000 pCi/L		SM7500-RnB
	Sodium-22	0	±	1.3	4.4	NE	NE	U	EPA:901.1
	Thallium-208	3.4	±	1.3	4	NE	NE	U	EPA:901.1
	Thorium-234	180	±	23	60	NE	NE	NQ	EPA:901.1
	Tritium	-66	±	71	240	NE	4 mrem/yr	U	EPA:906.0

Refer to footnotes at the end of tables.

Table-3
Groundwater Quality Results: Gross Alpha, Gross Beta, Gamma Emitting Isotopes, Radon, and Tritium
Sandia National Laboratories/New Mexico: Mixed Waste Landfill Groundwater Monitoring
New Mexico Environment Department DOE Oversight Bureau
April/May 2019

Monitoring Well/ Sample Date	Analyte	Activity[a] (pCi/L)			MDA[b] (pCi/L)	MCL (pCi/L)	Trigger Level[d] (pCi/L)	Laboratory Qualifier[e]	Analytical Method[f]
MWL-MW8 1-May-19	Actinium-228	18	±	6.9	22	NE	NE	U	EPA:901.1
	Americium-241	5.9	±	9.5	31	NE	NE	U	EPA:901.1
	Beryllium-7	5.2	±	13	43	NE	NE	U	EPA:901.1
	Bismuth-212	16	±	22	74	NE	NE	U	EPA:901.1
	Bismuth-214	2.9	±	7.8	26	NE	NE	U	EPA:901.1
	Cesium-134	-3.9	±	1.8	6	NE	NE	U	EPA:901.1
	Cesium-137	0.14	±	1.7	5.6	NE	NE	U,M	EPA:901.1
	Cobalt-60	-2.3	±	2.1	7.4	NE	NE	U	EPA:901.1
	Gross alpha	7.2	±	1.2	2.5	15 pCi/L	15 pCi/L	M3	EPA:900.0
	Gross beta	4.9	±	0.72	2.2	4 mrem/yr	4 mrem/yr	M3	EPA:900.0
	Iodine-131	-1.3	±	3.1	10	NE	NE	U	EPA:901.1
	Lead-212	0.56	±	4.3	14	NE	NE	U	EPA:901.1
	Lead-214	4.6	±	6.7	22	NE	NE	U	EPA:901.1
	Potassium-40	-21	±	54	180	NE	NE	U	EPA:901.1
	Protactinium-234m	690	±	250	790	NE	NE	U	EPA:901.1
	Radon-222	190	±	17	35	NE	1000 pCi/L		SM7500-RnB
	Sodium-22	-1.2	±	2.1	7.3	NE	NE	U	EPA:901.1
	Thallium-208	5.3	±	1.6	5	NE	NE	NQ	EPA:901.1
	Thorium-234	-23	±	45	150	NE	NE	U	EPA:901.1
	Tritium	33	±	72	240	NE	4 mrem/yr	U	EPA:906.0

Refer to footnotes at the end of tables.

Table-3
Groundwater Quality Results: Gross Alpha, Gross Beta, Gamma Emitting Isotopes, Radon, and Tritium
Sandia National Laboratories/New Mexico: Mixed Waste Landfill Groundwater Monitoring
New Mexico Environment Department DOE Oversight Bureau
April/May 2019

Monitoring Well/ Sample Date	Analyte	Activity[a] (pCi/L)			MDA[b] (pCi/L)	MCL (pCi/L)	Trigger Level[d] (pCi/L)	Laboratory Qualifier[e]	Analytical Method[f]
MWL-MW9 30-Apr-19	Actinium-228	6	±	9.8	33	NE	NE	U	EPA:901.1
	Americium-241	0.12	±	1.1	3.8	NE	NE	U	EPA:901.1
	Beryllium-7	1.5	±	8.2	28	NE	NE	U	EPA:901.1
	Bismuth-212	31	±	17	55	NE	NE	U	EPA:901.1
	Bismuth-214	13	±	5.3	17	NE	NE	U	EPA:901.1
	Cesium-134	-3.4	±	1.1	4	NE	NE	U	EPA:901.1
	Cesium-137	-1.1	±	1.1	3.9	NE	NE	U	EPA:901.1
	Cobalt-60	0.78	±	1.3	4.3	NE	NE	U	EPA:901.1
	Gross alpha	9.4	±	1.4	2.9	15 pCi/L	15 pCi/L	M3	EPA:900.0
	Gross beta	4.3	±	0.69	2.2	4 mrem/yr	4 mrem/yr	M3	EPA:900.0
	Iodine-131	1.2	±	2.4	7.9	NE	NE	U	EPA:901.1
	Lead-212	3.3	±	2.7	9	NE	NE	U	EPA:901.1
	Lead-214	14	±	3.9	12	NE	NE	TI	EPA:901.1
	Potassium-40	-33	±	35	120	NE	NE	U	EPA:901.1
	Protactinium-234m	350	±	200	640	NE	NE	U	EPA:901.1
	Radon-222	450	±	29	26	NE	1000 pCi/L		SM7500-RnB
	Sodium-22	2	±	1.3	4.3	NE	NE	U	EPA:901.1
	Thallium-208	0.98	±	2.1	7.5	NE	NE	U	EPA:901.1
	Thorium-234	26	±	16	68	NE	NE	U	EPA:901.1
	Tritium	12	±	72	240	NE	4 mrem/yr	U	EPA:906.0

Refer to footnotes at the end of tables.

Footnotes for MWL Groundwater Monitoring Analytical Results Tables

Sandia National Laboratories/New Mexico

New Mexico Environment Department DOE Oversight Bureau

April/May 2019

BW = Background well

EPA = U.S. Environmental Protection Agency.

µg/L = Micrograms per liter.

mg/L = Milligrams per liter.

mrem/yr = Millirem per year.

MW = Monitoring well

pCi/L = Picocuries per liter.

LTMMP = Long-term monitoring and maintenance plan

[a]Result or Activity

Result applies to Tables-1 and -2. Activity applies to Table-3.

Activity = A negative value indicates that the sample count rate was below that of the instrument background; result is below the Minimum Detectable Activity (MDA).

[b]Reporting Limit (RL)

The RL applies to Table-1.

RL = The reporting limit is the lowest that can be reliably measured by a laboratory with defined limits of precision and accuracy.

[c]MDL or MDA

The MDL applies to Tables-1 and -2. MDA applies to Table-3.

MDA = The minimal detectable activity is used for radiochemical procedures and is defined as the concentration at which there is a 95% confidence that an analyte signal will be distinguishable from an analyte-free sample.

MDL = Method detection limit. The minimum concentration of an analyte that can be measured and reported with 99% confidence that the analyte is greater than zero.

[d]MCL and Trigger Levels

Regulatory limits: The MCL is listed first, followed by the MAC. A single value is listed when the MCL and MAC are equal (for example, total mercury). If no value exists, NE is used.

MAC = Maximum allowable concentration. MACs were established by the New Mexico Water Quality Control Commission (NMWQCC September 2004).

Trigger Levels = Trigger levels as defined in Section 5.2.4 of the LTMMP (SNL/NM March 2012).

The following are the MCLs for gross alpha particles and beta particles in community water systems:

- 15 pCi/L = Gross alpha particle activity, excluding total uranium (40 CFR Part 141).
- 4 mrem/yr = any combination of beta and/or gamma emitting radionuclides (as dose rate).

NE = Not established

Footnotes for MWL Groundwater Monitoring Analytical Results Tables (Concluded)

Sandia National Laboratories/New Mexico

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[e]Laboratory Qualifier

Lab qualifier applies to Table-1.

J = the reported value was obtained from a reading that was less than the Reporting Limit but greater than or equal to the Method Detection Limit (MDL).

U = the analyte was analyzed for, but not detected.

Lab qualifier applies to Table-3.

M = the requested MDA not met.

M3 = The requested MDA was not met, but the reported activity is greater than the reported MDA.

NQ = indicates that no peak was found, therefore the nuclide is not detected or supported at any level above the reported MDC."

U = result is less than the sample specific Minimum Detectable Activity (MDA).

[f]Analytical Method

EPA, 1986 (and updates), "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd ed., U.S. Environmental Protection Agency, Washington, D.C.

Standard Methods for the Examination of Water and Wastewater, SM7500-Rn B Method, 22nd Edition, published jointly by American Public Health Association, American Water Works Association, and Water Environment Federation, Washington, D.C., 1988.

EPA, 1980, Prescribed Procedures for Measurement of Radioactivity in Drinking Water, EPA-600-4-80-032, U.S. Environmental Protection Agency, Cincinnati, Ohio.

DOE = U.S. Department of Energy.

EPA = U.S. Environmental Protection Agency

HASL = Health and Safety Laboratory

SM = Standard Method

SW = Solid Waste