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 2018 Q-1

Prepared by Chris Armijo, Environmental Scientist
Sandia Oversight Section
121 Tijeras Ave., NE Suite 1000
Albuquerque, NM 87102
(505) 383-2070
chris.armijo1@state.nm.us

Final Report

3/5/2018

The purpose of this communication is to transmit groundwater quality data collected by the New Mexico Environment Department DOE Oversight Bureau from Sandia National Laboratories Mixed Waste Landfill during the first quarter of Federal Fiscal Year 2018.

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 October 2017. The Bureau collected groundwater samples from Mixed Waste Landfill (MWL) groundwater monitoring wells MWL-BW2 (plus duplicate), MWL-MW7, MWL-MW8 and MWL-MW9. Split 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 used ALS Environmental Laboratory located in Fort Collins, Colorado to analyze and report data results from samples collected at MWL. ALS Environmental is 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, gross 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 MDLs.

Analytical results for radionuclides are listed in Table-3 and used to screen for potential radiological contamination. Gross alpha activity ranged from 7.9 pCi/L at MWL-BW2 duplicate to 10 pCi/L at MWL-MW7. Radon-222 activity ranged from 180 pCi/L at MWL-MW7 to 450 pCi/L at MWL-BW2 duplicate. 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) monitoring wells during this semi-annual sampling event at the MWL. Samples collected by the Bureau and analyzed by ALS Environmental reported concentrations of metals, VOCs and radionuclides below established EPA MCLs and SNL/NM trigger levels listed in the LTMMP.

The DOE-OB will continue to monitor groundwater quality at MWL semi-annually and make the data reports available to the public.

References

Sandia National Laboratories, New Mexico. Annual Groundwater Monitoring Report, Calendar Year 2016.

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.

Table-1

Groundwater Quality Results: Total Target Analyte List Metals plus Uranium

SNL/NM Mixed Waste Landfill Groundwater Monitoring

New Mexico Environment Department DOE Oversight Bureau

October 2017

Monitoring Well/ Sample Date	Analyte	Result (mg/L)	EPA MCL (mg/L)	LTMMP Trigger Level (mg/L)	Laboratory Detection Limit (mg/L)	Method Detection Limit (mg/L)	Laboratory Qualifier	Analytical Method
MWL-BW2 17-Oct-17	Aluminum	0.23	NE	NE	0.1	0.0087		SW-846:6020
	Antimony	0.000049	0.006	NE	0.001	0.000049	U	SW-846:6020
	Arsenic	0.0016	0.01	NE	0.002	0.0016	U	SW-846:6020
	Barium	0.11	2	NE	0.005	0.0016		SW-846:6020
	Beryllium	0.000081	0.004	NE	0.0005	0.000081	U	SW-846:6020
	Cadmium	0.000062	0.005	0.0025	0.002	0.000062	U	SW-846:6020
	Calcium	69	NE	NE	1	0.077		SW-846:6020
	Chromium	0.0033	0.1	0.043	0.01	0.00082	J	SW-846:6020
	Cobalt	0.00016	NE	NE	0.005	0.00016	U	SW-846:6020
	Copper	0.0016	NE	NE	0.02	0.0016	U	SW-846:6020
	Iron	0.16	NE	NE	0.1	0.0047		SW-846:6020
	Lead	0.000096	NE	NE	0.002	0.000096	U	SW-846:6020
	Magnesium	23	NE	NE	0.1	0.012		SW-846:6020
	Manganese	0.01	NE	NE	0.005	0.00032		SW-846:6020
	Mercury	0.00006	0.002	NE	0.0001	0.00006	U	SW-846:7470A
	Nickel	0.002	NE	0.05	0.02	0.00081	J	SW-846:6020
	Potassium	4	NE	NE	1	0.11		SW-846:6020
	Selenium	0.0024	0.05	NE	0.01	0.00018	J	SW-846:6020
	Silver	0.000023	NE	NE	0.0005	0.000023	U	SW-846:6020
	Sodium	53	NE	NE	1	0.18		SW-846:6020
	Thallium	0.000015	0.002	NE	0.0001	0.000015	U	SW-846:6020
	Uranium	0.0073	0.03	0.015	0.0001	0.000022		SW-846:6020
	Vanadium	0.0043	NE	NE	0.005	0.00023	J	SW-846:6020
	Zinc	0.0035	NE	NE	0.1	0.0035	U	SW-846:6020

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

LTMMP = Mixed Waste Landfill Long-Term Monitoring and Maintenance Plan

NE = Not Established

U = the analyte was analyzed for but not detected

Table-1

Groundwater Quality Results: Total Target Analyte List Metals plus Uranium

SNL/NM Mixed Waste Landfill Groundwater Monitoring

New Mexico Environment Department DOE Oversight Bureau

October 2017

Monitoring Well/ Sample Date	Analyte	Result (mg/L)	EPA MCL (mg/L)	LTMMP Trigger Level (mg/L)	Laboratory Detection Limit (mg/L)	Method Detection Limit (mg/L)	Laboratory Qualifier	Analytical Method
MWL-BW2 17-Oct-17 Dup	Aluminum	0.21	NE	NE	0.1	0.0087		SW-846:6020
	Antimony	0.00036	0.006	NE	0.001	0.000049	J	SW-846:6020
	Arsenic	0.0016	0.01	NE	0.002	0.0016	U	SW-846:6020
	Barium	0.11	2	NE	0.005	0.0016		SW-846:6020
	Beryllium	0.000081	0.004	NE	0.0005	0.000081	U	SW-846:6020
	Cadmium	0.000062	0.005	0.0025	0.002	0.000062	U	SW-846:6020
	Calcium	70	NE	NE	1	0.077		SW-846:6020
	Chromium	0.0034	0.1	0.043	0.01	0.00082	J	SW-846:6020
	Cobalt	0.00016	NE	NE	0.005	0.00016	U	SW-846:6020
	Copper	0.0016	NE	NE	0.02	0.0016	U	SW-846:6020
	Iron	0.17	NE	NE	0.1	0.0047		SW-846:6020
	Lead	0.000096	NE	NE	0.002	0.000096	U	SW-846:6020
	Magnesium	23	NE	NE	0.1	0.012		SW-846:6020
	Manganese	0.01	NE	NE	0.005	0.00032		SW-846:6020
	Mercury	0.00006	0.002	NE	0.0001	0.00006	U	SW-846:7470A
	Nickel	0.0021	NE	0.05	0.02	0.00081	J	SW-846:6020
	Potassium	4.1	NE	NE	1	0.11		SW-846:6020
	Selenium	0.0027	0.05	NE	0.01	0.00018	J	SW-846:6020
	Silver	0.000023	NE	NE	0.0005	0.000023	U	SW-846:6020
	Sodium	53	NE	NE	1	0.18		SW-846:6020
	Thallium	0.000015	0.002	NE	0.0001	0.000015	U	SW-846:6020
	Uranium	0.0071	0.03	0.015	0.0001	0.000022		SW-846:6020
	Vanadium	0.0045	NE	NE	0.005	0.00023	J	SW-846:6020
	Zinc	0.019	NE	NE	0.1	0.0035	J	SW-846:6020

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Groundwater Quality Results: Total Target Analyte List Metals plus Uranium

SNL/NM Mixed Waste Landfill Groundwater Monitoring

New Mexico Environment Department DOE Oversight Bureau

October 2017

Monitoring Well/ Sample Date	Analyte	Result (mg/L)	EPA MCL (mg/L)	LTMMP Trigger Level (mg/L)	Laboratory Detection Limit (mg/L)	Method Detection Limit (mg/L)	Laboratory Qualifier	Analytical Method
MWL-MW7 23-Oct-17	Aluminum	0.022	NE	NE	0.1	0.0087	J	SW-846:6020
	Antimony	0.0001	0.006	NE	0.001	0.000049	J	SW-846:6020
	Arsenic	0.0016	0.01	NE	0.002	0.0016	U	SW-846:6020
	Barium	0.1	2	NE	0.005	0.0016		SW-846:6020
	Beryllium	0.000081	0.004	NE	0.0005	0.000081	U	SW-846:6020
	Cadmium	0.000062	0.005	0.0025	0.002	0.000062	U	SW-846:6020
	Calcium	58	NE	NE	1	0.077		SW-846:6020
	Chromium	0.0054	0.1	0.043	0.01	0.00082	J	SW-846:6020
	Cobalt	0.00016	NE	NE	0.005	0.00016	U	SW-846:6020
	Copper	0.0016	NE	NE	0.02	0.0016	U	SW-846:6020
	Iron	0.12	NE	NE	0.1	0.0047		SW-846:6020
	Lead	0.000096	NE	NE	0.002	0.000096	U	SW-846:6020
	Magnesium	20	NE	NE	0.1	0.012		SW-846:6020
	Manganese	0.0076	NE	NE	0.005	0.00032		SW-846:6020
	Mercury	0.00006	0.002	NE	0.0001	0.00006	U	SW-846:7470A
	Nickel	0.0026	NE	0.05	0.02	0.00081	J	SW-846:6020
	Potassium	4.8	NE	NE	1	0.11		SW-846:6020
	Selenium	0.00018	0.05	NE	0.01	0.00018	U	SW-846:6020
	Silver	0.000023	NE	NE	0.0005	0.000023	U	SW-846:6020
	Sodium	46	NE	NE	1	0.18		SW-846:6020
	Thallium	0.000015	0.002	NE	0.0001	0.000015	U	SW-846:6020
	Uranium	0.0079	0.03	0.015	0.0001	0.000022		SW-846:6020
	Vanadium	0.0073	NE	NE	0.005	0.00023		SW-846:6020
	Zinc	0.0035	NE	NE	0.1	0.0035	U	SW-846:6020

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SNL/NM Mixed Waste Landfill Groundwater Monitoring

New Mexico Environment Department DOE Oversight Bureau

October 2017

Monitoring Well/ Sample Date	Analyte	Result (mg/L)	EPA MCL (mg/L)	LTMMP Trigger Level (mg/L)	Laboratory Detection Limit (mg/L)	Method Detection Limit (mg/L)	Laboratory Qualifier	Analytical Method
MWL-MW8 24-Oct-17	Aluminum	0.016	NE	NE	0.1	0.0087	J	SW-846:6020
	Antimony	0.00012	0.006	NE	0.001	0.000049	J	SW-846:6020
	Arsenic	0.0016	0.01	NE	0.002	0.0016	U	SW-846:6020
	Barium	0.12	2	NE	0.005	0.0016		SW-846:6020
	Beryllium	0.000081	0.004	NE	0.0005	0.000081	U	SW-846:6020
	Cadmium	0.000062	0.005	0.0025	0.002	0.000062	U	SW-846:6020
	Calcium	61	NE	NE	1	0.077		SW-846:6020
	Chromium	0.005	0.1	0.043	0.01	0.00082	J	SW-846:6020
	Cobalt	0.00016	NE	NE	0.005	0.00016	U	SW-846:6020
	Copper	0.0016	NE	NE	0.02	0.0016	U	SW-846:6020
	Iron	0.079	NE	NE	0.1	0.0047	J	SW-846:6020
	Lead	0.0001	NE	NE	0.002	0.000096	J	SW-846:6020
	Magnesium	21	NE	NE	0.1	0.012		SW-846:6020
	Manganese	0.027	NE	NE	0.005	0.00032		SW-846:6020
	Mercury	0.00006	0.002	NE	0.0001	0.00006	U	SW-846:7470A
	Nickel	0.0026	NE	0.05	0.02	0.00081	J	SW-846:6020
	Potassium	5.3	NE	NE	1	0.11		SW-846:6020
	Selenium	0.00095	0.05	NE	0.01	0.00018	J	SW-846:6020
	Silver	0.000023	NE	NE	0.0005	0.000023	U	SW-846:6020
	Sodium	48	NE	NE	1	0.18		SW-846:6020
	Thallium	0.000015	0.002	NE	0.0001	0.000015	U	SW-846:6020
	Uranium	0.0081	0.03	0.015	0.0001	0.000022		SW-846:6020
	Vanadium	0.002	NE	NE	0.005	0.00023	J	SW-846:6020
	Zinc	0.0035	NE	NE	0.1	0.0035	U	SW-846:6020

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Groundwater Quality Results: Total Target Analyte List Metals plus Uranium

SNL/NM Mixed Waste Landfill Groundwater Monitoring

New Mexico Environment Department DOE Oversight Bureau

October 2017

Monitoring Well/ Sample Date	Analyte	Result (mg/L)	EPA MCL (mg/L)	LTMMP Trigger Level (mg/L)	Laboratory Detection Limit (mg/L)	Method Detection Limit (mg/L)	Laboratory Qualifier	Analytical Method
MWL-MW9 18-Oct-17	Aluminum	0.015	NE	NE	0.1	0.0087	J	SW-846:6020
	Antimony	0.00005	0.006	NE	0.001	0.000049	J	SW-846:6020
	Arsenic	0.0039	0.01	NE	0.002	0.0016		SW-846:6020
	Barium	0.094	2	NE	0.005	0.0016		SW-846:6020
	Beryllium	0.000081	0.004	NE	0.0005	0.000081	U	SW-846:6020
	Cadmium	0.000062	0.005	0.0025	0.002	0.000062	U	SW-846:6020
	Calcium	56	NE	NE	1	0.077		SW-846:6020
	Chromium	0.0024	0.1	0.043	0.01	0.00082	J	SW-846:6020
	Cobalt	0.00016	NE	NE	0.005	0.00016	U	SW-846:6020
	Copper	0.0016	NE	NE	0.02	0.0016	U	SW-846:6020
	Iron	0.02	NE	NE	0.1	0.0047	J	SW-846:6020
	Lead	0.000096	NE	NE	0.002	0.000096	U	SW-846:6020
	Magnesium	20	NE	NE	0.1	0.012		SW-846:6020
	Manganese	0.0038	NE	NE	0.005	0.00032	J	SW-846:6020
	Mercury	0.00006	0.002	NE	0.0001	0.00006	U	SW-846:7470A
	Nickel	0.0028	NE	0.05	0.02	0.00081	J	SW-846:6020
	Potassium	5.1	NE	NE	1	0.11		SW-846:6020
	Selenium	0.00084	0.05	NE	0.01	0.00018	J	SW-846:6020
	Silver	0.000023	NE	NE	0.0005	0.000023	U	SW-846:6020
	Sodium	47	NE	NE	1	0.18		SW-846:6020
	Thallium	0.000015	0.002	NE	0.0001	0.000015	U	SW-846:6020
	Uranium	0.0086	0.03	0.015	0.0001	0.000022		SW-846:6020
	Vanadium	0.0086	NE	NE	0.005	0.00023		SW-846:6020
	Zinc	0.0099	NE	NE	0.1	0.0035	J	SW-846:6020

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

LTMMP = Mixed Waste Landfill Long-Term Monitoring and Maintenance Plan

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Table-2
Groundwater Quality Results: Method Detection Limits for VOCs (EPA Method 8260B)
SNL/NM Mixed Waste Landfill Groundwater Monitoring
New Mexico Environment Department DOE Oversight Bureau
October 2017

Analyte	MDL (µg/L)
Acetone	3
Benzene	0.32
Bromodichloromethane	0.35
Bromoform	0.34
Bromomethane	0.3
Butanone[2-]	3
Carbon Disulfide	0.3
Carbon Tetrachloride	0.32
Chlorobenzene	0.3
Chlorodibromomethane	0.35
Chloroethane	0.32
Chloroform	0.3
Chloromethane	0.3
Dichlorodifluoromethane	0.32
Dichloroethane[1,1-]	0.3
Dichloroethane[1,2-]	0.3
Dichloroethene[1,1-]	0.3
Dichloroethene[cis-1,2-]	0.33
Dichloroethene[trans-1,2-]	0.33
Dichloropropane[1,2-]	0.3
Dichloropropene[cis-1,3-]	0.33
Dichloropropene[trans-1,3-]	0.33
Ethylbenzene	0.31
Hexanone[2-]	3
Methyl-2-pentanone[4-]	3
Methylene Chloride	0.3
Styrene	0.32
Tetrachloroethane[1,1,2,2-]	0.3
Tetrachloroethene	0.3
Toluene	0.31
Trichloroethane[1,1,1-]	0.3
Trichloroethane[1,1,2-]	0.3
Trichloroethene	0.31
Vinyl acetate	0.78
Vinyl Chloride	0.31
Xylene (Total)*	NA

* MDL for Total Xylene not calculated. MDL for the M-Xylene + P-Xylene isomers, and O-Xylene were both calculated at 0.31 ug/L.

Table-3

Groundwater Quality Results: Gross Alpha, Gross Beta, Gamma Emitting Isotopes, Radon and Tritium

SNL/NM Mixed Waste Landfill Groundwater Monitoring

New Mexico Environment Department DOE Oversight Bureau

October 2017

Monitoring Well/ Sample Date	Analyte	Activity[a] (pCi/L)			EPA MCL (pCi/L)	LTMMP Trigger Level (pCi/L)	MDA (pCi/L)	Laboratory Qualifier	Analytical Method
MWL-BW2 17-Oct-17	Actinium-228	21	±	4.9	NE	NE	17		EPA:901.1
	Americium-241	82	±	38	NE	NE	120	U	EPA:901.1
	Beryllium-7	17	±	12	NE	NE	40	U	EPA:901.1
	Bismuth-212	6	±	18	NE	NE	62	U	EPA:901.1
	Bismuth-214	7	±	6.9	NE	NE	23	U	EPA:901.1
	Cesium-134	-1.4	±	1.5	NE	NE	4.9	U	EPA:901.1
	Cesium-137	-3.4	±	1.4	NE	NE	4.9	U	EPA:901.1
	Cobalt-60	1.5	±	1.5	NE	NE	5.1	U	EPA:901.1
	Gross alpha	8.2	±	0.91	15 pCi/L	15 pCi/L	1.4		EPA:900
	Gross beta	6.4	±	0.71	4 mrem/yr	4 mrem/yr	1.5		EPA:900
	Iodine-131	-6.9	±	8.7	NE	NE	29	U	EPA:901.1
	Lead-212	-2.9	±	4.2	NE	NE	14	U	EPA:901.1
	Lead-214	5.5	±	7.3	NE	NE	24	U	EPA:901.1
	Potassium-40	45	±	38	NE	NE	130	U	EPA:901.1
	Protactinium-234m	100	±	240	NE	NE	790	U	EPA:901.1
	Rn-222	400	±	27	NE	1000 pCi/L	31		Rn222
	Sodium-22	1.1	±	1.6	NE	NE	5.2	U	EPA:901.1
	Thallium-208	-0.32	±	2.7	NE	NE	8.9	U	EPA:901.1
	Thorium-234	-35	±	83	NE	NE	280	U	EPA:901.1
	Tritium	18	±	87	4 mrem/yr	4 mrem/yr	290	U	EPA:906.0

LTMMP = Mixed Waste Landfill Long-Term Monitoring and Maintenance Plan

NE = Not Established

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

[a] Negative numbers indicate the sample count or result was less than the instrument background; result is below the Minimum Detectable Activity (MDA).

Table-3

Groundwater Quality Results: Gross Alpha, Gross Beta, Gamma Emitting Isotopes, Radon and Tritium

SNL/NM Mixed Waste Landfill Groundwater Monitoring

New Mexico Environment Department DOE Oversight Bureau

October 2017

Monitoring Well/ Sample Date	Analyte	Activity[a] (pCi/L)			EPA MCL (pCi/L)	LTMMP Trigger Level (pCi/L)	MDA (pCi/L)	Laboratory Qualifier	Analytical Method
MWL-BW2 17-Oct-17 Dup	Actinium-228	24	±	6	NE	NE	18		EPA:901.1
	Americium-241	2.3	±	11	NE	NE	35	U	EPA:901.1
	Beryllium-7	-11	±	13	NE	NE	46	U	EPA:901.1
	Bismuth-212	28	±	22	NE	NE	71	U	EPA:901.1
	Bismuth-214	17	±	3.5	NE	NE	11		EPA:901.1
	Cesium-134	0.32	±	2.1	NE	NE	7	U	EPA:901.1
	Cesium-137	-3.2	±	1.6	NE	NE	5.5	U	EPA:901.1
	Cobalt-60	-1.9	±	1.9	NE	NE	6.6	U	EPA:901.1
	Gross alpha	7.9	±	1	15 pCi/L	15 pCi/L	2.2		EPA:900
	Gross beta	5.4	±	0.8	4 mrem/yr	4 mrem/yr	2.1		EPA:900
	Iodine-131	-2.6	±	12	NE	NE	41	U	EPA:901.1
	Lead-212	5.5	±	4.8	NE	NE	16	U	EPA:901.1
	Lead-214	8.4	±	3.1	NE	NE	12	U	EPA:901.1
	Potassium-40	24	±	45	NE	NE	150	U	EPA:901.1
	Protactinium-234m	250	±	260	NE	NE	880	U	EPA:901.1
	Rn-222	450	±	30	NE	1000 pCi/L	33		Rn222
	Sodium-22	0.51	±	1.7	NE	NE	5.9	U	EPA:901.1
	Thallium-208	5.5	±	1.5	NE	NE	4.7		EPA:901.1
	Thorium-234	-3.3	±	46	NE	NE	150	U	EPA:901.1
	Tritium	-74	±	85	4 mrem/yr	4 mrem/yr	290	U	EPA:906.0

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Table-3

Groundwater Quality Results: Gross Alpha, Gross Beta, Gamma Emitting Isotopes, Radon and Tritium

SNL/NM Mixed Waste Landfill Groundwater Monitoring

New Mexico Environment Department DOE Oversight Bureau

October 2017

Monitoring Well/ Sample Date	Analyte	Activity[a] (pCi/L)			EPA MCL (pCi/L)	LTMMP Trigger Level (pCi/L)	MDA (pCi/L)	Laboratory Qualifier	Analytical Method
MWL-MW7 23-Oct-17	Actinium-228	2.6	±	12	NE	NE	39	U	EPA:901.1
	Americium-241	-18	±	45	NE	NE	150	U	EPA:901.1
	Beryllium-7	-6.4	±	12	NE	NE	41	U	EPA:901.1
	Bismuth-212	23	±	18	NE	NE	60	U	EPA:901.1
	Bismuth-214	18	±	4.3	NE	NE	13	UI	EPA:901.1
	Cesium-134	3	±	2.1	NE	NE	6.8	U	EPA:901.1
	Cesium-137	0.62	±	1.2	NE	NE	4.1	U	EPA:901.1
	Cobalt-60	-0.41	±	1.4	NE	NE	4.9	U	EPA:901.1
	Gross alpha	10	±	1	15 pCi/L	15 pCi/L	1.4		EPA:900
	Gross beta	5.3	±	0.67	4 mrem/yr	4 mrem/yr	1.6		EPA:900
	Iodine-131	5.7	±	7.1	NE	NE	24	U	EPA:901.1
	Lead-212	-1.8	±	4.7	NE	NE	16	U	EPA:901.1
	Lead-214	3.5	±	2.5	NE	NE	8.1	U	EPA:901.1
	Potassium-40	21	±	40	NE	NE	130	U	EPA:901.1
	Protactinium-234m	180	±	220	NE	NE	740	U	EPA:901.1
	Rn-222	180	±	16	NE	1000 pCi/L	32		Rn222
	Sodium-22	-0.95	±	1.3	NE	NE	4.5	U	EPA:901.1
	Thallium-208	-0.21	±	2.8	NE	NE	9.3	U	EPA:901.1
	Thorium-234	24	±	62	NE	NE	210	U	EPA:901.1
	Tritium	-48	±	100	4 mrem/yr	4 mrem/yr	350	U	EPA:906.0

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Monitoring Well/ Sample Date	Analyte	Activity[a] (pCi/L)			EPA MCL (pCi/L)	LTMMP Trigger Level (pCi/L)	MDA (pCi/L)	Laboratory Qualifier	Analytical Method
MWL-MW8 24-Oct-17	Actinium-228	24	±	5.1	NE	NE	19		EPA:901.1
	Americium-241	15	±	15	NE	NE	48	U	EPA:901.1
	Beryllium-7	13	±	14	NE	NE	45	U	EPA:901.1
	Bismuth-212	29	±	21	NE	NE	69	U	EPA:901.1
	Bismuth-214	-6.8	±	7.1	NE	NE	24	U	EPA:901.1
	Cesium-134	-1	±	2.1	NE	NE	7.2	U	EPA:901.1
	Cesium-137	-0.25	±	1.5	NE	NE	5	U	EPA:901.1
	Cobalt-60	-2.7	±	2.1	NE	NE	7.4	U	EPA:901.1
	Gross alpha	9.2	±	0.96	15 pCi/L	15 pCi/L	1.3		EPA:900
	Gross beta	5	±	0.65	4 mrem/yr	4 mrem/yr	1.6		EPA:900
	Iodine-131	-0.41	±	7.8	NE	NE	26	U	EPA:901.1
	Lead-212	1.4	±	4.1	NE	NE	14	U	EPA:901.1
	Lead-214	13	±	2.9	NE	NE	8.8		EPA:901.1
	Potassium-40	-13	±	49	NE	NE	160	U	EPA:901.1
	Protactinium-234m	280	±	290	NE	NE	960	U	EPA:901.1
	Rn-222	190	±	16	NE	1000 pCi/L	31		Rn222
	Sodium-22	-0.29	±	2	NE	NE	6.8	U	EPA:901.1
	Thallium-208	-0.77	±	2.4	NE	NE	8.1	U	EPA:901.1
	Thorium-234	14	±	41	NE	NE	140	U	EPA:901.1
	Tritium	-34	±	100	4 mrem/yr	4 mrem/yr	350	U	EPA:906.0

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October 2017

Monitoring Well/ Sample Date	Analyte	Activity[a] (pCi/L)			EPA MCL (pCi/L)	LTMMP Trigger Level (pCi/L)	MDA (pCi/L)	Laboratory Qualifier	Analytical Method
MWL-MW9 18-Oct-17	Actinium-228	19	±	7.6	NE	NE	24	U	EPA:901.1
	Americium-241	9	±	11	NE	NE	35	U	EPA:901.1
	Beryllium-7	22	±	15	NE	NE	50	U	EPA:901.1
	Bismuth-212	-26	±	24	NE	NE	82	U	EPA:901.1
	Bismuth-214	18	±	7.8	NE	NE	34	U	EPA:901.1
	Cesium-134	2	±	2.5	NE	NE	8.1	U	EPA:901.1
	Cesium-137	-3.4	±	1.8	NE	NE	6.3	U	EPA:901.1
	Cobalt-60	1.8	±	2.3	NE	NE	7.7	U	EPA:901.1
	Gross alpha	9.4	±	1	15 pCi/L	15 pCi/L	1.6		EPA:900
	Gross beta	6.6	±	0.78	4 mrem/yr	4 mrem/yr	1.7		EPA:900
	Iodine-131	-1	±	7.9	NE	NE	27	U	EPA:901.1
	Lead-212	1.3	±	4.8	NE	NE	16	U	EPA:901.1
	Lead-214	2.1	±	7.2	NE	NE	24	U	EPA:901.1
	Potassium-40	34	±	55	NE	NE	180	U	EPA:901.1
	Protactinium-234m	-440	±	330	NE	NE	1100	U	EPA:901.1
	Rn-222	360	±	26	NE	1000 pCi/L	37		Rn222
	Sodium-22	0.77	±	2.3	NE	NE	7.7	U	EPA:901.1
	Thallium-208	5.6	±	1.8	NE	NE	5.7	U	EPA:901.1
	Thorium-234	-30	±	45	NE	NE	150	U	EPA:901.1
	Tritium	41	±	110	4 mrem/yr	4 mrem/yr	360	U	EPA:906.0

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