

DOE Oversight Bureau, New Mexico Environment Department

**Groundwater Monitoring at
Sandia National Laboratories/New Mexico
Chemical Waste Landfill**

**Conducted by the
New Mexico Environment Department DOE Oversight Bureau
for FFY 2016 Q-4**

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Final Report

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The purpose of this communication is to transmit groundwater quality data collected by the New Mexico Environment Department DOE Oversight Bureau from Chemical Waste Landfill groundwater monitoring wells during fourth quarter FFY 2016.

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Introduction

The New Mexico Environment Department (NMED) DOE Oversight Bureau (DOE-OB or Bureau) has compiled and assessed groundwater data collected during July 2016. The Bureau collected groundwater samples from Chemical Waste Landfill (CWL) groundwater monitoring wells CWL-BW5 (plus duplicate), CWL-MW9, CWL-MW10 and CWL-MW11. Split samples were collected using standard Sandia National Laboratories/New Mexico (SNL/NM) sampling procedures and equipment in accordance with the CWL Post-Closure Care Permit (PCCP) Groundwater Sampling and Analysis Plan (SAP). Samples were analyzed for total target analyte list metals and volatile organic compounds (VOCs). The Bureau used ALS Environmental Laboratory located in Fort Collins, Colorado to analyze and report data results from samples collected at CWL. 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 concentration limits for the hazardous constituents of concern at the CWL listed in the PCCP.

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 Chemical Waste Landfill Groundwater Concentration Limits for Hazardous Constituents of Concern (COC) in Table 1-2 of the SNL/NM Post-Closure Care Plan for the CWL, Permit Attachment 1, October 2009.

Under the current PCCP, SNL/NM is required to collect samples from CWL monitoring wells CWL-BW5, CWL-MW9, CWL-MW10 and CWL-MW11. Samples are analyzed for trichloroethene (TCE) and metals (chromium and nickel).

Results

Analytical results for total target analyte list (TAL) metals are presented in Table-1. Metals concentrations for chromium and nickel were below established MCLs and PCCP concentration limits; all other metals concentrations were below established MCLs. In accordance with the CWL PCCP, SNL/NM only analyzes groundwater samples for the metals chromium and nickel. The CWL PCCP concentration limits for chromium and nickel are 0.050 mg/L and 0.028 mg/L, respectively.

Volatile organic compounds detected at concentrations above the method detection limits (MDLs) are presented in Table-2. Trichloroethene (TCE) was detected above the MDL at monitoring well CWL-MW10 at a concentration of 0.55 µg/L. The result was "J" flagged, indicating that the result was an estimated

value. The PCE concentration was below the EPA MCL and CWL PCCP limit of 5 µg/L. Table-3 summarizes laboratory MDLs for the remaining VOCs analyzed from the samples collected at CWL monitoring wells.

Conclusion

Groundwater samples were collected from four (4) monitoring wells during this semi-annual sampling event at CWL. Samples collected by the Bureau and analyzed by ALS Environmental reported concentrations of metals and VOCs below established EPA MCLs and SNL/NM COC concentration limits listed in the PCCP. Groundwater results from CWL are comparable to historical results.

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

References

Sandia National Laboratories/New Mexico (SNL/NM). "Annual Groundwater Monitoring Report Calendar Year 2015." Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), October 2009. "Chemical Waste Landfill Post-Closure Care Plan," Permit Attachment 1, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), October 2009. "Chemical Waste Landfill Post-Closure Care Plan," Permit Attachment 2, Sandia National Laboratories, Albuquerque, New Mexico.

Sandia National Laboratories/New Mexico (SNL/NM), March 2016. "Chemical Waste Landfill Annual Post-Closure Care Report Calendar Year 2015," Sandia National Laboratories, Albuquerque, New Mexico.

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

Table-1 NMED DOE Oversight Bureau FFY 2016 Q-4 Chemical Waste Landfill Groundwater Quality Results: Total Target Analyte List Metals plus Uranium

Monitoring Well/ Sample Date	Analyte	Result (mg/L)	EPA MCL (mg/L)	CWL PCCP Limits (mg/L)	Laboratory Detection Limit (mg/L)	MDL (mg/L)	Laboratory Qualifier	Analytical Method
CWL-BW5 12-Jul-16	Aluminum	0.041	NE	NE	0.2	0.041	U	SW-846:6010B
	Antimony	0.0056	0.006	NE	0.02	0.0056	U	SW-846:6010B
	Arsenic	0.0047	0.01	NE	0.01	0.0047	U	SW-846:6010B
	Barium	0.069	2	NE	0.1	0.0015	JB	SW-846:6010B
	Beryllium	0.0016	0.004	NE	0.005	0.00044	J	SW-846:6010B
	Cadmium	0.00039	0.005	NE	0.005	0.00039	U	SW-846:6010B
	Calcium	120	NE	NE	1	0.051	B	SW-846:6010B
	Chromium	0.0011	0.10	0.050	0.01	0.0011	U	SW-846:6020
	Chromium	0.0025	0.10	0.050	0.01	0.0014	J	SW-846:6010B
	Cobalt	0.0016	NE	NE	0.01	0.0016	U	SW-846:6010B
	Copper	0.016	NE	NE	0.01	0.0022		SW-846:6010B
	Iron	0.016	NE	NE	0.1	0.016	U	SW-846:6010B
	Lead	0.0041	NE	NE	0.003	0.0028		SW-846:6010B
	Magnesium	29	NE	NE	1	0.058		SW-846:6010B
	Manganese	0.00086	NE	NE	0.01	0.00086	U	SW-846:6010B
	Mercury	0.00006	0.002	NE	0.0001	0.00006	U	SW-846:7470A
	Nickel	0.0042	NE	0.028	0.02	0.0042	U	SW-846:6020
	Nickel	0.0016	NE	0.028	0.02	0.0016	U	SW-846:6010B
	Potassium	7	NE	NE	1	0.086		SW-846:6010B
	Selenium	0.0047	0.05	NE	0.005	0.0047	U	SW-846:6010B
	Silver	0.003	NE	NE	0.01	0.003	U	SW-846:6010B
Sodium	89	NE	NE	1	0.061		SW-846:6010B	
Thallium	0.0052	0.002	NE	0.01	0.0052	U	SW-846:6010B	
Vanadium	0.002	NE	NE	0.01	0.002	J	SW-846:6010B	
Zinc	0.0046	NE	NE	0.02	0.0046	U	SW-846:6010B	

B = Compound was found in the blank and sample.

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).

NE = Not Established

U = the analyte was analyzed for but not detected

Table-1 NMED DOE Oversight Bureau FFY 2016 Q-4 Chemical Waste Landfill Groundwater Quality Results: Total Target Analyte List Metals plus Uranium

Monitoring Well/ Sample Date	Analyte	Result (mg/L)	EPA MCL (mg/L)	CWL PCCP Limits (mg/L)	Laboratory Detection Limit (mg/L)	MDL (mg/L)	Laboratory Qualifier	Analytical Method
CWL-BW5 12-Jul-16 DUP	Aluminum	0.041	NE	NE	0.2	0.041	U	SW-846:6010B
	Antimony	0.0056	0.006	NE	0.02	0.0056	U	SW-846:6010B
	Arsenic	0.0047	0.01	NE	0.01	0.0047	U	SW-846:6010B
	Barium	0.065	2	NE	0.1	0.0015	JB	SW-846:6010B
	Beryllium	0.002	0.004	NE	0.005	0.00044	J	SW-846:6010B
	Cadmium	0.00039	0.005	NE	0.005	0.00039	U	SW-846:6010B
	Calcium	120	NE	NE	1	0.051	B	SW-846:6010B
	Chromium	0.0011	0.10	0.050	0.01	0.0011	U	SW-846:6020
	Chromium	0.0021	0.10	0.050	0.01	0.0014	J	SW-846:6010B
	Cobalt	0.0016	NE	NE	0.01	0.0016	U	SW-846:6010B
	Copper	0.014	NE	NE	0.01	0.0022		SW-846:6010B
	Iron	0.016	NE	NE	0.1	0.016	U	SW-846:6010B
	Lead	0.0028	NE	NE	0.003	0.0028	J	SW-846:6010B
	Magnesium	28	NE	NE	1	0.058		SW-846:6010B
	Manganese	0.00086	NE	NE	0.01	0.00086	U	SW-846:6010B
	Mercury	0.00006	0.002	NE	0.0001	0.00006	U	SW-846:7470A
	Nickel	0.0042	NE	0.028	0.02	0.0042	U	SW-846:6020
	Nickel	0.0016	NE	0.028	0.02	0.0016	U	SW-846:6010B
	Potassium	6.9	NE	NE	1	0.086		SW-846:6010B
	Selenium	0.0047	0.05	NE	0.005	0.0047	U	SW-846:6010B
	Silver	0.003	NE	NE	0.01	0.003	U	SW-846:6010B
Sodium	87	NE	NE	1	0.061		SW-846:6010B	
Thallium	0.0052	0.002	NE	0.01	0.0052	U	SW-846:6010B	
Vanadium	0.002	NE	NE	0.01	0.002	U	SW-846:6010B	
Zinc	0.0046	NE	NE	0.02	0.0046	U	SW-846:6010B	

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Table-1 NMED DOE Oversight Bureau FFY 2016 Q-4 Chemical Waste Landfill Groundwater Quality Results: Total Target Analyte List Metals plus Uranium

Monitoring Well/ Sample Date	Analyte	Result (mg/L)	EPA MCL (mg/L)	CWL PCCP Limits (mg/L)	Laboratory Detection Limit (mg/L)	MDL (mg/L)	Laboratory Qualifier	Analytical Method
CWL-MW9 12-Jul-16	Aluminum	0.041	NE	NE	0.2	0.041	U	SW-846:6010B
	Antimony	0.0056	0.006	NE	0.02	0.0056	U	SW-846:6010B
	Arsenic	0.0047	0.01	NE	0.01	0.0047	U	SW-846:6010B
	Barium	0.1	2	NE	0.1	0.0015	B	SW-846:6010B
	Beryllium	0.0014	0.004	NE	0.005	0.00044	J	SW-846:6010B
	Cadmium	0.00039	0.005	NE	0.005	0.00039	U	SW-846:6010B
	Calcium	100	NE	NE	1	0.051	B	SW-846:6010B
	Chromium	0.0011	0.10	0.050	0.01	0.0011	U	SW-846:6020
	Chromium	0.0017	0.10	0.050	0.01	0.0014	J	SW-846:6010B
	Cobalt	0.0016	NE	NE	0.01	0.0016	U	SW-846:6010B
	Copper	0.015	NE	NE	0.01	0.0022		SW-846:6010B
	Iron	0.016	NE	NE	0.1	0.016	U	SW-846:6010B
	Lead	0.0095	NE	NE	0.003	0.0028		SW-846:6010B
	Magnesium	28	NE	NE	1	0.058		SW-846:6010B
	Manganese	0.0018	NE	NE	0.01	0.00086	J	SW-846:6010B
	Mercury	0.00006	0.002	NE	0.0001	0.00006	U	SW-846:7470A
	Nickel	0.0094	NE	0.028	0.02	0.0042	JB	SW-846:6020
	Nickel	0.0016	NE	0.028	0.02	0.0016	U	SW-846:6010B
	Potassium	8.6	NE	NE	1	0.086		SW-846:6010B
	Selenium	0.0047	0.05	NE	0.005	0.0047	U	SW-846:6010B
	Silver	0.003	NE	NE	0.01	0.003	U	SW-846:6010B
	Sodium	74	NE	NE	1	0.061		SW-846:6010B
Thallium	0.0052	0.002	NE	0.01	0.0052	U	SW-846:6010B	
Vanadium	0.002	NE	NE	0.01	0.002	U	SW-846:6010B	
Zinc	0.0046	NE	NE	0.02	0.0046	U	SW-846:6010B	

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Table-1 NMED DOE Oversight Bureau FFY 2016 Q-4 Chemical Waste Landfill Groundwater Quality Results: Total Target Analyte List Metals plus Uranium

Monitoring Well/ Sample Date	Analyte	Result (mg/L)	EPA MCL (mg/L)	CWL PCCP Limits (mg/L)	Laboratory Detection Limit (mg/L)	MDL (mg/L)	Laboratory Qualifier	Analytical Method
CWL-MW10 18-Jul-16	Aluminum	0.035	NE	NE	0.2	0.027	J	SW-846:6010B
	Antimony	0.0054	0.006	NE	0.02	0.0054	U	SW-846:6010B
	Arsenic	0.0039	0.01	NE	0.01	0.0039	U	SW-846:6010B
	Barium	0.37	2	NE	0.1	0.00099		SW-846:6010B
	Beryllium	0.0004	0.004	NE	0.005	0.0004	U	SW-846:6010B
	Cadmium	0.00095	0.005	NE	0.005	0.00095	U	SW-846:6010B
	Calcium	110	NE	NE	1	0.023		SW-846:6010B
	Chromium	0.0011	0.10	0.050	0.01	0.0011	U	SW-846:6020
	Chromium	0.0011	0.10	0.050	0.01	0.0011	U	SW-846:6010B
	Cobalt	0.001	NE	NE	0.01	0.001	U	SW-846:6010B
	Copper	0.0019	NE	NE	0.01	0.0019	U	SW-846:6010B
	Iron	0.74	NE	NE	0.1	0.016		SW-846:6010B
	Lead	0.0027	NE	NE	0.003	0.0027	U	SW-846:6010B
	Magnesium	28	NE	NE	1	0.021		SW-846:6010B
	Manganese	1.3	NE	NE	0.01	0.0007		SW-846:6010B
	Mercury	0.00006	0.002	NE	0.0001	0.00006	U	SW-846:7470A
	Nickel	0.0042	NE	0.028	0.02	0.0042	U	SW-846:6020
	Nickel	0.0016	NE	0.028	0.02	0.0016	U	SW-846:6010B
	Potassium	9.3	NE	NE	1	0.17		SW-846:6010B
	Selenium	0.0041	0.05	NE	0.005	0.0041	U	SW-846:6010B
	Silver	0.0016	NE	NE	0.01	0.0016	U	SW-846:6010B
	Sodium	72	NE	NE	1	0.026	B	SW-846:6010B
Thallium	0.0053	0.002	NE	0.01	0.0053	U	SW-846:6010B	
Vanadium	0.00093	NE	NE	0.01	0.00093	U	SW-846:6010B	
Zinc	0.02	NE	NE	0.02	0.003	J	SW-846:6010B	

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Table-1 NMED DOE Oversight Bureau FFY 2016 Q-4 Chemical Waste Landfill Groundwater Quality Results: Total Target Analyte List Metals plus Uranium

Monitoring Well/ Sample Date	Analyte	Result (mg/L)	EPA MCL (mg/L)	CWL PCCP Limits (mg/L)	Laboratory Detection Limit (mg/L)	MDL (mg/L)	Laboratory Qualifier	Analytical Method
CWL-MW11 14-Jul-16	Aluminum	0.041	NE	NE	0.2	0.041	U	SW-846:6010B
	Antimony	0.0056	0.006	NE	0.02	0.0056	U	SW-846:6010B
	Arsenic	0.0047	0.01	NE	0.01	0.0047	U	SW-846:6010B
	Barium	0.08	2	NE	0.1	0.0015	JB	SW-846:6010B
	Beryllium	0.0019	0.004	NE	0.005	0.00044	J	SW-846:6010B
	Cadmium	0.00039	0.005	NE	0.005	0.00039	U	SW-846:6010B
	Calcium	110	NE	NE	1	0.051	B	SW-846:6010B
	Chromium	0.0011	0.10	0.050	0.01	0.0011	U	SW-846:6020
	Chromium	0.0017	0.10	0.050	0.01	0.0014	J	SW-846:6010B
	Cobalt	0.0016	NE	NE	0.01	0.0016	U	SW-846:6010B
	Copper	0.015	NE	NE	0.01	0.0022		SW-846:6010B
	Iron	0.016	NE	NE	0.1	0.016	U	SW-846:6010B
	Lead	0.01	NE	NE	0.003	0.0028		SW-846:6010B
	Magnesium	29	NE	NE	1	0.058		SW-846:6010B
	Manganese	0.012	NE	NE	0.01	0.00086		SW-846:6010B
	Mercury	0.00006	0.002	NE	0.0001	0.00006	U	SW-846:7470A
	Nickel	0.0042	NE	0.028	0.02	0.0042	U	SW-846:6020
	Nickel	0.0016	NE	0.028	0.02	0.0016	U	SW-846:6010B
	Potassium	9.6	NE	NE	1	0.086		SW-846:6010B
	Selenium	0.0047	0.05	NE	0.005	0.0047	U	SW-846:6010B
	Silver	0.003	NE	NE	0.01	0.003	U	SW-846:6010B
	Sodium	77	NE	NE	1	0.061		SW-846:6010B
Thallium	0.0052	0.002	NE	0.01	0.0052	U	SW-846:6010B	
Vanadium	0.002	NE	NE	0.01	0.002	U	SW-846:6010B	
Zinc	0.0046	NE	NE	0.02	0.0046	U	SW-846:6010B	

B = Compound was found in the blank and sample.

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Table-2 NMED DOE Oversight Bureau FFY 2016 Q-4 Chemical Waste Landfill Groundwater Quality Results: Detected Volatile Organic Compounds

Monitoring Well/ Sample Date	Analyte	Result (µg/L)	EPA MCL (µg/L)	CWL PCCP Limit (µg/L)	Laboratory Detection Limit (µg/L)	MDL (µg/L)	Laboratory Qualifier	Analytical Method
CWL-MW10 18-Jul-16	Trichloroethene	0.55	5	5	1	0.3	J	SW-846:8260B_25

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).

Table-3 NMED DOE Oversight Bureau FFY 2016 Q-4 Chemical Waste Landfill Groundwater Quality Results: Method Detection Limits for Volatile Organic Compounds by Method SW-846:8260B_25

Analyte	MDL (µg/L)
Acetone	3
Benzene	0.3
Bromobenzene	0.3
Bromochloromethane	0.3
Bromodichloromethane	0.3
Bromoform	0.3
Bromomethane	0.3
Butanone[2-]	3
Butylbenzene[n-]	0.3
Butylbenzene[sec-]	0.3
Butylbenzene[tert-]	0.3
Carbon Disulfide	0.3
Carbon Tetrachloride	0.3
Chlorobenzene	0.3
Chlorodibromomethane	0.3
Chloroethane	0.3
Chloroform	0.3
Chlorohexane[1-]	0.3
Chloromethane	0.3
Chlorotoluene[2-]	0.3
Chlorotoluene[4-]	0.3
Dibromo-3-Chloropropane[1,2-]	0.4
Dibromoethane[1,2-]	0.3
Dibromomethane	0.3
Dichlorobenzene[1,2-]	0.3
Dichlorobenzene[1,3-]	0.3
Dichlorobenzene[1,4-]	0.3
Dichlorodifluoromethane	0.3
Dichloroethane[1,1-]	0.3
Dichloroethane[1,2-]	0.3
Dichloroethene[1,1-]	0.3
Dichloroethene[cis-1,2-]	0.3
Dichloroethene[trans-1,2-]	0.3
Dichloropropane[1,2-]	0.3
Dichloropropane[1,3-]	0.3

Analyte	MDL (µg/L)
Dichloropropane[2,2-]	0.3
Dichloropropene[1,1-]	0.3
Dichloropropene[cis-1,3-]	0.3
Dichloropropene[trans-1,3-]	0.3
Ethylbenzene	0.3
Hexachlorobutadiene	0.3
Hexanone[2-]	3
Iodomethane	0.38
Isopropylbenzene	0.3
Isopropyltoluene[4-]	0.3
Methyl tert-Butyl Ether	0.3
Methyl-2-pentanone[4-]	3
Methylene Chloride	0.44
Naphthalene	0.3
Propylbenzene[1-]	0.3
Styrene	0.3
Tetrachloroethane[1,1,1,2-]	0.3
Tetrachloroethane[1,1,2,2-]	0.3
Tetrachloroethene	0.2
Toluene	0.3
Trichloro-1,2,2-trifluoroethane[1,1,2-]	0.3
Trichlorobenzene[1,2,3-]	0.3
Trichlorobenzene[1,2,4-]	0.3
Trichloroethane[1,1,1-]	0.3
Trichloroethane[1,1,2-]	0.3
Trichloroethene	0.3
Trichlorofluoromethane	0.3
Trichloropropane[1,2,3-]	0.3
Trimethylbenzene[1,2,4-]	0.3
Trimethylbenzene[1,3,5-]	0.3
Vinyl acetate	0.3
Vinyl Chloride	0.3
Xylene[1,2-]	0.3
Xylene[1,3-]+Xylene[1,4-]	0.3