DOE Oversight Bureau, New Mexico Environment Department

Groundwater Monitoring at Sandia National Laboratories/New Mexico

Conducted by the
New Mexico Environment Department DOE Oversight Bureau
for FFY 2013 Q-1

Prepared by Chris Armijo, Geoscientist
Sandia Oversight Section
P.O. Box 5400 MS 1396
Albuquerque, NM 87185-5400
(505) 845-5823
chris.armijo1@state.nm.us

Final Report

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The purpose of this communication is to transmit groundwater data collected by the New Mexico Environment Department DOE Oversight Bureau from Solid Waste Management Unit 8/58 Coyote Canyon Blast Area groundwater monitoring wells during first quarter FFY 2013.

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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 October 2012. The Bureau collected groundwater samples from Solid Waste Management Unit (SWMU) 8/58 Coyote Canyon Blast Area (CCBA) monitoring well CCBA-MW2.

Split samples were collected using standard Sandia National Laboratories/New Mexico (SNL/NM) sampling procedures and equipment. The samples were submitted to an independent analytical laboratory for analysis of total metals, inorganics, organics, and radiochemistry. Benzo[a]pyrene was detected above the U.S. Environmental Protection Agency (EPA) maximum contaminant level (MCL) of 0.2 µg/L at monitoring well CCBA-MW2.

Data Assessment

All groundwater samples were collected and analyzed in accordance with EPA protocols. Data results are compared to applicable MCLs established by the EPA National Primary Drinking Water Regulations (40 CFR 141), National Primary Drinking Water Standards, EPA, July 2002. Perchlorate results are compared to the *Compliance Order on Consent (COOC) Pursuant to the New Mexico Hazardous Waste Act 74-4-10: Sandia National Laboratories Consent Order*, New Mexico Environment Department, April 19, 2004.

Results

Analytical results for total target analyte list (TAL) metals plus uranium are listed in Table 1. All metal concentrations were below established MCLs.

Analytical results for major anions (as bromide, chloride, fluoride, and sulfate), cations (as calcium, lithium, magnesium, potassium, silicon, sodium, and strontium), cyanide, nitrate-nitrite, and perchlorate are presented in Table 2. All analytes were below established MCLs and the perchlorate Consent Order level.

Analytical results for high explosives (HE) compounds are listed in Table 3. No HE compounds were detected above the (method detection Limit) MDL.

Volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) detected above the method detection limit are presented in Table 4. Benzo[a]pyrene was detected above the EPA MCL of 0.2 µg/L at monitoring well CCBA-MW2. The concentration detected was 1.8 µg/L. No other compounds were detected above their associated MCL. The laboratory MDLs for the remaining VOCs and SVOCs are presented in Table 5.

Analytical results for radiochemistry samples are listed in Table 6. Samples were analyzed for gross alpha gross beta, gamma-emitting isotopes, and isotopic uranium. No isotopes were detected above EPA MCLs.

References

Compliance Order on Consent Pursuant to the New Mexico Hazardous Waste Act 74-4-10: Sandia National Laboratories Consent Order, New Mexico Environment Department, April 19, 2004.

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

Table-1 NMED DOE OB FFY 2013 Q-1 SWMU 8/58 Groundwater Quality Results: Total TAL Metals + U

Monitoring Well/ Sample Date	Analyte	Result (mg/L)	EPA MCL (mg/L)	Quantitation Limit (mg/L)	MDL (mg/L)	Laboratory Qualifier	Analytical Method
CCBA-MW2 23-Oct-12	Aluminum	0.025	NE	0.05	0.025	U	SW-846:6020
	Antimony	0.0002	0.006	0.002	0.0002	U	SW-846:6020
	Arsenic	0.0013	0.01	0.002	0.001	J	SW-846:6020
	Barium	0.052	2	0.001	0.0005		SW-846:6020
	Beryllium	0.0001	0.004	0.001	0.0001	U	SW-846:6020
	Cadmium	0.0005	0.005	0.001	0.0005	U	SW-846:6020
	Calcium	58	NE	0.05	0.03		SW-846:6020
	Chromium	0.001	0.1	0.002	0.001	U	SW-846:6020
	Cobalt	0.0006	NE	0.001	0.0006	U	SW-846:6020
	Copper	0.0015	1.3	0.002	0.001	J	SW-846:6020
	Iron	0.03	NE	0.05	0.025	J	SW-846:6020
	Lead	0.0006	0.015	0.001	0.0006	U	SW-846:6020
	Magnesium	17	NE	0.05	0.025		SW-846:6020
	Manganese	0.00056	NE	0.001	0.0004	J	SW-846:6020
	Mercury	0.0001	0.002	0.0002	0.0001	U	SW-846:7470A
	Nickel	0.0001	NE	0.002	0.0001	U	SW-846:6020
	Potassium	1.4	NE	0.05	0.025		SW-846:6020
	Selenium	0.0035	0.05	0.002	0.001		SW-846:6020
	Silver	0.0003	NE	0.001	0.0003	U	SW-846:6020
	Sodium	44	NE	0.05	0.025		SW-846:6020
	Thallium	0.0005	0.002	0.001	0.0005	U	SW-846:6020
	Uranium	0.0055	0.03	0.001	0.0002		SW-846:6020
	Vanadium	0.0099	NE	0.01	0.003	J	SW-846:6020
	Zinc	0.004	NE	0.005	0.004	U	SW-846:6020

J = Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

NE = Not Established

U = Analyte not detected at or above the reporting limit or MDL

Table-2 NMED DOE OB FFY 2013 Q-1 SWMU 8/58 Groundwater Quality Results: Anions, Cations, Cyanide and Nitrate-Nitrite

Monitoring Well/ Sample Date	Analyte	Result	EPA MCL	Quantitation Limit	MDL (mg/L)	Units	Laboratory Qualifier	Analytical Method
CCBA-MW2 23-Oct-12	Bromide	0.5	NE	0.5	0.088	mg/L		EPA:300.0
	Chloride	39	NE	5	0.19	mg/L	B	EPA:300.0
	Fluoride	1.4	4	0.5	0.059	mg/L		EPA:300.0
	Sulfate	93	NE	5	0.25	mg/L		EPA:300.0
	Perchlorate	0.34	NE	4	0.34	ug/L	U	EPA:314.0
	Nitrate Nitrite as N	3.3	10	0.5	0.053	mg/L	B	EPA:353.2
	Calcium	48	NE	0.05	0.03	mg/L		SW-846:6020
	Lithium	0.015	NE	0.01	0.006	mg/L		SW-846:6020
	Magnesium	15	NE	0.05	0.025	mg/L		SW-846:6020
	Potassium	1.3	NE	0.05	0.025	mg/L		SW-846:6020
	Sodium	42	NE	0.05	0.025	mg/L		SW-846:6020
	Strontium	0.38	NE	0.005	0.002	mg/L		SW-846:6020
	Cyanide, Total	7.3	200	10	1.5	ug/L	J	SW-846:9012A

B = Compound was found in the blank and sample.

J = Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

NE = Not Established

U = Analyte not detected at or above the reporting limit or MDL

Table-3 NMED DOE OB FFY 2013 Q-1 SWMU 8/58 Groundwater Quality Results: High Explosives

Monitoring Well/ Sample Date	Analyte	Result (µg/L)	Quantitation Limit (µg/L)	MDL (µg/L)	Laboratory Qualifier	Analytical Method
CCBA-MW2 23-Oct-12	1,3,5-trinitrobenzene	0.018	0.22	0.018	U	SW-846:8321A
	1,3-Dinitrobenzene	0.019	0.22	0.019	U	SW-846:8321A
	2,4,6-Trinitrotoluene	0.011	0.22	0.011	U	SW-846:8321A
	2,4-Dinitrotoluene	0.02	0.22	0.02	U	SW-846:8321A
	2,6-Dinitrotoluene	0.016	0.22	0.016	U	SW-846:8321A
	2-Amino-4,6-dinitrotoluene	0.028	0.22	0.028	U	SW-846:8321A
	4-Amino-2,6-dinitrotoluene	0.017	0.22	0.017	U	SW-846:8321A
	HMX	0.052	0.22	0.052	U	SW-846:8321A
	m-Nitrotoluene	0.025	0.22	0.025	U	SW-846:8321A
	Nitrobenzene	0.014	0.22	0.014	U	SW-846:8321A
	o-Nitrotoluene	0.018	0.22	0.018	U	SW-846:8321A
	p-Nitrotoluene	0.025	0.22	0.025	U	SW-846:8321A
	RDX	0.021	0.22	0.021	U	SW-846:8321A
	Tetryl	0.019	0.22	0.019	U	SW-846:8321A

U = Analyte not detected at or above the reporting limit or MDL

Table-4 NMED DOE OB FFY 2013 Q-1 SWMU 8/58 Groundwater Quality Results: Detected Volatile and Semi-Volatile Organic Compounds

Monitoring Well/ Sample Date	Analyte	Result (µg/L)	EPA (µg/L)	Quantitation Limit (µg/L)	MDL (µg/L)	Laboratory Qualifier	Analytical Method
CCBA-MW2 23-Oct-12	Toluene	0.38	1000	1	0.25	J	SW-846:8260B
	Benzo[b]fluoranthene	1.7		11	1.3	J	SW-846:8270C
	Benzo[k]fluoranthene	1.8		11	1	J	SW-846:8270C
	Benzo[g,h,i]perylene	2.4		11	1.5	J	SW-846:8270C
	Benzo[a]pyrene	1.8	0.2	11	0.72	J	SW-846:8270C
	Bis(2-ethylhexyl)phthalate	1.4		11	1.1	J	SW-846:8270C
	Dichlorobenzidine[3,3'-]	1.4		53	1	J	SW-846:8270C

J = Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Table-5 NMED DOE OB FFY 2013 Q-1 SWMU 8/58 Groundwater Quality Results: Method Detection Limits for Volatile Organic Compounds Semi-Volatile Organic Compounds

Analyte	MDL (µg/L)	Analytical Method
Acenaphthene	1.2	SW-846:8270C
Acenaphthylene	1.2	SW-846:8270C
Anthracene	1.1	SW-846:8270C
Benzo[a]anthracene	1.1	SW-846:8270C
Benzo[b]fluoranthene	1.3	SW-846:8270C
Benzo[k]fluoranthene	1	SW-846:8270C
Benzo[g,h,i]perylene	1.5	SW-846:8270C
Benzo[a]pyrene	0.72	SW-846:8270C
Bis(2-chloroethoxy)methane	1.1	SW-846:8270C
Bis(2-chloroethyl)ether	1.6	SW-846:8270C
bis (2-chloroisopropyl) ether	1.4	SW-846:8270C
Bis(2-ethylhexyl)phthalate	1.1	SW-846:8270C
Bromophenyl-phenylether[4-]	1.2	SW-846:8270C
Butylbenzylphthalate	1.5	SW-846:8270C
Chloroaniline[4-]	2.1	SW-846:8270C
Chloro-3-methylphenol[4-]	2.1	SW-846:8270C
Chloronaphthalene[2-]	1.4	SW-846:8270C
Chlorophenol[2-]	1.7	SW-846:8270C
Chlorophenyl-phenyl[4-] ether	1.2	SW-846:8270C
Chrysene	0.65	SW-846:8270C
Dibenz(a,h)anthracene	2.1	SW-846:8270C
Dibenzofuran	1.2	SW-846:8270C
Di-n-butylphthalate	1.2	SW-846:8270C
Dichlorobenzene[1,2-]	1.6	SW-846:8270C
Dichlorobenzene[1,3-]	1.6	SW-846:8270C
Dichlorobenzene[1,4-]	1.5	SW-846:8270C
Dichlorobenzidine[3,3'-]	1	SW-846:8270C
Dichlorophenol[2,4-]	2.8	SW-846:8270C
Diethylphthalate	0.99	SW-846:8270C
Dimethylphenol[2,4-]	2.3	SW-846:8270C
Dimethyl Phthalate	0.93	SW-846:8270C
Dinitro-2-methylphenol[4,6-]	2.3	SW-846:8270C
Dinitrophenol[2,4-]	21	SW-846:8270C
2,4-Dinitrotoluene	2.1	SW-846:8270C
2,6-Dinitrotoluene	2.1	SW-846:8270C
Di-n-octylphthalate	1.6	SW-846:8270C
Fluoranthene	0.69	SW-846:8270C
Fluorene	0.99	SW-846:8270C
Hexachlorobenzene	1.5	SW-846:8270C
Hexachlorobutadiene	1.4	SW-846:8270C
Hexachlorocyclopentadiene	5.3	SW-846:8270C
Hexachloroethane	1.5	SW-846:8270C
Indeno[1,2,3-cd]pyrene	3.6	SW-846:8270C

Analyte	MDL (µg/L)	Analytical Method
Isophorone	1.1	SW-846:8270C
Methylnaphthalene[2-]	1.6	SW-846:8270C
Methylphenol[2-]	0.99	SW-846:8270C
Methylphenol[4-]	1.2	SW-846:8270C
Naphthalene	1.4	SW-846:8270C
Nitroaniline[2-]	2.1	SW-846:8270C
Nitroaniline[3-]	1.5	SW-846:8270C
Nitroaniline[4-]	1.6	SW-846:8270C
Nitrobenzene	1.7	SW-846:8270C
Nitrophenol[2-]	2	SW-846:8270C
Nitrophenol[4-]	6.5	SW-846:8270C
Nitrosodiphenylamine[N-]	0.57	SW-846:8270C
Nitroso-di-n-propylamine[N-]	1.5	SW-846:8270C
Pentachlorophenol	2.1	SW-846:8270C
Phenanthrene	1.1	SW-846:8270C
Phenol	1.2	SW-846:8270C
Pyrene	1.5	SW-846:8270C
Trichlorobenzene[1,2,4-]	1.5	SW-846:8270C
Trichlorophenol[2,4,5-]	2.1	SW-846:8270C
Trichlorophenol[2,4,6-]	2.1	SW-846:8270C

Table-5 NMED DOE OB FFY 2013 Q-1 SWMU 8/58 Groundwater Quality Results: Method Detection Limits for Volatile Organic Compounds Semi-Volatile Organic Compounds

Analyte	MDL (µg/L)	Analytical Method
Benzene	0.13	SW-846:8260B
Bromodichloromethane	0.14	SW-846:8260B
Bromoform	0.1	SW-846:8260B
Bromomethane	0.29	SW-846:8260B
Carbon Tetrachloride	0.15	SW-846:8260B
Chlorobenzene	0.12	SW-846:8260B
Chloroethane	0.34	SW-846:8260B
Chloroform	0.12	SW-846:8260B
Chloromethane	0.25	SW-846:8260B
Dichloroethane[1,1-]	0.1	SW-846:8260B
Dichloroethane[1,2-]	0.22	SW-846:8260B
Dichloroethene[cis-1,2-]	0.1	SW-846:8260B
Dichloroethene[trans-1,2-]	0.11	SW-846:8260B
Dichloroethene[1,1-]	0.14	SW-846:8260B
Dichloropropane[1,2-]	0.15	SW-846:8260B
Butanone[2-]	0.35	SW-846:8260B
Hexanone[2-]	0.17	SW-846:8260B
Dichloropropene[cis-1,3-]	0.22	SW-846:8260B
Dichloropropene[trans-1,3-]	0.08	SW-846:8260B
4-Methyl-2-pentanone (MIBK)	0.18	SW-846:8260B
Ethylbenzene	0.1	SW-846:8260B
Acetone	2.1	SW-846:8260B
Methylene Chloride	0.35	SW-846:8260B
Styrene	0.15	SW-846:8260B
Tetrachloroethane[1,1,2,2-]	0.09	SW-846:8260B
Carbon Disulfide	0.16	SW-846:8260B
Tetrachloroethene	0.1	SW-846:8260B
Toluene	0.25	SW-846:8260B
Trichloroethane[1,1,1-]	0.19	SW-846:8260B
Trichloroethane[1,1,2-]	0.31	SW-846:8260B
Trichloroethene	0.13	SW-846:8260B
Dibromochloromethane	0.13	SW-846:8260B
Vinyl Chloride	0.22	SW-846:8260B
Vinyl acetate	0.21	SW-846:8260B
Xylenes, Total	0.18	SW-846:8260B

Table-6 NMED DOE OB FFY 2013 Q-1 SWMU 8/58 Groundwater Quality Results: Gross Alpha, Gross Beta, Isotopic Uranium and Gamma Emitting Isotopes

Monitoring Well/ Sample Date	Analyte	Activity (pCi/L)			MDA (pCi/L)	Laboratory Qualifier	Analytical Method
CCBA-MW2 23-Oct-12	Actinium-228	3.66	±	3.5	6.77	U	EPA:901.1M
	Beryllium-7	1.82	±	7.3	12.8	U	EPA:901.1M
	Bismuth-212	-12.60	±	12	18.8	U	EPA:901.1M
	Bismuth-214	-2.47	±	9.6	14.9	U	EPA:901.1M
	Cesium-134	1.29	±	0.87	1.75	U	EPA:901.1M
	Cesium-137	-0.151	±	0.88	1.51	U	EPA:901.1M
	Cobalt-60	0.0273	±	0.96	1.74	U	EPA:901.1M
	Gross Alpha	7.79	±	3.2	3.38		EPA:900.0
	Gross Beta	3.02	±	1.1	1.5		EPA:900.0
	Lead-212	0.445	±	1.1	1.96	U	EPA:901.1M
	Lead-212	-3.87	±	2.1	2.9	U	EPA:901.1M
	Potassium-40	25.4	±	20	14.5	J	EPA:901.1M
	Protactinium-234m	70.3	±	100	193	U	EPA:901.1M
	Sodium-22	0.91	±	0.99	1.940	U	EPA:901.1M
	Tallium-208	0.899	±	0.8	1.52	U	EPA:901.1M
	Thorium-234	70.3	±	100	193	U	EPA:901.1M
	Uranium-234	7.41	±	1	0.00771		HASL-300:ISOU
	Uranium-235	0.111	±	0.026	0.00558		HASL-300:ISOU
	Uranium-238	1.77	±	0.26	0.00849		HASL-300:ISOU

J = Qualifier has been assigned and the result is below the Reporting Limit, RL (CRDL) or Report Value is Estimated.

U = Analyzed for but not detected above limiting criteria. Limit criteria is less tha the MDA or not identified by gamma scan software.