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**Groundwater Monitoring at Sandia National Laboratories/New Mexico
Solid Waste Management Units 8/58 Coyote Canyon Blast Area
Conducted by the NMED DOE OB for FFY 2012 Q-3**

The New Mexico Environment Department (NMED) DOE Oversight Bureau (Bureau) has compiled and assessed groundwater data collected during April 2012. The Bureau collected groundwater samples from Coyote Canyon Blast Area (CCBA) monitoring well CCBA-MW1, located within Solid Waste Management Units (SWMUs) 8/58 at Sandia National Laboratories/New Mexico (SNL/NM).

Split samples were collected using standard SNL/NM sampling procedures and equipment. Groundwater samples were analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), high explosive (HE) compounds, nitrate-nitrite, major anions, major cations, Target Analyte List (TAL) metals plus uranium, perchlorate, total cyanide, gross alpha and beta activity, radionuclides by gamma spectroscopy, and isotopic uranium. No constituents were detected above established U.S. Environmental Protection Agency (EPA) drinking water standards, except for fluoride. Fluoride exceeds the established Maximum Contaminate Level (MCL) of 4.0 milligrams per liter (mg/L) in the sample collected from CCBA-MW1 at a concentration of 4.7 mg/L.

Data Assessment

All groundwater samples were collected and analyzed in accordance with U.S. EPA protocols. Data results are compared to applicable MCLs from the EPA National Primary Drinking Water Regulations (40 CFR 141).

Currently there is no U.S. EPA National Primary Drinking Water MCL or State of New Mexico drinking water standard for perchlorate. However, 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. The COOC screening level for perchlorate is 4 micrograms per liter ($\mu\text{g/L}$).

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. Fluoride was detected above the EPA MCL of 4 mg/L at a concentration of 4.7 mg/L. All other analytes were below established MCLs. Perchlorate and cyanide were non-detects from samples collected at CCBA-MW1.

Analytical results for HE compounds are listed in Table-3. No HE compounds were detected above the method detection limits (MDLs).

Analytical results for volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) are listed in Table-4 and Table-5, respectively. No compounds were detected above their associated MDLs.

The results for gamma-emitting radionuclides, gross alpha and beta activity, and isotopic uranium are presented in Table-6. All radionuclide activity results were below MCLs, where established.

Response

Questions or comments should be addressed to Chris Armijo by phone at (505) 383-2070, by e-mail at chris.armijo1@state.nm.us, or to the address in the letterhead.

Enclosure: (1) Table-1 Total TAL Metals plus Uranium
 (2) Table-2 Anions, Cations, Nitrate-Nitrite, Perchlorate and Total Cyanide Results
 (3) Table-3 High Explosive Compounds Results
 (4) Table-4 Volatile Organic Compounds Results
 (5) Table-5 Semi-Volatile Organic Compounds Results
 (6) Table-6 Gross Alpha, Gross Beta, Gamma Spectroscopy, and Isotopic Uranium Results

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**Table-1 NMED DOE OB FFY 2012 Q-3 Solid Waste Management Units 8/58 Coyote Canyon Blast Area
Groundwater Quality Results: Total TAL Metals plus Uranium**

Monitoring Well/ Sample Date	Analyte	Result (mg/L)	EPA MCL (mg/L)	Quantitation Limit (mg/L)	MDL (mg/L)	Laboratory Qualifier	Analytical Method
CCBA-MW1 23-Apr-12	Aluminum	0.048	NE	0.2	0.048	U	SW-846:6010B
	Antimony	0.0098	0.006	0.02	0.0098	U	SW-846:6010B
	Arsenic	0.012	0.01	0.02	0.012	U	SW-846:6010B
	Barium	0.0045	2	0.005	0.0025	B	SW-846:6010B
	Beryllium	0.00044	0.004	0.002	0.0003	B	SW-846:6010B
	Cadmium	0.0005	0.005	0.002	0.0005	U	SW-846:6010B
	Calcium	48.6	NE	0.5	0.05		SW-846:6010B
	Chromium	0.0012	0.1	0.008	0.0012	U	SW-846:6010B
	Cobalt	0.003	NE	0.005	0.003	U	SW-846:6010B
	Copper	0.0021	1.3	0.01	0.0021	U	SW-846:6010B
	Iron	0.02	NE	0.1	0.02	U	SW-846:6010B
	Lead	0.0025	0.015	0.005	0.0025	U	SW-846:6010B
	Magnesium	10	NE	0.5	0.04		SW-846:6010B
	Manganese	0.0073	NE	0.005	0.0025		SW-846:6010B
	Mercury	0.0001	0.002	0.0002	0.0001	U	SW-846:7470A
	Nickel	0.0024	NE	0.005	0.0024	U	SW-846:6010B
	Potassium	4.4	NE	1	0.093		SW-846:6010B
	Selenium	0.013	0.05	0.02	0.013	U	SW-846:6010B
	Silver	0.00084	NE	0.005	0.00084	U	SW-846:6010B
	Sodium	67	NE	1	0.25		SW-846:6010B
	Thallium	0.009	0.002	0.02	0.009	U	SW-846:6010B
Uranium	0.0018	0.03	0.001	0.0002		SW-846:6020	
Vanadium	0.0019	NE	0.005	0.0019	U	SW-846:6010B	
Zinc	0.003	NE	0.01	0.003	U	SW-846:6010B	

B = Estimated result. Result is less than RL.

NE = Not Established

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

Table-2 NMED DOE OB FFY 2012 Q-3 Solid Waste Management Units 8/58 Coyote Canyon Blast Area Groundwater Quality Results: Anions, Cations, Nitrate-Nitrite, Perchlorate and Total Cyanide

Monitoring Well/ Sample Date	Analyte	Result	EPA MCL	Quantitation Limit	MDL	Units	Laboratory Qualifier	Analytical Method
CCBA-MW1 23-Apr-12	Bromide	0.31	NE	0.5	0.088	mg/L	B	EPA:300.0
	Chloride	32.4	NE	1	0.037	mg/L	H	EPA:300.0
	Chloride	30.4	NE	2	0.074	mg/L	D,Q	EPA:300.0
	Fluoride	4.7	4	0.5	0.059	mg/L		EPA:300.0
	Sulfate	59.5	NE	1	0.049	mg/L	H	EPA:300.0
	Sulfate	56.9	NE	2	0.098	mg/L	D,Q	EPA:300.0
	Perchlorate - LC/MS/MS	0.34	NE	4	0.34	ug/L	U	EPA:314.0
	Nitrate-Nitrite	1.4	10	0.05	0.0053	mg/L		EPA:353.2
	Cyanide, Total	1.5	200	10	1.5	ug/L	U	SW-846:9012A
	Calcium	44.5	NE	0.5	0.05	mg/L		SW846-6010B
	Magnesium	10	NE	0.5	0.04	mg/L		SW846-6010B
	Potassium	4.5	NE	1	0.093	mg/L		SW846-6010B
	Silicon	14	NE	0.5	0.05	mg/L		SW846-6010B
	Sodium	62.6	NE	1	0.25	mg/L		SW846-6010B
Strontium	0.25	NE	0.05	0.005	mg/L		SW846-6010B	

B = Estimated result. Result is less than RL and greater than or equal to the IDL.

D = Dilution

H = Estimated result. Result concentration exceeds the calibration range

NE = Not Established

Q = Elevated reporting limit. The reporting limit is elevated due to high analyte levels.

U = Undetected at the Limit of Detection.

Table-3 NMED DOE OB FFY 2012 Q-3 Solid Waste Management Units 8/58 Coyote Canyon Blast Area Groundwater Quality Results: High Explosive Compounds

Monitoring Well/ Sample Date	Analyte	Result (µg/L)	Quantitation Limit (µg/L)	MDL (µg/L)	Laboratory Qualifier	Analytical Method
CCBA-MW1 23-Apr-12	1,3,5-trinitrobenzene	0.018	0.22	0.018	U	SW846-SW8321A
	1,3-Dinitrobenzene	0.021	0.22	0.019	U	SW846-SW8321A
	2,4,6-Trinitrotoluene	0.012	0.22	0.012	U	SW846-SW8321A
	2,4-Dinitrotoluene	0.021	0.22	0.021	U	SW846-SW8321A
	2,6-Dinitrotoluene	0.016	0.22	0.016	U	SW846-SW8321A
	2-Amino-4,6-dinitrotoluene	0.029	0.22	0.029	U	SW846-SW8321A
	2-nitrotoluene	0.019	0.22	0.019	U	SW846-SW8321A
	3-Nitrotoluene	0.026	0.22	0.026	U	SW846-SW8321A
	4-Amino-2,6-dinitrotoluene	0.017	0.22	0.017	U	SW846-SW8321A
	4-Methylnitrobenzene	0.026	0.22	0.026	U	SW846-SW8321A
	HMX	0.053	0.22	0.053	U	SW846-SW8321A
	Nitrobenzene	0.014	0.22	0.014	U	SW846-SW8321A
	RDX	0.022	0.22	0.022	U	SW846-SW8321A
	Tetryl	0.02	0.22	0.02	U	SW846-SW8321A

U = Analyte NOT DETECTED at or above the reporting limit or MDL, if MDL is specified

Table-4 NMED DOE OB FFY 2012 Q-3 Solid Waste Management Units 8/58 Coyote Canyon Blast Area Groundwater Quality Results: Volatile Organic Compounds

Monitoring Well/ Sample Date	Analyte	Result (µg/L)	Quantitation Limit (µg/L)	MDL (µg/L)	Laboratory Qualifier	Analytical Method
CCBA-MW1 23-Apr-12	4-Methyl-2-pentanone (MIBK)	0.18	2	0.18	U	SW-846:8260B
	Acetone	2.1	10	2.1	U	SW-846:8260B
	Benzene	0.13	1	0.13	U	SW-846:8260B
	Bromodichloromethane	0.14	1	0.14	U	SW-846:8260B
	Bromoform	0.1	1	0.1	U	SW-846:8260B
	Bromomethane	0.29	1	0.29	U	SW-846:8260B
	Butanone[2-]	0.35	2	0.35	U	SW-846:8260B
	Carbon Disulfide	0.16	2	0.16	U	SW-846:8260B
	Carbon Tetrachloride	0.15	1	0.15	U	SW-846:8260B
	Chlorobenzene	0.12	1	0.12	U	SW-846:8260B
	Chloroethane	0.34	1	0.34	U	SW-846:8260B
	Chloroform	0.12	1	0.12	U	SW-846:8260B
	Chloromethane	0.25	1	0.25	U	SW-846:8260B
	Dibromochloromethane	0.13	1	0.13	U	SW-846:8260B
	Dichloroethane[1,1-]	0.1	1	0.1	U	SW-846:8260B
	Dichloroethane[1,2-]	0.22	1	0.22	U	SW-846:8260B
	Dichloroethene[1,1-]	0.14	1	0.14	U	SW-846:8260B
	Dichloroethene[cis-1,2-]	0.1	1	0.1	U	SW-846:8260B
	Dichloroethene[trans-1,2-]	0.11	1	0.11	U	SW-846:8260B
	Dichloropropane[1,2-]	0.15	1	0.15	U	SW-846:8260B
	Dichloropropene[cis-1,3-]	0.22	1	0.22	U	SW-846:8260B
	Dichloropropene[trans-1,3-]	0.08	1	0.08	U	SW-846:8260B
	Ethylbenzene	0.1	1	0.1	U	SW-846:8260B
	Hexanone[2-]	0.17	2	0.17	U	SW-846:8260B
	Methylene Chloride	0.35	1	0.35	U	SW-846:8260B
	Styrene	0.15	1	0.15	U	SW-846:8260B
	Tetrachloroethane[1,1,2,2-]	0.09	1	0.09	U	SW-846:8260B
	Tetrachloroethene	0.1	1	0.1	U	SW-846:8260B
	Toluene	0.25	1	0.25	U	SW-846:8260B
	Trichloroethane[1,1,1-]	0.19	1	0.19	U	SW-846:8260B
	Trichloroethane[1,1,2-]	0.31	1	0.31	U	SW-846:8260B
Trichloroethene	0.13	1	0.13	U	SW-846:8260B	
Vinyl acetate	0.21	2	0.21	U	SW-846:8260B	
Vinyl Chloride	0.22	1	0.22	U	SW-846:8260B	
Xylene (Total)	0.18	1	0.18	U	SW-846:8260B	

U = Analyte NOT DETECTED at or above the reporting limit or MDL, if MDL is specified

Table-5 NMED DOE OB FFY 2012 Q-3 Solid Waste Management Units 8/58 Coyote Canyon Blast Area Groundwater Quality Results: Semi-Volatile Organic Compounds

Monitoring Well/ Sample Date	Analyte	Result (µg/L)	Quantitation Limit (µg/L)	MDL (µg/L)	Laboratory Qualifier	Analytical Method
CCBA-MW1 23-Apr-12	1,2,4-Trichlorobenzene	1.4	10	1.4	U	SW-846:8270C
	1,2-Dichlorobenzene	1.5	10	1.5	U	SW-846:8270C
	1,3-Dichlorobenzene	1.5	10	1.5	U	SW-846:8270C
	1,4-Dichlorobenzene	1.4	10	1.4	U	SW-846:8270C
	2,2'-oxybis[1-chloropropane]	1.3	10	1.3	U	SW-846:8270C
	2,4,5-Trichlorophenol	2	10	2	U	SW-846:8270C
	2,4,6-Trichlorophenol	2	10	2	U	SW-846:8270C
	2,4-Dichlorophenol	2.7	10	2.7	U	SW-846:8270C
	2,4-Dimethylphenol	2.2	10	2.2	U	SW-846:8270C
	2,4-Dinitrophenol	20	51	20	U	SW-846:8270C
	2,4-Dinitrotoluene	2	10	2	U	SW-846:8270C
	2,6-Dinitrotoluene	2	10	2	U	SW-846:8270C
	2-Chloronaphthalene	1.3	10	1.3	U	SW-846:8270C
	2-Chlorophenol	1.6	10	1.6	U	SW-846:8270C
	2-Methylnaphthalene	1.5	10	1.5	U	SW-846:8270C
	2-Methylphenol	0.95	10	0.95	U	SW-846:8270C
	2-Nitroaniline	2	51	2	U	SW-846:8270C
	2-Nitrophenol	1.9	10	1.9	U	SW-846:8270C
	3,3'-Dichlorobenzidine	0.98	51	0.98	U	SW-846:8270C
	4,6-Dinitro-2-methylphenol	2.2	51	2.2	U	SW-846:8270C
	4-Bromophenyl phenyl ether	1.1	10	1.1	U	SW-846:8270C
	4-Chloro-3-methylphenol	2	10	2	U	SW-846:8270C
	4-Chloroaniline	2	10	2	U	SW-846:8270C
	4-Chlorophenyl phenyl ether	1.1	10	1.1	U	SW-846:8270C
	4-Nitroaniline	1.5	51	1.5	U	SW-846:8270C
	4-Nitrophenol	6.2	51	6.2	U	SW-846:8270C
	Acenaphthene	1.1	10	1.1	U	SW-846:8270C
	Acenaphthylene	1.1	10	1.1	U	SW-846:8270C
	Anthracene	1	10	1	U	SW-846:8270C
	Benz(a)anthracene	1	10	1	U	SW-846:8270C
	Benzo(a)pyrene	0.69	10	0.69	U	SW-846:8270C
	Benzo(b)fluoranthene	1.2	10	1.2	U	SW-846:8270C
	Benzo(g,h,i)perylene	1.4	10	1.4	U	SW-846:8270C
Benzo(k)fluoranthene	0.98	10	0.98	U	SW-846:8270C	
Bis(2-chloroethoxy)methane	1	10	1	U	SW-846:8270C	
Bis(2-chloroethyl)ether	1.5	10	1.5	U	SW-846:8270C	
Bis(2-ethylhexyl)phthalate	1.2	10	1	J	SW-846:8270C	

J = Estimated result. Result is less than RL.

U = Analyte NOT DETECTED at or above the reporting limit or MDL, if MDL is specified

Table-5 NMED DOE OB FFY 2012 Q-3 Solid Waste Management Units 8/58 Coyote Canyon Blast Area Groundwater Quality Results: Semi-Volatile Organic Compounds

Monitoring Well/ Sample Date	Analyte	Result (µg/L)	Quantitation Limit (µg/L)	MDL (µg/L)	Laboratory Qualifier	Analytical Method
CCBA-MW1 23-Apr-12	Butylbenzylphthalate	1.4	10	1.4	U	SW-846:8270C
	Chrysene	0.62	10	0.62	U	SW-846:8270C
	Dibenz(a,h)anthracene	2	10	2	U	SW-846:8270C
	Dibenzofuran	1.1	10	1.1	U	SW-846:8270C
	Diethylphthalate	0.95	10	0.95	U	SW-846:8270C
	Dimethyl Phthalate	0.9	10	0.9	U	SW-846:8270C
	Di-n-butylphthalate	1.1	10	1.1	U	SW-846:8270C
	Di-n-octylphthalate	1.5	10	1.5	U	SW-846:8270C
	Fluoranthene	0.66	10	0.66	U	SW-846:8270C
	Fluorene	0.95	10	0.95	U	SW-846:8270C
	Hexachlorobenzene	1.4	10	1.4	U	SW-846:8270C
	Hexachlorobutadiene	1.3	10	1.3	U	SW-846:8270C
	Hexachlorocyclopentadiene	5.1	51	5.1	U	SW-846:8270C
	Hexachloroethane	1.4	10	1.4	U	SW-846:8270C
	Indeno(1,2,3-cd)pyrene	3.5	10	3.5	U	SW-846:8270C
	Isophorone	1	10	1	U	SW-846:8270C
	Methylphenol, 3-&4-	1.2	20	1.2	U	SW-846:8270C
	Naphthalene	1.3	10	1.3	U	SW-846:8270C
	Nitroaniline[3-]	1.4	51	1.4	U	SW-846:8270C
	Nitrobenzene	1.6	10	1.6	U	SW-846:8270C
	N-Nitrosodiphenylamine	0.55	10	0.55	U	SW-846:8270C
	N-nitrosodipropylamine	1.4	10	1.4	U	SW-846:8270C
	Pentachlorophenol	2	51	2	U	SW-846:8270C
	Phenanthrene	1	10	1	U	SW-846:8270C
Phenol	1.1	10	1.1	U	SW-846:8270C	
Pyrene	1.4	10	1.4	U	SW-846:8270C	

J = Estimated result. Result is less than RL.

U = Analyte NOT DETECTED at or above the reporting limit or MDL, if MDL is specified

**Table-6 NMED DOE OB FFY 2012 Q-3 Solid Waste Management Units 8/58 Coyote Canyon Blast Area
Groundwater Quality Results: Gross Alpha, Gross Beta, Gamma Spectroscopy, and Isotopic Uranium**

Monitoring Well/ Sample Date	Analyte	Activity (pCi/L)		MDA (pCi/L)	Laboratory Qualifier	Analytical Method
CCBA-MW1 23-Apr-12	Actinium-228	-4.74	± 17.00	20.90	U	EPA:901.1M
	Beryllium-7	-2.07	± 22.00	36.90	U	EPA:901.1M
	Bismuth-212	64.90	± 36.00	64.50	U	EPA:901.1M
	Bismuth-214	110.00	± 42.00	24.10		EPA:901.1M
	Cesium-134	2.40	± 2.70	4.70	U	EPA:901.1M
	Cesium-137	-4.08	± 2.70	4.25	U	EPA:901.1M
	Cobalt-60	0.87	± 2.50	4.33	U	EPA:901.1M
	Gross Alpha	3.53	± 2.00	2.65		EPA:900.0
	Gross Beta	6.38	± 1.40	1.55		EPA:900.0
	Iodine-131	-0.58	± 5.00	8.46	U	EPA:901.1M
	Lead-212	-1.63	± 7.40	8.05	U	EPA:901.1M
	Lead-212	112.00	± 19.00	8.35		EPA:901.1M
	Potassium-40	-290.00	± 90.00	116.00	U	EPA:901.1M
	Protactinium-234m	441.00	± 310.00	570.00	U	EPA:901.1M
	Sodium-22	-0.22	± 2.50	4.35	U	EPA:901.1M
	Tallium-208	-1.59	± 4.40	5.04	U	EPA:901.1M
	Thorium-234	441.00	± 310.00	570.00	U	EPA:901.1M
	Uranium-234	1.97	± 0.34	0.01		HASL-300:ISOU
	Uranium-235	0.05	± 0.02	0.01		HASL-300:ISOU
Uranium-238	0.63	± 0.12	0.01		HASL-300:ISOU	

U = Result is less than the sample detection limit.

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