



SUSANA MARTINEZ
Governor
JOHN A. SANCHEZ
Lt. Governor

NEW MEXICO ENVIRONMENT DEPARTMENT

DOE Oversight Bureau

121 Tijeras Ave., NE Suite 1000
Albuquerque, NM
Phone (505) 383-2073 Fax (505) 222-9510
www.env.nm.gov



BUTCH TONGATE
Cabinet Secretary
J. C. BORREGO
Acting Deputy Secretary

Groundwater Monitoring at Sandia National Laboratories/New Mexico Solid Waste Management Unit 68 Old Burn Site Conducted by NMED DOE OB for FFY 2012 Q-4

The New Mexico Environment Department (NMED) DOE Oversight Bureau (DOE-OB or Bureau) has compiled and assessed groundwater data collected during July 2012. The Bureau collected groundwater samples from Solid Waste Management Unit (SWMU) 68 Old Burn Site (OBS) monitoring well OBS-MW3. Split samples were collected using standard Sandia National Laboratories/New Mexico (SNL/NM or Sandia) sampling procedures and equipment. The samples were submitted to an independent analytical laboratory, where they were analyzed for total metals, inorganics, organics and radiochemistry. No anomalies were observed in groundwater samples collected from monitoring well OBS-MW3.

Data Assessment

Data results are compared to applicable Maximum Contaminant Levels (MCLs) established by the U.S. Environmental Protection Agency (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), dissolved major cations (as calcium, lithium, magnesium, potassium, silicon, sodium, and strontium), nitrate-nitrite, perchlorate, hexavalent chromium and total cyanide are listed in Table-2. All analytes were detected below established EPA drinking water standards and the sample analyzed for perchlorate was below the COOC screening level of 4 micrograms per liter ($\mu\text{g/L}$). Hexavalent chromium was not detected above the laboratory method detection limit (MDL).

Analytical results for high explosive (HE) compounds are listed in Table-3. No HE compounds were detected above their associated MDLs.

Analytical results for volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) are presented in Table-4 and Table-5, respectively. Toluene was the only compound detected above the MDL at concentration of 0.45 µg/L. The EPA MCL for toluene is 1000 µg/L. The toluene value was detected below the practical quantitation limit and qualified with a “B” flag, indicating it was an estimated value. No SVOCs were detected above their associated MDLs.

Analytical results for radiochemistry samples are listed in Table-6. Samples were analyzed for gross alpha, gross beta, gamma emitting isotopes and isotopic uranium. Unadjusted gross alpha activity was 23.2 ± 5.9 pCi/L. The EPA MCL for gross alpha activity of 15 pCi/L is based on a corrected gross alpha value, which excludes both total uranium and radon from initial gross alpha count. Subsequently, when the total uranium activity is subtracted from the gross alpha value, the gross activity result from the sample collected at OBS-MW3 is below the EPA drinking water standard. No other isotopes were detected above EPA MCLs.

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 Target Analyte List Metals plus Uranium Results
 (2) Table-2 Major Anions, Major Cations, Nitrate-Nitrite, Perchlorate,
 Hexavalent Chromium 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

Distribution: David Rast, DOE/SSO
 Karen Oden, DOE/SSO
 Tim Jackson, SNL/NM Groundwater
 Michael Skelly, SNL/NM Groundwater
 Susan Lucas Kamat, Bureau Chief, DOE OB

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**Table-1 NMED DOE OB FFY 2012 Q-4 Solid Waste Management Unit 68 Groundwater Quality Results:
Total Target Analyte List 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
OBS-MW3 19-Jul-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	0.001	0.01	0.002	0.001	U	SW-846:6020
	Barium	0.029	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	75	NE	0.05	0.03		SW-846:6020
	Chromium	0.0016	0.1	0.002	0.001	B,J	SW-846:6020
	Cobalt	0.0006	NE	0.001	0.0006	U	SW-846:6020
	Copper	0.001	1.3	0.002	0.001	U	SW-846:6020
	Iron	0.025	NE	0.05	0.025	U	SW-846:6020
	Lead	0.0006	0.015	0.001	0.0006	U	SW-846:6020
	Magnesium	15.6	NE	0.05	0.025		SW-846:6020
	Manganese	0.0005	NE	0.001	0.0004	B	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	1.6	NE	0.05	0.025		SW-846:6020
	Selenium	0.0031	0.05	0.002	0.001		SW-846:6020
	Silver	0.0003	NE	0.001	0.0003	U	SW-846:6020
	Sodium	21.8	NE	0.05	0.025		SW-846:6020
Thallium	0.0005	0.002	0.001	0.0005	U	SW-846:6020	
Uranium	0.013	0.03	0.001	0.0002		SW-846:6020	
Vanadium	0.003	NE	0.01	0.003	U	SW-846:6020	
Zinc	0.004	NE	0.005	0.004	U	SW-846:6020	

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

J = Method blank contamination. The associated method blank contains the target analyte at a reportable level.

NE = Not Established

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

Table-2 NMED DOE OB FFY 2012 Q-4 Solid Waste Management Unit 68 Groundwater Quality Results: Major Anions, Major Cations, Nitrate-Nitrite, Perchlorate, Hexavalent Chromium and Total Cyanide

Monitoring Well/ Sample Date	Analyte	Result	EPA MCL	Quantitation Limit	MDL	Units	Laboratory Qualifier	Analytical Method
OBS-MW3 19-Jul-12	Bromide	0.42	NE	0.5	0.088	mg/L	B	EPA:300.0
	Chloride	24.5	NE	2	0.074	mg/L	D,Q	EPA:300.0
	Fluoride	2.3	4	0.5	0.059	mg/L		EPA:300.0
	Sulfate	88.5	NE	2	0.098	mg/L	D,Q	EPA:300.0
	Perchlorate	0.45	NE	4	0.34	ug/L	B	EPA:314.0
	Nitrate-Nitrite	1.6	10	0.25	0.026	mg/L	D,Q	EPA:353.2
	Hexavalent Chromium	0.002	0.1	0.01	0.002	mg/L	U	SW-846:7196A
	Cyanide, Total	10	200	10	1.5	ug/L	U	SW-846:9012A
	Calcium	81.5	NE	0.5	0.05	mg/L	J	SW846-6010B
	Magnesium	16.6	NE	0.5	0.04	mg/L		SW846-6010B
	Potassium	1.8	NE	1	0.093	mg/L	J	SW846-6010B
	Silicon	14.4	NE	0.5	0.05	mg/L		SW846-6010B
	Sodium	24.3	NE	1	0.25	mg/L	J	SW846-6010B
	Strontium	0.61	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

J = Method blank contamination. The associated method blank contains the target analyte at a reportable level.

NE = Not Established

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

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

**Table-3 NMED DOE OB FFY 2012 Q-4 Solid Waste Management Unit 68 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
OBS-MW3 19-Jul-12	1,3,5-trinitrobenzene	0.019	0.23	0.019	D,U	SW846-SW8321A
	1,3-Dinitrobenzene	0.02	0.23	0.02	D,U	SW846-SW8321A
	2,4,6-Trinitrotoluene	0.012	0.23	0.012	D,U	SW846-SW8321A
	2,4-Dinitrotoluene	0.022	0.23	0.022	D,U	SW846-SW8321A
	2,6-Dinitrotoluene	0.017	0.23	0.017	D,U	SW846-SW8321A
	2-Amino-4,6-dinitrotoluene	0.03	0.23	0.03	D,U	SW846-SW8321A
	2-nitrotoluene	0.02	0.23	0.02	D,U	SW846-SW8321A
	3-Nitrotoluene	0.027	0.23	0.027	D,U	SW846-SW8321A
	4-Amino-2,6-dinitrotoluene	0.018	0.23	0.018	D,U	SW846-SW8321A
	4-Methylnitrobenzene	0.027	0.23	0.027	D,U	SW846-SW8321A
	HMX	0.055	0.23	0.055	D,U	SW846-SW8321A
	Nitrobenzene	0.015	0.23	0.015	D,U	SW846-SW8321A
	RDX	0.023	0.23	0.023	D,U	SW846-SW8321A
	Tetryl	0.021	0.23	0.021	D,U	SW846-SW8321A

D = Dilution

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

**Table-4 NMED DOE OB FFY 2012 Q-4 Solid Waste Management Unit 68 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
OBS-MW3 19-Jul-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	0.45	1	0.25	J	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	

J = Estimated result. Result is less than RL.

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

**Table-5 NMED DOE OB FFY 2012 Q-4 Solid Waste Management Unit 68 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
OBS-MW3 19-Jul-12	1,2,4-Trichlorobenzene	1.5	11	1.5	D,U	SW-846:8270C
	1,2-Dichlorobenzene	1.6	11	1.6	D,U	SW-846:8270C
	1,3-Dichlorobenzene	1.6	11	1.6	D,U	SW-846:8270C
	1,4-Dichlorobenzene	1.5	11	1.5	D,U	SW-846:8270C
	2,2'-oxybis[1-chloropropane]	1.4	11	1.4	D,U	SW-846:8270C
	2,4,5-Trichlorophenol	2.2	11	2.2	D,U	SW-846:8270C
	2,4,6-Trichlorophenol	2.2	11	2.2	D,U	SW-846:8270C
	2,4-Dichlorophenol	2.8	11	2.8	D,U	SW-846:8270C
	2,4-Dimethylphenol	2.4	11	2.4	D,U	SW-846:8270C
	2,4-Dinitrophenol	22	54	22	D,U	SW-846:8270C
	2,4-Dinitrotoluene	2.2	11	2.2	D,U	SW-846:8270C
	2,6-Dinitrotoluene	2.2	11	2.2	D,U	SW-846:8270C
	2-Chloronaphthalene	1.4	11	1.4	D,U	SW-846:8270C
	2-Chlorophenol	1.7	11	1.7	D,U	SW-846:8270C
	2-Methylnaphthalene	1.6	11	1.6	D,U	SW-846:8270C
	2-Methylphenol	1	11	1	D,U	SW-846:8270C
	2-Nitroaniline	2.2	54	2.2	D,U	SW-846:8270C
	2-Nitrophenol	2.1	11	2.1	D,U	SW-846:8270C
	3,3'-Dichlorobenzidine	1	54	1	D,U	SW-846:8270C
	4,6-Dinitro-2-methylphenol	2.4	54	2.4	D,U	SW-846:8270C
	4-Bromophenyl phenyl ether	1.2	11	1.2	D,U	SW-846:8270C
	4-Chloro-3-methylphenol	2.2	11	2.2	D,U	SW-846:8270C
	4-Chloroaniline	2.2	11	2.2	D,U	SW-846:8270C
	4-Chlorophenyl phenyl ether	1.2	11	1.2	D,U	SW-846:8270C
	4-Nitroaniline	1.6	54	1.6	D,U	SW-846:8270C
	4-Nitrophenol	6.6	54	6.6	D,U	SW-846:8270C
	Acenaphthene	1.2	11	1.2	D,U	SW-846:8270C
	Acenaphthylene	1.2	11	1.2	D,U	SW-846:8270C
	Anthracene	1.1	11	1.1	D,U	SW-846:8270C
	Benz(a)anthracene	1.1	11	1.1	D,U	SW-846:8270C
	Benzo(a)pyrene	0.74	11	0.74	D,U	SW-846:8270C
	Benzo(b)fluoranthene	1.3	11	1.3	D,U	SW-846:8270C
Benzo(g,h,i)perylene	1.5	11	1.5	D,U	SW-846:8270C	
Benzo(k)fluoranthene	1	11	1	D,U	SW-846:8270C	
Bis(2-chloroethoxy)methane	1.1	11	1.1	D,U	SW-846:8270C	
Bis(2-chloroethyl)ether	1.6	11	1.6	D,U	SW-846:8270C	

D = Dilution

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

**Table-5 NMED DOE OB FFY 2012 Q-4 Solid Waste Management Unit 68 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
OBS-MW3 19-Jul-12	Bis(2-ethylhexyl)phthalate	1.1	11	1.1	D,U	SW-846:8270C
	Butylbenzylphthalate	1.5	11	1.5	D,U	SW-846:8270C
	Chrysene	0.66	11	0.66	D,U	SW-846:8270C
	Dibenz(a,h)anthracene	2.2	11	2.2	D,U	SW-846:8270C
	Dibenzofuran	1.2	11	1.2	D,U	SW-846:8270C
	Diethylphthalate	1	11	1	D,U	SW-846:8270C
	Dimethyl Phthalate	0.96	11	0.96	D,U	SW-846:8270C
	Di-n-butylphthalate	1.2	11	1.2	D,U	SW-846:8270C
	Di-n-octylphthalate	1.6	11	1.6	D,U	SW-846:8270C
	Fluoranthene	0.71	11	0.71	D,U	SW-846:8270C
	Fluorene	1	11	1	D,U	SW-846:8270C
	Hexachlorobenzene	1.5	11	1.5	D,U	SW-846:8270C
	Hexachlorobutadiene	1.4	11	1.4	D,U	SW-846:8270C
	Hexachlorocyclopentadiene	5.4	54	5.4	D,U	SW-846:8270C
	Hexachloroethane	1.5	11	1.5	D,U	SW-846:8270C
	Indeno(1,2,3-cd)pyrene	3.7	11	3.7	D,U	SW-846:8270C
	Isophorone	1.1	11	1.1	D,U	SW-846:8270C
	Methylphenol, 3-&4-	1.3	22	1.3	D,U	SW-846:8270C
	Naphthalene	1.4	11	1.4	D,U	SW-846:8270C
	Nitroaniline[3-]	1.5	54	1.5	D,U	SW-846:8270C
	Nitrobenzene	1.7	11	1.7	D,U	SW-846:8270C
	N-Nitrosodiphenylamine	0.59	11	0.59	D,U	SW-846:8270C
	N-nitrosodipropylamine	1.5	11	1.5	D,U	SW-846:8270C
	Pentachlorophenol	2.2	54	2.2	D,U	SW-846:8270C
Phenanthrene	1.1	11	1.1	D,U	SW-846:8270C	
Phenol	1.2	11	1.2	D,U	SW-846:8270C	
Pyrene	1.5	11	1.5	D,U	SW-846:8270C	

D = Dilution

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

Table-6 NMED DOE OB FFY 2012 Q-4 Solid Waste Management Unit 68 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
OBS-MW3 19-Jul-12	Actinium-228	2.28 ± 4.9	9.62	U	EPA:901.1M
	Beryllium-7	22.1 ± 15	24.4	U	EPA:901.1M
	Bismuth-212	-10.4 ± 22	29	U	EPA:901.1M
	Bismuth-214	-1.36 ± 12	25.3	U	EPA:901.1M
	Cesium-134	-0.278 ± 1.2	2.21	U	EPA:901.1M
	Cesium-137	0.827 ± 1.2	2.02	U	EPA:901.1M
	Cobalt-60	1.08 ± 1.3	2.8	U	EPA:901.1M
	Gross Alpha	23.2 ± 5.9	2.12		EPA:900.0
	Gross Beta	6.1 ± 1.7	2.24		EPA:900.0
	Lead-212	0.501 ± 1.3	2.41	U	EPA:901.1M
	Lead-212	0.793 ± 2.9	4.64	U	EPA:901.1M
	Potassium-40	-22.7 ± 27	49.5	U	EPA:901.1M
	Protactinium-234m	103 ± 130	280	U	EPA:901.1M
	Sodium-22	-0.182 ± 1.5	2.8	U	EPA:901.1M
	Tallium-208	0.987 ± 1.1	2.27	U	EPA:901.1M
	Thorium-234	103 ± 130	280	U	EPA:901.1M
	Uranium-234	21.4 ± 2.9	0.00588		HASL-300:ISOU
	Uranium-235	0.176 ± 0.035	0.00668		HASL-300:ISOU
Uranium-238	3.92 ± 0.55	0.00898		HASL-300:ISOU	

U = Result is less than the sample detection limit.