

RESOURCE MANAGEMENT SERVICES, INC.

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65 Fenton Road
Indiana, Pennsylvania
15701EPA Permit# PAS2D020BLCE
DEP Permit# 37-033-27255-00-00

December 4, 2009

Waste Characterization

Dannic Energy - Green Glen #1 Disposal Well

Collector:

Dannic/MH

Analyses By:

Geo-Chemical Testing

Sample Identification:

RMS 1/11/13 RMS 2/11/13 RMS 3/11/13 RMS 4/11/13

Lab Identification:

G0911360-1 G0911360-2 G0911360-3 G0911360-4

Analyte

pH	4.91	6.30	7.50	5.31	Std Units
Alkalinity	<5	10	40	<5	Mg/l as CaCO3
Specific Conductance	186,000	705	91	199,000	umhos/cm
T. Dissolved Solids	199,000	2750	72	341,000	Mg/l
Chlorides	120,000	210	11	190,000	Mg/l
Lab Dissolved Oxygen	10	7.9	10	NA	Mg/l
T. Organic Carbon	18.6	210	12.7	2.2	Mg/l
Specific Gravity	1.150	1.001	1.001	NA	gm/ml
Sulfate	<5	10	<5	22	Mg/l
Sulfide	<0.1	<0.1	<0.1	<0.1	Mg/l
Aluminum	<1.0	3.1	32.6	<1.0	Mg/l
Barium	426	1.47	0.77	1,960	Mg/l
Calcium	20,500	38.2	14.3	36,900	Mg/l
Iron	70.4	15.6	88.7	300	Mg/l
Magnesium	2,410	3.6	14.7	2,200	Mg/l
Manganese	21.7	0.43	2.31	3.85	Mg/l
Sodium	23,800	94.2	6.5	22,300	Mg/l
Strontium	885	3.22	0.1700	25,300	Mg/l
Hardness	61,000	110	96.5	101,000	Mg/l as CaCO3

Submitted By:

Resource Management Services


Rick F. Bonazza

President

RMS 1/11/13 shallow brine
RMS 2/11/13 Marcellus
RMS 3/11/13 Drill Pit water
RMS 4/11/13 Oriskany

Clarion County, PA

Constituent	Units	Drill Pit Fluid 5/21/2010	Produced Water 11/17/2010
Acidity	mg/L	22.2	265
Aluminum	ug/L	442 B	399 B J
Ammonia Nitrogen	mg/L	199 J	241
Arsenic	ug/L	94.4 B J	100 U
Barium	ug/L	10500	16200
Benzene	ug/L	460	390
Beryllium	ug/L	40 U	40 U
Biochemical Oxygen Demand	mg/L	783	>2010
Boron	ug/L	15100	9330
Bromide	mg/L	713	999
Cadmium	ug/L	50 U	2.3 B
Calcium	ug/L	11500000 J	16800000
Chemical Oxygen Demand (COD)	mg/L	3810 J	8810
Chloride	mg/L	89100	135000
Chromium	ug/L	12.8 B	22.5 B
Cobalt	ug/L	1250 U	500 U
Copper	ug/L	250 U	250 U
Hardness, as CaCO3	mg/L	45000	86000
Iron	ug/L	30800	56600
Iron Dissolved	ug/L	30800	47200
Lead	ug/L	75 U	30 U
Lithium	ug/L	75600	148000
Magnesium	ug/L	1120000	1490000
Manganese	ug/L	3340	5280
Mercury	ug/L	0.2 U	0.2 U
Molybdenum	ug/L	400 U	400 U
Nickel	ug/L	1000 U	400 U
Nitrate-Nitrite	ug/L	NA	NA
Nitrate	mg/L	5 U G	25 U G
Nitrite	mg/L	5 U G	25 U G
Oil & Grease (HEM)	mg/L	63.9	2080
pH	No Units	6.2	6.0
Selenium	ug/L	50 U	50 U
Silver	ug/L	50 U	50 U
Sodium	ug/L	27900000	33400000
Specific Conductance	umhos/cm	245000 J	520000
Strontium	ug/L	1170000 / 1770000	310000 / 2600000
Sulfate	mg/L	240	153 B J
Toluene	ug/L	800	1900
Total Alkalinity	mg/L	73.8 J	4.7 B J
Total Dissolved Solids	mg/L	119000	260000
Total Kjeldahl Nitrogen	mg/L	NA	149
Total Recoverable Phenolics	mg/L	0.045 J	0.11 J
Total Suspended Solids	mg/L	91.0	102.0
Zinc	ug/L	75.4 B	90 B
MBAS	mg/L	0.199	0.025 U
Ethylene Glycol	mg/L	100 U	1000 U
Uranium	ug/L	5000 U	25000 U
Thorium	ug/L	10000 U	22100
Strontium-90	pCi/L	-29 U	NA
Gross Alpha	pCi/L	35000	10400
Gross Beta	pCi/L	10900	1910
Cesium 137	pCi/L	-6 U	NA

NOTES

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G - Reporting limit elevated due to matrix interference

Clearfield County, PA

Constituent	Units	Drill Pit Fluid 11/17/2010	Flow Back 11/17/2010
Acidity	mg/L	5 U	5 U
Aluminum	ug/L	1020 B	297 B J
Ammonia Nitrogen	mg/L	29.7	8
Arsenic	ug/L	33.5 B	100 U
Barium	ug/L	5180	9920
Benzene	ug/L	5 U	5 U
Beryllium	ug/L	40 U	40 U
Biochemical Oxygen Demand	mg/L	369	53.2
Boron	ug/L	362 B	1510 B J
Bromide	mg/L	5.1	28
Cadmium	ug/L	50 U	50 U
Calcium	ug/L	186000	373000
Chemical Oxygen Demand (COD)	mg/L	1420	286
Chloride	mg/L	13200	3490
Chromium	ug/L	1270	50 U
Cobalt	ug/L	500 U	500 U
Copper	ug/L	250 U	250 U
Hardness, as CaCO3	mg/L	580	1320
Iron	ug/L	1000	6800
Iron Dissolved	ug/L	491 B	3280
Lead	ug/L	14.5 B	30 U
Lithium	ug/L	242 B	3200
Magnesium	ug/L	15100 B	44300 B
Manganese	ug/L	4760	646
Mercury	ug/L	0.042 B	0.2 U
Molybdenum	ug/L	400 U	400 U
Nickel	ug/L	23.9 B	400 U
Nitrate-Nitrite	ug/L	NA	NA
Nitrate	mg/L	1.2 U	0.5 U G
Nitrite	mg/L	1.2 U G	0.5 U G
Oil & Grease (HEM)	mg/L	19.5	13.1
pH	No Units	7.1	7.4
Selenium	ug/L	50 U	50 U
Silver	ug/L	50 U	50 U
Sodium	ug/L	8030000	1570000
Specific Conductance	umhos/cm	45300	12300
Strontium	ug/L	5200 / 4130 J	117000 / 94700
Sulfate	mg/L	115	126 J
Toluene	ug/L	5 U	5 U
Total Alkalinity	mg/L	568	103 J
Total Dissolved Solids	mg/L	21700	6740
Total Kjeldahl Nitrogen	mg/L	34.3	8.52
Total Recoverable Phenolics	mg/L	0.024	0.016 J
Total Suspended Solids	mg/L	13.2	25.6
Zinc	ug/L	75.6 B	66.2 B
MBAS	mg/L	0.025 U	0.134
Ethylene Glycol	mg/L	1000 U	1000 U
Uranium	ug/L	10000 U	500 U
Thorium	ug/L	5000 U	510
Strontium-90	pCi/L	NA	NA
Gross Alpha	pCi/L	80 U	49
Gross Beta	pCi/L	170	21
Cesium 137	pCi/L	NA	NA

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Greene County, PA

Constituent	Units	Flow Back			Produced Water 4/9/2009
		3/24/2009	3/28/2009	4/1/2009	
Acidity	mg/L	5 U	5 U	5 U	5 U
Aluminum	ug/L	985 B	2,000 U	417 B	522 B
Ammonia Nitrogen	mg/L	90.7 J	110 J	91.4 J	116 J
Arsenic	ug/L	100 U	100 U	26.2 B	100 U
Barium	ug/L	603 B	150 B	13,000	306,000
Benzene	ug/L	75 U	5.1	3.1 J	31
Beryllium	ug/L	40 U	40 U	40 U	40 U
Biochemical Oxygen Demand	mg/L	26.6	36.8	122	218
Boron	ug/L	6,230 J	12,800 J	16,800 J	16,900 J
Bromide	mg/L	0.2 U	0.2 U	262	522
Cadmium	ug/L	50 U	50 U	50 U	50 U
Calcium	ug/L	33,100 B	32,500 B	1,860,000	4,490,000
Chemical Oxygen Demand (COD)	mg/L	705 J	506 J	1,380	3,040
Chloride	mg/L	338	39.6	24,900	46,500
Chromium	ug/L	12.7 B	50 U	28 B	49.9 B
Cobalt	ug/L	5.6 B	5.6 B	500 U	500 U
Copper	ug/L	90.1 B	250 U	250 U	250 U
Hardness, as CaCO3	mg/L	140	140	6,700	20,000
Iron	ug/L	4,600	30,200	17,500	34,000
Iron Dissolved	ug/L	NA	NA	NA	NA
Lead	ug/L	30 U	30 U	30 U	20 B
Lithium	ug/L	43.6 B	36.3 B	19,200	34,900
Magnesium	ug/L	7,820 B	8,530 B	201,000	472,000
Manganese	ug/L	191	598	1,160	2,410
Mercury	ug/L	0.82 B J	0.2 U	0.2 U	0.2 U
Molybdenum	ug/L	400 U	13 B	400 U	400 U
Nickel	ug/L	12.6 B	13.7 B	400 U	13.5 B
Nitrate-Nitrite	ug/L	0.57	0.77 J	0.87 J	0.77 J
Nitrate	mg/L	NA	NA	NA	NA
Nitrite	mg/L	NA	NA	NA	NA
Oil & Grease (HEM)	mg/L	8.6	8.2	6.8	6.4
pH	No Units	50 U	50 U	50 U	29 B
Selenium	ug/L	NA	NA	NA	NA
Silver	ug/L	NA	NA	NA	NA
Sodium	ug/L	NA	NA	NA	NA
Specific Conductance	umhos/cm	1,630	532	223,000	635,000
Strontium	ug/L	NA	NA	NA	NA
Sulfate	mg/L	10	25	2.3 J	23
Toluene	ug/L	194 J	112 J	356 J	206 J
Total Alkalinity	mg/L	1,230	1,010	40,400	83,100
Total Dissolved Solids	mg/L	108	181	148	131
Total Kjeldahl Nitrogen	mg/L	NA	NA	NA	NA
Total Recoverable Phenolics	mg/L	400	0.01 U	90	30.8
Total Suspended Solids	mg/L	83 J	25	15 U	14 J
Zinc	ug/L	NA	NA	NA	NA
MBAS	mg/L	10 U	10 U	100 U	100 U
Ethylene Glycol	mg/L	NA	NA	NA	NA
Uranium	ug/L	NA	NA	NA	NA
Thorium	ug/L	NA	NA	NA	NA
Strontium-90	pCi/L	NA	NA	NA	NA
Gross Alpha	pCi/L	NA	NA	NA	NA
Gross Beta	pCi/L	NA	NA	NA	NA
Cesium 137	pCi/L	NA	NA	NA	NA

Greene County, PA

Constituent	Units	Flow Back				Produced Water
		4/1/2009	4/3/2009	4/7/2009	4/17/2009	4/17/2009
Acidity	mg/L	5 U	5 U	5 U	40.8	345
Aluminum	ug/L	166 B	176 B	571 B	539 B J	1020 B J
Ammonia Nitrogen	mg/L	15.6 J	36.3 J	70.3 J	NA	214 J
Arsenic	ug/L	100 U	100 U	35.4 B	50.8 B	100 U
Barium	ug/L	2210	26700	434000	1010000 J	2110000
Benzene	ug/L	5 U	7.8	5.8	17	5 U
Beryllium	ug/L	40 U	40 U	40 U	40 U	40 U
Biochemical Oxygen Demand	mg/L	788	158	106	32.4	26
Boron	ug/L	414 B J	8360 J	14400 J	16800	18600
Bromide	mg/L	32.8	172	536	880	1430
Cadmium	ug/L	50 U	50 U	50 U	4.4 B J	50 U
Calcium	ug/L	227000	1030000	4950000	9600000 J	19400000
Chemical Oxygen Demand (COD)	mg/L	996	1330	17700	4670	8570
Chloride	mg/L	3560	16900	48900	76800	121000 J
Chromium	ug/L	50 U	50 U	50 U	14 B J	50 U
Cobalt	ug/L	500 U	500 U	1000 U	1000 U	5000 U
Copper	ug/L	250 U	250 U	250 U	250 U	250 U
Hardness, as CaCO3	mg/L	1060	4700	20000	39200	106000
Iron	ug/L	1180	12400	28200	74800	144000
Iron Dissolved	ug/L	NA	NA	NA	NA	NA
Lead	ug/L	30 U	30 U	60 U	38.2 B J	30 U
Lithium	ug/L	808	11800	34600	56100	112000
Magnesium	ug/L	49400 B	131000	559000	1000000	1810000
Manganese	ug/L	189	782	2630	5170 J	10400
Mercury	ug/L	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Molybdenum	ug/L	400 U	19.7 B	8.7 B	400 U	400 U
Nickel	ug/L	400 U	10.6 B	800 U	800 U	400 U
Nitrate-Nitrite	ug/L	1.1 J	0.38 J	0.38 J	0.91 J	0.085 B
Nitrate	mg/L	NA	NA	NA	NA	NA
Nitrite	mg/L	NA	NA	NA	NA	NA
Oil & Grease (HEM)	mg/L	6.6 U	5 U	5.1	4.9 U	6.1
pH	No Units	7	6.9	6.5	6	5.9
Selenium	ug/L	50 U	50 U	50 U	30.1 B	50 U
Silver	ug/L	50 U	50 U	50 U	50 U	50 U
Sodium	ug/L	1460000	7540000	21300000	32600000	47700000
Specific Conductance	umhos/cm	4980 J	68400 J	183000 J	256000 J	468000
Strontium	ug/L	23200	139000	650000	1370000 J	2870000 J
Sulfate	mg/L	50.3	10.7 B J	40.2 B J	39.8 B J	42.4 B J
Toluene	ug/L	5.6	3.8 J	7.7	13	5 U
Total Alkalinity	mg/L	308 J	278 J	135 J	87.9 J	40.3 J
Total Dissolved Solids	mg/L	5910	28900	55100	124000	199000
Total Kjeldahl Nitrogen	mg/L	7.8	42.5	86.1	95.5	146
Total Recoverable Phenolics	mg/L	0.14 J	0.057 J	0.0076 B	0.011	0.0089 B
Total Suspended Solids	mg/L	1040	7	47	1100	237
Zinc	ug/L	200 U	406	264	200 U	147 B J
MBAS	mg/L	0.05 U	0.0621	0.258	0.05 U	0.05 U
Ethylene Glycol	mg/L	1000 UJ	100 UJ	100 UJ	50 UJ	50 UJ
Uranium	ug/L	NA	NA	NA	NA	NA
Thorium	ug/L	NA	NA	NA	NA	NA
Strontium-90	pCi/L	NA	NA	NA	NA	NA
Gross Alpha	pCi/L	NA	NA	NA	NA	NA
Gross Beta	pCi/L	NA	NA	NA	NA	NA
Cesium 137	pCi/L	NA	NA	NA	NA	NA

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Greene County, PA

Constituent	Units	Flow Back			Produced Water 5/13/2009
		2/12/2009	2/13/2009	2/17/2009	
Acidity	mg/L	5 U	5 U	5 U	162
Aluminum	ug/L	298 J	887 J	47200 J	358 B
Ammonia Nitrogen	mg/L	1.8 J	5.4 J	34.1 J	96
Arsenic	ug/L	10 U	17.5	92.9	54 B
Barium	ug/L	111 B	7620	165000	1440000
Benzene	ug/L	2000 U	250 U	100 U	5 U
Beryllium	ug/L	4 U	4 U	20 U	40 U
Biochemical Oxygen Demand	mg/L	438	656	721	1080
Boron	ug/L	109 B E	5420	12200	13000 J
Bromide	mg/L	1	35.5	242	766
Cadmium	ug/L	5 U	5 U	7.4 B	2.5 B
Calcium	ug/L	52700	297000	2260000 J	8500000 J
Chemical Oxygen Demand (COD)	mg/L	3450	1290	6970	8590
Chloride	mg/L	234	4900 J	26800 J	78300
Chromium	ug/L	4.3 B	32.6	130	50 U
Cobalt	ug/L	1.1 B	50 U	250 U	1000 U
Copper	ug/L	28.6	22.5 B	2280	250 U
Hardness, as CaCO ₃	mg/L	230	1500	8400	40000
Iron	ug/L	1720	14700	140000 J	87800
Iron Dissolved	ug/L	NA	NA	NA	NA
Lead	ug/L	4.7	3	349	45.6 B
Lithium	ug/L	17.5 B	4350	21400	44500
Magnesium	ug/L	16700	40800	291000	933000
Manganese	ug/L	146	1150	3290	4720
Mercury	ug/L	0.025 B	0.05 B J	0.24 J	0.2 U
Molybdenum	ug/L	40 U	10.5 B	50.5 B J	400 U
Nickel	ug/L	6.2 B	17.6 B	187 B	800 U
Nitrate-Nitrite	ug/L	0.73 J	0.61 J	0.52 J	0.1 U
Nitrate	mg/L	NA	NA	NA	NA
Nitrite	mg/L	NA	NA	NA	NA
Oil & Grease (HEM)	mg/L	NA	4.8 U	350	21.3
pH	No Units	7.1	7.7	6.6	6.2
Selenium	ug/L	5 U	4.3 B	25 U	50 U
Silver	ug/L	5 U	5 U	25 U	50 U
Sodium	ug/L	321000	2860000	12900000	26900000
Specific Conductance	umhos/cm	1970 J	19200 J	122000 J	249000 J
Strontium	ug/L	789 J E	24100 J	345000	1220000
Sulfate	mg/L	374 J	348 J	25.9 J	50 G U
Toluene	ug/L	2000 U	250 U	100 U	5 U
Total Alkalinity	mg/L	120 J	577 J	266 J	75.2 J
Total Dissolved Solids	mg/L	1410	9020	40700	155000
Total Kjeldahl Nitrogen	mg/L	25.8	21.8	46.5	92.8
Total Recoverable Phenolics	mg/L	0.065 J	0.01 U	0.028	0.0091 B
Total Suspended Solids	mg/L	16	23.2	3220	153
Zinc	ug/L	43.6	248	2930 J	29.3 B J
MBAS	mg/L	NA	3.38	0.210	4.54
Ethylene Glycol	mg/L	50 U	50 U	52	100 UJ
Uranium	ug/L	NA	NA	NA	NA
Thorium	ug/L	NA	NA	NA	NA
Strontium-90	pCi/L	NA	NA	NA	NA
Gross Alpha	pCi/L	NA	NA	NA	NA
Gross Beta	pCi/L	NA	NA	NA	NA
Cesium 137	pCi/L	NA	NA	NA	NA

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Indiana County, PA

Constituent	Units	Produced Water 11/17/2010	
Acidity	mg/L	24.0	
Aluminum	ug/L	226	B J
Ammonia Nitrogen	mg/L	85.1	
Arsenic	ug/L	100	U
Barium	ug/L	2610000	
Benzene	ug/L	5	U
Beryllium	ug/L	40	U
Biochemical Oxygen Demand	mg/L	668	
Boron	ug/L	16300	
Bromide	mg/L	624	
Cadmium	ug/L	50	U
Calcium	ug/L	10300000	
Chemical Oxygen Demand (COD)	mg/L	7770	
Chloride	mg/L	68900	
Chromium	ug/L	155	
Cobalt	ug/L	2500	U
Copper	ug/L	250	U
Hardness, as CaCO ₃	mg/L	36000	
Iron	ug/L	131000	
Iron Dissolved	ug/L	101000	
Lead	ug/L	30	U
Lithium	ug/L	89900	
Magnesium	ug/L	914000	
Manganese	ug/L	3780	
Mercury	ug/L	0.2	U
Molybdenum	ug/L	400	U
Nickel	ug/L	400	U
Nitrate-Nitrite	ug/L	NA	
Nitrate	mg/L	5	U G
Nitrite	mg/L	5	U G
Oil & Grease (HEM)	mg/L	95.3	
pH	No Units	6.6	
Selenium	ug/L	50	U
Silver	ug/L	50	U
Sodium	ug/L	28000000	
Specific Conductance	umhos/cm	245000	
Strontium	ug/L	1900000 / 2440000	
Sulfate	mg/L	35.7	B J
Toluene	ug/L	5	U
Total Alkalinity	mg/L	141	J
Total Dissolved Solids	mg/L	94400	
Total Kjeldahl Nitrogen	mg/L	23.1	
Total Recoverable Phenolics	mg/L	0.065	J
Total Suspended Solids	mg/L	97	
Zinc	ug/L	110	B
MBAS	mg/L	0.0581	
Ethylene Glycol	mg/L	1000	U
Uranium	ug/L	25000	U
Thorium	ug/L	12700	
Strontium-90	pCi/L	NA	
Gross Alpha	pCi/L	16600	
Gross Beta	pCi/L	4790	
Cesium 137	pCi/L	NA	

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Washington County, PA

Constituent	Units	Supply Water	Flow Back				Produced Water
		3/24/2009	3/24/2009	3/27/2009	4/1/2009	4/9/2009	6/29/2009
Acidity	mg/L	5 U	5 U	5 U	5 U	122	388
Aluminum	ug/L	2000 U	2000 U	510 B	950 B	1450 B	2570
Ammonia Nitrogen	mg/L	20.8 J	12.9 J	60.3 J	115 J	135 J	168 J
Arsenic	ug/L	100 U	100 U	36.9 B	78.4 B	82.8 B	109
Barium	ug/L	74.7 B	91.4 B	19200	77100	83100	87200
Benzene	ug/L	5 U	5 U	280	880	400	290
Beryllium	ug/L	40 U	40 U	40 U	40 U	40 U	40 U
Biochemical Oxygen Demand	mg/L	2.7	154	75.4	64.8	120	12400
Boron	ug/L	65.9 B J	122 B J	12600 J	12200 J	14700 J	12700
Bromide	mg/L	0.2 U	0.2 U	376	826	1040	1600
Cadmium	ug/L	50 U	50 U	50 U	2.2 B	4.7 B	3.2 B
Calcium	ug/L	49800 B	59500	3980000	8880000	14000000	2E+07 J
Chemical Oxygen Demand (COD)	mg/L	13.2 J	851 J	2470 J	5170	8370	18400
Chloride	mg/L	18.5	30.7	31500	72000	100000	138000 J
Chromium	ug/L	50 U	50 U	11.4 B	39.3 B	32.8 B	15.8 B
Cobalt	ug/L	500 U	500 U	10.5 B	1000 U	2500 U	5000 U
Copper	ug/L	250 U	49.3 B	62.1 B	116 B	73.3 B	250 U
Hardness, as CaCO3	mg/L	182	190	12300	34000	53000	77000
Iron	ug/L	882 B	2440	12200	49600	75200	68700 J
Iron Dissolved	ug/L	NA	NA	NA	NA	NA	NA
Lead	ug/L	30 U	30 U	25.2 B	61	106 B	300 U
Lithium	ug/L	500 U	30.1 B	33900	55900	86000	105000
Magnesium	ug/L	6700 B	7910 B	394000	881000	1380000	2E+06
Manganese	ug/L	116 B	140 B	2390	4680	7320	8990 J
Mercury	ug/L	0.61 B J	0.66 B J	0.065 B J	0.2 U	0.2 U	0.2 U
Molybdenum	ug/L	400 U	400 U	11.5 B	30.8 B	400 U	400 U
Nickel	ug/L	400 U	25.1 B	15.3 B	26.4 B	2000 U	4000 U
Nitrate-Nitrite	ug/L	0.51	0.47	0.45 J	0.34 J	0.25 J	0.1 U
Nitrate	mg/L	NA	NA	NA	NA	NA	NA
Nitrite	mg/L	NA	NA	NA	NA	NA	NA
Oil & Grease (HEM)	mg/L	4.7 U	7.3	4.9 U	20.4	9.9	802
pH	No Units	6.7	7	6.4	6.4	6.2	5.9
Selenium	ug/L	50 U	50 U	50 U	50 U	50 U	49.9 B
Silver	ug/L	50 U	50 U	50 U	50 U	50 U	50 U
Sodium	ug/L	7980 B	25700 B	14700000	23700000	34000000	4E+07
Specific Conductance	umhos/cm	575 J	476 J	124000 J	233000 J	288000 J	480000 J
Strontium	ug/L	220 B	303 B	539000	1350000	2100000	3E+06 J
Sulfate	mg/L	139	59.2	102	60.7 B	89.3 J	32.8 B J
Toluene	ug/L	1.1 J	5 U	300	920	540	1600
Total Alkalinity	mg/L	80.9 J	126 J	157 J	54 J	60.2 J	11.5 J
Total Dissolved Solids	mg/L	215	462	61200	116000	157000	200000
Total Kjeldahl Nitrogen	mg/L	56.4	33.5	77.7	55.9	127	87.7
Total Recoverable Phenolics	mg/L	0.01 U	0.085	0.058	0.016 J	0.01 U	0.23
Total Suspended Solids	mg/L	16.8	90 B	6.8	204	209	83
Zinc	ug/L	200 U	59.5 B J	132 B J	106 B	123 B	218
MBAS	mg/L	0.0613	0.112	0.0641	0.05 U	0.465	0.699
Ethylene Glycol	mg/L	10 U	44	10 U	100 UJ	100 UJ	290 J
Uranium	ug/L	NA	NA	NA	NA	NA	NA
Thorium	ug/L	NA	NA	NA	NA	NA	NA
Strontium-90	pCi/L	NA	NA	NA	NA	NA	NA
Gross Alpha	pCi/L	NA	NA	NA	NA	NA	NA
Gross Beta	pCi/L	NA	NA	NA	NA	NA	NA
Cesium 137	pCi/L	NA	NA	NA	NA	NA	NA

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Washington County, PA

Constituent	Units	Flow Back				Produced Water
		1/26/2009	1/29/2009	2/2/2009	2/10/2009	4/29/2009
Acidity	mg/L	5 U	5 U	107	106	185
Aluminum	ug/L	481	328	166 B	1000 U	811 B J
Ammonia Nitrogen	mg/L	9.3 J	32 J	82.4 J	107 J	259
Arsenic	ug/L	9.1 B	13.5	50 U	12.6 B	114
Barium	ug/L	9810	3570	21400 J	74200 J	133000
Benzene	ug/L	150 U	240	1200	420	360
Beryllium	ug/L	4 U	4 U	20 U	2.2 B	40 U
Biochemical Oxygen Demand	mg/L	2 U	132	1950	149	33.6
Boron	ug/L	2140 J	9260 J	14300 J	16200 J	13500 J
Bromide	mg/L	107	120	544	849	1380 J
Cadmium	ug/L	10.5	5 U	25 U	1.4 B	7.7 B
Calcium	ug/L	2990000	1370000 J	7630000 J	12500000 J	1.8E+07 J
Chemical Oxygen Demand (COD)	mg/L	1730	1340	6120	4340	36600
Chloride	mg/L	10700 J	10500 J	50000	78600 J	122000
Chromium	ug/L	4.8 B	11.1	7.5 B	8.4 B	20.9 B
Cobalt	ug/L	50 U	50 U	250 U	250 U	2500 U
Copper	ug/L	21 B	25 U	125 U	125 U	27.2 B
Hardness, as CaCO3	mg/L	9500	4700	26400	43500	85000
Iron	ug/L	11600	6030	20400 J	54200	69700
Iron Dissolved	ug/L	NA	NA	NA	NA	NA
Lead	ug/L	111	3.8	15 U	15 U	68 B
Lithium	ug/L	14900 J E	13900 E	49100 J E	73700 J	88600
Magnesium	ug/L	235000	153000	817000	1330000 J	1710000
Manganese	ug/L	3640	1060	4220	7090	8830
Mercury	ug/L	0.55 J	0.05 B	0.023 B	0.049 B J	0.2 U
Molybdenum	ug/L	8.9 B J	28.8 B J	9.6 B J	6.8 B J	400 U
Nickel	ug/L	10.4 B	18.6 B J	11 B	7 B	2000 U
Nitrate-Nitrite	ug/L	0.15	0.27 J	0.15 J	0.089 B J	NA
Nitrate	mg/L	NA	NA	NA	NA	NA
Nitrite	mg/L	NA	NA	NA	NA	NA
Oil & Grease (HEM)	mg/L	19.4	5.7	4.8 U	30.8	14.7
pH	No Units	7.6	7.8	6.6	5.5	6.1
Selenium	ug/L	5 U	5 U	25 U	25 U	44 B
Silver	ug/L	0.82 B	0.73 B	2.8 B	5.5 B	50 U
Sodium	ug/L	6190000	6370000	22000000 J	32500000 J	3.4E+07
Specific Conductance	umhos/cm	34600 J	48800 J	175000 J	284000 J	440000 J
Strontium	ug/L	439000 E	167000 E	1080000 J E	1850000 J	2520000
Sulfate	mg/L	198 J	222 J	106	60.1 J	83.8 J
Toluene	ug/L	81 J	340	2300	820	660
Total Alkalinity	mg/L	121 J	226 J	97.6 J	53.2 J	43.1 J
Total Dissolved Solids	mg/L	27800	22400	87800	112000	194000
Total Kjeldahl Nitrogen	mg/L	23	51	71.7	112	136
Total Recoverable Phenolics	mg/L	0.082	0.064	0.01 U	0.015	0.039 J
Total Suspended Solids	mg/L	790	81	35.6	17	150
Zinc	ug/L	117 J	86.9 J	84.9 B J	66.8 B	73.8 B J
MBAS	mg/L	0.500 U	0.0691	0.131	0.0857	0.138
Ethylene Glycol	mg/L	20.1	20.6	20.8	11	100 UJ
Uranium	ug/L	NA	NA	NA	NA	NA
Thorium	ug/L	NA	NA	NA	NA	NA
Strontium-90	pCi/L	NA	NA	NA	NA	NA
Gross Alpha	pCi/L	NA	NA	NA	NA	NA
Gross Beta	pCi/L	NA	NA	NA	NA	NA
Cesium 137	pCi/L	NA	NA	NA	NA	NA

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Washington County, PA

Constituent	Units	Flow Back			Produced Water 4/22/2009
		4/16/2009	4/16/2009	4/18/2009	
Acidity	mg/L	5 U	5 U	5 U	5 U
Aluminum	ug/L	176 B J	2000 U	526 B J	315 B J
Ammonia Nitrogen	mg/L	0.2 U	2	16	165 J
Arsenic	ug/L	100 U	100 U	100 U	57.1 B
Barium	ug/L	61 B J	114 B J	2,520 J	249,000 J
Benzene	ug/L	5 U	5 U	2.5 J	17
Beryllium	ug/L	40 U	40 U	40 U	40 U
Biochemical Oxygen Demand	mg/L	2 U	442	101	122
Boron	ug/L	42.6 B	87.1 B	6,520	15,700
Bromide	mg/L	0.2 U	1 G U	82.9	386
Cadmium	ug/L	50 U	50 U	50 U	1.4 B J
Calcium	ug/L	23,500 B J	29,700 B J	465,000 J	3,400,000 J
Chemical Oxygen Demand (COD)	mg/L	32.6	1,740	1,080	2,820
Chloride	mg/L	19.6	75.5	7,430	35,600
Chromium	ug/L	50 U	50 U	13.1 B J	30 B J
Cobalt	ug/L	500 U	500 U	5.7 B	500 U
Copper	ug/L	250 U	250 U	250 U	250 U
Hardness, as CaCO ₃	mg/L	84	110	1,660	11,000
Iron	ug/L	105 B	293 B	7,660	27,200
Iron Dissolved	ug/L	NA	NA	NA	NA
Lead	ug/L	30 U	30 U	30 U	30 U
Lithium	ug/L	500 U	27.5 B	8,730	34,400
Magnesium	ug/L	5,540 B	6,200 B	45,100 B	329,000
Manganese	ug/L	10.4 B J	64 B J	681 J	1,680 J
Mercury	ug/L	0.2 U	0.2 U	0.2 U	0.2 U
Molybdenum	ug/L	400 U	400 U	73.1 B E	46.2 B
Nickel	ug/L	400 U	400 U	400 U	400 U
Nitrate-Nitrite	ug/L	0.4 J	0.46 J	0.51 J	0.43 J
Nitrate	mg/L	NA	NA	NA	NA
Nitrite	mg/L	NA	NA	NA	NA
Oil & Grease (HEM)	mg/L	7.3	7	7.3	6.6
pH	No Units	50 U	50 U	50 U	50 U
Selenium	ug/L	NA	NA	NA	NA
Silver	ug/L	NA	NA	NA	NA
Sodium	ug/L	NA	NA	NA	NA
Specific Conductance	umhos/cm	208 B J	564 J	53,800 J	477,000 J
Strontium	ug/L	NA	NA	NA	NA
Sulfate	mg/L	5 U	5 U	1.6 J	20
Toluene	ug/L	32.6 J	75.8 J	270 J	176 J
Total Alkalinity	mg/L	80	657	12,900	64,700
Total Dissolved Solids	mg/L	2.8 B	50	17.6	107
Total Kjeldahl Nitrogen	mg/L	NA	NA	NA	NA
Total Recoverable Phenolics	mg/L	4.4	220	109	24
Total Suspended Solids	mg/L	15 U	3.3 J	15 U	15
Zinc	ug/L	NA	NA	NA	NA
MBAS	mg/L	50 U	100 U	NA	NA
Ethylene Glycol	mg/L	NA	NA	NA	NA
Uranium	ug/L	NA	NA	NA	NA
Thorium	ug/L	NA	NA	NA	NA
Strontium-90	pCi/L	NA	NA	NA	NA
Gross Alpha	pCi/L	NA	NA	NA	NA
Gross Beta	pCi/L	NA	NA	NA	NA
Cesium 137	pCi/L	NA	NA	NA	NA

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