GROUNDWATER HYDROLOGY (880-X-8E-.06(1))

Description of Groundwater Hydrology

Groundwater availability is determined by the inherent water-bearing characteristics of aquifers which are controlled by geologic factors such as type, permeability, and structure of strata which make up the aquifers. On the Cumberland Plateau, groundwater occurs along well defined fractures, joints and bedding planes of the alternating sequences of the sandstones and shales within the Pottsville Formation. Recharge of aquifers is primarily by the infiltration of rainfall which percolates downward through openings along joints, fractures and bedding planes. As stated in "Geohydrology and Susceptibility of Major Aquifers to Surface Water Contamination in Alabama; Area 2; U.S.G.S. Water-Resources Investigations Report 88-4177", the Pottsville Formation is the predominate aquifer of north Alabama but large water supplies generally are not available from the this formation. Groundwater occurs in conditions where the underlying stratum prevents downward percolation of water and forms a "perched" water table along the alternating sequences of clays, sandstones, shales and coal seams. These perched zones are susceptible to climatic conditions such as seasonal precipitation variations and frequency of rainfall which can cause an increase in aquifer storage and groundwater pressure. In general, permeability decreases with depth and as stated in "Regional Analysis of the Black Creek-Cobb Coalbed Methane Target Interval, Black Warrior Alabama, U.S.G.S. Bulletin 145" structural geology is a primary control on the hydrologic system. The production of water for water wells in the formation decreases with depth and these wells are typically developed in the weathered near-surface part of the Pottsville at an average depth of 150 feet. Due to decreasing permeability of the Pottsville, little additional water production is obtained below a depth of approximately 400 feet.

Ground water production is variable by local conditions in the Pottsville Formation and wells developed in this formation generally do not produce excessive groundwater as compared to the limestone aquifers of the Appalachian Plateaus and Interior Low Plateaus of Alabama. According to "Ground Water Atlas of the United States, U.S.G.S. Report HA 730-G", the sandstone beds of the Pottsville Formation yield small volumes of water, but the Pottsville supplies water to a large number of domestic wells because it caps thousands of square miles of upland plateaus. Water in the sandstone is obtained primarily from fractures. Recharge is primarily by the infiltration of rainfall which percolates downward through the soil and weathered rock horizon into the formation and is generally stored in and transmitted through openings along joints, fractures and bedding planes.

The overburden within the permit area is atypical of the Pottsville Formation as described with alternating layers of sandstones, shales, clays and coal seams and is capped by conglomeratic massive sandstone intervals. Information from this site shows that very little water is present in the strata above the coal seam and no distinct stratigraphic zones were encountered that consistently produce water were encountered during data collection. Groundwater movement near the Bull Gap Mine is believed to be in the direction of dip that is primarily to the south/southwest, based on the data obtained from drill holes. No springs and/or seeps were noted on the proposed permit area.

Lithologic Description of Water Bearing Zone(s)

Minimal groundwater was encountered during drilling of the Monitoring Wells/ Overburden Sample points. Water was noted on several drill logs by Cedar Lake Mining, Inc. and several of the lower intervals produced enough water to expel wet cuttings during the drilling of the monitoring wells. Groundwater qualities, levels and quantities are determined at the site by geology, extents of surface and underground mine works and climatic conditions. OB-01/MW-01 was drilled by MS&R

Equipment Company Inc. on 10/20/2008 and a ten (10) foot casing was installed at the time of drilling. The site of OB-01/MW-01 is located on Increment No. 1 and was drilled to a depth of 110.0 feet that penetrated both the Lower Bynum and the Underwood Seams. The site is in old surface coal mine works where the Upper Bynum seam was area mined. OB-02/MW-02 is located at the boundary of Increment No. 1 and Increment No. 3 on the upper limb of the Raccoon Mountain Syncline and was drilled on 10/23/2008 to a total depth of 87.00 feet. This hole was cased ten (10) feet into massive sandstone and the drillhole penetrated the Underwood Seam. OB-03/MW-03 is located on Increment No. 5 and was drilled on 03/11/2009 to a depth of 122.00 feet. OB-03/MW-03 penetrated both the Upper and Lower Bynum Seams and was cased twenty (20) feet into hard sandstone. (The Underwood Seam is not minable on Increment No. 5 due to extensive underground works so the overburden/groundwater monitoring well only penetrated through the Lower Bynum.) OB-04/MW-04 is located on Increment No. 4 near the head of Bull Gap Hollow and was drilled on 10/24/2009 to a depth of 180.00 feet. This hole was cased twenty (20) feet into hard sandstone and penetrated the Underwood Seam. The Upper Bynum pinches out in this area and no recorded seam thickness and/or marker was noted by the personnel of MS&R Equipment Company Inc. (See drawings OB-01/MW-01, OB-02/MW-02, OB-03/MW-03 and OB-04/MW-04 for details of these overburden/groundwater monitoring well and corresponding site data and wellhead protection appliances installed at each well.)

On March 18, 2009, the first groundwater samples were taken by TASK Engineering Management Inc. after giving all monitoring wells time to stabilize. On this date the monitoring wells showed the following depths:

MONITORING WELL ID	DEPTH TO WATER	WATER ELEVATION (MSL)
MW-01	74.95	1,040.58
MW-02	36.90	1,091.94
MW-03	83.20	1,124.93
MW-04	44.00	1,210.95

Note that the Raccoon Mountain Syncline structures have determined the relative groundwater elevations on this site. Several local normal thrust faults have occurred along the southeast limb of the syncline but due to small vertical displacements, these faults have not resulted in local variations of the groundwater elevation. (See Hydro-Geo Map). The extents of the underground mining of the Underwood Seam and local geology create an artificial aquifer whose waters exit the site from the location of the proposed Basin 001E. Seasonal variations indicate that the water volume stored in the abandoned underground mine works drops to a low level during dry seasons or periods of low precipitation. At total of twenty-eight (28) groundwater samples were collected from March 18, 2008 through June 19, 2011 and showed little variation other than seasonal lows and highs. For a more detailed description of the lithology of the Pottsville water bearing zones see the attached Lithologic fence diagrams (cross-sections) in Part II-E, drawings Geologic Section A-A', Geologic Section B-B' , Geologic Section C-C' and Geologic Section D-D' as shown in drawing Geologic Fence Diagrams .

Aquifer Test(s):

Aquifer test(s) have not been required at this time.

Well Inventory:

A well inventory is pending. Three (3) residences are located within one-half (1/2) mile of the mine site and are located on the south/southwest side of Straight Mountain.

Groundwater Baseline Quality:

See attached Groundwater Baseline Analysis.

Geologic Structures that Impact Groundwater Movement

The Raccoon Mountain/Blount Mountain Syncline directly impacts the movement of groundwater at Bull Gap Mine. As stated previously in the geologic section of this permit, Blount Mountain has been isolated from the Plateau Coal Field by a major unnamed thrust fault that has dropped the coal measures at least two hundred (200) feet down on the southeast side of the axis of Murphree Valley Anticline. This thrust fault and other geologic forces that tilted the Raccoon Mountain Syncline upward on its southeastern limb determines that groundwater flow be directed generally to the southwest along the primary dip of the local strata. For maps and cross-sections to support the geology/lithology of this site, see the attached Structural Contour Map (Hydro-Geo Map) and

Geologic Fence Diagrams, Geologic Section A-A', Geologic Section B-B' , Geologic Section C-C' and Geologic Section D-D' (cross-sections) in Part II-E.

Groundwater Description Support Data:

All maps Fence Diagrams (cross-sections) are certified under Attachment II-H, Certification Statement.

Groundwater Sampling and Analytical Methods:

Groundwater samples were taken by TASK Engineering Management Inc. from the installed monitoring wells at the proposed mine site by the following methods:

1) Prior to starting the groundwater sampling sequence, the groundwater level was measured using the top of the casing as a reference point. This level and/or depth to the water surface was then measured using a "Solinst Water Level Meter 101" which will electronically read the existing water level and measure to an accuracy of 1/100' and to a depth of 300'. Ground surface elevations are determined by aerial photographs and digital terrain models and final water elevations are determined by correction (subtraction) of the stickup interval value measured for each individual well to adjust to actual surface elevation (MSL) and final determination of the water elevation (MSL).

2) Once water elevation is determined, the monitoring well is bailed using a three (3) inch diameter, three (3) foot length PVC well bailer to purge at least ten (10) bailer volumes (where the water quantities are available in the well). The well will then be allowed to recover for a minimum of one (1) hour.

3) After purging and recovery, the monitoring well is sampled using a "Solinst Stainless Steel Point Source Bailer-Model 429" which allows samples of groundwater from specific depths using a system of top and bottom ball valves. Samples are taken approximately ten (10) feet above the coal seam as determined from drill logs and developed geologic columns.

Note: Samples are taken approximately ten (10) feet above the coal seam because most coal seams within the Pottsville Formation are generally fairly good aquifers due to the cleat systems found in coal and representative samples can be taken by this method.

4) Monitoring well samples are decanted from the bailer into new, clean plastic sample bottles immediately after removing the bailer from the well. Depth to water surface, pH and Conductivity are measured in the field. After all field measurements are completed, the time, date, mine identification and monitoring well identification are recorded on the sample bottle and on a chain of custody form to maintain documentation and sample integrity. Samples are then deposited

in a field cooler with ice to refrigerate to near 4°C for delivery to the TASK Engineering Management Inc. offices for further chemical testing.

5) The bailer is washed with distilled water and dried after each sample sequence to avoid contamination.

All groundwater samples were taken by the hand-dip (grab) method as defined by the 17th Edition of Standard Methods for the Examination of Water and Wastewater. See following for description and documentation of methodology of analyses:

1) Analysis of pH was a direct reading and performed in accordance with the standard operating procedures of the Hach Company's sensION1 Portable pH meter.

2) Analysis of Conductivity, SpC, was a direct reading and performed in accordance with the standard operating procedures of the Hach Company's DR3 Spectrophotometer which is equipped with a conductivity meter.

3) Analysis of Total Iron, Fe, was utilizing a Hach DR/890 Colorimeter and performed in accordance with the Hach DR/820-DR/850-DR/890 Datalogging Colorimeter Handbook, "FerroVer Method", pp.227 through 233 (USEPA approved).

4) Analysis of Total Manganese, Mn, was performed in accordance with the Hach DR/820-DR/850-DR/890 Datalogging Colorimeter Handbook, "Periodate Oxidation Method", pp.253 through 261 (USEPA approved).

5) Analysis of Sulfate, SO_4, was performed in accordance with the Hach DR/820-DR/850-DR/890 Datalogging Colorimeter Handbook, "SulfaVer 4 Method", pp.539 through 545 (USEPA approved).

6) Analysis of Acidity was performed by digital titration in accordance with the Hach Water Analysis Handbook , "Methyl Orange Method" pp.2-3 through 2-5.

7) Analysis of Alkalinity was performed by digital titration in accordance with the Hach Water Analysis Handbook, "Titration Method" pp.2-9 through 2-12.

NOTE: Any chemical analyses parameters outside the ability of TASK Engineering Management Inc. will be sent to ESC Lab Sciences for processing. Samples not analyzed by TASK Engineering Management Inc. will be so noted by correspondence to the Regulatory Authority.

Results of Groundwater Sampling and Analytical Data for Each Sample

See attached Groundwater Water Baseline Tables. All groundwater samples were analyzed for pH, Total Iron, Total Manganese, Conductivity, Sulfates, Acidity, Alkalinity, Water Depth and Water Elevation.

GROUNDWATER BASELINE ANALYSIS

SAMPLE I.D.: MW-01
MONITORING SOURCE: WELL
SURFACE ELEVATION: 1112.75 FT.
CASING STICKUP: 2.58 FT. (31")
MONITORING ELEVATION: 1115.53 FT.

DATE	H2O DEPTH FT.	H2O ELEV. FT.	pH s.u.	SpC u-mhos/cm	Fe Mg/l	Mn Mg/l	SO4 Mg/l	ACID Mg/l	ALKA Mg/l
03/18/09	74.95	1040.58	6.09	1000	2.17	2.60	360	15	29
04/22/09	73.26	1042.27	5.33	1255	2.45	3.17	256	24	31
05/19/09	72.22	1043.31	5.79	1100	2.33	3.05	332	22	35
06/24/09	73.96	1041.57	6.12	890	2.04	2.85	157	18	28
07/23/09	73.55	1041.98	6.04	995	1.96	2.45	250	16	33
08/22/09	74.01	1041.52	6.10	945	2.21	2.78	223	28	36
09/29/09	73.20	1042.33	5.98	1145	2.09	2.55	324	29	44
10/21/09	72.85	1042.68	6.89	1120	0.36	0.90	305	31	48
11/25/09	74.25	1041.28	5.55	705	2.14	2.36	350	34	46
12/22/09	73.57	1041.96	5.23	845	1.89	3.11	345	44	54
01/27/10	75.35	1042.18	5.40	1055	2.45	3.06	226	37	47
02/24/10	74.16	1041.37	6.00	1010	2.10	2.14	220	22	34
03/23/10	73.56	1041.97	5.91	1075	1.55	2.75	197	25	40
04/21/10	75.25	1040.28	5.45	1235	2.36	3.02	245	26	45
05/26/10	76.14	1039.39	6.13	745	1.68	2.31	236	21	36
06/23/10	76.74	1038.79	6.03	550	1.87	2.94	159	19	25
07/23/10	77.03	1038.50	5.47	855	2.23	3.24	312	26	41
08/25/10	76.79	1038.74	5.68	1065	2.56	2.54	227	20	40
09/22/10	78.55	1036.98	6.11	1075	2.26	2.69	332	14	26
10/20/10	78.69	1036.84	5.84	1145	2.05	2.55	274	24	34
11/22/10	75.89	1039.64	5.89	1100	1.69	2.63	255	26	33
12/21/10	75.22	1040.31	6.04	1025	2.14	2.06	179	18	36
01/26/11	74.94	1040.59	5.31	1200	2.25	2.46	238	27	41
02/23/11	72.15	1043.38	5.58	1235	2.36	2.44	224	26	46
03/25/11	70.50	1045.03	5.12	1275	1.98	2.22	118	33	55
04/24/11	72.16	1043.37	5.26	1195	2.26	2.58	126	31	50
05/25/11	73.22	1042.31	5.37	1045	2.05	2.77	146	29	44
06/19/11	75.66	1039.87	5.88	1006	6.28	3.20	332	32	48

GROUNDWATER BASELINE ANALYSIS

SAMPLE I.D.: MW-02
MONITORING SOURCE: WELL
SURFACE ELEVATION: 1127.09 FT.
CASING STICKUP: 1.75 FT. (21")
MONITORING ELEVATION: 1128.84 FT.

DATE	H2O DEPTH FT.	H2O ELEV. FT.	pH s.u.	SpC u-mhos/cm	Fe Mg/l	Mn Mg/l	SO4 Mg/l	ACID Mg/l	ALKA Mg/l
03/18/09	36.90	1091.94	3.50	1100	7.04	31.00	310	36	55
04/22/09	28.11	1090.73	4.21	900	5.69	25.00	430	30	44
05/19/09	25.29	1093.55	4.66	925	6.01	28.00	452	27	45
06/24/09	27.96	1090.88	3.94	1055	6.58	25.00	296	38	51
07/23/09	28.68	1090.16	4.08	965	6.11	28.00	349	32	41
08/22/09	26.44	1092.40	3.68	1035	7.01	27.00	397	41	61
09/29/09	24.76	1094.08	4.89	750	5.22	21.00	348	36	54
10/21/09	23.60	1095.24	4.16	850	7.42	26.75	295	24	37
11/25/09	24.99	1093.85	5.11	635	5.36	23.00	426	26	39
12/22/09	25.29	1093.55	4.21	875	6.22	33.00	329	33	51
01/27/10	27.11	1091.73	3.87	1065	6.74	32.00	328	40	64
02/24/10	27.05	1091.79	3.66	1105	6.21	17.00	456	38	53
03/23/10	26.95	1091.89	3.76	1165	7.12	34.00	408	38	55
04/21/10	27.16	1091.68	3.88	925	6.59	27.00	347	41	66
05/26/10	27.34	1091.50	4.32	1045	4.28	21.00	294	38	54
06/23/10	28.22	1090.62	4.59	935	4.69	25.00	328	37	42
07/23/10	28.56	1090.28	4.47	955	5.66	28.00	403	28	47
08/25/10	26.88	1091.96	3.88	1085	6.11	32.00	349	34	50
09/22/10	28.44	1090.40	3.62	1135	6.99	30.00	364	36	46
10/20/10	27.76	1091.08	4.56	975	5.44	27.00	361	24	34
11/22/10	25.39	1093.25	3.79	1115	7.01	33.00	476	33	48
12/21/10	27.69	1091.15	4.08	1010	6.43	25.00	294	29	41
01/26/11	26.04	1092.80	4.77	1130	6.76	30.00	316	22	29
02/23/11	25.76	1093.08	3.84	960	7.01	34.00	366	36	44
03/25/11	22.93	1095.91	5.78	805	4.75	22.00	243	25	54
04/24/11	26.37	1092.47	6.22	1080	6.22	28.00	335	19	33
05/25/11	25.76	1090.05	3.61	970	7.02	30.00	369	40	58
06/19/11	24.50	1104.34	5.07	711	8.12	13.00	273	29	41

GROUNDWATER BASELINE ANALYSIS

SAMPLE I.D.: MW-03
MONITORING SOURCE: WELL
SURFACE ELEVATION: 1205.64 FT.
CASING STICKUP: 2.49 FT. (29.88")
MONITORING ELEVATION: 1208.13 FT.

DATE	H2O DEPTH FT.	H2O ELEV. FT.	pH s.u.	SpC u-mhos/cm	Fe Mg/l	Mn Mg/l	SO4 Mg/l	ACID Mg/l	ALKA Mg/l
03/18/09	83.20	1124.93	3.31	990	1.42	5.63	350	28	45
04/22/09	82.56	1125.57	4.07	665	0.95	6.64	297	31	50
05/19/09	79.64	1128.49	4.78	735	1.55	3.27	149	35	55
06/24/09	76.11	1132.02	4.36	850	1.10	4.26	79	24	41
07/23/09	81.78	1126.35	5.36	1100	1.69	6.21	114	19	44
08/22/09	78.75	1129.38	5.01	1040	1.41	5.54	345	22	53
09/29/09	77.44	1130.69	5.57	980	0.89	3.46	138	27	51
10/21/09	77.65	1130.48	6.29	65	0.09	BDL	BDL	33	48
11/25/09	75.11	1133.02	4.59	660	1.69	4.88	197	31	49
12/22/09	79.76	1128.37	5.02	740	1.28	5.09	216	27	54
01/27/10	74.34	1133.79	4.69	735	1.89	3.65	334	21	48
02/24/10	71.76	1136.37	4.42	665	1.87	4.21	87	20	45
03/23/10	73.24	1134.89	4.55	540	2.01	5.84	104	26	49
04/21/10	74.08	1134.05	4.50	625	1.76	4.89	178	21	54
05/26/10	72.89	1135.24	4.89	705	2.09	5.58	214	18	41
06/23/10	74.55	1133.58	4.20	680	1.66	4.71	326	19	39
07/23/10	75.14	1132.99	4.11	720	0.94	3.35	149	27	32
08/25/10	74.05	1134.08	4.34	650	1.54	4.56	224	22	39
09/22/10	75.39	1132.74	4.02	550	1.04	2.47	168	30	35
10/20/10	73.97	1134.16	4.25	600	1.56	2.98	377	28	49
11/22/10	73.27	1134.86	4.47	745	2.11	4.02	347	25	37
12/21/10	74.21	1133.92	4.28	610	1.68	3.57	290	23	40
01/26/11	73.44	1134.69	4.57	670	1.47	5.06	336	38	44
02/23/11	72.99	1135.14	4.66	715	1.52	4.24	287	28	47
03/25/11	71.95	1136.18	5.61	800	1.69	4.36	356	21	32
04/24/11	72.65	1135.48	5.06	775	1.57	5.04	119	19	36
05/25/11	73.56	1134.57	4.54	695	1.99	4.79	217	20	33
06/19/11	76.42	1131.71	5.44	14	0.71	BDL	4	16	37

GROUNDWATER BASELINE ANALYSIS

SAMPLE I.D.: MW-04
MONITORING SOURCE: WELL
SURFACE ELEVATION: 1252.66 FT.
CASING STICKUP: 2.29 FT. (27.50")
MONITORING ELEVATION: 1254.95 FT.

DATE	H2O DEPTH FT.	H2O ELEV. FT.	pH s.u.	SpC u-mhos/cm	Fe Mg/l	Mn Mg/l	SO4 Mg/l	ACID Mg/l	ALKA Mg/l
03/18/09	44.00	1210.95	5.35	25	0.79	1.00	BDL	25	44
04/22/09	44.68	1210.27	5.44	145	1.04	1.23	123	19	47
05/19/09	44.46	1210.49	5.65	125	1.18	1.31	139	24	39
06/24/09	44.55	1210.40	5.04	240	0.65	1.05	225	22	40
07/23/09	43.94	1211.01	5.14	195	0.76	1.15	294	17	37
08/22/09	44.27	1210.68	4.99	300	0.97	0.95	274	26	46
09/29/09	43.77	1211.18	5.69	85	1.18	1.42	154	14	25
10/21/09	44.40	1210.55	5.91	16	0.21	0.90	2	18	26
11/25/09	44.21	1210.74	5.61	105	0.88	1.09	267	18	27
12/22/09	43.89	1211.06	5.27	95	1.05	1.28	144	20	26
01/27/10	44.05	1210.90	4.86	210	0.96	1.25	176	28	33
02/24/10	43.62	1211.33	5.29	235	1.37	1.47	204	21	31
03/23/10	43.78	1211.17	5.38	240	0.95	1.54	183	14	25
04/21/10	43.52	1211.43	5.42	260	0.99	1.18	187	17	30
05/26/10	43.11	1211.84	5.75	325	1.48	1.55	288	10	28
06/23/10	43.88	1211.07	4.88	240	1.28	1.50	204	29	33
07/23/10	44.29	1210.66	4.18	195	1.17	1.38	237	34	50
08/25/10	43.81	1211.14	4.73	215	1.24	0.89	143	27	48
09/22/10	44.34	1210.61	4.25	200	0.86	1.08	152	36	52
10/20/10	45.11	1209.84	4.56	260	0.79	0.98	148	38	45
11/22/10	44.43	1210.52	4.38	235	1.07	1.19	152	34	47
12/21/10	44.83	1210.12	4.11	190	1.34	1.87	293	36	54
01/26/11	44.56	1210.39	4.87	255	1.66	1.18	227	27	44
02/23/11	44.17	1210.78	4.46	220	2.01	1.87	334	30	47
03/25/11	43.88	1211.07	5.12	315	2.14	1.82	356	24	37
04/24/11	43.90	1211.05	4.95	285	2.02	2.16	248	28	39
05/25/11	44.48	1210.47	4.38	240	1.75	2.21	306	35	45
06/19/11	44.05	1210.90	4.88	22	3.13	1.20	1	24	34

SEASONAL GROUNDWATER DATA

SAMPLE I.D.: MW-01
SURFACE ELEVATION: 1112.75 FT.
CASING STICKUP: 2.58 FT. (31")
MONITORING ELEVATION: 1115.53 FT.

SEASON	H20 DEPTH	H2O EL.	pH s.u.	SpC u-mhos/cm	Fe Mg/l	Mn Mg/l	SO4 Mg/l	ACID Mg/l	ALKA Mg/l
SUMMER	75.52	1040.01	5.90	1013.33	2.22	2.71	278.00	22.17	36.67
FALL	75.08	1040.45	5.91	990.00	1.71	2.27	284.67	29.50	41.83
WINTER	73.66	1042.16	5.63	1121.43	2.12	2.52	226.14	26.43	41.71
SPRING	74.29	1041.24	5.71	1002.33	2.59	2.88	221.00	24.67	38.00
AVERAGE	74.64	1040.96	5.79	1031.77	2.16	2.59	252.45	25.69	39.55

SEASONAL GROUNDWATER DATA

SAMPLE I.D.: MW-02
SURFACE ELEVATION: 1127.09 FT.
CASING STICKUP: 1.75 FT. (21")
MONITORING ELEVATION: 1128.84 FT.

SEASON	H20 DEPTH	H2O EL.	pH s.u.	SpC u-mhos/cm	Fe Mg/l	Mn Mg/l	SO4 Mg/l	ACID Mg/l	ALKA Mg/l
SUMMER	27.29	1091.55	4.10	987.50	6.18	27.67	368.33	34.50	49.83
FALL	25.79	1093.02	4.32	910.00	6.31	27.96	363.50	28.17	41.67
WINTER	23.68	936.75	3.63	880.71	5.50	23.71	288.43	28.14	42.71
SPRING	26.75	1092.87	4.50	949.56	6.13	24.67	347.11	33.22	48.22
AVERAGE	25.88	1053.55	4.14	931.94	6.03	26.00	341.84	31.01	45.61

SEASONAL GROUNDWATER DATA

SAMPLE I.D.: MW#3
SURFACE ELEVATION: 1205.64 FT.
CASING STICKUP: 2.49 FT. (29.88")
MONITORING ELEVATION: 1208.13 FT.

SEASON	H20 DEPTH	H2O EL.	pH s.u.	SpC u-mhos/cm	Fe Mg/l	Mn Mg/l	SO4 Mg/l	ACID Mg/l	ALKA Mg/l
SUMMER	77.09	1131.04	4.74	840.00	1.25	4.27	189.67	24.50	42.33
FALL	75.66	1132.47	4.82	570.00	1.40	3.42	237.83	27.83	46.17
WINTER	74.42	1133.71	4.54	730.71	1.70	4.71	264.86	26.00	44.29
SPRING	75.83	1132.30	4.65	638.22	1.49	4.35	175.89	22.56	42.89
AVERAGE	75.75	1132.38	4.69	694.73	1.46	4.19	217.06	25.22	43.92

SEASONAL GROUNDWATER DATA

SAMPLE I.D.: MW#4
SURFACE ELEVATION: 1252.66 FT.
CASING STICKUP: 2.29 FT. (27.50")
MONITORING ELEVATION: 1254.95 FT.

SEASON	H20 DEPTH	H2O EL.	pH s.u.	SpC u-mhos/cm	Fe Mg/l	Mn Mg/l	SO4 Mg/l	ACID Mg/l	ALKA Mg/l
SUMMER	95.96	2623.10	10.30	467.00	3.28	3.18	489.83	61.50	92.00
FALL	44.48	1210.47	4.97	150.17	0.89	1.22	167.67	27.33	37.50
WINTER	44.01	1210.94	5.05	214.29	1.41	1.45	211.57	24.14	37.29
SPRING	44.07	1210.88	5.15	209.11	1.50	1.49	191.22	23.11	37.22
AVERAGE	57.13	1563.85	6.37	260.14	1.77	1.83	265.07	34.02	51.00