

BLACK WARRIOR MINERALS, INC.
MINE NO. 1, P-3950, R-5
Addendum to ATTACHMENT II-G

SURFACE WATER HYDROLOGY (880-X-8E-.06(1))

1. Surface Water Hydrology Description:

The proposed permit area is located in the Locust Fork Basin and is drained by Crooked Creek. Stream flow varies with rainfall with low flows usually occurring in the summer months and high flows occurring in January. During the periods of low precipitation, base flow tends to be low. The long-term effect of mining in this area will be calculated from data collected at Station DSW-1 (downstream) on Crooked Creek, Station USW-1A (upstream) on U.T. to Crooked Creek, and Station USW-1B (upstream) on Crooked Creek.

All surface water leaving parts of the permit area that has been disturbed by mining will be routed through ten (10) sediment basins before being discharged into state waters. All streams in Alabama are considered to be waters of the state. There are no streams or springs located within the permit boundaries. The Alabama Department of Environmental Management designation of streams within the surrounding area is as follows: The Alabama Department of Environmental Management has classified Crooked Creek as "Fish and Wildlife". The USGS Hydrologic Unit Code and SCS Sub-watershed Number for the area streams is 03160111-120. The watershed boundary acreage for this permit is 584 acres. The Alabama Department of Environmental Management NPDES Permit No. is AL0079707. Baseline surface water quality and quantity for this mine site will be characterized by data taken at Station DSW-1 (downstream) on Crooked Creek, Station USW-1A (upstream) on U.T. to Crooked Creek, and Station USW-1B (upstream) on Crooked Creek. Performance monitoring will be taken from Station DSW-1 (downstream) on Crooked Creek. Station DSW-1 is located downstream (Crooked Creek) of the permit area and drains approximately 10,368 acres or 16.2 square miles. Approximately 559 acres will be disturbed by this mining operation at Station DSW-1. Data collected from DSW-1 downstream of the mine site will be used in the water quality projections. For the locations of the surface water monitoring stations see the attached [Hydrologic Monitoring Map](#).

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Addendum to ATTACHMENT II-G

Seventy-five (75) acres of the permit have been surface mined by pre-law mining activities. Mining was conducted on the Mary Lee seam. No reclamation was conducted after mining stopped.

2. Surface Water Bodies

Ten (10) sediment control structures are proposed for this mining operation. The basins are proposed as permanent structures with the exception of basin 042 being temporary. For the locations of surface water monitoring stations see the [Hydrologic Monitoring Map](#). For the locations and NPDES numbers of sediment basins see attached [Hydro-Geo Map](#).

3. Surface Water Uses:

The known uses of surface water on Crooked Creek are considered to be fish and wildlife as classified by the Alabama Department of Environmental Management. There is one small farm pond located in the NE/SW of Section 9 approximately 510 feet downstream of proposed basin 120P. The farm pond is owned by Jon & Patti Moon.

4. Surface Water Quality:

For surface water quality see attached Surface Water Baseline Analysis. Samples taken from DSW-1, USW-1A, and USW-1B indicate that the water in Crooked Creek is of good quality. As shown in the Attached Surface Water Baseline Analysis all parameters are within the expected EPA limits.

5. Surface Water Quantity:

For water quantity and drainage areas see attached Surface Water Baseline Analysis and [Hydrologic Monitoring Map](#).

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6. Surface Water Sampling and Analytical Methods:

No Change from original permit.

7. Precipitation Modeling:

No modeling methods are employed at this time.

8. Surface Water Monitoring Station Location(s):

Four (4) new sediment basins are being added. For locations of surface water monitoring stations see the attached [Hydrologic Monitoring Map](#).

9. Surface Water Sampling and Analytical Information:

For Sampling and analytical information see above statement 6 and attached Surface Water Baseline Analysis. All surface water samples collected by McGehee Engineering Corp. were analyzed for the pH, Total Iron, Total Manganese, Total Suspended Solids, Conductivity, Acidity, Alkalinity, and Sulfates. The vast majority of the chemical analyses are completed within 24 hours of sample collection.

The pre-mining surface water baseline data is included for stations DSW-1, USW-1A and USW-1B. Also the active mining performance monitoring data is also included for each station. Seasonal averages are also included for the pre-mining baseline and active-mining performance.

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MINE NO. 1, P-3950, R-5
Addendum to ATTACHMENT II-G

PRE-MINE SURFACE WATER BASELINE ANALYSIS

SAMPLE I.D.: DSW-1
 MONITORING SOURCE: CROOKED CREEK
 DRAINAGE AREA: 16.2 SQ. MI.
 LOCATION FROM MINE: DOWNSTREAM

DATE	DISH. cfs	pH s.u.	SpC u-mhos/cm	TSS Mg/l	Fe Mg/l	Mn Mg/l	SO ₄ Mg/l	ACID Mg/l	ALKA Mg/l
1-11-10	15.3001	8.17	276	22	0.66	0.15	107	0	25
2-08-10	35.6970	6.87	149	12	0.59	0.06	36	10	20
3-22-10	13.1137	8.48	237	29	0.99	0.10	71	13	22
4-12-10	30.6063	7.41	202	3	0.25	0.07	58	14	42
5-10-10	23.9063	6.81	239	5	0.30	0.07	68	13	29
6-14-10	6.3750	7.44	314	4	0.40	0.09	68	3	44
8-23-10	0.3188	8.02	508	14	0.37	0.24	182	8	68
10-4-10	0.3365	8.15	788	5	0.46	0.28	283	6	74

ACTIVE MINING SURFACE WATER ANALYSIS

SAMPLE I.D.: DSW-1
 MONITORING SOURCE: CROOKED CREEK
 DRAINAGE AREA: 16.2 SQ. MI.
 LOCATION FROM MINE: DOWNSTREAM

DATE	DISH. cfs	pH s.u.	SpC u-mhos/cm	TSS Mg/l	Fe Mg/l	Mn Mg/l	SO ₄ Mg/l	ACID Mg/l	ALKA Mg/l
1-13-11	20.39	8.24	237	2	0.25	0.08			
4-14-11	47.81	8.07	234	8	0.38	0.06			
8-1-11	6.37	6.74	431	2	0.62	0.13			
11-18-11	4.08	6.37	365	10	0.70	0.05			
2-6-12	77.52	6.65	179	6	0.53	0.06			
5-21-12	4.25	7.12	345	21	0.74	0.15			
8-27-12	3.19	6.78	351	6	0.41	0.13			
11-14-12	15.30	7.99	324	7	0.73	0.07			
2-7-13	30.60	6.86	237	6	0.27	0.07			
4-10-13	63.75	8.18	200	7	0.34	0.05			
7-30-13	6.80	7.96	377	5	0.30	0.10			
11-7-13	1.36	7.41	1,025	6	0.11	0.07			

Note: All samples taken were sampled and analyzed by McGehee Engineering Corp. within the same calendar day.

BLACK WARRIOR MINERALS, INC.
MINE NO. 1, P-3950, R-5
Addendum to ATTACHMENT II-G

PRE-MINE SURFACE WATER BASELINE ANALYSIS

SAMPLE I.D.: USW-1A
 MONITORING SOURCE: U.T. TO CROOKED CREEK
 DRAINAGE AREA: 11.0 SQ. MI.
 LOCATION FROM MINE: UPSTREAM

DATE	DISH. cfs	pH s.u.	SpC u-mhos/cm	TSS Mg/l	Fe Mg/l	Mn Mg/l	SO ₄ Mg/l	ACID Mg/l	ALKA Mg/l
1-11-10	0.3486	7.68	48	2	0.21	0.03	2	2	12
2-08-10	3.0606	7.12	47	2	0.35	0.03	11	0	10
3-22-10	0.2244	6.97	222	8	0.36	0.2	9	9	15
4-12-10	1.4571	6.83	188	1	0.22	0.13	69	11	46
5-10-10	0.3825	6.65	238	3	0.26	0.16	92	5	16
6-14-10	0.1167	6.91	393	5	0.27	0.16	92	6	21
8-23-10	DRY								
10-4-10	DRY								

ACTIVE MINING SURFACE WATER ANALYSIS

SAMPLE I.D.: USW-1A
 MONITORING SOURCE: U.T. TO CROOKED CREEK
 DRAINAGE AREA: 11.0 SQ. MI.
 LOCATION FROM MINE: UPSTREAM

DATE	DISH. Cfs	pH s.u.	SpC u-mhos/cm	TSS Mg/l	Fe Mg/l	Mn Mg/l	SO ₄ Mg/l	ACID Mg/l	ALKA Mg/l
1-13-11	0.5645	8.58	247	1	0.10	0.03			
4-14-11	1.0582	7.21	319	5	0.38	0.23			
8-1-11	0.2039	7.52	768	10	0.12	0.06			
11-18-11	2.1245	7.22	61.8	1	0.23	0.03			
2-6-12	4.2072	8.06	47.7	3	0.45	0.01			
5-21-12	0.7969	7.30	531	3	0.27	0.23			
8-27-12	0.4675	6.97	132.7	1	0.14	0.02			
11-14-12	1.0519	8.76	417	1	0.23	0.20			
2-7-13	3.4000	7.49	78.5	1	0.22	BML			
4-10-13	1.4510	7.59	50.5	1	0.31	BML			
7-30-13	0.8500	7.90	66.7	3	0.24	BML			
11-7-13	0.0128	7.62	96.9	1	0.31	0.44			

Note: All samples taken were sampled and analyzed by McGehee Engineering Corp. within the same calendar day.

BLACK WARRIOR MINERALS, INC.**MINE NO. 1, P-3950, R-5****Addendum to ATTACHMENT II-G****PRE-MINE SURFACE WATER BASELINE ANALYSIS**

SAMPLE I.D.: USW-1B

MONITORING SOURCE: CROOKED CREEK

DRAINAGE AREA: 1.3 SQ. MI.

LOCATION FROM MINE: UPSTREAM

DATE	DISH. cfs	pH s.u.	SpC u-mhos/cm	TSS Mg/l	Fe Mg/l	Mn Mg/l	SO ₄ Mg/l	ACID Mg/l	ALKA Mg/l
1-11-10	8.9993	7.53	147	2	0.29	0.1	18	6	32
2-08-10	19.5429	7.10	17	3	0.30	0.05	33	32	17
3-22-10	7.6500	7.71	159	14	0.34	0.10	49	7	19
4-12-10	2.1168	6.93	147	2	0.23	0.09	45	15	37
5-10-10	5.1000	6.63	175	5	0.27	0.12	488	6	22
6-14-10	2.6846	7.03	179	8	0.70	0.14	488	5	32
8-23-10	0.4039	7.81	182.8	7	0.46	0.13	18	7	52
10-4-10	0.0367	8.39	130	6	3.80	0.31	19	0	34

ACTIVE MINING SURFACE WATER ANALYSIS

SAMPLE I.D.: USW-1B

MONITORING SOURCE: CROOKED CREEK

DRAINAGE AREA: 1.3 SQ. MI.

LOCATION FROM MINE: UPSTREAM

DATE	DISH. Cfs	pH s.u.	SpC u-mhos/cm	TSS Mg/l	Fe Mg/l	Mn Mg/l	SO ₄ Mg/l	ACID Mg/l	ALKA Mg/l
1-13-11	1.2094	8.83	213.7	1	.21	0.07			
4-14-11	30.6063	7.31	138.2	4	.29	0.06			
8-1-11	4.2505	7.62	208.3	5	1.03	0.12			
11-18-11	11.3327	7.93	235.0	7	0.55	0.05			
2-6-12	36.7183	7.87	124.4	3	0.47	0.04			
5-21-12	9.1803	7.42	165.7	14	0.96	0.12			
8-27-12	20.3939	7.90	181.6	10	0.84	0.02			
11-14-12	11.4750	8.88	185.5	13	1.13	0.05			
2-7-13	30.6000	6.75	134.4	2	0.24	0.06			
4-10-13	25.5000	8.38	153.9	2	0.34	0.05			
7-30-13	2.1168	8.16	350.0	3	0.36	0.20			
11-7-13	0.6059	6.84	1,075	9	0.17	0.12			

Note: All samples taken were sampled and analyzed by McGehee Engineering Corp. within the same calendar day.

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MINE NO. 1, P-3950, R-5
Addendum to ATTACHMENT II-G

PRE- MINING SEASONAL DATA

SAMPLE I.D.: DSW-1
 MONITORING SOURCE: CROOKED CREEK
 DRAINAGE AREA: 16.2 SQ. MI.
 LOCATION FROM MINE: DOWNSTREAM

SEASON	DISH. cfs	pH s.u.	SpC u-mhos/cm	TSS Mg/l	Fe Mg/l	Mn Mg/l	SO ₄ Mg/l	ACID Mg/l	ALKA Mg/l
SPRING	22.5421	7.18	226	12.3	0.51	0.08	66	13	31
SUMMER	3.34	7.63	411	9	0.39	0.17	125	5.5	56
FALL	0.34	8.15	788	5	0.46	0.28	283	6	74
WINTER	25.4986	7.15	213	17	0.63	0.1	72	5	23
AVERAGE	12.9	7.42	409.5	10.8	0.49	0.16	136.5	7.3	46

ACTIVE MINING SEASONAL DATA

SAMPLE I.D.: DSW-1
 MONITORING SOURCE: CROOKED CREEK
 DRAINAGE AREA: 16.2 SQ. MI.
 LOCATION FROM MINE: DOWNSTREAM

SEASON	DISH. cfs	pH s.u.	SpC u-mhos/cm	TSS Mg/l	Fe Mg/l	Mn Mg/l	SO ₄ Mg/l	ACID Mg/l	ALKA Mg/l
SPRING	38.60	7.79	260	12.0	0.49	0.09			
SUMMER	5.45	7.16	386	4.3	0.44	0.12			
FALL	6.91	7.26	571	7.7	0.51	0.06			
WINTER	42.84	7.25	218	4.7	0.35	0.07			
AVERAGE	23.45	7.37	358.8	7.2	0.45	0.09			

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PRE- MINING SEASONAL DATA

SAMPLE I.D.: USW-1A
 MONITORING SOURCE: U.T. TO CROOKED CREEK
 DRAINAGE AREA: 11.0 SQ. MI.
 LOCATION FROM MINE: UPSTREAM

SEASON	DISH. cfs	pH s.u.	SpC u-mhos/cm	TSS Mg/l	Fe Mg/l	Mn Mg/l	SO ₄ Mg/l	ACID Mg/l	ALKA Mg/l
SPRING	0.6880	6.80	216	4.0	0.28	0.16	57	8	26
SUMMER	0.1167	6.91	393	5	0.27	0.16	92	6	21
FALL	DRY								
WINTER	1.7046	7.34	48	2	0.28	0.0	7	1	11
AVERAGE	0.8364	6.96	219	3.67	0.28	0.11	52	5	19.33

ACTIVE MINING SEASONAL DATA

SAMPLE I.D.: USW-1A
 MONITORING SOURCE: U.T. TO CROOKED CREEK
 DRAINAGE AREA: 11.0 SQ. MI.
 LOCATION FROM MINE: UPSTREAM

SEASON	DISH. cfs	pH s.u.	SpC u-mhos/cm	TSS Mg/l	Fe Mg/l	Mn Mg/l	SO ₄ Mg/l	ACID Mg/l	ALKA Mg/l
SPRING	1.102	7.37	300.2	3.0	0.32	0.15			
SUMMER	0.507	7.46	322.5	4.7	0.17	0.03			
FALL	1.063	7.87	191.9	1.0	0.26	0.09			
WINTER	2.724	8.04	124.4	1.7	0.26	0.01			
AVERAGE	1.349	7.69	234.8	2.60	0.25	0.07			

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MINE NO. 1, P-3950, R-5

Addendum to ATTACHMENT II-G

PRE- MINING SEASONAL DATA

SAMPLE I.D.: USW-1B

MONITORING SOURCE: CROOKED CREEK

DRAINAGE AREA: 1.3 SQ. MI.

LOCATION FROM MINE: UPSTREAM

SEASON	DISH. cfs	pH s.u.	SpC u-mhos/cm	TSS Mg/l	Fe Mg/l	Mn Mg/l	SO ₄ Mg/l	ACID Mg/l	ALKA Mg/l
SPRING	4.9556	6.91	160	7.0	0.28	0.10	194	9	26
SUMMER	2.6846	7.03	179	8	0.7	0.14	488	5	32
FALL	0.0367	8.39	130	6	3.80	0.31	19	0	34
WINTER	14.2711	7.26	82	3	0.30	0.1	26	19	25
AVERAGE	5.487	7.04	137.75	6	1.27	0.16	181.75	8.25	29.25

ACTIVE MINING SEASONAL DATA

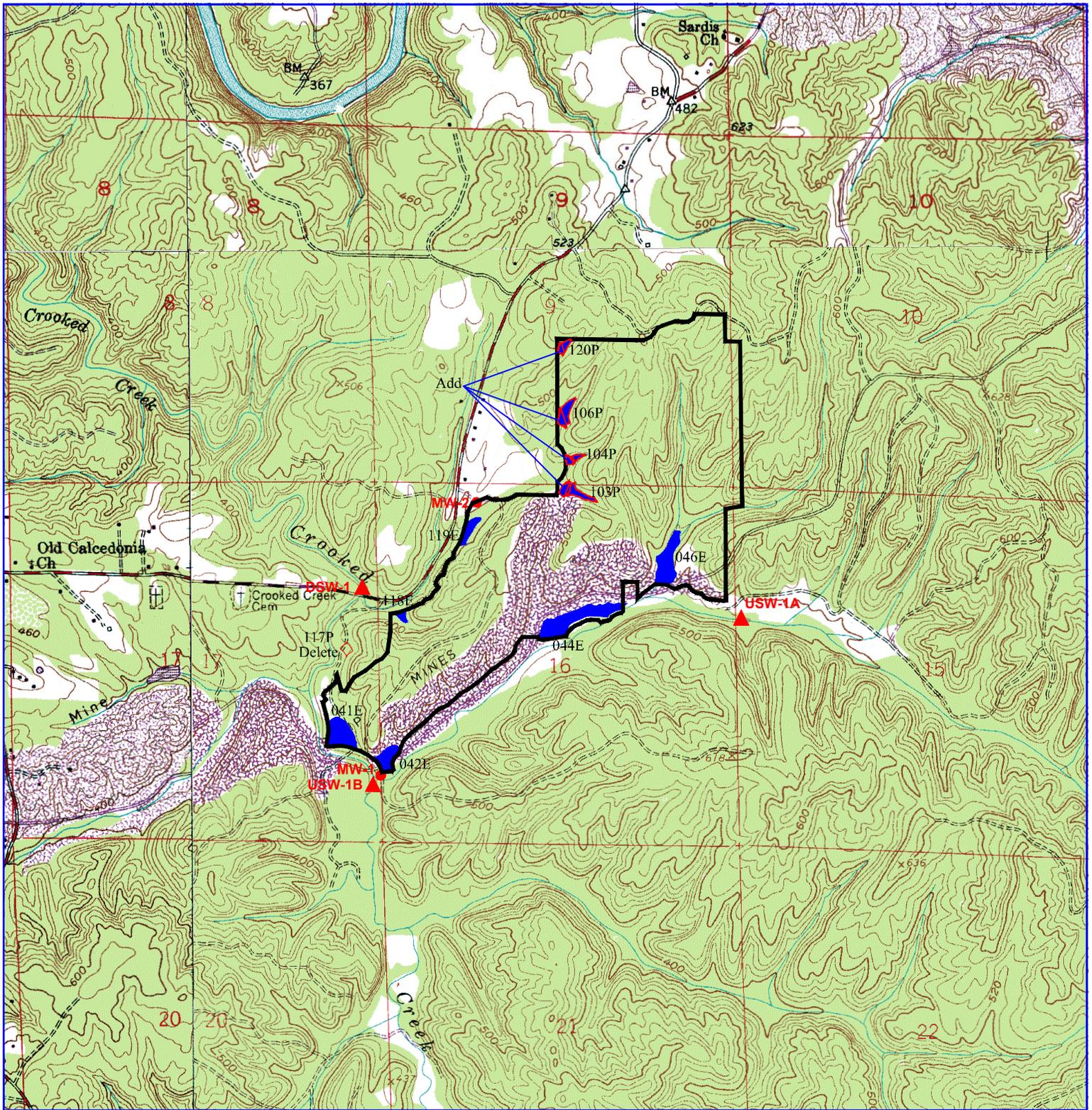
SAMPLE I.D.: USW-1B

MONITORING SOURCE: CROOKED CREEK

DRAINAGE AREA: 1.3 SQ. MI.

LOCATION FROM MINE: UPSTREAM

SEASON	DISH. cfs	pH s.u.	SpC u-mhos/cm	TSS Mg/l	Fe Mg/l	Mn Mg/l	SO ₄ Mg/l	ACID Mg/l	ALKA Mg/l
SPRING	21.76	7.70	152.6	6.7	0.53	0.08			
SUMMER	8.920	7.89	246.6	6.0	0.74	0.11			
FALL	7.805	7.88	498.5	9.7	0.62	0.07			
WINTER	22.843	7.82	157.5	2.0	0.31	0.06			
AVERAGE	15.332	7.82	263.8	6.1	0.55	0.08			



BLACK WARRIOR MINERALS, INC. - MINE NO. 1
 HYDROLOGIC MONITORING MAP
 NPDES: AL0079707

SECTIONS 9,10, 15, 16, & 17
 TOWNSHIP 15 SOUTH, RANGE 3 WEST,
 ALL IN JEFFERSON COUNTY, ALABAMA.
 BASE MAP: GARDENDALE U.S.G.S. QUAD.

-  001P SEDIMENT BASIN
-  MW1 MONITORING WELL
-  SW-1 STREAM SITE

 PROPOSED PERMIT AREA



SCALE 1"=2000'