ATTACHMENT II-G

SURFACE WATER HYDROLOGY

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

General Description of Surface Water Hydrology

The proposed Masseyline surface mine permit site is located in the Locust Fork Basin and is drained by Gurley Creek and unnamed tributaries of Gurley Creek. Prior to surface coal mining at the site, two (2) major unnamed tributaries conveyed surface water flow due north to Gurley Creek. Surface coal mining operations were conducted pre-law (pre-1969) and the flows of these unnamed tributaries were disrupted as these major and contributing minor drainage channels were mined through. As stated in the geology section, the coal seams and overburden strata are located on the eastern limb of the Warrior Coal Field monocline and are increasing in elevation from west to east. In addition, the coal seams are increasing in elevation to the north with the Black Creek seam outcropping at or near the elevation of Gurley Creek. Surface mining operations were conducted relative to site geology conditions and mining was conducted from south to north up to the crossing of Gurley Creek. It appears that the Black Creek coal seam has been mined through the streambed of Gurley Creek north of the proposed permit area. Operations were also conducted north of Gurley Creek with mining advancing north and west on coal deposits adjacent to the meanders of the creek. An open pit and corresponding highwall have been left and due to the lower elevation of the bottom coal seam (Black Creek) being below the creek bed, Gurley Creek now flows through the old pit and the original stream channel is now dry. (See Hydro-Geo Map for orientation of existing highwalls and flow channels of Gurley Creek.)

Due to previous mining, all connectivity of overland drainage flows have been disrupted. The site now has several minor unnamed tributaries that have been blocked by spoils along the eastern boundary of the old mining works. A main unnamed tributary that historically flowed from south to north, under Bethel Road and into Gurley Creek has been severely impaired with surface drainage flows following their normal patterns until they cascade over the highwalls into impounded water in the pit areas. Several open and abandoned flooded pits exist along the highwall area south of Bethel Road and a Bureau of Land Management-Abandoned Mine Lands program has reclaimed the mined area north of Bethel Road and a drainage channel has been established from a system of dual box culverts that convey drainage under Bethel Road, along the existing reclaimed highwall to intersect with Gurley Creek approximately 500' due west of the original drainage channel. Because of these conditions, surface water flows from the mine site in limited amounts from the eastern boundary of the old spoil piles due east to a major unnamed tributary that flows north to Gurley Creek and from the old pit areas due south of the box culverts under Bethel Road. Any connectivity of surface water flows is by saturation of the existing spoil piles until water levels accumulate to the point to allow flow under Bethel Road at the previously discussed dual box culverts.

The proposed mine site lies in USGS Hydrologic Unit Code and SCS Sub-watershed Number for the immediate drainage area of Gurley Creek is 03160111-090 as defined by the USDA Soil Conservation Service. Gurley Creek forms from the outflow drainage of Mountain Lake and Zamora Lake and flows generally west through a gap in Sand Mountain knows as "The Narrows" past the proposed site of CDM's Masseyline Mine and finally into Locust Fork of the Black Warrior River. Self Creek flows into Gurley Creek approximately one (1) mile before Gurley Creek flows into Locust Fork of the Black Warrior River about one (1) mile west of the town of Trafford, Alabama.

A total of ten (10) sediment control structures are proposed to control exit flows from this facility (See NPDES Permit Map for basins identification and location.) There are no perennial streams or springs located within the proposed permit boundary.

The Alabama Department of Environmental Management designation of streams within the surrounding area are as follows: Gurley Creek - Fish and Wildlife.

Three (3) surface water monitoring stations, designated SW-1 (upstream), SW-2 (downstream) and SW-3 (upstream) have been established to monitor baseline surface water quality, and quantity.

Performance monitoring for this proposed mine site will be characterized by data taken from SW-2, the downstream monitoring site on Gurley Creek and will be used in the water quality projections. The upstream surface water monitoring stations (SW-1 & SW-3) will be monitored for baseline data. See Hydro-Geo Map for the location of the surface water monitoring stations.

Surface-Water Bodies

Other than chance pit pools the intermittent/wet weather streams as previously described there are no other surface-water bodies. The proposed sediment basins on this site will be temporary and will be removed in the reclamation process.

Surface Water Uses

The known uses of surface water on Gurley Creek and/or any unnamed tributaries and wet-weather streams at this site are considered fish and wildlife.

Surface Water Quality

See attached Surface Water Baseline Analyses. Samples taken from surface water monitoring stations SW-1, SW-2 and SW-3 indicate the water is of good quality. Samples have been taken over adequate monthly intervals to identify seasonal flow characteristics.

Surface Water Quantity

Stream Flow (overland flow) water quantity in cubic feet per second (cfs) is determined at each sampling interval of baseline data. Flow rate measurement of surface water samples were performed in accordance with ASTM D3858-95 (Reapproved 2008) pages 1-9, "Standard Test Method for Open-Channel Flow Measurement of Water by Velocity-Area Method" and utilizing a "FP211 Flow Probe" digital water velocity meter.

Surface Water Sampling and Analytical Methods

All surface water samples were collected by the grab method and analyzed by TASK Engineering Management Inc. Flow rates were determined as outline in the previous "Surface Water Quantity" section. Flow velocity, pH and Specific Conductivity of all samples were measured in the field at the time said samples were taken. Samples are immediately stored in new, clean plastic sample bottles. After all field measurements are completed, the time, date, mine identification and surface monitoring site 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.

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.

8) Analysis of Suspended solids was performed by gravimetric methods and/or Photometric methods as required.

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.

Precipitation Modeling

No modeling and/or simulation methods are employed at this time.

Surface Water Monitoring Station Location(s)

For locations of surface water monitoring stations, see Hydro-Geo Map.

Results of Surface Water Sampling and Analytical Data for Each Sample

See attached Surface Water Baseline Tables. All surface water samples were analyzed for Quantity of Flow, pH, Conductivity, Total Suspended Solids, Total Iron, Total Manganese, Sulfates, Acidity, and Alkalinity.

SURFACE WATER BASELINE ANALYSIS

SAMPLE I.D.: SW-1
MONITORING SOURCE: GURLEY CREEK
DRAINAGE AREA: 23.498 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	SO4 Mg/l	ACID Mg/l	ALKA Mg/l
10/20/10	16.05	7.57	125	1	0.15	0.25	8	5	12
11/22/10	39.72	7.68	140	3	0.24	0.31	12	6	17
12/21/10	22.85	7.62	135	1	0.19	0.20	5	9	13
01/26/11	77.83	8.11	178	7	0.31	0.42	36	11	21
02/23/11	26.79	7.72	133	4	0.22	0.40	15	12	23
03/25/11	91.55	7.26	77	12	0.09	0.17	3	8	16
04/24/11	76.83	7.91	128	5	0.21	0.27	22	10	17
05/25/11	23.24	7.59	139	2	0.24	0.20	7	7	15
06/27/11	62.10	7.95	160	8	0.32	0.44	27	8	12
07/27/11	104.13	8.22	72	19	0.19	0.15	76	5	14
08/25/11	19.04	7.44	119	3	0.31	0.23	17	7	21
09/29/11	127.64	8.33	78	24	0.16	0.19	26	12	24
10/26/11	23.34	7.33	109	6	0.22	0.31	23	13	19
11/28/11	118.11	8.06	183	26	0.19	0.27	55	6	14
12/28/11	94.36	7.91	149	19	0.17	0.24	31	7	17

SURFACE WATER BASELINE ANALYSIS

SAMPLE I.D.: SW-2
MONITORING SOURCE: GURLEY CREEK
DRAINAGE AREA: 27.147 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	SO4 Mg/l	ACID Mg/l	ALKA Mg/l
10/20/10	20.49	6.77	236	3	0.56	0.37	87	5	24
11/22/10	50.70	7.07	178	7	0.49	0.53	127	2	19
12/21/10	29.17	6.54	245	6	0.33	0.21	78	6	27
01/26/11	99.35	7.17	79	14	0.41	0.62	139	8	33
02/23/11	34.20	6.89	191	7	0.47	0.39	154	4	22
03/25/11	116.87	8.02	127	26	0.29	0.19	277	3	31
04/24/11	98.08	7.82	196	27	0.37	0.45	209	7	20
05/25/11	31.33	6.84	168	12	0.29	0.36	178	3	19
06/27/11	79.28	7.56	209	15	0.46	0.51	201	4	27
07/27/11	132.93	8.26	77	21	0.25	0.35	245	5	21
08/25/11	28.22	6.81	146	9	0.29	0.33	176	3	32
09/29/11	162.94	8.33	94	37	0.14	0.42	97	4	36
10/26/11	36.22	6.92	177	10	0.26	0.52	116	6	17
11/28/11	150.77	7.96	239	35	0.24	0.49	262	7	16
12/28/11	120.45	8.06	212	27	0.12	0.38	169	5	15

SURFACE WATER BASELINE ANALYSIS

SAMPLE I.D.: SW-3
MONITORING SOURCE: UNNAMED TRIBUTARY OF GURLEY CREEK
DRAINAGE AREA: 3.466 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	SO4 Mg/l	ACID Mg/l	ALKA Mg/l
10/20/10	3.10	7.21	77	4	0.33	1.09	11	10	12
11/22/10	7.83	7.32	84	3	0.29	1.16	14	11	10
12/21/10	4.14	7.46	93	6	0.35	0.89	6	13	15
01/26/11	15.49	7.67	81	12	0.19	1.19	21	14	12
02/23/11	5.49	7.51	79	5	0.36	1.26	20	9	14
03/25/11	18.85	8.06	103	15	0.40	1.17	19	12	15
04/24/11	16.21	7.89	95	11	0.27	1.09	17	9	12
05/25/11	4.55	7.10	73	2	0.31	0.95	9	11	13
06/27/11	11.61	7.41	86	9	0.26	1.04	13	7	18
07/27/11	21.03	8.21	136	17	0.32	1.26	24	9	15
08/25/11	3.56	7.19	93	1	0.21	1.12	18	13	20
09/29/11	28.21	8.26	139	19	0.22	0.85	11	11	17
10/26/11	4.89	7.45	98	7	0.46	1.21	16	8	14
11/28/11	22.91	8.09	112	20	0.48	1.30	19	10	15
12/28/11	20.85	7.97	109	23	0.31	1.26	22	7	19

SEASONAL BASELINE DATA

SAMPLE I.D.: SW-1
MONITORING SOURCE: GURLEY CREEK
DRAINAGE AREA: 23.498 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	SO4 Mg/l	ACID Mg/l	ALKA Mg/l
SUMMER	83.60	7.80	89.67	15.33	0.22	0.19	39.67	8.00	19.67
FALL	52.57	7.63	140.17	9.33	0.19	0.26	22.33	7.67	15.33
WINTER	65.39	7.56	129.33	7.67	0.21	0.33	18.00	10.33	20.00
SPRING	54.06	7.78	142.33	5.00	0.26	0.30	18.67	8.33	14.67
AVERAGE	63.91	7.70	125.38	9.33	0.22	0.27	24.67	8.58	17.42

SEASONAL BASELINE DATA

SAMPLE I.D.: SW-2
MONITORING SOURCE: GURLEY CREEK
DRAINAGE AREA: 27.147 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	SO4 Mg/l	ACID Mg/l	ALKA Mg/l
SUMMER	108.03	7.26	105.67	22.33	0.23	0.37	172.67	4.00	29.67
FALL	67.97	6.94	214.50	14.67	0.33	0.42	139.83	5.17	19.67
WINTER	83.47	7.16	132.33	15.67	0.39	0.40	190.00	5.00	28.67
SPRING	69.56	7.20	191.00	18.00	0.37	0.44	196.00	4.67	22.00
AVERAGE	82.26	7.14	160.88	17.67	0.33	0.41	174.63	4.71	25.00

SEASONAL BASELINE DATA

SAMPLE I.D.: SW-3
MONITORING SOURCE: GURLEY CREEK
DRAINAGE AREA: 3.466 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	SO4 Mg/l	ACID Mg/l	ALKA Mg/l
SUMMER	17.60	7.60	122.67	12.33	0.25	1.08	17.67	11.00	17.33
FALL	10.62	7.48	95.50	10.50	0.37	1.15	14.67	9.83	14.17
WINTER	13.28	7.69	87.67	10.67	0.32	1.21	20.00	11.67	13.67
SPRING	10.79	7.36	84.67	7.33	0.28	1.03	13.00	9.00	14.33
AVERAGE	13.07	7.53	97.63	10.21	0.30	1.12	16.33	10.38	14.88