

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

1. Groundwater Hydrology Description

Groundwater usually occurs in the Pottsville Formation under confined conditions due to sharp contrast in permeability within the aquifer. Groundwater usually occurs at the depths of less than 200 feet in secondary features such as openings along fractures and bedding planes and in weathered sandstone and conglomerate beds. Only small amounts of groundwater suitable for domestic use are available in the weathered deposits (Geohydrology and Susceptibility of Major Aquifers to Surface Water Contamination in Alabama; Area 3; U.S.G.S Water-Resources Investigations Report 88-4120).

Major sources of groundwater in the adjacent area are coal seams, bedding planes, joint fractures, lithologic or erosional contacts, and faults.

Beaird Mining & Minerals Co., Inc. drilled, cased and capped holes, MW-1, MW-2 and MW-3 as shown in the Monitoring Well Typical. During the drilling of MW-1, water was encountered at sixty (60) feet below the surface, which is well below the Mary Lee seam. During the drilling of MW-3, dampness was encountered

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DIRECTOR, W. L. FINNEY
ENVIRONMENTAL

at forty-nine (49) feet below the surface, which is well below the Mary Lee seam. No groundwater was encountered during the drilling of OB1A, OB1B, OB1C, or MW-2. MW-1, MW-2, and MW-3 will be used to describe the baseline groundwater quality and quantity in the vicinity of the permit area.

The groundwater within the permit and adjacent area has been impacted due to the extensive surface mining that has occurred within and adjacent to the permit area. Increments No. 3, 4, and 5 have been rim cut from the previous surface mining.

Groundwater movement in the vicinity of the Cane Creek Mine is believed to be in the direction of dip, which is to the southwest.

2. Lithologic Description of Water Bearing Zone(s):

Based on drilling at this mine site groundwater was found in sandstones, sandy shales, coal seams, and along bedding planes. Groundwater which is likely to be affected by this mine site exist within a small, low yielding perched aquifer associated with the Mary Lee Coal Seam. The permit area is believed to have been partially dewatered by the previous surface mining in the

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area.

3. Aquifer Test(s):

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

4. Well Inventory:

A well inventory conducted by Environmental Engineering Services, Inc. revealed that there are no groundwater users identified within a one-half mile radius of the proposed mine site. All residents adjacent to the permit area are serviced by municipal water supply from Cordova. Cordova purchases its water from the Jasper Waterworks, who's source is the Sipsey Fork of the Mulberry River.

5. Groundwater Baseline Quality:

Samples were taken by Environmental Engineering Services, Inc. from the four (4) monitoring wells within and adjacent to the permit area shows that the groundwater from which these wells draw their water is of good quality. However these wells show a higher level of sulfates than normal, this could be due to all the previous mining within the area. For baseline quality see attached Groundwater Baseline Analysis.

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6. Geologic Structures that Influence Groundwater Movement:

Local folding and faulting influences the movement of groundwater within the permit and adjacent area. Groundwater movement within the permit area is believed to be in the direction of the dip of the strata except for areas adjacent to the highwall, which has been dewatered. There are no major geological structures noted within the permit area that influences the movement of groundwater other than minor folding or rolling of the coal seam. For maps and cross-sections to support the geological structures see the attached Structural Contour Map and Cross-Sections in Part II-E.

7. Groundwater Description Support Data:

All maps and cross-sections are certified under Attachment II-H, Certification Statement.

8. Groundwater Sampling and Analytical Methods:

Samples were taken by Environmental Engineering Services, Inc. with a hand bailer until a constant temperature, pH and Conductivity was reached, this assures the sample is from recharge. Depth to the water, pH and Conductivity is measured

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CANE CREEK MINE
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in the field. Groundwater level measurements are determined by use of a weighted tape prior to any bailing. The surface elevation has been predetermined by locating the drill holes with an Altimeter and topographic map. All groundwater water samples were taken by the grab method as defined by the 17th Edition of Standard Methods for the Examination of Water and Wastewater, "1060 Collection and Preservation of Samples", pp.1-30 through 1-40. Analysis of pH was performed in accordance with the Hach Water Analysis Handbook, "Electrode Method pp.486 through 488. This method is EPA approved. Analysis of Conductivity, SpC, was performed in accordance with the 17th Edition of Standard Methods for the Examination of Water and Wastewater, "2510 Conductivity", pp.2-57 through 2-61. Analysis of Total Iron, Fe, was performed in accordance with the Hach Water Analysis Handbook, "FerroVer Method", pp.321 through 325. This method is EPA approved and was adapted from Standard Methods for the Examination of Water and Wastewater. Analysis of Total Manganese, Mn, was performed in accordance with the Hach Water Analysis Handbook, "Periodate Oxidization Method", pp.361 through 363. This method is EPA approved and was adapted from Standard Methods for the Examination of Water and Wastewater. Analysis of Sulfate, SO_4 , was performed in accordance with

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the Hach Water Analysis Handbook, "Sulfaver 4 Method", pp.567 through 571. This method is EPA approved and was adapted from Standard Methods for the Examination of Water and Wastewater.

9. Groundwater Sampling and Analytical Information:

For sampling and analytical information see above statement 8 and the attached table entitled Groundwater Baseline Analysis.

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SOUTH CAROLINA
COMMISSION

WATER ANALYSIS

MINING COMPANY: BEARD MINING AND MINERAL

DATE SAMPLED: 6/11/93

DATE ANALYZED: 6/11/93

ANALYST: C.J.G.

ANALYSIS PERFORMED ON	MW1	MW2	MW3	MW4			
TIME SAMPLED	12:40PM	1:30PM	1:08PM				
pH(log)	7.2	7.4	7.5	D			
SPECIFIC CONDUCTIVITY	527	818	658	R			
IRON, TOTAL(mg/l)	4.80	0.05	0.25	Y			
MANGANESE, TOTAL(mg/l)	0.5	0.8	0.3				
SULFATE, TOTAL(mg/l)	+80	+80	+80	N			
CHLORIDE, TOTAL(mg/l)				O			
CHROMIUM, TOTAL(mg/l)							
CADMIUM, TOTAL(mg/l)				S			
ARSENIC, TOTAL(mg/l)				A			
MERCURY, TOTAL(mg/l)				M			
LEAD, TOTAL(mg/l)				P			
SELENIUM, TOTAL(mg/l)				L			
ZINC, TOTAL(mg/l)				E			
PHENOL(mg/l)							
TOTAL SUSPENDED SOLIDS(mg/l)							
TOTAL DISSOLVED SOLIDS(mg/l)							
HARDNESS(mg/l CA CO)							
TURBIDITY(NTU)							
CHEMICAL OXYGEN DEMAND							
ACIDITY(mg/l)							
ALKALINITY(mg/l)							
BARIUM(mg/l)							
SILVER(mg/l)							
TOTAL ORGANIC CARBON(mg/l)							
WATER LEVEL ELEVATION(MSL)	5.5	52.5	45				
FLOW(cfs)							

B - BASIN, GW - GROUND WATER, SW - SURFACE WATER

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WATER ANALYSIS

MINING COMPANY: BEARD MINING AND MINERAL

DATE SAMPLED: 7/9/93
 DATE ANALYZED: 7/11/93
 ANALYST: C.J.G.

ANALYSIS PERFORMED ON	MW1	MW2	MW3	MW4			
TIME SAMPLED	5:00PM	4:35PM	4:05PM				
pH(log)	7.7	8.1	7.7	D			
SPECIFIC CONDUCTIVITY	577	830	1853	R			
IRON, TOTAL(mg/l)	0.15	0.10	0.02	Y			
MANGANESE, TOTAL(mg/l)	0.4	0.8	0.4				
SULFATE, TOTAL(mg/l)	+80	+80	+80	N			
CHLORIDE, TOTAL(mg/l)				O			
CHROMIUM, TOTAL(mg/l)							
CADMIUM, TOTAL(mg/l)				S			
ARSENIC, TOTAL(mg/l)				A			
MERCURY, TOTAL(mg/l)				M			
LEAD, TOTAL(mg/l)				P			
SELENIUM, TOTAL(mg/l)				L			
ZINC, TOTAL(mg/l)				E			
PHENOL(mg/l)							
TOTAL SUSPENDED SOLIDS(mg/l)							
TOTAL DISSOLVED SOLIDS(mg/l)							
HARDNESS(mg/l CA CO)							
TURBIDITY(NTU)							
CHEMICAL OXYGEN DEMAND							
ACIDITY(mg/l)							
ALKALINITY(mg/l)							
BARIUM(mg/l)							
SILVER(mg/l)							
TOTAL ORGANIC CARBON(mg/l)							
WATER LEVEL ELEVATION(MSL)	4	52	32				
FLOW(cfs)							

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WATER ANALYSIS

MINING COMPANY:

BEARD MINING AND MINERAL

DATE SAMPLED:

7/20/83

DATE ANALYZED:

7/21/83

ANALYST:

C.J.G.

ANALYSIS PERFORMED ON	MW1	MW2	MW3	MW4			
TIME SAMPLED	1:52PM	11:30AM	1:08PM				
pH(log)	6.7	7.1	7.3	D			
SPECIFIC CONDUCTIVITY	575	835	1770	R			
IRON, TOTAL(mg/l)	0.38	0.70	0.10	Y			
MANGANESE, TOTAL(mg/l)	0.8	1.3	0.08				
SULFATE, TOTAL(mg/l)	+80	+80	+80	N			
CHLORIDE, TOTAL(mg/l)				O			
CHROMIUM, TOTAL(mg/l)							
CADMIUM, TOTAL(mg/l)				S			
ARSENIC, TOTAL(mg/l)				A			
MERCURY, TOTAL(mg/l)				M			
LEAD, TOTAL(mg/l)				P			
SELENIUM, TOTAL(mg/l)				L			
ZINC, TOTAL(mg/l)				E			
PHENOL(mg/l)							
TOTAL SUSPENDED SOLIDS(mg/l)							
TOTAL DISSOLVED SOLIDS(mg/l)							
HARDNESS(mg/l CA CO)							
TURBIDITY(NTU)							
CHEMICAL OXYGEN DEMAND							
ACIDITY(mg/l)							
ALKALINITY(mg/l)							
BARIUM(mg/l)							
SILVER(mg/l)							
TOTAL ORGANIC CARBON(mg/l)							
WATER LEVEL ELEVATION(MSL)	8	54	34				
FLOW(cfs)							

B-BASIN, GW-GROUND WATER, SW-SURFACE WATER

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WATER ANALYSIS

MINING COMPANY: BEARD MINING AND MINERAL

DATE SAMPLED: 9/23/93

DATE ANALYZED: 9/24/93

ANALYST: C.J.G.

ANALYSIS PERFORMED ON	MW1	MW2	MW3	MW4			
TIME SAMPLED		9:45PM	2:20PM				
pH(log)	D	7.0	7.2	D			
SPECIFIC CONDUCTIVITY	R	702	1678	R			
IRON, TOTAL(mg/l)	Y	0.05	TRACE	Y			
MANGANESE, TOTAL(mg/l)		TRACE	0.1				
SULFATE, TOTAL(mg/l)	N	+80	+80	N			
CHLORIDE, TOTAL(mg/l)	O			O			
CHROMIUM, TOTAL(mg/l)							
CADMIUM, TOTAL(mg/l)	S			S			
ARSENIC, TOTAL(mg/l)	A			A			
MERCURY, TOTAL(mg/l)	M			M			
LEAD, TOTAL(mg/l)	P			P			
SELENIUM, TOTAL(mg/l)	L			L			
ZINC, TOTAL(mg/l)	E			E			
PHENOL(mg/l)							
TOTAL SUSPENDED SOLIDS(mg/l)							
TOTAL DISSOLVED SOLIDS(mg/l)							
HARDNESS(mg/l CA CO)							
TURBIDITY(NTU)							
CHEMICAL OXYGEN DEMAND							
ACIDITY(mg/l)							
ALKALINITY(mg/l)							
BARIUM(mg/l)							
SILVER(mg/l)							
TOTAL ORGANIC CARBON(mg/l)							
WATER LEVEL ELEVATION(MSL)		56.1	35.3				
FLOW(cfs)							

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