

BIRMINGHAM COAL & COKE CO., INC
KNIGHT MINE, P-39--
Attachment II-E

GEOLOGY (880-X-8E-.06(2))

1. Geologic Description of the Permit and Adjacent Area

The Birmingham Coal & Coke Company, Inc.- Knight Mine is located in southern Franklin County southeast of Phil Campbell, in Sections 5 & 6, Township 9 South, Range 10 West, in Winston County and Sections 31 & 32, Township 8 South, Range 10 West, in Franklin County, Alabama as seen from the Kinlock Springs and Phil Campbell U.S.G.S Quadrangles and (see attached [Mine Site Location Map](#) and [Hydro-Geo Map](#)). The proposed mine site will occupy approximately one hundred seventy eight (178) acres. This mine site is located within the Warrior Coal Basin of the Cumberland Plateau of the Appalachian Plateaus Physiographic Province Geologic Map of Alabama dated 1989. The mine site is primarily underlain by the Pottsville Formation of Pennsylvanian age is characterized according to the “Hydrologic Assessment, Eastern Coal Province Area 22, Alabama” as the following: Alternating beds of gray sandstone, conglomerate, siltstone, and shale with beds of coal and underclay. No major geologic features were encountered during drilling within the permit area. The coal seam to be mined at this site will be the Bear Creek Coal Seam.

2. Geochemistry:

The rocks outcropping within the permit area belong to the upper Pottsville Formation and consist of clastic sediments of a deltaic environment. Generally the coals of the Warrior Coal Basin are separated by monotonous sequences of blue-gray fossiliferous shale, sandstones, siltstones and underclays according to the “Hydrologic Assessment, Eastern Coal Province Area

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22, Alabama”. All drill holes available at this site showed similar cyclothemetic beds of sandy shales, sandstones.

Three (3) drill holes were used to describe the lithology within the permit and surrounding area. Drill holes OB/MW-1, OB/MW-2, and OB-1 were drilled in 2012 by Cahaba Contracting & Reclamation, LLC. All drill holes were rotary drilled. Cuttings were logged and collected and stored in gallon size sip-lock type bags at DSM Design Group’s lab for further inspection and analyses. The cuttings were sampled in a minimum of five foot increments or at each strata change. All drill holes were logged by DSM Design Group. For the lithologic description of the drill holes and monitoring wells see the attached Lithologic Description [OB/MW-1, OB/MW-2, and OB-1](#) and [drill logs](#). For the locations of drill holes and monitoring wells see the attached map entitled [Hydro-Geo Map](#). See attached [Monitoring Well Diagrams](#).

Acid Base Accounts were performed by DSM Design Group’s lab for [OB/MW-1, OB/MW-2, and OB-1](#). Acid forming material should not pose a problem at this mine site according to the overall Acid Base Account of the drill holes having an average of greater than four. No drill holes in the permit boundary indicated the presence of acid forming materials.

The following chart shows the mass-weighted averages for each overburden hole.

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Drill Hole ID	Percent Sulfur	Neutralization Potential	Acid-Base Account	Tons/Acre Excess CaCO ₃
MW-1	0.0484	7.8511	6.3388	1354
MW-2	0.0400	1.3356	0.0845	-12
OB-1	0.0508	7.3889	5.8026	1290
Average	0.0464	5.5252	4.0753	877

According to the overall average Acid Base Accounts of the overburden sampled in the overburden holes, there is no portion of the overburden considered to be acid forming material. The weighted averages indicate that there is more than sufficient alkaline material contained in the overburden at this mine to neutralize any small amount of acid forming material that may be encountered.

The overburden samples and data collected from drill holes are believed to exist throughout the entire permit area. For the chemical analyses of the overburden materials see the Over burden Analysis Spreadsheet and Lab Sheets. See the attached [Hydro-Geo Map](#) for the locations of the overburden holes. The acreages for the over burden analysis was determined using the Thiessen polygon method. See the attached [Thiessen Polygon Map](#) for illustrations.

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3. Sulfur Content of Coal:

The total sulfur percentages of the coal seams to be mined at this site are listed below. The total sulfur percentages of each coal seam are based on averages of many coal samples.

Seam	Percent Sulfur (raw Dry)
Bear Creek	1.0

4. Coal Seam(s) Information:

The coal seam to be recovered at this mine site is located within the “J” Coal Group. Based on drilling results there is one (1) mine able seam, the Bear Creek at this mine site. The Bear Creek Seam will be mined as deep as economically possible. For coal seam information, see the following table:

SEAM	THICKNESS	OVERBURDEN	STRIKE/DIP
BEAR CREEK	2.05'	61'	S 33 ⁰ W/ 34 ⁰ SE

5. Coal Cropline(s) Location:

For a map showing the outcrop location with respect to the proposed permit area; see the attached [Hydro-Geo Map](#).

6. Geologic Description Support Data:

For maps or cross-sections used to support the geologic description see the attached map(s) entitled [Geologic Cross-Section A-A'](#) & [Geologic Cross-Section B-B'](#).

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7. Drill Hole Locations and Elevations:

For elevations and locations of drill holes and other sample sites, see attached [Hydro-Geo Map](#) and Lithologic Description Drawings. ([OB/MW-1, OB/MW-2, and OB-1,](#)) and [drill logs](#).

8. Sampling and Analytical Data:

Samples for [OB/MW-1, OB/MW-2, and OB-1](#) were collected by capturing cuttings blown from the hole with a clean shovel. Samples were taken every five (5) feet or change in lithology. Care was taken to blow the hole clean at each interval to insure a clean sample. Each overburden sample was described and analyzed. Chemical analysis, including Paste pH, Total Sulfur, and Neutralization Potential were conducted by personnel of DSM Design Group's lab in accordance with Field and Laboratory Methods Applicable to Overburden and Mine soils developed, USEPA, Environment Protection Technology Series, EPA-600/2-78-054 dated March 1978 guidelines.

9. Required Additional Overburden Testing:

Indications of additional overburden testing or additional parameters have not been received at this time. If drilled or sampled during the preparation of this application, portions of all of the overburden samples shall be retained for additional testing at the office of DSM Design Group, LLC. until the issuance of the permit. Based on the geologic data (acid base account), no acid or toxic forming materials were disclosed in the overburden holes. Therefore, the neutralization potential should neutralize any acid materials encountered during mining.

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10. Certification Statement:

I, J. David McGehee, hereby certify that the information contained in Attachment II-E, and all maps, plans, and cross-sections included in the answers to Parts II-E, of this application were either prepared under my direct supervision or prepared and certified by other professional engineers or geologists, and that the information included herein is correct and accurate to the best of my knowledge and belief.

DSM Design Group, LLC.

J. David McGehee, P.E.
AL Reg. No. 18496

Date