

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

**1. Geologic Description of the Permit and Adjacent Area**

The Southland Resources, Inc.- Camp Cherry Austin Mine is located in eastern Tuscaloosa County west of Brookwood in Sections 28, 29, 32, & 33, Township 20 South, Range 8 West, all located in Tuscaloosa County, Alabama as seen from the Lake Nichol Quadrangle (see attached [Mine Site Location Map](#) and [Hydro-Geo Map](#)). The proposed mine site will occupy approximately two hundred fifty-six (256) acres of which approximately two hundred forty one (241) acres will be mining acres and fifteen (15) acres will be roads, ponds, office and equipment storage areas. This mine site is located within the Warrior Basin 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 as the following: Interbedded dark-gray shale, siltstone, medium-gray sandstone, and lesser amounts of coal, fireclay and conglomerate. In the higher elevations within the proposed permit area, the Pottsville Formation is unconformably overlain by the Tuscaloosa Group of Cretaceous Age. The Tuscaloosa Group is composed of unconsolidated sand and gravel with minor thin beds of clay.

This proposed mine site lies near the Arkadelphia Syncline. See the attached [Major Structures Map](#), which was taken from "Depositional setting of the Pottsville Formation in the Black Warrior Basin". Structurally the permit area is affected by regional anticlines, synclines, or faults. The most common geologic structural features in the Warrior Basin are faults and folds. The faults generally tend to be normal faults with a dominant northwest-southeast orientation.

**SOUTHLAND RESOURCES, INC.  
CAMP CHERRY AUSTIN MINE, P- 4000  
ATTACHMENT II-E**

There are two (2) faults present in the permit area. The east fault has a displacement of 62' down to the west south of the permit area and decreases further to the north of the fault. The west fault has a displacement of 30' down to the east south of the permit area and decreases further to the north of the fault. The location of the faults were obtained from Drummond Company mapping and P-3478 Permit Map. There are no known underground mine workings within the permit boundary.

The coal seams to be mined at this site by Southland Resources, Inc. will be the Brookwood, Milldale, and Carter Coal Seams.

**2. Geochemistry:**

According to the Hydrologic Assessment, Eastern Coal Province Area 23, Alabama, the mine site is primarily underlain by the Pottsville Formation of the Pennsylvanian age and chiefly consists of the following: Alternating beds of gray sandstone, conglomerate, siltstone and shale with beds of coal and underclay. All drill holes available at this site showed similar alternating beds of sandy shales, sandstones, coal and underclay.

OB-30803, MW/OB-30806, MW-38014, and MW/OB-30815 were drilled by Drummond Company. MW/OB-30815 was destroyed at some point and was re-drilled by Technical Drilling Services in August of 2019 along with CCA-1 and CCA-3. Those overburden holes along with several historical drill holes installed by the Drummond Company, Inc. (DCI) were used to describe the lithology within the permit area and surrounding area. DCI drilled the additional

**SOUTHLAND RESOURCES, INC.  
CAMP CHERRY AUSTIN MINE, P- 4000  
ATTACHMENT II-E**

drill holes years earlier for their exploration and reserve analysis. All drill holes were drilled to at least the Carter Coal Seam. For the lithologic description of the drill holes see the attached OB-30803, MW/OB-30806, MW-38014, and MW/OB-30815. All drill holes were rotary drilled. Drill cuttings from the overburden were sampled in five foot increments (or change in overburden) with the exception of MW/OB-30815 being sampled every one foot increment for a majority of the hole. For the locations of drill holes and monitoring wells see the attached map entitled [Hydro-Geo Map](#). Analysis for the overburden samples OB-30803, MW/OB-30806, and MW/OB-30815 was performed at Drummond Company' lab. Analysis for the overburden samples CCA-1 and CCA-3 was performed by McGehee Engineering. See [Overburden Analysis Spreadsheet](#) for sample results. See [Theisson Polygon Map](#) for proportion of drill hole overburden representation. See attached [Drill Logs](#).

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

Drill Hole ID	Percent Sulfur	Neutralization Potential	Acid-Base Account	Tons/Acre Excess CaCO <sub>3</sub>
OB-30803	0.1008	7.8279	4.6767	740
OB-30806	0.2090	4.5395	-1.9905	196
OB-30815	0.1598	14.4822	9.4893	2967
CCA-1	0.0000	3.9348	3.9348	786
CCA-3	0.0594	-3.4333	-5.2903	121
AVG.	0.1058	5.4702	2.1640	962

**SOUTHLAND RESOURCES, INC.**  
**CAMP CHERRY AUSTIN MINE, P- 4000**  
**ATTACHMENT II-E**

There was some acid forming material present as shown in the overburden analysis for all overburden holes. In OB-30803 the strata from 10'-20' and from 25'-30' indicated acid forming material. The zone of acid forming material in MW/OB-30806 is found in the previously mined spoil material (0'-37'). The sandstone material below the spoil (37'-50') also shows being acid forming. It is believed that these samples were possibly contaminated from the above spoil material. In MW/OB-30815 the acid forming material varies in small increments throughout the hole in the sandy shale and sandstone strata. The following strata are considered acid forming material: 25'-30' (-6.31), 30'-31' (-26.13), 36'-37' (-23.28), 38'-39' (-15.41), 41'-42' (-11.66), 70'-71' (-6.75), 72'-73' (-6.09), and 82'-83' (-7.91). The strata from 91'-91.5' (-90.06) and 97.9'-99' (-7.91) indicated acid forming material, however, it is believed that these samples were contaminated by the coal seams directly above the strata. In CCA-1 the strata from 20'-25', 40'-45', and 50'-55' indicated acid forming material. The zone of acid forming material in CCA-3 is found in the previously mined spoil material (0'-40'). There are two other samples within the hole that show being acid forming material (50'-55' and 65'-70'), it is believed that these samples were possibly contaminated from the above spoil material or coal.

The overall average indicates that there is an excess of 962 tons/acres of CaCO<sub>3</sub> in the overburden at this mine. The acid forming material in OB-30803, MW/OB-30815, CCA-1 will be mixed thoroughly with the surrounding higher neutralization potential material that will aide in neutralizing the acid forming zones. The larger concentration of acid forming material found in the spoil material of MW/OB-30806 and CCA-3 will require special handling to aide in the

**SOUTHLAND RESOURCES, INC.  
CAMP CHERRY AUSTIN MINE, P- 4000  
ATTACHMENT II-E**

prevention of any long term effects or problems. A [special plan for handling acid forming materials](#) has been outlined in Part III-A-5.

**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)
Brookwood	1.06
Milldale	1.11
Carter	0.93

**4. Coal Seam(s) Information:**

The coal seam to be recovered at this mine site is located within the Brookwood Group. Based on drilling results there are three (3) mineable seams, the Brookwood, Milldale, and Carter Coal Seams at this mine site.

SEAM	THICKNESS	OVERBURDEN	STRIKE/DIP
Brookwood	3.1'	64'	N 30° E S 2° E
Milldale	2.2'	16'	N 25° E S 1° E
Carter	1.4'	15'	N 24° E S 2° E

**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 Investigation Cross-Sections A-A'](#) and [Geologic Investigation Cross-Sections B-B'](#).

**7. Drill Hole Locations and Elevations:**

For elevations and locations of drill holes and other sample sites, see attached [Hydro-Geo Map](#).

**8. Sampling and Analytical Data:**

Cuttings were collected by capturing cuttings blown from the hole with a clean shovel. Samples were taken every five (5) feet (one foot for hole MW/OB-30815) or change in lithology. Care was taken to blow the hole clean at each interval to ensure 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 Drummond Company, Inc.'s lab in accordance with Field and Laboratory Methods Applicable to Overburden and Minesoils 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 McGehee Engineering Corp. until the issuance of the permit. Based on the geologic data (acid base account), some areas within the permit contains acid or toxic forming materials. The handling of this material is outlined in [attachment III-A-5 Acid Forming Material Handling Plan](#). The remaining permit area has sufficient neutralization potential that should neutralize any acid materials encountered during mining.

**SOUTHLAND RESOURCES, INC.  
CAMP CHERRY AUSTIN MINE, P- 4000  
ATTACHMENT II-E**

**Certification Statement:**

I, Bradley K. Simmons, 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.

**McGehee Engineering Corp.**

---

Bradley K. Simmons, P.E.

Alabama Reg. No. 33277

---

Date



**SOUTHLAND RESOURCES, INC.  
CAMP CHERRY AUSTIN MINE, P- 4000  
ATTACHMENT II-E**

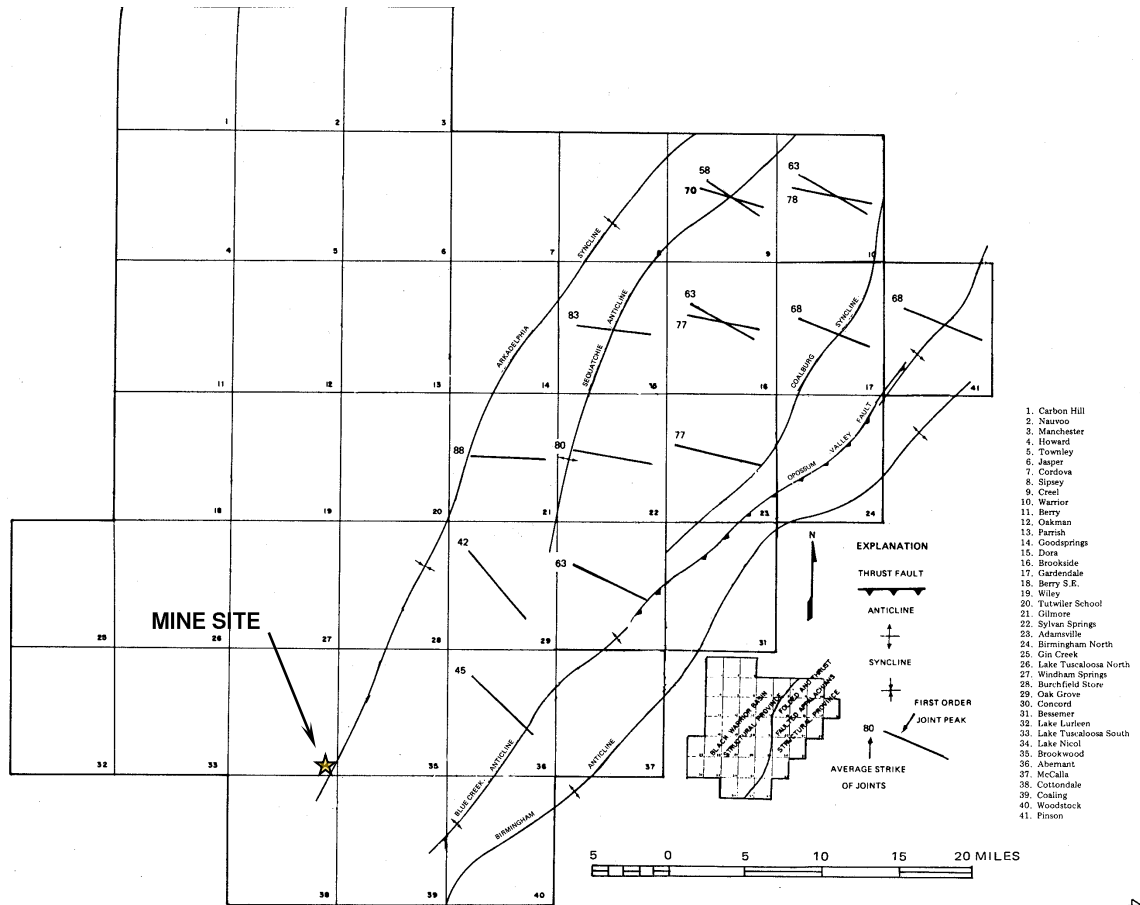


Figure 24.--Major fold axes in area of study and northwesterly oriented first order joint peaks in the Folded and Thrust-Faulted Appalachian structural province. Each numbered grid cell corresponds to a 7½-minute quadrangle. Key to individual quadrangle names is in column at right of figure.

**SOUTHLAND RESOURCES, INC.  
CAMP CHERRY AUSTIN MINE**

**MAJOR STRUCTURES MAP**

SECTIONS 28, 29, 32, & 33, TOWNSHIP 20 SOUTH, RANGE 8 WEST,  
TUSCALOOSA COUNTY, ALABAMA  
AS SHOWN ON THE LAKE NICOL U.S.G.S. QUADRANGLE

