

SIGNAL RESOURCES, LLC

WOLF BRANCH WEST MINE, P-39XX

ALABAMA SURFACE MINING COMMISSION

SURFACE MINING PERMIT APPLICATION

ATTACHMENT IV-C-2

TOPSOIL VARIANCE APPLICATION

Prepared by:

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INTRODUCTION

The purpose of this document is to compare local topsoils with a select mixture of Pottsville overburden materials to demonstrate that the overburden material is superior in physical and chemical properties to the local topsoil, and also compare, overburden lithologies and overburden chemistries to demonstrate the likelihood of replicating prior revegetation success at the Wolf Branch West Mine.

Surface mining has occurred on the Mary Lee Coal group by regulated coal companies within the permit area and by unregulated miners in adjacent areas. In this instance, previous miners re-graded overburden and stockpiled/replaced existing topsoils. Revegetation of this site after reclamation has been successful. Though pre-law operators often did not revegetate, natural revegetation occurred on sites adjacent to the proposed permit with surprising success. The historical success of natural revegetation in the Pottsville overburden has contributed to the Regulatory Authority granting an initial topsoil variance to mine site overlapping this proposed site (Pleasant Grove South Mine, P-3844). This site has demonstrated revegetation success by utilizing a select mixture of Pottsville overburden. Revegetation success at this site is largely due to a consistent lithology of Pottsville shale and sandstone, which, when mixed during mining, results in a medium which is suitable for both pine tree and ground cover growth.

SITE CONSIDERATIONS

The Signal Resources, LLC - Wolf Branch West Mine site is located in Sections 27 and 34, Township 20 South, Range 9 West, Tuscaloosa County, Alabama, as seen from the 1983 photorevised Lake Nicol, Alabama U.S.G.S. 7. minute Quadrangle maps. The proposed mine site will occupy approximately 44.0 acres of which approximately 40.2 acres are bonded as mining area. As shown on the attached [Permit Map](#) for this application, the surface ownership for this permit area is Mary E. Stephenson Etal.. Soils information for the permit and adjacent areas were taken from the "Soil Survey of Walker County, Alabama" that was issued in March of 1992 and from digital information available from the NRCS Web Soil Survey (<https://websoilsurvey.sc.egov.usda.gov/>). Soil types and boundaries delineated within the proposed permit area and adjacent areas are shown on the attached [Soils Map](#) as well as the permit area location, previously mined areas, drill holes, & overburden and topsoil sampling locations. A [Prime Farmland Soil Survey](#) was conducted in areas containing soil SpB to determine whether these soils are prime farmland soils. The determination revealed that the soils in these areas are not prime farmland soils.

Soils delineated on the Soils Map within the permit area are as follows:

<u>Map Symbol</u>	<u>Soil Type</u>
NSC	Nauvoo and Sipsev Soils, 6-12% Slopes
McE	Montevallo Channery Silt Loam, 30-60% Slopes
SpB	Spadra-Whitewell Complex, 0-3% Slopes

As shown on the attached [Soils Map](#), SpB is classified as a "Prime Farmland Soil" by the Natural Resources Conservation Service. However, A [Prime Farmland Soil Survey](#) was conducted in areas containing soil SpB to determine whether these soils are prime farmland soils. The determination revealed that the soils in these areas are not prime farmland soils. As such, topsoil stockpiling is not proposed for this application.

LAND USE

The premining land use for the entire permit area is a mixture of undeveloped timberland and previously disturbed areas. Previously disturbed areas are delineated on the Permit Map and Soils Map. The post mining land use for the acreage within the proposed permit area is undeveloped lands or no current use utilizing perennial grasses as the revegetation species.

TOPSOIL DESCRIPTIONS

The following descriptions are for soils delineated within the Wolf Branch West Mine as shown above. As stated previously, soils information (including soil descriptions) for the permit and adjacent areas were taken from the "Soil Survey of Walker County, Alabama" that was issued in March of 1992 and from digital information available from the NRCS Web Soil Survey (<https://websoilsurvey.sc.egov.usda.gov/>).

NSC – Nauvoo and Sipsev Soils, 6 to 12 percent slopes

These deep and moderately deep, well drained, gently sloping and sloping soils are on ridgetops. Slopes are smooth and convex. Individual areas are irregular in shape and range from 40 to 200 acres in size. They are about 50 percent Nauvoo soil and 40 percent Sipsev soil. Each soil is in areas large enough to be mapped separately. Because of their present and expected use, however, they were not mapped separately. Most mapped areas have both of these soils, but a few areas may have only one of them. Typically, the Nauvoo soil has a surface layer of dark yellowish brown fine sandy loam about 4 inches thick. The upper part of the subsoil is red clay loam. It extends to a depth of 25 inches. The lower part is yellowish red sandy clay loam and mottled fine sandy loam. It extends to a depth of 40 inches. It is underlain by level-bedded, weathered sandstone. Typically, the Sipsev soil has a surface layer of brown loamy sand about 4 inches thick. The subsurface layer is yellowish brown sandy loam. It extends to a depth of 16 inches. The subsoil is strong brown sandy clay loam. It extends to a depth of 31 inches. It is underlain by weathered sandstone.

McE – Montevallo Channery Silt Loam, 30 to 50 percent slopes

This shallow, well drained, very steep soil is on side slopes and narrow ridgetops in the uplands. Slopes are complex and convex. Individual areas are irregular in shape and range from 40 to 400 acres in size. Typically, the surface layer is dark yellowish brown channery silt loam about 3 inches thick. The upper part of the subsoil is yellowish brown very channery loam. It extends to a depth of 5 inches. The lower part is strong brown extremely channery loam. It extends to a depth of 12 inches. It is underlain by yellowish brown, weathered, fractured siltstone and sandstone.

SpB – Spadra-Whitwell Complex, 0 to 3 percent slopes

These deep, well drained and moderately well drained, nearly level and gently sloping soils are on low stream terraces. They generally are occasionally flooded, but some areas below Lewis Smith Dam along the Black Warrior River and areas at the higher elevations along the Blackwater, Lost, and Wolf Creeks are only rarely flooded. Slopes are generally long, smooth, and slightly convex. Individual areas are generally long and fairly broad and parallel the streams. They range from 20 to 120 acres in size. They are about 45 percent Spadra soil and 40 percent Whitwell soil. The two soils occur as areas so intricately mixed or so small that mapping them separately is not practical at the selected scale. Typically, the Spadra soil has a surface layer of dark yellowish brown fine sandy loam about 7 inches thick. The subsoil is loam throughout. The upper part is dark brown. It extends to a depth of 21 inches. The next part is mottled dark yellowish brown, yellowish brown, and light yellowish brown. It extends to a depth of 33 inches. The lower part is

dark brown and mottled. It extends to a depth of 58 inches. The underlying material to a depth of 64 inches or more is dark yellowish brown sandy loam.

GEOLOGIC INFORMATION

Structurally, the site is located within the Warrior Coal Basin. The strata which underlies and outcrops in this region is the Pottsville Formation of the Pennsylvanian basins of the Appalachian Plateau. The Pottsville Formation in this area consists of thin to thick bedded sandstones, shales, and coal seams. Structurally, the Warrior Basin is formed by a large gentle syncline that extends from north-central Mississippi in the west to north-central Alabama in the east. The syncline is tilted southwestward with a regional dip of 30 to 200 feet per mile.

No faults, fractures, or other significant geologic structures are known to exist locally which would alter the of strata within and adjacent to the proposed permit area.

Locally, the strata which outcrops in the immediate vicinity of the mine site includes shales, siltstones, fireclays, and coal seams associated with the Mary Lee Coal Group.

According to “Depositional Settings of the Pottsville Formation in the Black Warrior Basin”, the Mary Lee Group lies approximately 40 to 130 feet above the Black Creek Coal Group and from 140 to 400 feet below the Pratt Coal Group.

The target seams at this facility is the Mary Lee Seam of the Mary Lee Coal Group. The Mary Lee Seam does not outcrop within the permit area and occurs between approximately 235 and 285 ft/ MSL and averages approximately 32 inches thick.

MINE SITE INFORMATION

The Signal Resources, LLC – Wolf Branch West Mine is located in Sections 34 and 35, Township 14 South, Range 8 West, Walker County, Alabama, as shown by the Jasper, Alabama USGS quadrangle map. The proposed mine site will occupy approximately 44.0 acres of which approximately 40.2 will be mining area.

LAND USE

The pre-mining landuse of the permitted area consists of undeveloped/no current use without trees. The proposed post mining landuse of the permit area will be undeveloped/no current use with perennial grasses being the primary vegetative cover.

SAMPLING TECHNIQUES AND GENERAL SAMPLE INFORMATION

Soil samples were taken at locations displayed on the attached [Soils Map](#). This map shows the site location and soil types within the area. The operations plan and existing site conditions were considered when selecting sampling locations which are located within the fines areas, on the berm where material will be relocated from, and the uplands within the site to the east where the berm material will be distributed to.

Soil samples were taken using a hand shovel and collecting a roughly cylindrical sample of the upper 10-12 inches of soil at the location. Each sample was delivered to Bhate Geosciences Corporation for sieve analysis, and the pan material (#10 sieve) was delivered to the Auburn University Soil Testing Laboratory for chemical analysis.

*NOTE: Available water capacity as provided by the Auburn University Soil Testing Laboratory is representative of only the -2mm fraction of the sample. The “total” available water capacity can be obtained by multiplying the fraction of the soil sample obtained in the field as shown by the sieve analysis.

PHYSIO-CHEMICAL ANALYSIS

See attached [Lab Reports and Overburden Analysis Spreadsheets](#) taken from P-3844. In addition, please find the attached [Soil Lab Report for Samples WBWMSS-1 \(WBMWM SS McE\) and WBWMSS-2 \(WBMWM SS SpB\)](#) and [Spoil Lab Report for Sample OB-1](#).

Soil samples were collected from two representative locations throughout the proposed mine site. Each sample was collected by hand and placed in a one-gallon resealable plastic bag and delivered to Bhate Geosciences Corp. for sieve analysis. The 2mm sieve material was retained and delivered to the Auburn University Soil, Plant, and Water Laboratory for chemical analysis. Each soil was tested for nitrogen, potassium, calcium, magnesium, zinc, manganese, pH, and lime buffer capacity. In addition, textural analysis and multiple sulfur analysis was performed on each sample.

Overburden samples were taken from drill cuttings with every 5’ of penetration into the ground using a rotary air drill and tested by Perc Engineering Co., Inc. for the P-3844 Pleasant Grove South Mine permit application. These lab reports represent the unweathered stratum on the site which will not be disturbed. As no blasting is proposed at this site, only weathered spoil formed from the material represented by these samples will be disturbed. A representative sample of this spoil material which will replace the existing topsoils was taken at location OB-1 using a hand shovel to dig beneath the spoil until mostly unweathered material was encountered. This material was placed into a 1 gallon resealable plastic bag and delivered to Standard Laboratories, Inc. in Tennessee.

The results of these chemical analyses were analyzed, and the topsoil was compared to the overburden material. Comparison of the topsoil and overburden can be seen in the table below.

SOIL AND OVERBURDEN COMPARISON						
	Sample I.D.	pH	% Sulfur	Max. Pot. Acidity	Nuet. Pot.	Acid-Base Account
SOIL	WBWMSS-1	6.7	0.0113	0.350	<1	-0.350
	WBWMSS-2	7.2	0.0256	0.800	12	11.200
	Sample I.D.	pH	% Sulfur	Max. Pot. Acidity	Nuet. Pot.	Acid-Base Account
OVERBURDEN	P-3844 MW-14332	5.841	0.3020	9.428	11.691	2.263
	P-3844 MW-12773	5.900	0.2350	7.345	13.475	6.130
	OB-1	8.010	0.1100	3.366	75.000	71.56

pH analysis reveals that the spoil material (OB-1) which will be removed is of a higher pH and has a greater neutralization potential than the topsoils which will be replaced. Sample WBWMSS-1 is representative of the weathered spoil material on the site and is shown to have a low pH and neutralization potential. However, even the unweathered overburden samples taken by Perc Engineering Co., Inc. which represents the material from which the spoil (OB-1) was formed have comparable or better acid-base accounts to the existing topsoils.

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The native soils have also been found to be lacking in fertility, requiring at least 60 lbs/acre of nitrogen, 50 lbs/acre of potassium, and at least 80 lbs/acre of potassium for optimal growth of revegetation grasses. While the soils are not acidic as is typical of the region and do not require lime due to their high calcium content, the replacement material is comparable to the existing topsoils and exceeds them in this metric.

The following tables illustrate the characteristics and fertility of the native soils in the area, as well as the recommended fertilization requirements.

SOIL CHARACTERISTICS							
Sample I.D.	Textural Class	% Sand	% Silt	% Clay	% Organic Matter	PPM NO3-N	Avail. H2O (cm3/cm3)
WBWMSS-1	Sandy loam	85.00	0.00	15.0	2.8	5.0	0.07
WBWMSS-2	Loamy fine sand	83.75	3.75	12.5	3.2	5.1	0.08

SOIL FERTILITY								
Sample I.D.	pH (s.u.)	P (lbs/Acre)	K (lbs/Acre)	Ca (lbs/Acre)	Mg (lbs/Acre)	Zn (lbs/Acre)	Mn (lbs/Acre)	Lime Buffer Capacity
WBWMSS-1	6.7	5	28	137	768	---	---	---
WBWMSS-2	7.2	35	45	308	9999	---	---	---

SOIL FERTILIZER RECCOMENDATIONS				
Sample I.D.	N (lbs/Acre)	P (lbs/Acre)	K (lbs/Acre)	Limestone (tons/Acre)
WBWMSS-1	60	90	90	0
WBWMSS-2	60	50	80	0