SHANNON, LLC
SHANNON MINE NO. 4
ATTACHMENT IV-C-2

TOPSOIL VARIANCE APPLICATION

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INTRODUCTION

Section 880-X-10C.08(5) of the Administrative Code of the Alabama Surface Mining Commission states that selected overburden materials may be substituted for or used as a supplement to topsoil "if the person who conducts the surface mining activities can demonstrate to the State Regulatory Authority that the resulting soil medium is equal to or more suitable for sustaining revegetation that the existing topsoil, and the substitute material is the best available in the permit area to support revegatation". Mining of the Upper New Castle, Lower New Castle, Mary Lee, Blue Creek and Jagger Coal Seams within the Shannon Mine No. 4 area has occurred in the past during pre-law mining and the permanent program. Natural revegetation has been successful in the past on the previously mined areas both within and adjacent to the proposed permit area. The Shannon Mine No. 4 occupies approximately 2039 acres of which approximately 1250 acres (61%) has been previously mined by others during pre-law mining and the permanent program. The previously mined areas within and adjacent to this proposed permit area have exhibited acceptable natural revegetation as shown in the photos enclosed in this report. During the normal mining operation the lowest overburdens (Jagger and Blue Creek overburdens) to be removed will be spoiled in such a manner as to be the final cover material. Revegetation success at this site on the previously mined areas are largely due to a consistent lithology of shale and some sandstone, which, when mixed during mining, results in a medium which is favorable for both pine tree and ground cover growth. Portions of the previously mined areas will be re-mined to recover the Jagger Coal Seam that was left and spoiled on by previous mining operations. The

existing spoil material over the reclaimed Jagger highwall will be used as cover material in some areas.

The purpose of this report is to compare local topsoils to a select overburden material (Blue Creek and Jagger overburden) to demonstrate the select overburden is equal to or more suitable for sustaining revegetation. This report is requesting a topsoil variance in favor of a selected overburden material on the entire permit with the exceptions of the areas included for Primary Roads at the Shannon Mine No. 4.

MINE SITE INFORMATION

The Shannon, LLC, Shannon Mine No. 4 is a proposed surface mine site and is located in southwestern Jefferson County and northeastern Tuscaloosa County approximately 1.3 miles northeast of the community of Abernant. More specifically the proposed permit area is located in parts of Sections 1, 2, 3, 4, 9, 10, and 11, Township 20 South, Range 6 West and Sections 34, 35, and 36, Township 19 South, Range 6 West, Jefferson and Tuscaloosa Counties, Alabama as seen from the 1980 Abernant and McCalla, Alabama USGS 7.5 minute quadrangles. The proposed permit area lies to the northwest of Blue Creek Road, northeast of Rockhouse Road, southwest of Sumpter/Lawsontown Road and southeast of the C.S.X. Railroad.

The proposed mine site will occupy approximately 2039 acres of which approximately 1913 will be mining area and 126 acres will be coal stockpiles, haulroads, basins, drainage courses and access roads. Previous mining has occurred within and adjacent to the proposed permit area and includes pre-law surface disturbance, permanent program surface disturbance and underground mines. Approximately 1250 acres within the proposed permit area have been previously disturbed by pre-law operators, Black Diamond Coal Mining Co., and by Alabama Land & Mineral Corp. Alabama Land & Mineral Corp.'s Shannon Mine (P-3224), Oswayo #3 Mine (P-3438), Oswayo #4 Mine (P-3483), Area 6 Mine (P-3699) and Shannon, LLC Shannon Mine (P-3859) lie within the proposed boundaries of the Shannon Mine No. 4. As shown on the Soils Map the proposed permit area is underlain by the abandoned works of Black Diamond Coal

Mining Company.'s Shannon Mine and Sumter Mine. Both the Shannon and Sumter underground mines are within the Blue Creek Seam. There were no records found on the pre-law surface mining activities. Five (5) coal seams currently proposed to be mined, in descending order, are the Upper New Castle, Lower New Castle, Mary Lee, Blue Creek and Jagger Coal Seams. A rim cut has been taken on all seams within the proposed permit and adjacent areas. The Blue Creek Seam has been extensively underground mine within the proposed permit and adjacent areas. The previously mined areas within the proposed permit area lack topsoil replacement and consist of reclaimed highwalls, and graded spoil piles. The regraded overburden within and adjacent to the proposed permit area has had good success with the natural revegetation. Both permanent program and pre-law mine sites have demonstrated excellent natural revegetation utilizing heterogeneous overburden of the Mary Lee Group. Revegetation success at these sites are largely due to a consistent lithology of shale and some sandstone, which, when mixed during mining, results in a medium which is favorable for both pine tree and ground cover growth. As stated above almost 61% of the proposed permit area has been previously mined and has shown acceptable natural revegetation, it will be shown in this report that the select overburden material (Blue Creek and Jagger overburden) at this site is equal to or more suitable than the native topsoils as a medium for post mine revegetation. The attached Soils Map shows the proposed permit area, previously mined areas, drill hole locations, overburden and topsoil sampling locations and soil types within the proposed permit area.

SOIL INFORMATION

Soils information for the permit and adjacent areas were taken from the "Soil Survey of Jefferson County, Alabama" that was issued in August of 1982. Soil types and boundaries delineated within the proposed permit area and adjacent areas are shown on the attached Soils Map.

Soils delineated on the Soils Map within the permit area that are included in the Topsoil Variance are as follows:

Map Symbol	Soil Name and Slope Range
25	Palmerdale very shaly loam, 6% to 45% slopes
29	Montevallo-Nauvoo Association steep
31	Nauvoo fine sandy loam, 8% to 15% slopes
35	Palmerdale complex, steep

Note that Soil 25 and Soil 35 are soils that have been previously mined. Previously mined overburden soil samples were only taken in the Soil 35 areas where the previously mined overburden will be re-disturbed.

LAND USE

The premining land use for mining area within the proposed permit area is previously disturbed areas and undeveloped no current use. Previously disturbed areas are delineated on the Soils Map and are a result of pre-law and permanent program surface mining and underground mining. The proposed post mining landuse of the permit area will be Forest and Permanent Water Impoundments..

TOPSOIL DESCRIPTIONS

The following descriptions are for soils delineated within the Shannon Mine No. 4 as shown above. As stated previously, soils information (including soil descriptions) for the proposed permit and adjacent areas were taken from the "Soil Survey of Jefferson County, Alabama" that was issued in August of 1982.

29-Montevallo-Nauvoo association, steep

This map unit consists of soils on strongly dissected areas of sandstone and shale plateaus in the northern and western parts of the county. Extensive surface and deep mining of coal occur in this area. The underlying layers of sandstone, siltstone, shale, and coal are nearly level. The ridges are commonly underlain by sandstone, and the side

slopes are generally underlain by shale and siltstone. The soils are in a regular pattern that is closely related to landscape position and underlying parent material. Areas of this map unit are large. Slope ranges from 6 to 55 percent.

Montevallo soils, on the steep sides of ridges, make up about 40 percent of the map unit. Typically, the surface layer is very dark gray shaly silt loam and dark grayish brown shaly silt loam about 6 inches thick. The subsoil is yellowish brown very shaly silt loam about 10 inches thick. The underlying material is weathered siltstone and shale. The slope of Montevallo soils in this map unit is generally more than 15 percent.

Nauvoo soils, on ridgetops and ridge sides, make up about 25 percent of most areas. Typically, the surface layer is dark grayish brown fine sandy loam about 6 inches thick. The subsoil is about 36 inches thick. The upper 6 inches is yellowish brown fine sandy loam, and the lower 30 inches is yellowish red clay loam. The underlying material is soft, highly weathered sandstone. The slope of Nauvoo soils in this map unit is generally 6 to 15 percent. The available water capacity is very low for Montevallo soils and moderate for Nauvoo soils. In most years, there are periods in which soil moisture is not adequate for optimum plant growth. These periods are longer for Montevallo soils. Both soils are moderately permeable and have a low shrink-swell potential. Surface runoff is rapid for Montevallo soils and moderately rapid for Nauvoo soils. If these soils do not have a plant cover, sheet and rill erosion is a very severe hazard for Montevallo soils and a severe hazard for Nauvoo soils. The surface layer of both soils is strongly acid to very strongly acid. Nauvoo soils can be tilled within a wide range in moisture content. Minor

soils in this association are Allen, Docena, Gorgas, Holston, State, Sullivan, and Townley soils. Also some areas have sandstone bedrock outcrop, and a few areas have been surface mined for coal. Allen and Holston soils are on fans, foot slopes, and toe slopes. Docena, State, and Sullivan soils are in depressions, drainageways, and on flood plains. Gorgas soils are on side slopes. Townley soils, the most extensive of the minor soils, are on ridgetops and upper sides of ridges; slope ranges from 10 to 25 percent. These minor soils and Rock outcrop make about 35 percent of the map unit. The soils of this map unit are used primarily for woodland. Many small areas have been altered by surface mining of coal. A few small areas are used for cultivated crops and pasture. Montevallo soils are not suited to cultivated crops, pasture, or hay because of steep slopes, the hazard of erosion, and shallow soil depth. Areas of Nauvoo soils and the minor Townley soils are suited to these uses, but they are limited by slope and the hazard of erosion. Areas of these soils are generally long and narrow, small, and poorly accessible. The soils of this map unit are suited to woodland use. Suitable species, productivity potential, and management problems are variable. Montevallo soils are suited to coniferous trees, and the potential productivity is moderate. However, the steep slopes and shallow soil depth are limitations. During wet seasons, windthrow of trees is a moderate hazard. Constructing and maintaining roads for logging, loading areas, and fire lanes is difficult on these soils. Poor harvesting techniques can cause severe erosion. Nauvoo soils are well suited to coniferous and deciduous tress, and the potential productivity is moderate to high. There are no significant management concerns. These soils are well suited to constructing and maintaining roads for logging, loading areas, and fire lanes. If grading is necessary for loading areas, stockpiling of the surface layer material and respreading it

after harvest will help vegetation restoration. Montevallo soils are not favorable for residential and industrial uses because of steep slopes and shallow soil depth. Septic tank effluent may flow out to the surface because of pressure caused by elevation difference, or it may flow laterally or downslope through rock cracks, and then surface around residential units at a lower elevation. Plant growth is difficult to maintain on the steep, shallow Montevallo soils. Extensive excavation is needed to prepare dwelling sites on these soils, and potential soil loss is severe. Nauvoo soils are favorable for residential and industrial uses, but slope is a limitation. Also, areas of Nauvoo soils and the included Townley soils are generally long and narrow and are poorly accessible. The soils of this map unit are suited to most low traffic recreation uses. Nauvoo soils are better suited to most recreation facilities than Montevallo soils. A few sites are suitable for pond construction. Many areas of Montevallo soils have suitably shaped basins. However, these soils are shallow in depth and have poor reservoir basins. In such basins, excessive seepage may occur through rock cracks and old root channels. Also, suitable soil material for dams is not available. Surface and subsurface mining of coal is extensive in many areas of these soils. Reclaiming these soils after surface mining operations is difficult because of the remaining steep slopes, the droughty nature of rock spoil, and the wide variation of reaction. Grading and reapplying topsoil will help reduce these problems. Most of the needed topsoil can be stockpiled on site before mining. Montevallo soils are a poor source of topsoil because they are shallow and have steep slopes. A much thicker layer of topsoil can be obtained from some minor soils, primarily Nauvoo, Allen, and Holston soils. The loamy subsoil of these soils can be modified for suitable rooting medium by applying lime and fertilizer and by minimizing tillage. The

Montevallo soils are in capability subclass Vlle and in woodland ordination group 4d. The Nauvoo soils are in capability subclass IVe and in Woodland ordination group 2o.

25-Palmerdale very shaly loam, 6% to 45% slopes

This complex consists of steep, somewhat excessively drained Palmerdale soils and other soils on surface mining spoil piles. The surface layer varies in texture depending upon the coal seam removed and whether spoils have been smoothed. The older areas that have not been reclaimed or remined have very steep and complex slopes and have many highwalls and deep open pits of water. Slopes ranges from 6 to 45 percent in most areas. Areas are 60 to 3,700 or more acres and irregular in shape. Typically, the surface layer is grayish brown very shaly loam that is as much as 60 percent shale and sandstone fragments and is about 5 inches thick. The underlying material is grayish brown very shaly sandy loam that is approximately 90 percent fragments. Palmerdale soils is very low in natural fertility and organic matter content. Reaction ranges from strongly acid to extremely acid throughout. Permeability is moderately rapid, and available water capacity is low. The root zone is restricted by large rocks. Surface runoff is very rapid. The hazard of rill and channel erosion is very severe. Included in mapping are areas of Brilliant, Montevallo, Nauvoo, Pikeville, and Smithdale soils. These soils make up about 15 percent of the area. Most unreclaimed areas areas of this Palmerdale soil are dominantly void of vegetation with a few scattered pine and hardwood trees. Reclaimed areas have been planted to grasses and legumes or pines. This soil is not suite to cultivated crops. The reclaimed area are fairly well suited to pasture and hay. The

Palmerdale soil is fairly suited to loblolly pine. Management concerns include a severe erosion hazard, a severe equipment use limitation, and a severe seedling mortality rate. Some areas are not accessible because of slope gradients and the location of highwalls. Other soils on benches and toe slopes and in basins and drainageways have a higher potential productivity than Palmerdale soils. The alkaline soils are poorly suited to most trees, especially pines. The soils of this map unit are in capability subclass VIIs and in woodland ordination group 3x.

31-Nauvoo fine sandy loam, 8% to 15% slopes

This map unit consists of soils on strongly sloping, well drained soil on ridges and upland plateaus that are underlain by sandstone. The landscape in some places is small knolls and depressions tha have a few, small upland drainageways. Slopes are convex. Areas are 20 to 100 acres or more and irregular in shape. Slope ranges from 8 to 15 percent. Typically, the surface layer is very dark grayish brown and dark brown fine sandy loam about 7 inches thick. The subsurface layer is yellowish brown fine sandy loam about 5 inches thick. The subsoil is yellowish red clay loam about 22 inches thick. The layer below the subsoil is about 12 inches of red and yellow sandy loam that has a relict rock structure. The underlying material is highly weathered, red and yellow sandstone. In places, soils are similar to Nauvoo soils except that they have a yellower subsoil, or soil is 50 to 60 inches thick, or the depth to weathered sandstone is 60 to 72 inches, or slopes are either less than 8 or more than 15 percent. The available water capacity of this soil is moderate. In most years, there are periods in which soil moisture is not adequate for

optimum plant growth. Permeability is moderate, and the shrink-swell potential is low. Surface runoff is moderatly fast. If this soil does not have a plant cover, sheet and rill erosion is a very severe hazard. The surface layer is strongly acid to very strongly acid. This soil can be tilled within a wide range in moisture content. Included with this soil in mapping are areas of Docena, Montevallo, Sullivan, and Townley soils. Also included are soils somewhat similar to Nauvoo soils except that they have either a moderately slowly permeable subsoil or hard bedrock at 40 to 60 inches. This soil is used primarily for pasture and woodland. Many areas adjacent to roads are in residential use. This soil is suited to pasture and hay. Coniferous and deciduous trees are well suited to this soil, and the potential productivity is high. There are no significant management concerns. The soil has many favorable properties for residential uses. Some grading, cutting and filling, and excavating are needed for local roads, streets, and dwellings. Grading can be minimized if streets are laid out laterally along the ridgetops toward drainageways. Low strength is a moderate limitation for local roads and streets. In areas to be cut and filled, the surface layer should be removed, stockpiled, and respread to provide a good rooting medium for plants. The strong slope limits the use of the soil for industrial and commercial facilities because a considerable amount of cutting and filling is needed. This soil is suited to most recreation uses. In most areas, grading is needed for site preparation for intense recreation uses. In these areas, the surface layer should be removed, stockpiled, and respread to provide a good rooting medium for plants. Many potential sites are suitable for pond construction. Seepage and the underlying highly weathered sandstone are moderate limitations. To minimize the risk of seepage,

construction materials should not be removed from the reservoir floor. The Nauvoo soil is in capability subclass IVe and in woodland ordination group 2o.

35-Palmerdale complex, steep

This complex consists of steep, somewhat excessively drained Palmerdale soils and other soils on surface mining spoil piles. The sediment-producing slope and highwalls have convex slopes. The sediment-receiving benches, drainageways, and basins have concave slopes. Slope ranges from 15 to 60 percent in most areas. Areas are 40 to 1,000 or more acres and irregular in shape. The areas of Palmerdale soils and other soils in this complex are so intricately mixed, or so small, that mapping them separately was not practical. Palmerdale soils and similar soils make up about 70 percent of the map unit. Typically, Palmerdale soils are more than 60 inches thick. The soil is dark gray very shaly silt loam. In places, soils are similar to Palmerdale soils except that they are medium acid to moderately alkaline, or they have slopes of less than 15 percent. Other soils on benches, in drainageways, and in basins make up about 20 percent of the map unit. These soils are more than 60 inches thick. Typically, they have a silt loam surface layer about 10 inches thick. The underlying material is very shaly silt loam. The available water capacity for Palmerdale soils is low. There are lengthy periods in which soil moisture is not adequate for optimum plant growth. Palmerdale soils are moderately rapidly permeable and have a low shrink-swell potential. These soils are subject to subsidence. Surface runoff is very rapid. The hazard of rill and channel erosion is very severe. The surface layer is strongly acid in Palmerdale soils and medium acid to

moderately alkaline in soils similar to Palmerdale soils. Included in mapping are areas of Montevallo, Nauvoo, and Townley soils. The included soils and areas of escarpments, highwalls, and bedrock outcrop make up about 10 percent of the map unit. The soils are not suited to cultivated crops, pasture, and have because of steep slopes, fragments on the surface, and the droughty nature of the soils. Present land use of these soils is oriented primarily towards reclamation and establishment of trees. Reclaiming Palmerdale soils is difficult because of steep slopes, the hazard of erosion, droughtiness, and the acidity of the soil. In addition, north facing slopes are subject to soil freezing to a depth of several inches and "frost heave" during thawing. Some of the problems of reclamation can be minimized by applying topsoil from other soils and adding lime and fertilizer. Palmerdale soils are suited to coniferous and deciduous trees; the potential productivity is moderate. Coniferous trees are generally favorable trees establish on these soils. Management concerns include a severe erosion hazard, a severe equipment use limitation, and a severe seedling mortality rate. Some areas are not accessible because of slope gradients and the location of highwalls. Other soils on benches and toe slopes and in basins and drainageways have a higher potential productivity than Palmerdale soils. The alkaline soils are poorly suited to most trees, especially pines. The soils of this map unit are in capability subclass VIIs and in woodland ordination group 3x.

GEOLOGIC DESCRIPTION

The Geologic description of the Shannon, LLC .'s, Shannon Mine No. 4 was prepared by qualified personnel of Twin Pines, LLC from several drill holes within and adjacent to the proposed permit area.

The proposed mine site will occupy approximately 2053 acres of which approximately 1930 will be mining area and 123 acres will be coal stockpiles, haulroads, basins, drainage courses and access roads. Previous mining has occurred within and adjacent to the proposed permit area and includes pre-law surface disturbance, permanent program surface disturbance and underground mines. Approximately 1250 acres within the proposed permit area have been previously disturbed by pre-law operators, Black Diamond Coal Mining Co., and by Alabama Land & Mineral Corp. Alabama Land & Mineral Corp.'s Shannon Mine (P-3224), Oswayo #3 Mine (P-3438), Oswayo #4 Mine (P-3483), Area 6 Mine (P-3699) and Shannon, LLC Shannon Mine (P-3859) lie within the proposed boundaries of the Shannon Mine No. 4. As shown on the Soils Map the proposed permit area is underlain by the abandoned works of Black Diamond Coal Mining Company.'s Shannon Mine and Sumter Mine. Both the Shannon and Sumter underground mines are within the Blue Creek Seam. There were no records found on the pre-law surface mining activities. Five (5) coal seams currently proposed to be mined, in descending order, are the Upper New Castle, Lower New Castle, Mary Lee, Blue Creek and Jagger Coal Seams. A rim cut has been taken on all seams within the proposed permit and adjacent areas. The Blue Creek Seam has been extensively underground mine within the proposed permit and adjacent areas.

Structurally, the proposed mine is located within the Cumberland Plateau Section of the Appalachian Plateau Physiographic Region. The proposed permit area is located within the southeastern most section of the Warrior Coal Basin know as the Blue Creek Basin. The Blue Creek Basin is a relatively narrow, canoe-shaped synclinal area approximately 12 miles long and up to 4 miles wide and is separated from the main Warrior Basin by the steeply dipping strata of the Blue Creek Anticline. The general structure of the Blue Creek Basin is dominated by several northeast-southwest trending folds that plunge to the southwest. The proposed permit area is influenced by two (2) prominent regional structure features, the Blue Creek Anticline approximately 0.25 miles to the northwest and the Blue Creek Syncline which centers the proposed permit area. Both the Blue Creek Anticline and the Blue Creek Syncline have a northeasterly trend and are generally parallel to the southeastern boundary of the Warrior Coal Basin. The Blue Creek Syncline is an asymmetrical syncline that plunges to the southwest. Along the northwestern limb of the syncline the strata dips 15 degrees to 18 degrees to the southeast and along the southeastern limb strata dips 9 degrees to 12 degrees to the northwest.

Local structural features in the proposed permit area consist of five (5) normal faults which have a northwesterly trend. The northwesterly trending faults have vertical displacements of 15 feet to 125 feet or more. See the Major Structures Map in the HydroGeo report for the location of the regional and local structure features.

The strata which underlies and outcrops in this region is of the Pottsville Formation of the Pennsylvanian Age. The Warrior Basin is the southern most of a series of Pennsylvanian basins of the Appalachian Plateau. The Pottsville Formation in this area

consists of thin to thick bedded sandstones, siltstones, shales, clays, 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. Toward the interior of the Warrior Basin, the regional southwest dip of Pottsville strata is modified by a series of three synclines and two anticlines. Of these, the major structures are the Warrior and Coalburg synclines, and the Sequatchie anticline. The fold axes are parallel to the Appalachian system in a northeast-southwest direction and plunge to the southwest with the regional dip.

Locally, the strata which outcrops in the immediate vicinity of the proposed mine site is the coal-bearing Pennsylvanian aged Pottsville Formation which includes siltstones, shales, sandstones, underclays, 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.

As stated earlier there are five (5) mineable coal seams located within the proposed permit area. The entire permit area has been rim cut and reclaimed. None of the seams outcrop within the proposed permit area. The overburden above the Upper New Castle ranges between 113 to 353 feet, the innerburden between the Upper New Castle and Lower New Castle ranges between 30 to 46 feet, the innerburden between the Lower New Castle and the Blue Creek ranges between 35 to 84 feet, the innerburden between the Blue Creek and Lower Blue Creek ranges between 3 to 17 feet, and the innerburden

between Blue Creek and Jagger ranges be tween 18 a nd 48 fe et within the proposed permit area. The thickness of the Upper New Castle Seam averages approxim ately 14 inches. The thickness of the Lower New Castle Seam averages approxim ately 38 inches thick. The thickness of the Blue Creek Se am averages approxim ately 84 inches. The thickness of the Lower Blue Creek Seam averages approximately 15 inches thick and the Jagger Seam averages approxim ately 30 inches. The Upper New Castle, Lower New Castle, Mary Lee and Jagger Coal Seam s are solid within the proposed pe rmit area. The Blue Creek Coal Seam has been extensively underground m ined. Only pillars of Blue Creek Coal that were not recovere d by the previous underground m ining operations will be surface mined at this site.

This site is an area m ine located on several com plex t rending ridges whose relief are approximately 260 ft. above the receiving stream s. The rocks outcropping wi thin the proposed perm it area belong to the upper Pottsville Form ation and consist of clastic sediments of a deltaic environm ent. Acco rding to the "Hydrologic Assessme nt, Eastern Coal Province Area 23, Alabam a" generally the coals are seperated by sequences of gray sandstone, conglomerate, siltstone, shale underclays.

Seven (7) overburden geochemistry sites (DH-14092, DH-14095, DH-12575, DH-12608, DH-1725, DH-1726, and DH-1727) and num erous exploratory drill holes were used to describe the lithology withi n a nd surrounding the proposed perm it area. Personnel of Twin Pines, LLC drilled overburden geochem istry sites DH-1725, DH-1726, and DH-1727 in June of 2011, utilizing a Failing 1500 air ro tary drill w ith a 4-3/4 inch drill bit. Samples were collected from drill cuttings ev ery 5 ft. or change in lithology and a log

was kept of the lithology encountered by personnel of Twin Pines, LLC. Collected samples were cataloged and stored in plastic gallon size ziploc bags for later inspection and testing. These samples were transported to PERC Engineering Co., Inc.'s Laboratory where collected samples were utilized for geochemical analysis, including paste pH, total sulfur, and neutralization potential was conducted according to ASTM guidelines. Personnel of Costain Coal, Inc. drilled overburden geochemistry sites DH-14092, DH-14095, DH-12575, and DH-12608 in June, August, and November of 1991. Samples were collected from drill cuttings every 5 ft. or change in lithology and a log was kept of the lithology encountered by personnel of Costain Coal, Inc.

Lithologic logs were constructed from the seven (7) overburden geochemistry drill holes mentioned above by qualified personnel of Twin Pines, LLC and Costain Coal, Inc. The average total sulfur content from of the Upper New Castle was analyzed as 1.28 to 1.66 percent, the Lower New Castle was analyzed as 1.42 to 1.79 percent, the Mary Lee was analyzed as 0.90 to 1.13 percent, the Blue Creek was analyzed as 0.90 to 1.03 percent, the Lower Blue Creek was analyzed as 0.82 percent, and the Jagger was analyzed as 1.09 to 1.32 percent.

Information provided in the Weighted Average Overburden Analysis sheets for this site revealed that only one interval in DH-1727 at a depth of 380.0' - 385.0' was tested as being potentially acid-forming other than intervals located below the coal seams in DH-1726 and DH-1727 which were contaminated with coal. With timely reclamation, excess neutralization potential of the overburden material, and the location of these intervals within the stratigraphic column these intervals should not pose a problem.

Due to the fact that all overburden at this site does not occupy similar areas, intervals shown in the attached results of geochemical analysis which are located in the upper portions of the drill logs occupy a smaller volume than intervals which are located closer to the bottom, consequently, their acid-base accounts do not contribute as substantially to the overall chemistry of the overburden. In an attempt to more accurately describe the acid-base potential of the overburden at the Shannon Mine No. 4 site, a spreadsheet which was developed at the Pennsylvania Dept. of Environmental Resources, Bureau of Mining and Reclamation was employed. This spreadsheet not only takes into account the volume occupied by each interval tested, but also the amount of coal lost into the spoil. The results of the Volumetric Overburden Analysis method from overburden geochemistry sites DH-12575, DH-12608, DH- 14092, DH-14095, DH-1725, DH-1726, and DH-1727 are favorable: overburden at the Shannon Mine No. 4 contain an average of 18.77 (tons $CaCO_3$/1000 tons overburden) excess neutralization potential.

SAMPLING TECHNICS

Information utilized to describe the orientation, lithology, and geochemistry of the Shannon Mine No. 4 and adjacent areas include overburden geochemistry sites (DH-1725, DH-1726, DH-1727, DH-14092, DH-14095, DH-12575 and DH-12608) and numerous exploratory drill holes.

Personnel of Twin Pines, LLC drilled overburden geochemistry sites DH-1725, DH-1726, and DH-1727 in June of 2011, utilizing a Failing 1500 air rotary drill with a 4-3/4 inch drill bit. Samples were collected from drill cuttings every 5 ft. or change in lithology

and a log was kept of the lithology encountered by personnel of Twin Pines, LLC. Collected samples were cataloged and stored in plastic gallon size ziploc bags for later inspection and testing. These samples were transported to PERC Engineering Co., Inc.'s Laboratory where collected samples were utilized for geochemical analysis, including paste pH, total sulfur, and neutralization potential was conducted according to ASTM guidelines. Personnel of Costain Coal, Inc. drilled overburden geochemistry sites DH-14092, DH-14095, DH-12575, and DH-12608 in June, August, and November of 1991. Samples were collected from drill cuttings every 5 ft. or change in lithology and a log was kept of the lithology encountered by personnel of Costain Coal, Inc.

Soil and overburden samples were taken at locations shown on the attached Soils Map by qualified personnel of Twin Pine, LLC on June 1, 2011. Five (5) samples of soil number 29 (Montevallo-Nauvoo association, steep), one (1) sample of soil number 31 (Nauvoo fine sandy loam, 8% to 15% slopes) were collected along with six (6) samples of the heterogeneous overburden soil number 35 (Palmerdale complex, steep) from previously disturbed areas within the proposed permit area.

Each sample was selected as the most representative of the area in both texture and vegetative cover (which reflects chemical suitability). Samples were taken by digging a cylindrical to slightly conical shaped hole 6-8 inches deep with a spade. All contents of this section are included in the sample. Soil samples taken lack vegetative and other organic cover so they will more accurately reflect topsoil that is cleaned of vegetative cover and stockpiled for soil redistribution. Sieve analysis was conducted on oven-dried samples by PERC Engineering Co., Inc.'s Laboratory to determine coarse fragment and

soil percentages. Results of this analysis is in Table 1. The minus 2mm (or soil) fraction of all samples were then sent to Auburn University Soil Testing Laboratory for the following analyses: Soil fertility, pH, recommendations for post mining revegetation, % sand, silt, and clay, available water capacity, and ppm of nitrate nitrogen in the soil. Results of this analysis are given in Table 3.

*Note: available water capacity (AWC) conducted by Auburn University Testing Laboratory is determined on only the soil (-2mm) fraction of the sample obtained in the field. To obtain the "Total" available water capacity, the AWC will be added to the available water capacities of the larger coarse fragments as shown in Table 4.

TABLE 2

OVERBURDEN VS TOPSOIL COMPARISON

&	SOIL (AVERAGE)	PREVIOUSLY MINED OVERBURDEN (AVERAGE)	SELECTED OVERBURDEN DH-1725, DH-1726, DH-1727, DH-12757, DH-12608, DH14092, DH-14095 (AVERAGE)
pH (Median)	4.75	6.25	7.92
Fertility ratings for P, K, & Mg:			
Phosphorus	27.3	27.2	N/A
Potassium	93.7	128.5	N/A
Magnesium	84.5	778.7	N/A
Recommendations for Limestone, N, P_2O5, K_2O:			
Limestone (Tons/Acre)	1.92	0.33	N/A
N (Lbs./Acre)	60	60	N/A
P_2O5 (Lbs./Acre)	73.3	66.7	N/A
K_2O (Lbs./Acre)	55	40	N/A
Sulfur (percent)	0.017	0.193	0.185
Maximum Potential Acidity*	0.53	6.03	5.79
Neutralizing Potential*	+1.17	+10.25	+30.27

TABLE 2

&	SOIL (AVERAGE)	PREVIOUSLY MINED OVERBURDEN (AVERAGE)	SELECTED OVERBURDEN DH-1725, DH-1726, DH-1727, DH-12757, DH-12608, DH14092, DH-14095 (AVERAGE)
Acid-Base Account*	+0.64	+4.22	+24.48
Percent Organic Matter	1.73	9.61	N/A
Nitrate Nitrogen (ppm)	1.47	0.87	N/A
Sand Percentage	41.25	62.70	N/A
Silt Percentage	45.21	28.54	N/A
Clay Percentage	13.54	8.76	N/A
Available Water Capacity (In. H_2O/In. Soil)	0.1450	0.1133	N/A
Coarse Fragment Percentage	4.01	51.76	N/A
Soil Percentage	95.99	48.24	N/A
"Total" Available H_2O Capacity (in. H_2O/in. soil)	0 .1430	0.1279	N/A
Soil Erodibility Factor "K"	.32	.24	N/A

*Tons CaCo3 Equivalent/1000 tons material

TABLE 4

TOTAL AVAILABLE WATER CAPACITY

Montevallo-Nauvoo association, steep &
Nauvoo fine sandy loam, 8% to 15% slopes

PERCENT OF SAMPLE RETAINED

SAMPLE I.D.	1"	1/2"	1/4"	2mm
Soil 29-1	0.00	0.00	0.51	1.70
Soil 29-2	0.00	0.00	1.00	2.51
Soil 29-3	0.00	0.14	0.54	3.47
Soil 29-4	0.00	0.14	0.61	1.59
Soil 29-5	0.00	1.45	2.61	4.42
Soil 31-1	0.00	0.00	0.84	2.49
AVE:	0.00	0.29	1.02	2.69

0.00% x .0389 in./in. = .0000 in./in.
0.29% x .0492 in./in. = .0001 in./in.
1.02% x .0603 in./in. = .0006 in./in.
2.69% x .1149 in./in. = .0031 in./in.
.0038 in./in.

< 2mm average from Table 2: 95.99%

Average available water capacity of < 2mm taken from Auburn University Soil Testing Laboratory = 0.1450 in./in.

95.99% x .1450 in./in. = 0.1392 in./in.
+ 0.0038 in./in.
Ave. TAWC for soils = 0.1430 in./in.

*Available water capacity values (in./in.) were obtained from "A Method of Comparing Soil Materials for Plant Available Water" which was supplied by the Alabama Surface Mining Commission.

TABLE 4 (Continued)

TOTAL AVAILABLE WATER CAPACITY

Palmerdale Complex, steep
(Previously mined overburden)

PERCENT OF SAMPLE RETAINED

SAMPLE I.D.	1"	1/2"	1/4"	2mm
35-1	0.88	10.22	19.25	33.72
35-2	3.39	9.91	10.94	17.78
35-3	2.20	13.94	23.88	26.78
35-4	3.34	12.88	16.86	20.05
35-5	1.98	9.76	11.18	19.20
35-6	0.83	9.46	12.82	17.30
AVE:	2.10	11.03	15.82	22.47

2.10% x .0389 in./in. = .0008 in./in.
11.03% x .0492 in./in. = .0005 in./in.
15.82% x .0603 in./in. = .0095 in./in.
22.47% x .1149 in./in. = .0258 in./in.
.0366 in./in.

< 2mm average from Table 2: 48.24%

Average available water capacity of < 2mm taken from Auburn University Soil Testing Laboratory = 0.1133 in./in.

48.24% x .1133 in./in. = 0.0913 in./in.
+ 0.0366 in./in.
Ave. TAWC for overburden = 0.1279 . in./in.

*Available water capacity values (in./in.) were obtained from "A Method of Comparing Soil Materials for Plant Available Water" which was supplied by the Alabama Surface Mining Commission.

CHEMICAL ANALYSIS COMPARISON

A comparison of the physical and chemical analysis between the average of the topsoil and overburden samples collected within the proposed permit area reveals that the selected overburden at the Shannon Mine No. 4 is more suitable as a plant growth medium than the native soils present. The median pH of the native topsoils was 4.75 and the previously mined overburden averaged 6.25 and 7.92 on the selected overburden material. As a result, the Auburn Soil Testing Laboratory has recommended an average of 1.92 tons/acre of limestone on the native topsoils and 0.33 tons/acre of limestone on the previously mined overburden.

Overburden at the Shannon Mine No. 4 is more fertile than the native topsoils. Overburden was rated higher in magnesium and potassium, while the native topsoils were rated higher in phosphorus. Auburn University's Soil Testing Laboratory recommends an average of 60 lbs/acre of N on the native topsoils and 60 lbs/acre of N on the previously mined overburden, an average of 73.3 lbs/acre of P_2O_5 on the native topsoils and 66.7 lbs/acre of P_2O_5 of on the previously mined overburden, and average of 55 lbs/acre of K_2O on the native topsoils and 40 lbs/acre of K_2O on the previously mined overburden. As a result the overburden requires an average of 7 lbs/acre more additional nutrients than the native topsoils.

The average acid-base account of the previously mined overburden material was +4.22 and the selected overburden material was +24.48. The average acid-base account of the

native topsoils was a +0.64 . The average neutralization potential was higher in the previously mined overburden than the native topsoils. Also, the previously mined overburden contained an average of 7.88% more organic matter and 0.60% less nitrate nitrogen than the native topsoils.

TEXTURAL ANALYSIS COMPARISON

Textural analysis, performed by the PERC Engineering Co., Inc.'s Laboratory revealed that the native topsoil samples contained more soil and less coarse fragments than the overburden samples, as expected. The heterogeneous overburden was also found to have a higher percentage of silt and less clay and sand than the native topsoil in the <2mm sized material. The native soils are higher in the average available water capacity (0.1450 cm./cm.) than the previously mined overburden (0.1133 cm./cm.) The average "Total" available water capacity as shown in Table 4 is (0.1430 in./in.) for the native soils and (0.1279 in./in.) for the previously mined overburden. The above information suggests that the overburden at the Shannon Mine No. 4 is equal to or more suitable for post mining revegetation than the native topsoils.

CONCLUSIONS

As shown in the data represented in this report, the heterogenous overburden at the Shannon Mine No. 4 was observed to be equal to or more suitable for sustaining revegetation than the native topsoils. Therefore this report suggest that the heterogenous overburden is the best to support revegetation at this proposed mine site and therefore satisfies the criteria set forth in 880-X-10C.08-(5).

OVERBURDEN REDISTRIBUTION PLAN

All overburden at the proposed mine site will be backfilled, compacted, and graded as required in Part IV of this permit application. The mining method used at the Shannon Mine No. 4 is a Dozer/Loader operation. Overburden will be rough graded by Caterpillar type dozers. Once overburden has been rough graded, farm-type tractors will be used to disc the overburden to its final contour, decrease compaction, and increase the mechanical breakage of the surface layer. If any rocks 24" in diameter or greater that remain on the surface, will be collected and buried. At this time the following criteria will be used to evaluate the textural quality of the graded overburden:

a) Rocks of a size greater than 10" shall not exceed 10% by weight of the substitute material.

b) The substitute material shall not contain more than 15% by weight of materials between 10 and 3 inches in size.

c) The substitute material shall not contain more than 50% by weight of materials between 3 and .75 inches in size.

d) At least 30% by weight of the substitute material shall be of a size less than 2 millimeters.

Sampling frequency shall be 1 sample per 20 acres. Overburden sampling will follow the guidelines as described in the "Sampling Techniques" section of this report.

If this criteria is not met, Shannon, LLC shall redisc the overburden and resample. If increasing the mechanical breakage will not enhance the texture of the graded overburden to a satisfactory level, additional soil sized material will be hauled and spread on site or rocks will be recovered from the surface and buried until the above criteria is achieved. The final texture samples taken shall be sent to the Auburn University Soil Laboratory where the following tests shall be conducted: %sand, silt, & clay, textural classification, pH, total sulfur, acid-base account, fertility ratings for phosphorus, potassium, and magnesium, and amendment recommendations for post mining revegetation for limestone, nitrogen, P_2O and K_2O. Results of this analysis will be used to determine the amount of soil amendments, if any, to be applied to the plant medium. Results of all analyses shall be supplied to the Regulatory Authority for review. Any toxic forming materials encountered will be removed or covered with 4 feet of non-toxic non-acid forming material. Approved seed mixtures will be planted and hay used as mulch will be blown upon the seeded overburden according to ASMC guidelines. The above reclamation procedures will be conducted by track equipment, where feasible, and all traffic except pond monitoring vehicles and reseeding equipment shall be prohibited from reclaimed areas to reduce compaction. The preceding report suggests that the post mining productivity of the Shannon Mine No. 4 will be enhanced by the utilization of overburden for a plant growth medium in conjunction with the above stated reclamation procedures.

CERTIFICATION STATEMENT:

The preceding geologic information submitted in the Topsoil Variance Application prepared for Shannon, LLC at the Shannon Mine No. 4 was by me or under my supervision and I hereby certify that it is true and correct to the best of my knowledge or belief.

Twin Pines, LLC

_____ Date:_____

W. Keith Madison, P.G.
License No. 0122

Shannon, LLC
Shannon Mine No. 4

Photo of the vegetation growth within the previously mined areas within the permit area.

Shannon, LLC

Shannon Mine No. 4

Photo of native topsoil collection site.

Shannon, LLC
Shannon Mine No. 4

Photo of the overburden collection site showing the texture and vegetation cover of the previously mined overburden.

Shannon, LLC
Shannon Mine No. 4

Photo showing vegetation growth within the previously mined areas with`in the permit.