



STATE OF ALABAMA
SURFACE MINING COMMISSION

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MEMORANDUM

TO: Sherry Wilson
Office of Surface Mining

Mr. Richard Hulcher
Department of Environmental Management

Mr. Frank White
Alabama Historic Preservation Officer

The District Engineer
U.S. Corps of Engineers

Alabama Department of Industrial Relations
Division of Safety & Inspection

BLM - District Office

State of Alabama
Abandoned Mine Land Reclamation

Tuscaloosa County Commission

U.S. Fish & Wildlife Service

Mr. Keith Guyse, Fish & Game Division

Mr. Mitch Reid - Alabama Rivers Alliance

FROM: JOHNATHAN E. HALL, DIRECTOR

RE: **PERMANENT PROGRAM PERMIT FOR: CAHABA RESOURCES, LLC**

Permit P-3986-63-21-S, Carter Mine

Pursuant to the Alabama Surface Mining Commission Regulation 880-X-8K-.12(2), we are hereby notifying you of the issuance of the above permit.

You may also view a copy of this permit at our web address of:

<http://surface-mining.alabama.gov/PermitDecisions.html>

Enclosed for your information and file is a copy of the permit which shows the legal description of the mine site.

JEH/ml



STATE OF ALABAMA SURFACE MINING COMMISSION

Page 1 of 7

Permit Number:P- 3986 -63-21-S

License Number:L- 755

PERMIT TO ENGAGE IN SURFACE COAL MINING OPERATIONS

Pursuant to **The Alabama Surface Mining Control and Reclamation Act of 1981**, as amended, **ALA. Code Section 9-16-70 et. seq. (1975)** a permit to engage in Surface Coal Mining Operations in the State of Alabama is hereby granted to:

Cahaba Resources, LLC
Post Office Box 122
Vance, Alabama 35490-0122

Such operations are restricted to 120 acres as defined on the permit map and located in:

NW/SE, NE/SE, SW/SE and SE/SE of Section 34; SW/SW of Section 35; all within Township 20 South, Range 8 East, Tuscaloosa County, Alabama.

This permit is subject to suspension or revocation upon violation of any of the following conditions:

1. The permittee shall conduct Surface Coal Mining and Reclamation Operations in accordance with the plans, provisions and schedules in the permit application.
2. The permittee shall conduct operations in a manner to prevent damage or harm to the environment and public health and safety and shall notify ASMC ~~and the public in accordance with ASMC Rule 800-X-81-XB~~ of any condition which threatens the environment or public health and safety.

CONDITIONS TO BE PLACED ON PERMIT P-3986-63-21-S

3. Surface coal mining operations are restricted to those areas for which sufficient bond has been posted with ASMC. On the date of issuance of this permit, bond was posted only for increment(s) 1 consisting of 35 acres as defined on the permit map.
4. No mining disturbance is to occur on any part of the permit on which legal "right of entry" has not been obtained. When such rights are "pending" the applicant shall submit acceptable evidence, to the Director, that such rights have been obtained according to ASMC Regulation 880-X-8D-.07.
5. No disturbance is to occur on any properties on which land use comments from legal owners of record are "pending" prior to the applicant providing acceptable comments.
6. No disturbance is to occur in the 300' setback area to any occupied dwelling prior to the applicant providing acceptable evidence to ASMC of its having secured a waiver of each subject area signed by the owner of the dwelling.
7. No mining disturbance shall occur within the 100' setback of any public road or the relocation of any public road prior to the applicant providing acceptable evidence, to the Director, of its having secured approval for a waiver from the appropriate jurisdictional authority and specific written waiver from ASMC.
8. The permittee shall notify the ASMC and seek consultation with the US Fish and Wildlife Service if:
 - a. The permit is modified in any way that causes an effect on species or Critical Habitat listed under the Endangered Species Act of 1973.
 - b. New information reveals the operation may affect Federally protected species or designated Critical Habitat in a manner or extent not previously considered or
 - c. A new species is listed or Critical Habitat is designated under the Endangered Species Act that may be affected by the operation.
9. The permittee shall contact the ASMC and consult with the Alabama Historic Preservation Officer if the permit is modified or if previously unknown archaeological or historic resources are discovered on the permit area. Upon discovery of previously unknown artifacts or archaeological features the permittee shall cease operations until the Alabama Historic Preservation Officer approves resumption of operations.
10. Surface coal mining operations may not be conducted on any increment for which the surface or mineral owner of record has not been provided a minimum of 30 days' notice of the filing of this permit application. Operations may only be conducted in Increment 01 until expiration of this comment period March 11, 2016 or written waivers submitted to ASMC from all affected property owners.

CONDITIONS TO BE PLACED ON PERMIT P-3986-63-21-S

11. Disturbance in the 100' setback of Black Creek is granted for the construction of Basin 006 only. No mining disturbance may occur in the one hundred foot setback.
12. Five (5) tons per acre of agriculture lime is to be spread on the pit floor prior to cover material placement. This applies to all areas to be mined.

DATE ISSUED: FEBRUARY 24, 2016
EFFECTIVE DATE: FEBRUARY 24, 2016
EXPIRATION DATE: FEBRUARY 23, 2021



Johnathan E. Hall, Director

FINDINGS PERMIT NO.: P-3986-63-21-S

The ASMC, acting by and through its Director, hereby finds, on the basis of information set forth in the application or from information otherwise available, that --

1. The permit application is complete and accurate and the applicant has complied with all requirements of the Act and the regulatory program.
2. The applicant has demonstrated that reclamation as required by the Act and the regulatory program can be accomplished under the reclamation plan contained in the permit application.
3. The proposed permit area is:
 - (a) Not within an area under study or administrative proceedings under a petition, filed pursuant to Chapter 880-X-7 to have an area designated as unsuitable for surface coal mining operations;
 - (b) Not within an area designated as unsuitable for mining pursuant to Chapter 880-X-7 or subject to the prohibitions or limitations of Section 880-X-7B-.06 and Section 880-X-7B-.07 of this chapter; or
4. For mining operations where the private mineral estate to be mined has been severed from the private surface estate, the applicant has submitted to the Regulatory Authority the documentation required under Section 880-X-8D.07 and Section 880-X-8G-.07 of this chapter.
5. The Regulatory Authority has made an assessment of the probable cumulative impacts of all anticipated coal mining on the hydrologic balance in the cumulative impact area and has determined that the proposed operation has been designed to prevent material damage to the hydrologic balance outside the permit area.
6. The applicant has demonstrated that any existing structure will comply with Section 880-X-2B-.01, and the applicable performance standards of Chapter 3 or 10.
7. The applicant has paid all reclamation fees from previous and existing operations as required by 30 C.F.R., Subchapter R.
8. The applicant has satisfied the applicable requirements of Subchapter 880-X-8J.
9. The applicant has, if applicable, satisfied the requirements for approval of a long-term, intensive agricultural, postmining land use, in accordance with the requirements of 880-X-10C-.58(4) and 880-X-10D-.52(4).

FINDINGS PERMIT NO.: P-3986-63-21-S

10. The operation will not affect the continued existence of endangered or threatened species, or result in destruction or adverse modification of their critical habitats, as determined under the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.).
11. The Regulatory Authority has taken into account the effect of the proposed permitting action on properties listed or eligible for listing on the National Register of Historic Places. This finding is supported in part by inclusion of appropriate permit conditions or changes in the operation plan protecting historic resources, or a documented decision that the Regulatory Authority has determined that no additional protection measures are necessary.
12. For a proposed remining operation where the applicant intends to reclaim in accordance with the requirements of Section 880-X-10C-.56 or 880-X-10D-.49, the site of the operation is a previously mined area as defined in Section 880-X-2A-.06.
13. Surface coal mining and reclamation operations will not adversely affect a cemetery.
14. After application approval but prior to issue of permit, ASMC reconsidered its approval, based on the compliance review required by Section 880-X-8K-.10(2)(a) in light of any new information submitted under 880-X-8D-.05(8).
15. The applicant has submitted the performance bond or other equivalent guarantee required under Chapter 880-X-9 of the ASMC Rules prior to the issuance of the permit.
16. For mining operations where a waiver is granted from the 100' setback from a public road according to 880-X-7B-.07, the interests of the public and affected landowners have been protected.
17. The Regulatory Authority has taken into account the effect of the proposed permitting action on properties listed or eligible for listing on the National Register of Historic Places. In a letter dated April 2015 TerraXplorations, Inc. (TerraX) conducted a Phase I Cultural Resource Survey in Tuscaloosa County, Alabama, for approximately 130 acres on April 15 and 16, 2016. As a result of the Phase 1 survey two new archaeological sites were added to the Alabama State Site File (ASSF), Site 1TU1122 and Site 1TU1123. Disturbances to the survey area include logging, access roads, push piles throughout the site and mining operations, based on heavy disturbance and significant erosion at the historic resource (1TU1123) and the prehistoric resources (1TU1122) are not recommended as potentially eligible for the National Register of Historic Places (NRHP). TerraX recommends no further cultural resource studies for the subject property. By a letter dated June 8, 2015 the State Historical Preservation Office (SHPO) Re: AHC 15-0917, based on the cultural resource assessments conducted by the TerraX, determined

FINDINGS PERMIT NO.: P-3986-63-21-S

that the project activities will have no adverse effect on cultural resources eligible for or listed on the NRHP and therefore concur with the project activities. This finding is supported in part by inclusion of appropriate permit conditions or changes in the operation plan protecting historic resources, or a documented decision that the Regulatory Authority has determined that no additional protection measures are necessary. Concerns for unknown resources, which might be discovered during mining, have been made conditions of the permit.

18. Yokley Environmental Consulting Service (Yokley) conducted an environmental assessment for the habitat and the possible presence of federally listed and state protected sensitive species for Tuscaloosa County, Alabama on April 20, 2015. The approximately 130 acre proposed Carter Mine site has multiple access roads, several electrical and pipeline rights-of-way, older access roads have been converted to green fields by hunters, four active gas well sites and 12 coal truck beds stored at a central location. Massive historical disturbance of the area and lack of reclamation and logging has caused continued disturbance and loss. Yokley concludes the proposed surface mine activity will not affect the listed species and their required habitat, since the listed species and their required habitat does not exist on the proposed site and immediately adjacent land. Including the current stream bank areas in the required reclamation of the site after the proposed surface mining would improve the terrain and provide more suitable habitat in the future. By comments dated dated May 14, 2015 the US Fish and Wildlife Service (FWS) concur with the conclusion that no federally listed species/critical habitat are known to occur in the project area. In a letter dated April 9, 2015 the Alabama Department of Conservation and Natural Resources (ADCNR) had no objection to the proposed surface mining project located in Tuscaloosa County, Alabama based on the information provided by letter dated March 20, 2015 and ADCNR own research. By a letter dated March 23, 2015 the ADCNR states the closest sensitive species as occurring approximately 0.6 miles from the subject site. In a letter dated, February 5, 2015 the US Army Corps of Engineers (USACE) authorized the activities by Nationwide Permit Verification- Project Number: SAM-2015-00745-CMS. DA authorization is necessary because the project will involve the placement of fill material into jurisdictional waters of the United States, regulated under Section 404 of the Clean Water Act. The work will involve the placement of fill into 360 linear feet (lf) of intermittent stream, 3.6 acres of wetlands, and 3.89 acres of open water associated with the installation of sediment ponds and coal removal activities. Based upon the PCN the proposal is authorized by Nationwide Permit (NWP) 49 with the following special condition: To show net increase in aquatic resource functions, reclamation to waters of the U.S. on the project site shall be conducted in accordance with the plan submitted in the PCN dated December 26, 2015. The Alabama Surface Mining Commission finds that the proposed operation will not jeopardize the continued existence of endangered or threatened species or critical habitat thereof.

FINDINGS PERMIT NO.: P-3986-63-21-S

19. The proposed permit area is:
- a. Not within an area under study or administrative proceedings under a petition, filed pursuant to Chapter 880-X-7 to have an area designated as unsuitable for surface coal mining operations.
 - b. Not within an area designated as unsuitable for mining pursuant to Chapter 880-X-7 or subject to the prohibitions or limitations of Section 880-X-7B-.06 and Section 880-X-7B.-07 of this chapter.

BASED ON THESE FINDINGS, I RECOMMEND THAT THIS PERMIT BE ISSUED.

DATE: February 24, 2016



Robert Armes
Permit Manager

/ml
cc: I & E, Permit File

CUMULATIVE HYDROLOGIC IMPACT ASSESSMENT

**Cahaba Resources, LLC
Carter Mine
ASMC : P-3986**

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CUMULATIVE HYDROLOGIC IMPACT ASSESSMENT

Cahaba Resources, LLC

Carter Mine

ASMC : P-3986

HUC: 031601120505

NPDES : AL0082414

As required under Federal Public Law 95-87, Section 510(b)(3), the Alabama Surface Mining Commission (ASMC) must find in writing the following proposed operation has been designed to prevent material damage to the hydrologic balance outside the permit area. The applicant must submit a determination of probable hydrologic consequences of mining and reclamation operations in Part II.H of the permit application for areas both on and off the mine site. This determination will allow the ASMC to assess probable cumulative impacts of all anticipated mining activities on the surface and ground water hydrology of the permit and adjacent areas as stated in Federal Public Law 95-87, Section 507(b)(11) and ASMC Rule 880-X-8E-.06(1)(g). The following assessment and findings are intended to fulfill the above.

I. GENERAL INFORMATION

The proposed Cahaba Resources, LLC P-3986 is for a surface coal mining operation encompassing 120 acres including mining acres and haul/access roads, impoundments, stockpiles, equipment storage areas and diversion ditches. Originally the study area for this permit included 130 acres, but the permit footprint was since reduced.

The proposed mine site is located in part of Sections 34 and 35, Township 20 South, Range 8 West, Tuscaloosa County, Alabama as seen from the 1983 photo revised Brookwood and Coaling Alabama USGS 7.5 minute Quadrangles.

A significant portion of the permit area is previously disturbed with no recoverable coal. It is stated in the permit application that one of the main objectives of mining this permit, aside from coal recovery, is to reclaim the previously disturbed portions for the surface owners.

This permit area is located in the Bee Branch Lower Hurricane Creek sub-watershed area. It is located just south of the mouth of Black Creek and west of an unnamed tributary to Black Creek. See Map No. 1 for the general area.

A. Geology of the Warrior Coal Basin

The Pottsville Formation of Early and Middle Pennsylvanian age in Alabama is divided into four fields: the Warrior, Cahaba, Coosa and Plateau fields. All fields were once connected by an unbroken area of coal measures, however separation occurred as a result of folding, faulting and erosion of uplifted areas.

The Warrior coal field is a gently folded or flat-lying area classified as the Cumberland Plateau. It lies in a large, gentle monoclinical structure that extends west into central

Mississippi. The regional dip is towards the southwest. This regional southwest dip is interrupted by 2 anticlines (the Blue Creek anticline and the Sequatchie anticline) and three synclines or basins (the Blue Creek basin, Coalburg syncline and Warrior syncline).

The Warrior field has numerous normal faults that trend north and northwest up to 4 miles in length with up to 200 feet of displacement (“Geology of Coal Resources of the Coal-Bearing Rocks of Alabama, Alabama Geological Survey Bulletin 1182-B”).

During the beginning of the Pennsylvanian age (approximately 320 million years ago), most of Alabama was still part of a shallow, warm ocean basin. The transgressions and regressions of the seas lead to the rhythmic cycle of sandstone, underclay, coal beds, and shale with zones of marine and brackish water fossils that rest on the basal resistant conglomerate orthoquartzite of the Boyles sandstone formation. This sequence immediately repeats itself with similar rocks (marine shale, sandstone or clay, coal seam, freshwater shale and sandstone). This appears to show the rise of sea level, depositing marine sediments, then the falling of sea level allowing the coal producing forests to grow. This was followed by an influx of river deposited sands and muds, which would rapidly accumulate plant material. Then, the sea would rise again repeating the process.

At the end of the Pennsylvanian, the uplift of the region left the coal bearing ecosystem behind. During this periods of uplift, no new sediments could be deposited for at least 200 million years. The gap in time between the Pennsylvanian deposition and the Cretaceous deposition resulted in an unconformity that allows for surface coal mining to exist in the Alabama coal fields.

B. Historical and Active Coal Mines

While there are many active permits within the same area as the Carter Mine, only three permitted ASMC permits are within the sub-watershed area of Bee Branch-Lower Hurricane Creek. One is the Black Warrior Minerals, Inc. Seaboard Mine, ASMC P-3937. This permit was issued on 1/13/2010 and considered active. The second permit within the sub-watershed is the Black Warrior Minerals, LLC Fleetwood Mine, ASMC P-3810. This permit was issued on 3/30/2000 and is expired. Only a portion of the third permit is within the watershed, Shannon, LLC Shannon Mine, ASMC P-3859. This permit was issued on 11/2/2004 and is considered active. Much of the permit area consists of pre-law mining. Pre law mining is mining that occurred before SMCRA (the Surface Mining Control and Reclamation Act) of 1977, Public Law 95-97.

II. CUMULATIVE IMPACT AREA (CIA)

The Cumulative Impact Area (CIA) is that area, including the permit area, within which impacts resulting from the proposed operation may interact with the hydrologic impacts of all other past, current and anticipated coal mining on the surface and groundwater systems.

The CIA for surface water for Permit P-3986 has been defined as the area inside the Bee Branch-Lower Hurricane Creek sub-watershed that encompasses the P-3986

permit area, as well as a small portion of the Shannon, LLC P-3859 Shannon Mine, all of the Black Warrior Minerals, Inc. P-3937 Seaboard Mine and all of the Black Warrior Minerals, LLC P-3810 Fleetwood Mine. The P-3810, Fleetwood Mine is expired meaning there is no more active mining and the permit is currently finished with reclamation.

The critical point is a discharge-weighted technique used to find the concentrations of solutes at different locations in a stream system. Baseline conditions are needed for the general area as well as an estimate of solute concentrations for the proposed mining area. These are given in the PHC. For this permit, a site down stream of P-3810 (SW-2) on Hurricane Creek will be used to estimate the cumulative effects of this mining operation with the effects of P-3810 and P-3937.

The CIA for groundwater for this permit is limited to the proposed permit. The CIA has been selected based upon the Commission's assessment of the possible hydrologic impacts, which may occur as a result of mining operations. The subsurface hydrologic components considered in this assessment include all significant water-bearing units in, and within the vicinity of, the proposed permit and adjacent areas. Other areas of proposed, future mining are not known at this time; however, no cumulative impacts to groundwater are expected due to the limited areal extent of the aquifer system. Groundwater occurs in openings along fractures and bedding planes generally in a sandstone unit within 250 to 350 ft. of the surface.

A. Geologic/Hydrogeologic Information

i. Geology

The proposed P-3986 permit area is located in the Warrior Basin of the Appalachian Plateaus Physiographic Province. The area is underlain by the Coker and Pottsville Formation, and pre-Pennsylvanian rocks. The Pottsville Formation contains coal beds and is overlain by the Coker Formation. The Pottsville Formation consists of alternating beds of gray sandstone, conglomerate, siltstone, and shale with beds of coal and underclay. The formation is thick in this area, approximately 4,500 feet. Except for the conglomeritic sandstone at the base of the formation, few lithologic horizons can be correlated regionally. (Hydrologic Assessment, Eastern Coal Province Area 23, Alabama USGS Water-Resources Investigations Open-File Report 80-683).

The Coker Formation unconformably overlies the Pottsville Formation in the area. The Coker consists of unconsolidated sand, gravel and clay with prominent sand and gravel beds at or near the base of the formation. Strata generally trend northwest and generally dip southwest 30 to 40 ft/mi. The maximum thickness of the Coker is 475 feet, however most surface coal mining that requires the removal of the Coker Formation has occurred where the thickness of the Coker is considerably less than 100 feet. (Hydrologic Assessment, Eastern Coal Province Area 23, Alabama).

This mine site will remove the Carter Coal Seam. The Brookwood Group is generally known to include the Guide, Brookwood and Milldale Seams above the Carter seam,

however these seams were not identified during the drilling program. Approximately 66 percent of the proposed permit area has been previously disturbed by pre-law mining (79 of the 120 acres).

Overburden thickness above the Carter coal Seam ranges from 0 ft. at the cropline to approximately 51 ft. at the deepest point. Cretaceous material within the proposed permit ranged from approximately 5 feet to 50 feet in thickness.

ii. Potentially Acid- and Toxic-Forming Materials

Five drill holes were used to describe the lithology for the area, with two being used for overburden analysis. Drill cutting were taken every 5 ft. or change in lithology to at least 5 feet below the coal seam for analysis of potentially acid- and toxic forming properties. For these samples overburden analyses were conducted including paste pH, total sulfur, maximum potential acidity and neutralization potential in order to obtain the acid base account of the overburden. Potentially acid- and toxic-forming materials are those that exhibit a pH of less than 4.0 s.u. or a deficiency in calcium carbonate equivalent of at least 0 tons per 1,000 tons of material (T/KT).

iii. Surface Water

The proposed permit area is located in the Warrior River Basin and drains to Black Creek and an unnamed tributary to Black Creek. Black Creek drains to Hurricane Creek which ultimately flows into the Black Warrior River.

The Alabama Department of Environmental Management has classified Hurricane Creek as “Fish and Wildlife.” According to 335-6-11-.02, “use classifications apply water quality criteria adopted for particular uses based on existing utilizations, uses reasonably expected in the future, and those uses not now possible because of correctable pollution but which could be made if the effects of pollution were controlled or eliminated. Of necessity, the assignment of use classifications must take into consideration the physical capability of waters to meet certain uses.”

To characterize the existing quality and quantity of water within Black Creek, baseline data were obtained and submitted in the permit application. Downstream Surface Water Monitoring Site CRCMCS-1 was sampled on 7 occasions between 08-26-2014 and 3-26-2015. Upstream Surface Water Monitoring Site CRCMSW-2 was sampled on 8 occasions between 08-26-2014 and 3-26-2015. Table 1 included at the end of this assessment presents the baseline data.

During mining, four sediment control structures will be used under Alabama Department of Environmental Management NPDES Permit Number AL0082414. The purpose of sediment basins is to allow sediment to settle and not discharge into receiving streams. They will drain into Black Creek and an unnamed tributary to Black Creek. All are proposed as permanent water impoundments for fish and wildlife habitat.

iv. Ground Water

According to the “Geohydrology and Susceptibility of Major Aquifers to Surface Contamination in Alabama, Area 6” by the U.S. Geological Survey, Water-Resources Investigations Report 87-4113, “the Pottsville Formation consists chiefly of sandstone, conglomerate, siltstone, and shale with beds of coal and underclay. Water in the Pottsville aquifer occurs under confined conditions due to sharp contrast in permeability within the aquifer. Groundwater usually occurs at depths of less than 200 feet in secondary features such as openings along fractures and bedding planes. Only small amounts of groundwater suitable for domestic use are available in the weathered deposits. The quantity of water available to wells throughout the aquifer depends on the size and extent of the water-bearing openings.” Large water supplies are generally not available from the Pottsville Formation and no municipal wells tap the Pottsville Formation within the study area.

Rocks in the aquifer are tightly cemented and have little primary porosity and permeability. They contain water in secondary features and solutioning is not an effective agent for the enhancement of secondary features due to its silicic lithology (as compared to carbonate aquifers in the area). Due to the folded and faulted geologic structure, the Pottsville Formation is not continuous from one area to another. Groundwater movement between aquifers is restricted due to the confining beds, and movement within the aquifer generally is from hills and highland areas to streams and other areas of natural discharge.

The Coker Formation consists of a basal nonmarine zone of gravel, marine sand and clay. A clay zone is usually present at the top of the Coker. In areas where the Coker is less than 100 feet thick, only the basal beds remain. Also, the Coker is not used extensively downdip where shallower aquifers are available.

According to the Hydrologic Assessment, Eastern Coal Province Area 23, Alabama by the US Geological Survey Water-Resources Investigations Open-File Report 80-683, rain is the source of groundwater in the area. Annual rainfall averages 54 inches per year, which nearly 5 percent of recharges the ground water reservoirs. According to the “Hydrologic Assessment, Eastern Coal Province Area 23”, ground water movement generally is to the southwest. The Coker Formation dips toward the southwest about 30 feet per mile and the water moves through the more permeable lower part which contains sand and gravel beds and overlies the Pottsville Formation.

Little is known about recharge and ground water movement in the Pottsville Formation; however, according to the permit application, the main direction of water is reliant on the contact between the Pottsville and Coker Formations and towards streams. Water may move in other directions based on topographic features of the area or fracture systems in the formation. It is also mentioned that because of the perched water tables and irregular lensing properties of the Pottsville Formation that water

levels are unpredictable and areal correlations are only possible within short distances.

Ground water in the Pottsville occurs in sandstone beds and in fractures and bedding planes. The openings are small, and yield to wells range from less than 10 gal/min to as much as 50 gal/min. The depth to water is generally less than 30 feet in stream valleys and more than 50 feet in hills and ridges.

Domestic Wells

A well inventory of the proposed permit area revealed 58 residences within a ½ mile radius of the proposed permit site. Of the inventoried residences, 48 utilize municipal water from either Citizens' water Authority as their only source. Eighteen residences were not at home and four residences were vacant.

Company Installed Wells

Groundwater monitoring sites used for describing the local characteristics within and adjacent to the Carter Mine groundwater monitoring sites CRCMMW-2, CRCMMW-3 and CRCMMW-4 which were drilled and cased for baseline for the Carter Mine (groundwater monitoring well CRCMMW-1 caved in so it was not utilized). The sites were drilled by personnel of Cahaba Resources and cased by personnel of PERC Engineering Co., Inc.

Groundwater monitoring well CRCMMW-2 is drilled to a depth of approximately 50 feet into a sandy shale unit. It is cased to a depth of 42 feet and monitors the characteristics of groundwater within the cretaceous sediments of the Coker Formation.

Groundwater Monitoring Site CRCMMW-3 is drilled to a depth of approximately 55 feet into a shale unit of the Pottsville Formation. It is cased to approximately 44 feet and monitors groundwater above the Carter seam.

Groundwater monitoring Site CRCMMW-4 is drilled to a depth of approximately 50 feet into sandstone. It is cased for only approximately 9 feet and open hole the rest of the depth. This well monitors above the Carter Coal Seam within the Pottsville Formation.

Baseline data was submitted for the monitoring wells. This data is summarized in Table 4 at the end of this assessment. Groundwater characteristics show similar quality to the aquifer characteristics of the Coker Formation.

B. Coal Processing Waste

Coal processing waste (gob and slurry) will not be generated or disposed of at the site.

C. Material Damages

With respect to the CHIA, material damage to the hydrologic balance means the changes to the hydrologic balance caused by surface mining and reclamation operations to the extent that these changes would significantly affect present and potential uses as designated by the regulatory authority. This includes the hydrologic impact that results from the cumulation of flows from all coal mining sites in a cumulative impact area. Examples of material damage are: permanent destruction of a major regional aquifer; temporary contamination of an aquifer in use that cannot be mitigated; and solute contributions to streams above receiving stream standards.

A CHIA is based on the best currently available data and is a prediction of mining-related impacts to the hydrologic balance. Permittees (and permit applicants) are required to monitor water quality and quantity. Exceeding material damage thresholds might also cause significant reduction of the capability of an area to support aquatic life, livestock and wildlife communities.

III. FINDINGS

Based on the information presented above, the following findings have been made relative to the proposed permit area.

A. Historical Coal Mines

With regard to the historical surface mines in, and within the vicinity of, the proposed site, the possible cumulative effect of the previous mining along with the proposed operations on surface and ground water quality/quantity will be discussed in detail in the following Surface Water and Ground Water sections.

B. Potentially Acid- and Toxic-Forming Materials

Laboratory analyses of the bedrock overlying the Carter Coal Seam show that the overburden at the Carter Mine contains 10482 excess tons/acre of neutralization potential; a neutralization potential of +1.85, and an acid-base account of +0.01 (tons CaCO₃/1000 tons overburden. It should be noted that an acid base account is not a water quality prediction tool, but instead is used to support the ability of vegetation to be established and supported. According to the “Coal Mine Drainage Prediction and Pollution Prevention in Pennsylvania” publication by the Pennsylvania Department of Environmental Protection, excess neutralization potential most likely produces alkaline drainage.

The materials handling plan included in the permit application will require any potentially acid- and toxic-forming strata encountered (such as spoiled coal) to be covered with a minimum of four feet of non-toxic, non-combustible earthen material. Also, this material may not be placed within the root zone. The material will undergo

relatively quick burial that will restrict the development of acid-forming conditions.

The sulfur percentages are very low in the overburden analysis, which is a major constituent in the acid-forming process. Such low sulfur values are a good indicator of inability for the acid forming process to begin. Also low is the availability of neutralizing potential. As such, lime addition of 5 tons/acre is required to be spread along the pit floor before reclamation.

C. Surface Water

Based on laboratory analysis of the samples collected at surface water sites CRCMSW-1 and CRCMSW-2 on the unnamed tributary to Black Creek and Black Creek, the waters contain low TSS, iron and manganese.

The Critical Point site that will be used for this permit is the Surface Water Monitoring Site SW-2 used for P-3810. This site was initially used in the permit application for P-3810 for water quality and quantity projections. The duration of the permit resulted in 65 sample events that will be used for the Critical Point evaluation. This site is downstream on Hurricane Creek, and receives drainage from P-3810, P-3937, P-3986 and a small portion of P-3859. The Critical Point evaluation was used to determine the new concentration of total suspended solids (TSS), iron (Fe) and conductivity at this point, and compared to the baseline surface water data from monitoring site CRCMSW-1 downstream of the mine site.

$$C_{nc} = \frac{Q_a C_a + Q_c [(A_c - A_a) / A_c] C_g}{Q_a + Q_c [(A_c - A_a) / A_c]}$$

Where:

C_{nc} = new concentration at the critical point,

C_g = concentration from the general area,

C_a = concentration from the anticipated mine area,

A_c = drainage area above the critical point

A_a = anticipated mine area in the drainage basin,

Q_a = average flow from the anticipated mining area in the drainage basin, and

Q_c = average flow at the critical point

Using current monitoring data at the Critical Point and the information from the water quality and quantity projections, the new concentration of analyzed parameters is as follows:

Total Suspended Solids $C_{nc} = 6.79$ mg/l

Iron $C_{nc} = 0.66$ mg/l

Conductivity $C_{nc} = 372.4$ μ mhos

These values are at or lower than background levels currently at the P-3810 surface water monitoring site SW-2.

A worksheet is available in Table 2 following this assessment.

Changes in the quantity and quality of the waters in the streams draining the site are expected to be minimal due to the proposed mining activities. During mining, runoff from the disturbed areas will be diverted into sediment basins that are designed to retain all settleable solids, skim and retain all floating solids, and provide adequate detention volume and time to minimize the contribution of suspended solids and dissolved solids into the receiving streams. Effluent from the sediment basins will be monitored by the permittee in accordance with National Pollution Discharge Elimination System (NPDES) permit requirements issued by the Alabama Department of Environmental Management (ADEM). The effluent will be chemically treated, if necessary, in accordance with the NPDES permit. The basins will be monitored quarterly through final bond release in order to characterize and document any effects the mining may have on the surface-water hydrologic balance. Post-Mining water quality and quantity estimates provided by the applicant are based on several factors:

1. Baseline surface water quality
2. Estimated impact during mining
3. Size of the permit area compared to the size of the watershed
4. Amount of previous mining within the watershed

According to the permit application, this mine site is expected to have a negligible increase in base flow, average flows, and peak flow rates relative to the baseline conditions. The NPDES maximum and average limitations set forth by ADEM for this mine site are as follows: pH limit is between 6.0 – 9.0 s.u., TSS maximum limit is 70 mg/L and the average is 35 mg/L, Fe maximum limit is 6.0 mg/L and the average is 3.0 mg/L with a 4-Day average of 3.45 mg/L and the Mn maximum limit is 4.0 with the average being 2.0 mg/L. Additional parameters were set by ADEM with the new NPDES permit including Selenium, Cadmium, Copper, Thallium, Nickel, Aluminum, Arsenic, Cyanide, Mercury, Toxicity and total dissolved solids. Limits and monitoring requirements for these parameters can be found in both the Hydrologic Monitoring Plan for this permit, as well as the ADEM NPDES permit (AL0082414).

Any potentially acid- and toxic-forming materials will undergo relatively quick burial that will minimize exposure of the materials with the atmosphere; thus lessening the potential for Acid Mine Drainage (AMD) to develop. This, along with the sediment basins, vegetation of the disturbed areas and erosion control practices, and addition of 5 tons of lime/acre on the pit floor should serve to lessen impacts to the streams and surface water bodies. Should any increase in mineralization occur in the surface waters as a result of the mining operations, it is anticipated the levels will diminish and return to pre-mining concentrations once mining and reclamation activities are complete. Table 3 shows the post-mining water quality projections based on the downstream site Black Creek.

In addition to the surface water data submitted for five existing on-site impoundments created by pre-law mining. Analysis of these samples show neutral pH, low conductivity, and iron and manganese level below effluent limitations.

D. Ground Water

The proposed operations are not expected to have a permanent adverse impact on the overall quality of the ground water at the site or surroundings. The main aquifer in this area is a sandstone unit located below the Carter Coal Seam. Also, area has been extensively pre-law mined, and due to the size of the proposed permit with respect to the watershed area any effects to the groundwater system would be considered negligible in comparison. According to the permit application as well as published reports, groundwater movement is in the south and west directions, however groundwater movement in this area is influenced by streams, as well as local surface topography.

IV. CONCLUSION

The assessment of probable cumulative impacts of the Cahaba Resources, LLC P-3986 Carter Mine finds the proposed operations have been designed to prevent material damage to the hydrologic balance outside the proposed permit area.

Table 1
Ranges/Averages of Surface-Water Quality/Quantity
Stream Points
P-3986

Parameter	CRCMSW-1 Downstream Black Branch	CRCMSW-2 Upstream Black Branch
Discharge Rate (cfs)	6.33 - 20.65 (18.03)	0.51 - 4.22 (2.30)
Field pH (S. U.)	6.25 - 7.20	5.79 - 7.2
Total Suspended Solids (mg/L)	1 - 3 (2.0)	0.01 - 1 (1.0)
Total Iron (mg/L)	0.21 - 1 (0.63)	0.36 - 0.78 (0.63)
Total Manganese (mg/L)	0.07 - 1.61 (0.44)	0.05 - 0.11 (0.08)
Specific Conductivity 25 °C (μ mhos/cm)	58 - 187 (92.75)	58 - 180 (94.38)
Acidity (mg/L)	4 - 18 8.75)	0.01 - 22 (26.25)
Alkalinity (mg/L)	12 - 26 (18.5)	14 - 64 (26.25)
Sulfates (mg/L)	53 - 67 (59.7)	0.01 - 2 (1.2)

Average values are set in parentheses.
Averages calculated as geometric means.

Table 2

**Cahaba Resources, LLC P-3986
Critical Point Evaluation**

$$C_{nc} = \frac{Q_a C_a + Q_c [(A_c - A_a) / A_c] C_g}{Q_a + Q_c [(A_c - A_a) / A_c]}$$

C_{nc} = new concentration at the critical point,

C_g = concentration from the general area,

C_a = concentration from the anticipated mine area,

A_c = drainage area above the critical point

A_a = anticipated mine area in the drainage basin,

Q_a = average flow from the anticipated mining area in the drainage basin, and

Q_c = average flow at the critical point

Units

Standards:			
	A_c	40.269	sq mi
	A_a	0.194	sq mi
	Q_a	2.24	cfs
	Q_c	681	cfs

Variables:	C_g	C_a	Units
TSS	6.81	1.4	mg/l
Fe	0.659	0.58	mg/l
Conductivity	373.3 umhos	87.86 <i>us</i>	**

Results:	C_{nc}
TSS	1.17 mg/l
Fe	0.68 mg/l
Conductivity	362.8 umhos

A_c Data from ArcMap Area measurement *

A_a Data from Surface Water Projections Sheet

Q_a Data taken from Permit Application Surface Water Hydrology

Q_c Data taken from P-3810 SW-2 site quarterly monitoring data

*Area of Bee Branch-Lower Hurricane Creek watershed is 48.36723 square miles. Subtract the area of 8.098155 square miles for area below critical point in watershed.

** The conversion between umhos and *us* is 1

Table 3
P-3986
Estimate of Post-Mining, Average Event
Surface-Water Quality

BWMSMSW1

Parameter	Estimated Value
Flow (cfsm)	4.863
pH (s.u.)	6.44
Iron (mg/L)	1.291
Manganese (mg/L)	1.471
Specific Conductivity 25 °C (μ mhos)	149
TSS (mg/L)	3.9
Sulfates (mg/L)	60.7

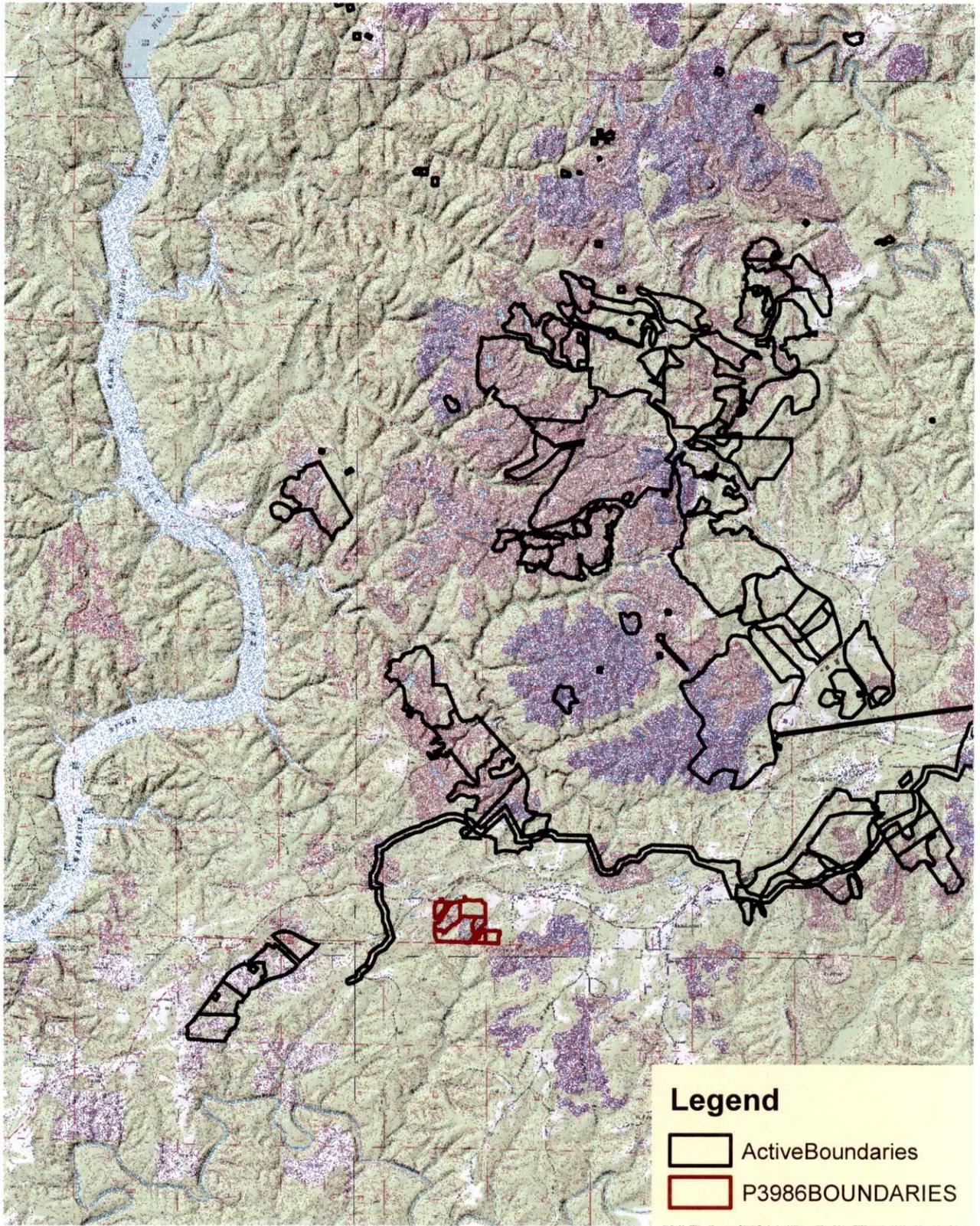
Table 4
P-3986
Ground Water Baseline Data

Parameter	CRCMMW-2	CRCMMW-3	CRCMW-4
Water Level (feet below surface)	18.1 – 23.25 (21.27)	38.0 – 45.2 (41.5)	7.07 – 17.25 (12.48)
Specific Conductivity 25 °C (μ mhos/cm)	39 - 495 (192.7)	73 - 228 (138)	64 - 222 (182)
Total Iron (mg/L)	0.24 – 0.47 (0.35)	6.18 – 51.3 (26.2)	5.56 – 28.45 (17.5)
Total Manganese (mg/L)	0.83 – 1.86 (1.09)	0.66 – 2.71 (1.16)	0.41 – 1.11 (0.85)
Field pH (s.u.)	5.15 – 7.19	5.48 – 6.72	5.3 – 7.05
Sulfates (mg/L)	<1.0	<1 - 29 (4.83)	1 - 35 (29.14)
Acidity (mg/L)	14 - 40 (25)	18 - 52 (29.1)	22 - 42 (29.7)
Alkalinity (mg/L)	14 - 40 (25.0)	10 - 36 (32.6)	10 - 74 (63.1)

Average values are set in parentheses.
Averages calculated as geometric means

Map No. 1
Cahaba Resources, LLC
Carter Mine
Permit Area

1

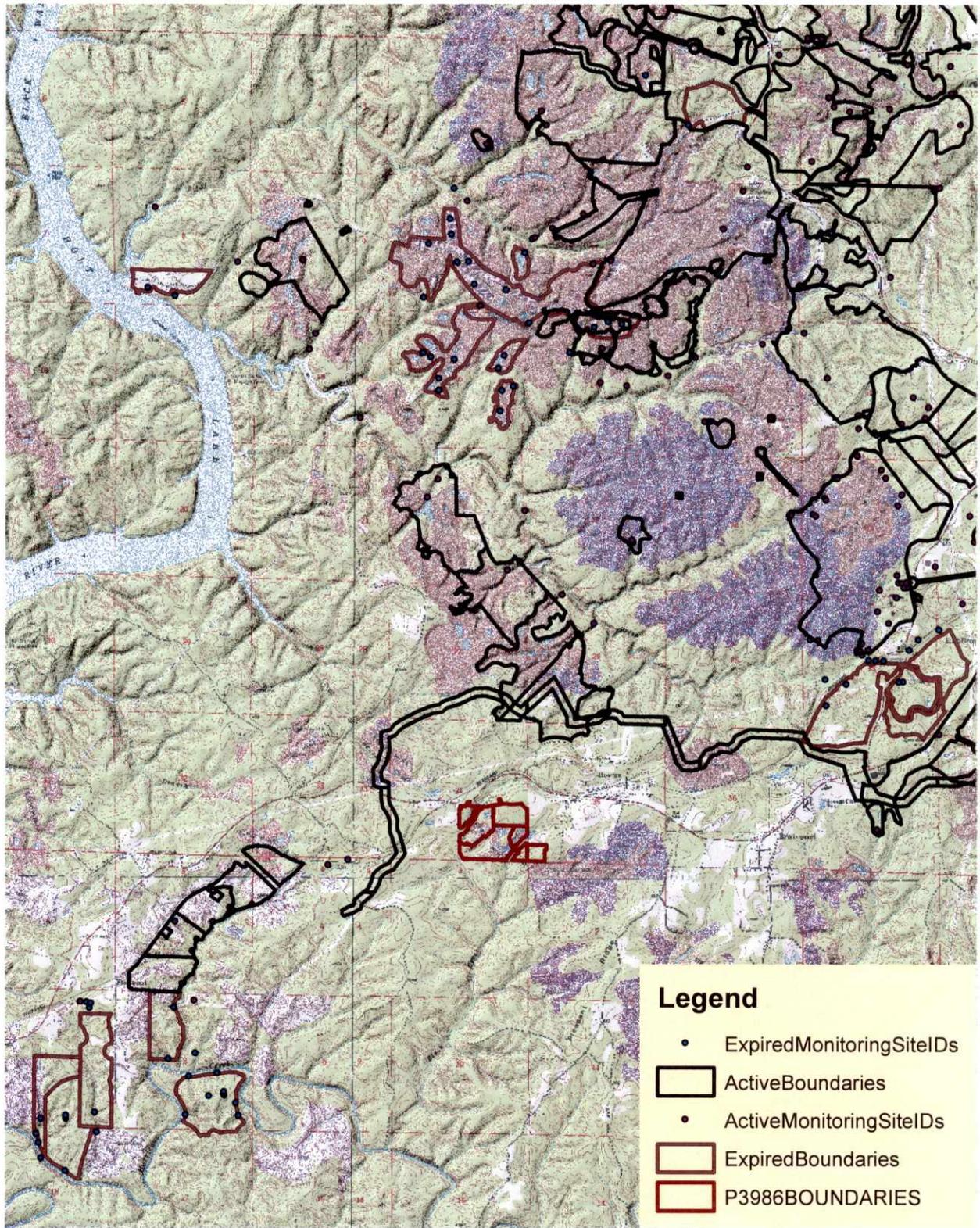


0 0.4 0.8 1.6 2.4 3.2 Miles

USGS Shaded Relief

Map No. 2
Cahaba Resources, LLC
Carter Mine
Adjacent Permits

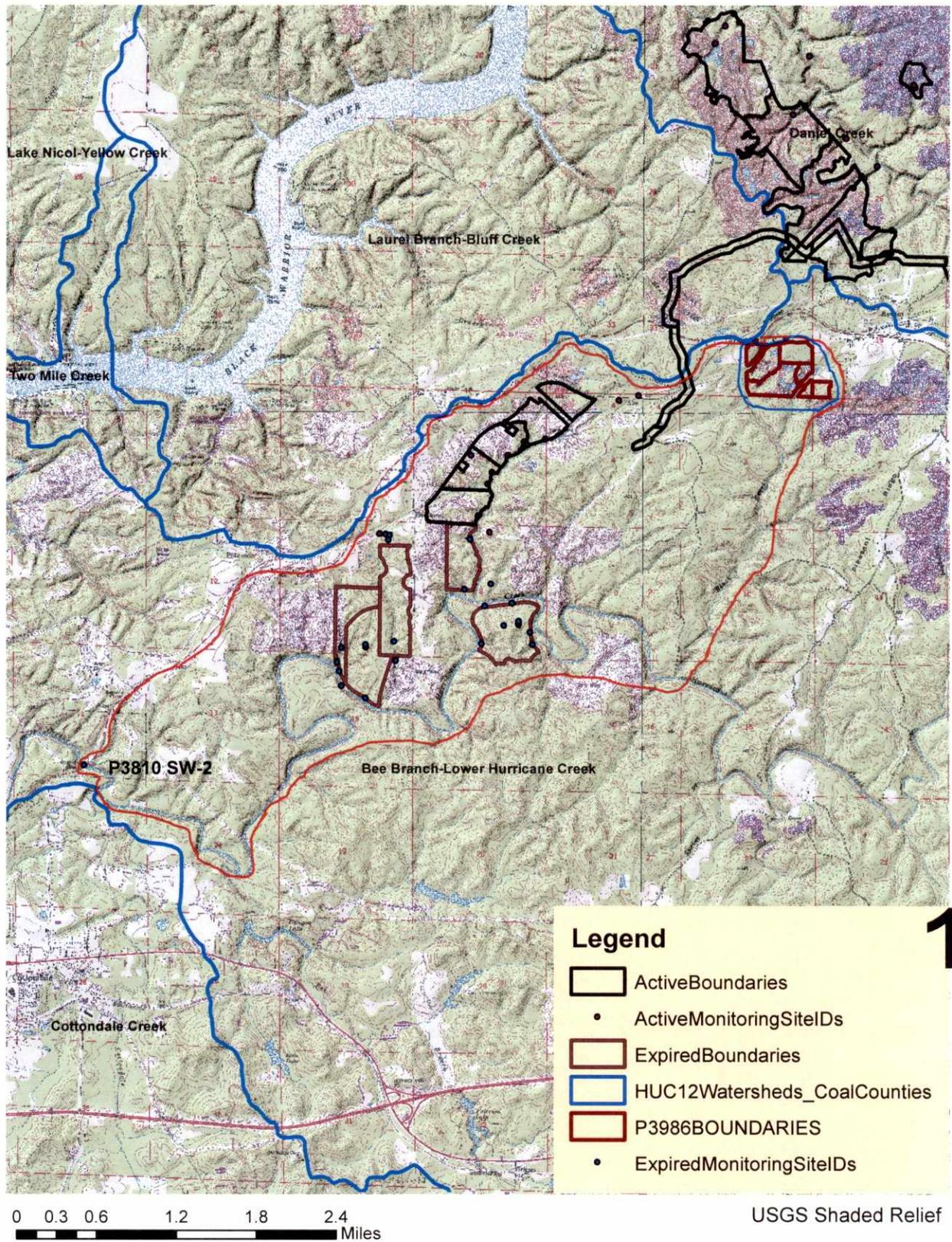
1



0 0.3 0.6 1.2 1.8 2.4
Miles

USGS Shaded Relief

**Map No. 3
Cahaba Resources, LLC
Carter Mine
Cumulative Impact Areas**



**Surface Water Cumulative Impact Area outlined in red.
Ground Water Cumulative Impact Area outlined in light blue.**