STATE OF ALABAMA
SURFACE MINING COMMISSION

Permit Number:P- 3957-64-17-S

License Number:L- 459

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:

REED MINERALS INC
PO BOX 2420
JASPER AL 35502
(MINE NO. 5)

Such operations are restricted to 178 * acres as defined on the permit map and located in: (See Condition #3)

SE/SE, SW/SE OF SECTION 10, NW/NW, SW/NW, NW/SW OF SECTION 14, NE/NE, SE/NE, SW/NE, NW/NE, NE/SE, SE/SE OF SECTION 15, TOWNSHIP 15 SOUTH, RANGE 6 WEST, ALL IN WALKER 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 880-X-8K-.16 of any condition which threatens the environment or public health and safety.

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 #6 consisting of 5 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 l00' 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. Every load of coal will be tarped and loads of coal and heavy equipment will not be transported from the mine between the hours of 6:45 to 8:00 a.m. or 3:00 to 4:00 p.m., Monday through Friday, which is the time that school buses will be in the area.

11. Applicable weight limits on the trucks hauling coal from the property will be strictly enforced by Reed Minerals, Inc.

12. Reed Minerals, Inc. will gate the access road to the property. The gate will be locked when employees are not on site.

13. If no speed limits are posted on public roads, the limit for paved roads is 45 MPH and on unpaved roads 35 MPH.

EFFECTIVE DATE: OCTOBER 30, 2012

ISSUANCE DATE: OCTOBER 30, 2012

EXPIRATION DATE: OCTOBER 29, 2017

Randall C. Johnson, Director

/ns

cc: I & E, Permit File

FINDINGS

PERMIT NO.: P-3957-64-17-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. A petition to designate an area unsuitable that encompasses the proposed mining operation was filed with ASMC on September 10, 2012, thirty days after the close of the informal conference held on this application on August 9, 2012. Therefore, this permit application decision is not subject to delay pending a final decision on the petition as provided under 880-X-7D-.06(1)(g).

   (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.

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-l0C-.58(4) and 880-X-10D-.52(4).

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. For a proposed remining operation where the applicant intends to reclaim in accordance with the requirements of Section 880-X-l0C-.56 or 880-X-10D.-49, the site of the operation is a previously mined area as defined in Section 880-X-2A-.06.

12. Surface coal mining and reclamation operations will not adversely affect a cemetery.

13. 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).

14. 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.

15. 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.

16. 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. Panamerican Consultants, Inc. (PCI) conducted a cultural-resources survey from January 9-20, 2006 and February 7-9, 2006 for approximately 224 acres. In a letter dated February 15, 2006 the results of the cultural-resources reconnaissance survey indicated that two sites (1WA249 and 1WA250) were recorded and added to the Alabama State Archaeological Site File (ASASF), two additional isolated finds were also recorded. PCI recommends that only site 1WA24 is potentially eligible National Register of Historic

Places (NRHP) listing and this site should be avoided by surface mining activities. P.E. LaMoreaux and Associates, Inc. (PELA) conducted a cultural resource survey of approximately 506 acres, with approximately 266 acres not being previously surveyed from October 28-31, 2008. No examination of site 1Wa249 made beyond noting its undisturbed surface area since the 2006 survey. PELA found no new prehistoric of historic sites through the course of the investigation. Site 1Wa249 was previously listed as potentially eligible to the NRHP and avoidance is recommended. For the remainder of the project area, it is PELA's opinion that the proposed project will not impact any cultural resources that are eligible or potentially eligible for the NHRP, in a letter dated November 4, 2008. In a letter dated December 1, 2008 the State Historical Preservation Office (SHPO) concur with the resource assessment conducted by PELA and agree with the findings. The SHPO concurs with the proposed activities with the exception of the area surrounding archeological site 1WA249. As this site is potentially eligible for the NRHP, it should be avoided. 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.

17. A letter dated January 4, 2006 by Mr. E. S. Lyle, Jr. conducted a red-cockaded woodpecker and bald eagle survey of the area to be mined. No suitable nesting area was noted for either species and there was no suitable foraging habitat for the red-cockaded woodpecker. Mr. Lyle concluded that the mine would have no affect or red-cockaded woodpecker colonies or bald eagle nesting. The US Fish and Wildlife Service (FWS), in comments dated November 25, 2008, stated that no federally listed species/habitats occur with in the project area. In a letter October 15, 2008 the Alabama Department of Conservation and Natural Resources (ADCNR) determined that the closest sensitive species occurs approximately 4.2 mile from the project site. The US Army Corps of Engineers (USACE) approved the proposed project by Nationwide Permit 21 (NWP21), File Number: SAM-2009-00470-CTM, in a letter dated July 23, 2009. The project will fill approximately 10,338 linear feet of stream and 0.81 acre of water impoundment. Mitigation for unavoidable impacts will be conducted with the plan submitted in the PCN dated April 7, 2009. Mitigation will be conducted when the mining process has been completed. A restrictive covenant shall be signed and submitted to USACE office for supplemental mitigation. The ASMC finds that the proposed operation will not jeopardize the continued existence of endangered or threatened species or critical habitat thereof.

THE FOLLOWING ARE COMMENTS AND RESPONSES ON P-3957-64-17-S, REED MINERALS, INC.

ENGINEERING & OPERATION:

18. **COMMENT:** Who would oversee the development and implementation of necessary engineering measures to ensure that Reed #5 would not cause or contribute to a violation of water quality?

RESPONSE: Detailed design sedimentation pond plans are submitted for review and approval as required by Rule 880-X-10C-.17. A professional engineer shall certify to the ASMC that the structure has been constructed in accordance with the approved plans prior to disturbance in the drainage area.

The ASMC inspector for the mine site will inspect the ponds and mine area to insure that the ponds meet the requirements of the approved design plans.

Rule 880-X-10C-.17(2) requires that all surface discharge from the disturbed area pass through a siltation structure to prevent, to the extent possible, any contribution of additional suspended solids to the stream flow or runoff outside the permit area. The use of sedimentation ponds is the best technology currently available.

Pond plans are in house for ponds 003, 005, 006, 011, 014 and 016.

19. **COMMENT**: The trap efficiency of sedimentation ponds is lower than expected on construction sites.

RESPONSE: The use of sedimentation ponds for sediment control on proposed surface mine areas is the best technology currently available. The use of the model SEDCAD is the best technology currently available to design sedimentation ponds for large disturbed area due to surface mining.

The SEDCAD program includes several design parameters such as detention volume, sediment volume, spillway type, time of concentration, curve number, hydrograph response, K soil value, slope length, slope percentage, and particle size distribution.

These parameters are included in the detailed design plans as per the SEDCAD requirements and actual field condition and test.

Several of the pond designs are proposed to be constructed in Phase I and II conditions. The Phase I has a smaller proposed disturbed area. This is due to the mining of the pond pool area. The regrading of the pool area will be the Phase II construction for the pond surface areas and volumes at maximum disturbed acreage.

These parameters, pond areas and volumes, and particle size distribution affects the trap efficiency. These models are based on actual tests from Dr. Richard C. Warner, University of Kentucky.

It appears that Dr. Pitt's assessment is for construction sites and not surface mine sites. As stated in the introduction, the design criteria for the construction sites are different from more permanent stormwater control ponds.

The mind ponds are designed to treat or contain a 10-year-24 hour event.

20. **COMMENT:** Dam construction plans do not treat failure as a worst-case scenario.

RESPONSE: Each pond, unless it is totally incised, has a stability analysis. This analysis is based on actual core samples to the stiff base for the foundation material. Also, embankment material samples are taken.

These samples are then tested for soil type and soil parameters. All designs are based on current and prudent engineering practices. Also, these impoundments have a minimum static safety factor of 1.3 for a normal pool with steady static seepage saturation conditions as per the regulation 880-X-10C-.20(1)(d).

21. **COMMENT:** The pollution abatement and prevention plan contains generic design requirements and no engineer's signature.

RESPONSE: The PAP is the general plan in the ASMC permit. The general plan is certified by a professional engineer.

GENERAL ENVIRONMENTAL:

22. **COMMENT:** Under the rare species segment of the Surface Mining commission permitting process…there's a mention of the November 2008 survey…but it was not included in the application. (Pg 10-11)

RESPONSE: A threatened and endangered (T&E) species and critical habitat study was conducted and submitted to the U.S. Fish and Wildlife Service (USFWS) in November 2008. The USFWS agreed that no Federally listed species/critical habitat occur in the project boundaries.

23. **COMMENT:** Alabama Department of Conservation and Natural Resources (ADCNR) found nothing at this site. Well if you read what DCNR wrote…inform them on what could be here and a survey needs to be performed. (Pg 11)

RESPONSE: ADCNR recommended contacting the USFWS in October 2008 for information on possibility T&E species within the project area, and recommended a site survey be conducted. USFWS was contacted 1 month later in November 2008 when a T&E survey was submitted and concurred with by USFWS for the project.

24. **COMMENT:** One of these talks about historical sites…those site numbers are 1WA218, 1WA249 and 1WA250…and the Alabama Historic Commission does not currently include any indication in its data base that Phase II testing in this site has been conducted. (Pg 14).

RESPONSE: There have been two separate Phase I cultural resource surveys for the project area. One conducted in 2006 by Panamerican and another in 2008 by PE LaMoreaux & Associates, Inc. Both concluded that site 1WA249 needed a Phase II survey prior to any disturbance in the site area or the area should be avoided, as it is potentially eligible for the National Register of Historic Places (NRHP). Site 1WA249 is not in the permitted area and has a fifty foot buffer zone. Site 1WA250 was surveyed and is considered not eligible for the NRHP. Site 1WA218 is not mentioned in either survey. The State Historic Preservation Officer (SHPO) has concurred with these findings.

BONDING:

25. **COMMENT**: Landowner comment letters not being submitted with the permit application.

RESPONSE: The ASMC requires landowner comment letters be submitted prior to bonding.

ASMC regulation requires a reclamation bond to be posted for each mining operation to cover the cost to ASMC should the operator default on its obligations under the permit. The operator has chosen to initiate Increment VI as identified on the permit map. Increment VI is composed of a total of 5 incidental acres, 4 acres are for office, equipment storage, and coal stockpile areas, 1 acre is for proposed permanent water impoundment no. 003P, and 0.25 acres for primary roads no. 1 & 2.

Office, equipment storage, and coal stockpiles are bonded on a flat per acre rate, which is $2,000 per acre. An additional amount of bond is required for office building demolition in the amount of $1,500. Permanent water impoundments are bonded on a per structure basis, $10,000 per structure is held for permanent impoundments, this will be used to make any needed repairs to spillways, culverts, dams, etc. Haul roads are calculated on a per acre basis as well, $1,000 per acre is held for haul road reclamation, this includes the grading and revegetation of the road. Topsoil substitute rates are used when topsoil will not be returned to the surface prior to revegetation; this is a flat rate of $200 per acre.

Unit costs for each variable associated with reclamation are constantly monitored to ensure current rates are mirrored in bonding. The final step in bonding is to apply a contractor profit and overhead margin of 15 percent to the subtotal of each bond.

The total bond required for increment VI is $24,495. Bonds for other increments will be calculated and posted as mining progresses.

GENERAL COMMENTS:

26. **COMMENT**: The US Army Corps of Engineers Nationwide permit for this operation expired on March 18, 2012.

RESPONSE: Although the permit expiration date was March 18, 2012, USACE regulations allow a one year grace period for initiation of impacts authorized under the permit. The permittee has until March 18, 2013 to initiate activities covered under the

permit. The permittee also has until February 1, 2013 to request re-verification of the Nationwide Permit 21 for an additional period of time.

27. **COMMENT**: The Nationwide Permit 21 does not authorize the construction of excess spoil fills but several are proposed in the ASMC permit.

RESPONSE: The Nation Wide Permit 21 for this operation only covers impacts to jurisdictional waters regulated by the USACE. The excess spoil fills proposed in the ASMC permit are not located in jurisdictional waters of the United States. This was confirmed by email from the USACE dated October 24, 2012 from Courtney Shea, Biologist-Project Manager, USACE.

28. **COMMENT**: Many comments were received expressing concern over the impacts of this proposed operation on the Birmingham Water Works Board (BWWB) intake facility which is located south of the proposed mine site. A resolution from the City of Birmingham requested denial of this permit because of concerns regarding impacts to the BWWB intake facility. The resolution expressed concern that the cumulative impact of three other mine sites located within 5.5 miles of the intake would severely impact water quality in the Mulberry Fork to the extent that it would increase the costs of water treatment at the plant. The BWWB expressed concerns that existing and proposed operations might result in increased treatment costs.

RESPONSE: The ASMC has conducted a Cumulative Hydrologic Impact Assessment considering this proposed operation and all currently permitted and reclaimed mining operations that exist in the watershed down to the intake. Hydrologic data from discharge points at reclaimed sites show that water quality is in compliance with all effluent limits. The ASMC reviewed hydrologic monitoring data collected from 12 permitted coal mine outfalls collected in 2007 that are located within 13 km of the Burnt Cane Creek watershed boundary. These hydrologic samples were analyzed for a broad spectrum of potential contaminates that included toxic metals. None of the results exceeded Alabama Water Quality Criteria. There is no evidence that these mining operations are contributing to, or will contribute to, degradation of water quality in the Mulberry Fork. No evidence has been presented that past mining operations have resulted in treatment difficulties at the intake.

29. **COMMENT:** "A typical ASMC permit does not include a provision requiring compliance with the performance standards in Ala. Admin. Code Chap. 880-X-10C. However, Ala. Code s. 9-16-90(a) says "Any permit issued pursuant to this article to conduct surface mining operations *shall require* that such surface coal mining operations will meet all applicable performance standards of this article, and such other requirements as the regulatory authority shall promulgate." (Emphasis added). This is a mandatory duty imposed by the Legislature on the ASMC. Accordingly, I request that all initial permits, permit revisions, and permit renewals include a provision requiring compliance with all the standards in Ala. Admin. Code Chap. 880-X-10C."

RESPONSE: Alabama Administrative Code 880-X-8K-.11 contains the following language:

880-X-8K-.11 Permit Conditions. Each permit issued by the Alabama Surface Mining Commission shall be subject to the following conditions:

> (3) The permittee shall comply with the terms and conditions of the permit, all applicable performance standards of the Act, and the requirements of the regulatory program.

This is a regulatory requirement of every permit issued by ASMC. It is not necessary to include this as a specific permit condition.

30. **COMMENT:** The permit should be denied because the proposed operation is located within an area that should be considered unsuitable for mining under Alabama Administrative Code 880-X-7C-.04.

RESPONSE: Alabama Administrative Code Chapter 880-X- 7 et seq. establishes areas that are unsuitable for mining as well as sets forth procedures for filing petitions to designate areas Unsuitable for Mining. This operation is not located within the protected area of any lands which are designated Unsuitable for Mining under Chapter 880-X-7. The commenter cites reasons that the area should be designated as unsuitable for mining as outlined in 880-X-7C-.04. This regulation outlines criteria for designating an area as unsuitable for mining if a valid petition is filed with the ASMC. A petition to designate an area in the watershed as unsuitable for mining, was submitted to ASMC on September 10, 2012. This petition is under review by the ASMC. An informal conference was held on the proposed permit on August 9, 2012 pursuant to 880-X-8K-.05. ASMC regulation 88-X-7D-.06(1)(g) provides that: "Any petitions received after the close of the public comment period on a permit application relating to the same permit area shall not prevent the State Regulatory Authority from issuing a decision on that permit application. The State Regulatory Authority may return any petition received thereafter to the petitioner with a statement why the State Regulatory Authority cannot consider the petition. For the purposes of this Rule, close of the public comment period shall mean at the close of any informal conference held under Rule 880-X-8K-.08, or, if no conference is requested, at the close of the period for filing written comments and objections under Rules 880-X-8K-.06 - 880-X-8K-.07."

31. **COMMENT:** Many comments were received expressing concerns for noise, dust, truck traffic and general aesthetic impacts from a mining operation.

RESPONSE: It is true that there will be an increase in vehicle traffic from the mine. ASMC has imposed a condition on the permit limiting operation of coal trucks on public

roads during hours when school buses will be transporting students. Noise and dust and other aesthetic problems will increase during operation of a coal mine. Dust generated from traffic on mine roads will be controlled as required under Part III of the operation plan. Fugitive dust and noise cannot be avoided nor are they within the purview of the consideration of a permit application.

The proposed mine site is an abandoned manufacturing facility, that in its current condition, represents and aesthetic "eyesore" in the community. The mining of this site will remove the remnants of the abandoned facility and result in reclamation to a more productive state.

32. **COMMENT:** The operation will have a negative economic impact on the area, which was affected by the April 27, 2011 tornadoes.

RESPONSE: The mineral rights to coal on this property are owned by the Cordova Industrial Development Board. The board has signed a lease agreement with the mining company that will result in significant royalties when the coal is extracted. This will result in a positive economic impact directly to the City of Cordova. Coal severance taxes collected from the operation will be redistributed to Walker County, which will also have a positive economic impact. The remnants of the abandoned manufacturing facility will be removed and the site reclaimed which will result in improved potential for the site to be developed for other uses in the future.

33. **COMMENT:** There is a lack of independence between ADEM and ASMC in consideration of permits under the Clean Water Act (CWA) and the Alabama Surface Mining Control and Reclamation Act (ASMCRA).

RESPONSE: Both the CWA and the ASMCRA apply to coal mining operations in Alabama. As such, the provisions of both overlap creating a necessity for coordination between ADEM and ASMC in the review and approval of permit applications for coal mining operations. The two agencies have a long standing Memorandum of Understanding which defines and distributes procedures and coordination to prevent conflicting permitting results which could place either agency's permit in violation of provisions of the other agency's permit. This coordination is required under Federal and State laws and regulations that apply to the respective agency's grants of authority from the Federal government to regulate coal mining in the State of Alabama. There is no ambiguity in the responsibilities of the agencies for enforcement and permitting. Each agency has responsibilities for administration of the requirements of the CWA and ASMCRA that cannot be delegated and have not been delegated. Some of those responsibilities do in fact overlap and each agency carries them out in coordination with the other agency.

34. **COMMENT:** The ASMC must be independent of the mining industry and be professionally skeptical of all permit applications and make decision based on issues relevant to each proposed project without bias in any way or another.

RESPONSE: Code of Alabama § 9-16-71. Declaration of public policy and legislative intent; states a follows:

"(a) The objective of this article is to provide for the safe, responsible and reasonable reclamation of lands upon which surface disturbances will be created by surface mining and the surface effects of underground mining so as to protect the taxable value of property and preserve natural resources within the state and protect and promote the health and safety of the people of this state, consistent with the protection of property and with maximum employment and the economic and industrial well-being of the state. The Legislature finds and declares that the extraction of coal by surface mining provides a major present and future source of energy and is an essential and necessary activity which contributes to the economic and material well-being of the state."

And:

"g) The Legislature further finds that there are wide variations in the circumstances and conditions resulting from surface mining due to a diversity in terrain, climate, biologic, hydrologic, geologic, vegetative, chemical and other physical conditions in areas subject to mining operations. By reason of this diversity and its complex nature, it is necessary, in order to achieve the most effective, beneficial, economical, and equitable results, that the provisions of this article shall have a statewide application and shall supersede and render void any local, municipal or county regulation or control of surface coal mining operations; provided that regulations shall be promulgated to account for the diverse technical factors as may be applicable for the state as a whole or may vary from area to area, to account for varying local conditions such as may be appropriate to accomplish the policy and intent of this article."

The ASMC follows these directives from the Alabama Legislature in reviewing every permit application submitted to the agency.

HYDROLOGY:

35. **COMMENT:** This mine in total would include 23 points of waste discharge into the Mulberry Fork and its Tributaries upstream of a primary drinking water intake for the city of Birmingham.

RESPONSE: The initial NPDES permit is for 23 points of discharge. This permit as submitted has 10 sediment basins. The mine is approximately 5 miles upstream of the Birmingham Water Works Intake. Any increase in sediment or metals from the mine would be negligible at the intake due to the volume of water in the Mulberry Fork as compared to any discharge from the mine site. Also, the initial acreage in the NPDES permit is for 506 acres, The ASMC permit consists of only 178 acres.

36. **COMMENT**: The NPDES permit is jointly administered by ADEM and the Surface Mining Commission.

RESPONSE: The NPDES permit is the sole responsibility of ADEM. The ASMC incorporates the parameters set by ADEM in the Hydrologic Monitoring Plan (HMP), and may include any additional parameters or testing deemed necessary.

37. **COMMENT:** The Safe Drinking Water Act contains secondary maximum contaminate levels for heavy metals. The levels allowed by the NPDES permit would allow ten times the MCL for iron and 40 times the Maximum Contaminant Level (MCL) for manganese.

RESPONSE: The secondary MCL are for aesthetics. The discharge from the mine does not need to meet drinking water standards. Drinking water standards are for after treatment of wastewater, for human consumption. In addition, ADEM is responsible for the NPDES permit limits.

38. **COMMENT:** A concern that treatment for the wastewater did not adequately consider constituents such as arsenic, sulfur, salinity, mercury, lead, zinc copper, cadmium and others.

RESPONSE: Two samples were run for baseline, one upstream and one downstream of the permit area. While metals currently exist in the water, they are below even Drinking Water Standard levels. Also, metals such as the ones listed above would most likely be contained in the coal but not in elemental form. And, the coal is what is being removed from the site. Additionally, 32 parameters have been established to be monitored at all surface water monitoring sites. These parameters are listed in the approved Hydrologic Monitoring Plan.

39. **COMMENT:** There is no study of what the cumulative impacts of this mine and others would have on the Mulberry Fork.

RESPONSE: A Cumulative Hydrologic Impact Assessment has been prepared is included as part the permit decision.

40. **COMMENT:** No precipitation modeling methods are employed at this time.

RESPONSE: Average rainfall is 55 inches per year according to several sources, including the Hydrologic Assessment, Eastern Coal Province, Areas 23, Alabama – USGS Water-Resources Investigations Open-File Report 80-683.

41. **COMMENT:** Well H257 has arsenic in the well. It is 51 times the detection limit, and 16 times the level in the surface water. Additional concerns were for formaldehyde and phenols, chemicals used at the once existing plywood plant.

RESPONSE: There are trace amounts of arsenic in the well. The detection limit is the lowest detectable amount the particular machine running the sample can accurately detect. The Primary Drinking Water Standard (PDWS) for arsenic is 0.01 mg/l, or 10 ug/l. The value in well H257 and the surface water is below the PDWS. Also, arsenic is detectable upstream of the mine site, as well as midstream and downstream. Therefore, it cannot be concluded that this particular site will contribute to arsenic in the surface water system. Phenols and formaldehyde were tested for, and phenols showed very low levels in only one well. Formaldehyde was below detection limit.

42. **COMMENT:** The permit states, "during drilling of the monitoring wells, no stratigraphic zones were observed to consistently produce water in usable quantities.

RESPONSE: Monitoring wells drilled for coal permits are typically only a few feet below the coal seam in order to monitor changes from disturbance. The most productive aquifer systems in the Pottsville Formation occur well below the coal seams, well below the depth of any monitoring well.

43. **COMMENT:** The ADEM permit indicates phenol not to be present.

RESPONSE: Discrepancies in the ADEM permit cannot be addressed by the ASMC.

44. **COMMENT:** The Commission needs to fully understand how to make a proper regression analysis on confidence levels or correlation coefficients so low.

RESPONSE: The ASMC is aware of statistical analysis, however, based on historical data, consultant regression analyses are usually very close to actual site conditions during and post mining.

45. **COMMENTS:** There is an acidic layer of overburden above the New Castle Seam. Once disturbed, how will they track it?

RESPONSE: Any identified "acidic" layers are taken into account in the Acid Base Account (ABA). This is a determination of potential acidic conditions for the whole stratigraphic column. However, the overburden gets mixed, and as such, no single layer remains as it was in its initial state. The overburden analysis shows a neutralization potential of +5.65 tons CaCO3 per 1000 tons overburden, which is a favorable alkaline condition. Also, previous mining in the adjacent areas has not historically created any acid mine drainage problems.

46. **COMMENT:** The highest use of our water is public drinking water, and if anything, we should be identifying the source waters, stream and surface as well as aquifer recharge areas.

RESPONSE: According to the Geologic Survey of Alabama, Alabama receives 55 inches of rainwater each year, but on average only 6 inches move underground to become groundwater recharge.

47. **COMMENT:** Many citizens commented on the water quality degradation of the Black Warrior River, and such degradation leading to health concerns from use and consumption.

RESPONSE: Sediment basins are built to retain solids during a storm event. In most cases, sediment basins do not discharge continually as their discharge is in response to overland flow. While it is true some heavy metals may be present in the overburden, most likely they exist in the coal seams due to the depositional environment responsible for their existence. However, these heavy metals do not exist in their raw, elemental form. They are usually part of an ion exchange, replacing another ion in a mineral. The solubility of material into water is dependent on the water chemistry itself.

Many constituents of concern already exist in the water. Not all of them can be attributed to coal mining. Considering all the unregulated activities that occur in the River as well as along the banks of the River, no one culprit can be pinpointed. Natural erosion and evolution of a river add to the chemistry of the waters. Native soils, untouched, contain metals in their mineralogical make-up.

48. **COMMENT:** If iron and manganese are present in concentrations that greatly exceed recommended levels for safe drinking water, the BWWB states that it is also reasonable to expect that the other toxic pollutants associated with coal mine drainage will also greatly exceed levels protective of aquatic life and water quality.

RESPONSE: Additional parameters have been added to the surface water monitoring sites, including many metals.

49. **COMMENT:** The Hydrologic Monitoring Plan (HMP) should be revised to include sampling and reporting of all parameters.

RESPONSE: The HMP includes basin discharge parameters as set by ADEM in the NPDES permit. Additional parameters were added during review. Also, additional parameters were added to the surface water monitoring. While it was suggested organic compounds be added, these are not mining related and therefore not included. A list of these parameters can be seen in the HMP included in the permit.

50. **COMMENT:** The groundwater hydrology indicates that the baseline groundwater quality investigation is not sufficient. In addition to pH, iron, manganese, acidity, alkalinity and sulfate, a number of constituents should be added.

RESPONSE: Additional groundwater testing of installed wells was performed and the results show constituents below detection limit, or below the Primary Drinking Water Standard limit. These parameters and results are shown in the Cumulative Hydrologic Impact Assessment (CHIA) which are included with the permit. Additional soils samples were taken and tested at 18 sites as shown in a report by Environmental Management & Engineers, Inc. Results indicate no organic compounds tested for are present in surface soils. All samples report "non detect". Also the report states "the results of the heavy metals tests indicate levels typical of background levels in soils of north central Alabama and or do not appear to present an environmental problem."

BLASTING

51. **COMMENT**: Several comments expressed concerns over potential adverse effects of blasting on the community including the wholesale destruction of homes, the cracking of foundations, and damage to historic structures from ground vibrations.

RESPONSE: Those concerns reflect a popular perception of blasting that is not based in fact and creates unwarranted alarm. Blasting is conducted under very strict regulation to protect the public interest and is conducted near residential areas routinely without causing damage. It is true that surface coal mining is a rather obtrusive neighbor by its very nature and it is allowed to generate certain levels of ground vibration, but is not allowed to damage residences.

The mine will have an approved blasting plan prior to commencement of blasting; review and revision of the plan is still ongoing. Blasting at Reed #5 will be monitored and maintained within regulatory boundaries. A survey will be made of the area within one half mile of the mine site to identify any historic structures or structures of unusual construction that might require special protection. It is over a mile and a half from the near edge of the proposed permit to Cordova. No effect at all on anything in Cordova is expected.

52. **COMMENT**: Concerns were expressed about flyrock hazards.

RESPONSE: This is a primary concern to the ASMC and every precaution will be made to ensure safety of the public - these include safe blasting practices, warnings, spotters along the river as needed. There has been only one incident of a person being struck by flyrock from blasting in a modern, regulated Alabama coal mine and that was in 1990 and was a fatality. Both blasters and regulators are working, and praying, that there is no recurrence of that tragedy and great progress has been made in blasting safety. Because of the layout of the mining, very few houses have any potential for flyrock hazard at all.

53. **COMMENT**: Concerns were also expressed over noise from blasting operations.

RESPONSE: Blasting does cause large air overpressures that are likely to echo along the bluffs of the river and be heard over a wide area. Damage from airblast is extremely rare and limited to window breakage. These sudden changes in air pressure do cause windows, floors and walls to vibrate causing anxiety and annoyance to homeowners. Every effort will be made to minimize this affect, however mining operations are allowed, as they must be, certain levels of noise. To minimize the effect of blasting noise, blasting is allowed only between sunrise and sunset Monday through Saturday except in emergency situations.

54. **COMMENT**: Dust and fume exposure is a major concern expressed in several comments.

RESPONSE:That is certainly understandable. Dust and fumes generated from blasting are not subject to ASMC regulation, however. Those concerns have been relayed to the mining company and are addressed voluntarily in the blasting plan with such mitigating measures as

blasting, in so far as possible, when wind and weather conditions are best for protecting the public.

55. **COMMENT**: General concerns about degradation of the proposed mine site were expressed.

RESPONSE: This is an abandoned industrial site. The soil types depicted on the Soils Map attached to the Permit Application represent the soils present prior to the industrial development. Those soils have either been removed or covered and physically degraded long ago over almost the entirety of the site. Under the current conditions, the site is neither attractive from the standpoint of natural beauty, nor capable of agricultural productivity.

VIOLATIONS

56. **COMMENT**: In Part F of the applicants license file the applicant must list violations of any department or agency in the United States pertaining to air or water environmental protection incurred by the applicant for the last three years.

RESPONSE: A review of this list, the Alabama Surface Mining Commission records and the Alabama Department of Environmental Management violation records shows that neither Reed Minerals, Inc., nor any related companies have a consistent pattern of violations.

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

DATE: OCTOBER 30, 2012

Mark Woodley

Mark Woodley, Permit Manager

/ns

CUMULATIVE HYDROLOGIC IMPACT ASSESSMENT

Permit Number P- 3957 **NPDES AL0079936**
Reed Minerals, Inc. **No. 5 Mine**

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 Reed Minerals, Inc. (ASMC P-3957) No. 5 Mine is for a coal mining operation encompassing approximately 178 acres. The mine site is located in parts of Sections 10, 14 and 15; Township 15 South, Range 6 West; Walker County, Alabama as seen from the Goodsprings Quadrangle.

The site is located near the city of Cordova, on a previously disturbed industrial site. It is located in a bend of the Mulberry Fork of the Black Warrior River. The site is bound on the east by the Mulberry Fork of the Black Warrior River, and on the west by the Dovertown Community.

The surface mining method of area mining will be used at this site. This includes removing of timber, topsoil removal, drilling and blasting then removal of the overburden, coal removal, regrading to approximate original contour., topsoil replacement (if necessary) and revegetation.

Historical Coal Mines

There are several historical coal mines located within the vicinity of the permit area. The term "historical" refers to mines that were in operation prior to the enactment of Alabama's permanent program. The mines that would potentially impact the cumulative area are located on the east side of the Mulberry Fork. Parts of these disturbed areas have been permitted under the ASMC permanent program.

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-3957 has been defined as the area just upstream of the permit area on the Mulberry Fork, and includes drainage from the Horse Creek Mine (P-3858) down to below the Quinton Mine (P-3860). This includes drainage from the Red Star Mine (P-3859) and the Shepherd Bend Mine (P-3945). The CIA encompasses the five operations as well as some pre-law mining areas that have not been reclaimed. This includes those areas of anticipated mining operations that may impact this assessment area as well as mines, which may lead to cumulative effects. (See Map 1).

The CIA for groundwater for this permit is limited to the permit area itself (see Map 1a). The CIA has been selected based upon the Department'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. The more significant water-bearing units occur below the coal seams in the Pottsville Formation. While other areas of proposed, future mining are not known, no cumulative impacts to groundwater are expected due to the lack of a widespread, regional aquifer system and the boundary that is the Mulberry Fork.

Active or Proposed Mines

Previous mining in this area of the Mulberry watershed includes pre-law and regulated mine sites. These regulated mine sites include the Evergreen Mining – Red Star Mine (ASMC Permit P-3857), the Horse Creek Mining, LLC – Horse Creek Mine (ASMC Permit P-3858), the Quinton Mining, LLC Quinton Mine (ASMC P-3860) and the Shepherd Bend, LLC – Shepherd Bend Mine (ASMC Permit P-3945). The Red Star, Horse Creek and Quinton Mines area all finished with active mining, and in various phases of reclamation. The Shepherd Bend Mine has not started operation as of this findings document.

A. Geologic/Hydrogeologic Information

i. Geology

This mine site is located in the Warrior Coal Basin. According to the "Depositional Settings of the Pottsville Formation in the Black Warrior Basin", the Plateau Coal Field is a small, transitional basin which connects the Black Warrior Basin with smaller basins in southeastern Tennessee. The Pottsville Formation underlies and outcrops in this region, which is of

Pennsylvanian age. The Pottsville Formation consists of thin to thick-bedded sandstones, siltstones, shales, clays and coal seams. This permit area is located on the northwest limb of the Arkadelphia syncline.

The target seams are the New Castle and Mary Lee seams of the Mary Lee coal group. Neither the New Castle or Mary Lee outcrop within the permit area. The innerburden between the New Castle and Mary Lee is approximately 33 feet.

ii. Potentially Acid- and Toxic Forming Materials

Overburden analysis was conducted on two overburden sample sites (30373C and 30376C), which are located within the permit area. The analysis was run to determine the potential for acid-and toxic-forming properties. 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). Samples were collected every 5 feet or change in lithology (with the exception of the target coal seams) and analyzed for pH (paste), total sulfur, potential acidity, neutralization potential and fizz rating.

iii. Surface Water

This permit is located in the Warrior River Basin, in sub-watershed 190 of the Mulberry Fork Watershed (HUC 03160109). It is drained by unnamed tributaries to the Mulberry Fork and the Mulberry Fork itself. All surface water will be routed through ten sediment basins before being discharged. Monitoring was conducted on two surface water sites, one upstream and one downstream of the operation area on the Mulberry Fork.

The Alabama Department of Environmental Management (ADEM) has designated this portion of the Mulberry Fork as Public Water Supply and Fish and Wildlife. At the downstream monitoring site, approximately 1,234,555 acres (1929 square miles) is drained to the Mulberry Fork. Approximately 178 acres will be disturbed by this operation at the downstream site (SW-2).

To characterize the existing quality of water within the Mulberry Fork, baseline data were obtained and submitted in the permit application. Baseline data is shown in Table 1 with corresponding sites on Map 1.

Included in the permit application are surface water quality projections. The existing water quality at Monitoring Site SW-2 was modeled to predict what changes in the mine would have on the water quality of the receiving stream. In conjunction with modeling Monitoring Site SW-2, the quality of sediment basins and surface water sites of the Horse Creek Mine and Red

Star Mine were used. These discharges should reflect closely the anticipated discharges expected at this mine site. The results are given in Table 1.

Post-Mining water quality and quantity estimates are based on several factors:

1. Baseline surface water quality
2. Estimated impact during mining
3. Size of the permit area compared to the impacted watershed
4. Amount of previous mining in the watershed and vicinity

iv. Ground Water

Groundwater in the Warrior Basin occurs in fractures and along bedding planes in the Pottsville Formation. The sandstone beds within 250 to 350 feet of the surface generally contain the most productive water-bearing openings. Regionally, the primary source of recharge to groundwater is rainfall, which averages 55 inches per year. According to the U.S. Geological Survey Report, the Pottsville Aquifer is tightly cemented and has small primary porosity and permeability, and the yields of public water for wells completed in this aquifer are less than 0.15 Mgal/d (million gallons per day). This aquifer is also commonly high in iron.

During the drilling of exploration holes, very little groundwater was encountered. The aquifer that will be impacted from this operation would be one of and including the coal seams. The aquifer that is usable for domestic purposes is located below the coal seams.

Domestic Wells

A well inventory was conducted in April and May of 2012 on dwellings within a ½ mile radius to determine if domestic wells were present. The inventory revealed five active wells. Of the five wells, only one is used as a primary source of water. The remaining four wells are either used as a secondary source, or not at all. There are no known areas included in an wellhead protection zone.

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.

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 analysis of the bedrock overlying, and immediately below the Mary Lee seam reveal favorable overburden with 556 tons/acre excess CaCO3, with a neutralization potential of +14.7330. There was noted a high sulfur interval above the New Castle seam. However, this material will be mixed with surrounding overburden, which has an excess of alkaline material to neutralize any potential acid problems.

Another important consideration is that previous mining in the Mary Lee Coal Group in the surrounding area, and throughout the Warrior Basin, have not historically created acid mine drainage. Also, the regulated mines have not had any acid mine drainage associated with them. Therefore, adverse effects to the hydrologic balance of the area are not anticipated.

The potential for acid formation will be eliminated by use of a mining method that will create a "mixing" effect with overburden having a positive acid base

count to neutralize the potential acidity. This includes extensive lime neutralization and erosion control principles.

C. Surface Water

Laboratory analysis of the samples collected from the Mulberry Fork for baseline at this mine site reveal minimal disturbance to the waterway in the form of conductivity and sulfates. Elevated conductivity is related to any surface or subsurface disturbance. Sulfates are a direct product of pyrite oxidation. Pyrite, or 'fools gold' is an iron sulfide, that when exposed to air and water is a catalyst for the acid forming process.

Along with the usual analysis run for baseline, Reed Minerals, Inc. had additional analysis run at three surface water sites. SW-1 is located upstream of the mine site, SW-2 is located below the mine site, and SW-3 is located mid permit. The analysis includes metals and phenols.

In the attached water data from the three surface sites, it is shown that the quality of the water in the Mulberry Fork exceeds even Primary Drinking Water Standards for the contaminants analyzed, with the exception of aluminum at only one of the monitoring sites. However, surface water does not need to meet drinking water standards until treated and ready for human consumption. This data is shown in Table 2. Table 3 shows the Primary Drinking Water Standards.

The pre-mining land use is classified as undeveloped, no current use. The footprint of the mine sits on top of an old, abandoned industrial site.

Surface Water Users

The Birmingham Water Works Board utilizes an intake facility on the Mulberry Fork approximately 5.5 miles downstream of this mine's future discharge.

A study by Malcolm Pirnie was submitted for the downstream Shepherd Bend Mine. Surface water sampling was done to determine potential impacts of the mine near the Mulberry Intake. This study utilized four locations sampled during a wet weather event, and a dry weather event in July and August of 2009. The site chosen was the Horse Creek Mining, LLC, Horse Creek Mine, approximately 1.5 miles upstream of the Mulberry Intake. The four sites were at the Mulberry Intake, 800 feet downstream of the mine outfall, the mine outfall itself, and 800 feet upstream of the mine outfall.

The laboratory analysis was performed at the Water Works Board Envirolab and the Alabama Power Laboratory. The test analyzed 26

parameters, including 10 metals run as soluble metals resulting in a total of 36 analyses. The results show none of the constituents sampled at any of four sites were above the MCL (maximum contaminant level) for even drinking water standards. The samples from the actual mine outfall showed elevated aluminum, iron, manganese, Total Organic Carbon and strontium, however these are not included in the Primary Drinking Water Standards list. Aluminum, iron, manganese and zinc are included on the Secondary Drinking Water Standards list, which are guidelines for contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor or color). Downstream of the outfall the constituents were no longer elevated.

Because the geology of the Horse Creek Mine, the Shepherd Bend Mine and The No. 5 Mine are similar, and the study shows no contaminant from the outfall, or downstream of the mine site exceeding the Primary Drinking Water MCL, it is reasonable to conclude that if mining operations are conducted as regulated, there will be no elevated metals to 'toxic' levels. Additionally, the discharge has time and distance to allow for mixing with the full stream flow. This, along with the additional surface water data submitted, shows negligible impact from surface mining in this watershed.

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 have been designed to allow sediment to settle out prior to discharging. 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. The effluent will be chemically treated, if necessary, in accordance with the NPDES permit. The basins will be monitored bi-weekly through final bond release in order to characterize and document any effects the mining may have on the surface-water hydrologic balance. The basins are all proposed as temporary water impoundments.

Once mining has begun, the applicant will continue to sample and monitor sites SW-1 (upstream on the Mulberry Fork), SW-2 (downstream on the Mulberry Fork) and site SW-3 (mid way down the permit area) quarterly through final bond release in order to characterize and document any effects the mining may have on the surface-water hydrologic balance.

D. Ground Water

Laboratory analyses of samples collected from the three installed wells reveal the ground water within the bedrock strata below the Mary Lee seam is neutral to slightly acidic with relatively neutral pH and low acidity

concentrations. Conductivity and sulfates show little impact from any previous disturbance. For a summary of the baseline data collected from the bedrock wells, please refer to Table 5 presented at the end of this assessment.

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. As noted previously, little water was encountered above the Mary Lee seam. Also, no great impact is anticipated to the ground water quality for the aquifer below the Mary Lee. Groundwater flow is to the south and southwest.

Additional monitoring was conducted on the three monitoring wells due the site being an old Industrial facility. The site was a plywood plant, which is known to utilize organics and phenols, which can contaminate the soil and groundwater. Additional testing of the monitoring wells revealed very low metal concentrations, and no tested parameters were above the Primary Drinking Water Standards levels. Additional testing for formaldehyde indicated Below Detection Limit (BDL), which was 5 parts per billion.

A well inventory was conducted within a ½ mile radius of the permit area. There were five active wells within the half-mile radius of the mine. Only one is used as a primary water source. The remaining houses utilize their wells as a secondary use for outdoor purposes.

As discussed previously, the bedrock strata that will be excavated during the mining operations are predominantly non-acid and non-toxic. Mining and management practices/techniques and contemporaneous reclamation should result in less water quality issues as compared to historical mining. Should any increase in mineralization occur in the ground water as a result of the proposed activities, it is anticipated the levels will diminish and return to pre-mining concentrations once mining and reclamation activities are complete. Ground water will be further protected by properly sealing and abandoning all drill holes completed at the site (with the exception of blast holes) that will not be used for monitoring purposes. With regard to the availability of ground water after mining and reclamation is complete as compared to existing quantities, the backfilled spoil material will have a greater recharge capacity as compared to the undisturbed strata.

Conclusion

The assessment of probable cumulative impacts of the Reed Minerals, Inc, P-3957, No. 5 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-3957

Parameter	SW-1	SW-2
Discharge Rate (cfs)	641 - 8770 (3266)	641 - 8770 (3266)
Field pH (s.u.)	6.41 – 7.51 (6.73)	6.36 – 8.23 (6.62)
Acidity (mg/L)	0 – 27 (12)	0 - 47 (48)
Alkalinity (mg/L)	24 - 118 (55)	8 - 123 (48)
Total Suspended Solids (mg/L)	1 - 11 (6)	1 - 17 (6)
Total Iron (mg/L)	0.09 – 0.77 (0.24)	0.04 – 0.69 (0.23)
Total Manganese (mg/L)	0.04 – 0.18 (0.08)	0.03 – 0.12 (0.07)
Conductivity 25 ^{0}C (μmhos/cm)	50 - 237 (106)	59 - 246 (113)
Sulfate (mg/L)	9 - 129 (39)	9 - 109 (35)

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

Table 2
Additional Surface Water Data
Stream Points
P-3957

Parmaeter	SW-1	SW-2	SW-3
pH (s.u.)	6.6	7.5	7.8
Specific Conductance (uS/cm)	186.0	161.0	150.0
Total Dissolved Solids (mg/L)	114.0	95.0	92.0
Total Suspended Solids (mg/L)	14	15	7.0
Sulfate (mg/L)	34.0	5.0	4.0
Chlorides (mg/L)	3.5	7.0	2.5
Turbidity (NTU)	11.4	13.2	10.0
Acidity (mg/L)	24.0	28.0	20.0
Alkalinity (mg/L)	41.0	38.0	42.0
Bicarbonate Alkalinity (mg/L)	41.0	37.9	41.8
Carbonate Alkalinity (mg/L)	0.0	0.1	0.2
Hydroxyl Alkalinity (mg/L)	0.0	0.0	0.0
Hardness (mg/L as $CaCO_3$)	76.0	56.5	61.9
Iron, Total (mg/L)	0.4	0.6	0.8
Manganese, Total (mg/L)	0.1	0.2	0.3
Aluminum, Total (mg/L)	0.3	0.6	0.3
Calcium, Total (mg/L)	14.9	11.3	12.3
Magnesium, Total (mg/L)	9.4	6.9	7.6
Sodium, Total (mg/L)	6.6	7.5	7.8
Potassium, Total (mg/L)	3.0	2.4	2.7
Antimony, Total (ug/L)	BDL	BDL	BDL
Arsenic, Total (ug/L)	0.4	0.4	0.5
Beryllium, Total (ug/L)	BDL	BDL	BDL
Cadmium, Total (ug/L)	0.1	BDL	BDL
Chromium, Total (ug/L)	BDL	BDL	BDL
Copper, Total (ug/L)	2.0	1.0	BDL
Lead, Total (ug/L)	0.2	0.2	0.2
Nickel, Total (ug/L)	BDL	BDL	BDL
Selenium, Total (ug/L)	BDL	BDL	BDL
Silver, Total (ug/L)	BDL	BDL	BDL
Thallium, Total (ug/L)	BDL	BDL	BDL
Zinc, Total (ug/L)_	21.8	BDL	BDL
Mercury, Total (ug/L)	BDL	BDL	BDL
Cyanide, Total (ug/L)	BDL	BDL	BDL

Analysis run by McGehee Engineering
Sample Date 5-14-12
BDL = Below Detection Limit

Table 3
Primary and Secondary Drinking Water Standards

Primany Drining Water Standard		
Contaminant	**MCL (mg/L)**	**MCL (ug/L)**
Antimonoy	0.01	10
Arsenic	0.01	10
Asbestos	7 Million Fibers/Liter	
Barium	2.00	2000
Beryllium	0.00	0
Cadmium	0.01	10
Chromium	0.10	10
Cyanide	0.20	20
Fluoride	4.00	4000
Lead	0.02	20
Mercury	0.00	0
Nickel	0.01	10
Nitrate (as N)	10.00	10000
Nitrite (as N)	1.00	1000
Total Nitrate/Nitrite	10.00	10000
Selenium	0.05	50
Sulfate	500.00	500000
Thallium	0.00	0
Secondary Drinking Water Standard		
Aluminum	0.05 to 0.2	50 to 200
Chlroide	250.00	250000
Color	15 (color units)	
Copper	1.00	1000
Corrosivity	noncorrosive	
Fluoride	2.00	2000
Foaming Agents	5.00	5000
Iron	0.30	300
Manganese	0.05	50
Odor	3 threshold odor number	
pH	6.5 - 8.5	
Silver	0.10	100
Sulfate	250.00	250000
Total Dissolved Solids	500.00	500000
Zinc	5.00	5000

Table 4
Predicted Water Quality
Monitoring Site SW-2

Drainage Area (square miles) : 1929 Mining Ratio: 0.0001
Mining Area (acres) : 178

	pH	TSS	Fe	Mn	SpC
X Coefficients	-0.9237	-0.0875	0.4641	0.1689	0.1236
Constants	7.0188	0.5653	-0.8148	-1.2219	1.9906

PROJECTED DISCHARGE OF SEDIMENT BASINS BASED ON NPDES DISCHARGE LIMITS

	pH s.u.	TSS mg/l	Fe mg/l	Mn mg/l	SpC umhos/cm
During Mining	6.00	35	6.00	4.00	2000
After Mining	6.00	35	6.00	4.00	2000

LOW FLOW

Mining Condition	Flow cfsm	pH s.u.	TSS mg/l	Fe mg/l	Mn mg/l	SpC umhos/cm
Before	0.09	7.96	5	0.05	0.04	73
During	0.09	7.96	5	0.05	0.04	73
After	0.09	7.96	5	0.05	0.04	73

Average FLOW

Mining Condition	Flow cfsm	pH s.u.	TSS mg/l	Fe mg/l	Mn mg/l	SpC umhos/cm
Before	1.55	6.84	4	0.19	0.06	103
During	1.55	6.84	4	0.19	0.07	104
After	1.55	6.84	4	0.19	0.07	104

HIGH FLOW

Mining Condition	Flow cfsm	pH s.u.	TSS mg/l	Fe mg/l	Mn mg/l	SpC umhos/cm
Before	19.69	5.82	3	0.61	0.10	141
During	19.69	5.82	3	0.61	0.10	142
After	19.69	5.82	3	0.61	0.10	142

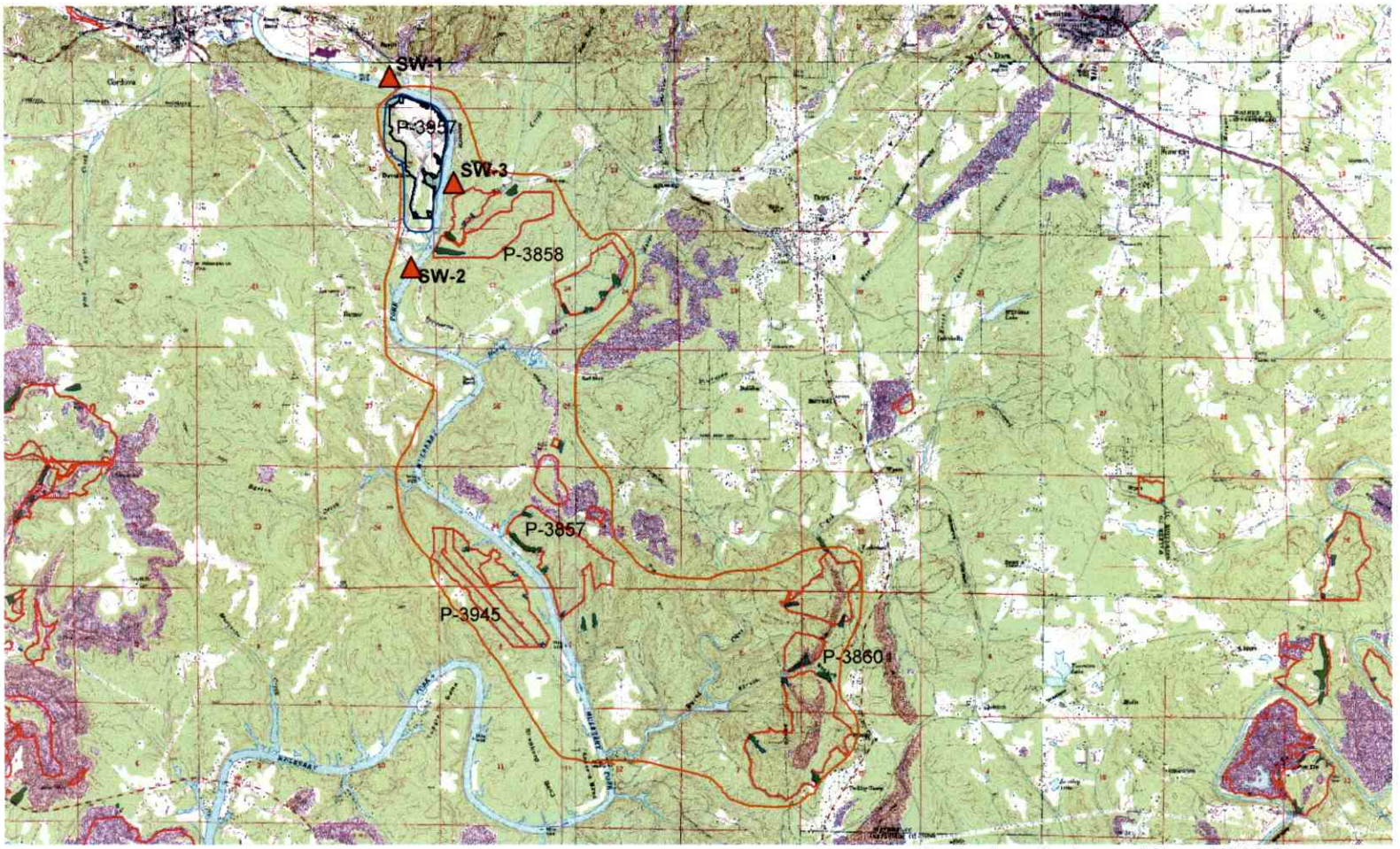
Table 5
Ranges/Averages of Ground Water Quality/Quantity
Monitoring Wells
P-3957

Parameter	H255	H256	H257
Water Depth (feet)	21.42 – 27.00 (24.56)	5.08 – 14.00 (10.76)	6.42 – 13.42 (11.27)
Field pH (S. U.)	5.66 – 6.96 (6.18)	6.12 – 7.05 (6.44)	6.12 – 6.42 (6.28)
Acidity (mg/L)	0 - 66 (38)	19 - 56 (38)	0 - 88 (27)
Alkalinity (mg/L)	4 - 129 (47)	9 - 84 (48)	19 - 77 (49)
Total Iron (mg/L)	0.08 – 13.72 (3.23)	0.33 – 6.70 (2.70)	0.64 – 14.98 (3.95)
Total Manganese (mg/L)	0.12 – 1.11 (0.43)	0.03 – 0.15 (0.11)	0.31 – 1.01 (0.72)
Conductivity 25 ^{0}C (μmhos/cm)	103 - 267 (159)	137 - 349 (240)	84 - 228 (153)
Sulfate (mg/L)	8 - 49 (26)	37 - 116 (86)	18 - 102 (41)

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

Monitoring elevation H255: 320.00 feet msl
Monitoring elevation H256: 305.00 feet msl
Monitoring elevation H257: 281.00 feet msl

Map No. 1
P-3957



Dora, Goodsprings, Cordova and Sipsey USGS Quadrangles

N ⇑

- Permit Area
- Previous Mining
- Surface Water Cumulative Impact Area
- Groundwater Cumulative Impact Area
- Surface Water Monitoring Site