May 8, 2013

Bill Richardson
Water Protection Division (3WP30)
U.S. Environmental Protection Agency Region 3
1650 Arch Street
Philadelphia, PA 19103–2029

Re: Comments of Arch Coal, Inc., to
EPA's Proposed Revisions to the West Virginia 2012 Section 303(d) List
78 FR 20913 (April 8, 2013)

Dear Mr. Richardson:

This letter is in response to the "Notice and Initial Request for Public Comment" published in the Federal Register on Monday, April 8, 2013, (78 FR 20912) by the United States Environmental Protection Agency ("EPA") regarding West Virginia's 2012 Section 303(d) list of water quality limited segments (the "303(d) List"). Arch Coal, Inc., and its subsidiaries (collectively referred to in this letter as "Arch") hold NPDES permits for mining facilities in West Virginia. Therefore, Arch may be directly affected by the decision by EPA to include additional streams on West Virginia's 303(d) List based on benthics macroinvertebrate data.

Arch is particularly concerned with EPA's disregard for the West Virginia Legislature's efforts to provide greater regulatory clarity and a more holistic approach to the State's stream assessment methodologies and the implementation of West Virginia's narrative criteria. In addition, the available data demonstrates that the stream listings are faulty, as EPA failed to consider significant quantities of data that were available and within the possession of the West Virginia Department of Environmental Protection ("WVDEP").

For the reasons set forth in the following sections, Arch requests that EPA reconsider its decision to add 255 streams to the West Virginia 303(d) List as biologically impaired. The West Virginia Coal Association ("WVCA") is filing a comment letter in response to EPA's revisions to the West Virginia 303(d) List. Arch joins in the WVCA comments and incorporates them by reference as if they were fully set forth herein.

Arch's comments are divided into two sections. The first section focuses on the requirements of the Clean Water Act and the reasons that EPA's proposed listings violate the intent and requirements of the applicable statute and regulations. The second section focuses on the technical data that is available which demonstrates that EPA's proposed listings are inaccurate.

I. EPA has exceeded its authority under the Clean Water Act.

A. EPA misapplied the Clean Water Act requirements for 303(d) stream listings.

By letter dated March 25, 2013, EPA provided its review of the West Virginia 303(d) List to WVDEP. The letter contained three attachments. Enclosure 1 sets forth EPA's full review of the 2012 303(d) List, including a discussion of its decision to partially disapprove the 303(d) List based on WVDEP's decision not to add streams for biological impairment based on benthics data generated after publication of the 2010 303(d) List. Enclosure 2 sets forth EPA's alleged listing rationale for the addition of streams to the 2012 303(d) List, and Enclosure 3 identifies the 255 streams that EPA proposes to add to the 2012 303(d) List. These documents will be referred to herein as the EPA Letter, Enclosure 1, Enclosure 2, and Enclosure 3, respectively.

Notably, EPA correctly cites the applicable statutory section which is the genesis of the West Virginia 303(d) List. In its entirety, Section 303(d)(1)(a) of the Clean Water Act (33 U.S.C. § 1313(d)(1)(a)) states:

> Each state shall identify those waters within its boundaries **for which the effluent limitations** required by section 301(b)(1)(A) and section 301(b)(1)(B) **are not stringent enough to implement any water quality standard** applicable to such waters. The State shall establish a priority ranking for such waters, taking into account the severity of the pollution and the uses to be made of such waters.

(Emphasis added). Therefore, a stream must meet two criteria to be listed on the 303(d) List as impaired: (1) the stream is not meeting one or more of the State's water quality criteria; and (2) the cause of the impairment must be related to insufficient effluent limitations.

For numeric water quality criteria, this process is simple. The available monitoring data is compared to the acute and chronic criteria applicable to the designated uses of the stream, and streams are identified that do not meet the numeric criteria. Regardless of whether the impairment is caused by point sources or nonpoint sources, the cause of the impairment is clear – the loading of a particular pollutant in the stream exceeds the amount that the stream can

assimilate. In these circumstances, numeric effluent limits on point source dischargers are insufficient to regulate the loading of the pollutant to the stream.

For the State's narrative water quality criteria, the process is not as simple. WVDEP has determined, and the West Virginia Legislature has confirmed, that the biological integrity of a stream is an indicator of whether a stream is meeting the State's narrative criteria.[1] However, a determination that a stream is biologically impaired is only the first step. Based on the plain language of the Clean Water Act, the agency must determine whether the biological impairment is the result of "effluent limits … [which] are not stringent enough to implement any water quality standard." 33 U.S.C. § 1313(d)(1)(a). Therefore, if more stringent effluent limitations will not remedy the biological impairment, then the stream should not be placed on the 303(d) List.

This conclusion makes practical sense. The end product of the 303(d) listing process is a TMDL (total maximum daily load) that calculates the maximum amount of a pollutant that a body of water can receive while still meeting water quality standards. Therefore, if the cause of the impairment is something other than pollutant loading, then a TMDL will not remedy the biological impairment.

As demonstrated in later sections of this comment letter, this is a real possibility. The biological health of a stream segment is related to many factors, and the chemical composition of the stream is only one of those factors. The stream habitat is at least as important as the chemical composition of the stream. The USGS website describes the factors that affect the biological community in a stream:

> The condition of the habitat (including embeddedness of stones, amount of cover from instream structures and streambank features, and contaminants in bottom sediments and food) and the quality of the water (temperature, light, pH, conductivity, dissolved oxygen, nutrients, and dissolved and suspended solids) can affect the distribution of aquatic organisms. Other factors that affect the distribution of organisms include dispersal (proximity of colonization areas or downstream barriers such as dams), predation and competition from native and introduced species, food sources from upstream and terrestrial inputs, and hydrologic conditions such as floods and droughts.

[1] However, the Legislature explicitly rejected DEP's data requirement used to demonstrate biological impairment in past 303(d) listings. This is addressed in a separate section of this comment letter.

http://pubs.usgs.gov/of/1999/ofr99243/stream_biology.htm. A TMDL will not resolve an insufficient tree canopy that causes high water temperatures. A TMDL will not resolve stream embeddedness or stream bank erosion caused nearby roadways or residential development.

In its listing process, EPA disregarded its obligation to determine whether the alleged biological impairment was caused by effluent limitations that are not stringent enough to implement a water quality standard. Even assuming that EPA's determination of biological integrity was valid (which it is not), EPA cannot list streams on the 303(d) List based solely on biological data.

If the stream is biologically impaired and a TMDL will not resolve the impairment, then the stream should be included in Category 4 of the Integrated Report, which is reserved for "waters that are impaired or threatened but do not need a Total Maximum Daily Load." *West Virginia Integrated Water Quality Monitoring and Assessment Report 2012,* p. 4. Specifically, Category 4c sets forth "waters that have been determined to be impaired, but not by a pollutant."

EPA's attempt to oversimplify the requirements of the Clean Water Act has a real ramification for WVDEP. The agency must now expend resources to prioritize and schedule the 255 streams improperly listed by EPA for TMDL development, regardless of whether these streams would benefit from this process. Clearly, this improper allocation of State resources is outside EPA's authority and detracts from important work by DEP to revise its assessment methodology for biological integrity.

EPA's clear misunderstanding of the requirements of the Clean Water Act is demonstrated in Enclosure 1, where EPA states, "This document describes the basis for: … (2) EPA's decision to disapprove West Virginia's 2012 Section 303(d) list to the extent that it omits certain WQLS requiring a TMDL." Enclosure 1, p. 1. EPA has made no demonstration that a TMDL is required for these segments. EPA's effort to shortcut the listing process is not appropriate.

B. EPA acted in direct contradiction to State law.

In reviewing the 303(d) List, EPA noted the passage of Senate Bill 562 by the West Virginia Legislature. Senate Bill 562 is a significant Legislative action which modified the West Virginia Water Pollution Control Act, W. Va. Code §22-11-1 *et seq*. ("WPCA") Since the West Virginia water quality standards in 47 CSR 2 are developed under the authority of the WPCA, the water quality standards must be interpreted in light of the language in the WPCA.

WVDEP's past listing decisions for biological integrity have been challenged repeatedly. The passage of Senate Bill 562 provided a Legislative directive to WVDEP in its interpretation of the State's narrative criteria. In short, the West Virginia Legislature has told WVDEP that a review of benthics data is insufficient to determine the biological integrity of a receiving stream.

EPA contends that "WVDEP failed to evaluate existing and readily available information related to West Virginia's applicable narrative water quality criteria." Enclosure 1, p. 3. This is inaccurate. DEP has clearly considered the benthics data – it was provided to EPA as part of the database available and reviewed for the 303(d) listing process. DEP has not excluded or rejected the benthics data. DEP has simply recognized the Legislative directive that benthics data cannot be used alone to determine whether a stream is to be placed on the 303(d) List as biologically impaired.

EPA boldly states, "Recognizing WVDEP's position that it is unable to carry out the requirement set forth in 40 CFR 130.7(b)(5), EPA has an obligation to take action to ensure that the federal requirement is satisfied." EPA Letter, p. 1. The Integrated Report contains no such statement by WVDEP. Instead, DEP simply states that it is working on a revised methodology to meet the requirements of Senate Bill 562. DEP specifically acknowledges in the Integrated Report that it did not consider in past 303(d) Lists whether streams had been adequately assessed or whether biological impairment is related to the need for a TMDL:

> Most streams with low biological scores are listed as having an unknown source/cause of impairment on the 303(d) List and most are listed, by default, for their entire length. **It is doubtful that the entire length of every stream is impaired**, but without further data, the exact length of impairment is unknown. Each listed stream will be revisited prior to TMDL development. The additional assessments performed in the pre-TMDL monitoring effort will better define the impaired length. The causative stressor(s) of the impairment and the contributing sources of pollution also will be identified during the TMDL development process. **If the stressor identification process demonstrates that the biological impairment is not caused by a pollutant, then no TMDL will be developed.**

Integrated Report, p. 16. The West Virginia Legislature has required DEP to improve the listing process. It is untenable for EPA to force DEP backward in the listing process instead of forward, especially in light of the Legislative action.

EPA is to provide considerable discretion to a State in developing and interpreting its water quality standards. 63 FR 36745 (July 7, 1998). The West Virginia Legislature determined that

"the biologic component of West Virginia's narrative water quality standard requires evaluation of the **holistic health of the aquatic ecosystem**." W. Va. Code § §22-11-7b(f). In the 2012 303(d) List, DEP acted in compliance with the Legislature's requirement to assess the holistic health of the ecosystem. Because DEP only had benthics data in its database, insufficient information was available to list additional streams in 2012 for biological impairment. Until an assessment methodology is complete, it is premature for WVDEP or EPA to list additional streams as impaired.

Moreover, 40 CFR 130.7(b)(5) does not require DEP to use a particular listing methodology. Instead it requires DEP simply to review and assess the available data as part of its methodology.[2] EPA is aware that DEP is working on a new stream assessment process to meet the directives of the West Virginia Legislature. Instead of requiring the agency to reopen the 303(d) List once this methodology is complete, EPA has improperly listed streams based on a methodology rejected by the West Virginia Legislature as contrary to the WPCA.

II. Readily available data demonstrates that the EPA listing decisions were improper.

Arch has multiple facilities throughout the State of West Virginia. To the extent possible based on the limited information provided, Arch has attempted to cross-reference the location of its NPDES permits with the streams listed on EPA's Enclosure 3. Arch has determined that it holds NDPES permits that discharge into or near the following streams on Enclosure 3:

[2] (5) "Each State shall assemble and evaluate all existing and readily available water quality-related data and information to develop the list required by §§130.7(b)(1) and 130.7(b)(2). At a minimum "all existing and readily available water quality-related data and information" includes but is not limited to all of the existing and readily available data and information …" 40 CFR 130.7(b)(5).

Stream	Watershed
Littles Creek	Upper Guyandotte
Pigeon Creek	Tug Fork
Jennie Creek	Tug Fork
Marrowbone Creek	Tug Fork
Three Fork Creek	Tygart Valley
Little Indian Creek	Monongahela
Ben Creek	Tug Fork
Deckers Creek	Monongahela
Dents Run	Monongahela
Gnatty Creek	West Fork
Isaac Creek	West Fork
Robinson Run	Monongahela
Wades Run	Monongahela
Sandlick Run	West Fork
Scotts Run	Monongahela
Guston Run	Monongahela
Snider Run	Monongahela
Simpson Creek	West Fork
Tenmile Creek	West Fork

ACI specifically objects to the inclusion of these streams on Enclosure 3 and the West Virginia 303(d) List for biological impairment. Because the limited time available to review the proposed listings by EPA, Arch may later identify additional streams on Enclosure 3 that are adjacent to or downstream of current or past Arch mining operations. Arch reserves the right to object to or challenge the listing of any stream on Enclosure 3 for inclusion in the 303(d) List.

As part of obtaining the necessary NPDES permits for these properties, Arch has conducted biological monitoring of certain watersheds. These monitoring reports are provided to the WVDEP and West Virginia Division of Natural Resources. The monitoring conducted by Arch demonstrates that low WVSCI scores are frequently caused by factors unrelated to insufficient effluent limitations. Poor habitat is a frequent contributor to low WVSCI scores. While mining may affect habitat in some areas prior to reclamation, these effects are very transient in nature. Impacts due to other activities, in particular roads and residential construction, appear to be more permanent.

While WVDEP has obtained these monitoring reports, the agency has not incorporated the monitoring results in a format that is available for review by the Watershed Assessment Branch. Accordingly, DEP needs additional time to incorporate this information in the assessment of streams for biological integrity. These reports are more comprehensive than simply a WVSCI score. Many contain a habitat assessment, and fish surveys are available for a number of streams. Once DEP has developed a holistic approach as required by the Legislature, these documents will be useful tools in determining whether certain streams should be included on the 303(d) List.

Arch's challenge is based on EPA's faulty methodology and disregard of W. Va. Code §22-11-7b(f). As an example of the impact of the faulty methodology, Arch has evaluated biological monitoring conducted of Scotts Run in the Monongahela Watershed. In October 2010, biological monitoring was conducted by AllStar Ecology, LLC, of Scotts Run and Unnamed Tributaries to Scotts Run. A copy of the Monitoring Report for this biological assessment is provided in Attachment A.

Scott's Run is a watershed with past mining activity. However, the area also contains significant residential development that has affected the riparian zone. Two samples were collected in Scotts Run, and two samples were collected from unnamed tributaries of Scotts Run. *See* Figure 1. Specifically, EPA listed Scotts Run in the section stating that it has a West Virginia Scream Condition Index ("WVSCI") score of less than 60.6. The Arch data indicates that Scotts Run has WVSCI scores greater than 60.6.

The benthic station on the unnamed tributary of Scotts Run that is north of Cassville (USUTSR) has a WVSCI score of 76.2. This station has little or no impact from mine discharge waters. The upstream Scotts Run station (USR) has a WVSCI score of 72.3. The WVSCI score on the second unnamed tributary to Scotts Run (USUTR-2), which is located slightly west of Cassville, is 63.2. The farthest downstream point, DSR, has a WVSCI score of 66.1. *See* Figures 1 & 2. None of these WVSCI scores are below 60.6, despite EPA's listing.

Mining discharges have the potential to reach all benthic locations, except for USUTR-2 (Figure 1). USUTR-2 has the lowest WVSCI score (63.2) of the stations monitored in the benthic survey. The WVSCI score for Scotts Branch does not enter the "gray area" until after USUTR-2 has entered Scotts Branch. At Station DSR, the WVSCI score is 66.1. The data indicates that

the unnamed tributary west of Cassville, which contains no mining discharges, is adversely affecting Scotts Branch.

Toxicity test performed by Arch substantiates this conclusion. In November 2010, acute and chronic toxicity tests (Attachments B and C) were performed which showed no toxicity of the Outlet 001 effluent (IC50 and NOEC ≥100). This indicates that the marginal WVSCI score found at DSR is not likely to be related to the mine effluent entering Scotts Run.

The AllStar Monitoring Report states that the physical habitat at USUTR-2 was suboptimal, in part due to "the impact from nearby roads and man-made bank alterations". In addition, "marginal scores for vegetative protection and poor rating for riparian vegetative zone were a result of the mowed banks and close proximity houses and roads" for station DSR. Scotts Run and an unnamed tributary have been negatively impacted by housing and road developments located in the vicinity.

Aerial images taken from Google Earth (Figures 2 and 3) indicate that a housing development was being built slightly upstream of USUTR-2 at the time the benthic survey was conducted. Housing projects have great potential to negatively impact streams. It appears likely that this housing project, in conjunction with roads and houses that already exist along Scotts Run, are contributors the to the lower WVSCI scores observed on Scotts Run.

Figure 1. Aerial image showing Scotts Run, Benthic Stations, and all SMCRA permits in the area.

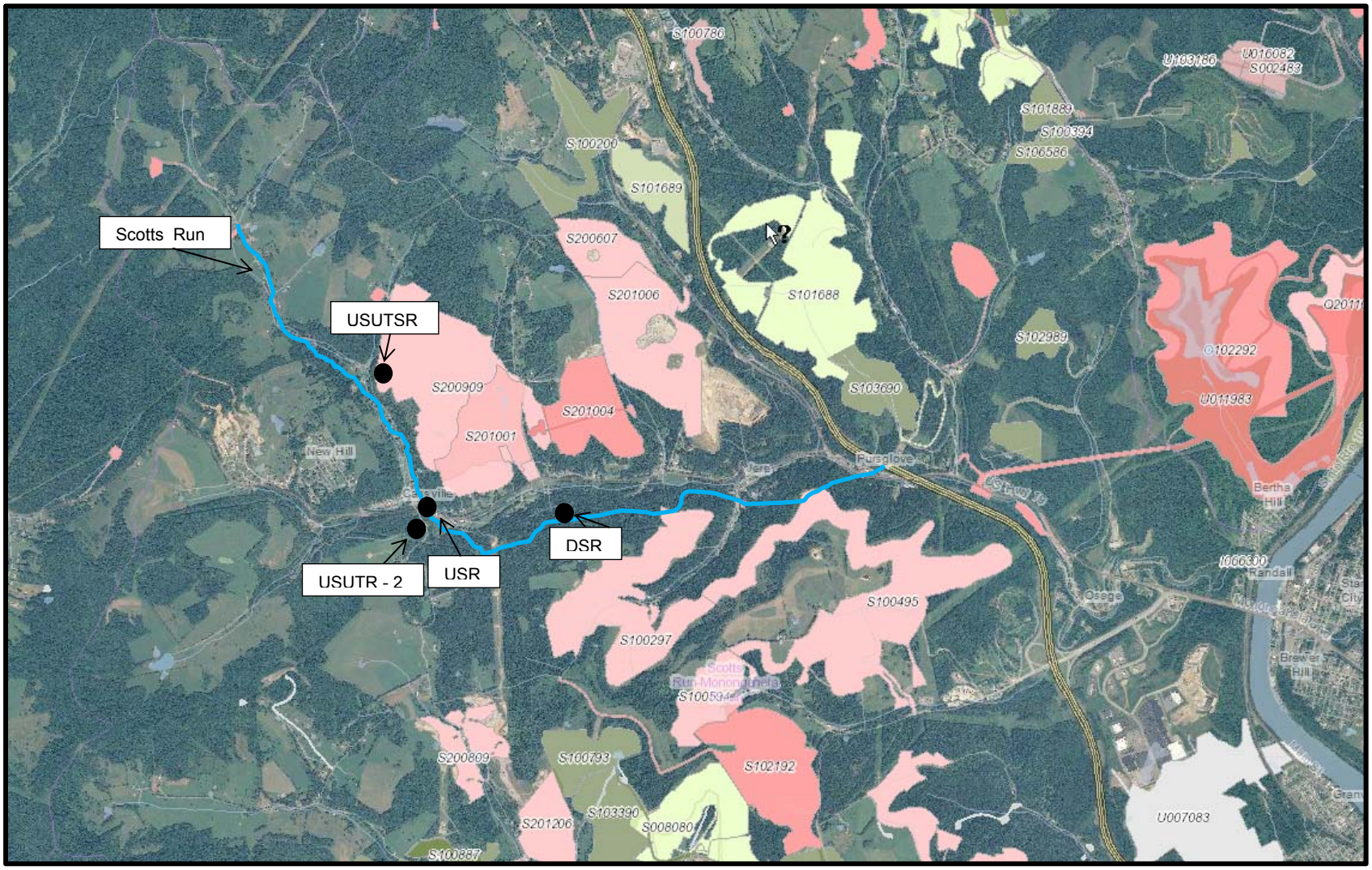


Figure 2. Aerial Google Earth Image from October 2011 of Scotts Run showing benthic scores.

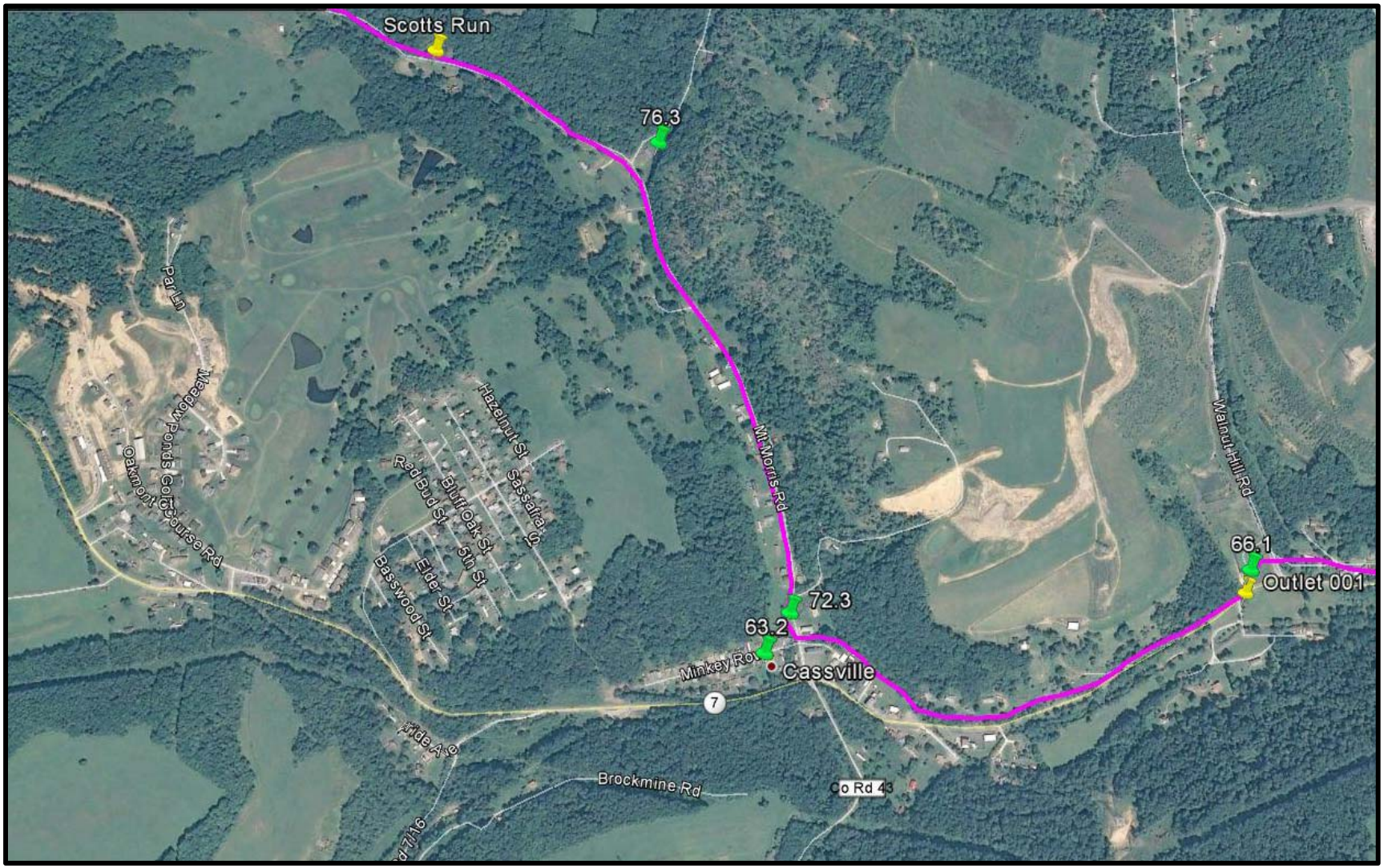
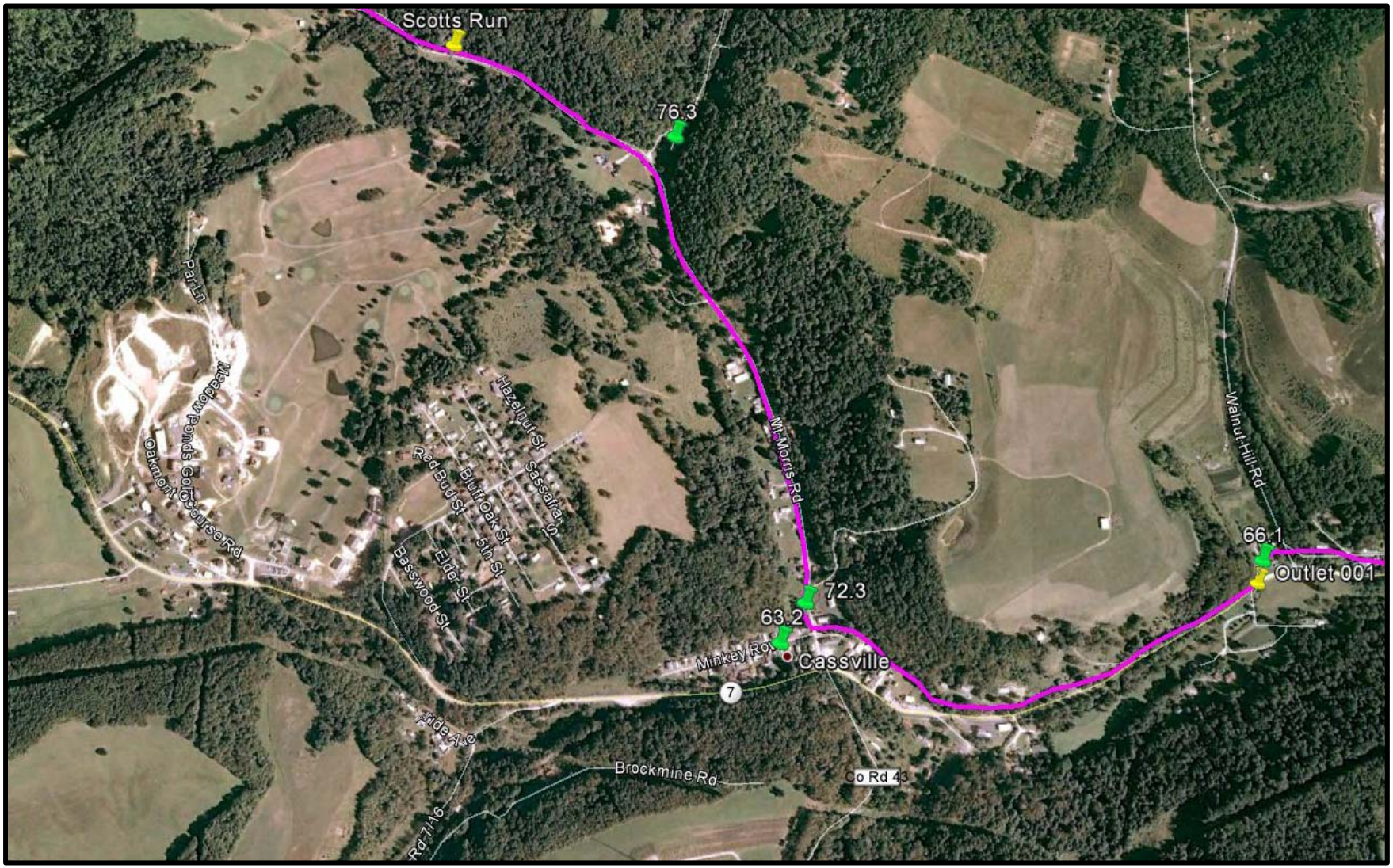


Figure 3. Aerial Google Earth Image from October 2009 of Scotts Run showing benthic scores.



III. Conclusion

Based on the comments provided in this letter, Arch respectfully requests that EPA withdraw its proposed revisions to the 303(d) List. EPA has not demonstrated that the streams listed on Enclosure 3 are biologically impaired as defined by W. Va. Code §22-11-7b(f). Moreover, even assuming that the streams on Enclosure 3 are biologically impaired, EPA has not attempted to demonstrate that the alleged biological impairment is related to insufficient effluent limitations. Many factors separate from the chemical integrity of the water can result in low WVSCI scores. This does not mean that the water should be placed in the 303(d) List. Placing a stream on the 303(d) List has legal and financial implications for the State. Arch encourages EPA to reconsider its comments to the 2012 303(d) List. If EPA believes that delisting streams should be done mid-cycle (Enclosure 1, p. 16), then EPA should encourage DEP to update its list of impaired streams in the same manner. In the meantime, it is appropriate to keep the list unchanged from 2010 with regard to biological impairment.

Sincerely,

John J. McDaniel
Director of Engineering and Technical Services
Arch Coal, Inc., Eastern Operations

Attachment A

Biological Monitoring Report

Scotts Run and Unnamed Tributaries to Scotts Run

November 3, 2010
Updated – December 6, 2010
Updated – December 29, 2010
Updated - January 6, 2011

Prepared By:

AllStar Ecology, LLC
1580 McKinney Cave Rd.
Reedsville, WV 26547

AllStar Ecology LLC
Natural Resource Specialists

For:

Patriot Mining Company, Inc.
51 Scott Run Road
Maidsville, WV 26541-8177

Introduction

On October 8, 2010, water chemistry, physical habitat, and benthic macroinvertebrate communities were sampled in approximate 100 meter reaches in two unnamed tributaries to Scotts Run and at one Scotts Run mainstem location in Monongalia County, WV. On this sampling day, the weather was clear and sunny and there had not been heavy rain in the seven days prior to sampling. On December 21, 2010 water chemistry, physical habitat, and benthic macroinvertebrate communities were sampled in an approximate 100 meter reach in another Scotts Run mainstem location in Monongalia County, WV. On this sampling day, the weather was cloudy, cold, and there had not been a heavy precipitation event in the seven days prior to sampling. The four study locations are listed and illustrated below.

Site Name	Stream	Location
USUTSR	Unnamed Tributary to Scotts Run	Sampled just upstream of Cassville Mt. Morris Rd. along Fleming Rd.
USR	Scotts Run	Sampled upstream of USUTR-2 confluence along Cassville Mt. Morris Rd.
USUTR-2	Unnamed Tributary to Scotts Run	Sampled upstream of Minkey Row along Cassville Mt. Morris Rd.
DSR	Scotts Run	Sampled downstream of unnamed tributary along Route 7

Methods

West Virginia Department of Environmental Protection's (WVDEP) Standard Operating Procedures were followed and are outlined in ***Rapid Bioassessment Protocols for Use in Wadeable Rivers and Streams, Second Edition*** (Barbour et al. 1999). Water chemistry parameters including pH, specific conductance, temperature, total dissolved solids, and dissolved oxygen were measured in the field using Oakton handheld probes. Physical habitat was assessed using the Rapid Visual Habitat Assessment (RVHA) approach for high-gradient streams (Barbour et al. 1999). A rectangular dip net was used to collect four benthic macroinvertebrate samples in targeted riffle habitat through out the four stream reaches for a total area sampled of one square meter per site. The four samples taken at each site were then combined, sieved through a standard 30µ sieve, and stored in alcohol. Back in the laboratory, the samples were sorted and all macroinvertebrates present were identified to the Family level with the exception of aquatic worms (Oligochaeta) which were identified to sub-class only. The West Virginia Stream Condition Index was then calculated as the average of the following macroinvertebrate metrics: percent Ephemeroptera, Plecoptera, and Trichoptera (EPT) abundance, EPT richness, modified Hilsenhoff index, taxa richness, percent Chironomidae, and percent two dominant taxa (Gerritson et al. 2000).

Results

Water Chemistry – Using the Oakton handheld probes, the following water chemistry data were collected at each of the four sites:

Site	pH	Temperature (◦ C)	Dissolved Oxygen (mg/L)	Specific Conductance (µs/cm)	Total Dissolved Solids (ppm)
USUTSR	8.28	12.3	9.23	46	228
USR	8.57	5.4	13.96	520	260
USUTR-2	7.67	12.3	9.58	699	349
DSR	7.93	18.1	10.3	892	445

Physical Habitat –

Using the RVHA method and data sheet, the following observation scores were recorded for physical habitat at each of the four sites:

Habitat Parameter	USUTSR Score	Condition Category	USR Score	Condition Category	USUTSR-2 Score	Condition Category	DSR Score	Condition Category
Epifaunal Substrate	7	Marginal	8	Marginal	13	Suboptimal	8	Marginal
Embeddedness	16	Optimal	15	Suboptimal	11	Suboptimal	14	Suboptimal
Velocity/Depth Regime	14	Suboptimal	10	Marginal	13	Suboptimal	14	Suboptimal
Sediment Deposition	18	Optimal	15	Suboptimal	17	Optimal	13	Suboptimal
Channel Flow Status	17	Optimal	13	Optimal	17	Optimal	17	Optimal
Channel Alteration	14	Suboptimal	9	Marginal	12	Suboptimal	14	Suboptimal
Frequency of Riffles	16	Optimal	5	Poor	18	Optimal	13	Suboptimal
Bank Stability (Left)	6	Suboptimal	3	Marginal	4	Marginal	7	Suboptimal
Bank Stability (Right)	6	Suboptimal	3	Marginal	4	Marginal	7	Suboptimal
Vegetative Protection (Left)	4	Marginal	4	Marginal	4	Marginal	5	Marginal
Vegetative Protection (Right)	5	Marginal	4	Marginal	4	Marginal	5	Marginal
Riparian Vegetative Zone Width (Left)	1	Poor	1	Poor	4	Marginal	1	Poor
Riparian Vegetative Zone Width (Right)	1	Poor	2	Poor	4	Marginal	1	Poor
TOTAL SCORE	125	Suboptimal	92	Marginal	125	Suboptimal	119	Suboptimal

USUTSR

This perennial, warmwater stream is a spring-fed direct tributary to Scotts Run (photo on the right is looking upstream from Fleming Rd). The predominant surrounding landuse at this site was a combination of forest, field/pasture, and residential with some potential sources of nonpoint source pollution and evidence of moderate watershed erosion. The dominant riparian vegetation was grass. The stream canopy cover was partly open and the stream wetted width was estimated to be < 1 m wide and approximately 10 cm. deep. The high water mark on the stream banks was estimated to be 2 m higher than the water level. The proportion of the reach represented by riffle, run, and pool was estimated to be 40 %, 30 %, and 30 %, respectively. Large woody debris were not present; however some small woody debris was observed as well as attached algae covering approximately 15% of the stream reach. The water was clear, odorless, and did not have any surface oils. The sediment odor was normal, there were no oils in the sediment, and there were no sediment deposits. The sample reach was estimated to be comprised of the following inorganic substrate components: 10 % bedrock, 0 % boulder, 40 % cobble, 30 % gravel, 15 % sand, 5 % silt, and 0 % clay. Organic substrate components included 2 % detritus, 0 % muck-mud, and 0 % marl.

USR

This perennial, warmwater stream is a spring-fed direct tributary to the Monongahela River (photo below is looking downstream toward Minkey Row). The predominant surrounding landuse at this site was a combination of forest, and residential with some potential sources of nonpoint source pollution and evidence of moderate watershed erosion. The dominant riparian vegetation was grass/ground cover including mullen (***Dactylis glomerata***) and moneywort (***Lysimachia nummularia).*** The stream canopy cover was partly open and the stream wetted width was estimated to be 2 m wide and approximately 0.10 m deep. The high water mark on the stream banks was estimated to be 1 m higher than the water level. The proportion of the reach represented by riffle, run, and pool was estimated to be 80%, 10 %, and 10 %, respectively. There was evidence of channelization and no dams were present. Large woody debris approximately 1 m^2 was observed at a density of approximately 0.001 m^2/km^2. Rooted emergent aquatic vegetation was also observed covering approximately 10% of the reach. The water was clear, odorless, and did not have any surface oils. The sediment odor was normal, there were no oils in the sediment, and there were evidence of gravel deposits. The sample reach was estimated to be comprised of the following inorganic substrate components: 0 % bedrock, 2 % boulder, 40 % cobble, 40 % gravel, 13 % sand, 5 % silt, and 0 % clay. Organic substrate components included 3 % detritus, 0 % muck-mud, and 0 % marl.

USUTSR-2

This perennial, warmwater stream is a spring-fed direct tributary to Scotts Run (photo below is looking upstream from Minkey Row). The predominant surrounding landuse at this site was a combination of forest and residential with some potential sources of nonpoint source pollution and evidence of moderate watershed erosion. The dominant riparian vegetation was a combination of trees and shrubs with the dominant species being Walnut trees (***Juglans nigra***). The stream canopy cover was partly shaded and the stream wetted width was estimated to be 1.5 m wide and approximately 15 cm deep. The high water mark on the stream banks was estimated to be 2 m higher than the water level. The proportion of the reach represented by riffle, run, and pool was estimated to be 40 %, 40%, and 20 %, respectively. There was evidence that the stream has been channelized indicated by man-made stream banks and a straightened channel, and there were no dams present. Large woody debris were not present; however some small woody debris

was observed as well as attached algae covering approximately 60% of the stream reach. The water was clear, odorless, and did not have any surface oils. The sediment odor was normal, there were no oils in the sediment, and there were no sediment deposits. The sample reach was estimated to be comprised of the following inorganic substrate components: 0 % bedrock, 15 % boulder, 30 % cobble, 30 % gravel, 20 % sand, 5 % silt, and 0 % clay. Organic substrate components included 10 % detritus, 0 % muck-mud, and 0 % marl.

DSR

This perennial, warmwater stream is a spring-fed direct tributary to the Monongahela River (photo below is looking upstream toward the confluence of UTSR-1 and a driveway bridge). The predominant surrounding landuse at this site was a combination of forest and residential with some potential sources of nonpoint source pollution and evidence of moderate watershed erosion. The dominant riparian vegetation was grass with the dominant species being foxtail grass (***Setaria spp.***). The stream canopy cover was partly open and the stream wetted width was estimated to be 3.0 m wide and approximately 15 cm deep. The high water mark on the stream banks was estimated to be 1 m higher than the water level. The proportion of the reach represented by riffle, run, and pool was estimated to be 40 %, 40 %, and 20 %, respectively. There was evidence that the stream has been channelized and there were no dams present. Large woody debris was not present. Attached algae was observed at this site and was estimated to cover 70% of the reach. The water was clear, odorless, and did not have any surface oils. The sediment odor was normal and there were no oils in the sediment; however, deposits of iron oxide were observed, but not to the degree seen in UTSR-1. The sample reach was estimated to be comprised of the following inorganic substrate components: 0 % bedrock, 5 % boulder, 60 % cobble, 30 % gravel, 5 % sand, 3 % silt, and 0 % clay. Organic substrate components included 3 % detritus, 0 % muck-mud, and 0 % marl.

Benthic Macroinvertebrates –

USUTSR

Kick nets on one square meter yielded 127 organisms that were collected and identified at this site representing 26 different families. Dominant families collected (in order of dominance) included: common net spinning caddisfly (Trichoptera Hydropsychidae), water penny beetle (Coleoptera Psephenidae), and broad-winged damselfly (Odonata Calopterygidae).

The following macroinvertebrates were collected and identified at this site:

Taxa		Count
Oligochaeta	.	7
Unknown Snails	.	2
Decapoda	Cambaridae	2
Isopoda	Asellidae	2
Ephemeroptera	Baetidae	2
Ephemeroptera	Heptageniidae	6
Trichoptera	Hydropsychidae	37
Trichoptera	Philopotamidae	1
Trichoptera	Polycentropodidae	1
Trichoptera	Limnephilidae	5
Plecoptera	Chloroperlidae	1
Plecoptera	Perlidae	1
Odonata	Gomphidae	4
Odonata	Cordulegastridae	1
Odonata	Aeshnidae	3
Odonata	Calopterygidae	13
Coleoptera	Elmidae	3
Coleoptera	Psephenidae	23
Megaloptera	Corydalidae	1
Megaloptera	Sialidae	1
Hemiptera	Corixidae	1
Hemiptera	Gerridae	1
Hemiptera	Saldidae	1
Diptera	Chironomidae	2
Diptera	Tipulidae	5
Diptera	Tabanidae	1
SUM		**127**

The West Virginia Stream Condition Index (WVSCI) was calculated to be 76.3 (Appendix A) and the following macroinvertebrate indices were also calculated:

USUTSR Macroinvertebrate Indices	Score
WV Stream Condition Index	76.3
Total Number	127
% Ephemeroptera, Plecoptera, Trichoptera (EPT)	42.5
EPT Richness	8
% Tolerant	8.0
% Ephemeroptera	6.3
Modified Hilsenhoff Index	5.1
% 2 Dominance	47.2
Taxa Richness	26
% Chironomidae	1.6

USR

Kick nets on one square meter yielded 278 organisms that were collected and identified at this site representing 18 different families. Dominant families collected (in order of dominance) included: common net spinning caddisfly (Trichoptera Hydropsychidae), non-biting midge (Diptera Chironomidae), Flathead Mayfly (Ephemeroptera Heptageniidae) and water penny beetle (Coleoptera Psephenidae).

The following macroinvertebrates were collected and identified at this site:

Taxa		Count
Gastropoda	Planorbidae	2
Other	Snails	1
Isopoda	Asellidae	9
Ephemeroptera	Baetidae	2
Ephemeroptera	Caenidae	2
Ephemeroptera	Heptageniidae	13
Ephemeroptera	Isonychiidae	1
Trichoptera	Hydropsychidae	155
Trichoptera	Philopotamidae	1
Plecoptera	Chloroperlidae	1
Plecoptera	Capniidae/Leuctridae	3
Plecoptera	Perlodidae	2
Odonata	Aeshnidae	1
Coleoptera	Elmidae	6
Coleoptera	Psephenidae	10
Diptera	Chironomidae	60
Diptera	Tipulidae	7
Diptera	Athericidae	2
SUM		**278**

The West Virginia Stream Condition Index (WVSCI) was calculated to be 72.3 (Appendix B) and the following macroinvertebrate indices were also calculated:

USR Macroinvertebrate Indices	Score
WV Stream Condition Index	72.3
Total Number	278
% Ephemeroptera, Plecoptera, Trichoptera (EPT)	64.7
EPT Richness	9
% Tolerant	21.6
% Ephemeroptera	6.5
Modified Hilsenhoff Index	5.4
% 2 Dominance	58.3
Taxa Richness	18
% Chironomidae	21.6

USUTSR-2

Kick nets on one square meter yielded 174 organisms at this site that were collected and identified representing twelve different families. This site was heavily dominated (137 collected) by common net spinning caddisfly (Trichoptera Hydropsychidae).

The following macroinvertebrates were collected and identified at this site:

Taxa		Count
Ephemeroptera	Baetidae	1
Ephemeroptera	Caenidae	4
Ephemeroptera	Isonychiidae	1
Trichoptera	Hydropsychidae	137
Trichoptera	Philopotamidae	2
Coleoptera	Elmidae	7
Coleoptera	Psephenidae	2
Hemiptera	Saldidae	2
Hemiptera	Veliidae	2
Diptera	Chironomidae	5
Diptera	Tipulidae	10
Diptera	Empididae	1
SUM		**174**

The West Virginia Stream Condition Index (WVSCI) was calculated to be 63.2 at the USUTSR-2 site (Appendix C) and the following macroinvertebrate indices were also calculated:

USUTSR-2 Macroinvertebrate Indices	Score
WV Stream Condition Index	63.2
Total Number	174
% Ephemeroptera, Plecoptera, Trichoptera (EPT)	83.3
EPT Richness	5
% Tolerant	2.9
% Ephemeroptera	3.4
Modified Hilsenhoff Index	5.0
% 2 Dominance	84.5
Taxa Richness	12
% Chironomidae	2.9

DSR

Kick nets on one square meter yielded 110 organisms that were collected and identified representing 17 different families. The site was dominated by the following families (in order of dominance): riffle beetle (Coleoptera Elmidae), net spinning caddisfly (Trichoptera Hydropsychidae), water penny beetle (Coloptera Psephenidae), and crane fly (Diptera Tipulidae).

The following macroinvertebrates were collected and identified at this site:

Taxa		Count
Oligochaeta	.	9
Gastropoda	Physidae	5
Unknown	Snails	1
Isopoda	Asellidae	2
Ephemeroptera	Caenidae	3
Ephemeroptera	Heptageniidae	1
Ephemeroptera	Ephemeridae	1
Trichoptera	Hydropsychidae	19
Odonata	Gomphidae	2
Odonata	Aeshnidae	1
Odonata	Calopterygidae	6
Coleoptera	Elmidae	27
Coleoptera	Psephenidae	16
Coleoptera	Hydrophilidae	1
Diptera	Tipulidae	12
Diptera	Athericidae	3
Diptera	Muscidae	1
SUM		**110**

The West Virginia Stream Condition Index (WVSCI) was calculated to be 66.1 at the DSR site (Appendix D) and the following macroinvertebrate indices were also calculated:

DSR Macroinvertebrate Indices	Score
WV Stream Condition Index	66.1
Total Number	110
% Ephemeroptera, Plecoptera, Trichoptera (EPT)	21.8
EPT Richness	4
% Tolerant	9.2
% Ephemeroptera	4.5
Modified Hilsenhoff Index	5.1
% 2 Dominance	41.8
Taxa Richness	17
% Chironomidae	0.0

Discussion

USUTSR

All of the water chemistry parameters studied were found to be in the normal range for streams and comply with WV State Water Quality Standards.

Overall, the physical habitat at this site was suboptimal. The embeddedness, sediment deposition, channel flow status, and frequency of riffles were optimal at this site and the velocity/depth regime, channel alteration, and bank stability were suboptimal. However, the epifaunal substrate and vegetative protection were marginal. Further, the riparian vegetative zone was poor. The low scores for vegetative protection and riparian vegetative zone were a result of the mowed stream banks, close proximity house, and influence of Fleming Road.

Given the macroinvertebrate community collected and identified, the stream rating at this site was good (WVSCI 70.0-85.0). Macroinvertebrate diversity at this site was good with eight different EPT taxa collected and was the second highest of the four study streams.

USR

The pH, dissolved oxygen, and temperature at this site were found to be in the normal range for streams and comply with WV State Water Quality Standards.

Overall, the physical habitat at this site was marginal. The channel flow status was optimal at this site and the embeddedness and level of sediment deposition were suboptimal. However, the epifaunal substrate, velocity/depth regime, degree of channel alteration, and bank stability and vegetative protection on both river right and left were marginal. Further, the frequency of riffles and riparian vegetative zone on both river right and left were poor. The low scores for channel

alteration, bank stability, and vegetative protection and zone were a result of the mowed banks, close proximity residences, and Cassville Mt. Morris Rd.

Based on the calculated WVSCI score, water quality at this site is good (WVSCI 70.0-85.0). Macroinvertebrate diversity at this site was good with nine different EPT taxa collected and was the highest of the four study streams. However, the site was heavily dominated by net-spinning caddisfly (Trichoptera Hydropsychidae) and non-biting midge (Diptera Chironomidae) and therefore did not reach the excellent level.

USUTSR-2

The pH, dissolved oxygen, and temperature at this site were found to be in the normal range for streams and comply with WV State Water Quality Standards.

Overall, the physical habitat at this site was suboptimal. The sediment deposition, channel flow status and frequency of riffles were optimal and the epifaunal substrate, embeddedness, velocity/depth regime, and channel alteration were suboptimal at this site. Bank stability, vegetation, protection, and riparian zones were marginal due to the impact from nearby roads and man-made bank alterations.

Based on the calculated WVSCI score, this stream received a marginal rating (WVSCI 55.0 – 69.9). Although macroinvertebrate abundance at this site was high, the only EPT organisms collected were common net spinning caddisfly (one of the more pollution tolerant caddisfly taxa) which heavily dominated the site (Gerritson et al. 2000).

DSR

The pH, dissolved oxygen, and temperature at this site were found to be in the normal range for streams and comply with WV State Water Quality Standards.

Overall, the physical habitat at this site was suboptimal. The channel flow status was optimal, and the embeddedness, velocity/depth regime, sediment deposition, channel alteration, frequency of riffles, and bank stability were all suboptimal. The marginal scores for vegetative protection and poor rating for riparian vegetative zone were a result of the mowed banks and close proximity houses and roads.

Given the macroinvertebrate community collected and identified, the stream rating at this site was marginal (Gerritson et al. 2000). Four EPT taxa were colleted, but no stoneflies were found and the site was dominated (41.8 %) by riffle beetle (Coleoptera Elmidae) and common net spinning caddisfly (Trichoptera Hydropsychidae which is one of the more pollution tolerant caddisfly taxa).

Literature Cited

Barbour, M.T., J. Gerritsen, B.D. Snyder, and J.B. Stribling. 1999. Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates and Fish, Second Edition. EPA 841-B-99-002. U.S. Environmental Protection Agency; Office of Water; Washington, D.C.

Gerritson, J., J. Burton, and M.T. Barbour. 2000. A Stream Condition Index for West Virginia Wadeable Streams. Tetra Tech, Inc. Owings Mills, MD.

U.S. EPA. 1997. Monitoring Water Quality. EPA 841-B-97-003. U.S. Environmental Protection Agency; Office of Water; Washington, D.C.

Appendix A. WVSCI Spreadsheet for USUTSR

Biotic Index Calculation Spreadsheet				
	Total count for all samples		Tolerance	MHI Score
Macroinvertebrate Groups	Total #	P/A		
Stonefly	2	1	2.0	4
Mayfly	8	1	3.0	24
Most Caddisflies	7	1	3.0	21
Water Penny	23	1	4.0	92
Fishflies and Hellgrammites	0	0	4.0	0
Riffle Beetle	3	1	4.0	12
Common Netspinner	37	1	5.0	185
Alderfly	1	1	6.0	6
Watersnipe	0	0	4.0	0
Cranefly	5	1	5.0	25
Other Beetle Larva	0	0	6.0	0
Damselfly	13	1	7.0	91
Dragonfly	8	1	5.0	40
Clams and Mussels	0	0	5.0	0
Crayfish	2	1	6.0	12
Scud	0	0	6.0	0
Sowbug	2	1	7.0	14
Snails	2	1	5.0	10
Blackfly Larva	0	0	7.0	0
Midge Larva	2	1	8.0	16
Other Fly Larva	1	1	8.0	8
Flatworms	0	0	8.0	0
Leeches	0	0	10.0	0
Aquatic Worms	7	1	10.0	70
Water Bugs	3	1	8.0	24
Total # of macroinvertebrates	**127**			**654**
	Total # of Kinds	**17**	**SOS Index**	34
Indices	**Score**	**% Correlation**		
% EPT Abundance	42.5	46.3		
EPT Richness	8	61.5		
% Generally Tolerant	8.0	100.0		
% Ephemeroptera	6.3	10.0		
Modified Hilsenhoff Index	5.1	68.3		
% Dominance	29.1	68.6		
Taxa Richness	26	100.0		
%Acid Tolerant	0.0	#DIV/0!		
%Aluminum Floc Tolerant	29.1	85.8		
% Chironomidae	1.57	99.4		
% 2 Dominant	47.24	82.4		
	WVSCI		**76.3**	
	Acid SCI		**68.0**	
Site Name	**Stream Rating Scale - SCI**			
	Excellent	Good	Marginal	Poor
0	> 85.0	85.0 - 70.0	69.9 - 55.0	< 55.0
Site Code	**Stream Rating Scale - SOS**			
	Excellent	Good	Marginal	Poor
USUTSR	> 22.0	17.0-22.0	11.0-16.0	< 11.0

Appendix B. WVSCI Spreadsheet for USR

Biotic Index Calculation Spreadsheet				
	Total count for all samples		Tolerance	MHI Score
Macroinvertebrate Groups	Total #	P/A		
Stonefly	6	1	2.0	12
Mayfly	18	1	3.0	54
Most Caddisflies	1	1	3.0	3
Water Penny	10	1	4.0	40
Fishflies and Hellgrammites	0	0	4.0	0
Riffle Beetle	6	1	4.0	24
Common Netspinner	155	1	5.0	775
Alderfly	0	0	6.0	0
Watersnipe	2	1	4.0	8
Cranefly	7	1	5.0	35
Other Beetle Larva	0	0	6.0	0
Damselfly	0	0	7.0	0
Dragonfly	1	1	5.0	5
Clams and Mussels	0	0	5.0	0
Crayfish	0	0	6.0	0
Scud	0	0	6.0	0
Sowbug	9	1	7.0	63
Snails	3	1	5.0	15
Blackfly Larva	0	0	7.0	0
Midge Larva	60	1	8.0	480
Other Fly Larva	0	0	8.0	0
Flatworms	0	0	8.0	0
Leeches	0	0	10.0	0
Aquatic Worms	0	0	10.0	0
Water Bugs	0	0	8.0	0
Total # of macroinvertebrates	**278**			**1514**
	Total # of Kinds	**12**	**SOS Index**	27

Indices	Score	% Correlation
% EPT Abundance	64.7	70.5
EPT Richness	9	69.2
% Generally Tolerant	21.6	46.3
% Ephemeroptera	6.5	10.0
Modified Hilsenhoff Index	5.4	64.1
% Dominance	55.8	35.9
Taxa Richness	18	85.7
%Acid Tolerant	1.1	100.0
%Aluminum Floc Tolerant	55.8	44.8
% Chironomidae	21.58	79.2
% 2 Dominant	58.27	65.2
	WVSCI	**72.3**
	Acid SCI	**49.4**

Site Name	**Stream Rating Scale - SCI**			
	Excellent	Good	Marginal	Poor
0	> 85.0	85.0 - 70.0	69.9 - 55.0	< 55.0
Site Code	**Stream Rating Scale - SOS**			
	Excellent	Good	Marginal	Poor
USR	> 22.0	17.0-22.0	11.0-16.0	< 11.0

Appendix C. WVSCI Spreadsheet for USUTSR-2

Biotic Index Calculation Spreadsheet				
	Total count for all samples		Tolerance	MHI Score
Macroinvertebrate Groups	Total #	P/A		
Stonefly	0	0	2.0	0
Mayfly	6	1	3.0	18
Most Caddisflies	2	1	3.0	6
Water Penny	2	1	4.0	8
Fishflies and Hellgrammites	0	0	4.0	0
Riffle Beetle	7	1	4.0	28
Common Netspinner	137	1	5.0	685
Alderfly	0	0	6.0	0
Watersnipe	1	1	4.0	4
Cranefly	10	1	5.0	50
Other Beetle Larva	0	0	6.0	0
Damselfly	0	0	7.0	0
Dragonfly	0	0	5.0	0
Clams and Mussels	0	0	5.0	0
Crayfish	0	0	6.0	0
Scud	0	0	6.0	0
Sowbug	0	0	7.0	0
Snails	0	0	5.0	0
Blackfly Larva	0	0	7.0	0
Midge Larva	5	1	8.0	40
Other Fly Larva	0	0	8.0	0
Flatworms	0	0	8.0	0
Leeches	0	0	10.0	0
Aquatic Worms	0	0	10.0	0
Water Bugs	4	1	8.0	32
Total # of macroinvertebrates	**174**			**871**
	Total # of Kinds	**9**	**SOS Index**	20
Indices	**Score**	**% Correlation**		
% EPT Abundance	83.3	90.7		
EPT Richness	5	38.5		
% Generally Tolerant	2.9	100.0		
% Ephemeroptera	3.4	10.0		
Modified Hilsenhoff Index	5.0	70.3		
% Dominance	78.7	25.4		
Taxa Richness	12	57.1		
%Acid Tolerant	0.0	#DIV/0!		
%Aluminum Floc Tolerant	78.7	31.8		
% Chironomidae	2.87	98.1		
% 2 Dominant	84.48	24.2		
	WVSCI		**63.2**	
	Acid SCI		**46.2**	
Site Name	**Stream Rating Scale - SCI**			
	Excellent	Good	Marginal	Poor
0	> 85.0	85.0 - 70.0	69.9 - 55.0	< 55.0
Site Code	**Stream Rating Scale - SOS**			
	Excellent	Good	Marginal	Poor
USUTSR-2	> 22.0	17.0-22.0	11.0-16.0	< 11.0

Appendix D. WVSCI Spreadsheet for DSR

Biotic Index Calculation Spreadsheet				
	Total count for all samples		Tolerance	MHI Score
Macroinvertebrate Groups	Total #	P/A		
Stonefly	0	0	2.0	0
Mayfly	5	1	3.0	15
Most Caddisflies	0	0	3.0	0
Water Penny	16	1	4.0	64
Fishflies and Hellgrammites	0	0	4.0	0
Riffle Beetle	27	1	4.0	108
Common Netspinner	19	1	5.0	95
Alderfly	0	0	6.0	0
Watersnipe	3	1	4.0	12
Cranefly	12	1	5.0	60
Other Beetle Larva	1	1	6.0	6
Damselfly	6	1	7.0	42
Dragonfly	3	1	5.0	15
Clams and Mussels	0	0	5.0	0
Crayfish	0	0	6.0	0
Scud	0	0	6.0	0
Sowbug	2	1	7.0	14
Snails	6	1	5.0	30
Blackfly Larva	0	0	7.0	0
Midge Larva	0	0	8.0	0
Other Fly Larva	1	1	8.0	8
Flatworms	0	0	8.0	0
Leeches	0	0	10.0	0
Aquatic Worms	9	1	10.0	90
Water Bugs	0	0	8.0	0
Total # of macroinvertebrates	**110**			**559**
	Total # of Kinds	**13**	**SOS Index**	26
Indices	**Score**	**% Correlation**		
% EPT Abundance	21.8	23.7		
EPT Richness	4	30.8		
% Generally Tolerant	9.2	100.0		
% Ephemeroptera	4.5	10.0		
Modified Hilsenhoff Index	5.1	69.3		
% Dominance	24.5	81.5		
Taxa Richness	17	81.0		
%Acid Tolerant	0.0	#DIV/0!		
%Aluminum Floc Tolerant	17.3	100.0		
% Chironomidae	0.00	101.0		
% 2 Dominant	41.82	90.9		
	WVSCI		**66.1**	
	Acid SCI		**60.6**	
Site Name	**Stream Rating Scale - SCI**			
	Excellent	Good	Marginal	Poor
0	> 85.0	85.0 - 70.0	69.9 - 55.0	< 55.0
Site Code	**Stream Rating Scale - SOS**			
	Excellent	Good	Marginal	Poor
DSR	> 22.0	17.0-22.0	11.0-16.0	< 11.0

Attachment B

ACUTE TOXICITY BIOASSAY REPORT

INTERNATIONAL COAL GROUP/
PATRIOT MINING COMPANY

REIC JOB #: 1011L24

CLIENT SAMPLE ID: OUTFALL 001

REI Consultants, Inc. received 1 sample on 11-26-10
for the analyses presented in the following report

ACUTE TOXICITY

BIOASSAY REPORT

Conducted For:
International Coal Group/
Patriot Mining Company
2708 Cranberry Square
Morgantown WV 26508

Conducted By:
REI Consultants, Inc.
1281 Mt View Road
P O Box 789
Cool Ridge WV 25825

Job #: 1011L24

REI CONSULTANTS, INC.
SAMPLE INFORMATION

Client: International Coal Group/Patriot Mining Company
Address: 2708 Cranberry Square
Morgantown WV 26508

REIC Job #: 1011L24

REIC Sample ID #: 1011L24-001

Client Sample ID #: Outfall 001

NPDES Permit #: WV1017535

Sample Type: Grab
Collected: **Date:** 11-26-10 **Time:** 0800

Bioassay Tests Performed: 48-Hr Static Acute Non-Renewal

Test Procedure: EPA Methods Manual 821-R-02-012; October 2002.

Measured Effect: Death or erratic behavior

Test Beginning: **Date:** 11-27-10 **Time:** 1315
Test Ending: **Date:** 11-29-10 **Time:** 1340

Test Organisms: Ceriodaphnia dubia **Age:** <24 Hrs

Dilution Water Used: Moderately Hard Synthetic Freshwater

Last Reference Toxicant Test Date: 11-20-10

Reference Toxicant Used and Resnlts: NaCl, acceptable results

REI CONSULTANTS, INC.
TEST RESULTS

REIC Sample #: 101IL24-001 Client Sample #: Outfall 001

Ceriodaphnia dubia

Statistical Test Method	LC-50	TUA	95% Confidence Limits	Data Qualifiers
None Needed	>100.0	<1.0	100.0 and Infinity	

1 incidental death occurred in the 50.0% test concentration. All test organisms survived in the 100.0%, 25.0%, 12.5% and 6.25% test concentrations and in the control.

Key:
TUA - Toxicity Units – Acute
LC50 - Lethal Concentration to 50% of population

Qualifiers:
P - Initial pH falls outside the range of 6.0 - 9.0
H - 36 Hour Hold Time Exceeded
T - Initial Temperature exceeded 0 - 6° Range

DATE 12-13-10 APPROVED Ed Kirk

Ed J. Kirk
Director-Biological Division

REI CONSULTANTS, INC.
TOXICITY TEST CONDITIONS

REIC Sample #: 1011L24-001
Client Sample ID: Outfall 001

Test Species: Ceriodaphnia dubia
Organism Source: In-house Cultures

Exposure Chamber
Container Type: disp. cups
Total vessel capacity: 50 ml
Test solution volume: 30 ml
Water depth: Constant X
Cyclic ___

Aeration During Test
None: X
Slow: ___
Moderate: ___
Vigorous: ___
Time aeration began: _____

Feeding Schedule
Not fed: ___
Fed daily: ___
Fed prior to test: X

Aeration Prior To Test Initiation
Moderate: X
Minutes: 18

Photoperiod
16Hr/8Hr: X
Other (specify): _____

Place Test Conducted
Environmental Chamber: X

Vessel type and volume used to deliver effluent and diluent to test chambers: 1000 ml volumetric flask and a 500 ml graduated cylinder

Material(s) used to place test organisms into test chambers: large-bore pipets

Condition of surviving organisms at end of test: Healthy

Comments: _____

Concentration (%)	Diluent (mls)	Effluent (mls)	Total (mls)
Control	1000	0	1000
6.25	937.5	62.5	1000
12.5	875	125	1000
25.0	750	250	1000
50.0	500	500	1000
100.0	0	1000	1000

R E I CONSULTANTS, INC. TOXICITY TEST DATA

Client: International Coal Group/Patriot Mining Company | **Test Beginning:** **Date:** 11-27-10 **Time:** 1315

Client Sample ID: Outfall 001 | **Test Ending:** **Date:** 11-29-10 **Time:** 1340

REIC Sample ID: 1011L24-001 | **Dilution Water:** Moderately Hard Synthetic Freshwater

NPDES Permit #: WV1017535 | **Test Organism:** Ceriodaphnia dubia **Age:** <24 Hrs.

Bioassay Test: 48 Hr Static Acute Non Renewal | **Isolation Date:** 11-26-10 **Time:** 1610

Sample Collection Data | **# Replicates:** 4 **# Organisms/Rep:** 5

Sample Volume: 2 Gallon **Sample Type:** Grab | **Effluent** **Dilution Water**

Collected From: **Date:** **Time:** | **Alkalinity** 49.3 **Chlorine** ND **Alkalinity** 58.6

Collected To: **Date:** 11-26-10 **Time:** 0800 | **Hardness** 896 **Dechlorinated** NA **Hardness** 83.5

Test Concentration (%)	Number of Live Organisms			Dissolved Oxygen (mg/l)			pH (SU)			Conductivity (μmhos)			Test Temperature (°C)		
	0Hrs	24Hrs	48Hrs	0Hrs	24Hrs	48Hrs	0Hrs	24Hrs	48Hrs	0Hrs	24Hrs	48Hrs	0Hrs	24Hrs	48Hrs
Control A	5	5	5	7.3	7.5	7.1	8.08	8.17	8.25	348		440	24.7	24.0	24.0
Control B	5	5	5												
Control C	5	5	5												
Control D	5	5	5												
6.25 A	5	5	5	7.4	7.7	7.3	8.05	8.24	8.29	458		548	24.9	24.0	24.0
6.25 B	5	5	5												
6.25 C	5	5	5												
6.25 D	5	5	5												
12.5 A	5	5	5	7.3	7.7	7.3	8.01	8.21	8.27	567		646	25.2	24.1	24.2
12.5 B	5	5	5												
12.5 C	5	5	5												
12.5 D	5	5	5												
25.0 A	5	5	5	7.4	7.7	7.2	7.99	8.21	8.24	780		885	25.6	24.2	24.3
25.0 B	5	5	5												
25.0 C	5	5	5												
25.0 D	5	5	5												
50.0 A	5	5	5	7.3	7.7	7.0	7.94	8.15	8.17	1154		1257	25.6	24.1	24.9
50.0 B	5	5	4												
50.0 C	5	5	5												
50.0 D	5	5	5												
100.0 A	5	5	5	7.3	7.7	7.0	7.87	8.09	8.10	1829		1957	25.7	24.1	24.9
100.0 B	5	5	5												
100.0 C	5	5	5												
100.0 D	5	5	5												
Initials	TW	TW	TW												
Time	1315	1300	1340												
Comments:															

TABLE 3. Chemical water quality from toxicity testing samples collected at Outfall 001. November 2010.

	SAMPLING STATION
	Outfall 001
PARAMETER	11/26/10
Alkalinity (mg/l)	47.0
Conductivity (umhos/cm)	1,540
Sulfate (mg/l)	162
TDS (mg/l)	1,310

Key:
TDS – Total Dissolved Solids

REIC
RESEARCH ENVIRONMENTAL & INDUSTRIAL CONSULTANTS, INC.

225 Industrial Park Rd.
Post Office Box 286
Beaver, WV 25813
800.999.0105
304.255.2500 • 304.255.2772 (fax)
website: www.reiclabs.com

TOXICITY TESTING
Chain Of Custody

This section to be completed by person collecting sample

Client's Name: Eckhart Mining Company Purchase Order #: _____
Mailing Address: 2708 Cranberry Square Morgantown, WV 26508
Contact Person: Ron Henrie Title: Manager Technical Services
Phone #: 304-594-4249 E-mail Address: chemric@intgate.com
Sampler's Name: Danny Sagel Title: Environmental Tech
Sample Source: New Hill Pond 001
NPDES Permit #: _____ Outfall #: _____
Receiving Stream: Scotts Run
Sample Appearance/Odor: Cloudy
From where and how was sample collected: outfall - grab sample
Flow: 1.1 gpm Number of Samples: 2 Interval: _____

Sample Type

(Grab:) (Collected:) Date: 11/26/10 Time: 8:00 AM

Composite: Collected From: Date: _____ Time: _____
Collected To: Date: _____ Time: _____

Please indicate Test Type and Test Species

Test Type

✓ Acute
✓ Chronic
___ Screen

Test Species

___ Pimephales promelas (Fathead Minnow)
___ Ceriodaphnia dubia
___ Daphnia magna
___ Daphnia pulex

Sample Field Readings

Temp.: 8.3 °C pH: 7.65 Cond.: 1608 D.O.: _____ Chlorine: _____
Ice Remaining: _____ Ice/Water Temperature: _____
Initials: _____ Date/Time: _____ Rain Event: _____
Volume collected: _____ Container Type: _____
Is the sample Chlorinated: _____ Dechlorinated: _____
Dechlorination Method: _____ Should REIC Dechlorinate sample?: _____
Date and Method of shipment to REIC: _____
Relinquished By: _____ Received By: _____
Relinquished By: _____ Received By: _____

For REIC Use Only

Sample ID #: _____ Received By: T. Burgess
Date and Time: 11/27/10
Sample Appearance on Arrival: Cloudy
Temp.: 4.0 pH: 7.14 Cond.: 1659 D.O.: 9.6 Chlorine: 0.0 Odor: None
Sample storage during shipment: Refrigerator

Attachment C

CHRONIC TOXICITY BIOASSAY REPORT

INTERNATIONAL COAL GROUP/
PATRIOT MINING COMPANY

REIC JOB #: 1011L24

CLIENT SAMPLE ID: OUTFALL 001

REI Consultants, Inc. received 1 sample on 11-22-10, 11-24-10 and 11-26-10 for the analyses presented in the following report

CHRONIC TOXICITY

BIOASSAY REPORT

Conducted For:
International Coal Group/
Patriot Mining Company
2708 Cranberry Square
Morgantown WV 26508

Conducted By:
REI Consultants, Inc.
1281 Mt View Road
P O Box 789
Cool Ridge WV 25825

Job #: 1011L24

REI CONSULTANTS, INC.
SAMPLE INFORMATION

Client: International Coal Group/Patriot Mining Company
Address: 2708 Cranberry Square
Morgantown WV 26508

REIC Job #: 1011L24

REIC Sample ID #: 1011L24-001

Client Sample ID #: Outfall 001

Sample Type: Grab

Collected From:	**Dates:**	**Times:**
	11-22-10	1200
	11-24-10	0736
	11-26-10	0800

Bioassay Tests Performed: 6-8 Day 3 brood water flea (*Ceriodaphnia dubia*) survival and reproduction test Method 1002.0.

Test Procedure: EPA Methods Manual 821-R-02-013; October 2002

Measured Effects: Death and/or reduced reproduction in *Ceriodaphnia dubia*.

Dilution Water Used: *Ceriodaphnia dubia* – Dilute Mineral Water

Test Beginning: Date: 11-23-10 **Time:** 1335

Test Euding: Date: 12-01-10 **Time:** 1215

REI CONSULTANTS, INC.
TEST INFORMATION

Type of Test Chambers Used:
Ceriodaphnia dubia - Disposable 50 milliliter polyethylene cups.

Number of Replicate Test Chambers per Treatment:
Ceriodaphnia dubia - 10

Volume of Test Solution Used per Chamber:
Ceriodaphnia dubia - 30 milliliters

Number of Organisms per Test Chamber:
Ceriodaphnia dubia - 1

Location Where Tests Were Conducted: Environmental chamber

Photoperiod: 16 Hrs. Light / 8 Hrs. Dark

Filtration: Sample filtered through a 60 micron screen

Test Temperature Range: 24.5 - 25.5°C

Test Organisms Used and Age: *Ceriodaphnia dubia* Age: 16 - 24 Hrs.

Source of Test Organisms: REI Consultants, Inc. in-house cultures.

Diseases/Treatments: None

Standard Reference Toxicant Used and Source:
NaCl, 99.6% J.T.Baker, Inc., Phillipsburg, N.J.

Date of Most Recent Reference Toxicant Test: 11-23-10

Reference Toxicant Test Results: *Ceriodaphnia dubia* = Acceptable

REI CONSULTANTS, INC.
TEST RESULTS

Ceriodaphnia dubia

Survival Data:		Statistical Test Method:	Data Qualifiers:
LC50	>100.0	None Needed	
NOEC	100.0	Fisher's Exact test	
LOEC	>100.0	Fisher's Exact test	
TUC	0.0		

Reproduction Data:		Statistical Test Method:	Data Qualifiers:
NOEC	100.0	Steel's Many One Rank test	
LOEC	>100.0	Steel's Many One Rank test	
IC25	>100.0	Linear Interpolation Method	
TUC	0.0		
PMSD	34.05		

Key:
LC50 - Lethal Concentration to 50% of population
NOEC - No Observable Effect Concentration
LOEC - Lowest Observable Effect Concentration
TUC - Toxicity Units Chronic
IC25 - 25% Inhibition Concentration
PMSD - Percent Minimum Significant Difference

Qualifiers:
P - Initial pH falls outside the range of 6.0 – 9.0
H - 36 Hour Hold Time Exceeded
T - Initial Temperature exceeded 0 – 6° Range

DATE 12-13-10 APPROVED Ed Kirk

Ed J. Kirk
Director-Biological Division

REI CONSULTANTS, INC.

TABLE 1. Survival and reproduction data form for *Ceriodaphnia dubia* survival and reproduction test.

Client: International Coal Group/Patriot Mining Company
REIC Sample ID: 1011L24-001
Client Sample ID: Outfall 001
Randomization Template #: 4

Test Beginning Date and Time: 11-23-10/1335
Test Ending Date and Time: 12-01-10/1215
Analysts: ML/JB/DL/PL/TW/GF/SB/TB/EP

Control Concentration														
	Replicate Number													
Day/Analyst	1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Percent Survival	Young/ Adults
1 / TB	+	+	+	+	+	+	+	+	+	+	0	10	100	0.0
2 / TB	+	+	+	+	+	+	+	+	+	+	0	10	100	0.0
3 / DL	+	+	+	+	+	+	+	+	+	+	0	10	100	0.0
4 / TW	+	+	+	+	+	3	2	4	+	2	11	10	100	1.1
5 / DL	+	5	4	4	3	+	+	+	3	S 8	27	10	100	2.7
6 / DL	8	+	+	+	+	S 3	8	7	+	S 7	33	10	100	3.3
7 / DL	10	+	12	11	5	S 13	10	13	8	+	82	10	100	8.2
8 /	3	16	18	+	8	11	* 12	* 13	11	10	77	10	100	7.7
Totals	**21**	**21**	**34**	**15**	**16**	**30**	**20**	**24**	**22**	**27**	**230**	**10**	**100**	**23.0**

6.25 % Concentration														
	Replicate Number													
Day/Analyst	1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Percent Survival	Young/ Adults
1 / TB	+	+	+	+	+	+	+	+	+	+	0	10	100	0.0
2 / TB	X	+	+	+	+	+	+	+	+	+	0	10	90	0.0
3 / DL		+	+	+	+	+	+	+	+	+	0	9	90	0.0
4 / TW		4	5	3	+	3	4	4	+	2	25	9	90	2.8
5 / DL		6	+	+	8	+	+	+	6	5	25	9	90	2.8
6 / DL		+	+	+	+	S 2	6	7	+	+	15	9	90	1.7
7 / DL		+	12	7	4	S 13	12	13	+	S 4	65	9	90	7.2
8 /		2	16	+	7	14	* 11	* 16	10	S 16	65	9	90	7.2
Totals	**0**	12	33	10	19	32	22	24	16	27	**195**	**10**	**90**	**19.5**

+ - alive
X - dead
S - split brood
* - 4th brood neonates not included

REI CONSULTANTS, INC.

TABLE 1. Survival and reproduction data form for *Ceriodaphnia dubia* survival and reproduction test. (Continued)

Client: International Coal Group/Patriot Mining Company
REIC Sample ID: 1011L24-001
Client Sample ID: Outfall 001
Randomization Template #: 4

Test Beginning Date and Time: 11-23-10/1335
Test Ending Date and Time: 12-01-10/1215
Analysts: ML/JB/DL/PL/TW/GF/SB/TB/EP

12.5 % Concentration														
	Replicate Number													
Day/Analyst	1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Percent Survival	Young/ Adults
1 / TB	+	+	+	+	+	+	+	+	+	+	0	10	100	0.0
2 / TB	+	+	+	+	+	+	+	+	+	+	0	10	100	0.0
3 / DL	+	+	+	+	+	+	+	+	+	+	0	10	100	0.0
4 / TW	+	4	5	2	+	3	4	4	+	2	24	10	100	2.4
5 / DL	+	8	+	+	3	+	+	+	7	8	26	10	100	2.6
6 / DL	3	+	+	+	+	8	10	7	+	+	28	10	100	2.8
7 / DL	10	+	6	10	+	15	13	12	13	+	79	10	100	7.9
8 /	2	12	22	12	11	* 14	* 15	* 13	22	13	94	10	100	9.4
Totals	**15**	**24**	**33**	**24**	**14**	**26**	**27**	**23**	**42**	**23**	**251**	**10**	**100**	**25.1**

25.0 % Concentration														
	Replicate Number													
Day/Analyst	1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Percent Survival	Young/ Adults
1 / TB	+	+	+	+	+	+	+	+	+	+	0	10	100	0.0
2 / TB	+	+	+	+	+	+	+	+	+	+	0	10	100	0.0
3 / DL	+	+	+	+	+	+	+	+	+	+	0	10	100	0.0
4 / TW	3	4	5	3	4	4	4	5	3	5	40	10	100	4.0
5 / DL	+	9	4	+	S 6	+	+	+	+	9	28	10	100	2.8
6 / DL	8	8	+	10	S 1	S 4	7	6	8	10	62	10	100	6.2
7 / DL	14	+	15	10	+	S 15	11	14	15	+	94	10	100	9.4
8 /	* 14	* 11	* 29	* 20	19	9	* 18	* 21	* 23	* 20	28	10	100	2.8
Totals	**25**	**21**	**24**	**23**	**30**	**32**	**22**	**25**	**26**	**24**	**252**	**10**	**100**	**25.2**

+ - alive
S - split brood
* - 4th brood neonates not included

REI CONSULTANTS, INC.

TABLE 1. Survival and reproduction data form for *Ceriodaphnia dubia* survival and reproduction test. (Continued)

Client: International Coal Group/Patriot Mining Company
REIC Sample ID: 1011L24-001
Client Sample ID: Outfall 001
Randomization Template #: 4

Test Beginning Date and Time: 11-23-10/1335
Test Ending Date and Time: 12-01-10/1215
Analysts: ML/JB/DL/PL/TW/GF/SB/TB/EP

50.0 % Concentration														
	Replicate Number													
Day/Analyst	1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Percent Survival	Young/ Adults
1 / TB	+	+	+	+	+	+	+	+	+	+	0	10	100	0.0
2 / TB	+	+	+	+	+	+	+	+	+	+	0	10	100	0.0
3 / DL	+	+	+	+	+	+	+	+	+	+	0	10	100	0.0
4 / TW	3	4	6	4	4	5	6	3	5	3	43	10	100	4.3
5 / DL	+	10	11	+	10	+	X 7	+	11	9	58	10	90	5.8
6 / DL	6	15	8	8	11	9		6	+	14	77	9	90	8.6
7 / DL	S 4	+	+	22	+	14		18	16	+	74	9	90	8.2
8 /	S 7	* 14	* 26	+	* 20	* 18		* 18	* 18	* 18	7	9	90	0.8
Totals	**20**	**29**	**25**	**34**	**25**	**28**	**13**	**27**	**32**	**26**	**259**	**10**	**90**	**25.9**

100.0 % Concentration														
	Replicate Number													
Day/Analyst	1	2	3	4	5	6	7	8	9	10	No. of Young	No. of Adults	Percent Survival	Young/ Adults
1 / TB	+	+	+	+	+	+	+	+	+	+	0	10	100	0.0
2 / TB	+	+	+	+	+	+	+	+	+	+	0	10	100	0.0
3 / DL	+	4	+	+	+	+	+	+	+	+	4	10	100	0.4
4 / TW	2	+	5	5	X 4	3	6	5	3	4	37	10	90	3.7
5 / DL	+	10	12	+		+	+	+	S 12	S 10	44	9	90	4.9
6 / DL	7	15	20	9		11	11	7	S 4	S 6	90	9	90	10.0
7 / DL	13	*S 8	+	15		15	14	S 13	+	+	70	9	90	7.8
8 /	* 12	*S 5	* 17	* 19		* 12	* 15	S 8	17	12	37	9	90	4.1
Totals	**22**	**29**	**37**	**29**	**4**	**29**	**31**	**33**	**36**	**32**	**282**	**10**	**90**	**28.2**

+ - alive
X - dead
S - split brood
* - 4th brood neonates not included

REI CONSULTANTS, INC.

TABLE 2. Chemical and physical data form for *Ceriodaphnia dubia* survival and reproduction test.

Client: International Coal Group/Patriot Mining Company
REIC Sample ID: 1011L24-001
Client Sample ID: Outfall 001
Test Beginning Date and Time: 11-23-10/1335
Test Ending Date and Time: 12-01-10/1215
Analysts: ML/JB/DL/PL/TW/GF/SB/TB/EP

Control Concentration								
Day	1	2	3	4	5	6	7	Remarks
Temperature (°C)	24.6	24.5	24.8	24.6	24.5	24.1	24.5	
DO Initial	7.2	7.7	7.3	7.2	7.2	7.7	7.1	
DO Final	6.4	6.7	7.3	7.0	7.4	7.0	7.0	
pH Initial	8.05	8.11	8.26	8.28	8.23	8.29	8.16	
pH Final	7.82	7.95	8.12	8.26	8.05	8.25	8.37	
Conductivity (us)	209	205	208	206	211	215	210	
Chlorine (mg/l)	ND	ND	ND	ND	ND	ND	ND	
Alkalinity (mg/l)	68.3	72.1	79.0	68.8	79.0	67.4	66.5	
Hardness (mg/l)	90.6	85.0	87.2	81.9	87.2	83.6	83.1	
Time	1335	1330	1135	1130	1200	1310	1215	
Initials	SB	TB	EP	EP	TW	TW	TB	

6.25 % Concentration								
Day	1	2	3	4	5	6	7	Remarks
Temperature (°C)	24.9	24.6	24.8	24.8	24.7	24.0	24.4	
DO Initial	7.1	7.7	7.2	7.3	7.2	7.8	7.1	
DO Final	6.0	6.8	7.2	7.1	7.3	7.1	7.1	
pH Initial	8.01	8.09	8.24	8.25	8.20	8.24	8.16	
pH Final	7.75	7.98	8.09	8.28	8.02	8.26	8.46	
Conductivity (us)	338	319	323	334	332	330	321	
Chlorine (mg/l)	ND	ND	ND	ND	ND	ND	ND	

12.5 % Concentration								
Day	1	2	3	4	5	6	7	Remarks
Temperature (°C)	25.4	24.5	24.8	24.8	24.8	24.3	24.6	
DO Initial	7.1	7.5	7.2	7.3	7.2	7.8	7.2	
DO Final	6.1	6.8	7.1	7.1	7.3	7.0	7.1	
pH Initial	7.98	8.04	8.19	8.21	8.15	8.20	8.10	
pH Final	7.77	7.94	8.07	8.26	8.03	8.26	8.41	
Conductivity (us)	473	457	454	467	451	458	453	
Chlorine (mg/l)	ND	ND	ND	ND	ND	ND	ND	

REI CONSULTANTS, INC.

TABLE 2. Chemical and physical data form for *Ceriodaphnia dubia* survival and reproduction test. (Continued)

Client: International Coal Group/Patriot Mining Company
REIC Sample ID: 1011L24-001
Client Sample ID: Outfall 001
Test Beginning Date and Time: 11-23-10/1335
Test Ending Date and Time: 12-01-10/1215
Analysts: ML/JB/DL/PL/TW/GF/SB/TB/EP

25.0 % Concentration								
Day	1	2	3	4	5	6	7	Remarks
Temperature (°C)	25.5	24.6	24.9	24.6	25.1	24.3	24.8	
DO Initial	7.1	7.4	7.1	7.3	7.2	7.8	7.2	
DO Final	6.3	6.8	7.0	7.2	7.3	7.0	6.8	
pH Initial	7.93	8.01	8.13	8.16	8.08	8.14	8.01	
pH Final	7.80	7.91	8.03	8.25	8.03	8.21	8.26	
Conductivity (us)	716	715	713	716	680	685	659	
Chlorine (mg/l)	ND	ND	ND	ND	ND	ND	ND	

50.0 % Concentration								
Day	1	2	3	4	5	6	7	Remarks
Temperature (°C)	25.2	24.7	25.0	25.0	25.5	24.1	24.8	
DO Initial	7.2	7.5	7.1	7.4	7.2	7.8	7.5	
DO Final	6.6	6.8	7.0	7.1	7.3	7.0	6.7	
pH Initial	7.85	7.96	8.06	8.07	8.01	8.07	7.92	
pH Final	7.80	7.87	7.96	8.19	7.99	8.17	8.14	
Conductivity (us)	1157	1159	1144	1142	1094	1097	1072	
Chlorine (mg/l)	ND	ND	ND	ND	ND	ND	ND	

100.0 % Concentration								
Day	1	2	3	4	5	6	7	Remarks
Temperature (°C)	24.6	24.7	25.0	24.8	25.5	24.2	24.8	
DO Initial	7.2	7.7	7.1	7.6	7.3	7.9	7.7	
DO Final	6.6	6.8	7.0	6.9	7.3	6.9	7.2	
pH Initial	7.72	7.85	7.93	7.93	7.88	7.94	7.78	
pH Final	7.68	7.74	7.80	8.06	7.88	7.95	7.57	
Conductivity (us)	1924	1942	1931	1946	1834	1817	1794	
Chlorine (mg/l)	ND	ND	ND	ND	ND	ND	ND	
Alkalinity (mg/l)	42.2		44.1		49.3			
Hardness (mg/l)	953		983		896			
Time	1335	1330	1135	1130	1200	1310	1215	
Initials	SB	TB	EP	EP	TW	TW	TB	

TABLE 3. Chemical water quality from toxicity testing samples collected at Outfall 001. November 2010.

	SAMPLING STATION		
	Outfall 001		
PARAMETER	11/22/10	11/24/10	11/26/10
Acidity (mg/l)	NR	4.1	NR
Alkalinity (mg/l)	43.8	42.2	47.0
Total Hardness (mg/l)	NR	969	NR
Conductivity (umhos/cm)	1,780	1,880	1,540
pH (SU)	NR	7.45	NR
Nitrate/Nitrite (mg/l)	NR	<0.030	NR
Chloride (mg/l)	NR	7.62	NR
Sulfate (mg/l)	919	935	162
TSS (mg/l)	NR	5	NR
TDS (mg/l)	1,450	1,450	1,310
Total Phosphorus (mg/l)	NR	<0.040	NR
Dissolved Aluminum (mg/l)	NR	<0.0130	NR
Total Aluminum (mg/l)	NR	0.018	NR
Calcium (mg/l)	NR	324	NR
Copper (mg/l)	NR	0.0022	NR
Dissolved Iron (mg/l)	NR	<0.0100	NR
Total Iron (mg/l)	NR	0.059	NR
Lead (mg/l)	NR	<0.00020	NR
Dissolved Manganese (mg/l)	NR	0.004	NR
Total Manganese (mg/l)	NR	0.008	NR
Magnesium (mg/l)	NR	39.0	NR
Mercury (mg/l)	NR	<0.00010	NR
Nickel (mg/l)	NR	0.0037	NR
Potassium (mg/l)	NR	40.2	NR
Selenium (mg/l)	NR	0.0024	NR
Sodium (mg/l)	NR	23.3	NR
Zinc (mg/l)	NR	0.0047	NR

Key:
NR – Not Requested
TDS – Total Dissolved Solids
TSS – Total Suspended Solids

REIC
RESEARCH ENVIRONMENTAL & INDUSTRIAL CONSULTANTS, INC.

225 Industrial Park Rd.
Post Office Box 286
Beaver, WV 25813
800.999.0105
304.255.2500 • 304.255.2572 (fax)
website: www.reiclabs.com

TOXICITY TESTING
Chain Of Custody

This section to be completed by person collecting sample

Member:
American Chemical Society
Association of Official Analytical Chemists
Petroleum Marketers Association
Rural Water Association
Mining & Reclamation Association
American Water Works Association
The Solid Waste Association of North America
West Virginia Manufacturers Association
Association of West Virginia Solid Waste Authorities
West Virginia Oil Marketers & Grocers Association

Client's Name: Patriot Mining Company Purchase Order #: _____
Mailing Address: 2208 Cranberry Square Morgantown WV 26508
Contact Person: Ron Hamric Title: Manager Technical Services
Phone #: 304-594-4248 E-mail Address: rhamric@intheal.com
Sampler's Name: Danny Sager Title: Environmental tech.
Sample Source: New Hill Pond 001
NPDES Permit #: _____ Outfall #: 001
Receiving Stream: Scotts Run
Sample Appearance/Odor: Clear - No odor
From where and how was sample collected: Out fall - grab sample
Flow: .75 gpm Number of Samples: 1 Interval: _____

Sample Type

Grab: Collected: Date: 11-22-10 Time: 12 PM

Composite: Collected From: Date: _____ Time: _____
Collected To: Date: _____ Time: _____

Please indicate Test Type and Test Species

Test Type

✓ Acute
✓ Chronic
___ Screen

Test Species

___ Pimephales promelas (Fathead Minnow)
___ Ceriodaphnia dubia
___ Daphnia magna
___ Daphnia pulex

Sample Field Readings

Temp.: 10.1 °C pH: 7.63 Cond.: 1731 D.O.: _____ Chlorine: _____
Ice Remaining: _____ Ice/Water Temperature: _____
Initials: _____ Date/Time: _____ Rain Event: _____
Volume collected: _____ Container Type: _____
Is the sample Chlorinated: _____ Dechlorinated: _____
Dechlorination Method: _____ Should REIC Dechlorinate sample?: _____
Date and Method of shipment to REIC: Overnight Mail
Relinquished By: _____ Received By: _____
Relinquished By: _____ Received By: _____

For REIC Use Only

Sample ID #: _____ Received By: TW
Date and Time: 11-23-10
Sample Appearance on Arrival: Clear
Temp.: 3° pH: 7.06 Cond.: 1826 D.O.: 11.0 Chlorine: 0.00 Odor: ND
Sample storage during shipment: In Cooler On Ice

REIC
RESEARCH ENVIRONMENTAL & INDUSTRIAL CONSULTANTS, INC.
225 Industrial Park Rd.
Post Office Box 286
Beaver, WV 25813
800.999.0105
304.255.2500 • 304.255.2572 (fax)
website: www.reiclabs.com

Sample

TOXICITY TESTING
Chain Of Custody

This section to be completed by person collecting sample

Client's Name: Patriot Mining Company Purchase Order #: _____
Mailing Address: 2708 Cranberry Square Morgantown WV 26508
Contact Person: Ron Harris Title: Manager Technical Services
Phone #: 304-594-4298 E-mail Address: rharris@intlcoal.com
Sampler's Name: Danny Sager Title: Environmental Tech.
Sample Source: New Hill Pond Coal
NPDES Permit #: _____ Outfall #: Coal
Receiving Stream: Scotts Run
Sample Appearance/Odor: Clear - no odor
From where and how was sample collected: out fall - grab sample
Flow: 0.79gpm Number of Samples: 1 Interval: _____

Sample Type 24

(Grab:) (Collected:) Date: 11-22-10 Time: 7:36 AM

Composite: Collected From: Date: _____ Time: _____
Collected To: Date: _____ Time: _____

Please indicate Test Type and Test Species

Test Type

- ✓ Acute
- ✓ Chronic
- ___ Screen

Test Species

- ___ Pimephales promelas (Fathead Minnow)
- ___ Ceriodaphnia dubia
- ___ Daphnia magna
- ___ Daphnia pulex

Sample Field Readings

Temp.: 7.2°C pH: 7.61 Cond.: 1750 D.O.: _____ Chlorine: _____
Ice Remaining: _____ Ice/Water Temperature: _____
Initials: _____ Date/Time: _____ Rain Event: _____
Volume collected: _____ Container Type: _____
Is the sample Chlorinated: _____ Dechlorinated: _____
Dechlorination Method: _____ Should REIC Dechlorinate sample?: _____
Date and Method of shipment to REIC: Hand Delivered
Relinquished By: Rose Cook Received By: [illegible]
Relinquished By: _____ Received By: _____

For REIC Use Only

Sample ID #: _____ Received By: DK
Date and Time: 11-25-10 1240
Sample Appearance on Arrival: _____
Temp.: _____ pH: 7.84 Cond.: 1980 D.O.: 10.3 Chlorine: _____ Odor: NO
Sample storage during shipment: 80 To 5° Cooler

REIC
RESEARCH ENVIRONMENTAL & INDUSTRIAL CONSULTANTS, INC.

225 Industrial Park Rd.
Post Office Box 286
Beaver, WV 25813
800.999.0105
304.255.2500 • 304.255.2572 (fax)
website: www.reiclabs.com

TOXICITY TESTING
Chain Of Custody

This section to be completed by person collecting sample

Client's Name: Patriot Mining Company Purchase Order #: _____
Mailing Address: 2708 Cranberry Square Morgantown, WV 26508
Contact Person: Ron Henric Title: Manager Technical Services
Phone #: 304-594-9298 E-mail Address: rhenric@atlticel.com
Sampler's Name: Danny Sagel Title: Environmental Tech
Sample Source: New Hill Pond 001
NPDES Permit #: _____ Outfall #: _____
Receiving Stream: Scotts Run
Sample Appearance/Odor: Cloudy
From where and how was sample collected: outfall - grab sample
Flow: 1.1 gpm Number of Samples: 2 Interval: _____

Sample Type

(Grab:) (Collected: Date: 11/26/10 Time: 8:00 AM

Composite: Collected From: Date: _____ Time: _____
Collected To: Date: _____ Time: _____

Please indicate Test Type and Test Species

Test Type

- ✓ Acute
- ___ Chronic
- ___ Screen

Test Species

- ___ Pimephales promelas (Fathead Minnow)
- ___ Ceriodaphnia dubia
- ___ Daphnia magna
- ___ Daphnia pulex

Sample Field Readings

Temp.: 8.1°C pH: 7.65 Cond.: 1608 D.O.: _____ Chlorine: _____
Ice Remaining: _____ Ice/Water Temperature: _____
Initials: _____ Date/Time: _____ Rain Event: _____
Volume collected: _____ Container Type: _____
Is the sample Chlorinated: _____ Dechlorinated: _____
Dechlorination Method: _____ Should REIC Dechlorinate sample?: _____
Date and Method of shipment to REIC: _____
Relinquished By: _____ Received By: _____
Relinquished By: _____ Received By: _____

For REIC Use Only

Sample ID #: _____ Received By: T. Burgess
Date and Time: 11/27/10
Sample Appearance on Arrival: Cloudy
Temp.: 4°C pH: 7.64 Cond.: 1659 D.O.: 9.6 Chlorine: 0.0 Odor: None
Sample storage during shipment: In Coolers on ice

Fisher's Exact Test

IDENTIFICATION	NUMBER OF ALIVE	DEAD	TOTAL ANIMALS
CONTROL	10	0	10
6.25	9	1	10
TOTAL	19	1	20

Critical Fisher's value (10,10,10) (alpha=0.05) is 6.0. b value is 9.
Since b is greater than 6.0 there is no significant difference
between CONTROL and TREATMENT at the 0.05 level.

Fisher's Exact Test

IDENTIFICATION	NUMBER OF ALIVE	DEAD	TOTAL ANIMALS
CONTROL	10	0	10
12.5	10	0	10
TOTAL	20	0	20

Critical Fisher's value (10,10,10) (alpha=0.05) is 6.0. b value is 10.
Since b is greater than 6.0 there is no significant difference
between CONTROL and TREATMENT at the 0.05 level.

Fisher's Exact Test

IDENTIFICATION	NUMBER OF ALIVE	DEAD	TOTAL ANIMALS
CONTROL	10	0	10
25.0	10	0	10

TOTAL	20	0	20

Critical Fisher's value (10,10,10) (alpha=0.05) is 6.0. b value is 10.
Since b is greater than 6.0 there is no significant difference
between CONTROL and TREATMENT at the 0.05 level.

Fisher's Exact Test

	NUMBER OF		
IDENTIFICATION	ALIVE	DEAD	TOTAL ANIMALS
CONTROL	10	0	10
50.0	9	1	10
TOTAL	19	1	20

Critical Fisher's value (10,10,10) (alpha=0.05) is 6.0. b value is 9.
Since b is greater than 6.0 there is no significant difference
between CONTROL and TREATMENT at the 0.05 level.

Fisher's Exact Test

	NUMBER OF		
IDENTIFICATION	ALIVE	DEAD	TOTAL ANIMALS
CONTROL	10	0	10
100.0	9	1	10
TOTAL	19	1	20

Critical Fisher's value (10,10,10) (alpha=0.05) is 6.0. b value is 9.
Since b is greater than 6.0 there is no significant difference
between CONTROL and TREATMENT at the 0.05 level.

Summary of Fisher's Exact Tests

GROUP	IDENTIFICATION	NUMBER EXPOSED	NUMBER DEAD	SIG 0.05
	CONTROL	10	0	
1	6.25	10	1	
2	12.5	10	0	
3	25.0	10	0	
4	50.0	10	1	
5	100.0	10	1	

Title: ICG 001
File: icg01 Transform: NO TRANSFORMATION
Number of Groups: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	control	1	10.0000	10.0000
1	control	2	0.0000	0.0000
2	6.25	1	10.0000	10.0000
2	6.25	2	1.0000	1.0000
3	12.5	1	10.0000	10.0000
3	12.5	2	0.0000	0.0000
4	25.0	1	10.0000	10.0000
4	25.0	2	0.0000	0.0000
5	50.0	1	10.0000	10.0000
5	50.0	2	1.0000	1.0000
6	100.0	1	10.0000	10.0000
6	100.0	2	1.0000	1.0000

Title: ICG 001
File: icg01 Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	control	2	0.0000	10.0000	5.0000
2	6.25	2	1.0000	10.0000	5.5000
3	12.5	2	0.0000	10.0000	5.0000
4	25.0	2	0.0000	10.0000	5.0000
5	50.0	2	1.0000	10.0000	5.5000
6	100.0	2	1.0000	10.0000	5.5000

Title: ICG 001
File: icg01 Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	control	50.0000	7.0711	5.0000	141.4214
2	6.25	40.5000	6.3640	4.5000	115.7084
3	12.5	50.0000	7.0711	5.0000	141.4214
4	25.0	50.0000	7.0711	5.0000	141.4214
5	50.0	40.5000	6.3640	4.5000	115.7084
6	100.0	40.5000	6.3640	4.5000	115.7084

Title: ICG 001
File: icg001cr Transform: NO TRANSFORMATION

Shapiro - Wilk's Test for Normality

******** Shapiro - Wilk's Test is aborted ********

This test can not be performed because total number of replicates is greater than 50.

Total number of replicates = 60

Title: ICG 001
File: icg001cr Transform: NO TRANSFORMATION

Bartlett's Test for Homogeneity of Variance

Calculated B1 statistic = 11.6991 (p-value = 0.0392)

Data PASS B1 homogeneity test at 0.01 level. Continue analysis.

Critical B = 15.0863 (alpha = 0.01, df = 5)
= 11.0705 (alpha = 0.05, df = 5)

Title: ICG 001
File: icg001cr Transform: NO TRANSFORMATION
Number of Groups: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	control	1	21.0000	21.0000
1	control	2	21.0000	21.0000
1	control	3	34.0000	34.0000
1	control	4	15.0000	15.0000
1	control	5	16.0000	16.0000
1	control	6	30.0000	30.0000
1	control	7	20.0000	20.0000
1	control	8	24.0000	24.0000
1	control	9	22.0000	22.0000
1	control	10	27.0000	27.0000
2	6.25	1	0.0000	0.0000
2	6.25	2	12.0000	12.0000
2	6.25	3	33.0000	33.0000
2	6.25	4	10.0000	10.0000
2	6.25	5	19.0000	19.0000
2	6.25	6	32.0000	32.0000
2	6.25	7	22.0000	22.0000
2	6.25	8	24.0000	24.0000
2	6.25	9	16.0000	16.0000
2	6.25	10	27.0000	27.0000
3	12.5	1	15.0000	15.0000
3	12.5	2	24.0000	24.0000
3	12.5	3	33.0000	33.0000
3	12.5	4	24.0000	24.0000
3	12.5	5	14.0000	14.0000
3	12.5	6	26.0000	26.0000
3	12.5	7	27.0000	27.0000
3	12.5	8	23.0000	23.0000
3	12.5	9	42.0000	42.0000
3	12.5	10	23.0000	23.0000
4	25.0	1	25.0000	25.0000
4	25.0	2	21.0000	21.0000
4	25.0	3	24.0000	24.0000
4	25.0	4	23.0000	23.0000
4	25.0	5	30.0000	30.0000
4	25.0	6	32.0000	32.0000
4	25.0	7	22.0000	22.0000
4	25.0	8	25.0000	25.0000
4	25.0	9	26.0000	26.0000
4	25.0	10	24.0000	24.0000
5	50.0	1	20.0000	20.0000
5	50.0	2	29.0000	29.0000
5	50.0	3	25.0000	25.0000
5	50.0	4	34.0000	34.0000
5	50.0	5	25.0000	25.0000
5	50.0	6	28.0000	28.0000
5	50.0	7	13.0000	13.0000
5	50.0	8	27.0000	27.0000
5	50.0	9	32.0000	32.0000

5	50.0	10	26.0000	26.0000
6	100.0	1	22.0000	22.0000
6	100.0	2	29.0000	29.0000
6	100.0	3	37.0000	37.0000
6	100.0	4	29.0000	29.0000
6	100.0	5	4.0000	4.0000
6	100.0	6	29.0000	29.0000
6	100.0	7	31.0000	31.0000
6	100.0	8	33.0000	33.0000
6	100.0	9	36.0000	36.0000
6	100.0	10	32.0000	32.0000

Title: ICG 001
File: icg001cr Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	control	10	15.0000	34.0000	23.0000
2	6.25	10	0.0000	33.0000	19.5000
3	12.5	10	14.0000	42.0000	25.1000
4	25.0	10	21.0000	32.0000	25.2000
5	50.0	10	13.0000	34.0000	25.9000
6	100.0	10	4.0000	37.0000	28.2000

Title: ICG 001
File: icg001cr Transform: NO TRANSFORMATION

Summary Statistics on Data TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	control	35.3333	5.9442	1.8797	25.8443
2	6.25	106.7222	10.3306	3.2668	52.9777
3	12.5	65.4333	8.0891	2.5580	32.2274
4	25.0	11.7333	3.4254	1.0832	13.5928
5	50.0	35.6556	5.9712	1.8883	23.0549
6	100.0	89.9556	9.4845	2.9993	33.6329

Title: ICG 001
File: icg001cr Transform: NO TRANSFORMATION

ANOVA Table

SOURCE	DF	SS	MS	F
Between	5	437.4833	87.4967	1.5224
Within (Error)	54	3103.5000	57.4722	
Total	59	3540.9833		

(p-value = 0.1983)

Critical F = 3.3769 (alpha = 0.01, df = 5,54)
= 2.3861 (alpha = 0.05, df = 5,54)

Since F < Critical F FAIL TO REJECT Ho: All equal (alpha = 0.05)

Title: ICG 001
File: icg001cr Transform: NO TRANSFORMATION

Dunnett's Test - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG 0.05
1	control	23.0000	23.0000		
2	6.25	19.5000	19.5000	1.0323	
3	12.5	25.1000	25.1000	-0.6194	
4	25.0	25.2000	25.2000	-0.6489	
5	50.0	25.9000	25.9000	-0.8554	
6	100.0	28.2000	28.2000	-1.5338	

Dunnett critical value = 2.3100 (1 Tailed, alpha = 0.05, df [used] = 5,40)
(Actual df = 5,54)

Title: ICG 001
File: icg001cr Transform: NO TRANSFORMATION

Dunnett's Test - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	control	10			
2	6.25	10	7.8317	34.1	3.5000
3	12.5	10	7.8317	34.1	-2.1000
4	25.0	10	7.8317	34.1	-2.2000
5	50.0	10	7.8317	34.1	-2.9000
6	100.0	10	7.8317	34.1	-5.2000

Title: ICG 001
File: icg001cr Transform: NO TRANSFORMATION

Steel's Many-One Rank Test - Ho: Control<Treatment

GROUP	IDENTIFICATION	MEAN IN ORIGINAL UNITS	RANK SUM	CRIT. VALUE	DF	SIG 0.05
1	control	23.0000				
2	6.25	19.5000	96.00	75.00	10.00	
3	12.5	25.1000	114.00	75.00	10.00	
4	25.0	25.2000	122.00	75.00	10.00	
5	50.0	25.9000	120.50	75.00	10.00	
6	100.0	28.2000	131.50	75.00	10.00	

Critical values are 1 tailed (k = 5)

Title: ICG 001
File: icg001cr Transform: NO TRANSFORMATION

GRP	IDENTIFICATION	MEAN	SMOOTHED MEAN	CONCENTRATION
1	control	23.0000	24.4833	0.0000
2	6.25	19.5000	24.4833	6.2500
3	12.5	25.1000	24.4833	12.5000
4	25.0	25.2000	24.4833	25.0000
5	50.0	25.9000	24.4833	50.0000
6	100.0	28.2000	24.4833	100.0000

ICp estimate with p = 25 is > 100.0000