Stefania Shamet/R3/USEPA/US

11/30/2010 11:38 AM

To: Marcus Zobrist, Js Wilson, MichaelG Lee

cc:

bcc:

Subject: Fw: Region 3's Comments on DRAFT R4 NPDES Mining Permit - KY

----- Forwarded by Stefania Shamet/R3/USEPA/US on 11/30/2010 11:36 AM -----

From: Stefania Shamet/R3/USEPA/US
To: Jeffrey Lapp/R3/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA
Date: 11/29/2010 05:54 PM
Subject: Fw: Region 3's Comments on DRAFT R4 NPDES Mining Permit - KY

----- Forwarded by Stefania Shamet/R3/USEPA/US on 11/29/2010 05:54 PM -----

From: Jon Capacasa/R3/USEPA/US
To: Jim Giattina/R4/USEPA/US@EPA
Cc: Early.William@epamail.epa.gov, John Pomponio/R3/USEPA/US@EPA, Stephen Field/R3/USEPA/US@EPA, Evelyn MacKnight/R3/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA, Stan Meiburg/R4/USEPA/US@EPA, Chris Thomas/R4/USEPA/US@EPA, Mark Nuhfer/R4/USEPA/US@EPA, Tom Welborn/R4/USEPA/US@EPA
Date: 11/29/2010 05:52 PM
Subject: Region 3's Comments on DRAFT R4 NPDES Mining Permit - KY

Jim -

(b) (5)
[redacted]

(b) (5)

Jon M. Capacasa, Director
Water Protection Division
EPA Region III

EPA draft CMpermit-11222010R3clean2.doc EPA draft CMpermit-11222010R3rdline.doc

ATTACHMENT REDACTED - DELIBERATIVE

Jeffrey Lapp/R3/USEPA/US
11/30/2010 02:01 PM

To "Barbara Rudnick", "Jessica Martinsen"
cc
bcc
Subject Fw: Surface Coal Mining COE Decision Document and TN NEPA SOP

Daniel Holliman

----- Original Message -----
From: Daniel Holliman
Sent: 11/30/2010 01:59 PM EST
To: Beth Walls; Cliff Rader; Daniel Holliman; Donna Mullins; Hector Pena; Heinz Mueller; Jeffrey Lapp; Kenneth Westlake; Peter Swenson; Rhonda Smith; Wendy Melgin; Kathleen Kowal
Subject: Surface Coal Mining COE Decision Document and TN NEPA SOP

Please find attached Thunder Ridge decision document. This is an example of the Louisville Districts justification for an EA/FONSI decision on a coal mine permit. Cliff asked me to forward this to the group on the call yesterday.

I have also attached a copy of the latest **draft** of the Tennessee NEPA SOP. This document is being developed by the TN interagency workgroup (OSM, EPA, FWS, COE, TDEC) for surface coal mine permitting. The purpose of this SOP is to outline how OSM and the COE conduct NEPA on surface coal mine permits in TN and how other agencies are incorporated into the process. We thought this might be helpful for the other regions to see.

Thanks,

Dan

Dan Holliman
Life Scientist
EPA Region 4, NEPA Program Office
Sam Nunn AFC, 61 Forsyth St.,
Atlanta, Ga 30303-8960

Phone: 1-404-562-9531
Email: Holliman.Daniel@epa.gov

TR_Decision_Document.doc NEPA_final_9-29-10.docx

Documents withheld - FOIA (b)(5)

Matthew Klasen/DC/USEPA/US
11/30/2010 02:55 PM

To Jim Pendergast, Gregory Peck, MichaelG Lee, Ross Geredien
cc
bcc
Subject For 3 pm: Draft OSM follow-up handout

Here's an initial rough draft that we can talk through at 3, and which requires some context. I'm assuming Greg can kick things off with a summary of how the Bob/Nancy/Joe meeting went last week.

Thanks,
Matt

ATTACHMENT REDACTED - DELIBERATIVE

2010-11-30 OSM SPR Follow-Up.docx

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

Christopher Hunter/DC/USEPA/US
11/30/2010 04:17 PM

To Marcel Tchaou
cc
bcc
Subject Fw: Draft Doe Branch 3b comment letter

Here is the incoming email. Please respond to all three contacts on Thursday with HQ comments.

Thanks!

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454
hunter.christopher@epa.gov

----- Forwarded by Christopher Hunter/DC/USEPA/US on 11/30/2010 04:17 PM -----

From: Jessica Martinsen/R3/USEPA/US
To: Christopher Hunter/DC/USEPA/US@EPA
Cc: Jeffrey Lapp/R3/USEPA/US@EPA, Mark Douglas/R3/USEPA/US@EPA
Date: 11/30/2010 03:34 PM
Subject: Draft Doe Branch 3b comment letter

Chris,

As promised (later than intended), here is the current draft of the 3b letter. Signature is due next Tuesday. I would respectfully request that HQ comments be received by Thursday December 2, so that the letter can be put into concurrence here in the Region. I have also attached the 3a letter for reference. Thank you for your consideration and review.

Doe Branch Surface Mine 3b draft_JM.doc Doe Branch 3a Final.doc

ATTACHMENTS REDACTED - DELIBERATIVE

Jessica Martinsen
U.S. EPA Region III
Office of Environmental Programs
1650 Arch St. (3EA30)
Philadelphia, PA 19103
215-814-5144 (office)
215-814-2783 (fax)

Francisco Cruz/R3/USEPA/US

12/01/2010 08:32 AM

To Amy Bergdale

cc Evelyn MacKnight, Stefania Shamet, Jaclyn McIlwain, Bette Conway

bcc

Subject Help - Ison Rock Ridge WET and Biological Conditions in the Draft Permit.

(b) (5) [redacted]

Thanks,

Francisco Cruz, P.E.
Hispanic Employment Program Advisory Council Manager
Environmental Engineer
NPDES Permits Branch (3WP41)
Office of Permits and Enforcement
Tel.: 215/814-5734
Fax: 215/814-2302

1003841 AG CSMO_NPDES Draft Permit final I 9_3_10.pdf

1003841 AG Ison Rock CSMO_NPDES Draft Factsheet 9_3_10.pdf

VIRGINIA DIVISION OF MINED LAND RECLAMATION
Joint CSMO/NPDES Permit Factsheet

Application Number 1003841
CSMO: Pending
NPDES: Pending

This document gives pertinent information concerning the joint Coal Surface Mining Operation (CSMO)/ National Pollutant Discharge Elimination System (NPDES) permit listed below. This permit is being processed as a **minor** industrial permit. The industrial discharge(s) result from the control of surface stormwater runoff and/or groundwater discharges associated with coal mining activities.

The permit development process included establishing permit conditions based upon the effluent limitations for coal mining promulgated by the U.S. Environmental Protection Agency set forth in 40 CFR 434, the State Water Quality Standards, the Callahan Creek Total Maximum Daily Load (TMDL) Report, and Storm Water requirements.

The effluent limitations contained in this permit will maintain all applicable state and federal standards, including the Water Quality Standards of 9 VAC 25-260-00 et seq, the Virginia Coal Surface Mining and Reclamation Regulations, and TMDL Reports.

1. Facility Information

Permittee Name: A & G COAL CORPORATION
Address: P. O. BOX 1010
City: WISE **State:** VA **Zip:** 24293
Facility: ISON ROCK RIDGE SURFACE MINE

Location:

Description: 0.8 MILE WEST OF ANDOVER ON ISON ROCK RIDGE
NAD 83 Virginia State Plane South: Northing: 3523351 Easting: 10223223
County: WISE
USGS 7.5' Quadrangle: APPALACHIA

Type of Mining

Surface - Area
Surface - Auger
Surface - Contour
Surface – Steep Slope

The permit application proposes surface mining on approximately 1230 acres located along Ison Rock Ridge in Wise County, approximately 0.8 mile west of Andover and 1.8 miles northwest of the Town of Appalachia. The proposed permit area is generally bounded to the north by

Preacher Creek and Route 686, to the east by Callahan Creek and Route 78, to the south by Looney Creek and Route 160, and to the west by Route 160.

Proposed activities include initial vegetation removal, top soil removal and storage, overburden removal, coal extraction activities, collection and treatment of stormwater contacting waste rock and disturbed areas, waste rock disposal in hollow fills, haul road construction and maintenance, coal haulage, regrading, revegetation, site reclamation, stream channel restoration, and previously mined area restoration.

Sic Code: 1221

2. CSMO/NPDES Permit Number:

CSMO: Pending
NPDES: Pending
Existing Permit Expiration Date:
Former NPDES Permit Number: NA
Former CSMO Permit Number: NA

3. Owner Contact:

Operator: James C. Justice II
Telephone: (276) 328-3421

4. Administrative Dates:

Administratively Complete Date: 03/28/2007
NPDES Reviewer Contact: RODNEY BAKER (276) 523-8184
Review Begin Date: 03/29/2007
Public Comment Beginning Date: 4/24/07 (1st publication, Coalfield Progress)
Note: Also published in Bristol Herald Courier beginning 3/26/07
Public Comment Ending Date: 6/14/07 (30 days following last publication, Coalfield Progress)
Informal Conference Dates: 1/27/09 (DMME Office, Big Stone Gap) and 3/9/09 (Andover)
Administrative Decision Date:
Issue Date:

5. Application Information:

Application Type: NEW CSMO/NPDES
Application Description: New Surface Contour/Area/Auger Permit.

6. Receiving Waters Classification:

Receiving Stream	Tier	Watershed	Basin

CALLAHAN CREEK	1	POWELL – CALLAHAN CREEK	TENNESSEE
PREACHER CREEK	1	POWELL – CALLAHAN CREEK	TENNESSEE
LOONEY CREEK	1	POWELL – PIGEON CREEK	TENNESSEE

7. Ambient Water Quality Description

Proposed discharges from this permit will enter tributaries to Callahan Creek and Looney Creek. Callahan Creek is an impaired stream with an approved TMDL. The Callahan Creek TMDL identified the most probable stressors affecting aquatic life use and established waste load allocations. Looney Creek is included in the Powell River TMDL currently under review by EPA and the draft TMDL identifies the most probable stressors and waste load allocations have been established. Both Callahan Creek and Looney Creek watersheds have a long history of mining and logging beginning in the 1890s and continuing until present. Early photography of the watersheds dating to the 1920s show completely deforested slopes and sediment clogged streams. Stream channels were relocated to accommodate railroads, housing, and access roads. Sanitation was accomplished by discharging sewage directly to the stream, a practice that continues to the present day. Therefore, both of these watersheds were heavily impacted by human activity prior to enactment of the Surface Mining Control and Reclamation Act (SMCRA) of 1977. Currently, active mining operations, abandoned mined lands, forested areas, residential areas, and other areas and activities contribute flow to the receiving streams of Preacher Creek, Callahan Creek, Looney Creek, and their tributaries.

A description of baseline data collected during 1980 and 1981 for Looney Creek, provides the following summary for water quality: *"Dissolved-solids concentrations ranged from 125 to 454 milligrams per liter (mg/l). Specific conductance values ranged from 220 to 700 umhos/cm^2 @ 25°C."* Further: *"Factors which may contribute to the sediment loading of Looney Creek are uncontrolled runoff from pre-OSM strip mines, access roads and abandoned refuse piles …*" "*Total suspended solids measured in the Bullitt area* (Looney Creek) *ranged from 1 to 3900 milligrams per liter (mg/l).* This data indicates TDS and TSS impact from pre-SMCRA mining within the watershed.

Background/baseline ambient water quality information on receiving streams is included in Section 5.9 of the joint permit application and summarized in Tables 1 and 2 below. The applicant has provided instream surface water baseline and priority pollutant metals data for locations in Preacher Creek, Callahan Creek, and Looney Creek. None of the metals concentrations except selenium exceeded acute or chronic Virginia numeric water quality standards, however, concentrations below chronic Virginia numeric water quality standards were detected. Instream selenium concentrations in Callahan Creek were at or near the chronic limit of 5 μg/L. The data are presented below:

TABLE 1

A&G Coal Corporation
Ison Rock Ridge
In-stream Monitoring
October 30, 2009 Sampling Event Summary Table

Parameter		WQ STANDARD		Station: Downstream Looney Creek BL-4	Downstream Callahan Creek KB-2S	Downstream Preacher Creek PC-1
Aluminum, dissolved	(mg/l)			0.017	0.017	0.017
Aluminum, total	(mg/l)			0.029	0.082	0.032
Calcium, dissolved	(mg/l)			60.4	75.7	48.8
Calcium, total	(mg/l)			65.7	76.2	52.2
Iron, dissolved	(mg/l)	0.3	PWS	0.019	0.026	0.014
Iron, total	(mg/l)	0.3	PWS	0.127	0.208	0.094
Magnesium, dissolved	(mg/l)			22.9	27.3	17.6
Magnesium, total	(mg/l)			24.7	32.7	18.8
Manganese, dissolved	(mg/l)	0.05	PWS	0.019	0.021	0.0076
Manganese, total	(mg/l)	0.05	PWS	0.026	0.025	0.0099
Mercury, dissolved	(ug/l)	1.4/0.77	acute/chronic	0.03	0.03	0.03
Mercury, total	(ug/l)	1.4/0.77	acute/chronic	0.03	0.03	0.03
Sodium, dissolved	(mg/l)			74	62.8	21.5
Sodium, total	(mg/l)			76.7	68.6	22.8
Acidity	(mg/l CaCO3)			1	1	1
Alkalinity	(mg/l CaCO3)			228	165	117
Alkalinity, CO3	(mg/l)			3.4	1.95	1.74
Alkalinity, HCO3	(mg/l)			228	165	117
Chloride	(mg/l)	860/230	acute/chronic	6.07	1.88	1.74
Conductivity	umhos/cm			835	891	523
Hardness	(mg/l CaCO3)			284	372	236
Nitrate	(mg/l)	10	PWS	0.595	0.758	0.867
Nitrite	(mg/l)			0.005	0.005	0.005
pH	STD			8.3	8.2	8.3
Phosphate, ortho	(mg/l)			0.015	0.015	0.015
Phosphate, total	(mg/l)			0.06	0.02	0.03
Sulfate	(mg/l)	250	PWS	186	266	131
TDS	(mg/l)	500	PWS	504	586	312
TSS	(mg/l)			4	4	4
Silica, SiO2	(ug/l)			5300	4800	5300
* Nickel, dissolved	(ug/l)	180/20	acute/chronic	1	1.5	1
* Nickel, total	(ug/l)	180/20	acute/chronic	2	2.4	2
Selenium, dissolved	(ug/l)	20/5	acute/chronic	2.5	4.2	4
Selenium, total	(ug/l)	20/5	acute/chronic	2.5	4.4	3.9
Arsenic, dissolved	(ug/l)	340/150	acute/chronic	2.5	2.5	2.5
Arsenic, total	(ug/l)	340/150	acute/chronic	2.5	2.5	2.5
* Cadmium, dissolved	(ug/l)	3.9/1.1	acute/chronic	0.5	0.5	0.5
* Cadmium, total	(ug/l)	3.9/1.1	acute/chronic	0.5	0.5	0.5
Beryllium, dissolved	(ug/l)			0.5	0.5	0.5
Beryllium, total	(ug/l)			0.5	0.5	0.5
Thallium, dissolved	(ug/l)	0.24	PWS	1	1	1
Thallium, total	(ug/l)	0.24	PWS	1	1	1
* Silver, dissolved	(ug/l)	3.4/	acute/chronic	1	1	1
* Silver, total	(ug/l)	3.4/	acute/chronic	1	1	1
* Copper, dissolved	(ug/l)	13/9	acute/chronic	5	5	5
* Copper, total	(ug/l)	13/9	acute/chronic	5	5	5
* Lead, dissolved	(ug/l)	120/14	acute/chronic	1.5	1.5	1.5
* Lead, total	(ug/l)	120/14	acute/chronic	1.5	1.5	1.5
* Zinc, dissolved	(ug/l)	120/120	acute/chronic	20	20	20
* Zinc, total	(ug/l)	120/120	acute/chronic	20	20	20
* Chromium, dissolved	(ug/l)	570/74	acute/chronic	5	5	5
* Chromium, total	(ug/l)	570/74	acute/chronic	5	5	5
Antimony, dissolved	(ug/l)	5.6	PWS	5	5	5
Antimony, total	(ug/l)	5.6	PWS	5	5	5

=METHOD DETECTION LIMIT; ACTUAL VALUE IS BELOW DETECTION LIMIT
PWS - PUBLIC WATER SUPPLY (AESTHETIC REASONS)
ACUTE/CHRONIC - ACUTE AND CHRONIC TOXICITY TO FRESHWATER AQUATIC LIFE
* - WATER QUALITY STANDARD CALCULATED WITH HARDNESS VALUE OF 100 (APPLICABLE STANDARD MAY BE LESS STRICT).

DRA/A&G, 06-316B, Item 5.9, 04-05-10

TABLE 2
Surface Water Baseline Station Data Medians
Feb 2007 through Feb 2010

	Station	Flow (GPM)	pH	Total Iron (mg/l)	Total Mn (mg/l)	TSS (mg/l)	Temp. (oC)	Acidity (mg/l)	Alkalinity (mg/l)	Cond. (umhos/cm)	TDS (mg/l)	Sulfates (mg/l)	Chloride (mg/l)	Total Se (ug/l)
	Preacher Creek													
	BL-2	50	7.2	0.60	0.10	9	14	0	163	460	224	129		
	PC-2	250	7.4	0.10	0.01	4	13	1	83	401	246	109	2.6	4.0
*	**GW-2**	30	7.2	0.03	0.00	4	13	1	191	499	288	65	1	5.1
	PC-1	312	7.7	0.17	0.01	4	14	1	130	451	272	89	2.8	3.9
	Callahan Creek													
	KB-1S	6335	8.0	0.21	0.02	4	14	1	171	861	608	282	2.2	4.8
	CC-4	4868	7.9	0.20	0.02	4	14	1	170	863	616	301	2.1	4.7
	CC-3	5730	8.0	0.19	0.02	4	14	1	158	868	622	305	2.3	4.3
**	**PC-1**	312	7.7	0.17	0.01	4	14	1	130	451	272	89	2.8	3.9
	CC-2	5791	8.0	0.19	0.02	4	13	1	169	849	596	275	2.4	4.8
	CC-1	4597	8.0	0.20	0.02	4	14	1	162	828	582	268	2.6	4.6
	KB-2S	7269	8.0	0.21	0.02	4	14	1	170	834	568	271	2.7	5.0
	Looney Creek													
	LC-5	750	7.7	0.30	0.10	4.5	14	0	156	665	424	147	8.2	1.8
*	**GW-3**	1481	7.0	0.090	0.189	4	14	1	318	784	500	111	6	0.6
	BL-7	3000	7.6	0.10	0.10	2	14	0	237	742	454	125	6.8	1.4
	BL-4	1500	7.4	0.60	0.10	6	13	0	205	710	270	196	9.2	2.6

Data presented in order from upstream to downstream for each stream
* GW-2 and GW-3 are abandoned mine discharges to the receiving stream
** PC-1 Preacher Creek input to Callahan Creek

Selenium data for mining discharges in the Callahan Creek watershed are not available; therefore reasonable potential to cause an exceedance is assumed. Since these discharges are stormwater driven and of limited duration, the acute limit for selenium was assigned.

In order to address TDS reasonable potential, the applicant is required to characterize the discharges from the permit by conducting four quarters of WET tests at representative discharges. DMLR will evaluate the results of the tests to determine whether a WET limit will be necessary for the permit. The applicant must also conduct semi-annual benthic surveys. This instream biological monitoring is required (including the downstream Looney and Callahan Creeks) for general water quality including TSS, TDS, conductivity, pH, and benthics and will address the narrative water quality standard. The permittee is required to determine the VASCI for the stream. If the score declines, then the Aquatic Protection Plan will be activated.

8. Permit Characterization/Special Conditions/Effluent Limitations:

[X] Narrative Water Quality Standards Applicable
9VAC25-260-20

Effluent screening for toxicity through WET assays is required. WET limits will be applied as applicable based on assay results

[X] Technology-based Effluent Limitations
40 CFR 434

[X] Numeric Water Quality based Effluent Limitations
9VAC25-260

An acute selenium effluent limit of 20ug/L will be imposed for all outfalls from this permit based on the elevated concentration of selenium in Callahan Creek.

[X] SMCRA Performance Standard
4VAC25-130-816.42 or 4VAC25-130-817.42

[X] Standard Permit Conditions Applicable
40 CFR 122.41 and 9VAC25-31-190

[X] Special Permit Conditions – TMDL Watershed
40 CFR 130 and CWA 303(d)

A waste load evaluation has been conducted by DMME for this permit application. The evaluation finds that the permittee must utilize offset credits in order to discharge mining effluent into Callahan Creek.

[ ] Special Permit Conditions – SMCRA
4VAC25-130-773-17

[ ] Special Permit Conditions – Alternate Effluent Limitations: Remining 4VAC25-130-825

[ ] Discharges limited based on receiving stream flow – Mixing Zone 9VAC260-20

[ ] Possible Interstate Effect

9. NPDES Effluent Limitation Basis

Parameter	Basis
Flow	Report only, no limit. Monitoring required by federal effluent guidelines (40 CFR Part 434).
pH	The pH limitation is based upon Virginia's water quality standards and federal effluent guidelines (40 CFR Part 434).
TSS	TSS limitations are based on federal effluent guidelines for coal mining (40 CFR Part 434). TSS is also load-limited based upon the approved TMDL, if applicable.
Iron, total	Iron limitations are based on federal effluent guidelines for coal mining (40 CFR Part 434).
Manganese, total	Manganese limitations are based on federal effluent guidelines for coal mining (40 CFR Part 434).
SS	SS limitations are based on federal effluent guidelines for coal mining (40 CFR Part 434).
TDS	Monitoring required for informational purposes. TDS is also load-limited based upon the approved TMDL, if applicable.
Selenium	Monitoring required limitations as applicable per 9VAC25-260. Instream monitoring data submitted with the permit application for Ison Rock Ridge indicates that selenium concentrations in Callahan Creek approach the chronic limit of 5 µg/L. Therefore, it is assumed a reasonable potential exists that discharges could contribute to an exceedance of the Virginia water quality criteria for selenium in Callahan Creek. The proposed discharges are all stormwater driven and have watershed areas less than one square mile. These discharges are not expected to be continuous or occur under drought conditions. Therefore, the acute water quality standard for selenium of 20 µg/L will be utilized as an effluent limit on all discharges from this mining operation. This limit is in keeping with Virginia Department of Environmental Quality (VADEQ) policy.
The monitoring frequency and sample type have been established after considering the consistency and nature of these operations, the existing analytical data and the potential environmental risk and consequences of the discharges. Reporting of monitoring data is required quarterly.	

10. Permit or Proposed Permit Area Questions

YES	NO	
	X	A. The area contains a publicly owned treatment works which discharges into the waters of the United States.
	X	B. The facility treats, stores, or disposes of hazardous wastes.
	X	C. Fluids are injected at this facility which are: (1) brought to the surface in connection with conventional oil or gas production; (2) used for the enhanced recovery of oil or natural gas; or (3) for storage of liquid hydrocarbons.
	X	D. The area contains a concentrated animal feeding operation or aquatic animal production facility that discharges into the waters of the United States.
	X	E. This facility will inject industrial effluent below the lowermost stratum containing, within one quarter mile of the well bore, underground sources of drinking water.

11. NPDES Outfall Description:

Sediment control structures and the associated NPDES outfalls for surface coal mining operations primarily receive precipitation runoff from mined areas and treat the runoff by settling sediment particles prior to discharge to the receiving stream. Precipitation runoff from mined areas also dissolves portions of exposed fresh rock and carries the associated ions in solution. These ions are not reduced in the sedimentation process prior to discharge. Certain dissolved ions or the combined concentration of these ions may cause benthic impairment depending on their makeup and/or abundance.

NPDES discharges associated with this permit are from the control of surface water runoff resulting from precipitation and/or groundwater discharges associated with coal mining activities. Typically, discharges are only treated by sedimentation, but in limited circumstances treatment may include chemical treatment such as the addition of neutralizing agents or flocculants.

The ten proposed outfalls for the Ison Rock Ridge permit can be divided into three categories based on the area controlled. The categories are bench basins, hollow fill discharges expected to occur less than 50% of the time, and hollow fills expected to discharge approximately 50% of the time or more. Discharges within each of the three categories are located in the same geological strata and receive precipitation runoff from the same sources.

Bench Basins – Outfalls in this category typically never discharge through the life of the permit. They control surface areas on average of 35 acres each and are located in areas above groundwater base level/influence. They receive surface drainage from precipitation runoff from active mine areas, which are then regraded, re-vegetated, and reclaimed. These ponds are designed to have sufficient volume to completely contain rain events less than 1.5 inches. Most have been overdesigned (are larger than design) and contain precipitation events greater than 1.5 inches without discharging. The collected water is lost through evaporation and infiltration. Any discharges from these ponds would have limited contact time with disturbed rock. Once an area

is reclaimed, the sediment control pond is removed. Outfalls P6, P7, L1, and L2 are bench basins.

P6 is a sediment pond located in an ephemeral drain way in the Preacher Creek watershed (a tributary of Callahan Creek) and controls surface runoff from 37.2 acres of mined area which includes 14.7 acres of abandoned mine lands. The point of discharge into the ephemeral drain way is approximately 2140 feet from its confluence with Preacher Creek.

P7 is a sediment pond located in an ephemeral drain way in the Preacher Creek watershed and controls surface runoff from 26.1 acres of mined area. The point of discharge into the ephemeral drain way is approximately 640 feet from its confluence with Preacher Creek.

L1 is a sediment pond located in an ephemeral drain way in the Looney Creek watershed and controls surface runoff from 52.4 acres of mined area. Pond L1A is in series with L1 and is located approximately 400 feet up-gradient. The point of discharge into the ephemeral drain way is approximately 900 feet from its confluence with Looney Creek.

L2 is a sediment pond located adjacent to an ephemeral drain way in the Looney Creek watershed and controls surface runoff from 26 acres of mined area. The point of discharge into the ephemeral drain way is approximately 900 feet from its confluence with Looney Creek.

Hollow Fills – This category of outfalls represents both those that may discharge less than 50% of the time (ephemeral), and those expected to discharge approximately 50% of the time or more (continuous) from surface flow accumulated and conveyed through groin ditches combined with any flow that may emanate from the hollow fill underdrain.

Ephemeral – Sediment ponds controlling drainage from hollow fills located in ephemeral drain ways typically do not discharge through the life of the permit. These hollow fills are placed above groundwater base level/influence and only receive surface drainage from surface flow from an average of 89 acres each. Outfalls L3 and L5 are for hollow fills located in ephemeral drain ways.

L3 is a sediment pond discharge located in an ephemeral drain way in the Looney Creek watershed and controls surface runoff from 52.4 acres of mined area and from Hollow fill L3. It has two ponds in series with it, Pond L3a and Pond L4. The point of discharge into the ephemeral drain way is approximately 1300 feet from its confluence with Looney Creek.

L5 is a sediment pond discharge located in a previously mined ephemeral drain way in the Looney Creek watershed and controls surface runoff from 96.9 acres of mined area and from Hollow fill L5. The point of discharge into the ephemeral drain way is approximately 450 feet from its confluence with Looney Creek.

Intermittent - Sediment ponds controlling drainage from hollow fills located in intermittent streams typically discharge at various times during the life of the permit. These discharges will most likely be intermittent and in response to precipitation events and wet periods where flow for that period may be continuous. These hollow fills are placed at or below the point of groundwater base level/influence and receive surface drainage from precipitation and groundwater recharge during wet periods (typically late winter/early spring). In limited instances the discharge may become continuous year round depending upon the size of the fill. They are located within watersheds averaging 271 acres each. Outfalls C1, P1, L6 and L8 are for hollow fills located in intermittent streams.

P1 is a sediment pond discharge located in an intermittent stream in the Preacher Creek watershed and controls surface runoff from 255 acres of mined area and from Hollow fills P1, P2, and P3. It has three ponds in series with it, Pond P3, Pond P4 and Pond P5. The point of discharge into the intermittent stream is approximately 830 feet from its confluence with Looney Creek.

C1 is a sediment pond discharge located in an intermittent stream in the Callahan Creek watershed and controls surface runoff from 240 acres of mined area and from Hollow fill L3. It has two ponds in series with it, Pond C2 and Pond C3. The point of discharge into the intermittent stream is approximately 450 feet from its confluence with Looney Creek.

L6 is a sediment pond discharge located in an intermittent stream in the Looney Creek watershed and controls surface runoff from 37.2 acres of mined area and from Hollow fills L6 and L7. The point of discharge into the intermittent stream is approximately 310 feet from its confluence with Looney Creek.

L8 is a sediment pond discharge located in an intermittent stream in the Looney Creek watershed and controls surface runoff from 403 acres of mined area and from Hollow fill L9. It has one pond in series with it, Pond L8A. The point of discharge into the intermittent stream is approximately 120 feet from its confluence with Looney Creek.

The following tables present details for each proposed outfall. Specific information, including location, regarding each outfall and facility is also found in Section 5, Section 12, and Section 21 of the CSMO/NPDES permit.

MPID Number		**Action**	Add	**Sampling Freq/Qtr**	6
Location No.	C1	**Elevation (ft)**	1,710	**Facility Location**	Pond C1
Quad	Appalachia	**Northing**	3,523,377	**Easting**	10,226,828
Watershed (ac.)	240.0	**Disturbed (ac.)**	232.3	**Receiving Stream**	Callahan Ck
Comment				**Status**	Not Constructed

MPID Number		**Action**	Add	**Sampling Freq/Qtr**	6
Location No.	P1	**Elevation (ft)**	1840	**Facility Location**	Pond P1
Quad	Appalachia	**Northing**	3525329	**Easting**	10222306
Watershed (ac.)	255	**Disturbed (ac.)**	238.1	**Receiving Stream**	Preacher Ck
Comment				**Status**	Not Constructed

MPID Number		**Action**	Add	**Sampling Freq/Qtr**	6
Location No.	P6	**Elevation (ft)**	2200	**Facility Location**	Pond P6
Quad	Appalachia	**Northing**	3526460	**Easting**	10219669
Watershed (ac.)	37.2	**Disturbed (ac.)**	28.5	**Receiving Stream**	Preacher Ck
Comment				**Status**	Not Constructed

MPID Number		**Action**	Add	**Sampling Freq/Qtr**	6
Location No.	P7	**Elevation (ft)**	1955	**Facility Location**	Pond P7
Quad	Appalachia	**Northing**	3525525	**Easting**	10225839
Watershed (ac.)	26.1	**Disturbed (ac.)**	26.1	**Receiving Stream**	Preacher Ck
Comment				**Status**	Not Constructed

MPID Number		**Action**	Add	**Sampling Freq/Qtr**	6
Location No.	L1	**Elevation (ft)**	1900	**Facility Location**	Pond L1
Quad	Appalachia	**Northing**	3520659	**Easting**	10226254
Watershed (ac.)	52.4	**Disturbed (ac.)**	52.4	**Receiving Stream**	Looney Ck
Comment				**Status**	Not Constructed

MPID Number		**Action**	Add	**Sampling Freq/Qtr**	6
Location No.	L2	**Elevation (ft)**	2020	**Facility Location**	Pond L2
Quad	Appalachia	**Northing**	3520528	**Easting**	10226631
Watershed (ac.)	26	**Disturbed (ac.)**	26	**Receiving Stream**	Looney Ck
Comment				**Status**	Not Constructed

MPID Number		**Action**	Add	**Sampling Freq/Qtr**	6
Location No.	L3	**Elevation (ft)**	1810	**Facility Location**	Pond L3
Quad	Appalachia	**Northing**	3521288	**Easting**	10224580
Watershed (ac.)	80.7	**Disturbed (ac.)**	80.3	**Receiving Stream**	Looney Ck
Comment				**Status**	Not Constructed

MPID Number		**Action**	Add	**Sampling Freq/Qtr**	6
Location No.	L5	**Elevation (ft)**	1880	**Facility Location**	Pond L5
Quad	Appalachia	**Northing**	3521573	**Easting**	10222415
Watershed (ac.)	96.9	**Disturbed (ac.)**	96.9	**Receiving Stream**	Looney Ck
Comment				**Status**	Not Constructed

MPID Number		**Action**	Add	**Sampling Freq/Qtr**	6
Location No.	L6	**Elevation (ft)**	1825	**Facility Location**	Pond L6
Quad	Appalachia	**Northing**	3521861	**Easting**	10220180
Watershed (ac.)	186.4	**Disturbed (ac.)**	128	**Receiving Stream**	Looney Ck
Comment				**Status**	Not Constructed

MPID Number		**Action**	Add	**Sampling Freq/Qtr**	6
Location No.	L8	**Elevation (ft)**	1895	**Facility Location**	Pond L8
Quad	Appalachia	**Northing**	3522449	**Easting**	10217339
Watershed (ac.)	403.4	**Disturbed (ac.)**	210.7	**Receiving Stream**	Looney Ck
Comment				**Status**	Not Constructed

12. <u>Instream Monitoring Description:</u>

Instream monitoring requirements and locations are addressed in Sections 5.7, 5.10, and 21.2 of the joint CSMO/NPDES permit. Location details for each instream monitoring site are tabulated below:

MPID Number	0003822	**Action**	Add	**Sampling Freq/Qtr**	3
Location No.	KB-1S	**Receiving Stream**	Callahan Ck	**Facility Location**	Upstream
Quad	Appalachia	**Northing**	3,530,121	**Easting**	10,227,446
Comment	Shared w/Meg-Lynn's PN 1101750				

MPID Number	0003823	**Action**	Add	**Sampling Freq/Qtr**	3
Location No.	KB-2S	**Receiving Stream**	Callahan Ck	**Facility Location**	Downstream
Quad	Appalachia	**Northing**	3,518,306	**Easting**	10,231,086
Comment					

MPID Number		**Action**	Add	**Sampling Freq/Qtr**	3
Location No.	CC-1	**Receiving Stream**	Callahan Ck	**Facility Location**	Midstream
Quad	Appalachia	**Northing**	3,522,666	**Easting**	10,228,185
Comment					

MPID Number		**Action**	Add	**Sampling Freq/Qtr**	3
Location No.	CC-2	**Receiving Stream**	Callahan Ck	**Facility Location**	After PCk
Quad	Appalachia	**Northing**	3,524,614	**Easting**	10,227,101
Comment					

MPID Number		**Action**	Add	**Sampling Freq/Qtr**	3
Location No.	CC-3	**Receiving Stream**	Callahan Ck	**Facility Location**	Prior PCk
Quad	Appalachia	**Northing**	3,525,000	**Easting**	10,227,279
Comment					

MPID Number		**Action**	Add	**Sampling Freq/Qtr**	3
Location No.	CC-4	**Receiving Stream**	Callahan Ck	**Facility Location**	After KBr
Quad	Appalachia	**Northing**	3,527,758	**Easting**	10,227,222
Comment					

MPID Number		**Action**	Add	**Sampling Freq/Qtr**	3
Location No.	PC-1	**Receiving Stream**	Preacher Ck	**Facility Location**	Downstream
Quad	Appalachia	**Northing**	3,524,891	**Easting**	10,226,901
Comment					

MPID Number		**Action**	Add	**Sampling Freq/Qtr**	3
Location No.	PC-2	**Receiving Stream**	Preacher Ck	**Facility Location**	Midstream
Quad	Appalachia	**Northing**	3,526,111	**Easting**	10,222,820
Comment					

MPID Number		**Action**	Add	**Sampling Freq/Qtr**	3
Location No.	BL-2	**Receiving Stream**	Preacher Ck	**Facility Location**	Upstream
Quad	Appalachia	**Northing**	3,529,653	**Easting**	10,218,015
Comment	Also monitored under MPID No. 1520079; PN 1301427				

MPID Number	0004419	**Action**	Add	**Sampling Freq/Qtr**	3
Location No.	LC-5	**Receiving Stream**	Looney Ck	**Facility Location**	Upstream
Quad	Appalachia	**Northing**	3,522,008	**Easting**	10,213,964
Comment	Shared w/A&G's PN 1101905				
MPID Number		**Action**	Add	**Sampling Freq/Qtr**	3
Location No.	BL-4	**Receiving Stream**	Looney Ck	**Facility Location**	Downstream
Quad	Appalachia	**Northing**	3,516,269	**Easting**	10,228,600
Comment					

MPID Number		**Action**	Add	**Sampling Freq/Qtr**	3
Location No.	BL-7	**Receiving Stream**	Looney Ck	**Facility Location**	Midstream
Quad	Appalachia	**Northing**	3,521,804	**Easting**	10,220,333
Comment					

14. Climatological Monitoring Description:

Climatological monitoring requirements and location information are addressed in Sections 5.12 and 21.2 of the joint CSMO/NPDES permit.

MPID Number	0001007	**Action**	Add		
Location No.	Airway	**Facility Location**	Kelly View		
Quad	Appalachia	**Northing**	3,547,133	**Easting**	10,217,995
Comment	Shared w/PN 1101694.				

15. Threatened/Endangered Species

For information regarding Threatened/Endangered Species, refer to Section 8.7 of the joint CSMO/NPDES permit application.

16. Site Inspection:

Site inspections are required under the Surface Mining Control and Reclamation Act (SMCRA) permit under 4 VAC 25-130-840.11.

17. Storm Water Discharges Associated with Industrial Activity:

All outfalls from the facility which contain storm water runoff will be subject to the storm water provisions of the NPDES program. The Surface Mining Control and Reclamation Act (SMCRA) permit authorized under 4 VAC 25-130 and issued jointly with this NPDES permit contains extensive storm water monitoring and management requirements which are incorporated into this NPDES permit by reference. The management and control of all storm water discharges is governed by the storm water management and drainage control provisions proposed in the SMCRA permit and meet or exceed the Storm Water Pollution Prevention Plan requirements of 9 VAC 25-151-80.

18. Anti-Degradation Review:

Stream Tier Designation:

Looney Creek – Tier 1
Preacher Creek – Tier 1
Callahan Creek – Tier 1

The State Water Control Board's Water Quality Standards includes an antidegradation policy (9 VAC 25-260-30). All state surface waters are provided one of three levels of antidegradation protection. For Tier 1, existing uses of the water body and the water quality to protect these uses must be maintained. Tier 2 water bodies have water quality that is better than the water quality standards. Significant lowering of the water quality of

Tier 2 waters is not allowed without an evaluation of the economic and social impacts. Tier 3 water bodies are exceptional waters and are so designated by regulatory amendment. The antidegradation policy prohibits new or expanded discharges into exceptional waters.

The proposed discharges will enter 303(d) listed waters Callahan Creek and Looney Creek; the designation for Looney Creek is based on its inclusion within the draft Powell River TMDL; the limitations in this permit were developed in accordance with § 303(d)(4) of the Clean Water Act.

19. <u>Anti-Backsliding</u>:

Because the effluent limitations included in the draft permit are at least as restrictive to those in the existing permit, the proposed action conforms to the anti-backsliding provision of the regulations.

20. <u>Permit Conditions</u>:

Refer to the standard conditions and special conditions contained in the joint CSMO/NPDES permit.

The following special conditions are proposed to be included in Sections C and D of the NPDES permit:

a. **Industrial Reopener.** The permit includes a standard reopener to address potential changes in the permit which may be required as a result of changes in effluent standards or limitations promulgated or approved under Section 307(a)(2) of the Clean Water Act. (Part I.B.1) [Section C]

   Rationale: 40 CFR 122.44 requires all permits for primary industrial categories to include the requirements of Section 307(a)(2) of the Clean Water Act.

b. **Notification Levels:** The permit includes a special condition which requires the permittee to notify the Department if they discharge certain toxic pollutants above established concentrations. [Section C]

   Rationale: Required by VPDES Permit Regulation, 9 VAC 25-31-200 A for all manufacturing, commercial, mining, and silvicultural dischargers.

c. **TMDL Reopener.** The permit includes a standard reopener to address potential changes in the permit which may be required as a result of a new or revised TMDL. [Section D]

   Rationale: Section 303(d) of the Clean Water Act requires that Total Maximum Daily Loads (TMDLs) be developed for streams listed as impaired. This special condition is to allow the permit to be reopened if necessary to bring it into

compliance with any applicable TMDL approved for the receiving stream. The reopener recognizes that, according to Section 402(o)(1) of the Clean Water Act, limits and/or conditions may be either more or less stringent than those contained in this permit. Specifically, they can be relaxed if they are the result of a TMDL, basin plan, or other wasteload allocation prepared under section 303 of the Act.

It is believed that the joint CSMO/NPDES permit effluent limitations and special conditions will maintain State water quality standards.

21. Materials Storage:

See Special Condition (p) 2 of the standard NPDES Permit Conditions in the NPDES Permit, Section C.

22. NPDES Permit Rating Worksheet:

The staff has completed the NPDES Permit Rating Worksheet and has determined that the facility meets the criteria to be classified as a minor source. The completed worksheet is included in Appendix IV.

Total Score: **45**

23. Detailed Description - Location of Discharge Point(s)

Reference the mapping included in Section 21.2 of the permit application.

24. Public Participation:

Public Notice Information:

Public Notice required. Public notice requires publication for 4 consecutive weeks in a newspaper of general circulation. The public comment period runs 30 days following the date of last publication. Refer to Sections 2.6 and 2.7 of the joint CSMO/NPDES permit.

A copy of the application materials is made available for public inspection and comment at the designated public office. A copy of the draft NPDES permit and fact sheet are available for public inspection and comment at the Division's Big Stone Gap office.

Public Comment Information:

Any person whose interests are or may be adversely affected by the proposed operation, or an Officer, or Head of any Federal, State, or local government agency or authority may within 30 days of the date of fourth publication may submit written comments or objections to the Division of Mined Land Reclamation concerning the proposed operation (and may also request, in writing, that the Division hold an Informal Conference concerning the application).

Any relevant comments received during the public comment period or provided during an Informal Conference are addressed in writing and provided to the commenters. Comments that were received after the public comment period were considered during the technical review process.

Procedures for requesting an informal conference:

A request for an informal conference shall follow the requirements of 4 VAC 25-130-773.13(c) of the Virginia Coal Surface Mining Reclamation Regulations.

All correspondence concerning the application should be submitted to the Division of Mined Land Reclamation, P.O. Drawer 900, Big Stone Gap, Virginia 24219, Telephone: (276) 523-8202 Attn: Permit Section. Written comments and a request for informal conference may be e-mailed to the Division at dmlrpublicnotice@dmme.virginia.gov

Procedures for requesting a formal hearing:

4VAC25-130-775.11(g). Administrative review.
Within 30 days after an applicant or permittee is notified of the decision of the division concerning an application for approval of exploration required under Part 772, a permit for surface coal mining and reclamation operations, a permit revision, a permit renewal, or a transfer, assignment, or sale of permit rights, the applicant, permittee, or any person with an interest which is or may be adversely affected by the decision may request, in writing, a formal public hearing to contest such action with the Director of the Division of Mined Land Reclamation, Drawer 900, Big Stone Gap, VA 24219.

Procedures for judicial review:

4VAC25-130-775.13. Judicial review.
(a) General. Any applicant, or any person with an interest which is or may be adversely affected by the final administrative decision and who has participated in the administrative hearings as an objector may appeal as provided in subsection (b) of this section if—
(1) The applicant or person is aggrieved by the director or his designee's final order under 4VAC25-130-775.11; or
(2) Either the division or the director failed to act within time limits specified in 4VAC25-130-775.11.
(b) Judicial review. The final order of the division pursuant to subsection (a) of 4VAC25-130-775.11 shall be subject to judicial review as provided by the Virginia Administrative Process Act and the rules of the Supreme Court of Virginia as promulgated thereto. The availability of such review shall not be construed to limit the operation of the rights established in Section 520 of the Federal Act.
(c) All notices of appeal for judicial review of a hearing officer's final decision, or the final decision on review and reconsideration, shall be filed with the Director, Division of

Mined Land Reclamation, Department of Mines, Minerals and Energy, Post Office Drawer 900, Big Stone Gap, Virginia 24219.

Public Comment Beginning Date:

April 24, 2007 (date of 1st publication, Coalfield Progress). The application was also published in the Bristol Herald Courier.

Public Comment Ending Date:

June 14, 2007 (30 days following date of last publication)

25. Variances

No NPDES permit variances are requested. All CSMO variances are addressed under the relevant sections of joint CSMO/NPDES permit application.

26. Staff Comments

Staff comments and applicant responses are located in Section 21.3 of the joint CSMO/NPDES permit.

26. Impaired Segments/TMDL watersheds

Discharges from this permit enter either the Callahan Creek watershed through outfalls C1, P1, P6, P7 or the Looney Creek watershed through outfalls L1, L2, L3, L5, L6, or L8. Callahan Creek has an approved TMDL and Looney Creek is a tributary of the Powell River that has a draft TMDL currently undergoing EPA review.

The Callahan Creek TMDL identifies TSS and TDS as the most probable benthic stressors. The recommended load allocation for TDS is a 76% reduction of TDS from nonpoint sources and 91% reduction from direct sources including abandoned underground mine discharges and straight pipe discharges. The TMDL states *" No TDS reductions from permitted sources are currently quantified. If reductions from permitted sources are required in the future, the reductions will be made through the application of appropriate BMPs."* Additionally, the TMDL states *"Unless and until VADEQ reopens and revises the TMDL to impose TDS waste load allocations on permitted sources (or categories of sources), new dischargers will be subject to monitor-only requirements, together with whatever permit-based requirements DMLR will impose pursuant to the CSMRR."* The TMDL also recommends an approximately 63% overall reduction in sediment loading (TSS) from disturbed forest, abandoned mine lands, and straight pipes. TDS and TSS waste load allocations were given for mining activities to be applied on a watershed wide basis as described in the EPA decision rationale document for the Callahan Creek TMDL.

DMLR will oversee compliance with mining waste load allocations for the respective TMDL by calculating mining waste loads on an annual basis for each discharge in the watershed utilizing compliance monitoring data. The annual loading will be determined by March 31 of each year. The mining waste load will be compared to the waste load allocation for the watershed. The EPA decision rationale document for the Callahan Creek TMDL states; *"The WLAs for both sediment and TDS were provided as a lumped load based on the nature of the dischargers. This lumped WLA can not be exceeded by the aggregate of all point sources."*

The waste load evaluation conducted by DMLR as part of this permit application indicated that the entire proposed waste load for this permit must be offset. The offset project has been completed and the resulting waste load reductions have been calculated and tracked utilizing the DMLR TMDL Reporting System. The waste load evaluation process is outlined below:

TMDL Waste Load Evaluations

Permitting actions in TMDL watersheds that propose additional mining waste load will be reviewed for consistency with the TMDL and a mining waste load evaluation will be conducted by DMLR. The mining waste load evaluation estimates the mining waste load from the proposed operation as follows.

1. Applicant calculates proposed mining waste load utilizing the DMLR method of estimation.
    a. Determine watershed area controlled for each sediment control structure.
    b. Determine previously mined area controlled within the watershed of each sediment control structure.
    c. Utilize the estimation parameters determined by DMLR for each stressor identified in the TMDL to estimate the mining waste load proposed by the application. For Callahan Creek the average flow per acre is 0.5 gpm and the TSS and TDS estimation concentrations are 35 mg/L and 597 mg/L respectively. The estimate utilizes the following formula:

Waste load estimation for surface mine discharges

Estimated mining waste load = (Watershed area (ac) – Previously mined area (ac)) X estimated stressor concentration (mg/L) X average flow per acre (gpm) X 365 days X 0.00545

The operator proposes to add four new NPDES outfalls within the Callahan Creek Watershed in this revision. The estimated waste load is presented in the table below:

Outfall ID	Watershed Area (ac)	Previously Mined Area (ac)	Load Producing Area (ac)	Estimated TDS Waste Load (kg/yr)	Estimated TSS Waste Load (kg/yr)
C1	240	64.5	175.5	104752.77	6111.58
P1	255	56.7	198.3	118361.68	6904.43
P6	37.2	14.7	22.5	13429.84	783.41
P7	26.1	0	26.1	15578.62	8596.59
Totals	**558.3**	**135.9**	**422.4**	**252122.91**	**14707.17**

DMLR utilizes a conservative approach assuming that each outfall will discharge at a continuous rate, that all proposed outfalls will be constructed at once and discharge at the same time, and that the concentration of discharge will be at the monthly average of 35 mg/L for TSS and the measured average TDS concentration for the particular watershed. The estimated value of 35 mg/L is approximately three times the average TSS concentration measured in the watershed. Further, the applicant is required to offset the entire estimated annual waste load for the proposed mining operation as calculated by DMLR. Offsets are required to have a minimum offset ratio of two units of offset loading to one unit of offset load credit. These measures alone are overly conservative with respect to TMDL waste loads.

DMLR has completed the waste load evaluation for the Callahan Creek portion of the proposed operation in accordance with the approved Callahan Creek TMDL. The evaluation indicates that the addition of TSS and TDS waste load proposed by this application will require offsets for both stressors (Tables 2 and 3). Offsets required for this permit correct near permanent sources of load from abandoned mine lands with temporary increases in mining waste loads. This application is proposing to draw upon offset load credits generated via abandoned mined land reclamation of an active slide located on Mud Lick Creek within the Callahan Creek watershed. The offset project is named the HiTop slide and the work necessary to reclaim the slide area has been completed. Prior to and currently, sediment control structures have been kept in place to remove sediment from surface water leaving the offset area., thus effecting an immediate reduction of sediment load from the offset area while work progressed. Additionally, the offset involved draining an abandoned underground mine that contained impounded water that was saturating the hillside and causing numerous reoccurring slides as well as contributing mineralized water to seeps along the numerous slide areas. Draining the deep mine reduced the mineralized seeps and therefore, TDS contribution to the Callahan Creek watershed. The offset work was completed in August 2009. The offset plan was submitted to EPA on May 8, 2008.

The offset will result in a net decrease of TSS and TDS load to Callahan Creek. The net reduction of load to the watershed will be as follows:

	TDS Waste Load	**TSS Waste Load**
Offset Balance	-1240742.55 kg/yr	-73096.92 kg/yr
Permit WLA	+252122.91 kg/yr	+14707.17 kg/yr
Total Remaining	-988619.64 kg/yr	-58389.75 kg/yr

BMPs are also proposed for reduction of TDS and TSS.

List of Appendices and Attachments

1. Appendix I: Effluent Screening
2. Appendix II: Evaluation of Water Quality Based Effluent Limitations
3. Appendix III: Evaluation of Alternate Effluent Limitations: Remining
4. Appendix IV: NPDES Major/Minor Permit Rating Worksheet
5. Attachment A – Factsheet/Monitoring Comment History

Appendix I. Effluent Screening/Representative Sampling:

The ten proposed outfalls for the Ison Rock Ridge permit can be divided into three categories based on the area controlled and whether the outfall is expected to discharge continuously, intermittently, or only in response to precipitation. The categories are bench basins, hollow fills in ephemeral reaches, and hollow fills in intermittent reaches. Discharges within each of the three categories are located in the same geological strata and receive precipitation runoff from the same sources. Due to the similarities between discharges within each classification, DMME is allowing representative sampling from one outfall of each class with the exception of the bench basins, which require no representative sampling as they seldom if ever discharge. Initial permit conditions will be imposed based on the representative data. Permit limits will be modified as appropriate at mid-term and /or renewal once discharge data is collected from the outfall when constructed. If any bench basins begin to have frequent discharges then representative sampling will be required for the bench basin(s) as well as any necessary permit limits..

In deciding which permit conditions are needed for a new or expanded discharge permit within TMDL watersheds, DMLR must perform a RP analysis. DMLR will also perform a RP analysis at permit mid-term and renewal. DMLR will consider whether the discharge will comply with the TMDL as a portion of the RP analysis. This analysis will be based primarily on the potential for the permit's individual sediment control structures to discharge, and upon the nature of the discharge, mining practices, including the geology, drainage area, etc.

Effluent Screening WET Analyses and/or WET Limits

When necessary due to the nature of a discharge, DMLR will assign WET screening requirements at representative outfalls within the watershed to begin within six months of mining disturbance for new or expanded discharges. These will be required when no representative WET screening data is available (Table 1). If representative data is available, DMLR will not require additional screening. At permit reissuance and mid-term, DMLR will use actual and representative WET and biological assessment data to determine, on a case-by-case basis, whether an existing discharge causes, has the RP to cause, or contributes to an excursion from the numeric or narrative water quality standards.

The collected WET assays will be utilized as a screening tool to conduct a RP analysis for effluent toxicity. Acute or chronic bioassays, as appropriate, will need to be utilized to measure WET in discharge samples for four consecutive quarters. Effluents demonstrating toxicity will receive appropriate WET limits for the discharge. Discharges not exhibiting toxicity will not receive WET limits. DMLR will review the need for WET analyses at mid-term and renewal. Characterization will need to be conducted by a qualified laboratory per DEQ protocol. WET assays will utilize standard WET testing organisms and toxicity will be determined utilizing the results from such testing.

Table 1
Effluent Screening Program
(new coal mine permit/modification or at permit mid-term/renewal)

Method	Initial Permit	Outfall construction	Mid-term and Renewal	Qualifier
WET	Representative discharge(s) identified in NPDES permit for each type of mining Ex. Bench basin, hollow fill, prep plant, dewatering	WET test of discharge for four consecutive quarters, to begin within 6 months of commencement of active mining operations relative to selected representative outfall (representative data may be used)	One test for each selected representative outfall (representative data may be used)	Continuous discharges (outfalls that have continuous discharge duration >5 days will require Chronic Outfall discharge duration ≤5 consecutive days will require Acute tests only.) WET limits will be applied to discharge if appropriate based on test results Continuous discharges for the purposes of this guidance are those that discharge 50% or more of the time and 5 consecutive days based on the submitted Discharge Monitoring Report (DMR).
Outfall Chemical	Selected representative discharges (representative data may be used) Ex. Bench basin, hollow fill, prep plant, dewatering	Sample collected from discharge, within 6 months of commencement of active mining operations relative to outfall	Selected representative outfall (representative data may be used)	Numeric effluent limits will be applied to discharge, if appropriate, based on analytical results after reopening permit
In-Stream Chemical	Receiving Streams Minimum monthly for six months for standard instream baseline parameters and once prior to start of operations for Table 2 parameters.	N/A	Receiving Streams	Can be coordinated with biological monitoring stations if appropriate

For both new and expanded discharge permits and existing permits at midterm and renewal, DMLR will document its RP assessment in the fact sheet for the permit. Where DMLR concludes that an existing outfall has a RP, the permit will be reopened to add WET limits in accordance with 40 CFR § 122.44(d) (1) (v). In cases where insufficient data is available to

make a determination of RP upon permit reissuance, the DMLR will place WET screening requirements and triggers in the permit.

WET Screening

When the DMLR assigns screening as described above, the permit writer will establish WET screening triggers using all applicable rules and guidance, including the EPA's 1991 *Technical Support Document for Water Quality-based Toxics Control* ("TSD").[1] In developing the WET trigger, the DMLR will consider the instream waste concentration of the effluent in the immediate receiving stream and calculate it so as to result in no greater than 1.0 chronic toxicity unit (TU_c) and 0.3 acute toxicity unit (TU_a) at the edge of the appropriate mixing zones, where applicable.

When needed, the permittee will need to perform WET screening for four consecutive quarters for representative outfalls. The TSD requires use of the most sensitive available surrogate organism (*Ceriodaphnia dubia*) for chronic toxicity testing of effluents in addition to *Pimephales promelas*. DMLR requires temperature, pH, dissolved oxygen, hardness, Total Dissolved Solids (TDS), conductivity, sulfate, and bicarbonate alkalinity analyses for each aliquot used in WET screening.

If WET screening shows an exceedance of the specified triggers prescribed in the permit, the permittee will need to resample and test the effluent within 30 days. If that test shows compliance, the permittee will need to continue WET screening in accordance with the permit requirements. However, if that test shows an exceedance, the permittee will need to, within 60 days, submit a toxicity reduction plan, as referenced in the Aquatic Protection Plan section, identifying actions it will take to achieve compliance with the WET triggers. If, after four additional consecutive quarters, the permittee is still exceeding WET triggers, the permittee will also need to submit a permit modification to place WET limits in the permit.

WET Limits

If the WET and biological assessment screening described above shows a RP, the DMLR will establish WET limits using all applicable rules and guidance, including the EPA's TSD.[2] To develop the WET limits, the DMLR will consider the instream waste concentration of the effluent in the immediate receiving stream and calculate it so as to result in no greater than 1.0 chronic toxicity unit (TU_c) and 0.3 acute toxicity unit (TU_a) at the edge of the appropriate mixing zones, where applicable.

The permittee will be required to perform WET testing at the assigned frequency identified in the permit. The TSD requires use of the most sensitive available surrogate organism (*Ceriodaphnia dubia*) for chronic toxicity testing of effluents in addition to *Pimephales promelas*. DMLR requires temperature, pH, dissolved oxygen, hardness, TDS, conductivity, sulfate, and bicarbonate alkalinity analyses for each aliquot used in WET testing.

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[1] EPA/505/2-90-001 PB91-127415
[2] Id.

If WET testing shows noncompliance with the specified limitations prescribed in the permit, the permittee will need to resample and test the effluent within 30 days. If the second test shows compliance, the permittee will need to continue WET testing in accordance with the permit requirements. However, if the second test shows noncompliance, the permittee will need to, within 60 days, conduct a Toxicity Reduction Evaluation (TRE)/Toxicity Identification Evaluation (TIE) analysis identifying actions it will take to achieve compliance with the WET discharge limitations.

Chemical Effluent Screening and Instream Chemical Analyses

In addition to what is currently required by technology based standards and identified TMDL stressors, the permit will require sampling for the parameters in Table 2 within 6 months of commencing the permitted activity, at mid-term, and at renewal for each representative outfall, and in receiving streams. The same sampling suite will be required for all established biological assessment stations ("BAS") semi-annually concurrently with aquatic surveys, as described below. All analyses and sample collection for representative discharges are to be conducted in accordance with requirements of 40 CFR 136. Metal analyses for these discharges will be required for total metals. Instream water quality standards are based on dissolved metal concentrations. If metal analyses concentrations exceed instream standards, the permittee will be asked to collect dissolved metal samples for those specific metals exceeding instream standards to confirm whether or not the standard has been met.

TABLE 2 - Parameters

Parameter
Flow (gpm)
Temperature (^{o}C)
pH (std units)
TSS (mg/L)
Specific Conductance (uS/cm)
TDS (mg/L)
Sulfates (mg/L)
Chlorides (mg/L)
Aluminum (mg/L)
Iron (mg/L)
Manganese (mg/L)
Magnesium (mg/L)
Total Acidity (mg/L)
Total Alkalinity (mg/L CaCO3)
Bicarbonate Alkalinity (mg/L)
Carbonate Alkalinity (mg/L)
Hardness (mg/L CaCO3)
Total Zinc (ug/L)
Total Antimony (ug/L)
Total Arsenic (ug/L)
Total Beryllium (ug/L)
Total Cadmium (ug/L)
Total Chromium (ug/L)
Total Copper (ug/L)
Total Lead (ug/L

TABLE 2 – Parameters (Continued)

Total Mercury (ug/L)
Total Nickel (ug/L)
Total Selenium (ug/L)
Total Silver (ug/L)
Total Thallium (ug/L)
Total Barium (µg/L)
Total Boron (µg/L)
Total Cobalt (µg/L)
Total Cyanide (µg/L)
Total Phenols (µg/L)
Nitrate (mg/L)
Nitrite (mg/L)
Dissolved Organic Carbon (mg/L)

Appendix II: Evaluation of Effluent Limitations

Sediment control structures and the associated NPDES outfalls for surface coal mining operations primarily receive precipitation runoff from mined areas and discharge in response to precipitation events. The ten proposed outfalls for the Ison Rock Ridge permit can be divided into three categories based on the area controlled and whether the outfall is expected to discharge continuously, intermittently, or only in response to precipitation. The categories are bench basins, hollow fills in ephemeral reaches, and hollow fills in intermittent reaches. Discharges within each of the three categories are located in the same geological strata and receive precipitation runoff from the same sources.

Regulations at 40 CFR 434 set forth technology based effluent limits for coal mining operations. Included in the regulation is an alternate effluent limit for TSS, manganese, and iron when increase in flow from a sediment control structure is due to precipitation. Discharges from this permit enter Callahan Creek and its tributaries and Looney Creek and its tributaries. The Callahan Creek TMDL has a TMDL and Looney Creek is within the Powell River watershed, which has a draft TMDL in review by EPA. Both TMDLs were modeled using a concentration of 70 mg/L for the TMDL mining waste load modeling, Therefore the alternate effluent limits for TSS are not appropriate and a maximum of 70 mg/L TSS is being applied to all outfalls in this permit for precipitation events up to the 10 year, 24 hour event. The alternate effluent limits for iron and manganese will remain.

Hollow fill - Continuous – Proposed outfalls C1, P1, L6, and L8. Effluent limits for this class of outfalls will include technology based effluent limits for pH, total iron, total Manganese, and TSS. Flow and TDS will be measured and reported. An acute effluent limit for Selenium of 20 μg/L will apply for those outfalls with intermittent discharges and a chronic limit of 5 μg/L will apply for those outfalls that develop into continuous discharges. Acute and chronic WET screening will be applied for four consecutive quarters. The results will be reviewed by DMLR to determine if WET limits will be necessary. WET limits will apply if screening results indicate toxicity. One additional WET Test will be required at mid-term and renewal at representative outfalls. Flow and TDS will be measured and reported. The TDS and TSS waste loads will comply with the aggregate mining waste load allocation of the TMDL taking into account offsets for this permit.

Hollow fill - Ephemeral – Proposed outfalls L3, and L5. Effluent limits for this class of outfalls will include technology based effluent limits for pH, total iron, total Manganese, and TSS. Flow and TDS will be measured and reported. The acute standard for Selenium of 20 μg/L will apply as an effluent limit. Acute WET screening will be applied for two consecutive semi-annual samples. The results will be reviewed by DMLR to determine if WET limits will be necessary. One additional WET Test will be required at mid-term and renewal at representative outfalls. Flow and TDS will be measured and reported. The TDS and TSS waste loads will comply with the aggregate mining waste load allocation of the TMDL taking into account offsets for this permit.

Bench Basins – Proposed outfalls P6, P7, L1, and L2. Effluent limits for this class of outfalls will include technology based effluent limits for pH, total iron, total Manganese, and TSS. The acute standard for Selenium of 20 μg/L will apply as an effluent limit. Flow and TDS will be measured and reported. The TDS and TSS waste loads will comply with the aggregate mining waste load allocation of the TMDL taking into account offsets for this permit.

Appendix III: Reasonable Potential Analysis

Callahan Creek, Looney Creek and their tributaries are the receiving streams for discharges from the proposed Ison Rock Ridge mining operation. Callahan Creek has an approved TMDL with the identified stressors of TDS and TSS. Looney Creek is located in the Powell River watershed and will be part of the TMDL developed for the Powell River, which has been submitted to the EPA for review. Both Callahan Creek and Looney Creek are Tier I streams. The Ison Rock Ridge application draws upon the TSS and TDS load credit generated by the HiTop mine offset and leads to a net reduction in these pollutants in the Callahan Creek watershed.

Instream monitoring data submitted with the permit application for Ison Rock Ridge indicates that selenium concentrations in Callahan Creek are at or near the chronic limit of 5 μg/L. Therefore, it is possible that discharges could contribute to an exceedance of the Virginia water quality criteria for selenium in Callahan Creek. The proposed discharges are all stormwater driven and have watershed areas less than one square mile. These discharges are not expected to be continuous or occur under drought conditions. Therefore, the acute standard for selenium of 20 μg/L will be utilized as an effluent limit on all discharges from this mining operation. If continuous discharges occur, mixing zone calculations will be conducted to determine whether chronic limits are needed.

In order to address the reasonable potential for TDS, the applicant is required to characterize representative discharges from the permit by conducting four quarters of WET tests. DMLR will evaluate the results of the WET tests to determine whether a WET limit will be necessary for the permit. In addition one additional WET Test will be required at mid-term and renewal at representative outfalls The applicant must also conduct annual benthic surveys as described below. This instream biological monitoring is required (including the downstream Looney and Callahan Creeks) for general water quality including TSS, TDS, conductivity, pH, and benthics and will address the narrative water quality standard.

Instream Biological Surveys

The DMLR will assign semi-annual biological monitoring downstream of the representative outfall, with initial sampling done prior to commencement of any permitted activity for new and expanded permits (Table 3). To ensure data quality/consistency and to minimize duplication of sampling efforts, the biological monitoring protocols defined in the DMLR Aquatic Species Specific Protection Measures (SSPM) should be followed for all instream surveys in areas covered by the SSPM. For other areas, the Virginia Stream Condition Index (VASCI) protocol may be used. In addition, all biologic sampling shall be done in accordance with the Virginia Department of Game and Inland Fisheries scientific collection permit requirements.

SSPM analysis will need to be adjusted to produce a VASCI score. In order to reconcile Kentucky protocols required in the SSPM, the DEQ has developed the following procedure:

- Conduct benthic sampling using Virginia benthic protocols including time of year restrictions for sample collection.

- Collect organisms, laboratory subsample to 300 organisms in a gridded pan.
- Identify organisms to genus level, excluding chironomids (midges).
- Collapse data to family level.
- Statistically rarify data to 100 organisms; computer subsampling programs available.
- Calculate the VASCI score.
- Provide raw 300 count genus-level data in electronic spreadsheet format.

The applicant is strongly encouraged to have a VADEQ approved Level III Quality Assurance Project Plan as well as laboratory and field standard operating procedures per the Virginia Citizen Water Quality Monitoring Program.

The permit will require the maintenance of acceptable ecosystem health in waters of the state. An applicant must submit a monitoring plan for agency approval that proposes instream BAS that allow a holistic assessment of the aquatic ecosystem and a determination of the impacts of the permitted activity.

Table 3.
Instream Biological Monitoring Program
(new coal mine permit/modification or at permit mid-term/renewal)

Monitoring target	**Years/ Frequency/ Seasonal window(s)[1]**	**Method(s)**	**Location(s)**
Invertebrates	0 – 5 / semi-annually / March 1 – May 31 and Sep. 1 – Nov. 30. With 2-week seasonal windows.	VASCI KYMBI[2] EKSAP[2]	One sample upstream of uppermost discharge site plus one site below the downstream-most NPDES outfall in each affected watershed. Applies to intermittent and perennial streams.
Fish	0,2, 4/ once per year / July 15 – November 15	TVA IBI KIBI for Big Sandy Basin	Below point where all drainage from the permit area passes. Perennial streams only.
Habitat	0 – 5/ concurrent with biomonitoring	EPA RBP	At each Aquatic Biological Station. Adjacent ephemeral reaches should also be included.
In-stream surface water chemistry	Years 0 – 5/ once per year/ concurrent with biomonitoring	EPA Table 2 parameters	Fish and Invertebrate Sites

1. Year 0 is baseline, pre-project. If no adverse impacts to streams are detected during the initial 5 year monitoring period and the permit is renewed, fish, invertebrate, and instream surface and sediment chemistry monitoring should be repeated at the appropriate frequency only during the year of the midterm review.
2. If other indices are used, VASCI score must also be included.

The applicant should work with the DMLR staff to establish a monitoring strategy with the most appropriate monitoring locations for a holistic evaluation of the aquatic ecosystem. The applicant will need to submit to DMLR for approval, a monitoring plan that is consistent with Virginia regulatory requirements.

- An instream BAS should be located at the first appropriate riffle/run habitat downstream of each new outfall in a perennial stream segment. Ideally, the BAS will be located such that future impacts to the stream are attributable solely to the permitted activity.
- Additional stations should be situated on a site-specific basis, but generally should be located upstream and downstream of the confluence of the immediate receiving stream and the stream into which it drains, which allows the aquatic ecosystem's health to be assessed in its entirety.
- If the first available location for a BAS is potentially influenced by other watershed activities and stressors, then a clear linkage between the permit controls and biological condition at the station may not be possible. Those scenarios will require baseline documentation of the other potential stressors and tracking of watershed activities over time. The applicant will also have to submit a monitoring plan in accordance with the provisions set forth in "Chemical Monitoring" above.
- Additional monitoring stations may be designated further upstream or downstream at points that are useful in determining the entire aquatic ecosystem's health. Such stations may be beneficial in identifying actions the applicant can take to improve the overall health of the aquatic ecosystem.
- Based on benthic data from the central Appalachian region, headwater catchments of over 75 acres should be able to yield at least 300 organisms in riffle habitats. Permit writers will consider whether use of fewer than 300 organisms is appropriate for headwater catchments draining less than 75 acres.
- The plan should include chemical and biological monitoring at the BAS prior to the start of the permitted activity.

If the aquatic ecosystem at the assessment stations, prior to initiation of the permitted activity, is not impaired based on the VASCI score, then the acceptable future biological condition will be a VASCI score greater than or equal to 60. In determining whether a lower VASCI score represents an unacceptable condition, the DMLR will utilize best professional judgment, including a holistic examination of the health of the aquatic ecosystem.

If the aquatic ecosystem at the assessment stations, prior to initiation of the permitted activity, is impaired based on the VASCI score, then the applicant will need to identify existing conditions within the watershed that may be contributing to the problem. A VASCI score greater than or equal to the baseline value or compliance with TMDL requirements would represent an acceptable future condition.

Aquatic Protection Plan

DMLR issues a combined SMCRA and NPDES permit. For all mining permit applications proposing new and expanded discharges, an Aquatic Protection Plan (APP) for DMLR review

and approval will need to be included in the combined permit. The plan is a preventative and predictive plan intended to reduce impacts. An APP describes the potential control measures the applicant would implement to minimize adverse biological impacts to the aquatic ecosystem surrounding the permitted activity. The plan should also include controls designed to lower the magnitude of pollutant loading associated with mining activities. If the agency cannot conclude that the proposed measures are reasonably expected to result in compliance, then the permit will not be issued.

The applicant should consider all appropriate options when selecting and implementing control measures. If WET limits are imposed as a result of effluent screening and those limits are not met, the applicant will need to amend its APP to include additional measures that enable it to comply with WET limits. This amended plan will need to include, at a minimum, a Toxicity Reduction Evaluation (TRE)/Toxicity Identification Evaluation (TIE) plan and schedule to obtain compliance with final effluent limits or triggers for chronic toxicity. For guidance in conducting a TRE/TIE study, the permittee should reference EPA's TSD. The TRE/TIE may identify toxic parameters associated with the effluent, and appropriate effluent limitations may need to be developed in accordance with 9VAC25-31-220(D) (1).

The applicant can implement any of a number of controls in an attempt to protect the aquatic ecosystem and to reduce or minimize the ionic strength in the stream. Some examples of control measures that may be included in the APP include, but are not limited to, the following:

- Test overburden to determine the material that contains sulfur or other ionic strength-bearing material, so it can be isolated through material handling;
- Minimize the amount of area disturbed at one time;
- Minimize stormwater contact with pulverized material;
- Increase stream buffer zones;
- Minimize fill areas;
- Cap fills and spoil so as to minimize pass-through of rain water;
- Revegetate any disturbed areas to minimize runoff;
- Develop a plan to reduce or prevent ionic stress;
- If necessary, conduct TRE/TIE pursuant to EPA's TSD;
- Weathered rock segregation and return to surface;
- Expedited reclamation;
- Enhanced riparian plantings;
- Natural stream restoration.

Appendix IV: Evaluation of Alternate Effluent Limitations: Remining

Not requested.

Appendix V: NPDES Major/Minor Permit Rating Worksheet

NPDES Permit Rating Worksheet

Date:
DMLR Application No: 1003841
DMLR Permit No:
VPDES Permit No:

FACTOR 1 Toxic Pollutant Potential

Does this permit have a prep plant?		Toxicity Group	Points
	yes	6	30
	no	5	25
	Score		25

FACTOR 2 Flow/Stream Flow Volume

Coal industry discharges are always Type III

What is sum of average discharges for each outfall for permit?

	Code	Points
Flow<1MGD	31	0
Flow1 to 5MGD	32	10
Flow>5 to 10MGD	33	20
Flow>10MGD	34	30
Score		0

FACTOR 3 Conventional Pollutants

Calculate TSS load for sum of all outfalls on permit

FLOW (gpm)	374.4
Concentration (mg/L)	35
Days	1
Load (lbs per day)	32.46218182

Compare Load to ranges

	Code	Points
<100 lbs/day	1	0
100 to 1000 lbs/day	2	5
>1000 to 5000 lbs/day	3	15
>5000 lbs/day	4	20
Score		0

FACTOR 4 Public Health Impact

Is a public drinking water intake located within 50 miles downstream of discharge?

	Points
no	0
yes	See below

If yes, is facility an UNDERGROUND mine prep plant?

	Code	Points
no	5	5
yes	6	10
Score		5

FACTOR 5 Water Quality Factors

A - Is (or will) one or more of the effluent discharge limits based on water quality factors of the receiving stream (rather than technology-based federal effluent guidelines, or technology-based state effluent guidelines), or has a wasteload allocation been assigned to the discharge?

	Code	Points
Yes	1	10
No	2	0
Score		10

B - Is the receiving water in compliance with applicable water quality standards for pollutants that are water quality limited in the permit?

	Code	Points
Yes	1	0
No	2	5
Score		5

C - Does the effluent discharged from this facility exhibit the reasonable potential to violate water quality standards due to whole effluent toxicity?

	Code	Points
Yes	1	10
No	2	0
Score		0

FACTOR 6 Proximity to Near Coastal Waters **Points** 0

SCORE SUMMARY

FACTOR 1	25
FACTOR 2	0
FACTOR 3	0
FACTOR 4	5
FACTOR 5	15
FACTOR 6	0
TOTAL	45

Attachment A. <u>Factsheet/Monitoring Comment History</u>

COMMONWEALTH OF VIRGINIA
Department of Mines, Minerals and Energy
Division of Mined Land Reclamation

NPDES Permit Number:
Associated CSMO Permit Number
Permit Application Number 1003841

Permit Original Issue Date:
Permit Effective Date: *pending*
Expiration Date: *pending*

AUTHORIZATION TO DISCHARGE UNDER THE
VIRGINIA POLLUTANT DISCHARGE ELIMINATION SYSTEM
AND
THE VIRGINIA STATE WATER CONTROL LAW

Pursuant to Authority under Section 45.1 -254 of the Code of Virginia, as amended, and the Virginia Pollutant Discharge Elimination System (VPDES) Regulation, Part X - Delegation of Authority to the Department of Mines, Minerals and Energy for Coal Surface Mining Operations (9VAC25-31-940), the following owner is authorized to discharge from the facility listed below in compliance with the provisions of the Clean Water Act as amended and pursuant to the State Water Control Law and regulations adopted pursuant thereto and in accordance with the effluent limitations, monitoring requirements, and other conditions set forth in Sections A, B, C, and D of this permit and the plans and requirements found in joint CSMO/NPDES permit number **110XXXX/008XXXX** and any and all subsequent approved permitting actions. For the purpose of this permit, NPDES and VPDES permits are synonymous.

Owner:	A & G Coal Corporation
Facility Name:	Ison Rock Ridge Surface Mine
City:	Appalachia
County:	Wise
Facility Location:	State Rt. 78, Andover, Virginia.

The owner is authorized to discharge to the following receiving streams:

Receiving Stream: Callahan Creek	Receiving Stream: Looney Creek
Basin: Tennessee - Big Sandy	Basin: Tennessee - Big Sandy
Subbasin: Clinch River	Subbasin: Clinch
Section: 1	Section: 1
Class: IV	Class: IV
Special Standards: None	Special Standards: None

_____
Director, Division of Mined Land Reclamation

_____
Date

Permit Contents

The complete joint CSMO/NPDES permit consists of the following:

I. The approved CSMO/NPDES Permit Application, and any and all subsequent approved permit revisions, renewals, midterms, anniversary reports, completion reports, and DMLR administrative actions.

II. The CSMO/NPDES Permit Document, including
Permit Face Sheet
Section A – Effluent Limitations and Monitoring Requirements
Section B – Schedule of Compliance (if applicable)
Section C – Standard Terms and Conditions
Section D – Other Requirements

III. The CSMO/NPDES Factsheet Document

Facility Information

Permittee Name: A & G COAL CORPORATION
Address: P. O. BOX 1010
City: WISE **State:** VA **Zip:** 24293
Facility: ISON ROCK RIDGE SURFACE MINE
Total permit acres: 1229.86

Application Information:

Application Type: NEW CSMO/NPDES
Application Description – Nature of Discharger: New Surface Contour/Area/Auger Permit.

NPDES Outfall Description:

NPDES outfalls associated with this permit result from the control of surface water runoff resulting from precipitation and/or groundwater discharges associated with coal mining activities. Treatment facilities may include sedimentation structures, chemical treatment such as the addition of neutralizing agents or flocculants, or no treatment (in the case of direct discharge of underground mine drainage when treatment is not required to meet applicable effluent limitations). The following details describe the treatment facility or source (reference the Facility Location field) associated with each approved outfall. Specific information regarding each outfall and facility is found in Section V and Section XII of the CSMO/NPDES permit.

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning with the permit's effective date and lasting until the permit's expiration date, the permittee is authorized to discharge storm water runoff from outfall serial numbers **P6, P7, L1, and L2**.

Such discharges shall be limited and monitored by the permittee as specified below:

EFFLUENT CHARACTERISTICS	DISCHARGE LIMITATION				MONITORING REQUIREMENTS	
	Monthly Average	Weekly Average	Minimum	Maximum	Frequency	Sample Type
Flow (MGD)	NL	NA	NA	NL	2/ Month*	Estimate
pH (standard units)	NA	NA	6.0	9.0	2/ Month*	Grab
Total Suspended Solids	35 mg/l	NA	NA	70 mg/l	2/ Month*	Grab
Total Dissolved Solids	NL	NA	NA	NL	2/ Month*	Grab
Total Iron	3.0 mg/l	NA	NA	6.0 mg/l	2/ Month*	Grab
Total Manganese	2.0 mg/l	NA	NA	4.0 mg/l	2/ Month*	Grab
Total Recoverable Selenium	20 µg/l	NA	NA	20 µg/l	1/ Month*	Grab

NL= No Limitation, monitoring required
NA= Not Applicable

Discharges shall comply with all elements of Virginia's narrative water quality standards.
There shall be no discharge of floating solids or visible foam in other than trace amounts.
Alternate Effluent limitations apply as described in section D, (KK).
Samples are to be collected at least seven (7) days apart.

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

2. During the period beginning with the permit's effective date and lasting until the permit's expiration date, the permittee is authorized to discharge storm water from outfall serial numbers **L3 & L5**.

Such discharges shall be limited and monitored by the permittee as specified below:

EFFLUENT CHARACTERISTICS	DISCHARGE LIMITATION				MONITORING REQUIREMENTS	
	Monthly Average	Weekly Average	Minimum	Maximum	Frequency	Sample Type
Flow (MGD)	NL	NA	NA	NL	2/ Month*	Estimate
Total Suspended Solids	35 mg/l	NA	NA	70 mg/l	2/ Month*	Grab
Total Dissolved Solids	NL	NA	NA	NL	2/ Month*	Grab
Total Iron	3.0 mg/l	NA	NA	6.0 mg/l	2/ Month*	Grab
Total Manganese	2.0 mg/l	NA	NA	4.0 mg/l	2/ Month*	Grab
Total Recoverable Selenium	20 µg/l	NA	NA	20 µg/l	2/ Month*	Grab
Acute Whole Effluent Toxicity	NA	NA	NA	NL	1/3 Months	Grab

NL= No Limitation, monitoring required
NA= Not Applicable

There shall be no discharge of floating solids or visible foam in other than trace amounts.
Discharges shall comply with all elements of Virginia's narrative water quality standards.
Alternate Effluent limitations apply as described in Section D, (KK).
See Section A (B) for additional monitoring and reporting requirements.
See Section A (C) for additional requirements regarding Whole Effluent Toxicity monitoring requirements.
*Samples are to be collected at least seven (7) days apart.

A. LIMITATIONS AND MONITORING REQUIREMENTS

3. During the period beginning with the permit's effective date and lasting until the permit's expiration date, the permittee is authorized to discharge storm water from outfall serial numbers: **P1, C1, L6 & L8**

Such discharges shall be limited and monitored by the permittee as specified below:

EFFLUENT CHARACTERISTICS	DISCHARGE LIMITATION				MONITORING REQUIREMENTS	
	Monthly Average	Weekly Average	Minimum	Maximum	Frequency	Sample Type
Flow (MGD)	NL	NA	NA	NL	2/ Month*	Estimate
Total Suspended Solids	35 mg/l	NA	NA	70 mg/l	2/ Month*	Grab
Total Dissolved Solids	NL	NA	NA	NL	2/ Month*	Grab
Conductivity	NL	NA	NA	NL	2/ Month*	Grab
Total Iron	3.0 mg/l	NA	NA	6.0 mg/l	2/ Month*	Grab
Total Manganese	2.0 mg/l	NA	NA	4.0 mg/l	2/ Month*	Grab
Total Recoverable Selenium	20 µg/l	NA	NA	20 µg/l	2/ Month*	Grab
Acute Whole Effluent Toxicity	NA	NA	NA	NL	1/3 Months*	Grab
Chronic Whole Effluent Toxicity	NA	NA	NA	NL	1/3 Months*	Grab

NL= No Limitation, monitoring required
NA= Not Applicable

There shall be no discharge of floating solids or visible foam in other than trace amounts.
Alternate Effluent limitations apply as described in Section D, (KK).
Discharges shall comply with all elements of Virginia's narrative water quality standards.
See Section A (B) for additional monitoring and reporting requirements.
See Section A (C) for additional requirements regarding Whole Effluent Toxicity monitoring requirements.
*Samples are to be collected at least seven (7) days apart.

B. OTHER REQUIREMENTS

The term Department refers to the Virginia Department of Mines, Minerals, and Energy

1. This permit shall be modified, or alternatively revoked and reissued, to comply with any applicable effluent standard, limitation or prohibition for a pollutant which is promulgated or approved under Section 307(a)(2) of the Clean Water Act, if the effluent standard, limitation, or prohibition so promulgated or approved:

    a. Is more stringent than any effluent limitation on the pollutant already in the permit; or

    b. Controls any pollutant not limited in the permit.

2. This permit shall be modified or alternatively revoked and reissued if any approved wasteload allocation procedure, pursuant to Section 303(d) of the Clean Water Act, imposes wasteload allocations, limits or conditions on the facility that are not consistent with the permit requirements.

3. Should effluent monitoring indicate the need for any water quality-based limitations, this permit may be modified or alternatively revoked and reissued to incorporate appropriate limitations.

4. The permittee shall notify the Department as soon as they know or have reason to believe:
    a. That any activity has occurred or will occur which would result in the discharge, on a routine or frequent basis, of any toxic pollutant which is not limited in this permit, if that discharge will exceed the highest of the following notification levels:
        (1) One hundred micrograms per liter;
        (2) Two hundred micrograms per liter for acrolein and acrylonitrile; five hundred micrograms per liter for 2,4-dinitrophenol and for 2-methyl-4,6-dinitrophenol; and one milligram per liter for antimony;
        (3) Five times the maximum concentration value reported for that pollutant in the permit application; or
        (4) The level established by the Board.
    b. That any activity has occurred or will occur which would result in any discharge, on a nonroutine or infrequent basis, of a toxic pollutant which is not limited in this permit, if that discharge will exceed the highest of the following notification levels:
        (1) Five hundred micrograms per liter;
        (2) One milligram per liter for antimony;
        (3) Ten times the maximum concentration value reported for that pollutant in the permit application; or
        (4) The level established by the Board.

5. Any and all product, materials, industrial wastes, and/or other wastes resulting from the purchase, sale, mining, extraction, transport, preparation, and/or storage of raw or intermediate materials, final product, by-product or wastes, shall be handled, disposed of, and/or stored in such a manner and consistent with Best Management Practices, so as not to permit a discharge of such product, materials, industrial wastes, and/or other wastes to State waters, except as expressly authorized.

6. The permittee shall monitor the effluent that is representative of outfalls **P1, C1, L6 and L8**, and a sample that is representative of outfalls **L3 and L5** for the substances noted in **Table 1, "Water Quality Criteria Monitoring"** according to the indicated analysis number, quantification level, sample type and frequency. The monitoring shall begin within six months of completion of construction of the first sedimentation basin serving any of these each of these two groups of outfall locations, or as soon as a measurable discharge occurs. Sampling and analysis of the representative outfalls is also required at permit midterm and renewal.

   The data shall be submitted with the discharge monitoring report for the final month of the calendar quarter in which the sampled discharge occurred. The data shall also be submitted with the materials required for midterm review and permit reissuance.

   Monitoring and analysis shall be conducted in accordance with 40 CFR Part 136 or alternative EPA approved methods. It is the responsibility of the permittee to ensure that proper QA/QC protocols are followed during the sample gathering and analytical procedures. The Department will use these data for making specific permit decisions in the future. This permit may be modified or, alternatively, revoked and reissued to incorporate limits for any of the substances listed in Table 1.

7. The permittee shall comply with the following reporting requirements for all Section.A monitoring:

   a. The quantification levels (QL) shall be less than or equal to the following concentrations:

Effluent Parameter	Quantification Level
TSS	1.0 mg/l
TDS	1.0 mg/l
Iron	1.0 mg/l
Manganese	1.0 mg/l
Selenium	2.5 ug/l

   The QL is defined as the lowest concentration used to calibrate a measurement system in accordance with the procedures published for the method. It is the responsibility of the permittee to ensure that proper quality assurance/quality control (QA/QC) protocols are followed during the sampling and analytical procedures. QA/QC information shall be documented to confirm that appropriate analytical procedures have been used and the required QLs have been attained. The permittee shall use any method in accordance with Section C of this permit.

   b. **Monthly Average** -- Compliance with the monthly average limitations and/or reporting requirements for the parameters listed in subsection a. of this permit condition shall be determined as follows: All concentration data below the QL used for the analysis (QL must be less than or equal to the QL listed in a. above shall be treated as zero. All concentration data equal to or above the QL used for the analysis (QL must be less than or equal to the QL listed in a. above) shall be treated as it is reported. An arithmetic average shall be calculated using all

reported data for the month, including the defined zeros. This arithmetic average shall be reported on the Discharge Monitoring Report (DMR) as calculated. If all data are below the QL used for the analysis (QL must be less than or equal to the QL listed in a. above), then the average shall be reported as "<QL". If reporting for quantity is required on the DMR and the reported monthly average concentration is <QL, then report "<QL" for the quantity. Otherwise use the reported concentration data (including the defined zeros) and flow data for each sample day to determine the daily quantity and report the monthly average of the calculated daily quantities.

Daily Maximum -- Compliance with the daily maximum limitations and/or reporting requirements for the parameters listed in subsection a. of this permit condition shall be determined as follows: All concentration data below the QL used for the analysis (QL must be less than or equal to the QL listed in a. above) shall be treated as zero. All concentration data equal to or above the QL used for the analysis (QL must be less than or equal to the QL listed in a. above) shall be treated as reported. An arithmetic average shall be calculated using all reported data, including the defined zeros, collected within each day during the reporting month. The maximum value of these daily averages thus determined shall be reported on the DMR as the Daily Maximum. If all data are below the QL used for the analysis (QL must be less than or equal to the QL listed in a. above), then the maximum value of the daily averages shall be reported as "<QL". If reporting for quantity is required on the DMR and the reported daily maximum is <QL, then report "<QL" for the quantity. Otherwise use the reported daily average concentrations (including the defined zeros) and corresponding daily flows to determine daily average quantities and report the maximum of the daily average quantities during the reporting month.

Single Datum - Any single datum required shall be reported as "<QL" if it is less than the QL used in the analysis (QL must be less than or equal to the QL listed in a. above). Otherwise the numerical value shall be reported.

c. **Significant Digits --** The permittee shall report at least the same number of significant digits as the permit limit for a given parameter. Regardless of the rounding convention used by the permittee (i.e., 5 always rounding up or to the nearest even number), the permittee shall use the convention consistently, and shall ensure that consulting laboratories employed by the permittee use the same convention.

C. WHOLE EFFLUENT TOXICITY TESTING:

1. Acute Monitoring: Outfalls [**L3 & L5**]

a. Commencing within 6 months of completion of the construction of the first referenced sediment basins listed above, the permittee shall perform quarterly acute toxicity tests until there are a minimum of 4 for each test required. The permittee shall collect representative grab samples from the first outfall to discharge active mine drainage (reference NPDES Definitions, (B)). The acute tests to use are:

48 Hour Static Acute test with *Ceriodaphnia dubia* (EPA Method 2002)
48 Hour Static Acute test with *Pimephales promelas* (EPA Method 2000)

These acute tests are to be conducted using 5 geometric dilutions of effluent with a minimum of 4 replicates, with 5 organisms in each. The NOAEC (No Observed Adverse Effect Concentration), as determined by hypothesis testing, shall be reported on the DMR. The LC_{50} should also be determined and noted on the submitted report. Tests in which control survival is less than 90% are not acceptable.

b. The test dilutions should be able to determine compliance with the following endpoint:

NOAEC = 100%

c. The permittee shall submit the following information with the results of the toxicity tests:

(1) An estimate of the total volume discharged and the duration of the discharge.
(2) The time at which the discharge was initiated.
(3) The time at which sampling was initiated.

d. The permittee may provide additional samples to address data variability during the period of initial data generation. These data shall be reported and may be included in the evaluation of effluent toxicity. Test procedures and reporting shall be in accordance with the WET testing methods cited in 40 CFR 136.3.

e. The test data will be evaluated by statistically for reasonable potential at the conclusion of the test period. The data may be evaluated sooner if requested by the permittee, or if toxicity has been noted. Should evaluation of the data indicate that a limit is needed, a WET limit and compliance schedule will be required and the toxicity tests of A.1. may be discontinued.

f. If after evaluating the data, it is determined that no limit is needed, the permittee shall continue acute toxicity testing (both species) of each outfall annually, as on the reporting schedule contained in Item B. below. All applicable data will be reevaluated for reasonable potential at the end of the permit term.

g. The permit may be modified or revoked and reissued to include pollutant specific limits in lieu of a WET limit should it be demonstrated that toxicity is due to specific parameters. The pollutant specific limits must control the toxicity of the effluent.

2. Acute and Chronic Monitoring: Outfalls [**P1, C1, L6 & L8**]

a. Commencing within 6 months of completion of the construction of the first referenced sediment basins listed above the permittee shall perform quarterly acute and chronic toxicity tests until there are a minimum of 4 for each test required. The permittee shall collect representative grab samples from the first outfall to discharge active mine drainage (reference NPDES Definitions, (B)). The acute tests to use are:

48 Hour Static Acute test with *Ceriodaphnia dubia* (EPA Method 2002)
48 Hour Static Acute test with *Pimephales promelas* (EPA Method 2000)

These acute tests are to be conducted using 5 geometric dilutions of effluent with a minimum of 4 replicates, with 5 organisms in each. The NOAEC (No Observed Adverse Effect Concentration), as determined by hypothesis testing, shall be reported on the DMR. The LC_{50} should also be determined and noted on the submitted report. Tests in which control survival is less than 90% are not acceptable. The chronic tests to use are:

Chronic 3-Brood Survival and Reproduction Static Renewal Test with Ce*riodaphnia dubia* (EPA Method 1002)

Chronic 7-Day Survival and Growth Static Renewal Test with *Pimephales promelas* (EPA Method 1000)

These chronic tests shall be conducted in such a manner and at sufficient dilutions (minimum of five dilutions, derived geometrically) to determine the "No Observed Effect Concentration" (NOEC) for survival and reproduction or growth. Results which cannot be quantified (i.e., a “less than” NOEC value) are not acceptable, and a retest will have to be performed. A retest of a non-acceptable test must be performed during the same compliance period as the .test it is replacing. Express the test NOEC as TUc (Chronic Toxic Units), by dividing 100/NOEC for DMR reporting. Report the LC50 at 48 hours and the IC25 with the NOEC’s in the test report.

b. The test dilutions should be able to determine compliance with the following endpoint:

Acute NOAEC = 100%
Chronic NOEC of 69% equivalent to a TU_C of 1.44

c. The permittee shall submit the following information with the results of the toxicity tests:

(1). An estimate of the total volume discharged and the duration of the

discharge.
(2). The time at which the discharge was initiated.
(3). The time at which sampling was initiated.

d. The permittee may provide additional samples to address data variability during the period of initial data generation. These data shall be reported and may be included in the evaluation of effluent toxicity. Test procedures and reporting shall be in accordance with the WET testing methods cited in 40 CFR 136.3.

e The test data will be evaluated by statistically for reasonable potential at the conclusion of the test period. The data may be evaluated sooner if requested by the permittee, or if toxicity has been noted. Should evaluation of the data indicate that a limit is needed, a WET limit and compliance schedule will be required and the toxicity tests of A.1. may be discontinued.

f. If after evaluating the data, it is determined that no limit is needed, the permittee shall continue acute and chronic toxicity testing (both species) of each outfall annually, as on the reporting schedule contained in Item B. below. All applicable data will be reevaluated for reasonable potential at the end of the permit term.

g. The permit may be modified or revoked and reissued to include pollutant specific limits in lieu of a WET limit should it be demonstrated that toxicity is due to specific parameters. The pollutant specific limits must control the toxicity of the effluent.

3. Reporting Schedule:

The permittee shall report the results of the toxicity tests on the appropriate DMR or other methods prescribed by the Department and supply one copy of the toxicity test reports specified in this Whole Effluent Toxicity Program. This data is to be provided within 30 days following the end of the calendar quarter in which the analysis was completed.

D. EVALUATION OF TMDL COMPLIANCE:

Outfalls, C1, P1, P6, and P7 are subject to the annual waste load allocation of 182,500 Kg/yr for TSS and 2,610,000 Kg/yr for TDS from the Callahan Creek TMDL. Outfalls, L1, L2, L3, L5, L6, and L8 are subject to a waste load allocation of 7,416,930 Kg/yr for TSS from the Powell River TMDL.

DMLR shall calculate the waste load allocation and provide notice to the permittee of any exceedance of the waste load allocation by March 31 of each year for the previous calendar year. Should the permittee discharge loading exceed the allowable waste load allocation, the permittee shall submit a plan and schedule for reducing the loading to the watershed within 60 days of the notice by the Department.

The discharges from this permit will be compared to the current mining waste load for the Callahan Creek watershed on an aggregate basis. The mining waste load estimated for this permit has been estimated and determined that an offset of the entire estimated mining waste load was needed. DMLR calculated the waste load allocations based on the offset that the permittee has completed through restoration of the HiTop slide.

If the aggregate mining waste load in the watershed exceeds the mining waste load allocation plus offsets, then this permit will be subject to DMLR's Watershed Waste Load Reduction Actions. Additionally, if this permittee is determined to be a major contributor, then additional waste load reduction actions as determined by DMLR will be necessary.

E. STREAM MONITORING CONDITIONS:

1. To ensure protection of sensitive species and to evaluate compliance with the narrative water quality standard, biological surveys (as outlined in the DMLR Aquatic Species Specific Protection Measures) utilizing accepted protocols are to be conducted semi-annually to determine the benthic health of Looney Creek, Preacher Creek and Callahan Creek as outlined in the joint CSMO/NPDES permit.

   To ensure data quality/consistency and to minimize sampling efforts, the biological monitoring protocols defined in the DMLR Aquatic Species Specific Protection Measures (SSPM) should be followed for all instream surveys. In addition, all biologic sampling shall be done in accordance with the Virginia Department of Game and Inland Fisheries scientific collection permit and DEQ's Virginia Stream Condition Index ("VASCI") protocol. In order to reconcile Kentucky protocols required in the SSPM, the DEQ has developed the following procedure.

   - Conduct benthic sampling using Virginia benthic protocols including time of year restrictions for sample collection.
   - Collect organisms, laboratory subsample to 300 organisms in a gridded pan.
   - Identify organisms to genus level, excluding chironomids (midges)
   - Collapse data to family level
   - Statistically rarify data to 100 organisms; computer subsampling programs available.
   - Calculate the VASCI score
   - Provide raw 300 count genus-level data in electronic spreadsheet format.

2. To ensure protection of sensitive species and to evaluate compliance with the numeric water quality standards, the permittee shall conduct surface water monitoring at instream locations identified in the Aquatic Protection Plan.

   The permittee has the option of conducting metals analyses for total metals only even though instream water quality standards are based on dissolved metal concentrations. If total metal analyses concentrations exceed instream standards, the permittee may collect dissolved metal samples for those metals exceeding instream standards to confirm whether or not the instream standard has been met. Otherwise the total metals concentration will be used to determine compliance with the instream standard.

   TABLE 1 - Parameters

   Parameter
   Flow (gpm)
   Temperature (^{o}C)
   pH (std units)
   TSS (mg/L)
   Specific Conductance (uS/cm)
   TDS (mg/L)
   Sulfates (mg/L)
   Chlorides (mg/L)
   Aluminum (mg/L)
   Iron (mg/L)
   Manganese (mg/L)

TABLE 1 – Parameters (cont.)

Parameter

Magnesium (mg/L)
Total Acidity (mg/L)
Total Alkalinity (mg/L CaCO3)
Bicarbonate Alkalinity (mg/L)
Carbonate Alkalinity (mg/L)
Hardness (mg/L CaCO3)
Total Zinc (ug/L)
Total Antimony (ug/L)
Total Arsenic (ug/L)
Total Beryllium (ug/L)
Total Cadmium (ug/L)
Total Chromium (ug/L)
Total Copper (ug/L)
Total Lead (ug/L)
Total Mercury (ug/L)
Total Nickel (ug/L)
Total Selenium (ug/L)
Total Silver (ug/L)
Total Thallium (ug/L)
Total Barium (µg/L)
Total Boron (µg/L)
Total Cobalt (µg/L)
Total Cyanide (µg/L)
Total Phenols (µg/L)
Nitrate (mg/L)
Nitrite (mg/L)
Dissolved Organic Carbon (mg/L)

3. The data provided to satisfy Section A will be evaluated upon each review, major modification and permit renewal to determine the facility compliance with the narrative and numeric water quality standards. Should any of the data indicate that the discharges from this operation cause or contribute to a potential violation of either a numeric or narrative water quality standard, additional pollutant specific limits or whole effluent toxicity limits shall be imposed.

Section B
Schedule of Compliance

No schedule of compliance is required for this permit.

Section C
Standard NPDES Permit Terms and Conditions

The term Department refers to the Virginia Department of Mines, Minerals, and Energy.

A. Monitoring.

1. Samples and measurements taken as required by this permit shall be representative of the monitored activity.

2. Monitoring shall be conducted according to procedures approved under Title 40 Code of Federal Regulations Part 136 or alternative methods approved by the U.S. Environmental Protection Agency, unless other procedures have been specified in this permit.

3. The permittee shall periodically calibrate and perform maintenance procedures on all monitoring and analytical instrumentation at intervals that will ensure accuracy of measurements.

B. Records.

1. Records of monitoring information shall include:
   a. The date, exact place, and time of sampling or measurements;
   b. The individual(s) who performed the sampling or measurements;
   c. The date(s) and time(s) analyses were performed;
   d. The individual(s) who performed the analyses;
   e. The analytical techniques or methods used; and
   f. The results of such analyses.

2. Except for records of monitoring information required by this permit related to the permittee's sewage sludge use and disposal activities, which shall be retained for a period of at least five years, the permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of the sample, measurement, report or application. This period of retention shall be extended automatically during the course of any unresolved litigation regarding the regulated activity or regarding control standards applicable to the permittee, or as requested by the Department.

C. Reporting Monitoring Results.

1. The permittee shall submit the results of the monitoring required by this permit not later than 30 days following the quarter in which monitoring takes place, unless another reporting schedule is specified elsewhere in this permit. Monitoring results shall be submitted to:

   Virginia Department of Mines, Minerals, and Energy
   Attn: Water Quality Section
   P.O. Drawer 900
   Big Stone Gap, VA 24219

2. Monitoring results shall be reported on a Discharge Monitoring Report (DMR) or on forms provided, approved or specified by the Department.

3. If the permittee monitors any pollutant specifically addressed by this permit more frequently than required by this permit using test procedures approved under Title 40 of the Code of Federal Regulations Part 136 or using other test procedures approved by the U.S. Environmental Protection Agency or using procedures specified in this permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DMR or reporting format specified by the Department, including electronic submittal.

4. Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified in this permit.

D. Duty to Provide Information.

The permittee shall furnish to the Department, within a reasonable time, any information which the Department may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The Department may require the permittee to furnish, upon request, such plans, specifications, and other pertinent information as may be necessary to determine the effect of the wastes from his discharge on the quality of state waters, or such other information as may be necessary to accomplish the purposes of the State Water Control Law. The permittee shall also furnish to the Department upon request, copies of records required to be kept by this permit.

E. Compliance Schedule Reports.

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date.

F. Unauthorized Discharges.

Except in compliance with this permit, or another permit issued by the Department, it shall be unlawful for any person to:

1. Discharge into state waters sewage, industrial wastes, other wastes, or any noxious or deleterious substances; or

2. Otherwise alter the physical, chemical or biological properties of such state waters and make them detrimental to the public health, or to animal or aquatic life, or to the use of such waters for domestic or industrial consumption, or for recreation, or for other uses.

G. Reports of Unauthorized Discharges.

Any permittee who discharges or causes or allows a discharge of sewage, industrial waste, other wastes or any noxious or deleterious substance into or upon state waters in violation of Section C

(F); or who discharges or causes or allows a discharge that may reasonably be expected to enter state waters in violation of Section C (F), shall notify the Department of the discharge immediately upon discovery of the discharge, but in no case later than 24 hours after said discovery. A written report of the unauthorized discharge shall be submitted to the Department, within five days of discovery of the discharge. The written report shall contain:

1. A description of the nature and location of the discharge;

2. The cause of the discharge;

3. The date on which the discharge occurred;

4. The length of time that the discharge continued;

5. The volume of the discharge;

6. If the discharge is continuing, how long it is expected to continue;

7. If the discharge is continuing, what the expected total volume of the discharge will be; and

8. Any steps planned or taken to reduce, eliminate and prevent a recurrence of the present discharge or any future discharges not authorized by this permit.

Discharges reportable to the Department under the immediate reporting requirements of other regulations are exempted from this requirement.

H. Reports of Unusual or Extraordinary Discharges.

If any unusual or extraordinary discharge including a bypass or upset should occur from a treatment works and the discharge enters or could be expected to enter state waters, the permittee shall promptly notify, in no case later than 24 hours, the Department by telephone after the discovery of the discharge. This notification shall provide all available details of the incident. (details of any adverse affects on aquatic life and the known number of fish killed must also be reported to DEQ). The permittee shall reduce the report to writing and shall submit it to the Department within five days of discovery of the discharge in accordance with Section C (I.2). Unusual and extraordinary discharges include but are not limited to any discharge resulting from:

1. Unusual spillage of materials resulting directly or indirectly from processing operations;

2. Breakdown of processing or accessory equipment;

3. Failure or taking out of service some or all of the treatment works; and

4. Flooding or other acts of nature.

I. Reports of Noncompliance

The permittee shall report any noncompliance which may adversely affect state waters or may endanger public health.

1. An oral report shall be provided within 24 hours from the time the permittee becomes aware of the circumstances. The following shall be included as information which shall be reported within 24 hours under this paragraph:
   a. Any unanticipated bypass; and
   b. Any upset which causes a discharge to surface waters.

2. A written report shall be submitted within 5 days and shall contain:
   a. A description of the noncompliance and its cause;
   b. The period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and
   c. Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

   The Department may waive the written report on a case-by-case basis for reports of noncompliance under Item I if the oral report has been received within 24 hours and no adverse impact on state waters has been reported.

3. The permittee shall report all instances of noncompliance not reported under Item I 1 or 2, in writing, at the time the next monitoring reports are submitted. The reports shall contain the information listed in Item I 2.

   NOTE: The immediate (within 24 hours) reports required in G, H and I may be made to the Department's Big Stone Gap Office Enforcement Section at (276) 523-8199 (voice). For emergencies the Virginia Department of Emergency Services maintains a 24 hour telephone service at 1-800-468-8892.

J. Notice of Planned Changes.

1. The permittee shall give notice to the Department as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when:
   a. The permittee plans alteration or addition to any building, structure, facility, or installation from which there is or may be a discharge of pollutants, the construction of which commenced:
      (1) After promulgation of standards of performance under Section 306 of Clean Water Act which are applicable to such source; or
      (2) After proposal of standards of performance in accordance with Section 306 of Clean Water Act which are applicable to such source, but only if the standards are promulgated in accordance with Section 306 within 120 days of their proposal;
   b. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations nor to notification requirements specified elsewhere in this permit; or
   c. The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan.

2. The permittee shall give advance notice to the Department of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

K. Signatory Requirements.

1. Applications. All permit applications shall be signed as follows:
   a. For a corporation: by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means: (i) A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities, provided the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;
   b. For a partnership or sole proprietorship: by a general partner or the proprietor, respectively; or
   c. For a municipality, state, federal, or other public agency: By either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a public agency includes: (i) The chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency.

2. Reports, etc. All reports required by permits, and other information requested by the Department shall be signed by a person described in Item K 1, or by a duly authorized representative of that person. A person is a duly authorized representative only if:
   a. The authorization is made in writing by a person described in Item K 1;
   b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.); and
   c. The written authorization is submitted to the Department.

3. Changes to authorization. If an authorization under Item K 2 is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Item K 2 shall be submitted to the Department prior to or together with any reports, or information to be signed by an authorized representative.

4. Certification. Any person signing a document under Item K 1 or 2 shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

L. Duty to Comply.

The permittee shall comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the State Water Control Law and the Clean Water Act, except that noncompliance with certain provisions of this permit may constitute a violation of the State Water Control Law but not the Clean Water Act. Permit noncompliance is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

The permittee shall comply with effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants and with standards for sewage sludge use or disposal established under Section 405(d) of the Clean Water Act within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if this permit has not yet been modified to incorporate the requirement.

M. Duty to Reapply.

If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee shall apply for and obtain a new permit. All permittees with a currently effective permit shall submit a new application at least 180 days before the expiration date of the existing permit, unless permission for a later date has been granted by the Department. The Department shall not grant permission for applications to be submitted later than the expiration date of the existing permit.

N. Effect of a Permit.

This permit does not convey any property rights in either real or personal property or any exclusive privileges, nor does it authorize any injury to private property or invasion of personal rights, or any infringement of federal, state or local law or regulations.

O. State Law.

Nothing in this permit shall be construed to preclude the institution of any legal action under, or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any other state law or regulation or under authority preserved by Section 510 of the Clean Water Act. Except as provided in permit conditions on "bypassing" (Item U), and "upset" (Item V) nothing in this permit shall be construed to relieve the permittee from civil and criminal penalties for noncompliance.

P. Oil and Hazardous Substance Liability.

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject under Sections 62.1-44.34:14 through 62.1-44.34:23 of the State Water Control Law.

Q. Proper Operation and Maintenance.

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes effective plant performance, adequate funding, adequate staffing, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by the permittee only when the operation is necessary to achieve compliance with the conditions of this permit.

R. Disposal of solids or sludges.

Solids, sludges or other pollutants removed in the course of treatment or management of pollutants shall be disposed of in a manner so as to prevent any pollutant from such materials from entering state waters.

S. Duty to Mitigate.

The permittee shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

T. Need to Halt or Reduce Activity not a Defense.

It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

U. Bypass.

1. "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility. The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of Section C (U.2) and (U.3).

2. Notice
   a. Anticipated bypass. If the permittee knows in advance of the need for a bypass, prior notice shall be submitted, if possible at least ten days before the date of the bypass.

b. Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required in Section C (I).

3. Prohibition of bypass.

a. Bypass is prohibited, and the Department may take enforcement action against a permittee for bypass, unless:
   (1) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
   (2) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and
   (3) The permittee submitted notices as required under Section C (U.2).

b. The Department may approve an anticipated bypass, after considering its adverse effects, if the Department determines that it will meet the three conditions listed above in Section C (U.3.a).

V. Upset.

1. An upset constitutes an affirmative defense to an action brought for noncompliance with technology based permit effluent limitations if the requirements of Section C (V.2) are met. A determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is not a final administrative action subject to judicial review.

2. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:
   a. An upset occurred and that the permittee can identify the cause(s) of the upset;
   b. The permitted facility was at the time being properly operated;
   c. The permittee submitted notice of the upset as required in Section C (I); and
   d. The permittee complied with any remedial measures required under Section C (S).

3. In any enforcement proceeding the permittee seeking to establish the occurrence of an upset has the burden of proof.

W. Inspection and Entry.

The permittee shall allow the Director, or an authorized representative, upon presentation of credentials and other documents as may be required by law, to:

1. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;
2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;
3. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and

4. Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Clean Water Act and the State Water Control Law, any substances or parameters at any location.

For purposes of this section, the time for inspection shall be deemed reasonable during regular business hours, and whenever the facility is discharging. Nothing contained herein shall make an inspection unreasonable during an emergency.

X. Permit Actions.

Permits may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

Y. Transfer of permits.

Permits are not transferable to any person except after approval of a succession application by the Department.

Z. Severability.
The provisions of this permit are severable, and if any provision of this permit or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

NPDES Permit Definitions

(A) The term "acid or ferruginous mine drainage" means mine drainage which, before any treatment, either has a pH of less than 6.0 or a total iron concentration equal to or more than 10 mg/l.

(B) The term "active mine drainage' means the area actively being used or disturbed for the extraction, removal, or recovery of coal from its natural deposits. This excludes areas where reclamation and revegetation has been completed.

(C) The term "alkaline mine drainage" means mine drainage which, before any treatment, has a pH equal to or more than 6.0 and a total iron concentration less than 10 mg/l.

(D) "Application" means the EPA standard national forms for applying for a permit, including any additions or modifications to the forms; or forms approved by EPA for use in approved States, including any approve additions or modifications.

(E) "Approved program or approved State" means a State administered NPDES program which has been approved or authorized by EPA under 40 CFR Part 123.

(F) "Best management practices" (BMP) means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States. BMPs include treatment requirements, operation procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

(G) "Coal preparation plant" means a facility where coal is crushed, screened, sized, cleaned, dried, or otherwise prepared and loaded for transit to a consuming facility. "Coal preparation plant associated areas" means the coal preparation plant yards, immediate access roads, coal refuse piles, and coal storage piles and facilities. "Coal preparation plant water circuit means all pipes, channels, basins, tanks, and all other structures and equipment that convey, contain, treat, or process any water that is used in coal preparation processes within a coal preparation plant.

(H) The term "commingled discharge" means discharges of drainage from underground workings that are mixed or commingled with surface mine drainage.

(I) "Composite sample" means a combination of individual samples of wastewater taken at 1 hour intervals, for eight (8) hours (or for the duration of discharge, whichever is less), to minimize the effect of variability of the individual samples. Individual samples must be of equal volume. (Example: one (1) liter per hour.)

(J) The term "controlled discharge" means any surface mine drainage that is pumped or siphoned from the active mining area.

(K) "CWA" means the Clean Water Act (formerly referred to as the Federal Water Pollution Control Act) Public Law 92-500 as amended by Public Law 95-217, and Public Law 95-576, 33 U.S.C. 1251 et seq.

(L) The "daily maximum" discharge means the total mass of a pollutant discharged during the calendar day. Where the pollutant is limited in terms other than mass, the daily maximum shall mean the average concentration or other measurement specified during the calendar day or other specified sampling day.

(M) "Discharge (of a pollutant)" means any addition of any pollutant or combination of pollutants to waters of the United States from any point source; or any addition of any pollutant or combination of pollutants to the waters of the contiguous zone or ocean from any point source other than a vessel or other floating craft which is being used as a means of transportation.

(N) "Existing source or existing discharger (in the NPDES program)" means any source which is not a new source or new discharger.

(O) "Effluent limitation" means any restriction imposed by the Director on quantities, discharge rates, and concentrations of pollutants that are discharged from point sources into waters of the United States, the waters of the contiguous zone, or the ocean.

(P) "Effluent limitation guideline" means a regulation published by the Administration under Section 304(b) of the CWA to adopt or revise effluent limitations.

(Q) "Environmental Protection Agency (EPA)" means the United States Environmental Protection Agency.

(R) "Estimate" means to be based on technical evaluation of the sources contributing to the discharge including, but not limited to, pump capabilities, water meters, and batch discharge volumes.

(S) "Grab sample" means an individual sample collected in less than 15 minutes.

(T) "Measured Flow" means any method of liquid volume measurement the accuracy of which has been previously demonstrated in engineering practices, or for which a relationship to absolute volume has been obtained.

(U) "Mine drainage" means any drainage, and any water pumped or siphoned, from an active mining area or a post-mining area. The abbreviation "ml/l" means milliliters per liter.

(V) The "monthly average" discharge means the total mass (and concentration if appropriate) of all daily discharges sampled and/or measured properly during a calendar month divided by the number of daily discharges sampled and/or measured properly during such month.

(W) The "monthly average" temperature means the arithmetic mean of temperature measurements made on an hourly basis, or mean value plot of the record of a continuous automated temperature recording instrument, either during a calendar month, or during the operating month if flows are of shorter duration.

(X) "National Pollutant Discharge Elimination System (NPDES)" means the national program for issuing, modifying, revoking and reissuing, terminating, monitoring, and enforcing permits and imposing and enforcing pretreatment requirements, under Sections 307, 318, 402, and 405 of CWA. The term includes an approved program.

(Y) "New discharger" means any building, structure, facility, or installation: (A) From which there is or may be a new or additional discharge of pollutants at a site at which on October 18, 1972, it had never discharged pollutants; (B) Which has never received a finally effective NPDES permit for discharges at that site; and (C) Which is not a "new source". This definition includes an indirect discharger, which commences discharging into waters of the United States. It also includes any existing mobile point source, such as an offshore oil drilling rig, seafood processing vessel, or aggregate plant that begins discharging at a location for which it does not have an existing permit.

(Z) "NA" means effluent limitations and monitoring requirements not required.

(AA) "NL" means no limitation on the affected parameters, however monitoring is required.

(BB) "Outfall" means a point source.

(CC) "Permit" means an authorization, license, or equivalent control document issued by EPA or an approved State to implement the requirements of 40 CFR Parts 122, 123, and 124.

(DD) "Point source" means any discernible, confined, and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, vessel, or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture.

(EE) "Pollutant" means dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical waste, biological materials, radioactive materials (except those regulated under the Atomic Energy Act of 1954, as amended (42 U.S.C. Section 2011 et seq.)), heat wrecked or discarded equipment, rocks, sand, cellar dirt and industrial, municipal, and agriculture waste discharged into water.

(FF) The term "post-mining area" means: (1) A reclamation area or (2) the underground workings of an underground coal mine after the extraction, removal, or recovery of coal from its natural deposit has ceased and prior to bond release.

(GG) The term "10-year, 24-hour precipitation event" means the maximum 24-hour precipitation event with a probable recurrence interval of once in ten years as defined by the National Weather service and Technical Paper No. 40, "Rainfall Frequency Atlas of the U.S.," May 1961, or equivalent regional or rainfall probability information developed there from.

(HH) The term "qualifying rainfall event" means the rainfall amounts as defined; active mine areas = 0.2"/24 hours, refuse areas = 2.5"/24 hours, controlled and commingled = 4.4"/24 hour.

(II) The term "reclamation area" means the surface area of a coal mine which has been returned to required contour and on which revegetation (specifically seeding or planting) work has commenced. The term "pre-reclamation area" means the surface area of a coal mine prior to reclamation.

(JJ) The term "settleable solids" is that matter measured by the volumetric method that is determined by the following procedure: (a) fill an imhoff cone to the one-liter mark with a thoroughly mixed sample. Allow to settle undisturbed for 45 minutes. Gently stir along the inside surface of the cone with a stirring rod. Allow to settle undisturbed for 15 minutes longer. Record the volume of settled material in the cone as milliliters per liter. The method detection limit for coal mining point sources is 0.4 ml/l.

(KK) The terms "treatment facility" and "treatment system" means all structures which contain, convey, and as necessary, physically or chemically treat coal mine drainage, coal preparation process water, surface runoff from disturbed areas, or drainage from coal preparation plant associated areas, which remove pollutants regulated by the Part from such waters. This includes all pipes, channels, ponds, basins, tanks, and all other equipment serving such structures.

(LL) The terms "underground mine drainage or discharge" mean discharges from the underground workings of underground mines until SMCRA bond release.

(MM) The "weekly average" discharge means the total concentration and mass of all daily discharges sampled and/or measured during a calendar week divided by the number of daily discharges sampled and/or measured during such week.

(NN) The term "coal refuse disposal pile" means any coal refuse deposited on the earth and intended as permanent disposal or long term storage (greater than 180 days) of such material, but does not include coal refuse deposited within the active mining area or coal refuse never removed from the active mining area.

Section D
Other Permit Requirements

NPDES Permit Special Conditions

(AA) Water Quality Monitoring

The Department may require every owner to furnish such plans, specifications, or other pertinent information as may be necessary to determine the effect of the discharge on the water quality or such information as may be necessary to accomplish the purposes of the CWA, including but not limited to chemical and biological testing. The permittee shall obtain and record such information on the receiving waters as requested by the Department. The information shall be subject to inspection by authorized State and Federal representatives and shall be submitted with such frequency and in such detail as requested by the Department.

(BB) Management Requirements

1. All discharges authorized by this NPDES permit shall be made in accordance with the terms and conditions of the permit. The Department must be notified at least thirty (30) days prior to all expansions, production increases, or process modifications that will result in new or increased discharge(s) of pollutant(s). Notification should be by submission of a new or revised CSMO/NPDES application, or, if such discharge(s) does not violate effluent limitations specified in the permit, by submission to the Department of notice of such new or increased discharge of pollutant(s). All expansions, production increases, or process modifications that will result in new or increased discharge(s) of pollutant(s) must be approved by the Department prior to implementation.

2. The discharge of any pollutant more frequently than, or at a level greater than that identified and authorized by this permit, shall constitute a violation of the terms and conditions of this permit.

3. The discharge of any pollutant(s) from this facility that enters into a water body with an existing and approved Total Maximum Daily Load (TMDL) must be made in compliance with the TMDL and any applicable TMDL implementation plan. If the discharge enters into a water body included on the state's current 303(d) list not having an existing and approved TMDL, the discharge of any pollutant(s) from this facility can not be the cause of the stream's impairment and 303(d) listing.

(CC) Availability of Reports

Except for data determined to be confidential under Section 308 of the Act, all reports prepared in accordance with the terms and conditions of this permit will be available for public inspection at the Department office. As required by the Act, effluent data will not be considered confidential. Knowingly making false statement on any such report may result in the imposition of criminal penalties as provided for in Section 309 of the Act and in Section 62.1-44.32 of the Code of Virginia.

(DD) Permit Modification and Reissuance

This permit shall be modified, or alternatively, revoked and reissued, to comply with any applicable effluent standard or limitation issued or approved under Section 301(b)(2)(C) and (D), 304 (b)(2), and 307 (a)(2) of the CWA, if the effluent standard or limitations so issued or approved:

(i) Contain different conditions or is otherwise more stringent than any effluent limitation in the permit; or

(ii) Control any pollutant not limited in the permit; or

(iii) The permit as modified or reissued under this paragraph shall also contain any other requirements of the Act as applicable.

(iv) Immediately after EPA's promulgation of applicable standards or limitations, a draft permit incorporating the new requirements shall be sent to the permittee.

(GG) State Law

1. Compliance with this permit during its term constitutes compliance with the Law and Act except for any standard imposed under Section 307 of the Act for a toxic pollutant injurious to human health.

2. State water quality standards contain an antidegradation policy that is applicable to this permit, facility, and discharge(s). Effluent limitations assigned to this permit require the operator to utilize the best available technology to treat all discharges and to protect water quality. As a condition of this permit, the permittee must take appropriate measures to comply with the antidegradation policy.

3. Nothing in this permit shall be construed to preclude the institution of any legal action under, or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any other State law or regulation or under authority preserved by Section 510 of the Act.

(HH) Toxic Pollutants

If a toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is established under Section 307(a) of the Act for a toxic pollutant which is present in the discharge and such standard or prohibition is more stringent than any limitation for such pollutant in this permit, this permit shall be revoked and reissued or modified in accordance with the toxic effluent standard or prohibition. Any effluent standard or prohibition established under Section 307(a) for a toxic pollutant injurious to human health is effective and enforceable by the time set forth in the promulgated standard, even absent permit modification.

(JJ) Chemical Treatment

Chemical treatment is not permitted unless specified in Section V of the CSMO/NPDES permit application or otherwise specifically authorized by the Department.

(KK) Alternate effluent limitations applicable to precipitation events

If indicated as applicable to an NPDES outfall or outfalls, the permit includes a special condition which provides an exclusion of the metals limitations during periods of runoff from a ≥ 10-year, 24 hour rainfall event as referenced in 40 CFR 434. An exclusion of the TSS monitoring during periods of runoff from a < 10-year, 24 hour rainfall event is not allowed. These exclusions and conditions are taken from the effluent guidelines in 40 CFR 434 and relevant TMDL reports.

CSMO Permit Special Conditions:

(a) Disposal of non-coal waste onsite is prohibited.

(b) Process water may be used on site for the purpose of dust suppression. Dust suppression shall be carried out as a best management practice provided that ponding or direct runoff from the site does not occur during or immediately following its application. Dust suppression shall not be employed as a wastewater disposal method

(b) No disturbance is allowed within the watersheds of any jurisdictional waters whether water of the United States or waters of the Commonwealth of Virginia (including jurisdictional isolated waters) without first obtaining a Section 404 of the Clean Water Act (CWA) permit from the U.S. Army Corps of Engineers and / or a Section 401 of the CWA Certification from the Virginia Department of Environmental Quality.

(c) Prior to disturbing any area not included in the approved permit an application for a permit revision / amendment must be submitted to the Department of Mines, Minerals and Energy (DMME) / Division of Mined Land Reclamation (DMLR) and the application must be approved with appropriate fees and bond submitted to DMLR.

(d) The Department shall conduct reviews of the approved permit pursuant to 4VAC25-130-774.11. Based upon the Department review DMLR may order the revision of the permit pursuant to 4VAC25-130-774.11(b) and (c).

(e) As outlined in the DMLR Aquatic Species Specific Protection Measures, biological surveys utilizing accepted protocols are to be conducted semi-annually to determine the benthic health of both Looney Creek and Callahan Creek as outlined in the joint CSMO/NPDES permit. If two consecutive same-season surveys in either stream indicate declines, then DMLR will determine whether corrective action will be necessary.

(f) To ensure continuing decrease in TDS for the Cumulative Impact Area, best management practices (BMPs), offsets, and/or mitigation activities proposed in the application to address TMDL issues, should be completed prior to commencement of mining on the proposed permit.

TMDL Special Conditions:

(a) TMDL Reopener Clause

This permit shall be modified or alternately revoked and reissued if any approved wasteload allocation procedure, pursuant to Section 303(d) of the Clean Water Act, imposes wasteload allocations, limits or other conditions on the facility that are not consistent with the requirements of this permit.

(b) Numeric Effluent Limitation Consisting of Annual Wasteloads of TSS and TDS from Each Discharge Point

The permittee shall ensure that discharges from permitted point sources comply with the concentration based numeric effluent limitations assigned in Section A of the joint CSMO/NPDES Permit and that permitted point source discharges shall not exceed the numeric wasteloads of pollution (concentration x flow) allocated in any approved benthic TMDL for the receiving stream.

1. Exceedances of the wasteload allocation by the permitted point sources will be determined by including the annual wasteload from this permit into calculations of the total annual transient mining wasteload for the watershed. The total annual transient wasteloads will then be compared to the mining wasteload allocations for the watershed taken from the approved benthic TMDL and will consider approved pollution reducing offsets. Tracking of mining wasteloads, wasteload offsets, calculations of mining wasteloads, and comparisons of mining wasteloads to allocations will be performed by the Virginia Department of Mines, Minerals, and Energy's Division of Mined Land Reclamation's (Division's) TMDL software program.

   Mining wasteload limitations shall be as follows:

   A) Discharges from this permit may not in aggregate, or alone, exceed the DMLR mining wasteload calculation within the respective TMDL watershed, and
   B) Discharges from this permit may not alone, or in combination with all permitted mining discharges, exceed the DMLR mining wasteload calculation within the respective TMDL watershed.

2. Wasteload allocation tracking spreadsheets (Historical Watershed Summary Report) is found in the factsheet.

3. If the Department determines that wasteloads from the permitted point sources result in exceedances of the numeric allocations as assigned in the TMDL, the "TMDL Watershed Mining Waste Load Reduction Actions" will be initiated.

(c) A Special Permit Condition Describing the Load Reduction Credit

The Department will use its existing TMDL database and software to maintain the accounting of load reduction credit tracking.

(d) A Monitoring Plan for Each NPDES Discharge Point

Reference section A of this permit.

(e) A Monitoring Plan for the Proposed Offset

The offset ratio for this permit is sufficient to assure that adequate pollution reductions will be accomplished without additional monitoring requirements beyond those previously identified in this joint permit.

The offset ratio is found in the TMDL Addendum in Section 6.1 of the joint CSMO/NPDES permit. The minimum offset ratio is 2:1.

(f) Special Conditions to Address Unanticipated Failure of the Offset

Prior to the release of any performance bond on this permit, the Department shall determine if the permittee has completed offset requirements. The offset completion timing is outlined in Section 6.1 of the joint CSMO/NPDES permit. If the permittee fails to complete the required offset, an alternative offset project must be approved by the Department and implemented prior to the release of any performance bond on this permit.

(g) Standard Provisions Stating Clearly that the Permittee is Responsible for Achieving All Effluent Limitations in the Permit

The permittee shall be responsible for achieving all concentration and loading based effluent limitations assigned by this permit. The permittee shall be responsible for implementing all best management practices required by this permit.

Total Maximum Daily Load (TMDL) Compliance and Documentation:

The Department finds that the permit will comply with the approved TMDL and the TMDL Waste Load Allocation (WLA). The permit is consistent with the TMDL WLA pursuant to 40 CFR 122.44 (d)(1)(viii)(B).

Tom Laverty/DC/USEPA/US	To	Sharmin Syed, David Hair, Gary Hudiburgh, Js Wilson
12/01/2010 11:25 AM	cc	Martha Segall, Michelle Schutz, Sarita Hoyt
	bcc	
	Subject	Fw: FOR YOUR REVIEW: Draft Spruce 404(c) Final Determination

Folks,

Could someone take a look at this and let everyone know what it says that's of significance for the 402 program and our coal mine permitting efforts in particular?

thanks

Tom

----- Forwarded by Tom Laverty/DC/USEPA/US on 12/01/2010 11:24 AM -----

From:	Christopher Hunter/DC/USEPA/US
To:	Denise Keehner/DC/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA, Cliff Rader/DC/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA, Charles Lee/DC/USEPA/US@EPA, Suzi Ruhl/DC/USEPA/US@EPA, Kevin Minoli/DC/USEPA/US@EPA, Karyn Wendelowski/DC/USEPA/US@EPA, Michael Slimak/DC/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA, John Pomponio/R3/USEPA/US@EPA, Regina Poeske/R3/USEPA/US@EPA, Greg Pond/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Jim Giattina/R4/USEPA/US@EPA, Tom Welborn/R4/USEPA/US@EPA, Tinka Hyde/R5/USEPA/US@EPA, Peter Swenson/R5/USEPA/US@EPA, Christine Mazzarella/R3/USEPA/US, Heather Case/DC/USEPA/US@EPA, Tom Laverty/DC/USEPA/US@EPA, Marcus Zobrist/DC/USEPA/US@EPA
Cc:	Palmer Hough/DC/USEPA/US@EPA, Julia McCarthy/R8/USEPA/US@EPA, Marcel Tchaou/DC/USEPA/US@EPA, Ross Geredien/DC/USEPA/US@EPA, Brian Frazer/DC/USEPA/US@EPA, Brian Topping/DC/USEPA/US@EPA, David Evans/DC/USEPA/US@EPA, Jim Pendergast/DC/USEPA/US@EPA, Tanya Code/DC/USEPA/US@EPA
Date:	12/01/2010 11:01 AM
Subject:	FOR YOUR REVIEW: Draft Spruce 404(c) Final Determination

Hello all,
Attached for your review, please find our draft Final Determination for the Spruce No. 1 Surface Mine 404(c) action. Now that the consultation period with the permittee has ended, we will need to move quickly toward finalizing this document, so I am requesting **all comments on this draft (in redline/strikeout) back to me by COB December 8**. At the end of next week, I will be sending the draft technical appendices for your review as well. Following comment review, we will be preparing a revised draft of the main body text and start the briefings for upper management. At the moment, we are planning for a publication and communications rollout for the Final Determination just after the New Year, possibly January 7, 2011.

I will be out of the office until December 9, but if you have any questions on the draft during the next week, please contact Palmer Hough.

Thank you,
Chris

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454
hunter.christopher@epa.gov

Spruce FD draft 120110.doc

ATTACHMENT REDACTED - DELIBERATIVE

Greg Pond/R3/USEPA/US
12/01/2010 11:57 AM

To Alaina DeGeorgio
cc
bcc
Subject Fw: Hobet45 Mining Data dated 10/15/2010

(b) (5) [redacted]

Greg

Greg Pond
Office of Monitoring and Assessment
U.S. EPA Region 3
1060 Chapline Street, Suite 303
Wheeling, WV 26003-2995
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(f) 304-234-0260
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Visit our website at http://epa.gov/reg3esd1/3ea50.htm

----- Forwarded by Greg Pond/R3/USEPA/US on 12/01/2010 11:55 AM -----

From: Greg Pond/R3/USEPA/US
To: Carmen Vitanza/R3/USEPA/US@EPA
Cc: Jessica Martinsen/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA, Stephanie Chin/R3/USEPA/US@EPA, John Pomponio/R3/USEPA/US@EPA
Date: 11/30/2010 08:50 AM
Subject: Re: Hobet45 Mining Data dated 10/15/2010

(b) (5) [redacted]

Greg Pond
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Carmen Vitanza	Hi Greg,	Attached you find the Hobet45 data f...	11/30/2010 07:19:20 AM

From: Carmen Vitanza/R3/USEPA/US
To: Greg Pond/R3/USEPA/US@EPA
Cc: Jessica Martinsen/R3/USEPA/US@EPA
Date: 11/30/2010 07:19 AM
Subject: Hobet45 Mining Data dated 10/15/2010

Hi Greg,

Attached you find the Hobet45 data for Patriot Mining dated 10/15/2010 this was the last file I recived from Hobet.

HOBET45_20101015.xls

Carmen W. Vitanza, Jr.
SEE Project/U.S. EPA Region III
Office of Environmental Programs
1650 Arch Street (3EA30)
Philadelphia, PA. 19103
Information System Specialist
215-814-2754 phone
215-814-2783 fax
EPA/SEE-EAID Division

Berry Branch / Stonecoal Branch
Surface Water Quality
Flow (GPM)

NC stands for Not Constructed
NF stands for No Flow

Tributary	Berry Branch															Stonecoal Branch						
NPDES Permit No.	WV1022890					WV1022911		WV1023039						Instream		WV1023039				Instream		
Outlet / ID	007	008	009	010	011	001	002	004	005	006	007	008	009	DSBB/119	USBB/122	001	010	011	012	DSSM	USSB	SBUT-3
20-Jan-10			NF		NF																	
27-Jan-10														1202	944							
28-Jan-10				10																		
29-Jan-10		5																				
30-Jan-10						238	NF									NC	NC	NC	NC	659	114	171
31-Jan-10	NC							NC	NC	NC	NC	NC	NC									
8-Feb-10																NC	NC	NC	NC	265	150	182
9-Feb-10	NC	140	NF	89	NF	337	NF	NC	NC	NC	NC	NC	NC	3210	1664							
22-Feb-10	NC	52	NF	31	NF	615	NF	NC	NC	NC	NC	NC	NC	623	1879							
23-Feb-10																NC	NC	NC	NC	583	107	40
2-Mar-10	NC	18	NF	22	NF	308	NF	NC	NC	NC	NC	NC	NC	1247	642							
3-Mar-10																NC	NC	NC	NC	211	180	24
18-Mar-10	NC	21	NF	19	NF			NC	NC	NC	NC	NC	NC	9812	604							
19-Mar-10																				347		
24-Mar-10						494	NF															
31-Mar-10																NC	NC	NC	NC			
1-Apr-10																				183	112	71
2-Apr-10	NC	14	NF	NF	NF	654	NF	NC	NC	NC	NC	NC	NC	4299	1205	NC	NC	NC	NC			
16-Apr-10	NC	NF	NF	NF	NF	512	NF	NC	NC	NC	NC	NC	NC	3211	1515	NC	NC	NC	NC			
19-Apr-10																				302	212	90
1-May-10	NC	NF	NF	NF	NF	232	NF	NC	NC	NC	NC	NC	NC	2412	1794	NC	NC	NC	NC			
3-May-10																				1120	642	567
20-May-10	NC	21	NF	4	NF	299	NF	NC	NC	NC	NC	NC	NC	6129	2420	NC	NC	NC	NC			
21-May-10																				812	466	371
2-Jun-10	NC	NF	NF	NF	NF	150	NF	NF	NF	NF	39	NF	NF	4095	1272							
3-Jun-10																NC	NC	NC	NC	140	86	NF
17-Jun-10																NC	NC	NC	NC	412	217	19
18-Jun-10	NC	NF	NF	NF	NF	350	NF	NF	NF	NF	60	NF	NF	4120	819							
1-Jul-10	NC	NF	NF	NF	NF	212	NF	NF	NF	NF	NF	NF	NF	2180	1039							
2-Jul-10																NC	NC	NC	NC	NF	NF	NF
28-Jul-10	NC	NF	NF	NF	NF	410	NF	NF	NF	NF	19	NF	NF	1149	651							
7/29/2010																NC	NC	NC	NC	180	45	NF
8/5/2010	NC	NF	NF	NF	NF	120	NF	NF	NF	NF	15	NF	NF	8143	5615							
8/9/2010																NC	NC	NC	NC	34	NF	NF
8/20/2010	NC	NF	NF	NF	NF	88	NF	NF	NF	NF	NF	NF	NF	3412	1740							
8/25/2010																NC	NC	NC	NC	NF	NF	NF
9/1/2010	NC	NF	NF	NF	NF	80	NF	NF	NF	NF	NF	NF	NF	1199	979							
9/3/2010																NC	NC	NC	NC	NF	NF	NF
9/17/2010	NC	NF	NF	NF	NF	40	NF	NF	NF	NF	NF	NF	NF	400	80							
9/20/2010																NC	NC	NC	NC	NF	NF	NF
10/1/2010	NC	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	245	34							
10/4/2010																NC	NC	NC	NC	NF	NF	NF

Berry Branch / Stonecoal Branch
Surface Water Quality
pH

NC stands for Not Constructed
NF stands for No Flow

Tributary	Berry Branch															Stonecoal Branch						
NPDES Permit No.	WV1022890					WV1022911		WV1023039						Instream		WV1023039				Instream		
Outlet / D	007	008	009	010	011	001	002	004	005	006	007	008	009	DSBB/119	USBB/122	001	010	011	012	DSSM	USSB	SBUT-3
20-Jan-10			NF		NF																	
27-Jan-10														6.9	7 2							
28-Jan-10				7 9																		
29-Jan-10		7																				
30-Jan-10						8 3	NF									NC	NC	NC	NC	8 6	7.9	8
31-Jan-10	NC							NC	NC	NC	NC	NC	NC									
8-Feb-10																NC	NC	NC	NC	8 3	7.8	8
9-Feb-10	NC	8 2	NF	8 3	NF	7.7	NF	NC	NC	NC	NC	NC	NC	7.15	7 8							
22-Feb-10	NC	7 9	NF	7 8	NF	7 5	NF	NC	NC	NC	NC	NC	NC	6.6	7.4							
23-Feb-10																NC	NC	NC	NC	9.1	8.6	9
2-Mar-10	NC	7 8	NF	8	NF	7.7	NF	NC	NC	NC	NC	NC	NC	7.8	7 6							
3-Mar-10																NC	NC	NC	NC	5 6	6	5 9
18-Mar-10	NC	6 5	NF	6 5	NF			NC	NC	NC	NC	NC	NC	6.6	7 5							
19-Mar-10																				6.7		
24-Mar-10						7	NF															
31-Mar-10																NC	NC	NC	NC			
1-Apr-10																				7 2	7.4	7 9
2-Apr-10	NC	7 2	NF	NF	NF	8 9	NF	NC	NC	NC	NC	NC	NC	7	9.4	NC	NC	NC	NC			
16-Apr-10	NC	NF	NF	NF	NF	7 8	NF	NC	NC	NC	NC	NC	NC	7.9	6.7	NC	NC	NC	NC			
19-Apr-10																				6	5.9	5 8
1-May-10	NC	NF	NF	NF	NF	8 2	NF	NC	NC	NC	NC	NC	NC	8.4	8 2	NC	NC	NC	NC			
3-May-10																				5 5	5.8	5 9
20-May-10	NC	8.1	NF	8	NF	7 2	NF	NC	NC	NC	NC	NC	NC	7.9	7 9	NC	NC	NC	NC			
21-May-10																				6.7	7	7
2-Jun-10	NC	NF	NF	NF	NF	7 9	NF	NF	NF	NF	7 8	NF	NF	7.3	7 5							
3-Jun-10																NC	NC	NC	NC	8	8.2	NF
17-Jun-10																NC	NC	NC	NC	6 3	6.5	6.4
18-Jun-10	NC	NF	NF	NF	NF	8	NF	NF	NF	NF	8 3	NF	NF	7.2	8							
1-Jul-10	NC	NF	NF	NF	NF	8	NF	NF	NF	NF	NF	NF	NF	7	7.4							
2-Jul-10																NC	NC	NC	NC	NF	NF	NF
28-Jul-10	NC	NF	NF	NF	NF	6 2	NF	NF	NF	NF	6	NF	NF	7.7	6.4							
7/29/2010																NC	NC	NC	NC	7.1	6.3	NF
8/5/2010	NC	NF	NF	NF	NF	7 6	NF	NF	NF	NF	7.1	NF	NF	6.5	6 5							
8/9/2010																NC	NC	NC	NC	6 2	NF	NF
8/20/2010	NC	NF	NF	NF	NF	7 5	NF	NF	NF	NF	NF	NF	NF	7	7 5							
8/25/2010																NC	NC	NC	NC	NF	NF	NF
9/1/2010	NC	NF	NF	NF	NF	7.4	NF	NF	NF	NF	NF	NF	NF	8	8							
9/3/2010																NC	NC	NC	NC	NF	NF	NF
9/17/2010	NC	NF	NF	NF	NF	8 6	NF	NF	NF	NF	NF	NF	NF	8.1	8 2							
9/20/2010																NC	NC	NC	NC	NF	NF	NF
10/1/2010	NC	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	7.8	7 8							
10/4/2010																NC	NC	NC	NC	NF	NF	NF

Berry Branch / Stonecoal Branch
Surface Water Quality
Iron (mg/l)

NC stands for Not Constructed
NF stands for No Flow

Tributary	Berry Branch															Stonecoal Branch						
NPDES Permit No.	WV1022890					WV1022911		WV1023039						Instream		WV1023039				Instream		
Outlet / D	007	008	009	010	011	001	002	004	005	006	007	008	009	DSBB/119	USBB/122	001	010	011	012	DSSM	USSB	SBUT-3
20-Jan-10			NF		NF																	
27-Jan-10														1 54	1.89							
28-Jan-10				1.98																		
29-Jan-10		0 39																				
30-Jan-10						0.25	NF									NC	NC	NC	NC	0.82	0 27	0.71
31-Jan-10	NC							NC	NC	NC	NC	NC	NC									
8-Feb-10																NC	NC	NC	NC	0.76	0 36	0.47
9-Feb-10	NC	0 6	NF	0.94	NF	0.53	NF	NC	NC	NC	NC	NC	NC	1 25	0.87							
22-Feb-10	NC	4.78	NF	0 8	NF	0.17	NF	NC	NC	NC	NC	NC	NC	0 68	0.31							
23-Feb-10																NC	NC	NC	NC	10.4	1	0 6
2-Mar-10	NC	0 62	NF	0 5	NF	0.19	NF	NC	NC	NC	NC	NC	NC	0 56	0.29							
3-Mar-10																NC	NC	NC	NC	5.65	2.41	0.19
18-Mar-10	NC	0 26	NF	1.09	NF			NC	NC	NC	NC	NC	NC	0 61	0.67							
19-Mar-10																				0 3		
24-Mar-10						0.36	NF															
31-Mar-10																NC	NC	NC	NC			
1-Apr-10																				0.69	0 26	2.76
2-Apr-10	NC	0 2	NF	NF	NF	0 2	NF	NC	NC	NC	NC	NC	NC	0.3	0.26	NC	NC	NC	NC			
16-Apr-10	NC	NF	NF	NF	NF	0.06	NF	NC	NC	NC	NC	NC	NC	0 28	0.23	NC	NC	NC	NC			
19-Apr-10																				0.23	0 22	0.32
1-May-10	NC	NF	NF	NF	NF	0.08	NF	NC	NC	NC	NC	NC	NC	0 27	0.37	NC	NC	NC	NC			
3-May-10																				3.33	2 27	1.89
20-May-10	NC	4 21	NF	1.22	NF	0.16	NF	NC	NC	NC	NC	NC	NC	2 96	2.13	NC	NC	NC	NC			
21-May-10																				0 3	0 32	0 3
2-Jun-10	NC	NF	NF	NF	NF	0.16	NF	NF	NF	NF	0.28	NF	NF	1 31	0.4							
3-Jun-10																NC	NC	NC	NC	0.22	0 25	NF
17-Jun-10																NC	NC	NC	NC	0.18	0 26	0.38
18-Jun-10	NC	NF	NF	NF	NF	0.21	NF	NF	NF	NF	0.84	NF	NF	0 64	0.34							
1-Jul-10	NC	NF	NF	NF	NF	0.1	NF	NF	NF	NF	NF	NF	NF	0 22	0 3							
2-Jul-10																NC	NC	NC	NC	NF	NF	NF
28-Jul-10	NC	NF	NF	NF	NF	0.15	NF	NF	NF	NF	0.27	NF	NF	0.6	0.27							
7/29/2010																NC	NC	NC	NC	0.19	0.19	NF
8/5/2010	NC	NF	NF	NF	NF	0.18	NF	NF	NF	NF	0.4	NF	NF	0 32	0.22							
8/9/2010																NC	NC	NC	NC	0.13	NF	NF
8/20/2010	NC	NF	NF	NF	NF	0.1	NF	NF	NF	NF	NF	NF	NF	0 38	0.35							
8/25/2010																NC	NC	NC	NC	NF	NF	NF
9/1/2010	NC	NF	NF	NF	NF	0.09	NF	NF	NF	NF	NF	NF	NF	0 85	0.77							
9/3/2010																NC	NC	NC	NC	NF	NF	NF
9/17/2010	NC	NF	NF	NF	NF	0.1	NF	NF	NF	NF	NF	NF	NF	0 38	0.51							
9/20/2010																NC	NC	NC	NC	NF	NF	NF
10/1/2010	NC	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	0 21	0.81							
10/4/2010																NC	NC	NC	NC	NF	NF	NF

Berry Branch / Stonecoal Branch
Surface Water Quality
Manganese (mg/l)

NC stands for Not Constructed
NF stands for No Flow

Tributary	Berry Branch															Stonecoal Branch						
NPDES Permit No.	WV1022890					WV1022911		WV1023039						Instream		WV1023039				Instream		
Outlet / D	007	008	009	010	011	001	002	004	005	006	007	008	009	DSBB/119	USBB/122	001	010	011	012	DSSM	USSB	SBUT-3
20-Jan-10			NF		NF																	
27-Jan-10														0.43	0 9							
28-Jan-10				0.16																		
29-Jan-10		1 03																				
30-Jan-10						0.87	NF									NC	NC	NC	NC	0.03	0 01	0.01
31-Jan-10	NC							NC	NC	NC	NC	NC	NC									
8-Feb-10																NC	NC	NC	NC	0.08	0.1	0.1
9-Feb-10	NC	0.15	NF	0.17	NF	0.83	NF	NC	NC	NC	NC	NC	NC	0.74	1.28							
22-Feb-10	NC	0.49	NF	0.04	NF	1.39	NF	NC	NC	NC	NC	NC	NC	0 98	1.52							
23-Feb-10																NC	NC	NC	NC	0 2	0 04	<.01
2-Mar-10	NC	0 69	NF	0.06	NF	1.33	NF	NC	NC	NC	NC	NC	NC	1.2	1.89							
3-Mar-10																NC	NC	NC	NC	0.12	0 05	<.01
18-Mar-10	NC	0 66	NF	0.05	NF			NC	NC	NC	NC	NC	NC	0 86	1.33							
19-Mar-10																				0.01		
24-Mar-10						0.88	NF															
31-Mar-10																NC	NC	NC	NC			
1-Apr-10																				0.03	0 02	0.04
2-Apr-10	NC	0 63	NF	NF	NF	0.92	NF	NC	NC	NC	NC	NC	NC	0.46	0.76	NC	NC	NC	NC			
16-Apr-10	NC	NF	NF	NF	NF	0 9	NF	NC	NC	NC	NC	NC	NC	0 62	1 2	NC	NC	NC	NC			
19-Apr-10																				0.02	0 01	0.01
1-May-10	NC	NF	NF	NF	NF	0.55	NF	NC	NC	NC	NC	NC	NC	0.2	0.96	NC	NC	NC	NC			
3-May-10																				0.12	0.1	0.04
20-May-10	NC	0.42	NF	0.02	NF	0.93	NF	NC	NC	NC	NC	NC	NC	0 61	1 2	NC	NC	NC	NC			
21-May-10																				0.02	0 02	<0 01
2-Jun-10	NC	NF	NF	NF	NF	1.19	NF	NF	NF	NF	0.57	NF	NF	0 66	1.76							
3-Jun-10																NC	NC	NC	NC	0.01	0 01	NF
17-Jun-10																NC	NC	NC	NC	0.01	0 04	0.01
18-Jun-10	NC	NF	NF	NF	NF	1.38	NF	NF	NF	NF	0.53	NF	NF	1.11	2.05							
1-Jul-10	NC	NF	NF	NF	NF	1.18	NF	NF	NF	NF	NF	NF	NF	0.19	1.42							
2-Jul-10																NC	NC	NC	NC	NF	NF	NF
28-Jul-10	NC	NF	NF	NF	NF	1.45	NF	NF	NF	NF	0.62	NF	NF	1 09	1.57							
7/29/2010																NC	NC	NC	NC	0.01	0 01	NF
8/5/2010	NC	NF	NF	NF	NF	1.45	NF	NF	NF	NF	0.76	NF	NF	0 67	1.21							
8/9/2010																NC	NC	NC	NC	0.01	NF	NF
8/20/2010	NC	NF	NF	NF	NF	1.77	NF	NF	NF	NF	NF	NF	NF	0 96	1.84							
8/25/2010																NC	NC	NC	NC	NF	NF	NF
9/1/2010	NC	NF	NF	NF	NF	2 2	NF	NF	NF	NF	NF	NF	NF	0.47	0.47							
9/3/2010																NC	NC	NC	NC	NF	NF	NF
9/17/2010	NC	NF	NF	NF	NF	1.18	NF	NF	NF	NF	NF	NF	NF	0 28	1.21							
9/20/2010																NC	NC	NC	NC	NF	NF	NF
10/1/2010	NC	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	0 28	1.06							
10/4/2010																NC	NC	NC	NC	NF	NF	NF

Berry Branch / Stonecoal Branch
Surface Water Quality
Aluminum (mg/l)

NC stands for Not Constructed
NF stands for No Flow

Tributary	Berry Branch															Stonecoal Branch						
NPDES Permit No.	WV1022890					WV1022911		WV1023039						Instream		WV1023039				Instream		
Outlet / D	007	008	009	010	011	001	002	004	005	006	007	008	009	DSBB/119	USBB/122	001	010	011	012	DSSM	USSB	SBUT-3
20-Jan-10			NF		NF																	
27-Jan-10														1.6	1.82							
28-Jan-10				3.07																		
29-Jan-10		0 34																				
30-Jan-10						0.15	NF									NC	NC	NC	NC	0.71	0 26	0.4
31-Jan-10	NC							NC	NC	NC	NC	NC	NC									
8-Feb-10																NC	NC	NC	NC	0.58	0 21	0.29
9-Feb-10	NC	0 92	NF	1.48	NF	0.43	NF	NC	NC	NC	NC	NC	NC	0 97	0.66							
22-Feb-10	NC	5 83	NF	1.26	NF	0.07	NF	NC	NC	NC	NC	NC	NC	0.49	0.06							
23-Feb-10																NC	NC	NC	NC	12.4	1.3	0.81
2-Mar-10	NC	0.73	NF	0.61	NF	0.25	NF	NC	NC	NC	NC	NC	NC	0 27	0.21							
3-Mar-10																NC	NC	NC	NC	5.01	2 81	0.28
18-Mar-10	NC	0.18	NF	1.73	NF			NC	NC	NC	NC	NC	NC	0.42	0.54							
19-Mar-10																				0.28		
24-Mar-10						0.24	NF															
31-Mar-10																NC	NC	NC	NC			
1-Apr-10																				0 5	0 26	2.61
2-Apr-10	NC	0 21	NF	NF	NF	0.23	NF	NC	NC	NC	NC	NC	NC	0.16	0.16	NC	NC	NC	NC			
16-Apr-10	NC	NF	NF	NF	NF	0.17	NF	NC	NC	NC	NC	NC	NC	0.15	0.16	NC	NC	NC	NC			
19-Apr-10																				0.19	0.18	0.36
1-May-10	NC	NF	NF	NF	NF	0.07	NF	NC	NC	NC	NC	NC	NC	<0.05	0.1	NC	NC	NC	NC			
3-May-10																				3.57	2 68	2.36
20-May-10	NC	3 55	NF	1.71	NF	0.33	NF	NC	NC	NC	NC	NC	NC	3 06	1.58	NC	NC	NC	NC			
21-May-10																				0 3	0 29	0.21
2-Jun-10	NC	NF	NF	NF	NF	0.11	NF	NF	NF	NF	0.43	NF	NF	0 67	0.15							
3-Jun-10																NC	NC	NC	NC	0.14	0.16	NF
17-Jun-10																NC	NC	NC	NC	0.1	0.14	0.52
18-Jun-10	NC	NF	NF	NF	NF	0.23	NF	NF	NF	NF	1.44	NF	NF	0.49	0.22							
1-Jul-10	NC	NF	NF	NF	NF	0.11	NF	NF	NF	NF	NF	NF	NF	0 07	0.27							
2-Jul-10																NC	NC	NC	NC	NF	NF	NF
28-Jul-10	NC	NF	NF	NF	NF	0.18	NF	NF	NF	NF	0.25	NF	NF	0.4	0.19							
7/29/2010																NC	NC	NC	NC	0.14	0.14	NF
8/5/2010	NC	NF	NF	NF	NF	0.85	NF	NF	NF	NF	0.33	NF	NF	0 21	0.13							
8/9/2010																NC	NC	NC	NC	0.07	NF	NF
8/20/2010	NC	NF	NF	NF	NF	0 2	NF	NF	NF	NF	NF	NF	NF	0.15	0.25							
8/25/2010																NC	NC	NC	NC	NF	NF	NF
9/1/2010	NC	NF	NF	NF	NF	<0 05	NF	NF	NF	NF	NF	NF	NF	0 32	0.24							
9/3/2010																NC	NC	NC	NC	NF	NF	NF
9/17/2010	NC	NF	NF	NF	NF	0.1	NF	NF	NF	NF	NF	NF	NF	0 05	0.06							
9/20/2010																NC	NC	NC	NC	NF	NF	NF
10/1/2010	NC	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	<0.05	0.55							
10/4/2010																NC	NC	NC	NC	NF	NF	NF

Berry Branch / Stonecoal Branch
Surface Water Quality
Total Alkalinity (mg/l)

NC stands for Not Constructed
NF stands for No Flow

Tributary	Berry Branch															Stonecoal Branch						
NPDES Permit No.	WV1022890					WV1022911		WV1023039						Instream		WV1023039				Instream		
Outlet / D	007	008	009	010	011	001	002	004	005	006	007	008	009	DSBB/119	USBB/122	001	010	011	012	DSSM	USSB	SBUT-3
20-Jan-10			NF		NF																	
27-Jan-10														22	33							
28-Jan-10																						
29-Jan-10																						
30-Jan-10						7	NF									NC	NC	NC	NC	20	22	21
31-Jan-10	NC							NC	NC	NC	NC	NC	NC									
8-Feb-10																NC	NC	NC	NC	<1	<1	<1
9-Feb-10	NC	4	NF	5	NF	20	NF	NC	NC	NC	NC	NC	NC	33	45							
22-Feb-10	NC	24	NF	6	NF	32	NF	NC	NC	NC	NC	NC	NC	68	91							
23-Feb-10																NC	NC	NC	NC	6	4	4
2-Mar-10	NC	35	NF	6	NF	36	NF	NC	NC	NC	NC	NC	NC	68	94							
3-Mar-10																NC	NC	NC	NC	7	4	3
18-Mar-10	NC	70	NF	6	NF			NC	NC	NC	NC	NC	NC	61	75							
19-Mar-10																				6		
24-Mar-10						34	NF															
31-Mar-10																NC	NC	NC	NC			
1-Apr-10																				129	4	6
2-Apr-10	NC	84	NF	NF	NF	60	NF	NC	NC	NC	NC	NC	NC	73	93	NC	NC	NC	NC			
16-Apr-10	NC	NF	NF	NF	NF	51	NF	NC	NC	NC	NC	NC	NC	90	112	NC	NC	NC	NC			
19-Apr-10																				7	7	5
1-May-10	NC	NF	NF	NF	NF	52	NF	NC	NC	NC	NC	NC	NC	96	133	NC	NC	NC	NC			
3-May-10																				5	4	5
20-May-10	NC	68	NF	7	NF	48	NF	NC	NC	NC	NC	NC	NC	44	70	NC	NC	NC	NC			
21-May-10																				6	5	5
2-Jun-10	NC	NF	NF	NF	NF	85	NF	NF	NF	NF	1	NF	NF	122	159							
3-Jun-10																NC	NC	NC	NC	7	8	NF
17-Jun-10																NC	NC	NC	NC	9	7	7
18-Jun-10	NC	NF	NF	NF	NF	68	NF	NF	NF	NF	4	NF	NF	139	185							
1-Jul-10	NC	NF	NF	NF	NF	117	NF	NF	NF	NF	NF	NF	NF	185	259							
2-Jul-10																NC	NC	NC	NC	NF	NF	NF
28-Jul-10	NC	NF	NF	NF	NF	72	NF	NF	NF	NF	7	NF	NF	86	108							
7/29/2010																NC	NC	NC	NC	11	10	NF
8/5/2010	NC	NF	NF	NF	NF	67	NF	NF	NF	NF	7	NF	NF	77	85							
8/9/2010																NC	NC	NC	NC	12	NF	NF
8/20/2010	NC	NF	NF	NF	NF	89	NF	NF	NF	NF	NF	NF	NF	143	182							
8/25/2010																NC	NC	NC	NC	NF	NF	NF
9/1/2010	NC	NF	NF	NF	NF	147	NF	NF	NF	NF	NF	NF	NF	113	123							
9/3/2010																NC	NC	NC	NC	NF	NF	NF
9/17/2010	NC	NF	NF	NF	NF	140	NF	NF	NF	NF	NF	NF	NF	132	139							
9/20/2010																NC	NC	NC	NC	NF	NF	NF
10/1/2010	NC	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	130	218							
10/4/2010																NC	NC	NC	NC	NF	NF	NF

Berry Branch / Stonecoal Branch
Surface Water Quality
Sulfate (mg/l)

NC stands for Not Constructed
NF stands for No Flow

Tributary	Berry Branch															Stonecoal Branch						
NPDES Permit No.	WV1022890					WV1022911		WV1023039						Instream		WV1023039				Instream		
Outlet / D	007	008	009	010	011	001	002	004	005	006	007	008	009	DSBB/119	USBB/122	001	010	011	012	DSSM	USSB	SBUT-3
20-Jan-10			NF		NF																	
27-Jan-10														88	108							
28-Jan-10																						
29-Jan-10																						
30-Jan-10						102	NF									NC	NC	NC	NC	9	9	10
31-Jan-10	NC							NC	NC	NC	NC	NC	NC									
8-Feb-10																NC	NC	NC	NC	25	440	358
9-Feb-10	NC	55	NF	55	NF	99	NF	NC	NC	NC	NC	NC	NC	103	157							
22-Feb-10	NC	84	NF	39	NF	169	NF	NC	NC	NC	NC	NC	NC	182	259							
23-Feb-10																NC	NC	NC	NC	9	8	10
2-Mar-10	NC	98	NF	47	NF	155	NF	NC	NC	NC	NC	NC	NC	171	251							
3-Mar-10																NC	NC	NC	NC	10	9	11
18-Mar-10	NC	222	NF	49	NF			NC	NC	NC	NC	NC	NC	161	210							
19-Mar-10																				9		
24-Mar-10						126	NF															
31-Mar-10																NC	NC	NC	NC			
1-Apr-10																				9	9	10
2-Apr-10	NC	180	NF	NF	NF	116	NF	NC	NC	NC	NC	NC	NC	154	196	NC	NC	NC	NC			
16-Apr-10	NC	NF	NF	NF	NF	140	NF	NC	NC	NC	NC	NC	NC	193	240	NC	NC	NC	NC			
19-Apr-10																				9	8	10
1-May-10	NC	NF	NF	NF	NF	157	NF	NC	NC	NC	NC	NC	NC	222	308	NC	NC	NC	NC			
3-May-10																				7	7	8
20-May-10	NC	72	NF	32	NF	131	NF	NC	NC	NC	NC	NC	NC	107	180	NC	NC	NC	NC			
21-May-10																				10	9	11
2-Jun-10	NC	NF	NF	NF	NF	237	NF	NF	NF	NF	11	NF	NF	335	340							
3-Jun-10																NC	NC	NC	NC	8	8	NF
17-Jun-10																NC	NC	NC	NC	9	8	9
18-Jun-10	NC	NF	NF	NF	NF	203	NF	NF	NF	NF	10	NF	NF	262	346							
1-Jul-10	NC	NF	NF	NF	NF	277	NF	NF	NF	NF	NF	NF	NF	316	435							
2-Jul-10																NC	NC	NC	NC	NF	NF	NF
28-Jul-10	NC	NF	NF	NF	NF	230	NF	NF	NF	NF	11	NF	NF	247	276							
7/29/2010																NC	NC	NC	NC	6	6	NF
8/5/2010	NC	NF	NF	NF	NF	252	NF	NF	NF	NF	11	NF	NF	270	288							
8/9/2010																NC	NC	NC	NC	10	NF	NF
8/20/2010	NC	NF	NF	NF	NF	293	NF	NF	NF	NF	NF	NF	NF	318	382							
8/25/2010																NC	NC	NC	NC	NF	NF	NF
9/1/2010	NC	NF	NF	NF	NF	278	NF	NF	NF	NF	NF	NF	NF	236	237							
9/3/2010																NC	NC	NC	NC	NF	NF	NF
9/17/2010	NC	NF	NF	NF	NF	360	NF	NF	NF	NF	NF	NF	NF	286	350							
9/20/2010																NC	NC	NC	NC	NF	NF	NF
10/1/2010	NC	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	562	560							
10/4/2010																NC	NC	NC	NC	NF	NF	NF

Berry Branch / Stonecoal Branch
Surface Water Quality
Selenium (ug/l)

NC stands for Not Constructed
NF stands for No Flow

Tributary	Berry Branch															Stonecoal Branch						
NPDES Permit No.	WV1022890					WV1022911		WV1023039						Instream		WV1023039				Instream		
Outlet / D	007	008	009	010	011	001	002	004	005	006	007	008	009	DSBB/119	USBB/122	001	010	011	012	DSSM	USSB	SBUT-3
20-Jan-10			NF		NF																	
27-Jan-10														4.2	9 2							
28-Jan-10				1 2																		
29-Jan-10		2.1																				
30-Jan-10						9.1	NF									NC	NC	NC	NC	<0.6	<0 6	0 9
31-Jan-10	NC							NC	NC	NC	NC	NC	NC									
8-Feb-10																NC	NC	NC	NC	<0.6	8.1	6 6
9-Feb-10	NC	<0.6	NF	<0.6	NF	6 8	NF	NC	NC	NC	NC	NC	NC	5	9 2							
22-Feb-10	NC	1 3	NF	0.7	NF	15.6	NF	NC	NC	NC	NC	NC	NC	9.8	14.7							
23-Feb-10																NC	NC	NC	NC	< 6	<.6	0 8
2-Mar-10	NC	<0.6	NF	<0.6	NF	14.2	NF	NC	NC	NC	NC	NC	NC	8	11.8							
3-Mar-10																NC	NC	NC	NC	< 6	<.6	<0.6
18-Mar-10	NC	1 3	NF	0 8	NF			NC	NC	NC	NC	NC	NC	14 5	17.4							
19-Mar-10																				<0.6		
24-Mar-10						11	NF															
31-Mar-10																NC	NC	NC	NC			
1-Apr-10																				<0.6	<0 6	<0.6
2-Apr-10	NC	<0.6	NF	NF	NF	7 6	NF	NC	NC	NC	NC	NC	NC	5.4	6 8	NC	NC	NC	NC			
16-Apr-10	NC	NF	NF	NF	NF	11.5	NF	NC	NC	NC	NC	NC	NC	8	10.1	NC	NC	NC	NC			
19-Apr-10																				<0.6	<0 6	<0.6
1-May-10	NC	NF	NF	NF	NF	4.7	NF	NC	NC	NC	NC	NC	NC	3	5.4	NC	NC	NC	NC			
3-May-10																				<0.6	<0 6	<0.6
20-May-10	NC	1.1	NF	1.1	NF	23.2	NF	NC	NC	NC	NC	NC	NC	9.5	17.4	NC	NC	NC	NC			
21-May-10																				<0.6	<0 6	<0.6
2-Jun-10	NC	NF	NF	NF	NF	7 8	NF	NF	NF	NF	<0.6	NF	NF	6.6	8 6							
3-Jun-10																NC	NC	NC	NC	<0 60	<0 6	NF
17-Jun-10																NC	NC	NC	NC	<0.6	<0 6	<0.6
18-Jun-10	NC	NF	NF	NF	NF	27.9	NF	NF	NF	NF	<0.6	NF	NF	24	31.1							
1-Jul-10	NC	NF	NF	NF	NF	13.8	NF	NF	NF	NF	NF	NF	NF	7.1	9 6							
2-Jul-10																NC	NC	NC	NC	NF	NF	NF
28-Jul-10	NC	NF	NF	NF	NF	22.1	NF	NF	NF	NF	<0.6	NF	NF	24.7	27.2							
7/29/2010																NC	NC	NC	NC	<0.6	<0 6	NF
8/5/2010	NC	NF	NF	NF	NF	64.2	NF	NF	NF	NF	<0.6	NF	NF	45.4	49.6							
8/9/2010																NC	NC	NC	NC	<0.6	NF	NF
8/20/2010	NC	NF	NF	NF	NF	19.3	NF	NF	NF	NF	NF	NF	NF	18.1	19.1							
8/25/2010																NC	NC	NC	NC	NF	NF	NF
9/1/2010	NC	NF	NF	NF	NF	15	NF	NF	NF	NF	NF	NF	NF	12	12.5							
9/3/2010																NC	NC	NC	NC	NF	NF	NF
9/17/2010	NC	NF	NF	NF	NF	10.5	NF	NF	NF	NF	NF	NF	NF	5.9	11.6							
9/20/2010																NC	NC	NC	NC	NF	NF	NF
10/1/2010	NC	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	13 2	4							
10/4/2010																NC	NC	NC	NC	NF	NF	NF

Berry Branch / Stonecoal Branch
Surface Water Quality
Total Dissolved Solids (mg/l)

NC stands for Not Constructed
NF stands for No Flow

Tributary	Berry Branch															Stonecoal Branch						
NPDES Permit No.	WV1022890					WV1022911		WV1023039						Instream		WV1023039				Instream		
Outlet / D	007	008	009	010	011	001	002	004	005	006	007	008	009	DSBB/119	USBB/122	001	010	011	012	DSSM	USSB	SBUT-3
20-Jan-10			NF		NF																	
27-Jan-10														150	162							
28-Jan-10																						
29-Jan-10																						
30-Jan-10						173	NF									NC	NC	NC	NC	29	20	24
31-Jan-10	NC							NC	NC	NC	NC	NC	NC									
8-Feb-10																NC	NC	NC	NC	45	559	512
9-Feb-10	NC	106	NF	112	NF	190	NF	NC	NC	NC	NC	NC	NC	201	295							
22-Feb-10	NC	192	NF	92	NF	328	NF	NC	NC	NC	NC	NC	NC	337	505							
23-Feb-10																NC	NC	NC	NC	22	19	22
2-Mar-10	NC	196	NF	86	NF	293	NF	NC	NC	NC	NC	NC	NC	356	477							
3-Mar-10																NC	NC	NC	NC	18	22	21
18-Mar-10	NC	409	NF	105	NF			NC	NC	NC	NC	NC	NC	294	393							
19-Mar-10																				23		
24-Mar-10						N/A	NF															
31-Mar-10																NC	NC	NC	NC			
1-Apr-10																				24	23	29
2-Apr-10	NC	318	NF	NF	NF	257	NF	NC	NC	NC	NC	NC	NC	307	387	NC	NC	NC	NC			
16-Apr-10	NC	NF	NF	NF	NF	355	NF	NC	NC	NC	NC	NC	NC	437	515	NC	NC	NC	NC			
19-Apr-10																				27	22	23
1-May-10	NC	NF	NF	NF	NF	390	NF	NC	NC	NC	NC	NC	NC	455	651	NC	NC	NC	NC			
3-May-10																				24	23	23
20-May-10	NC	187	NF	107	NF	274	NF	NC	NC	NC	NC	NC	NC	225	389	NC	NC	NC	NC			
21-May-10																				24	32	22
2-Jun-10	NC	NF	NF	NF	NF	464	NF	NF	NF	NF	99	NF	NF	559	686							
3-Jun-10																NC	NC	NC	NC	28	22	NF
17-Jun-10																NC	NC	NC	NC	22	20	24
18-Jun-10	NC	NF	NF	NF	NF	413	NF	NF	NF	NF	69	NF	NF	556	705							
1-Jul-10	NC	NF	NF	NF	NF	538	NF	NF	NF	NF	NF	NF	NF	707	912							
2-Jul-10																NC	NC	NC	NC	NF	NF	NF
28-Jul-10	NC	NF	NF	NF	NF	426	NF	NF	NF	NF	69	NF	NF	473	628							
7/29/2010																NC	NC	NC	NC	40	33	NF
8/5/2010	NC	NF	NF	NF	NF	370	NF	NF	NF	NF	125	NF	NF	586	589							
8/9/2010																NC	NC	NC	NC	27	NF	NF
8/20/2010	NC	NF	NF	NF	NF	490	NF	NF	NF	NF	NF	NF	NF	653	716							
8/25/2010																NC	NC	NC	NC	NF	NF	NF
9/1/2010	NC	NF	NF	NF	NF	610	NF	NF	NF	NF	NF	NF	NF	466	468							
9/3/2010																NC	NC	NC	NC	NF	NF	NF
9/17/2010	NC	NF	NF	NF	NF	697	NF	NF	NF	NF	NF	NF	NF	580	700							
9/20/2010																NC	NC	NC	NC	NF	NF	NF
10/1/2010	NC	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	746	952							
10/4/2010																NC	NC	NC	NC	NF	NF	NF

Berry Branch / Stonecoal Branch
Surface Water Quality
Total Suspended Solids (mg/l)

NC stands for Not Constructed
NF stands for No Flow

Tributary	Berry Branch															Stonecoal Branch						
NPDES Permit No.	WV1022890					WV1022911		WV1023039						Instream		WV1023039				Instream		
Outlet / D	007	008	009	010	011	001	002	004	005	006	007	008	009	DSBB/119	USBB/122	001	010	011	012	DSSM	USSB	SBUT-3
20-Jan-10			NF		NF																	
27-Jan-10														2	18							
28-Jan-10				27																		
29-Jan-10		2																				
30-Jan-10						13	NF									NC	NC	NC	NC	7	26	17
31-Jan-10	NC							NC	NC	NC	NC	NC	NC									
8-Feb-10																NC	NC	NC	NC	3	1	2
9-Feb-10	NC	14	NF	17	NF	6	NF	NC	NC	NC	NC	NC	NC	21	21							
22-Feb-10	NC	64	NF	3	NF	2	NF	NC	NC	NC	NC	NC	NC	8	3							
23-Feb-10																NC	NC	NC	NC	190	43	22
2-Mar-10	NC	6	NF	6	NF	2	NF	NC	NC	NC	NC	NC	NC	4	3							
3-Mar-10																NC	NC	NC	NC	10	20	2
18-Mar-10	NC	3	NF	25	NF			NC	NC	NC	NC	NC	NC	5	12							
19-Mar-10																				3		
24-Mar-10						18	NF															
31-Mar-10																NC	NC	NC	NC			
1-Apr-10																				12	8	41
2-Apr-10	NC	3	NF	NF	NF	5	NF	NC	NC	NC	NC	NC	NC	3	3	NC	NC	NC	NC			
16-Apr-10	NC	NF	NF	NF	NF	3	NF	NC	NC	NC	NC	NC	NC	2	3	NC	NC	NC	NC			
19-Apr-10																				19	22	21
1-May-10	NC	NF	NF	NF	NF	5	NF	NC	NC	NC	NC	NC	NC	2	4	NC	NC	NC	NC			
3-May-10																				50	64	44
20-May-10	NC	25	NF	14	NF	22	NF	NC	NC	NC	NC	NC	NC	5	17	NC	NC	NC	NC			
21-May-10																				3	15	19
2-Jun-10	NC	NF	NF	NF	NF	2	NF	NF	NF	NF	2	NF	NF	48	9							
3-Jun-10																NC	NC	NC	NC	2	2	NF
17-Jun-10																NC	NC	NC	NC	20	31	20
18-Jun-10	NC	NF	NF	NF	NF	28	NF	NF	NF	NF	3	NF	NF	3	8							
1-Jul-10	NC	NF	NF	NF	NF	5	NF	NF	NF	NF	NF	NF	NF	4	3							
2-Jul-10																NC	NC	NC	NC	NF	NF	NF
28-Jul-10	NC	NF	NF	NF	NF	5	NF	NF	NF	NF	9	NF	NF	10	2							
7/29/2010																NC	NC	NC	NC	4	8	NF
8/5/2010	NC	NF	NF	NF	NF	2	NF	NF	NF	NF	3	NF	NF	3	3							
8/9/2010																NC	NC	NC	NC	3	NF	NF
8/20/2010	NC	NF	NF	NF	NF	27	NF	NF	NF	NF	NF	NF	NF	6	12							
8/25/2010																NC	NC	NC	NC	NF	NF	NF
9/1/2010	NC	NF	NF	NF	NF	3	NF	NF	NF	NF	NF	NF	NF	8	3							
9/3/2010																NC	NC	NC	NC	NF	NF	NF
9/17/2010	NC	NF	NF	NF	NF	14	NF	NF	NF	NF	NF	NF	NF	15	17							
9/20/2010																NC	NC	NC	NC	NF	NF	NF
10/1/2010	NC	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	2	<2							
10/4/2010																NC	NC	NC	NC	NF	NF	NF

Berry Branch / Stonecoal Branch
Surface Water Quality
Conductivity (umhos)

NC stands for Not Constructed
NF stands for No Flow

Tributary	Berry Branch															Stonecoal Branch						
NPDES Permit	WV1022890					WV1022911		WV1023039						Instream		WV1023039				Instream		
Outlet / ID	007	008	009	010	011	001	002	004	005	006	007	008	009	DSBB/119	USBB/122	001	010	011	012	DSSM	USSB	SBUT-3
20-Jan-10			NF		NF																	
27-Jan-10														203	287							
28-Jan-10																						
29-Jan-10																						
30-Jan-10						309	NF									NC	NC	NC	NC	40	34	40
31-Jan-10	NC							NC	NC	NC	NC	NC	NC									
8-Feb-10																NC	NC	NC	NC	150	1180	1030
9-Feb-10	NC	480	NF	210	NF	360	NF	NC	NC	NC	NC	NC	NC	390	530							
22-Feb-10	NC	310	NF	150	NF	520	NF	NC	NC	NC	NC	NC	NC	1300	760							
23-Feb-10																NC	NC	NC	NC	40	31	37
2-Mar-10	NC	323	NF	149	NF	460	NF	NC	NC	NC	NC	NC	NC	460	630							
3-Mar-10																NC	NC	NC	NC	40	240	230
18-Mar-10	NC	548	NF	139	NF			NC	NC	NC	NC	NC	NC	482	605							
19-Mar-10																				38		
24-Mar-10						413	NF															
31-Mar-10																NC	NC	NC	NC			
1-Apr-10																				40	33	40
2-Apr-10	NC	588	NF	NF	NF	490	NF	NC	NC	NC	NC	NC	NC	591	700	NC	NC	NC	NC			
16-Apr-10	NC	NF	NF	NF	NF	508	NF	NC	NC	NC	NC	NC	NC	643	762	NC	NC	NC	NC			
19-Apr-10																				38	36	36
1-May-10	NC	NF	NF	NF	NF	540	NF	NC	NC	NC	NC	NC	NC	687	919	NC	NC	NC	NC			
3-May-10																				34	34	33
20-May-10	NC	332	NF	171	NF	461	NF	NC	NC	NC	NC	NC	NC	403	580	NC	NC	NC	NC			
21-May-10																				44	40	42
2-Jun-10	NC	NF	NF	NF	NF	626	NF	NF	NF	NF	127	NF	NF	1040	1080							
3-Jun-10																NC	NC	NC	NC	50	50	NF
17-Jun-10																NC	NC	NC	NC	39	33	34
18-Jun-10	NC	NF	NF	NF	NF	583	NF	NF	NF	NF	87	NF	NF	785	975							
1-Jul-10	NC	NF	NF	NF	NF	765	NF	NF	NF	NF	NF	NF	NF	912	1440							
2-Jul-10																NC	NC	NC	NC	NF	NF	NF
28-Jul-10	NC	NF	NF	NF	NF	691	NF	NF	NF	NF	150	NF	NF	736	836							
7/29/2010																NC	NC	NC	NC	43	42	NF
8/5/2010	NC	NF	NF	NF	NF	644	NF	NF	NF	NF	157	NF	NF	702	737							
8/9/2010																NC	NC	NC	NC	50	NF	NF
8/20/2010	NC	NF	NF	NF	NF	703	NF	NF	NF	NF	NF	NF	NF	841	987							
8/25/2010																NC	NC	NC	NC	NF	NF	NF
9/1/2010	NC	NF	NF	NF	NF	875	NF	NF	NF	NF	NF	NF	NF	534	747							
9/3/2010																NC	NC	NC	NC	NF	NF	NF
9/17/2010	NC	NF	NF	NF	NF	790	NF	NF	NF	NF	NF	NF	NF	700	780							
9/20/2010																NC	NC	NC	NC	NF	NF	NF
10/1/2010	NC	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	220	1300							
10/4/2010																NC	NC	NC	NC	NF	NF	NF

Berry Branch / Stonecoal Branch
Surface Water Quality
Calcium (mg/l)

NC stands for Not Constructed
NF stands for No Flow

Tributary	Berry Branch															Stonecoal Branch						
NPDES Permit No.	WV1022890					WV1022911		WV1023039						Instream		WV1023039				Instream		
Outlet / D	007	008	009	010	011	001	002	004	005	006	007	008	009	DSBB/119	USBB/122	001	010	011	012	DSSM	USSB	SBUT-3
20-Jan-10			NF		NF																	
27-Jan-10														20 9	39.8							
28-Jan-10																						
29-Jan-10																						
30-Jan-10						30.4	NF									NC	NC	NC	NC	2.99	2 24	2.62
31-Jan-10	NC							NC	NC	NC	NC	NC	NC									
8-Feb-10																NC	NC	NC	NC	7.17	99 3	78.3
9-Feb-10	NC	8.74	NF	9 6	NF	29	NF	NC	NC	NC	NC	NC	NC	32 2	51.4							
22-Feb-10	NC	27	NF	6 9	NF	51.2	NF	NC	NC	NC	NC	NC	NC	54 8	75.3							
23-Feb-10																NC	NC	NC	NC	3.11	2 51	2.48
2-Mar-10	NC	37.9	NF	8.44	NF	51.3	NF	NC	NC	NC	NC	NC	NC	58.7	80.4							
3-Mar-10																NC	NC	NC	NC	3.28	2 53	2.69
18-Mar-10	NC	67.8	NF	7.62	NF			NC	NC	NC	NC	NC	NC	48 6	64.6							
19-Mar-10																				<0.6		
24-Mar-10						39.8	NF															
31-Mar-10																NC	NC	NC	NC			
1-Apr-10																				2.72	2 36	2.31
2-Apr-10	NC	64.1	NF	NF	NF	49.1	NF	NC	NC	NC	NC	NC	NC	37 9	44.6	NC	NC	NC	NC			
16-Apr-10	NC	NF	NF	NF	NF	56.7	NF	NC	NC	NC	NC	NC	NC	64 9	79.3	NC	NC	NC	NC			
19-Apr-10																				4.09	2.44	2.68
1-May-10	NC	NF	NF	NF	NF	50.9	NF	NC	NC	NC	NC	NC	NC	67.4	89.2	NC	NC	NC	NC			
3-May-10																				2.61	2.47	2.97
20-May-10	NC	33.3	NF	8.48	NF	46.3	NF	NC	NC	NC	NC	NC	NC	34 5	58.9	NC	NC	NC	NC			
21-May-10																				2.72	2.48	2.57
2-Jun-10	NC	NF	NF	NF	NF	82.1	NF	NF	NF	NF	6.76	NF	NF	104	107							
3-Jun-10																NC	NC	NC	NC	2.32	2 65	NF
17-Jun-10																NC	NC	NC	NC	3.1	2 57	2.28
18-Jun-10	NC	NF	NF	NF	NF	73.9	NF	NF	NF	NF	5.26	NF	NF	93.4	99							
1-Jul-10	NC	NF	NF	NF	NF	106	NF	NF	NF	NF	NF	NF	NF	100	137							
2-Jul-10																NC	NC	NC	NC	NF	NF	NF
28-Jul-10	NC	NF	NF	NF	NF	75.8	NF	NF	NF	NF	7.86	NF	NF	86 2	91.2							
7/29/2010																NC	NC	NC	NC	3.42	3 29	NF
8/5/2010	NC	NF	NF	NF	NF	79.1	NF	NF	NF	NF	7.28	NF	NF	70 9	78.8							
8/9/2010																NC	NC	NC	NC	3.87	NF	NF
8/20/2010	NC	NF	NF	NF	NF	93.5	NF	NF	NF	NF	NF	NF	NF	80 9	104							
8/25/2010																NC	NC	NC	NC	NF	NF	NF
9/1/2010	NC	NF	NF	NF	NF	83.4	NF	NF	NF	NF	NF	NF	NF	96 3	96.3							
9/3/2010																NC	NC	NC	NC	NF	NF	NF
9/17/2010	NC	NF	NF	NF	NF	120	NF	NF	NF	NF	NF	NF	NF	95.4	117							
9/20/2010																NC	NC	NC	NC	NF	NF	NF
10/1/2010	NC	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	182	154							
10/4/2010																NC	NC	NC	NC	NF	NF	NF

Berry Branch / Stonecoal Branch
Surface Water Quality
Potassium (mg/l)

NC stands for Not Constructed
NF stands for No Flow

Tributary	Berry Branch															Stonecoal Branch						
NPDES Permit No.	WV1022890					WV1022911		WV1023039						Instream		WV1023039				Instream		
Outlet / D	007	008	009	010	011	001	002	004	005	006	007	008	009	DSBB/119	USBB/122	001	010	011	012	DSSM	USSB	SBUT-3
20-Jan-10			NF		NF																	
27-Jan-10														3 61	6.1							
28-Jan-10																						
29-Jan-10																						
30-Jan-10						3.89	NF									NC	NC	NC	NC	1.14	1 01	1.12
31-Jan-10	NC							NC	NC	NC	NC	NC	NC									
8-Feb-10																NC	NC	NC	NC	1.62	9 09	7.35
9-Feb-10	NC	2 2	NF	2.64	NF	3.95	NF	NC	NC	NC	NC	NC	NC	4 24	6.16							
22-Feb-10	NC	4 65	NF	2.23	NF	6.06	NF	NC	NC	NC	NC	NC	NC	6 32	8.67							
23-Feb-10																NC	NC	NC	NC	3.55	1.4	1.15
2-Mar-10	NC	4 32	NF	2.61	NF	6.31	NF	NC	NC	NC	NC	NC	NC	6.18	8.39							
3-Mar-10																NC	NC	NC	NC	2.41	1 82	1.14
18-Mar-10	NC	5 62	NF	7.62	NF			NC	NC	NC	NC	NC	NC	6 21	8.33							
19-Mar-10																				1.22		
24-Mar-10						5 6	NF															
31-Mar-10																NC	NC	NC	NC			
1-Apr-10																				1.26	1.19	1 8
2-Apr-10	NC	5 66	NF	NF	NF	7.99	NF	NC	NC	NC	NC	NC	NC	7.74	9.48	NC	NC	NC	NC			
16-Apr-10	NC	NF	NF	NF	NF	8.53	NF	NC	NC	NC	NC	NC	NC	8 29	9.95	NC	NC	NC	NC			
19-Apr-10																				1.31	1.13	1.11
1-May-10	NC	NF	NF	NF	NF	6.99	NF	NC	NC	NC	NC	NC	NC	8 04	11.3	NC	NC	NC	NC			
3-May-10																				2.14	1 97	1.88
20-May-10	NC	5 68	NF	3 8	NF	6.65	NF	NC	NC	NC	NC	NC	NC	9 21	7.73	NC	NC	NC	NC			
21-May-10																				1.57	1 32	1.23
2-Jun-10	NC	NF	NF	NF	NF	11.3	NF	NF	NF	NF	3.58	NF	NF	11	13.2							
3-Jun-10																NC	NC	NC	NC	1.33	1.42	NF
17-Jun-10																NC	NC	NC	NC	1.39	1.49	1.14
18-Jun-10	NC	NF	NF	NF	NF	9.83	NF	NF	NF	NF	3 8	NF	NF	10 2	13.1							
1-Jul-10	NC	NF	NF	NF	NF	12	NF	NF	NF	NF	NF	NF	NF	11 3	14.9							
2-Jul-10																NC	NC	NC	NC	NF	NF	NF
28-Jul-10	NC	NF	NF	NF	NF	10.1	NF	NF	NF	NF	8.99	NF	NF	10 3	10.8							
7/29/2010																NC	NC	NC	NC	1.67	1 58	NF
8/5/2010	NC	NF	NF	NF	NF	11.2	NF	NF	NF	NF	7.55	NF	NF	8.75	10.2							
8/9/2010																NC	NC	NC	NC	1.58	NF	NF
8/20/2010	NC	NF	NF	NF	NF	11	NF	NF	NF	NF	NF	NF	NF	12 8	14.7							
8/25/2010																NC	NC	NC	NC	NF	NF	NF
9/1/2010	NC	NF	NF	NF	NF	13.6	NF	NF	NF	NF	NF	NF	NF	10.4	10.3							
9/3/2010																NC	NC	NC	NC	NF	NF	NF
9/17/2010	NC	NF	NF	NF	NF	14.3	NF	NF	NF	NF	NF	NF	NF	9 85	13.8							
9/20/2010																NC	NC	NC	NC	NF	NF	NF
10/1/2010	NC	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	14 8	18.6							
10/4/2010																NC	NC	NC	NC	NF	NF	NF

Berry Branch / Stonecoal Branch
Surface Water Quality
Magnesium (mg/l)

NC stands for Not Constructed
NF stands for No Flow

Tributary	Berry Branch															Stonecoal Branch						
NPDES Permit No.	WV1022890					WV1022911		WV1023039						Instream		WV1023039				Instream		
Outlet / D	007	008	009	010	011	001	002	004	005	006	007	008	009	DSBB/119	USBB/122	001	010	011	012	DSSM	USSB	SBUT-3
20-Jan-10			NF		NF																	
27-Jan-10														11 2	21.5							
28-Jan-10																						
29-Jan-10																						
30-Jan-10						14.8	NF									NC	NC	NC	NC	2.27	1 98	2.24
31-Jan-10	NC							NC	NC	NC	NC	NC	NC									
8-Feb-10																NC	NC	NC	NC	5.49	103	81.7
9-Feb-10	NC	10.1	NF	10.7	NF	14.4	NF	NC	NC	NC	NC	NC	NC	16.1	24.8							
22-Feb-10	NC	14	NF	8.29	NF	23	NF	NC	NC	NC	NC	NC	NC	27	36.8							
23-Feb-10																NC	NC	NC	NC	3.49	2 39	2.42
2-Mar-10	NC	18.6	NF	10.7	NF	23.7	NF	NC	NC	NC	NC	NC	NC	28 5	38.9							
3-Mar-10																NC	NC	NC	NC	2.98	2 65	2.44
18-Mar-10	NC	27.5	NF	9.08	NF			NC	NC	NC	NC	NC	NC	22 8	30.3							
19-Mar-10																				2.28		
24-Mar-10						17.6	NF															
31-Mar-10																NC	NC	NC	NC			
1-Apr-10																				2 3	2.12	2.42
2-Apr-10	NC	28.3	NF	NF	NF	21.1	NF	NC	NC	NC	NC	NC	NC	21 9	26.4	NC	NC	NC	NC			
16-Apr-10	NC	NF	NF	NF	NF	22.4	NF	NC	NC	NC	NC	NC	NC	30 2	36.9	NC	NC	NC	NC			
19-Apr-10																				2.62	2.14	2.18
1-May-10	NC	NF	NF	NF	NF	23.2	NF	NC	NC	NC	NC	NC	NC	34.7	48.9	NC	NC	NC	NC			
3-May-10																				2.19	2.11	2.56
20-May-10	NC	14.4	NF	9.04	NF	18.6	NF	NC	NC	NC	NC	NC	NC	16 3	26.7	NC	NC	NC	NC			
21-May-10																				2.29	2 09	2.28
2-Jun-10	NC	NF	NF	NF	NF	32.3	NF	NF	NF	NF	3.35	NF	NF	43 8	50.1							
3-Jun-10																NC	NC	NC	NC	2.07	2.18	NF
17-Jun-10																NC	NC	NC	NC	2.24	2.3	2.13
18-Jun-10	NC	NF	NF	NF	NF	28.7	NF	NF	NF	NF	3	NF	NF	42 3	55							
1-Jul-10	NC	NF	NF	NF	NF	40.6	NF	NF	NF	NF	NF	NF	NF	52.7	70.9							
2-Jul-10																NC	NC	NC	NC	NF	NF	NF
28-Jul-10	NC	NF	NF	NF	NF	29.8	NF	NF	NF	NF	4.07	NF	NF	37 2	38.4							
7/29/2010																NC	NC	NC	NC	2.34	2 24	NF
8/5/2010	NC	NF	NF	NF	NF	32.8	NF	NF	NF	NF	4.28	NF	NF	30 9	35							
8/9/2010																NC	NC	NC	NC	2 6	NF	NF
8/20/2010	NC	NF	NF	NF	NF	37.4	NF	NF	NF	NF	NF	NF	NF	55.7	63.4							
8/25/2010																NC	NC	NC	NC	NF	NF	NF
9/1/2010	NC	NF	NF	NF	NF	47.3	NF	NF	NF	NF	NF	NF	NF	38 6	38.7							
9/3/2010																NC	NC	NC	NC	NF	NF	NF
9/17/2010	NC	NF	NF	NF	NF	47.9	NF	NF	NF	NF	NF	NF	NF	39.1	46.8							
9/20/2010																NC	NC	NC	NC	NF	NF	NF
10/1/2010	NC	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	70.1	89.3							
10/4/2010																NC	NC	NC	NC	NF	NF	NF

Berry Branch / Stonecoal Branch
Surface Water Quality
Bicarbonate Alkalinity (mg/l)

NC stands for Not Constructed
NF stands for No Flow

Tributary	Berry Branch															Stonecoal Branch						
NPDES Permit No.	WV1022890					WV1022911		WV1023039						Instream		WV1023039				Instream		
Outlet / D	007	008	009	010	011	001	002	004	005	006	007	008	009	DSBB/119	USBB/122	001	010	011	012	DSSM	USSB	SBUT-3
20-Jan-10			NF		NF																	
27-Jan-10														22	33							
28-Jan-10																						
29-Jan-10																						
30-Jan-10						<1	NF									NC	NC	NC	NC	<1	<1	<1
31-Jan-10	NC							NC	NC	NC	NC	NC	NC									
8-Feb-10																NC	NC	NC	NC	<1	<1	<1
9-Feb-10	NC	4	NF	5	NF	20	NF	NC	NC	NC	NC	NC	NC	33	45							
22-Feb-10	NC	24	NF	6	NF	32	NF	NC	NC	NC	NC	NC	NC	68	91							
23-Feb-10																NC	NC	NC	NC	6	4	4
2-Mar-10	NC	35	NF	6	NF	36	NF	NC	NC	NC	NC	NC	NC	68	94							
3-Mar-10																NC	NC	NC	NC	<1	<1	<1
18-Mar-10	NC	70	NF	6	NF			NC	NC	NC	NC	NC	NC	61	75							
19-Mar-10																				6		
24-Mar-10						34	NF															
31-Mar-10																NC	NC	NC	NC			
1-Apr-10																				129	4	6
2-Apr-10	NC	84	NF	NF	NF	60	NF	NC	NC	NC	NC	NC	NC	73	81	NC	NC	NC	NC			
16-Apr-10	NC	NF	NF	NF	NF	51	NF	NC	NC	NC	NC	NC	NC	90	112	NC	NC	NC	NC			
19-Apr-10																				7	7	5
1-May-10	NC	NF	NF	NF	NF	52	NF	NC	NC	NC	NC	NC	NC	96	133	NC	NC	NC	NC			
3-May-10																				5	4	5
20-May-10	NC	68	NF	7	NF	48	NF	NC	NC	NC	NC	NC	NC	44	70	NC	NC	NC	NC			
21-May-10																				6	5	5
2-Jun-10	NC	NF	NF	NF	NF	85	NF	NF	NF	NF	1	NF	NF	122	159							
3-Jun-10																NC	NC	NC	NC	7	8	NF
17-Jun-10																NC	NC	NC	NC	9	7	7
18-Jun-10	NC	NF	NF	NF	NF	68	NF	NF	NF	NF	4	NF	NF	139	185							
1-Jul-10	NC	NF	NF	NF	NF	117	NF	NF	NF	NF	NF	NF	NF	179	224							
2-Jul-10																NC	NC	NC	NC	NF	NF	NF
28-Jul-10	NC	NF	NF	NF	NF	72	NF	NF	NF	NF	7	NF	NF	86	108							
7/29/2010																NC	NC	NC	NC	11	10	NF
8/5/2010	NC	NF	NF	NF	NF	67	NF	NF	NF	NF	7	NF	NF	77	85							
8/9/2010																NC	NC	NC	NC	12	NF	NF
8/20/2010	NC	NF	NF	NF	NF	89	NF	NF	NF	NF	NF	NF	NF	143	182							
8/25/2010																NC	NC	NC	NC	NF	NF	NF
9/1/2010	NC	NF	NF	NF	NF	147	NF	NF	NF	NF	NF	NF	NF	113	123							
9/3/2010																NC	NC	NC	NC	NF	NF	NF
9/17/2010	NC	NF	NF	NF	NF	140	NF	NF	NF	NF	NF	NF	NF	132	139							
9/20/2010																NC	NC	NC	NC	NF	NF	NF
10/1/2010	NC	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	130	218							
10/4/2010																NC	NC	NC	NC	NF	NF	NF

Berry Branch / Stonecoal Branch
Surface Water Quality
Chloride (mg/l)

NC stands for Not Constructed
NF stands for No Flow

Tributary	Berry Branch															Stonecoal Branch						
NPDES Permit No.	WV1022890					WV1022911		WV1023039						Instream		WV1023039				Instream		
Outlet / D	007	008	009	010	011	001	002	004	005	006	007	008	009	DSBB/119	USBB/122	001	010	011	012	DSSM	USSB	SBUT-3
20-Jan-10			NF		NF																	
27-Jan-10														2.5	1.7							
28-Jan-10																						
29-Jan-10																						
30-Jan-10						3	NF									NC	NC	NC	NC	1	1.2	1
31-Jan-10	NC							NC	NC	NC	NC	NC	NC									
8-Feb-10																NC	NC	NC	NC	2 5	4	3
9-Feb-10	NC	<1.0	NF	1.1	NF	1.7	NF	NC	NC	NC	NC	NC	NC	1.6	1.7							
22-Feb-10	NC	1	NF	<1	NF	1.7	NF	NC	NC	NC	NC	NC	NC	2.4	2 5							
23-Feb-10																NC	NC	NC	NC	1 2	<1	<1
2-Mar-10	NC	<1.0	NF	1.1	NF	2	NF	NC	NC	NC	NC	NC	NC	2	2 5							
3-Mar-10																NC	NC	NC	NC	1 2	1	<1.0
18-Mar-10	NC	<1.0	NF	1.1	NF			NC	NC	NC	NC	NC	NC	3.5	4							
19-Mar-10																				1.1		
24-Mar-10						2	NF															
31-Mar-10																NC	NC	NC	NC			
1-Apr-10																				<1.0	<1 0	<1.0
2-Apr-10	NC	1 2	NF	NF	NF	3	NF	NC	NC	NC	NC	NC	NC	3.7	3 5	NC	NC	NC	NC			
16-Apr-10	NC	NF	NF	NF	NF	10.5	NF	NC	NC	NC	NC	NC	NC	8.4	10.8	NC	NC	NC	NC			
19-Apr-10																				1.1	1	<1.0
1-May-10	NC	NF	NF	NF	NF	15	NF	NC	NC	NC	NC	NC	NC	10 5	14.3	NC	NC	NC	NC			
3-May-10																				<1.0	<1 0	<1.0
20-May-10	NC	<1.0	NF	<1.0	NF	4 3	NF	NC	NC	NC	NC	NC	NC	5.6	3 2	NC	NC	NC	NC			
21-May-10																				1	<1 0	<1.0
2-Jun-10	NC	NF	NF	NF	NF	5.1	NF	NF	NF	NF		NF	NF	4	6							
3-Jun-10																NC	NC	NC	NC	<1.0	1	NF
17-Jun-10																NC	NC	NC	NC	1	1	<1.0
18-Jun-10	NC	NF	NF	NF	NF	11.8	NF	NF	NF	NF	15.5	NF	NF	13.1	17							
1-Jul-10	NC	NF	NF	NF	NF	5.7	NF	NF	NF	NF	NF	NF	NF	8.6	12							
2-Jul-10																NC	NC	NC	NC	NF	NF	NF
28-Jul-10	NC	NF	NF	NF	NF	4 9	NF	NF	NF	NF	15.5	NF	NF	8	8 3							
7/29/2010																NC	NC	NC	NC	3.4	1.1	NF
8/5/2010	NC	NF	NF	NF	NF	5 5	NF	NF	NF	NF	19.7	NF	NF	5	5							
8/9/2010																NC	NC	NC	NC	1	NF	NF
8/20/2010	NC	NF	NF	NF	NF	10.4	NF	NF	NF	NF	NF	NF	NF	7.4	8 9							
8/25/2010																NC	NC	NC	NC	NF	NF	NF
9/1/2010	NC	NF	NF	NF	NF	1.7	NF	NF	NF	NF	NF	NF	NF	3.6	3.7							
9/3/2010																NC	NC	NC	NC	NF	NF	NF
9/17/2010	NC	NF	NF	NF	NF	1 9	NF	NF	NF	NF	NF	NF	NF	4.4	2.1							
9/20/2010																NC	NC	NC	NC	NF	NF	NF
10/1/2010	NC	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	10	33.8							
10/4/2010																NC	NC	NC	NC	NF	NF	NF

Berry Branch / Stonecoal Branch
Surface Water Quality
Sodium (mg/l)

NC stands for Not Constructed
NF stands for No Flow

Tributary	Berry Branch															Stonecoal Branch						
NPDES Permit No.	WV1022890					WV1022911		WV1023039						Instream		WV1023039				Instream		
Outlet / D	007	008	009	010	011	001	002	004	005	006	007	008	009	DSBB/119	USBB/122	001	010	011	012	DSSM	USSB	SBUT-3
20-Jan-10			NF		NF																	
27-Jan-10														4 83	10.2							
28-Jan-10																						
29-Jan-10																						
30-Jan-10						2.95	NF									NC	NC	NC	NC	0.91	0 95	1
31-Jan-10	NC							NC	NC	NC	NC	NC	NC									
8-Feb-10																NC	NC	NC	NC	2.7	6 06	5.55
9-Feb-10	NC	1.12	NF	1.37	NF	1 8	NF	NC	NC	NC	NC	NC	NC	4 62	6.74							
22-Feb-10	NC	1 63	NF	1.21	NF	3.51	NF	NC	NC	NC	NC	NC	NC	11.1	15.3							
23-Feb-10																NC	NC	NC	NC	1.41	0 89	0.81
2-Mar-10	NC	2 01	NF	1.68	NF	3.61	NF	NC	NC	NC	NC	NC	NC	8.18	9.74							
3-Mar-10																NC	NC	NC	NC	1.35	1.2	0.95
18-Mar-10	NC	2.48	NF	1.14	NF			NC	NC	NC	NC	NC	NC	6 98	64.6							
19-Mar-10																				0.92		
24-Mar-10						2.79	NF															
31-Mar-10																NC	NC	NC	NC			
1-Apr-10																				0.96	0 85	0.85
2-Apr-10	NC	2 28	NF	NF	NF	3.03	NF	NC	NC	NC	NC	NC	NC	36 6	42	NC	NC	NC	NC			
16-Apr-10	NC	NF	NF	NF	NF	6	NF	NC	NC	NC	NC	NC	NC	19.7	21.1	NC	NC	NC	NC			
19-Apr-10																				1.34	0 94	0.81
1-May-10	NC	NF	NF	NF	NF	7 2	NF	NC	NC	NC	NC	NC	NC	24.4	33.8	NC	NC	NC	NC			
3-May-10																				0.86	0 92	0.82
20-May-10	NC	2.14	NF	1.54	NF	3.48	NF	NC	NC	NC	NC	NC	NC	3 34	3.88	NC	NC	NC	NC			
21-May-10																				1.14	1	0 9
2-Jun-10	NC	NF	NF	NF	NF	4.35	NF	NF	NF	NF	4.98	NF	NF	10 3	12.1							
3-Jun-10																NC	NC	NC	NC	0.94	1 06	NF
17-Jun-10																NC	NC	NC	NC	0.97	0 99	0.67
18-Jun-10	NC	NF	NF	NF	NF	6 8	NF	NF	NF	NF	3.89	NF	NF	28.4	36							
1-Jul-10	NC	NF	NF	NF	NF	6.82	NF	NF	NF	NF	NF	NF	NF	51 3	69.7							
2-Jul-10																NC	NC	NC	NC	NF	NF	NF
28-Jul-10	NC	NF	NF	NF	NF	5.23	NF	NF	NF	NF	5.59	NF	NF	12 9	11.3							
7/29/2010																NC	NC	NC	NC	1.11	1 03	NF
8/5/2010	NC	NF	NF	NF	NF	5.43	NF	NF	NF	NF	5.37	NF	NF	9.71	9.74							
8/9/2010																NC	NC	NC	NC	1.18	NF	NF
8/20/2010	NC	NF	NF	NF	NF	7.05	NF	NF	NF	NF	NF	NF	NF	24 3	27.6							
8/25/2010																NC	NC	NC	NC	NF	NF	NF
9/1/2010	NC	NF	NF	NF	NF	5.88	NF	NF	NF	NF	NF	NF	NF	11	10.9							
9/3/2010																NC	NC	NC	NC	NF	NF	NF
9/17/2010	NC	NF	NF	NF	NF	10.7	NF	NF	NF	NF	NF	NF	NF	15.4	11.4							
9/20/2010																NC	NC	NC	NC	NF	NF	NF
10/1/2010	NC	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	22 8	86.6							
10/4/2010																NC	NC	NC	NC	NF	NF	NF

Berry Branch / Stonecoal Branch
Surface Water Quality
Total Suspended Solids (mg/l)

NC stands for Not Constructed
NF stands for No Flow

Tributary	Berry Branch															Stonecoal Branch						
NPDES Permit No.	WV1022890					WV1022911		WV1023039						Instream		WV1023039				Instream		
Outlet / D	007	008	009	010	011	001	002	004	005	006	007	008	009	DSBB/119	USBB/122	001	010	011	012	DSSM	USSB	SBUT-3
20-Jan-10			NF		NF																	
27-Jan-10														<1	<1							
28-Jan-10																						
29-Jan-10																						
30-Jan-10						21	NF									NC	NC	NC	NC	6	4	4
31-Jan-10	NC							NC	NC	NC	NC	NC	NC									
8-Feb-10																NC	NC	NC	NC	<1	<1	<1
9-Feb-10	NC	<1	NF	<1	NF	<1	NF	NC	NC	NC	NC	NC	NC	<1	<1							
22-Feb-10	NC	<1	NF	<1	NF	<1	NF	NC	NC	NC	NC	NC	NC	<1	<1							
23-Feb-10																NC	NC	NC	NC	<1	<1	<1
2-Mar-10	NC	<1	NF	<1	NF	<1	NF	NC	NC	NC	NC	NC	NC	<1	<1							
3-Mar-10																NC	NC	NC	NC	20	17	17
18-Mar-10	NC	<1	NF	<1	NF			NC	NC	NC	NC	NC	NC	<1	<1							
19-Mar-10																				<1		
24-Mar-10						<1	NF															
31-Mar-10																NC	NC	NC	NC			
1-Apr-10																				<1	<1	<1
2-Apr-10	NC	<1	NF	NF	NF	<1	NF	NC	NC	NC	NC	NC	NC	<1	12	NC	NC	NC	NC			
16-Apr-10	NC	NF	NF	NF	NF	<1	NF	NC	NC	NC	NC	NC	NC	<1	<1	NC	NC	NC	NC			
19-Apr-10																				<1	<1	<1
1-May-10	NC	NF	NF	NF	NF	<1	NF	NC	NC	NC	NC	NC	NC	<1	<1	NC	NC	NC	NC			
3-May-10																				<1	<1	<1
20-May-10	NC	<1	NF	<1	NF	<1	NF	NC	NC	NC	NC	NC	NC	<1	<1	NC	NC	NC	NC			
21-May-10																				<1	<1	<1
2-Jun-10	NC	NF	NF	NF	NF	<1	NF	NF	NF	NF	<1	NF	NF	<1	<1							
3-Jun-10																NC	NC	NC	NC	<1	<1	NF
17-Jun-10																NC	NC	NC	NC	<1	<1	<1
18-Jun-10	NC	NF	NF	NF	NF	<1	NF	NF	NF	NF	<1	NF	NF	<1	<1							
1-Jul-10	NC	NF	NF	NF	NF	<1	NF	NF	NF	NF	NF	NF	NF	<1	<1							
2-Jul-10																NC	NC	NC	NC	NF	NF	NF
28-Jul-10	NC	NF	NF	NF	NF	<1	NF	NF	NF	NF	<1	NF	NF	<1	<1							
7/29/2010																NC	NC	NC	NC	<1	<1	NF
8/5/2010	NC	NF	NF	NF	NF	<1	NF	NF	NF	NF	<1	NF	NF	<1	<1							
8/9/2010																NC	NC	NC	NC	<1	NF	NF
8/20/2010	NC	NF	NF	NF	NF	<1	NF	NF	NF	NF	NF	NF	NF	<1	<1							
8/25/2010																NC	NC	NC	NC	NF	NF	NF
9/1/2010	NC	NF	NF	NF	NF	<1	NF	NF	NF	NF	NF	NF	NF	<1	<1							
9/3/2010																NC	NC	NC	NC	NF	NF	NF
9/17/2010	NC	NF	NF	NF	NF	<1	NF	NF	NF	NF	NF	NF	NF	<1	<1							
9/20/2010																NC	NC	NC	NC	NF	NF	NF
10/1/2010	NC	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	<1	<1							
10/4/2010																NC	NC	NC	NC	NF	NF	NF

Stefania Shamet/R3/USEPA/US
12/01/2010 12:00 PM

To John Pomponio, Jon Capacasa, Early.William
cc John Forren, Jeffrey Lapp
bcc Greg Pond
Subject Hobet 45 - (b) (5) [redacted]

(b) (5) [redacted]

----- Forwarded by Stefania Shamet/R3/USEPA/US on 12/01/2010 11:58 AM -----

From: Greg Pond/R3/USEPA/US
To: Carmen Vitanza/R3/USEPA/US@EPA
Cc: Jessica Martinsen/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA, Stephanie Chin/R3/USEPA/US@EPA, John Pomponio/R3/USEPA/US@EPA
Date: 11/30/2010 08:50 AM
Subject: Re: Hobet45 Mining Data dated 10/15/2010

(b) (5) [redacted]

[redacted]

[redacted]

[redacted]

Greg Pond
Office of Monitoring and Assessment
U.S. EPA Region 3
1060 Chapline Street, Suite 303
Wheeling, WV 26003-2995
(p) 304-234-0243
(f) 304-234-0260
pond.greg@epa.gov
Visit our website at http://epa.gov/reg3esd1/3ea50.htm

Carmen Vitanza	Hi Greg, Attached you find the Hobet45 data f...	11/30/2010 07:19:20 AM

From: Carmen Vitanza/R3/USEPA/US
To: Greg Pond/R3/USEPA/US@EPA
Cc: Jessica Martinsen/R3/USEPA/US@EPA
Date: 11/30/2010 07:19 AM
Subject: Hobet45 Mining Data dated 10/15/2010

Hi Greg,

Attached you find the Hobet45 data for Patriot Mining dated 10/15/2010 this was the last file I recived from Hobet.

HOBET45_20101015.xls

Carmen W. Vitanza, Jr.
SEE Project/U.S. EPA Region III
Office of Environmental Programs
1650 Arch Street (3EA30)
Philadelphia, PA. 19103
Information System Specialist
215-814-2754 phone
215-814-2783 fax
EPA/SEE-EAID Division

Berry Branch / Stonecoal Branch
Surface Water Quality
Flow (GPM)

NC stands for Not Constructed
NF stands for No Flow

Tributary								Berry Branc
NPDES Permit No.	WV1022890					WV1022911		
Outlet / ID	007	008	009	010	011	001	002	004
20-Jan-10			NF		NF			
27-Jan-10								
28-Jan-10				10				
29-Jan-10		5						
30-Jan-10						238	NF	
31-Jan-10	NC							NC
8-Feb-10								
9-Feb-10	NC	140	NF	89	NF	337	NF	NC
22-Feb-10	NC	52	NF	31	NF	615	NF	NC
23-Feb-10								
2-Mar-10	NC	18	NF	22	NF	308	NF	NC
3-Mar-10								
18-Mar-10	NC	21	NF	19	NF			NC
19-Mar-10								
24-Mar-10						494	NF	
31-Mar-10								
1-Apr-10								
2-Apr-10	NC	14	NF	NF	NF	654	NF	NC
16-Apr-10	NC	NF	NF	NF	NF	512	NF	NC
19-Apr-10								
1-May-10	NC	NF	NF	NF	NF	232	NF	NC
3-May-10								
20-May-10	NC	21	NF	4	NF	299	NF	NC
21-May-10								
2-Jun-10	NC	NF	NF	NF	NF	150	NF	NF
3-Jun-10								
17-Jun-10								
18-Jun-10	NC	NF	NF	NF	NF	350	NF	NF
1-Jul-10	NC	NF	NF	NF	NF	212	NF	NF
2-Jul-10								
28-Jul-10	NC	NF	NF	NF	NF	410	NF	NF
7/29/2010								
8/5/2010	NC	NF	NF	NF	NF	120	NF	NF
8/9/2010								
8/20/2010	NC	NF	NF	NF	NF	88	NF	NF
8/25/2010								
9/1/2010	NC	NF	NF	NF	NF	80	NF	NF
9/3/2010								
9/17/2010	NC	NF	NF	NF	NF	40	NF	NF
9/20/2010								
10/1/2010	NC	NF	NF	NF	NF	NF	NF	NF
10/4/2010								

:h								
WV1023039					Instream			WV10
005	006	007	008	009	DSBB/119	USBB/122	001	010
					1202	944		
							NC	NC
NC	NC	NC	NC	NC				
							NC	NC
NC	NC	NC	NC	NC	3210	1664		
NC	NC	NC	NC	NC	623	1879		
							NC	NC
NC	NC	NC	NC	NC	1247	642		
							NC	NC
NC	NC	NC	NC	NC	9812	604		
							NC	NC
NC	NC	NC	NC	NC	4299	1205	NC	NC
NC	NC	NC	NC	NC	3211	1515	NC	NC
NC	NC	NC	NC	NC	2412	1794	NC	NC
NC	NC	NC	NC	NC	6129	2420	NC	NC
NF	NF	39	NF	NF	4095	1272		
							NC	NC
							NC	NC
NF	NF	60	NF	NF	4120	819		
NF	NF	NF	NF	NF	2180	1039		
							NC	NC
NF	NF	19	NF	NF	1149	651		
							NC	NC
NF	NF	15	NF	NF	8143	5615		
							NC	NC
NF	NF	NF	NF	NF	3412	1740		
							NC	NC
NF	NF	NF	NF	NF	1199	979		
							NC	NC
NF	NF	NF	NF	NF	400	80		
							NC	NC
NF	NF	NF	NF	NF	245	34		
							NC	NC

Stonecoal Branch				
23039		Instream		
011	012	DSSM	USSB	SBUT-3
NC	NC	659	114	171
NC	NC	265	150	182
NC	NC	583	107	40
NC	NC	211	180	24
		347		
NC	NC			
		183	112	71
NC	NC			
NC	NC			
		302	212	90
NC	NC			
		1120	642	567
NC	NC			
		812	466	371
NC	NC	140	86	NF
NC	NC	412	217	19
NC	NC	NF	NF	NF
NC	NC	180	45	NF
NC	NC	34	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF

Berry Branch / Stonecoal Branch
Surface Water Quality
pH

NC stands for Not Constructed
NF stands for No Flow

Tributary								Berry Branch
NPDES Permit No.	WV1022890					WV1022911		
Outlet / ID	007	008	009	010	011	001	002	004
20-Jan-10			NF		NF			
27-Jan-10								
28-Jan-10				7.9				
29-Jan-10		7						
30-Jan-10						8.3	NF	
31-Jan-10	NC							NC
8-Feb-10								
9-Feb-10	NC	8.2	NF	8.3	NF	7.7	NF	NC
22-Feb-10	NC	7.9	NF	7.8	NF	7.5	NF	NC
23-Feb-10								
2-Mar-10	NC	7.8	NF	8	NF	7.7	NF	NC
3-Mar-10								
18-Mar-10	NC	6.5	NF	6.5	NF			NC
19-Mar-10								
24-Mar-10						7	NF	
31-Mar-10								
1-Apr-10								
2-Apr-10	NC	7.2	NF	NF	NF	8.9	NF	NC
16-Apr-10	NC	NF	NF	NF	NF	7.8	NF	NC
19-Apr-10								
1-May-10	NC	NF	NF	NF	NF	8.2	NF	NC
3-May-10								
20-May-10	NC	8.1	NF	8	NF	7.2	NF	NC
21-May-10								
2-Jun-10	NC	NF	NF	NF	NF	7.9	NF	NF
3-Jun-10								
17-Jun-10								
18-Jun-10	NC	NF	NF	NF	NF	8	NF	NF
1-Jul-10	NC	NF	NF	NF	NF	8	NF	NF
2-Jul-10								
28-Jul-10	NC	NF	NF	NF	NF	6.2	NF	NF
7/29/2010								
8/5/2010	NC	NF	NF	NF	NF	7.6	NF	NF
8/9/2010								
8/20/2010	NC	NF	NF	NF	NF	7.5	NF	NF
8/25/2010								
9/1/2010	NC	NF	NF	NF	NF	7.4	NF	NF
9/3/2010								
9/17/2010	NC	NF	NF	NF	NF	8.6	NF	NF
9/20/2010								
10/1/2010	NC	NF	NF	NF	NF	NF	NF	NF
10/4/2010								

h								
WV1023039					Instream			WV10
005	006	007	008	009	DSBB/119	USBB/122	001	010
					6.9	7.2		
							NC	NC
NC	NC	NC	NC	NC				
							NC	NC
NC	NC	NC	NC	NC	7.15	7.8		
NC	NC	NC	NC	NC	6.6	7.4		
							NC	NC
NC	NC	NC	NC	NC	7.8	7.6		
							NC	NC
NC	NC	NC	NC	NC	6.6	7.5		
							NC	NC
NC	NC	NC	NC	NC	7	9.4	NC	NC
NC	NC	NC	NC	NC	7.9	6.7	NC	NC
NC	NC	NC	NC	NC	8.4	8.2	NC	NC
NC	NC	NC	NC	NC	7.9	7.9	NC	NC
NF	NF	7.8	NF	NF	7.3	7.5		
							NC	NC
							NC	NC
NF	NF	8.3	NF	NF	7.2	8		
NF	NF	NF	NF	NF	7	7.4		
							NC	NC
NF	NF	6	NF	NF	7.7	6.4		
							NC	NC
NF	NF	7.1	NF	NF	6.5	6.5		
							NC	NC
NF	NF	NF	NF	NF	7	7.5		
							NC	NC
NF	NF	NF	NF	NF	8	8		
							NC	NC
NF	NF	NF	NF	NF	8.1	8.2		
							NC	NC
NF	NF	NF	NF	NF	7.8	7.8		
							NC	NC

Stonecoal Branch				
23039		Instream		
011	012	DSSM	USSB	SBUT-3
NC	NC	8.6	7.9	8
NC	NC	8.3	7.8	8
NC	NC	9.1	8.6	9
NC	NC	5.6	6	5.9
		6.7		
NC	NC			
		7.2	7.4	7.9
NC	NC			
NC	NC			
		6	5.9	5.8
NC	NC			
		5.5	5.8	5.9
NC	NC			
		6.7	7	7
NC	NC	8	8.2	NF
NC	NC	6.3	6.5	6.4
NC	NC	NF	NF	NF
NC	NC	7.1	6.3	NF
NC	NC	6.2	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF

Berry Branch / Stonecoal Branch
Surface Water Quality
Iron (mg/l)

NC stands for Not Constructed
NF stands for No Flow

Tributary								Berry Branch
NPDES Permit No.	WV1022890					WV1022911		
Outlet / ID	007	008	009	010	011	001	002	004
20-Jan-10			NF		NF			
27-Jan-10								
28-Jan-10				1.98				
29-Jan-10		0.39						
30-Jan-10						0.25	NF	
31-Jan-10	NC							NC
8-Feb-10								
9-Feb-10	NC	0.6	NF	0.94	NF	0.53	NF	NC
22-Feb-10	NC	4.78	NF	0.8	NF	0.17	NF	NC
23-Feb-10								
2-Mar-10	NC	0.62	NF	0.5	NF	0.19	NF	NC
3-Mar-10								
18-Mar-10	NC	0.26	NF	1.09	NF			NC
19-Mar-10								
24-Mar-10						0.36	NF	
31-Mar-10								
1-Apr-10								
2-Apr-10	NC	0.2	NF	NF	NF	0.2	NF	NC
16-Apr-10	NC	NF	NF	NF	NF	0.06	NF	NC
19-Apr-10								
1-May-10	NC	NF	NF	NF	NF	0.08	NF	NC
3-May-10								
20-May-10	NC	4.21	NF	1.22	NF	0.16	NF	NC
21-May-10								
2-Jun-10	NC	NF	NF	NF	NF	0.16	NF	NF
3-Jun-10								
17-Jun-10								
18-Jun-10	NC	NF	NF	NF	NF	0.21	NF	NF
1-Jul-10	NC	NF	NF	NF	NF	0.1	NF	NF
2-Jul-10								
28-Jul-10	NC	NF	NF	NF	NF	0.15	NF	NF
7/29/2010								
8/5/2010	NC	NF	NF	NF	NF	0.18	NF	NF
8/9/2010								
8/20/2010	NC	NF	NF	NF	NF	0.1	NF	NF
8/25/2010								
9/1/2010	NC	NF	NF	NF	NF	0.09	NF	NF
9/3/2010								
9/17/2010	NC	NF	NF	NF	NF	0.1	NF	NF
9/20/2010								
10/1/2010	NC	NF	NF	NF	NF	NF	NF	NF
10/4/2010								

h								
WV1023039					Instream		WV10	
005	006	007	008	009	DSBB/119	USBB/122	001	010
					1.54	1.89		
							NC	NC
NC	NC	NC	NC	NC				
							NC	NC
NC	NC	NC	NC	NC	1.25	0.87		
NC	NC	NC	NC	NC	0.68	0.31		
							NC	NC
NC	NC	NC	NC	NC	0.56	0.29		
							NC	NC
NC	NC	NC	NC	NC	0.61	0.67		
							NC	NC
NC	NC	NC	NC	NC	0.3	0.26	NC	NC
NC	NC	NC	NC	NC	0.28	0.23	NC	NC
NC	NC	NC	NC	NC	0.27	0.37	NC	NC
NC	NC	NC	NC	NC	2.96	2.13	NC	NC
NF	NF	0.28	NF	NF	1.31	0.4		
							NC	NC
							NC	NC
NF	NF	0.84	NF	NF	0.64	0.34		
NF	NF	NF	NF	NF	0.22	0.3		
							NC	NC
NF	NF	0.27	NF	NF	0.6	0.27		
							NC	NC
NF	NF	0.4	NF	NF	0.32	0.22		
							NC	NC
NF	NF	NF	NF	NF	0.38	0.35		
							NC	NC
NF	NF	NF	NF	NF	0.85	0.77		
							NC	NC
NF	NF	NF	NF	NF	0.38	0.51		
							NC	NC
NF	NF	NF	NF	NF	0.21	0.81		
							NC	NC

Stonecoal Branch				
23039		Instream		
011	012	DSSM	USSB	SBUT-3
NC	NC	0.82	0.27	0.71
NC	NC	0.76	0.36	0.47
NC	NC	10.4	1	0.6
NC	NC	5.65	2.41	0.19
		0.3		
NC	NC			
		0.69	0.26	2.76
NC	NC			
NC	NC			
		0.23	0.22	0.32
NC	NC			
		3.33	2.27	1.89
NC	NC			
		0.3	0.32	0.3
NC	NC	0.22	0.25	NF
NC	NC	0.18	0.26	0.38
NC	NC	NF	NF	NF
NC	NC	0.19	0.19	NF
NC	NC	0.13	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF

Berry Branch / Stonecoal Branch
Surface Water Quality
Manganese (mg/l)

NC stands for Not Constructed
NF stands for No Flow

Tributary								Berry Branch
NPDES Permit No.	WV1022890					WV1022911		
Outlet / ID	007	008	009	010	011	001	002	004
20-Jan-10			NF		NF			
27-Jan-10								
28-Jan-10				0.16				
29-Jan-10		1.03						
30-Jan-10						0.87	NF	
31-Jan-10	NC							NC
8-Feb-10								
9-Feb-10	NC	0.15	NF	0.17	NF	0.83	NF	NC
22-Feb-10	NC	0.49	NF	0.04	NF	1.39	NF	NC
23-Feb-10								
2-Mar-10	NC	0.69	NF	0.06	NF	1.33	NF	NC
3-Mar-10								
18-Mar-10	NC	0.66	NF	0.05	NF			NC
19-Mar-10								
24-Mar-10						0.88	NF	
31-Mar-10								
1-Apr-10								
2-Apr-10	NC	0.63	NF	NF	NF	0.92	NF	NC
16-Apr-10	NC	NF	NF	NF	NF	0.9	NF	NC
19-Apr-10								
1-May-10	NC	NF	NF	NF	NF	0.55	NF	NC
3-May-10								
20-May-10	NC	0.42	NF	0.02	NF	0.93	NF	NC
21-May-10								
2-Jun-10	NC	NF	NF	NF	NF	1.19	NF	NF
3-Jun-10								
17-Jun-10								
18-Jun-10	NC	NF	NF	NF	NF	1.38	NF	NF
1-Jul-10	NC	NF	NF	NF	NF	1.18	NF	NF
2-Jul-10								
28-Jul-10	NC	NF	NF	NF	NF	1.45	NF	NF
7/29/2010								
8/5/2010	NC	NF	NF	NF	NF	1.45	NF	NF
8/9/2010								
8/20/2010	NC	NF	NF	NF	NF	1.77	NF	NF
8/25/2010								
9/1/2010	NC	NF	NF	NF	NF	2.2	NF	NF
9/3/2010								
9/17/2010	NC	NF	NF	NF	NF	1.18	NF	NF
9/20/2010								
10/1/2010	NC	NF	NF	NF	NF	NF	NF	NF
10/4/2010								

h								
WV1023039					Instream		WV10	
005	006	007	008	009	DSBB/119	USBB/122	001	010
					0.43	0.9		
							NC	NC
NC	NC	NC	NC	NC				
							NC	NC
NC	NC	NC	NC	NC	0.74	1.28		
NC	NC	NC	NC	NC	0.98	1.52		
							NC	NC
NC	NC	NC	NC	NC	1.2	1.89		
							NC	NC
NC	NC	NC	NC	NC	0.86	1.33		
							NC	NC
NC	NC	NC	NC	NC	0.46	0.76	NC	NC
NC	NC	NC	NC	NC	0.62	1.2	NC	NC
NC	NC	NC	NC	NC	0.2	0.96	NC	NC
NC	NC	NC	NC	NC	0.61	1.2	NC	NC
NF	NF	0.57	NF	NF	0.66	1.76		
							NC	NC
							NC	NC
NF	NF	0.53	NF	NF	1.11	2.05		
NF	NF	NF	NF	NF	0.19	1.42		
							NC	NC
NF	NF	0.62	NF	NF	1.09	1.57		
							NC	NC
NF	NF	0.76	NF	NF	0.67	1.21		
							NC	NC
NF	NF	NF	NF	NF	0.96	1.84		
							NC	NC
NF	NF	NF	NF	NF	0.47	0.47		
							NC	NC
NF	NF	NF	NF	NF	0.28	1.21		
							NC	NC
NF	NF	NF	NF	NF	0.28	1.06		
							NC	NC

Stonecoal Branch				
23039		Instream		
011	012	DSSM	USSB	SBUT-3
NC	NC	0.03	0.01	0.01
NC	NC	0.08	0.1	0.1
NC	NC	0.2	0.04	<.01
NC	NC	0.12	0.05	<.01
		0.01		
NC	NC			
		0.03	0.02	0.04
NC	NC			
NC	NC			
		0.02	0.01	0.01
NC	NC			
		0.12	0.1	0.04
NC	NC			
		0.02	0.02	<0.01
NC	NC	0.01	0.01	NF
NC	NC	0.01	0.04	0.01
NC	NC	NF	NF	NF
NC	NC	0.01	0.01	NF
NC	NC	0.01	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF

Berry Branch / Stonecoal Branch
Surface Water Quality
Aluminum (mg/l)

NC stands for Not Constructed
NF stands for No Flow

Tributary								Berry Branch
NPDES Permit No.	WV1022890					WV1022911		
Outlet / ID	007	008	009	010	011	001	002	004
20-Jan-10			NF		NF			
27-Jan-10								
28-Jan-10				3.07				
29-Jan-10		0.34						
30-Jan-10						0.15	NF	
31-Jan-10	NC							NC
8-Feb-10								
9-Feb-10	NC	0.92	NF	1.48	NF	0.43	NF	NC
22-Feb-10	NC	5.83	NF	1.26	NF	0.07	NF	NC
23-Feb-10								
2-Mar-10	NC	0.73	NF	0.61	NF	0.25	NF	NC
3-Mar-10								
18-Mar-10	NC	0.18	NF	1.73	NF			NC
19-Mar-10								
24-Mar-10						0.24	NF	
31-Mar-10								
1-Apr-10								
2-Apr-10	NC	0.21	NF	NF	NF	0.23	NF	NC
16-Apr-10	NC	NF	NF	NF	NF	0.17	NF	NC
19-Apr-10								
1-May-10	NC	NF	NF	NF	NF	0.07	NF	NC
3-May-10								
20-May-10	NC	3.55	NF	1.71	NF	0.33	NF	NC
21-May-10								
2-Jun-10	NC	NF	NF	NF	NF	0.11	NF	NF
3-Jun-10								
17-Jun-10								
18-Jun-10	NC	NF	NF	NF	NF	0.23	NF	NF
1-Jul-10	NC	NF	NF	NF	NF	0.11	NF	NF
2-Jul-10								
28-Jul-10	NC	NF	NF	NF	NF	0.18	NF	NF
7/29/2010								
8/5/2010	NC	NF	NF	NF	NF	0.85	NF	NF
8/9/2010								
8/20/2010	NC	NF	NF	NF	NF	0.2	NF	NF
8/25/2010								
9/1/2010	NC	NF	NF	NF	NF	<0.05	NF	NF
9/3/2010								
9/17/2010	NC	NF	NF	NF	NF	0.1	NF	NF
9/20/2010								
10/1/2010	NC	NF	NF	NF	NF	NF	NF	NF
10/4/2010								

h								
WV1023039					Instream		WV10	
005	006	007	008	009	DSBB/119	USBB/122	001	010
					1.6	1.82		
							NC	NC
NC	NC	NC	NC	NC				
							NC	NC
NC	NC	NC	NC	NC	0.97	0.66		
NC	NC	NC	NC	NC	0.49	0.06		
							NC	NC
NC	NC	NC	NC	NC	0.27	0.21		
							NC	NC
NC	NC	NC	NC	NC	0.42	0.54		
							NC	NC
NC	NC	NC	NC	NC	0.16	0.16	NC	NC
NC	NC	NC	NC	NC	0.15	0.16	NC	NC
NC	NC	NC	NC	NC	<0.05	0.1	NC	NC
NC	NC	NC	NC	NC	3.06	1.58	NC	NC
NF	NF	0.43	NF	NF	0.67	0.15		
							NC	NC
							NC	NC
NF	NF	1.44	NF	NF	0.49	0.22		
NF	NF	NF	NF	NF	0.07	0.27		
							NC	NC
NF	NF	0.25	NF	NF	0.4	0.19		
							NC	NC
NF	NF	0.33	NF	NF	0.21	0.13		
							NC	NC
NF	NF	NF	NF	NF	0.15	0.25		
							NC	NC
NF	NF	NF	NF	NF	0.32	0.24		
							NC	NC
NF	NF	NF	NF	NF	0.05	0.06		
							NC	NC
NF	NF	NF	NF	NF	<0.05	0.55		
							NC	NC

Stonecoal Branch				
23039		Instream		
011	012	DSSM	USSB	SBUT-3
NC	NC	0.71	0.26	0.4
NC	NC	0.58	0.21	0.29
NC	NC	12.4	1.3	0.81
NC	NC	5.01	2.81	0.28
		0.28		
NC	NC			
		0.5	0.26	2.61
NC	NC			
NC	NC			
		0.19	0.18	0.36
NC	NC			
		3.57	2.68	2.36
NC	NC			
		0.3	0.29	0.21
NC	NC	0.14	0.16	NF
NC	NC	0.1	0.14	0.52
NC	NC	NF	NF	NF
NC	NC	0.14	0.14	NF
NC	NC	0.07	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF

Berry Branch / Stonecoal Branch
Surface Water Quality
Total Alkalinity (mg/l)

NC stands for Not Constructed
NF stands for No Flow

Tributary								Berry Branch
NPDES Permit No.	WV1022890					WV1022911		
Outlet / ID	007	008	009	010	011	001	002	004
20-Jan-10			NF		NF			
27-Jan-10								
28-Jan-10								
29-Jan-10								
30-Jan-10						7	NF	
31-Jan-10	NC							NC
8-Feb-10								
9-Feb-10	NC	4	NF	5	NF	20	NF	NC
22-Feb-10	NC	24	NF	6	NF	32	NF	NC
23-Feb-10								
2-Mar-10	NC	35	NF	6	NF	36	NF	NC
3-Mar-10								
18-Mar-10	NC	70	NF	6	NF			NC
19-Mar-10								
24-Mar-10						34	NF	
31-Mar-10								
1-Apr-10								
2-Apr-10	NC	84	NF	NF	NF	60	NF	NC
16-Apr-10	NC	NF	NF	NF	NF	51	NF	NC
19-Apr-10								
1-May-10	NC	NF	NF	NF	NF	52	NF	NC
3-May-10								
20-May-10	NC	68	NF	7	NF	48	NF	NC
21-May-10								
2-Jun-10	NC	NF	NF	NF	NF	85	NF	NF
3-Jun-10								
17-Jun-10								
18-Jun-10	NC	NF	NF	NF	NF	68	NF	NF
1-Jul-10	NC	NF	NF	NF	NF	117	NF	NF
2-Jul-10								
28-Jul-10	NC	NF	NF	NF	NF	72	NF	NF
7/29/2010								
8/5/2010	NC	NF	NF	NF	NF	67	NF	NF
8/9/2010								
8/20/2010	NC	NF	NF	NF	NF	89	NF	NF
8/25/2010								
9/1/2010	NC	NF	NF	NF	NF	147	NF	NF
9/3/2010								
9/17/2010	NC	NF	NF	NF	NF	140	NF	NF
9/20/2010								
10/1/2010	NC	NF	NF	NF	NF	NF	NF	NF
10/4/2010								

h								
WV1023039					Instream			WV10
005	006	007	008	009	DSBB/119	USBB/122	001	010
					22	33		
							NC	NC
NC	NC	NC	NC	NC				
							NC	NC
NC	NC	NC	NC	NC	33	45		
NC	NC	NC	NC	NC	68	91		
							NC	NC
NC	NC	NC	NC	NC	68	94		
							NC	NC
NC	NC	NC	NC	NC	61	75		
							NC	NC
NC	NC	NC	NC	NC	73	93	NC	NC
NC	NC	NC	NC	NC	90	112	NC	NC
NC	NC	NC	NC	NC	96	133	NC	NC
NC	NC	NC	NC	NC	44	70	NC	NC
NF	NF	1	NF	NF	122	159		
							NC	NC
							NC	NC
NF	NF	4	NF	NF	139	185		
NF	NF	NF	NF	NF	185	259		
							NC	NC
NF	NF	7	NF	NF	86	108		
							NC	NC
NF	NF	7	NF	NF	77	85		
							NC	NC
NF	NF	NF	NF	NF	143	182		
							NC	NC
NF	NF	NF	NF	NF	113	123		
							NC	NC
NF	NF	NF	NF	NF	132	139		
							NC	NC
NF	NF	NF	NF	NF	130	218		
							NC	NC

Stonecoal Branch				
23039		Instream		
011	012	DSSM	USSB	SBUT-3
NC	NC	20	22	21
NC	NC	<1	<1	<1
NC	NC	6	4	4
NC	NC	7	4	3
		6		
NC	NC			
		129	4	6
NC	NC			
NC	NC			
		7	7	5
NC	NC			
		5	4	5
NC	NC			
		6	5	5
NC	NC	7	8	NF
NC	NC	9	7	7
NC	NC	NF	NF	NF
NC	NC	11	10	NF
NC	NC	12	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF

Berry Branch / Stonecoal Branch
Surface Water Quality
Sulfate (mg/l)

NC stands for Not Constructed
NF stands for No Flow

Tributary								Berry Branch
NPDES Permit No.	WV1022890					WV1022911		
Outlet / ID	007	008	009	010	011	001	002	004
20-Jan-10			NF		NF			
27-Jan-10								
28-Jan-10								
29-Jan-10								
30-Jan-10						102	NF	
31-Jan-10	NC							NC
8-Feb-10								
9-Feb-10	NC	55	NF	55	NF	99	NF	NC
22-Feb-10	NC	84	NF	39	NF	169	NF	NC
23-Feb-10								
2-Mar-10	NC	98	NF	47	NF	155	NF	NC
3-Mar-10								
18-Mar-10	NC	222	NF	49	NF			NC
19-Mar-10								
24-Mar-10						126	NF	
31-Mar-10								
1-Apr-10								
2-Apr-10	NC	180	NF	NF	NF	116	NF	NC
16-Apr-10	NC	NF	NF	NF	NF	140	NF	NC
19-Apr-10								
1-May-10	NC	NF	NF	NF	NF	157	NF	NC
3-May-10								
20-May-10	NC	72	NF	32	NF	131	NF	NC
21-May-10								
2-Jun-10	NC	NF	NF	NF	NF	237	NF	NF
3-Jun-10								
17-Jun-10								
18-Jun-10	NC	NF	NF	NF	NF	203	NF	NF
1-Jul-10	NC	NF	NF	NF	NF	277	NF	NF
2-Jul-10								
28-Jul-10	NC	NF	NF	NF	NF	230	NF	NF
7/29/2010								
8/5/2010	NC	NF	NF	NF	NF	252	NF	NF
8/9/2010								
8/20/2010	NC	NF	NF	NF	NF	293	NF	NF
8/25/2010								
9/1/2010	NC	NF	NF	NF	NF	278	NF	NF
9/3/2010								
9/17/2010	NC	NF	NF	NF	NF	360	NF	NF
9/20/2010								
10/1/2010	NC	NF	NF	NF	NF	NF	NF	NF
10/4/2010								

h								
WV1023039					Instream			WV10
005	006	007	008	009	DSBB/119	USBB/122	001	010
					88	108		
							NC	NC
NC	NC	NC	NC	NC				
							NC	NC
NC	NC	NC	NC	NC	103	157		
NC	NC	NC	NC	NC	182	259		
							NC	NC
NC	NC	NC	NC	NC	171	251		
							NC	NC
NC	NC	NC	NC	NC	161	210		
							NC	NC
NC	NC	NC	NC	NC	154	196	NC	NC
NC	NC	NC	NC	NC	193	240	NC	NC
NC	NC	NC	NC	NC	222	308	NC	NC
NC	NC	NC	NC	NC	107	180	NC	NC
NF	NF	11	NF	NF	335	340		
							NC	NC
							NC	NC
NF	NF	10	NF	NF	262	346		
NF	NF	NF	NF	NF	316	435		
							NC	NC
NF	NF	11	NF	NF	247	276		
							NC	NC
NF	NF	11	NF	NF	270	288		
							NC	NC
NF	NF	NF	NF	NF	318	382		
							NC	NC
NF	NF	NF	NF	NF	236	237		
							NC	NC
NF	NF	NF	NF	NF	286	350		
							NC	NC
NF	NF	NF	NF	NF	562	560		
							NC	NC

Stonecoal Branch				
23039		Instream		
011	012	DSSM	USSB	SBUT-3
NC	NC	9	9	10
NC	NC	25	440	358
NC	NC	9	8	10
NC	NC	10	9	11
		9		
NC	NC			
		9	9	10
NC	NC			
NC	NC			
		9	8	10
NC	NC			
		7	7	8
NC	NC			
		10	9	11
NC	NC	8	8	NF
NC	NC	9	8	9
NC	NC	NF	NF	NF
NC	NC	6	6	NF
NC	NC	10	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF

Berry Branch / Stonecoal Branch
Surface Water Quality
Selenium (ug/l)

NC stands for Not Constructed
NF stands for No Flow

Tributary								Berry Branch
NPDES Permit No.	WV1022890					WV1022911		
Outlet / ID	007	008	009	010	011	001	002	004
20-Jan-10			NF		NF			
27-Jan-10								
28-Jan-10				1.2				
29-Jan-10		2.1						
30-Jan-10						9.1	NF	
31-Jan-10	NC							NC
8-Feb-10								
9-Feb-10	NC	<0.6	NF	<0.6	NF	6.8	NF	NC
22-Feb-10	NC	1.3	NF	0.7	NF	15.6	NF	NC
23-Feb-10								
2-Mar-10	NC	<0.6	NF	<0.6	NF	14.2	NF	NC
3-Mar-10								
18-Mar-10	NC	1.3	NF	0.8	NF			NC
19-Mar-10								
24-Mar-10						11	NF	
31-Mar-10								
1-Apr-10								
2-Apr-10	NC	<0.6	NF	NF	NF	7.6	NF	NC
16-Apr-10	NC	NF	NF	NF	NF	11.5	NF	NC
19-Apr-10								
1-May-10	NC	NF	NF	NF	NF	4.7	NF	NC
3-May-10								
20-May-10	NC	1.1	NF	1.1	NF	23.2	NF	NC
21-May-10								
2-Jun-10	NC	NF	NF	NF	NF	7.8	NF	NF
3-Jun-10								
17-Jun-10								
18-Jun-10	NC	NF	NF	NF	NF	27.9	NF	NF
1-Jul-10	NC	NF	NF	NF	NF	13.8	NF	NF
2-Jul-10								
28-Jul-10	NC	NF	NF	NF	NF	22.1	NF	NF
7/29/2010								
8/5/2010	NC	NF	NF	NF	NF	64.2	NF	NF
8/9/2010								
8/20/2010	NC	NF	NF	NF	NF	19.3	NF	NF
8/25/2010								
9/1/2010	NC	NF	NF	NF	NF	15	NF	NF
9/3/2010								
9/17/2010	NC	NF	NF	NF	NF	10.5	NF	NF
9/20/2010								
10/1/2010	NC	NF	NF	NF	NF	NF	NF	NF
10/4/2010								

h								
WV1023039					Instream			WV10
005	006	007	008	009	DSBB/119	USBB/122	001	010
					4.2	9.2		
							NC	NC
NC	NC	NC	NC	NC				
							NC	NC
NC	NC	NC	NC	NC	5	9.2		
NC	NC	NC	NC	NC	9.8	14.7		
							NC	NC
NC	NC	NC	NC	NC	8	11.8		
							NC	NC
NC	NC	NC	NC	NC	14.5	17.4		
							NC	NC
NC	NC	NC	NC	NC	5.4	6.8	NC	NC
NC	NC	NC	NC	NC	8	10.1	NC	NC
NC	NC	NC	NC	NC	3	5.4	NC	NC
NC	NC	NC	NC	NC	9.5	17.4	NC	NC
NF	NF	<0.6	NF	NF	6.6	8.6		
							NC	NC
							NC	NC
NF	NF	<0.6	NF	NF	24	31.1		
NF	NF	NF	NF	NF	7.1	9.6		
							NC	NC
NF	NF	<0.6	NF	NF	24.7	27.2		
							NC	NC
NF	NF	<0.6	NF	NF	45.4	49.6		
							NC	NC
NF	NF	NF	NF	NF	18.1	19.1		
							NC	NC
NF	NF	NF	NF	NF	12	12.5		
							NC	NC
NF	NF	NF	NF	NF	5.9	11.6		
							NC	NC
NF	NF	NF	NF	NF	13.2	4		
							NC	NC

Stonecoal Branch				
23039		Instream		
011	012	DSSM	USSB	SBUT-3
NC	NC	<0.6	<0.6	0.9
NC	NC	<0.6	8.1	6.6
NC	NC	<.6	<.6	0.8
NC	NC	<.6	<.6	<0.6
		<0.6		
NC	NC			
		<0.6	<0.6	<0.6
NC	NC			
NC	NC			
		<0.6	<0.6	<0.6
NC	NC			
		<0.6	<0.6	<0.6
NC	NC			
		<0.6	<0.6	<0.6
NC	NC	<0.60	<0.6	NF
NC	NC	<0.6	<0.6	<0.6
NC	NC	NF	NF	NF
NC	NC	<0.6	<0.6	NF
NC	NC	<0.6	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF

Berry Branch / Stonecoal Branch
Surface Water Quality
Total Dissolved Solids (mg/l)

NC stands for Not Constructed
NF stands for No Flow

Tributary								Berry Branch
NPDES Permit No.	WV1022890					WV1022911		
Outlet / ID	007	008	009	010	011	001	002	004
20-Jan-10			NF		NF			
27-Jan-10								
28-Jan-10								
29-Jan-10								
30-Jan-10						173	NF	
31-Jan-10	NC							NC
8-Feb-10								
9-Feb-10	NC	106	NF	112	NF	190	NF	NC
22-Feb-10	NC	192	NF	92	NF	328	NF	NC
23-Feb-10								
2-Mar-10	NC	196	NF	86	NF	293	NF	NC
3-Mar-10								
18-Mar-10	NC	409	NF	105	NF			NC
19-Mar-10								
24-Mar-10						N/A	NF	
31-Mar-10								
1-Apr-10								
2-Apr-10	NC	318	NF	NF	NF	257	NF	NC
16-Apr-10	NC	NF	NF	NF	NF	355	NF	NC
19-Apr-10								
1-May-10	NC	NF	NF	NF	NF	390	NF	NC
3-May-10								
20-May-10	NC	187	NF	107	NF	274	NF	NC
21-May-10								
2-Jun-10	NC	NF	NF	NF	NF	464	NF	NF
3-Jun-10								
17-Jun-10								
18-Jun-10	NC	NF	NF	NF	NF	413	NF	NF
1-Jul-10	NC	NF	NF	NF	NF	538	NF	NF
2-Jul-10								
28-Jul-10	NC	NF	NF	NF	NF	426	NF	NF
7/29/2010								
8/5/2010	NC	NF	NF	NF	NF	370	NF	NF
8/9/2010								
8/20/2010	NC	NF	NF	NF	NF	490	NF	NF
8/25/2010								
9/1/2010	NC	NF	NF	NF	NF	610	NF	NF
9/3/2010								
9/17/2010	NC	NF	NF	NF	NF	697	NF	NF
9/20/2010								
10/1/2010	NC	NF	NF	NF	NF	NF	NF	NF
10/4/2010								

h								
WV1023039					Instream		WV10	
005	006	007	008	009	DSBB/119	USBB/122	001	010
					150	162		
							NC	NC
NC	NC	NC	NC	NC				
							NC	NC
NC	NC	NC	NC	NC	201	295		
NC	NC	NC	NC	NC	337	505		
							NC	NC
NC	NC	NC	NC	NC	356	477		
							NC	NC
NC	NC	NC	NC	NC	294	393		
							NC	NC
NC	NC	NC	NC	NC	307	387	NC	NC
NC	NC	NC	NC	NC	437	515	NC	NC
NC	NC	NC	NC	NC	455	651	NC	NC
NC	NC	NC	NC	NC	225	389	NC	NC
NF	NF	99	NF	NF	559	686		
							NC	NC
							NC	NC
NF	NF	69	NF	NF	556	705		
NF	NF	NF	NF	NF	707	912		
							NC	NC
NF	NF	69	NF	NF	473	628		
							NC	NC
NF	NF	125	NF	NF	586	589		
							NC	NC
NF	NF	NF	NF	NF	653	716		
							NC	NC
NF	NF	NF	NF	NF	466	468		
							NC	NC
NF	NF	NF	NF	NF	580	700		
							NC	NC
NF	NF	NF	NF	NF	746	952		
							NC	NC

Stonecoal Branch				
23039		Instream		
011	012	DSSM	USSB	SBUT-3
NC	NC	29	20	24
NC	NC	45	559	512
NC	NC	22	19	22
NC	NC	18	22	21
		23		
NC	NC			
		24	23	29
NC	NC			
NC	NC			
		27	22	23
NC	NC			
		24	23	23
NC	NC			
		24	32	22
NC	NC	28	22	NF
NC	NC	22	20	24
NC	NC	NF	NF	NF
NC	NC	40	33	NF
NC	NC	27	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF

Berry Branch / Stonecoal Branch
Surface Water Quality
Total Suspended Solids (mg/l)

NC stands for Not Constructed
NF stands for No Flow

Tributary								Berry Branch
NPDES Permit No.	WV1022890					WV1022911		
Outlet / ID	007	008	009	010	011	001	002	004
20-Jan-10			NF		NF			
27-Jan-10								
28-Jan-10				27				
29-Jan-10		2						
30-Jan-10						13	NF	
31-Jan-10	NC							NC
8-Feb-10								
9-Feb-10	NC	14	NF	17	NF	6	NF	NC
22-Feb-10	NC	64	NF	3	NF	2	NF	NC
23-Feb-10								
2-Mar-10	NC	6	NF	6	NF	2	NF	NC
3-Mar-10								
18-Mar-10	NC	3	NF	25	NF			NC
19-Mar-10								
24-Mar-10						18	NF	
31-Mar-10								
1-Apr-10								
2-Apr-10	NC	3	NF	NF	NF	5	NF	NC
16-Apr-10	NC	NF	NF	NF	NF	3	NF	NC
19-Apr-10								
1-May-10	NC	NF	NF	NF	NF	5	NF	NC
3-May-10								
20-May-10	NC	25	NF	14	NF	22	NF	NC
21-May-10								
2-Jun-10	NC	NF	NF	NF	NF	2	NF	NF
3-Jun-10								
17-Jun-10								
18-Jun-10	NC	NF	NF	NF	NF	28	NF	NF
1-Jul-10	NC	NF	NF	NF	NF	5	NF	NF
2-Jul-10								
28-Jul-10	NC	NF	NF	NF	NF	5	NF	NF
7/29/2010								
8/5/2010	NC	NF	NF	NF	NF	2	NF	NF
8/9/2010								
8/20/2010	NC	NF	NF	NF	NF	27	NF	NF
8/25/2010								
9/1/2010	NC	NF	NF	NF	NF	3	NF	NF
9/3/2010								
9/17/2010	NC	NF	NF	NF	NF	14	NF	NF
9/20/2010								
10/1/2010	NC	NF	NF	NF	NF	NF	NF	NF
10/4/2010								

h								
WV1023039					Instream			WV10
005	006	007	008	009	DSBB/119	USBB/122	001	010
					2	18		
							NC	NC
NC	NC	NC	NC	NC				
							NC	NC
NC	NC	NC	NC	NC	21	21		
NC	NC	NC	NC	NC	8	3		
							NC	NC
NC	NC	NC	NC	NC	4	3		
							NC	NC
NC	NC	NC	NC	NC	5	12		
							NC	NC
NC	NC	NC	NC	NC	3	3	NC	NC
NC	NC	NC	NC	NC	2	3	NC	NC
NC	NC	NC	NC	NC	2	4	NC	NC
NC	NC	NC	NC	NC	5	17	NC	NC
NF	NF	2	NF	NF	48	9		
							NC	NC
							NC	NC
NF	NF	3	NF	NF	3	8		
NF	NF	NF	NF	NF	4	3		
							NC	NC
NF	NF	9	NF	NF	10	2		
							NC	NC
NF	NF	3	NF	NF	3	3		
							NC	NC
NF	NF	NF	NF	NF	6	12		
							NC	NC
NF	NF	NF	NF	NF	8	3		
							NC	NC
NF	NF	NF	NF	NF	15	17		
							NC	NC
NF	NF	NF	NF	NF	2	<2		
							NC	NC

Stonecoal Branch				
23039		Instream		
011	012	DSSM	USSB	SBUT-3
NC	NC	7	26	17
NC	NC	3	1	2
NC	NC	190	43	22
NC	NC	10	20	2
		3		
NC	NC			
		12	8	41
NC	NC			
NC	NC			
		19	22	21
NC	NC			
		50	64	44
NC	NC			
		3	15	19
NC	NC	2	2	NF
NC	NC	20	31	20
NC	NC	NF	NF	NF
NC	NC	4	8	NF
NC	NC	3	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF

Berry Branch / Stonecoal Branch
Surface Water Quality
Conductivity (umhos)

NC stands for Not Constructed
NF stands for No Flow

Tributary								Berry Branch
NPDES Permit	WV1022890					WV1022911		
Outlet / ID	007	008	009	010	011	001	002	004
20-Jan-10			NF		NF			
27-Jan-10								
28-Jan-10								
29-Jan-10								
30-Jan-10						309	NF	
31-Jan-10	NC							NC
8-Feb-10								
9-Feb-10	NC	480	NF	210	NF	360	NF	NC
22-Feb-10	NC	310	NF	150	NF	520	NF	NC
23-Feb-10								
2-Mar-10	NC	323	NF	149	NF	460	NF	NC
3-Mar-10								
18-Mar-10	NC	548	NF	139	NF			NC
19-Mar-10								
24-Mar-10						413	NF	
31-Mar-10								
1-Apr-10								
2-Apr-10	NC	588	NF	NF	NF	490	NF	NC
16-Apr-10	NC	NF	NF	NF	NF	508	NF	NC
19-Apr-10								
1-May-10	NC	NF	NF	NF	NF	540	NF	NC
3-May-10								
20-May-10	NC	332	NF	171	NF	461	NF	NC
21-May-10								
2-Jun-10	NC	NF	NF	NF	NF	626	NF	NF
3-Jun-10								
17-Jun-10								
18-Jun-10	NC	NF	NF	NF	NF	583	NF	NF
1-Jul-10	NC	NF	NF	NF	NF	765	NF	NF
2-Jul-10								
28-Jul-10	NC	NF	NF	NF	NF	691	NF	NF
7/29/2010								
8/5/2010	NC	NF	NF	NF	NF	644	NF	NF
8/9/2010								
8/20/2010	NC	NF	NF	NF	NF	703	NF	NF
8/25/2010								
9/1/2010	NC	NF	NF	NF	NF	875	NF	NF
9/3/2010								
9/17/2010	NC	NF	NF	NF	NF	790	NF	NF
9/20/2010								
10/1/2010	NC	NF	NF	NF	NF	NF	NF	NF
10/4/2010								

h								
WV1023039					Instream		WV10	
005	006	007	008	009	DSBB/119	USBB/122	001	010
					203	287		
							NC	NC
NC	NC	NC	NC	NC				
							NC	NC
NC	NC	NC	NC	NC	390	530		
NC	NC	NC	NC	NC	1300	760		
							NC	NC
NC	NC	NC	NC	NC	460	630		
							NC	NC
NC	NC	NC	NC	NC	482	605		
							NC	NC
NC	NC	NC	NC	NC	591	700	NC	NC
NC	NC	NC	NC	NC	643	762	NC	NC
NC	NC	NC	NC	NC	687	919	NC	NC
NC	NC	NC	NC	NC	403	580	NC	NC
NF	NF	127	NF	NF	1040	1080		
							NC	NC
							NC	NC
NF	NF	87	NF	NF	785	975		
NF	NF	NF	NF	NF	912	1440		
							NC	NC
NF	NF	150	NF	NF	736	836		
							NC	NC
NF	NF	157	NF	NF	702	737		
							NC	NC
NF	NF	NF	NF	NF	841	987		
							NC	NC
NF	NF	NF	NF	NF	534	747		
							NC	NC
NF	NF	NF	NF	NF	700	780		
							NC	NC
NF	NF	NF	NF	NF	220	1300		
							NC	NC

Stonecoal Branch				
23039		Instream		
011	012	DSSM	USSB	SBUT-3
NC	NC	40	34	40
NC	NC	150	1180	1030
NC	NC	40	31	37
NC	NC	40	240	230
		38		
NC	NC			
		40	33	40
NC	NC			
NC	NC			
		38	36	36
NC	NC			
		34	34	33
NC	NC			
		44	40	42
NC	NC	50	50	NF
NC	NC	39	33	34
NC	NC	NF	NF	NF
NC	NC	43	42	NF
NC	NC	50	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF

Berry Branch / Stonecoal Branch
Surface Water Quality
Calcium (mg/l)

NC stands for Not Constructed
NF stands for No Flow

Tributary								Berry Branch
NPDES Permit No.	WV1022890					WV1022911		
Outlet / ID	007	008	009	010	011	001	002	004
20-Jan-10			NF		NF			
27-Jan-10								
28-Jan-10								
29-Jan-10								
30-Jan-10						30.4	NF	
31-Jan-10	NC							NC
8-Feb-10								
9-Feb-10	NC	8.74	NF	9.6	NF	29	NF	NC
22-Feb-10	NC	27	NF	6.9	NF	51.2	NF	NC
23-Feb-10								
2-Mar-10	NC	37.9	NF	8.44	NF	51.3	NF	NC
3-Mar-10								
18-Mar-10	NC	67.8	NF	7.62	NF			NC
19-Mar-10								
24-Mar-10						39.8	NF	
31-Mar-10								
1-Apr-10								
2-Apr-10	NC	64.1	NF	NF	NF	49.1	NF	NC
16-Apr-10	NC	NF	NF	NF	NF	56.7	NF	NC
19-Apr-10								
1-May-10	NC	NF	NF	NF	NF	50.9	NF	NC
3-May-10								
20-May-10	NC	33.3	NF	8.48	NF	46.3	NF	NC
21-May-10								
2-Jun-10	NC	NF	NF	NF	NF	82.1	NF	NF
3-Jun-10								
17-Jun-10								
18-Jun-10	NC	NF	NF	NF	NF	73.9	NF	NF
1-Jul-10	NC	NF	NF	NF	NF	106	NF	NF
2-Jul-10								
28-Jul-10	NC	NF	NF	NF	NF	75.8	NF	NF
7/29/2010								
8/5/2010	NC	NF	NF	NF	NF	79.1	NF	NF
8/9/2010								
8/20/2010	NC	NF	NF	NF	NF	93.5	NF	NF
8/25/2010								
9/1/2010	NC	NF	NF	NF	NF	83.4	NF	NF
9/3/2010								
9/17/2010	NC	NF	NF	NF	NF	120	NF	NF
9/20/2010								
10/1/2010	NC	NF	NF	NF	NF	NF	NF	NF
10/4/2010								

h								
WV1023039					Instream			WV10
005	006	007	008	009	DSBB/119	USBB/122	001	010
					20.9	39.8		
							NC	NC
NC	NC	NC	NC	NC				
							NC	NC
NC	NC	NC	NC	NC	32.2	51.4		
NC	NC	NC	NC	NC	54.8	75.3		
							NC	NC
NC	NC	NC	NC	NC	58.7	80.4		
							NC	NC
NC	NC	NC	NC	NC	48.6	64.6		
							NC	NC
NC	NC	NC	NC	NC	37.9	44.6	NC	NC
NC	NC	NC	NC	NC	64.9	79.3	NC	NC
NC	NC	NC	NC	NC	67.4	89.2	NC	NC
NC	NC	NC	NC	NC	34.5	58.9	NC	NC
NF	NF	6.76	NF	NF	104	107		
							NC	NC
							NC	NC
NF	NF	5.26	NF	NF	93.4	99		
NF	NF	NF	NF	NF	100	137		
							NC	NC
NF	NF	7.86	NF	NF	86.2	91.2		
							NC	NC
NF	NF	7.28	NF	NF	70.9	78.8		
							NC	NC
NF	NF	NF	NF	NF	80.9	104		
							NC	NC
NF	NF	NF	NF	NF	96.3	96.3		
							NC	NC
NF	NF	NF	NF	NF	95.4	117		
							NC	NC
NF	NF	NF	NF	NF	182	154		
							NC	NC

Stonecoal Branch				
23039		Instream		
011	012	DSSM	USSB	SBUT-3
NC	NC	2.99	2.24	2.62
NC	NC	7.17	99.3	78.3
NC	NC	3.11	2.51	2.48
NC	NC	3.28	2.53	2.69
		<0.6		
NC	NC			
		2.72	2.36	2.31
NC	NC			
NC	NC			
		4.09	2.44	2.68
NC	NC			
		2.61	2.47	2.97
NC	NC			
		2.72	2.48	2.57
NC	NC	2.32	2.65	NF
NC	NC	3.1	2.57	2.28
NC	NC	NF	NF	NF
NC	NC	3.42	3.29	NF
NC	NC	3.87	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF

Berry Branch / Stonecoal Branch
Surface Water Quality
Potassium (mg/l)

NC stands for Not Constructed
NF stands for No Flow

Tributary								Berry Branch
NPDES Permit No.	WV1022890					WV1022911		
Outlet / ID	007	008	009	010	011	001	002	004
20-Jan-10			NF		NF			
27-Jan-10								
28-Jan-10								
29-Jan-10								
30-Jan-10						3.89	NF	
31-Jan-10	NC							NC
8-Feb-10								
9-Feb-10	NC	2.2	NF	2.64	NF	3.95	NF	NC
22-Feb-10	NC	4.65	NF	2.23	NF	6.06	NF	NC
23-Feb-10								
2-Mar-10	NC	4.32	NF	2.61	NF	6.31	NF	NC
3-Mar-10								
18-Mar-10	NC	5.62	NF	7.62	NF			NC
19-Mar-10								
24-Mar-10						5.6	NF	
31-Mar-10								
1-Apr-10								
2-Apr-10	NC	5.66	NF	NF	NF	7.99	NF	NC
16-Apr-10	NC	NF	NF	NF	NF	8.53	NF	NC
19-Apr-10								
1-May-10	NC	NF	NF	NF	NF	6.99	NF	NC
3-May-10								
20-May-10	NC	5.68	NF	3.8	NF	6.65	NF	NC
21-May-10								
2-Jun-10	NC	NF	NF	NF	NF	11.3	NF	NF
3-Jun-10								
17-Jun-10								
18-Jun-10	NC	NF	NF	NF	NF	9.83	NF	NF
1-Jul-10	NC	NF	NF	NF	NF	12	NF	NF
2-Jul-10								
28-Jul-10	NC	NF	NF	NF	NF	10.1	NF	NF
7/29/2010								
8/5/2010	NC	NF	NF	NF	NF	11.2	NF	NF
8/9/2010								
8/20/2010	NC	NF	NF	NF	NF	11	NF	NF
8/25/2010								
9/1/2010	NC	NF	NF	NF	NF	13.6	NF	NF
9/3/2010								
9/17/2010	NC	NF	NF	NF	NF	14.3	NF	NF
9/20/2010								
10/1/2010	NC	NF	NF	NF	NF	NF	NF	NF
10/4/2010								

h								
WV1023039					Instream			WV10
005	006	007	008	009	DSBB/119	USBB/122	001	010
					3.61	6.1		
							NC	NC
NC	NC	NC	NC	NC				
							NC	NC
NC	NC	NC	NC	NC	4.24	6.16		
NC	NC	NC	NC	NC	6.32	8.67		
							NC	NC
NC	NC	NC	NC	NC	6.18	8.39		
							NC	NC
NC	NC	NC	NC	NC	6.21	8.33		
							NC	NC
NC	NC	NC	NC	NC	7.74	9.48	NC	NC
NC	NC	NC	NC	NC	8.29	9.95	NC	NC
NC	NC	NC	NC	NC	8.04	11.3	NC	NC
NC	NC	NC	NC	NC	9.21	7.73	NC	NC
NF	NF	3.58	NF	NF	11	13.2		
							NC	NC
							NC	NC
NF	NF	3.8	NF	NF	10.2	13.1		
NF	NF	NF	NF	NF	11.3	14.9		
							NC	NC
NF	NF	8.99	NF	NF	10.3	10.8		
							NC	NC
NF	NF	7.55	NF	NF	8.75	10.2		
							NC	NC
NF	NF	NF	NF	NF	12.8	14.7		
							NC	NC
NF	NF	NF	NF	NF	10.4	10.3		
							NC	NC
NF	NF	NF	NF	NF	9.85	13.8		
							NC	NC
NF	NF	NF	NF	NF	14.8	18.6		
							NC	NC

Stonecoal Branch				
23039		Instream		
011	012	DSSM	USSB	SBUT-3
NC	NC	1.14	1.01	1.12
NC	NC	1.62	9.09	7.35
NC	NC	3.55	1.4	1.15
NC	NC	2.41	1.82	1.14
		1.22		
NC	NC			
		1.26	1.19	1.8
NC	NC			
NC	NC			
		1.31	1.13	1.11
NC	NC			
		2.14	1.97	1.88
NC	NC			
		1.57	1.32	1.23
NC	NC	1.33	1.42	NF
NC	NC	1.39	1.49	1.14
NC	NC	NF	NF	NF
NC	NC	1.67	1.58	NF
NC	NC	1.58	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF

Berry Branch / Stonecoal Branch
Surface Water Quality
Magnesium (mg/l)

NC stands for Not Constructed
NF stands for No Flow

Tributary								Berry Branch
NPDES Permit No.	WV1022890					WV1022911		
Outlet / ID	007	008	009	010	011	001	002	004
20-Jan-10			NF		NF			
27-Jan-10								
28-Jan-10								
29-Jan-10								
30-Jan-10						14.8	NF	
31-Jan-10	NC							NC
8-Feb-10								
9-Feb-10	NC	10.1	NF	10.7	NF	14.4	NF	NC
22-Feb-10	NC	14	NF	8.29	NF	23	NF	NC
23-Feb-10								
2-Mar-10	NC	18.6	NF	10.7	NF	23.7	NF	NC
3-Mar-10								
18-Mar-10	NC	27.5	NF	9.08	NF			NC
19-Mar-10								
24-Mar-10						17.6	NF	
31-Mar-10								
1-Apr-10								
2-Apr-10	NC	28.3	NF	NF	NF	21.1	NF	NC
16-Apr-10	NC	NF	NF	NF	NF	22.4	NF	NC
19-Apr-10								
1-May-10	NC	NF	NF	NF	NF	23.2	NF	NC
3-May-10								
20-May-10	NC	14.4	NF	9.04	NF	18.6	NF	NC
21-May-10								
2-Jun-10	NC	NF	NF	NF	NF	32.3	NF	NF
3-Jun-10								
17-Jun-10								
18-Jun-10	NC	NF	NF	NF	NF	28.7	NF	NF
1-Jul-10	NC	NF	NF	NF	NF	40.6	NF	NF
2-Jul-10								
28-Jul-10	NC	NF	NF	NF	NF	29.8	NF	NF
7/29/2010								
8/5/2010	NC	NF	NF	NF	NF	32.8	NF	NF
8/9/2010								
8/20/2010	NC	NF	NF	NF	NF	37.4	NF	NF
8/25/2010								
9/1/2010	NC	NF	NF	NF	NF	47.3	NF	NF
9/3/2010								
9/17/2010	NC	NF	NF	NF	NF	47.9	NF	NF
9/20/2010								
10/1/2010	NC	NF	NF	NF	NF	NF	NF	NF
10/4/2010								

h								
WV1023039					Instream		WV10	
005	006	007	008	009	DSBB/119	USBB/122	001	010
					11.2	21.5		
							NC	NC
NC	NC	NC	NC	NC				
							NC	NC
NC	NC	NC	NC	NC	16.1	24.8		
NC	NC	NC	NC	NC	27	36.8		
							NC	NC
NC	NC	NC	NC	NC	28.5	38.9		
							NC	NC
NC	NC	NC	NC	NC	22.8	30.3		
							NC	NC
NC	NC	NC	NC	NC	21.9	26.4	NC	NC
NC	NC	NC	NC	NC	30.2	36.9	NC	NC
NC	NC	NC	NC	NC	34.7	48.9	NC	NC
NC	NC	NC	NC	NC	16.3	26.7	NC	NC
NF	NF	3.35	NF	NF	43.8	50.1		
							NC	NC
							NC	NC
NF	NF	3	NF	NF	42.3	55		
NF	NF	NF	NF	NF	52.7	70.9		
							NC	NC
NF	NF	4.07	NF	NF	37.2	38.4		
							NC	NC
NF	NF	4.28	NF	NF	30.9	35		
							NC	NC
NF	NF	NF	NF	NF	55.7	63.4		
							NC	NC
NF	NF	NF	NF	NF	38.6	38.7		
							NC	NC
NF	NF	NF	NF	NF	39.1	46.8		
							NC	NC
NF	NF	NF	NF	NF	70.1	89.3		
							NC	NC

Stonecoal Branch				
23039		Instream		
011	012	DSSM	USSB	SBUT-3
NC	NC	2.27	1.98	2.24
NC	NC	5.49	103	81.7
NC	NC	3.49	2.39	2.42
NC	NC	2.98	2.65	2.44
		2.28		
NC	NC			
		2.3	2.12	2.42
NC	NC			
NC	NC			
		2.62	2.14	2.18
NC	NC			
		2.19	2.11	2.56
NC	NC			
		2.29	2.09	2.28
NC	NC	2.07	2.18	NF
NC	NC	2.24	2.3	2.13
NC	NC	NF	NF	NF
NC	NC	2.34	2.24	NF
NC	NC	2.6	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF

Berry Branch / Stonecoal Branch
Surface Water Quality
Bicarbonate Alkalinity (mg/l)

NC stands for Not Constructed
NF stands for No Flow

Tributary								Berry Branch
NPDES Permit No.	WV1022890					WV1022911		
Outlet / ID	007	008	009	010	011	001	002	004
20-Jan-10			NF		NF			
27-Jan-10								
28-Jan-10								
29-Jan-10								
30-Jan-10						<1	NF	
31-Jan-10	NC							NC
8-Feb-10								
9-Feb-10	NC	4	NF	5	NF	20	NF	NC
22-Feb-10	NC	24	NF	6	NF	32	NF	NC
23-Feb-10								
2-Mar-10	NC	35	NF	6	NF	36	NF	NC
3-Mar-10								
18-Mar-10	NC	70	NF	6	NF			NC
19-Mar-10								
24-Mar-10						34	NF	
31-Mar-10								
1-Apr-10								
2-Apr-10	NC	84	NF	NF	NF	60	NF	NC
16-Apr-10	NC	NF	NF	NF	NF	51	NF	NC
19-Apr-10								
1-May-10	NC	NF	NF	NF	NF	52	NF	NC
3-May-10								
20-May-10	NC	68	NF	7	NF	48	NF	NC
21-May-10								
2-Jun-10	NC	NF	NF	NF	NF	85	NF	NF
3-Jun-10								
17-Jun-10								
18-Jun-10	NC	NF	NF	NF	NF	68	NF	NF
1-Jul-10	NC	NF	NF	NF	NF	117	NF	NF
2-Jul-10								
28-Jul-10	NC	NF	NF	NF	NF	72	NF	NF
7/29/2010								
8/5/2010	NC	NF	NF	NF	NF	67	NF	NF
8/9/2010								
8/20/2010	NC	NF	NF	NF	NF	89	NF	NF
8/25/2010								
9/1/2010	NC	NF	NF	NF	NF	147	NF	NF
9/3/2010								
9/17/2010	NC	NF	NF	NF	NF	140	NF	NF
9/20/2010								
10/1/2010	NC	NF	NF	NF	NF	NF	NF	NF
10/4/2010								

h								
WV1023039					Instream			WV10
005	006	007	008	009	DSBB/119	USBB/122	001	010
					22	33		
							NC	NC
NC	NC	NC	NC	NC				
							NC	NC
NC	NC	NC	NC	NC	33	45		
NC	NC	NC	NC	NC	68	91		
							NC	NC
NC	NC	NC	NC	NC	68	94		
							NC	NC
NC	NC	NC	NC	NC	61	75		
							NC	NC
NC	NC	NC	NC	NC	73	81	NC	NC
NC	NC	NC	NC	NC	90	112	NC	NC
NC	NC	NC	NC	NC	96	133	NC	NC
NC	NC	NC	NC	NC	44	70	NC	NC
NF	NF	1	NF	NF	122	159		
							NC	NC
							NC	NC
NF	NF	4	NF	NF	139	185		
NF	NF	NF	NF	NF	179	224		
							NC	NC
NF	NF	7	NF	NF	86	108		
							NC	NC
NF	NF	7	NF	NF	77	85		
							NC	NC
NF	NF	NF	NF	NF	143	182		
							NC	NC
NF	NF	NF	NF	NF	113	123		
							NC	NC
NF	NF	NF	NF	NF	132	139		
							NC	NC
NF	NF	NF	NF	NF	130	218		
							NC	NC

Stonecoal Branch				
23039		Instream		
011	012	DSSM	USSB	SBUT-3
NC	NC	<1	<1	<1
NC	NC	<1	<1	<1
NC	NC	6	4	4
NC	NC	<1	<1	<1
		6		
NC	NC			
		129	4	6
NC	NC			
NC	NC			
		7	7	5
NC	NC			
		5	4	5
NC	NC			
		6	5	5
NC	NC	7	8	NF
NC	NC	9	7	7
NC	NC	NF	NF	NF
NC	NC	11	10	NF
NC	NC	12	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF

Berry Branch / Stonecoal Branch
Surface Water Quality
Chloride (mg/l)

NC stands for Not Constructed
NF stands for No Flow

Tributary								Berry Branch
NPDES Permit No.	WV1022890					WV1022911		
Outlet / ID	007	008	009	010	011	001	002	004
20-Jan-10			NF		NF			
27-Jan-10								
28-Jan-10								
29-Jan-10								
30-Jan-10						3	NF	
31-Jan-10	NC							NC
8-Feb-10								
9-Feb-10	NC	<1.0	NF	1.1	NF	1.7	NF	NC
22-Feb-10	NC	1	NF	<1	NF	1.7	NF	NC
23-Feb-10								
2-Mar-10	NC	<1.0	NF	1.1	NF	2	NF	NC
3-Mar-10								
18-Mar-10	NC	<1.0	NF	1.1	NF			NC
19-Mar-10								
24-Mar-10						2	NF	
31-Mar-10								
1-Apr-10								
2-Apr-10	NC	1.2	NF	NF	NF	3	NF	NC
16-Apr-10	NC	NF	NF	NF	NF	10.5	NF	NC
19-Apr-10								
1-May-10	NC	NF	NF	NF	NF	15	NF	NC
3-May-10								
20-May-10	NC	<1.0	NF	<1.0	NF	4.3	NF	NC
21-May-10								
2-Jun-10	NC	NF	NF	NF	NF	5.1	NF	NF
3-Jun-10								
17-Jun-10								
18-Jun-10	NC	NF	NF	NF	NF	11.8	NF	NF
1-Jul-10	NC	NF	NF	NF	NF	5.7	NF	NF
2-Jul-10								
28-Jul-10	NC	NF	NF	NF	NF	4.9	NF	NF
7/29/2010								
8/5/2010	NC	NF	NF	NF	NF	5.5	NF	NF
8/9/2010								
8/20/2010	NC	NF	NF	NF	NF	10.4	NF	NF
8/25/2010								
9/1/2010	NC	NF	NF	NF	NF	1.7	NF	NF
9/3/2010								
9/17/2010	NC	NF	NF	NF	NF	1.9	NF	NF
9/20/2010								
10/1/2010	NC	NF	NF	NF	NF	NF	NF	NF
10/4/2010								

h								
WV1023039					Instream		WV10	
005	006	007	008	009	DSBB/119	USBB/122	001	010
					2.5	1.7		
							NC	NC
NC	NC	NC	NC	NC				
							NC	NC
NC	NC	NC	NC	NC	1.6	1.7		
NC	NC	NC	NC	NC	2.4	2.5		
							NC	NC
NC	NC	NC	NC	NC	2	2.5		
							NC	NC
NC	NC	NC	NC	NC	3.5	4		
							NC	NC
NC	NC	NC	NC	NC	3.7	3.5	NC	NC
NC	NC	NC	NC	NC	8.4	10.8	NC	NC
NC	NC	NC	NC	NC	10.5	14.3	NC	NC
NC	NC	NC	NC	NC	5.6	3.2	NC	NC
NF	NF		NF	NF	4	6		
							NC	NC
							NC	NC
NF	NF	15.5	NF	NF	13.1	17		
NF	NF	NF	NF	NF	8.6	12		
							NC	NC
NF	NF	15.5	NF	NF	8	8.3		
							NC	NC
NF	NF	19.7	NF	NF	5	5		
							NC	NC
NF	NF	NF	NF	NF	7.4	8.9		
							NC	NC
NF	NF	NF	NF	NF	3.6	3.7		
							NC	NC
NF	NF	NF	NF	NF	4.4	2.1		
							NC	NC
NF	NF	NF	NF	NF	10	33.8		
							NC	NC

Stonecoal Branch				
23039		Instream		
011	012	DSSM	USSB	SBUT-3
NC	NC	1	1.2	1
NC	NC	2.5	4	3
NC	NC	1.2	<1	<1
NC	NC	1.2	1	<1.0
		1.1		
NC	NC			
		<1.0	<1.0	<1.0
NC	NC			
NC	NC			
		1.1	1	<1.0
NC	NC			
		<1.0	<1.0	<1.0
NC	NC			
		1	<1.0	<1.0
NC	NC	<1.0	1	NF
NC	NC	1	1	<1.0
NC	NC	NF	NF	NF
NC	NC	3.4	1.1	NF
NC	NC	1	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF

Berry Branch / Stonecoal Branch
Surface Water Quality
Sodium (mg/l)

NC stands for Not Constructed
NF stands for No Flow

Tributary								Berry Branch
NPDES Permit No.	WV1022890					WV1022911		
Outlet / ID	007	008	009	010	011	001	002	004
20-Jan-10			NF		NF			
27-Jan-10								
28-Jan-10								
29-Jan-10								
30-Jan-10						2.95	NF	
31-Jan-10	NC							NC
8-Feb-10								
9-Feb-10	NC	1.12	NF	1.37	NF	1.8	NF	NC
22-Feb-10	NC	1.63	NF	1.21	NF	3.51	NF	NC
23-Feb-10								
2-Mar-10	NC	2.01	NF	1.68	NF	3.61	NF	NC
3-Mar-10								
18-Mar-10	NC	2.48	NF	1.14	NF			NC
19-Mar-10								
24-Mar-10						2.79	NF	
31-Mar-10								
1-Apr-10								
2-Apr-10	NC	2.28	NF	NF	NF	3.03	NF	NC
16-Apr-10	NC	NF	NF	NF	NF	6	NF	NC
19-Apr-10								
1-May-10	NC	NF	NF	NF	NF	7.2	NF	NC
3-May-10								
20-May-10	NC	2.14	NF	1.54	NF	3.48	NF	NC
21-May-10								
2-Jun-10	NC	NF	NF	NF	NF	4.35	NF	NF
3-Jun-10								
17-Jun-10								
18-Jun-10	NC	NF	NF	NF	NF	6.8	NF	NF
1-Jul-10	NC	NF	NF	NF	NF	6.82	NF	NF
2-Jul-10								
28-Jul-10	NC	NF	NF	NF	NF	5.23	NF	NF
7/29/2010								
8/5/2010	NC	NF	NF	NF	NF	5.43	NF	NF
8/9/2010								
8/20/2010	NC	NF	NF	NF	NF	7.05	NF	NF
8/25/2010								
9/1/2010	NC	NF	NF	NF	NF	5.88	NF	NF
9/3/2010								
9/17/2010	NC	NF	NF	NF	NF	10.7	NF	NF
9/20/2010								
10/1/2010	NC	NF	NF	NF	NF	NF	NF	NF
10/4/2010								

h								
WV1023039					Instream		WV10	
005	006	007	008	009	DSBB/119	USBB/122	001	010
					4.83	10.2		
							NC	NC
NC	NC	NC	NC	NC				
							NC	NC
NC	NC	NC	NC	NC	4.62	6.74		
NC	NC	NC	NC	NC	11.1	15.3		
							NC	NC
NC	NC	NC	NC	NC	8.18	9.74		
							NC	NC
NC	NC	NC	NC	NC	6.98	64.6		
							NC	NC
NC	NC	NC	NC	NC	36.6	42	NC	NC
NC	NC	NC	NC	NC	19.7	21.1	NC	NC
NC	NC	NC	NC	NC	24.4	33.8	NC	NC
NC	NC	NC	NC	NC	3.34	3.88	NC	NC
NF	NF	4.98	NF	NF	10.3	12.1		
							NC	NC
							NC	NC
NF	NF	3.89	NF	NF	28.4	36		
NF	NF	NF	NF	NF	51.3	69.7		
							NC	NC
NF	NF	5.59	NF	NF	12.9	11.3		
							NC	NC
NF	NF	5.37	NF	NF	9.71	9.74		
							NC	NC
NF	NF	NF	NF	NF	24.3	27.6		
							NC	NC
NF	NF	NF	NF	NF	11	10.9		
							NC	NC
NF	NF	NF	NF	NF	15.4	11.4		
							NC	NC
NF	NF	NF	NF	NF	22.8	86.6		
							NC	NC

Stonecoal Branch				
23039		Instream		
011	012	DSSM	USSB	SBUT-3
NC	NC	0.91	0.95	1
NC	NC	2.7	6.06	5.55
NC	NC	1.41	0.89	0.81
NC	NC	1.35	1.2	0.95
		0.92		
NC	NC			
		0.96	0.85	0.85
NC	NC			
NC	NC			
		1.34	0.94	0.81
NC	NC			
		0.86	0.92	0.82
NC	NC			
		1.14	1	0.9
NC	NC	0.94	1.06	NF
NC	NC	0.97	0.99	0.67
NC	NC	NF	NF	NF
NC	NC	1.11	1.03	NF
NC	NC	1.18	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF

Berry Branch / Stonecoal Branch
Surface Water Quality
Total Suspended Solids (mg/l)

NC stands for Not Constructed
NF stands for No Flow

Tributary								Berry Branch
NPDES Permit No.	WV1022890					WV1022911		
Outlet / ID	007	008	009	010	011	001	002	004
20-Jan-10			NF		NF			
27-Jan-10								
28-Jan-10								
29-Jan-10								
30-Jan-10						21	NF	
31-Jan-10	NC							NC
8-Feb-10								
9-Feb-10	NC	<1	NF	<1	NF	<1	NF	NC
22-Feb-10	NC	<1	NF	<1	NF	<1	NF	NC
23-Feb-10								
2-Mar-10	NC	<1	NF	<1	NF	<1	NF	NC
3-Mar-10								
18-Mar-10	NC	<1	NF	<1	NF			NC
19-Mar-10								
24-Mar-10						<1	NF	
31-Mar-10								
1-Apr-10								
2-Apr-10	NC	<1	NF	NF	NF	<1	NF	NC
16-Apr-10	NC	NF	NF	NF	NF	<1	NF	NC
19-Apr-10								
1-May-10	NC	NF	NF	NF	NF	<1	NF	NC
3-May-10								
20-May-10	NC	<1	NF	<1	NF	<1	NF	NC
21-May-10								
2-Jun-10	NC	NF	NF	NF	NF	<1	NF	NF
3-Jun-10								
17-Jun-10								
18-Jun-10	NC	NF	NF	NF	NF	<1	NF	NF
1-Jul-10	NC	NF	NF	NF	NF	<1	NF	NF
2-Jul-10								
28-Jul-10	NC	NF	NF	NF	NF	<1	NF	NF
7/29/2010								
8/5/2010	NC	NF	NF	NF	NF	<1	NF	NF
8/9/2010								
8/20/2010	NC	NF	NF	NF	NF	<1	NF	NF
8/25/2010								
9/1/2010	NC	NF	NF	NF	NF	<1	NF	NF
9/3/2010								
9/17/2010	NC	NF	NF	NF	NF	<1	NF	NF
9/20/2010								
10/1/2010	NC	NF	NF	NF	NF	NF	NF	NF
10/4/2010								

h								
WV1023039					Instream		WV10	
005	006	007	008	009	DSBB/119	USBB/122	001	010
					<1	<1		
							NC	NC
NC	NC	NC	NC	NC				
							NC	NC
NC	NC	NC	NC	NC	<1	<1		
NC	NC	NC	NC	NC	<1	<1		
							NC	NC
NC	NC	NC	NC	NC	<1	<1		
							NC	NC
NC	NC	NC	NC	NC	<1	<1		
							NC	NC
NC	NC	NC	NC	NC	<1	12	NC	NC
NC	NC	NC	NC	NC	<1	<1	NC	NC
NC	NC	NC	NC	NC	<1	<1	NC	NC
NC	NC	NC	NC	NC	<1	<1	NC	NC
NF	NF	<1	NF	NF	<1	<1		
							NC	NC
							NC	NC
NF	NF	<1	NF	NF	<1	<1		
NF	NF	NF	NF	NF	<1	<1		
							NC	NC
NF	NF	<1	NF	NF	<1	<1		
							NC	NC
NF	NF	<1	NF	NF	<1	<1		
							NC	NC
NF	NF	NF	NF	NF	<1	<1		
							NC	NC
NF	NF	NF	NF	NF	<1	<1		
							NC	NC
NF	NF	NF	NF	NF	<1	<1		
							NC	NC
NF	NF	NF	NF	NF	<1	<1		
							NC	NC

Stonecoal Branch				
23039		Instream		
011	012	DSSM	USSB	SBUT-3
NC	NC	6	4	4
NC	NC	<1	<1	<1
NC	NC	<1	<1	<1
NC	NC	20	17	17
		<1		
NC	NC			
		<1	<1	<1
NC	NC			
NC	NC			
		<1	<1	<1
NC	NC			
		<1	<1	<1
NC	NC			
		<1	<1	<1
NC	NC	<1	<1	NF
NC	NC	<1	<1	<1
NC	NC	NF	NF	NF
NC	NC	<1	<1	NF
NC	NC	<1	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF
NC	NC	NF	NF	NF

David Evans/DC/USEPA/US	To	Janice Peters
12/01/2010 12:40 PM	cc	Jim Pendergast
	bcc	
	Subject	Fw: FOR YOUR REVIEW: Draft Spruce 404(c) Final Determination

Janice,

Please print this for me, and unless Jim says no need (quickly), make him a copy also.

Thanks,

dave

David Evans, Director
Wetlands Division
Office of Wetlands, Oceans and Watersheds
(202) 566-0535

----- Forwarded by David Evans/DC/USEPA/US on 12/01/2010 12:39 PM -----

From:	Christopher Hunter/DC/USEPA/US
To:	Denise Keehner/DC/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA, Cliff Rader/DC/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA, Charles Lee/DC/USEPA/US@EPA, Suzi Ruhl/DC/USEPA/US@EPA, Kevin Minoli/DC/USEPA/US@EPA, Karyn Wendelowski/DC/USEPA/US@EPA, Michael Slimak/DC/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA, John Pomponio/R3/USEPA/US@EPA, Regina Poeske/R3/USEPA/US@EPA, Greg Pond/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Jim Giattina/R4/USEPA/US@EPA, Tom Welborn/R4/USEPA/US@EPA, Tinka Hyde/R5/USEPA/US@EPA, Peter Swenson/R5/USEPA/US@EPA, Christine Mazzarella/R3/USEPA/US, Heather Case/DC/USEPA/US@EPA, Tom Laverty/DC/USEPA/US@EPA, Marcus Zobrist/DC/USEPA/US@EPA
Cc:	Palmer Hough/DC/USEPA/US@EPA, Julia McCarthy/R8/USEPA/US@EPA, Marcel Tchaou/DC/USEPA/US@EPA, Ross Geredien/DC/USEPA/US@EPA, Brian Frazer/DC/USEPA/US@EPA, Brian Topping/DC/USEPA/US@EPA, David Evans/DC/USEPA/US@EPA, Jim Pendergast/DC/USEPA/US@EPA, Tanya Code/DC/USEPA/US@EPA
Date:	12/01/2010 11:01 AM
Subject:	FOR YOUR REVIEW: Draft Spruce 404(c) Final Determination

Hello all,
Attached for your review, please find our draft Final Determination for the Spruce No. 1 Surface Mine 404(c) action. Now that the consultation period with the permittee has ended, we will need to move quickly toward finalizing this document, so I am requesting **all comments on this draft (in redline/strikeout) back to me by COB December 8**. At the end of next week, I will be sending the draft technical appendices for your review as well. Following comment review, we will be preparing a revised draft of the main body text and start the briefings for upper management. At the moment, we are planning for a publication and communications rollout for the Final Determination just after the New Year, possibly January 7, 2011.

I will be out of the office until December 9, but if you have any questions on the draft during the next week, please contact Palmer Hough.

Thank you,
Chris

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454

ATTACHMENT REDACTED - DELIBERATIVE

hunter.christopher@epa.gov Spruce FD draft 120110.doc

Ross Geredien/DC/USEPA/US
12/01/2010 12:51 PM

To Matthew Klasen
cc Gregory Peck, Jim Pendergast, MichaelG Lee
bcc
Subject Re: Stream Protection Rule check-in (take two)

For today's discussion. Several issues I've raised in my comment field. (b) (5)
(b) (5) [redacted]

Ross

ATTACHMENT REDACTED - DELIBERATIVE

2010-11-30 OSM SPR Follow-Up_RPG edits.docx

Ross Geredien
ORISE Fellow
EPA Office of Wetlands, Oceans, and Watersheds
202-566-1466
Geredien.ross(AT)epa.gov

Matthew Klasen Let's try this again. Greg (and I) are heading to t... 12/01/2010 08:17:45 AM

Stream Protection Rule check-in (take two)

Wed 12/01/2010 1:30 PM - 2:00 PM

Attendance is for Ross Geredien

Chair: **Matthew Klasen/DC/USEPA/US**
Location: (b) (6) [redacted]

Required: Gregory Peck/DC/USEPA/US@EPA, Jim Pendergast/DC/USEPA/US@EPA, MichaelG Lee/DC/USEPA/US@EPA, Ross Geredien/DC/USEPA/US@EPA

Description

Let's try this again. Greg (and I) are heading to the Hill this morning on MTM, so the 9 am time we discussed yesterday won't work. Mike, I see that you might have a conflict with this time, but this unfortunately seemed like the only time when 80% of the group was available.

Hope this works.

Thanks,
Matt

Personal Notes

Ross Geredien/DC/USEPA/US
12/01/2010 01:21 PM

To Matthew Klasen
cc Gregory Peck, Jim Pendergast, MichaelG Lee
bcc
Subject SPR Call document

Revised, please refer to this version.

ATTACHMENT REDACTED - DELIBERATIVE

2010-11-30 OSM SPR Follow-Up_RPG edits.docx

Ross Geredien
ORISE Fellow
EPA Office of Wetlands, Oceans, and Watersheds
202-566-1466
Geredien.ross(AT)epa.gov

Matthew Klasen | Let's try this again. Greg (and I) are heading to t... | 12/01/2010 08:17:45 AM

Stream Protection Rule check-in (take two)

Wed 12/01/2010 1:30 PM - 2:00 PM

Attendance is for Ross Geredien

Chair: Matthew Klasen/DC/USEPA/US
Location: (b) (6) [redacted]

Required: Gregory Peck/DC/USEPA/US@EPA, Jim Pendergast/DC/USEPA/US@EPA, MichaelG Lee/DC/USEPA/US@EPA, Ross Geredien/DC/USEPA/US@EPA

Description

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Hope this works.

Thanks,
Matt

Personal Notes

Matthew Klasen/DC/USEPA/US
12/01/2010 05:21 PM

To Gregory Peck
cc
bcc
Subject Fw: TN SOPs

Here are the old drafts of TN SOPs, some of which were superseded by Tom's most recent note.

mk

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

----- Forwarded by Matthew Klasen/DC/USEPA/US on 12/01/2010 05:20 PM -----

From: Tom Welborn/R4/USEPA/US
To: CynthiaN Johnson/DC/USEPA/US@EPA
Cc: Amy Newbold/R4/USEPA/US@EPA, Ann Campbell/DC/USEPA/US@EPA, Ben Ghosh/R4/USEPA/US@EPA, Beth Walls/R4/USEPA/US@EPA, Bharat Mathur/R5/USEPA/US@EPA, Bob Sussman/DC/USEPA/US@EPA, Brian Frazer/DC/USEPA/US@EPA, Brian Topping/DC/USEPA/US@EPA, Bridget Staples/R4/USEPA/US@EPA, Caroline Whitehead/DC/USEPA/US@EPA, Chad Harsh/R3/USEPA/US@EPA, Chris Thomas/R4/USEPA/US@EPA, Christopher Hunter/DC/USEPA/US@EPA, Cliff Rader/DC/USEPA/US@EPA, Daniel Holliman/R4/USEPA/US@EPA, Darren Reid/DC/USEPA/US@EPA, David Evans/DC/USEPA/US@EPA, Denis Borum/DC/USEPA/US@EPA, Denise Keehner/DC/USEPA/US@EPA, Duncan Powell/R4/USEPA/US@EPA, Elaine Suriano/DC/USEPA/US@EPA, Eric Somerville/R4/USEPA/US@EPA, Evelyn MacKnight/R3/USEPA/US@EPA, Georgia Bednar/DC/USEPA/US@EPA, Grace Robiou/DC/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA, Janice Donlon/R3/USEPA/US@EPA, Jeffrey Lapp/R3/USEPA/US@EPA, Jessica Martinsen/R3/USEPA/US@EPA, Jim Giattina/R4/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA, John Pomponio/R3/USEPA/US@EPA, Jon Capacasa/R3/USEPA/US@EPA, Jordan Dorfman/DC/USEPA/US@EPA, Justin Wright/DC/USEPA/US@EPA, Karyn Wendelowski/DC/USEPA/US@EPA, Kevin Minoli/DC/USEPA/US@EPA, Kevin Pierard/R5/USEPA/US@EPA, Larinda Tervelt/R4/USEPA/US@EPA, Mahri Monson/DC/USEPA/US@EPA, Marcus Zobrist/DC/USEPA/US@EPA, Marilyn Kuray/DC/USEPA/US@EPA, Mark Nuhfer/R4/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA, Melissa Raack/DC/USEPA/US@EPA, Michael Dunn/R3/USEPA/US@EPA, Michael Slimak/DC/USEPA/US@EPA, MichaelG Lee/DC/USEPA/US@EPA, Naimah Karim/R5/USEPA/US@EPA, Nanci Gelb/DC/USEPA/US@EPA, Nancy Stoner/DC/USEPA/US@EPA, Palmer Hough/DC/USEPA/US@EPA, Peter Silva/DC/USEPA/US@EPA, Peter Swenson/R5/USEPA/US@EPA, Philip Mancusi-Ungaro/R4/USEPA/US@EPA, Rebecca Cover/R4/USEPA/US@EPA, Robert Klepp/DC/USEPA/US@EPA, Rosemary Hall/DC/USEPA/US@EPA, Ross Geredien/DC/USEPA/US@EPA, Sharmin Syed/DC/USEPA/US@EPA, Shawn Garvin/R3/USEPA/US@EPA, Stan Meiburg/R4/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA, Stephanie Fulton/R4/USEPA/US@EPA, Susan Cormier/CI/USEPA/US@EPA, Susan Hansen/R4/USEPA/US@EPA, Susan Norton/DC/USEPA/US@EPA, Tanya Code/DC/USEPA/US@EPA, Timothy Landers/R6/USEPA/US@EPA, Tinka Hyde/R5/USEPA/US@EPA, Todd Bowers/R4/USEPA/US@EPA, Tom Laverty/DC/USEPA/US@EPA, Wendy Melgin/R5/USEPA/US@EPA, William Early/R3/USEPA/US
Date: 11/09/2010 11:56 AM
Subject: Re: Surface coal mining meeting STARTS AT 10:15 THIS MORNING ONLY-agenda attached

As requested on the call today here are the TN SOPs with EPA's comments:

TN SOP Doc8_SOP Revisions_10-13-10_tracked.docx

TN 10-18Doc4_Mitigation_final EPA 10-27.docx

TN SOP 10-18 Doc5_ESA_final_EPA 10-27.docx

TN SOP 10-18Doc9_SOP Public Participation EPA 10-27.docx

TN SOP Doc2_JD_Process_final epa 10-27.docx

TN SOP Doc3_TN SOP Avoidance and Minimization EPA 10-27.DOCX

TN SOP doc 7 epa 10-27.docx

TN WQ SOP 10-29.docx

Doc 1-TENNESSEE Process Flow Chart Edited 10-13-10.docx

Tom Welborn, Chief
Wetlands, Coastal and Oceans Branch
EPA Region 4
61 Forsyth Street, SW
Atlanta, GA 30303
404-562-9354
404-562-9343(FAX)
404-895-6312(cell)

ATTACHMENTS REDACTED - DELIBERATIVE

CynthiaN Johnson	Good morning, I have attached the agenda. Du...	11/09/2010 09:24:20 AM

From: CynthiaN Johnson/DC/USEPA/US
To: Ann Campbell/DC/USEPA/US@EPA, Ben Ghosh/R4/USEPA/US@EPA, Beth Walls/R4/USEPA/US@EPA, Bharat Mathur/R5/USEPA/US@EPA, Bob Sussman/DC/USEPA/US@EPA, Brian Frazer/DC/USEPA/US@EPA, Chris Thomas/R4/USEPA/US@EPA, Christopher Hunter/DC/USEPA/US@EPA, Cliff Rader/DC/USEPA/US@EPA, Daniel Holliman/R4/USEPA/US@EPA, Darren Reid/DC/USEPA/US@EPA, David Evans/DC/USEPA/US@EPA, Denis Borum/DC/USEPA/US@EPA, Denise Keehner/DC/USEPA/US@EPA, Duncan Powell/R4/USEPA/US@EPA, Evelyn MacKnight/R3/USEPA/US@EPA, Georgia Bednar/DC/USEPA/US@EPA, Grace Robiou/DC/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA, Janice Donlon/R3/USEPA/US@EPA, Jeffrey Lapp/R3/USEPA/US@EPA, Jim Giattina/R4/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA, John Pomponio/R3/USEPA/US@EPA, Jon Capacasa/R3/USEPA/US@EPA, Jordan Dorfman/DC/USEPA/US@EPA, Justin Wright/DC/USEPA/US@EPA, Karyn Wendelowski/DC/USEPA/US@EPA, Kevin Minoli/DC/USEPA/US@EPA, Kevin Pierard/R5/USEPA/US@EPA, Larinda Tervelt/R4/USEPA/US@EPA, Mahri Monson/DC/USEPA/US@EPA, Marcus Zobrist/DC/USEPA/US@EPA, Marilyn Kuray/DC/USEPA/US@EPA, Mark Nuhfer/R4/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA, Melissa Raack/DC/USEPA/US@EPA, Michael Dunn/R3/USEPA/US@EPA, Michael Slimak/DC/USEPA/US@EPA, MichaelG Lee/DC/USEPA/US@EPA, Naimah Karim/R5/USEPA/US@EPA, Nanci Gelb/DC/USEPA/US@EPA, Nancy Stoner/DC/USEPA/US@EPA, Palmer Hough/DC/USEPA/US@EPA, Peter Silva/DC/USEPA/US@EPA, Peter Swenson/R5/USEPA/US@EPA, Philip Mancusi-Ungaro/R4/USEPA/US@EPA, Rebecca Cover/R4/USEPA/US@EPA, Robert Klepp/DC/USEPA/US@EPA, Rosemary Hall/DC/USEPA/US@EPA, Ross Geredien/DC/USEPA/US@EPA, Sharmin Syed/DC/USEPA/US@EPA, Shawn Garvin/R3/USEPA/US@EPA, Stan Meiburg/R4/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA, Stephanie Fulton/R4/USEPA/US@EPA, Susan Cormier/CI/USEPA/US@EPA, Susan Norton/DC/USEPA/US@EPA, Tanya Code/DC/USEPA/US@EPA, Timothy Landers/R6/USEPA/US@EPA, Tinka Hyde/R5/USEPA/US@EPA, Todd Bowers/R4/USEPA/US@EPA, Tom Laverty/DC/USEPA/US@EPA, Tom

Welborn/R4/USEPA/US@EPA, Wendy Melgin/R5/USEPA/US@EPA, William Early/R3/USEPA/US, Elaine Suriano/DC/USEPA/US@EPA, Caroline Whitehead/DC/USEPA/US@EPA, Amy Newbold/R4/USEPA/US@EPA, Brian Topping/DC/USEPA/US@EPA, Bridget Staples/R4/USEPA/US@EPA, Eric Somerville/R4/USEPA/US@EPA, Chad Harsh/R3/USEPA/US@EPA, Jessica Martinsen/R3/USEPA/US@EPA, Susan Hansen/R4/USEPA/US@EPA

Date: 11/09/2010 09:24 AM

Subject: Surface coal mining meeting STARTS AT 10:15 THIS MORNING ONLY-agenda attached

---

Good morning,

I have attached the agenda. Due to other meetings, we are starting this call slightly later. **Please note that the call will start at 10:15 this morning.**

[attachment "Mining Call Agenda 11-9-10.doc" deleted by Tom Welborn/R4/USEPA/US]

Thanks,
Cynthia

--
Cynthia N. Johnson
Program Analyst
U.S. Environmental Protection Agency
Office of Wetlands, Oceans and Watersheds
Wetlands Division
Johnson.CynthiaN@EPA.gov
Phone: (202) 566-1679
Fax: (202) 566-1349

Mailing Address:
1200 Penn. Ave, NW MC: 4502T
Washington, DC 20460

Gregory Peck/DC/USEPA/US
12/02/2010 02:24 PM

To Kevin Minoli
cc Dawn Messier
bcc
Subject Re: Fw: Ison Rock Ridge

The cover memo and letter look much improved thanks to you and Dawn. I've made several minor edits to the letter and assume you caught the couple of typos in the memo. (b) (5) [redacted]

Thanks Nice job.

Greg

ATTACHMENT REDACTED - DELIBERATIVE

Ison Rock Ridge Specific Ojection letter 12-2-10 v1 .doc

Kevin Minoli | Let us know if you have comments. ----- Forward... | 12/02/2010 01:55:16 PM

From: Kevin Minoli/DC/USEPA/US
To: Gregory Peck/DC/USEPA/US@EPA
Cc: Dawn Messier/DC/USEPA/US@EPA
Date: 12/02/2010 01:55 PM
Subject: Fw: Ison Rock Ridge

Let us know if you have comments.
----- Forwarded by Kevin Minoli/DC/USEPA/US on 12/02/2010 01:55 PM -----

From: Stefania Shamet/R3/USEPA/US
To: Evelyn MacKnight/R3/USEPA/US@EPA, Dawn Messier/DC/USEPA/US@EPA, Kevin Minoli/DC/USEPA/US@EPA
Date: 12/02/2010 01:48 PM
Subject: Ison Rock Ridge

Here you go

[attachment "covermemo.doc" deleted by Gregory Peck/DC/USEPA/US] [attachment "Ison Rock Ridge Specific Ojection letter 12-2-10 v1 .doc" deleted by Gregory Peck/DC/USEPA/US]

Jim Pendergast/DC/USEPA/US
12/03/2010 02:28 PM

To: Christopher Hunter
cc:
bcc:
Subject: Re: FOR YOUR REVIEW: Draft Spruce 404(c) Final Determination

Chris -- (b) (5) [redacted]

Jim

Christopher Hunter | Hello all, Attached for your review, please find... | 12/01/2010 11:01:52 AM

From: Christopher Hunter/DC/USEPA/US
To: Denise Keehner/DC/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA, Cliff Rader/DC/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA, Charles Lee/DC/USEPA/US@EPA, Suzi Ruhl/DC/USEPA/US@EPA, Kevin Minoli/DC/USEPA/US@EPA, Karyn Wendelowski/DC/USEPA/US@EPA, Michael Slimak/DC/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA, John Pomponio/R3/USEPA/US@EPA, Regina Poeske/R3/USEPA/US@EPA, Greg Pond/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Jim Giattina/R4/USEPA/US@EPA, Tom Welborn/R4/USEPA/US@EPA, Tinka Hyde/R5/USEPA/US@EPA, Peter Swenson/R5/USEPA/US@EPA, Christine Mazzarella/R3/USEPA/US, Heather Case/DC/USEPA/US@EPA, Tom Laverty/DC/USEPA/US@EPA, Marcus Zobrist/DC/USEPA/US@EPA
Cc: Palmer Hough/DC/USEPA/US@EPA, Julia McCarthy/R8/USEPA/US@EPA, Marcel Tchaou/DC/USEPA/US@EPA, Ross Geredien/DC/USEPA/US@EPA, Brian Frazer/DC/USEPA/US@EPA, Brian Topping/DC/USEPA/US@EPA, David Evans/DC/USEPA/US@EPA, Jim Pendergast/DC/USEPA/US@EPA, Tanya Code/DC/USEPA/US@EPA
Date: 12/01/2010 11:01 AM
Subject: FOR YOUR REVIEW: Draft Spruce 404(c) Final Determination

Hello all,

Attached for your review, please find our draft Final Determination for the Spruce No. 1 Surface Mine 404(c) action. Now that the consultation period with the permittee has ended, we will need to move quickly toward finalizing this document, so I am requesting **all comments on this draft (in redline/strikeout) back to me by COB December 8**. At the end of next week, I will be sending the draft technical appendices for your review as well. Following comment review, we will be preparing a revised draft of the main body text and start the briefings for upper management. At the moment, we are planning for a publication and communications rollout for the Final Determination just after the New Year, possibly January 7, 2011.

I will be out of the office until December 9, but if you have any questions on the draft during the next week, please contact Palmer Hough.

Thank you,
Chris

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454
hunter.christopher@epa.gov [attachment "Spruce FD draft 120110.doc" deleted by Jim Pendergast/DC/USEPA/US]

Matthew Klasen/DC/USEPA/US
12/03/2010 06:48 PM

To Gregory Peck
cc
bcc
Subject Leeco letter

Take a look when you get a chance. I've left mitigation, cumulative impacts, and the conclusion alone for now, as well as the long AMP attachment. Hopefully the remainder is better than before...we'll see.

Thanks,
Matt

ATTACHMENT REDACTED - DELIBERATIVE

2010-12-03 Draft Leeco letter (MK2).docx

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

Gregory Peck/DC/USEPA/US
12/04/2010 02:50 PM

To Matthew Klasen
cc
bcc
Subject Leeco

Hey Matt

Hope you're enjoying your Saturday. I've read through the letter and appreciate the clear improvements you've made. (b) (5) [redacted]

Take a look and let me know what you think. If you're OK - we can get this around to others for review.

Best,
Greg

ATTACHMENT REDACTED - DELIBERATIVE

2010-12-03 Draft Leeco letter MK and GP edits.docx

Gregory Peck/DC/USEPA/US
12/04/2010 03:49 PM

To Matthew Klasen, Christopher Hunter, Brian Frazer, kevin.minoli, Karyn Wendelowski
cc stoner.nancy
bcc
Subject Stacy Branch/Leeco Letter

(b) (5)
[redacted]
Please take a look as soon as you can. We should probably send a HQ draft back to the Region by COB on Monday and schedule a conversation with Nancy and Dr. Sussman by the middle of the week.

Thanks all.

Greg

ATTACHMENT REDACTED - DELIBERATIVE

2010-12-03 Draft Leeco letter MK and GP edits.docx

Greg Pond/R3/USEPA/US
12/05/2010 12:56 PM

To Margaret Passmore
cc Amy Bergdale, Louis Reynolds, Frank Borsuk, Kelly Krock
bcc
Subject C. dubia mining tox paper

Maggie, this is super-duper! Great job. I "tracked changes". Some are just suggestions, some are edits. The Lit cited is messy so make sure you see what the journal requires in terms of formatting. We can discuss any of these comments whenever you want.

Greg

Document Withheld - FOIA (b)(5)

An evaluation of Ceriodaphnia dubia chronic toxicity_111910_GP edits.doc

Greg Pond
Office of Monitoring and Assessment
U.S. EPA Region 3
1060 Chapline Street, Suite 303
Wheeling, WV 26003-2995
(p) 304-234-0243
(f) 304-234-0260
pond.greg@epa.gov
Visit our website at http://epa.gov/reg3esd1/3ea50.htm

Cliff Rader/DC/USEPA/US
12/05/2010 08:53 PM

To Matthew Klasen
cc
bcc
Subject Re: Fw: Stacy Branch/Leeco Letter - New Version

Matt -

Here are my proposed edits...if you are okay with them, can you forward them on to the HQ group?

thanks,

Cliff

-----Matthew Klasen/DC/USEPA/US wrote: -----

To: Cliff Rader/DC/USEPA/US@EPA
From: Matthew Klasen/DC/USEPA/US
Date: 12/05/2010 05:01PM
Subject: Fw: Stacy Branch/Leeco Letter

FYI -- note a bit of new EIS language early on in the letter. (b) (5) [redacted]

mk

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

-----Forwarded by Matthew Klasen/DC/USEPA/US on 12/05/2010 05:01PM -----

To: Matthew Klasen/DC/USEPA/US@EPA, Christopher Hunter/DC/USEPA/US@EPA, Brian Frazer/DC/USEPA/US@EPA, (b) (6) Kevin Minoli [redacted], Karyn Wendelowski/DC/USEPA/US@EPA
From: Gregory Peck/DC/USEPA/US
Date: 12/04/2010 03:49PM
Cc: stoner.nancy@epa.gov
Subject: Stacy Branch/Leeco Letter

(b) (5) [redacted]

(b) (5) [redacted]
Please take a look as soon as you can. We should probably send a HQ draft back to the Region by COB on Monday and schedule a conversation with Nancy and Dr. Sussman by the middle of the week.

Thanks all.

Greg

(See attached file: 2010-12-03 Draft Leeco letter MK and GP edits.docx)

[attachment "2010-12-03 Draft Leeco letter MK and GP edits.docx" removed by Cliff Rader/DC/USEPA/US]

- 2010-12-03 Draft Leeco letter MK and GP and CR edits

ATTACHMENT REDACTED - DELIBERATIVE

Cliff Rader/DC/USEPA/US
12/05/2010 09:01 PM

To Matthew Klasen
cc
bcc
Subject RESEND - Leeco Stacy Branch

I had to make a few changes to the last paragraph...sorry.

Can you send this version around to the other HQ reviewers?

thanks. - 2010-12-03 Draft Leeco letter MK and GP and CR edits

ATTACHMENT REDACTED - DELIBERATIVE

Cliff Rader/DC/USEPA/US
12/05/2010 09:39 PM

To Matthew Klasen
cc
bcc
Subject Re: Stacy Branch/Leeco Letter

Thanks - except it came out as plain text format??

Here's another try....

-----Matthew Klasen/DC/USEPA/US wrote: -----

To: Gregory Peck/DC/USEPA/US@EPA
From: Matthew Klasen/DC/USEPA/US
Date: 12/05/2010 09:25PM
Cc: Christopher Hunter/DC/USEPA/US@EPA, Brian Frazer/DC/USEPA/US@EPA, (b) (6) Kevin Minoli [redacted] Karyn Wendelowski/DC/USEPA/US@EPA, stoner.nancy@epa.gov, Cliff Rader/DC/USEPA/US@EPA
Subject: Re: Stacy Branch/Leeco Letter

Hi folks,

Cliff added a few edits to the cumulative impacts and EJ sections of the letter, which are attached. Please use this updated version unless you've already started making edits to what Greg sent around yesterday.

Looking forward to everyone's thoughts so we can get a version back to R4 tomorrow.

Thanks,
Matt

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

-----Gregory Peck/DC/USEPA/US wrote: -----

To: Matthew Klasen/DC/USEPA/US@EPA, Christopher Hunter/DC/USEPA/US@EPA, Brian Frazer/DC/USEPA/US@EPA, (b) (6) Kevin Minoli [redacted] Karyn Wendelowski/DC/USEPA/US@EPA
From: Gregory Peck/DC/USEPA/US
Date: 12/04/2010 03:49PM
Cc: stoner.nancy@epa.gov
Subject: Stacy Branch/Leeco Letter

(b) (5) [redacted]

Please take a look as soon as you can. We should probably send a HQ draft back to the Region by COB on Monday and schedule a conversation with Nancy and Dr. Sussman by the middle of the week.

Thanks all.

Greg

(See attached file: 2010-12-03 Draft Leeco letter MK and GP edits.docx)

[attachment "2010-12-03 Draft Leeco letter MK and GP edits.docx" removed by Matthew Klasen/DC/USEPA/US]

[attachment "2010-12-03 Draft Leeco letter MK and GP and CR edits" removed by Cliff Rader/DC/USEPA/US]

- 2010-12-03 Draft Leeco letter MK and GP and CR edits

ATTACHMENT REDACTED - DELIBERATIVE

Matthew Klasen/DC/USEPA/US
12/05/2010 10:21 PM

To Matthew Klasen
cc
bcc
Subject Re: Stacy Branch/Leeco Letter

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

-----Matthew Klasen/DC/USEPA/US wrote: -----

To: Gregory Peck/DC/USEPA/US@EPA
From: Matthew Klasen/DC/USEPA/US
Date: 12/05/2010 09:25PM
Cc: Christopher Hunter/DC/USEPA/US@EPA, Brian Frazer/DC/USEPA/US@EPA, (b) (6) Kevin Minoli [redacted] Karyn Wendelowski/DC/USEPA/US@EPA, stoner.nancy@epa.gov, Cliff Rader/DC/USEPA/US@EPA
Subject: Re: Stacy Branch/Leeco Letter

Hi folks,

Cliff added a few edits to the cumulative impacts and EJ sections of the letter, which are attached. Please use this updated version unless you've already started making edits to what Greg sent around yesterday.

Looking forward to everyone's thoughts so we can get a version back to R4 tomorrow.

Thanks,
Matt

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

-----Gregory Peck/DC/USEPA/US wrote: -----

To: Matthew Klasen/DC/USEPA/US@EPA, Christopher Hunter/DC/USEPA/US@EPA, Brian Frazer/DC/USEPA/US@EPA, (b) (6) Kevin Minoli [redacted] Karyn Wendelowski/DC/USEPA/US@EPA
From: Gregory Peck/DC/USEPA/US
Date: 12/04/2010 03:49PM

Cc: stoner.nancy@epa.gov
Subject: Stacy Branch/Leeco Letter

(b) (5) [redacted]

Please take a look as soon as you can. We should probably send a HQ draft back to the Region by COB on Monday and schedule a conversation with Nancy and Dr. Sussman by the middle of the week.

Thanks all.

Greg

(See attached file: 2010-12-03 Draft Leeco letter MK and GP edits.docx)

[attachment "2010-12-03 Draft Leeco letter MK and GP edits.docx" removed by Matthew Klasen/DC/USEPA/US]

[attachment "2010-12-03 Draft Leeco letter MK and GP and CR edits" removed by Matthew Klasen/DC/USEPA/US] - 2010-12-03 Draft Leeco letter MK and GP and CR edits.docx

ATTACHMENT REDACTED - DELIBERATIVE

Matthew Klasen/DC/USEPA/US
12/05/2010 10:22 PM

To Cliff Rader
cc
bcc
Subject Re: really...try this one

Just checking -- does this one look OK? (I got a new computer last week and I'm still figuring things out.)

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

-----Cliff Rader/DC/USEPA/US wrote: -----

To: Matthew Klasen/DC/USEPA/US@EPA
From: Cliff Rader/DC/USEPA/US
Date: 12/05/2010 09:41PM
Subject: really...try this one

aargh!

[attachment "2010-12-03 Draft Leeco letter MK and GP and CR edits.docx" removed by Matthew Klasen/DC/USEPA/US] - 2010-12-03 Draft Leeco letter MK and GP and CR edits(2).docx

ATTACHMENT REDACTED - DELIBERATIVE

Matthew Klasen/DC/USEPA/US
12/06/2010 08:12 AM

To: Brian Frazer, Christopher Hunter, Cliff Rader, Gregory Peck, Karyn Wendelowski, kevin.minoli, Kevin Minoli
cc:
bcc:
Subject: Re: Stacy Branch/Leeco Letter

Let's try this again -- see attached for a letter in the right Word format.

Thanks,
Matt

ATTACHMENT REDACTED - DELIBERATIVE

2010-12-03 Draft Leeco letter MK and GP and CR edits.docx

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

Matthew Klasen	Hi folks, Cliff added a few edits to the cumulativ...	12/05/2010 09:25:20 PM

From: Matthew Klasen/DC/USEPA/US
To: Gregory Peck/DC/USEPA/US@EPA
Cc: Christopher Hunter/DC/USEPA/US@EPA, Brian Frazer/DC/USEPA/US@EPA, (b) (6) Kevin Minoli, Karyn Wendelowski/DC/USEPA/US@EPA, stoner.nancy@epa.gov, Cliff Rader/DC/USEPA/US@EPA
Date: 12/05/2010 09:25 PM
Subject: Re: Stacy Branch/Leeco Letter

Hi folks,

Cliff added a few edits to the cumulative impacts and EJ sections of the letter, which are attached. Please use this updated version unless you've already started making edits to what Greg sent around yesterday.

Looking forward to everyone's thoughts so we can get a version back to R4 tomorrow.

Thanks,
Matt

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

-----Gregory Peck/DC/USEPA/US wrote: -----

To: Matthew Klasen/DC/USEPA/US@EPA, Christopher Hunter/DC/USEPA/US@EPA, Brian Frazer/DC/USEPA/US@EPA, (b) (6) Kevin Minoli, Karyn Wendelowski/DC/USEPA/US@EPA
From: Gregory Peck/DC/USEPA/US
Date: 12/04/2010 03:49PM

Cc: stoner.nancy@epa.gov
Subject: Stacy Branch/Leeco Letter

(b) (5) [redacted]

Please take a look as soon as you can. We should probably send a HQ draft back to the Region by COB on Monday and schedule a conversation with Nancy and Dr. Sussman by the middle of the week.

Thanks all.

Greg

(See attached file: 2010-12-03 Draft Leeco letter MK and GP edits.docx)

[attachment "2010-12-03 Draft Leeco letter MK and GP edits.docx" removed by Matthew Klasen/DC/USEPA/US] 2010-12-03 Draft Leeco letter MK and GP and CR edits

ATTACHMENT REDACTED - DELIBERATIVE

Matthew Klasen/DC/USEPA/US
12/06/2010 09:20 AM

To Gregory Peck
cc
bcc
Subject Dr. Warner meeting summary for Bob P.

Hey Greg,

Here's a draft summary of the Richard Warner meeting, written in the context of the Bob P. meeting on Thursday.

I'm going to move on to focusing on the OSM rule language now (re-reading the rule to make sure we haven't missed any key parts, and reviewing the new language from Ross and Jim).

Thanks,
Matt

ATTACHMENT REDACTED - DELIBERATIVE

2010-12-06 Richard Warner meeting summary for Bob P mtg.docx

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

Matthew Klasen/DC/USEPA/US
12/06/2010 12:45 PM

To Ross Geredien
cc CynthiaN Johnson, Gregory Peck, Jim Pendergast, MichaelG Lee
bcc
Subject Re: Edits for mining call agenda?

Hey Ross,

I wasn't sure whether it made sense to include this on the agenda tomorrow -- given that it's only a small group working on this -- so I left it off the proposed edits I sent to Cynthia.

Let's talk later this afternoon on the BMP side. I've spent much of my morning (and will spend much of early afternoon) re-reading the rule to make sure we put our comments in the right place, and to make sure we're not duplicating things that are already here.

See attached for a compiled set of #s 1-3, including Mike Lee's edits from Wednesday last week and your proposed new text. (b) (5) [redacted]

Thanks,
Matt

ATTACHMENT REDACTED - DELIBERATIVE

2010-12-06 OSM Follow-Up.docx

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

Ross Geredien | Do we want to add an update on the SPR? Matt... | 12/06/2010 12:20:29 PM

From: Ross Geredien/DC/USEPA/US
To: CynthiaN Johnson/DC/USEPA/US@EPA
Cc: Matthew Klasen/DC/USEPA/US@EPA, Jim Pendergast/DC/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA
Date: 12/06/2010 12:20 PM
Subject: Re: Edits for mining call agenda?

Do we want to add an update on the SPR?

Matt - where are you on BMP's? Do we have time for a discussion?

Ross Geredien
ORISE Fellow
EPA Office of Wetlands, Oceans, and Watersheds
202-566-1466
Geredien.ross(AT)epa.gov

CynthiaN Johnson	Please send edits. Thanks,	12/06/2010 11:37:07 AM

From: CynthiaN Johnson/DC/USEPA/US
To: Ann Campbell/DC/USEPA/US@EPA, Ben Ghosh/R4/USEPA/US@EPA, Beth Walls/R4/USEPA/US@EPA, Bharat Mathur/R5/USEPA/US@EPA, Bob Sussman/DC/USEPA/US@EPA, Brian Frazer/DC/USEPA/US@EPA, Chris Thomas/R4/USEPA/US@EPA, Christopher Hunter/DC/USEPA/US@EPA, Cliff Rader/DC/USEPA/US@EPA, Daniel Holliman/R4/USEPA/US@EPA, Darren Reid/DC/USEPA/US@EPA, David Evans/DC/USEPA/US@EPA, Denis Borum/DC/USEPA/US@EPA, Denise Keehner/DC/USEPA/US@EPA, Duncan Powell/R4/USEPA/US@EPA, Evelyn MacKnight/R3/USEPA/US@EPA, Georgia Bednar/DC/USEPA/US@EPA, Grace Robiou/DC/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA, Janice Donlon/R3/USEPA/US@EPA, Jeffrey Lapp/R3/USEPA/US@EPA, Jim Giattina/R4/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA, John Pomponio/R3/USEPA/US@EPA, Jon Capacasa/R3/USEPA/US@EPA, Jordan Dorfman/DC/USEPA/US@EPA, Justin Wright/DC/USEPA/US@EPA, Karyn Wendelowski/DC/USEPA/US@EPA, Kevin Minoli/DC/USEPA/US@EPA, Kevin Pierard/R5/USEPA/US@EPA, Larinda Tervelt/R4/USEPA/US@EPA, Mahri Monson/DC/USEPA/US@EPA, Marcus Zobrist/DC/USEPA/US@EPA, Mark Nuhfer/R4/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA, Melissa Raack/DC/USEPA/US@EPA, Michael Dunn/R3/USEPA/US@EPA, Michael Slimak/DC/USEPA/US@EPA, MichaelG Lee/DC/USEPA/US@EPA, Naimah Karim/R5/USEPA/US@EPA, Nanci Gelb/DC/USEPA/US@EPA, Nancy Stoner/DC/USEPA/US@EPA, Palmer Hough/DC/USEPA/US@EPA, Peter Silva/DC/USEPA/US@EPA, Peter Swenson/R5/USEPA/US@EPA, Philip Mancusi-Ungaro/R4/USEPA/US@EPA, Rebecca Cover/R4/USEPA/US@EPA, Robert Klepp/DC/USEPA/US@EPA, Rosemary Hall/DC/USEPA/US@EPA, Ross Geredien/DC/USEPA/US@EPA, Sharmin Syed/DC/USEPA/US@EPA, Shawn Garvin/R3/USEPA/US@EPA, Stan Meiburg/R4/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA, Stephanie Fulton/R4/USEPA/US@EPA, Susan Cormier/CI/USEPA/US@EPA, Susan Norton/DC/USEPA/US@EPA, Tanya Code/DC/USEPA/US@EPA, Timothy Landers/R6/USEPA/US@EPA, Tinka Hyde/R5/USEPA/US@EPA, Todd Bowers/R4/USEPA/US@EPA, Tom Laverty/DC/USEPA/US@EPA, Tom Welborn/R4/USEPA/US@EPA, Wendy Melgin/R5/USEPA/US@EPA, William Early/R3/USEPA/US, Elaine Suriano/DC/USEPA/US@EPA, Caroline Whitehead/DC/USEPA/US@EPA, Amy Newbold/R4/USEPA/US@EPA, Brian Topping/DC/USEPA/US@EPA, Bridget Staples/R4/USEPA/US@EPA, Eric Somerville/R4/USEPA/US@EPA, Chad Harsh/R3/USEPA/US@EPA, Jessica Martinsen/R3/USEPA/US@EPA, Susan Hansen/R4/USEPA/US@EPA, Tom Marshall/DC/USEPA/US@EPA, Larry Long/R4/USEPA/US@EPA, Kip Tyler/R4/USEPA/US@EPA
Date: 12/06/2010 11:37 AM
Subject: Edits for mining call agenda?

[attachment "Mining Call Agenda 12-7-10.doc" deleted by Ross Geredien/DC/USEPA/US]

Please send edits.

Thanks,
Cynthia
--
Cynthia N. Johnson
Program Analyst
U.S. Environmental Protection Agency
Office of Wetlands, Oceans and Watersheds
Wetlands Division
Johnson.CynthiaN@EPA.gov
Phone: (202) 566-1679
Fax: (202) 566-1349

Mailing Address:

1200 Penn. Ave, NW MC: 4502T
Washington, DC 20460

Carmen Vitanza/R3/USEPA/US
12/06/2010 01:52 PM

To Greg Pond, Jessica Martinsen
cc
bcc
Subject Hobet45 Data for 10/31/2010

Hi Greg and Jessica,

Attached is the newest file I received from Hobet dated 10/31/2010.

HOBET45_20101031.xls

Carmen W. Vitanza, Jr.
SEE Project/U.S. EPA Region III
Office of Environmental Programs
1650 Arch Street (3EA30)
Philadelphia, PA. 19103
Information System Specialist
215-814-2754 phone
215-814-2783 fax
EPA/SEE-EAID Division

Berry Branch / Stonecoal Branch
Surface Water Quality
Total Suspended Solids (mg/l)

NC stands for Not Constructed
NF stands for No Flow

Tributary	Berry Branch															Stonecoal Branch						
NPDES Permit No.	WV1022890					WV1022911		WV1023039						Instream		WV1023039				Instream		
Outlet / D	007	008	009	010	011	001	002	004	005	006	007	008	009	DSBB/119	USBB/122	001	010	011	012	DSSM	USSB	SBUT-3
20-Jan-10			NF		NF																	
27-Jan-10														<1	<1							
28-Jan-10																						
29-Jan-10																						
30-Jan-10						21	NF									NC	NC	NC	NC	6	4	4
31-Jan-10	NC							NC	NC	NC	NC	NC	NC									
8-Feb-10																NC	NC	NC	NC	<1	<1	<1
9-Feb-10	NC	<1	NF	<1	NF	<1	NF	NC	NC	NC	NC	NC	NC	<1	<1							
22-Feb-10	NC	<1	NF	<1	NF	<1	NF	NC	NC	NC	NC	NC	NC	<1	<1							
23-Feb-10																NC	NC	NC	NC	<1	<1	<1
2-Mar-10	NC	<1	NF	<1	NF	<1	NF	NC	NC	NC	NC	NC	NC	<1	<1							
3-Mar-10																NC	NC	NC	NC	20	17	17
18-Mar-10	NC	<1	NF	<1	NF			NC	NC	NC	NC	NC	NC	<1	<1							
19-Mar-10																				<1		
24-Mar-10						<1	NF															
31-Mar-10																NC	NC	NC	NC			
1-Apr-10																				<1	<1	<1
2-Apr-10	NC	<1	NF	NF	NF	<1	NF	NC	NC	NC	NC	NC	NC	<1	12	NC	NC	NC	NC			
16-Apr-10	NC	NF	NF	NF	NF	<1	NF	NC	NC	NC	NC	NC	NC	<1	<1	NC	NC	NC	NC			
19-Apr-10																				<1	<1	<1
1-May-10	NC	NF	NF	NF	NF	<1	NF	NC	NC	NC	NC	NC	NC	<1	<1	NC	NC	NC	NC			
3-May-10																				<1	<1	<1
20-May-10	NC	<1	NF	<1	NF	<1	NF	NC	NC	NC	NC	NC	NC	<1	<1	NC	NC	NC	NC			
21-May-10																				<1	<1	<1
2-Jun-10	NC	NF	NF	NF	NF	<1	NF	NF	NF	NF	<1	NF	NF	<1	<1							
3-Jun-10																NC	NC	NC	NC	<1	<1	NF
17-Jun-10																NC	NC	NC	NC	<1	<1	<1
18-Jun-10	NC	NF	NF	NF	NF	<1	NF	NF	NF	NF	<1	NF	NF	<1	<1							
1-Jul-10	NC	NF	NF	NF	NF	<1	NF	NF	NF	NF	NF	NF	NF	<1	<1							
2-Jul-10																NC	NC	NC	NC	NF	NF	NF
28-Jul-10	NC	NF	NF	NF	NF	<1	NF	NF	NF	NF	<1	NF	NF	<1	<1							
7/29/2010																NC	NC	NC	NC	<1	<1	NF
8/5/2010	NC	NF	NF	NF	NF	<1	NF	NF	NF	NF	<1	NF	NF	<1	<1							
8/9/2010																NC	NC	NC	NC	<1	NF	NF
8/20/2010	NC	NF	NF	NF	NF	<1	NF	NF	NF	NF	NF	NF	NF	<1	<1							
8/25/2010																NC	NC	NC	NC	NF	NF	NF
9/1/2010	NC	NF	NF	NF	NF	<1	NF	NF	NF	NF	NF	NF	NF	<1	<1							
9/3/2010																NC	NC	NC	NC	NF	NF	NF
9/17/2010	NC	NF	NF	NF	NF	<1	NF	NF	NF	NF	NF	NF	NF	<1	<1							
9/20/2010																NC	NC	NC	NC	NF	NF	NF
10/1/2010	NC	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	<1	<1							
10/4/2010																NC	NC	NC	NC	NF	NF	NF
10/18/2010	NC	NF	NF	NF	NF	<1	NF	NF	NF	NF	NF	NF	NF	<1	<1							
10/19/2010																NC	NC	NC	NC	NF	NF	NF

Brian Frazer/DC/USEPA/US
12/06/2010 02:43 PM

To Matthew Klasen
cc Christopher Hunter, Cliff Rader, Gregory Peck, Karyn Wendelowski, Kevin Minoli, kevin.minoli
bcc
Subject Re: Stacy Branch/Leeco Letter

Greg and Matt -

Attached are our comments (on top of yours) on the Stacy Branch/Leeco letter to forward to region 4. If you have any questions, please give me a call.

Thanks,

bf

ATTACHMENT REDACTED - DELIBERATIVE

2010-12-03_Draft_Leeco_WD.docx
****

Brian M. Frazer, Chief
Wetlands & Aquatic Resources Regulatory Branch
Office of Wetlands, Oceans and Watersheds
U.S. EPA
1200 Pennsylvania Avenue, NW (MC 4502T)
Washington, DC 20460
202-566-1652

Matthew Klasen	Let's try this again -- see attached for a letter in t...	12/06/2010 08:12:53 AM

From: Matthew Klasen/DC/USEPA/US
To: Brian Frazer/DC/USEPA/US@EPA, Christopher Hunter/DC/USEPA/US@EPA, Cliff Rader/DC/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA, Karyn Wendelowski/DC/USEPA/US@EPA, (b) (6) Kevin Minoli, Kevin Minoli/DC/USEPA/US@EPA
Date: 12/06/2010 08:12 AM
Subject: Re: Stacy Branch/Leeco Letter

Let's try this again -- see attached for a letter in the right Word format.

Thanks,
Matt

[attachment "2010-12-03 Draft Leeco letter MK and GP and CR edits.docx" deleted by Brian Frazer/DC/USEPA/US]

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

Matthew Klasen	Hi folks, Cliff added a few edits to the cumulativ...	12/05/2010 09:25:20 PM

From: Matthew Klasen/DC/USEPA/US
To: Gregory Peck/DC/USEPA/US@EPA
Cc: Christopher Hunter/DC/USEPA/US@EPA, Brian Frazer/DC/USEPA/US@EPA, (b) (6) Kevin Minoli Karyn Wendelowski/DC/USEPA/US@EPA, stoner.nancy@epa.gov, Cliff Rader/DC/USEPA/US@EPA
Date: 12/05/2010 09:25 PM
Subject: Re: Stacy Branch/Leeco Letter

Hi folks,

Cliff added a few edits to the cumulative impacts and EJ sections of the letter, which are attached. Please use this updated version unless you've already started making edits to what Greg sent around yesterday.

Looking forward to everyone's thoughts so we can get a version back to R4 tomorrow.

Thanks,
Matt

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

-----Gregory Peck/DC/USEPA/US wrote: -----

To: Matthew Klasen/DC/USEPA/US@EPA, Christopher Hunter/DC/USEPA/US@EPA, Brian Frazer/DC/USEPA/US@EPA, (b) (6) Kevin Minoli, Karyn Wendelowski/DC/USEPA/US@EPA
From: Gregory Peck/DC/USEPA/US
Date: 12/04/2010 03:49PM
Cc: stoner.nancy@epa.gov
Subject: Stacy Branch/Leeco Letter

(b) (5)

Please take a look as soon as you can. We should probably send a HQ draft back to the Region by COB on Monday and schedule a conversation with Nancy and Dr. Sussman by the middle of the week.

Thanks all.

Greg

(See attached file: 2010-12-03 Draft Leeco letter MK and GP edits.docx)

[attachment "2010-12-03 Draft Leeco letter MK and GP edits.docx" removed by Matthew Klasen/DC/USEPA/US][attachment "2010-12-03 Draft Leeco letter MK and GP and CR edits" deleted by Brian Frazer/DC/USEPA/US]

Kevin Minoli/DC/USEPA/US
12/06/2010 03:04 PM

To Matthew Klasen
cc Brian Frazer, Christopher Hunter, Cliff Rader, Gregory Peck, Karyn Wendelowski, [redacted], MichaelG Lee
bcc
Subject Re: Stacy Branch/Leeco Letter

If everyone in OW is ok with this I would send them this version. I just haven't been able to get to this yet today and it is going to be a bit before I can spend some real time with it.

Matthew Klasen | Thanks Brian. I'll set up a time shortly to chat wit... | 12/06/2010 02:51:02 PM

From: Matthew Klasen/DC/USEPA/US
To: Brian Frazer/DC/USEPA/US@EPA
Cc: Christopher Hunter/DC/USEPA/US@EPA, Cliff Rader/DC/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA, Karyn Wendelowski/DC/USEPA/US@EPA, Kevin Minoli/DC/USEPA/US@EPA, [redacted] MichaelG Lee/DC/USEPA/US@EPA
Date: 12/06/2010 02:51 PM
Subject: Re: Stacy Branch/Leeco Letter

Thanks Brian. I'll set up a time shortly to chat with Region 4 tomorrow early afternoon (1 pm looks like it should work).

Kevin, Karyn, or Mike: Should we anticipate any comments coming on this draft from OGC, before we send a version back to R4?

Thanks,
Matt

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

Brian Frazer | Greg and Matt - Attached are our comments (on... | 12/06/2010 02:43:12 PM

From: Brian Frazer/DC/USEPA/US
To: Matthew Klasen/DC/USEPA/US@EPA
Cc: Christopher Hunter/DC/USEPA/US@EPA, Cliff Rader/DC/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA, Karyn Wendelowski/DC/USEPA/US@EPA, Kevin Minoli/DC/USEPA/US@EPA, [redacted]
Date: 12/06/2010 02:43 PM
Subject: Re: Stacy Branch/Leeco Letter

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bf

ATTACHMENT REDACTED - DELIBERATIVE

2010-12-03_Draft_Leeco_WD.docx

****

Brian M. Frazer, Chief
Wetlands & Aquatic Resources Regulatory Branch
Office of Wetlands, Oceans and Watersheds
U.S. EPA
1200 Pennsylvania Avenue, NW (MC 4502T)
Washington, DC 20460
202-566-1652

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From: Matthew Klasen/DC/USEPA/US
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Date: 12/06/2010 08:12 AM
Subject: Re: Stacy Branch/Leeco Letter

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Matt

[attachment "2010-12-03 Draft Leeco letter MK and GP and CR edits.docx" deleted by Brian Frazer/DC/USEPA/US]

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

Matthew Klasen	Hi folks, Cliff added a few edits to the cumulativ...	12/05/2010 09:25:20 PM

From: Matthew Klasen/DC/USEPA/US
To: Gregory Peck/DC/USEPA/US@EPA
Cc: Christopher Hunter/DC/USEPA/US@EPA, Brian Frazer/DC/USEPA/US@EPA, (b)(6) Kevin Minoli Karyn Wendelowski/DC/USEPA/US@EPA, stoner.nancy@epa.gov, Cliff Rader/DC/USEPA/US@EPA
Date: 12/05/2010 09:25 PM
Subject: Re: Stacy Branch/Leeco Letter

Hi folks,

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Thanks,

Matt

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

-----Gregory Peck/DC/USEPA/US wrote: -----

To: Matthew Klasen/DC/USEPA/US@EPA, Christopher Hunter/DC/USEPA/US@EPA, Brian Frazer/DC/USEPA/US@EPA, (b) (6) Kevin Minoli Karyn Wendelowski/DC/USEPA/US@EPA
From: Gregory Peck/DC/USEPA/US
Date: 12/04/2010 03:49PM
Cc: stoner.nancy@epa.gov
Subject: Stacy Branch/Leeco Letter

(b) (5)

Please take a look as soon as you can. We should probably send a HQ draft back to the Region by COB on Monday and schedule a conversation with Nancy and Dr. Sussman by the middle of the week.

Thanks all.

Greg

(See attached file: 2010-12-03 Draft Leeco letter MK and GP edits.docx)

[attachment "2010-12-03 Draft Leeco letter MK and GP edits.docx" removed by Matthew Klasen/DC/USEPA/US][attachment "2010-12-03 Draft Leeco letter MK and GP and CR edits" deleted by Brian Frazer/DC/USEPA/US]

Matthew Klasen/DC/USEPA/US
12/06/2010 04:14 PM

To Gregory Peck
cc
bcc
Subject Updated Stacy Branch letter

Includes clean and Track Changes versions.

mk

ATTACHMENT REDACTED - DELIBERATIVE

2010-12-03_Draft_Leeco - Clean.docx

2010-12-03_Draft_Leeco - TC.docx

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

Matthew Klasen/DC/USEPA/US
12/06/2010 04:29 PM

To Gregory Peck
cc
bcc
Subject Updated Leeco

Clean and track changes.

mk

ATTACHMENTS REDACTED - DELIBERATIVE

2010-12-06_Draft_Leeco - TC.docx

2010-12-06_Draft_Leeco - Clean.docx

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

Gregory Peck/DC/USEPA/US
12/06/2010 05:13 PM

To Denise Keehner
cc
bcc Matthew Klasen
Subject Fw: Leeco Letter

I should have included you on this. My apologies Denise.

Best,
Greg

----- Forwarded by Gregory Peck/DC/USEPA/US on 12/06/2010 05:12 PM -----

From: Gregory Peck/DC/USEPA/US
To: Stan Meiburg/R4/USEPA/US@EPA, Jim Giattina/R4/USEPA/US@EPA, Tom Welborn/R4/USEPA/US@EPA, KevinH Miller/R4/USEPA/US@EPA, Beth Walls/R4/USEPA/US@EPA, Heinz Mueller/R4/USEPA/US@EPA, Brian Frazer/DC/USEPA/US@EPA, Brian Topping/DC/USEPA/US@EPA, Christopher Hunter/DC/USEPA/US@EPA, Cliff Rader/DC/USEPA/US@EPA, Duncan Powell/R4/USEPA/US@EPA, Jeffrey Lapp/R3/USEPA/US@EPA, Jessica Martinsen/R3/USEPA/US@EPA, Kevin Minoli, MichaelG Lee/DC/USEPA/US@EPA, Philip Mancusi-Ungaro/R4/USEPA/US@EPA, Ross Geredien/DC/USEPA/US@EPA, David Evans/DC/USEPA/US@EPA, John Pomponio/R3/USEPA/US@EPA, Early.William@epamail.epa.gov
Cc: Matthew Klasen/DC/USEPA/US@EPA, Nancy Stoner/DC/USEPA/US@EPA, Bob Sussman/DC/USEPA/US@EPA
Date: 12/06/2010 04:33 PM
Subject: Leeco Letter

Folks:

The attachment represents the consolidated comments from HQ on the draft R4 Leeco letter. (b) (5) [redacted]

We'll plan to use this version for our conference call discussion tomorrow at 1pm. Hope this is helpful.

Best,
Greg

ATTACHMENT REDACTED - DELIBERATIVE

2010-12-06_Draft_Leeco - TC.docx 2010-12-06_Draft_Leeco - Clean.docx

---
Gregory E. Peck
Chief of Staff
Office of Water
U.S. Environmental Protection Agency

Matthew Klasen/DC/USEPA/US
12/06/2010 06:50 PM

To Matthew Klasen
cc
bcc
Subject stuff

mk 2010-12-01 Hill Coal Summit Docs.pdf Bernhardt-King-Palmer letter.pdf Bernhardt et al cumulative effects.pdf
2010-11-12 Cumulative impact legal provisions.docx MNK PARS 2010.doc 2008-12-30 MK IDP.doc
Surface and General SPR Text 10-27-10 EPA ed.docx 2010-12-06 OSM Follow-Up.docx

WORD ATTACHMENTS REDACTED - DELIBERATIVE

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

Emily S. Bernhardt
Associate Professor
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(919) 660-7318

Ryan S. King
Associate Professor
Department of Biology
Baylor University
One Bear Place #97388
Waco, TX 76798
354 710-2150

Margaret A. Palmer
Professor and Director
Chesapeake Biological Lab
University of Maryland
Box 38, Solomons MD
20688
410 326-7241

November 29, 2010

U.S. Environmental Protection Agency
EPA Docket Center (EPA/DC)
Water Docket, MC 2822T
1200 Pennsylvania Avenue, N.W.
Washington, D.C. 20460

RE: Comments on Docket ID No. EPA-HQ-OW-2010-0315
April 1, 2010 Detailed Guidance on Improving EPA Review of Appalachian Surface Coal Mining Operations under the CWA, NEPA, & the Environmental Justice EO

To whom it may concern:

Thank you for the opportunity to provide comments. In general, we want to commend EPA for the documents released on April 1, 2010. There has clearly been serious attention paid to ensuring that the guidance is informed by strong science. We provide the following comments with the hope that our input will further strengthen the final version. For context, we are stream ecologists with many years of expertise in aquatic ecology. Collectively our expertise includes stream restoration, the role of ecological processes and ecosystem features in supporting the structure and function of streams, stream and watershed biogeochemistry, and biostatistics.

There is now abundant scientific evidence from studies conducted by both EPA scientists and by independent scientists that the environmental impacts of surface coal mining in the Appalachian region cause serious and irreversible harm to aquatic ecosystems. The risks to aquatic systems come not only from direct loss of habitats and species due to the mining process and valley fills but there are substantial risks to aquatic life that extend downstream from mine sites. Surface mining results in the mobilization of dissolved solutes from mining residues (coal waste and rock overburden). Many of the solutes that are mobilized are ions (e.g., Mg, Fe, Mn, Se, etc.) which collectively lead to higher electrical conductivity in receiving

streams. Several of the more toxic ions (especially Se, Mn) are known to accumulate at high concentrations in stream biofilms where they may enter stream food webs (Conley et al. 2009; Lemly 2002, Lemly 2008)[1]. Whether or not individual component ions within mining-derived runoff reach streamwater concentrations that are individually lethal or toxic to aquatic life, the cumulative effect of elevated concentrations of multiple contaminants is clearly associated with a substantial reduction in water quality and biological integrity in streams and rivers below mine sites. EPA is to be commended for using conductivity as a benchmark because it is a robust measure of the cumulative or additive impacts of the elevated concentrations of multiple chemical stressors from mine sites that lead to biological impairment of streams. Each constituent pollutant increases conductivity and they may have additive or multiplicative ecological impacts.

Two EPA reports[2] document this impact quite well citing a substantial body of peer-reviewed research publications. A few additional papers have been published since these two reports were released and they provide additional evidence that conductivity is substantially elevated below mine sites and that stream biological integrity is substantially impacted including *both* the structure and function of the streams (Fritz et al. 2010[3], Johnson et al. 2010[4], Pond 2010[5]). The scientific evidence that conductivity below surface mines is substantially elevated and that higher conductivity is associated with biological impairment is now overwhelming. Further, the methods used by the U.S. EPA[1] as well as those used in independent studies by Johnson et al. (2010)[3] and by Bernhardt et al. (*in review)*, all demonstrate that the use of conductivity as a benchmark to regulate mining is supported by very strong science.

---

[1]Conley, J.M., D.H, Funk, and D.B. Buchwalter. 2009.. Selenium Bioaccumulation and Maternal Transfer in the Mayfly *Centroptilum triangulifer* in a Life-Cycle, Periphyton-Biofilm Trophic Assay. Env. Sci. & Techology /43:7952-7957; Lemly, A.D. 2002. Selenium assessment in aquatic ecosystems: A guide for hazard evaluation and water quality criteria. New York: Springer-Verlag New York, Inc. 162pp.; Lemly, A.D. 2008. Aquatic hazard of selenium pollution from coal mining. Pages 167-183 (Chapter 6) in G.B. Fosdyke, editor. Coal Mining: Research, Technology, and Safety. Nova Science Publishers, Inc., New York.

[2]U.S. EPA. 2010. A field-based aquatic life benchmark for conductivity in central Appalachian streams. EPA/600/R-10/023A ; U.S. EPA 2009. The Effects of Mountaintop Mines and Valley Fills on Aquatic Ecosystems of the Central Appalachian Coalfields EPA/600/R-09/138A

[3] Fritz, K.M., S. Fulton, B.R. Johnson, C.D. Barton, J.D. Jack, D.A. Word, and R.A. Burke. 2010. Structural and functional characteristics of natural and constructed channels draining a reclaimed mountaintop removal and valley fill coal mine. J. North Amer. Benthological Soc 29(2): 673-689.

[4] Johnson, B.R., A. Haas, and K. M. Fritz1 2010. Use of spatially explicit physicochemical data to measure downstream impacts of headwater stream disturbance. Water Resources Res. 46: W09526, doi:10.1029/2009WR008417

[5]Pond, G. 2010. Patterns of Ephemeroptera taxa loss in Appalachian headwater streams (Kentucky, USA), Hydrobiologia Hydrobiologia DOI 10.1007/s10750-009-0081-6

We do, however, have several concerns about the April 1 Guidance:

1. The upper level conductivity limit of 500 µS/cm identified by EPA is higher than what the weight of scientific evidence supports. Significant biological impairment occurs at lower levels of conductivity. Pond (2010)[4] found "a strong threshold-type response between % mayflies and increasing specific conductance … when specific conductance was 175 uS/cm (change point analysis; lower 90% CL = 124 µS/cm, upper CL = 336 µS/cm)". Further, EPA found that "conductivity levels of 300 µS/cm or below in Appalachian headwater streams is a benchmark for retaining 95% of native benthic species" (page 21, Detailed Guidance), yet a level of 500 µS/cm was set as the upper limit despite lack of quantitative scientific reasoning for selection of this higher level. The Detailed Guidance (bottom, page 11) cites Pond et al. (2008)[6] in support of this high level, yet Pond et al. grouped their study sites into classes based on conductivity and 500 µS/cm was the lowest category class they used.

Additionally, we conducted an independent analysis of West Virginia DEP water quality data (Bernhardt et al. *in review*) using a state-of-the-art threshold detection (TITAN; Baker and King 2010[7]) method that is more rigorous than the method used by EPA (Cormier et al. 2010[8]). We found a threshold level (277µS cm^{-1} with 95% CI of 176 -344 µS cm^{-1}) remarkably similar to that found by Cormier et al. and significantly less than the 500 µS/cm upper limit EPA identifies in the Detailed Guidance. Further, because the Cormier et al. method is based on extirpation of macroinvertebrates only for those genera with ≥ 30 observations, even they acknowledged their benchmark may not be sufficiently conservative. The method we employed estimates the point of greatest *decline* in the frequency <u>and</u> abundance of species and only requires 5 occurrences for analysis meaning it can incorporate responses of rare species. The EPA method required a minimum of 30 occurrences per taxon, or ~10% of the sample units in the data set. Imposing higher occurrence frequencies increases the probability of selecting taxa that span a wider range of conductivity, and thus may bias the conductivity benchmark higher than it would be if less frequent and potentially more sensitive taxa were included in the analysis.

An additionally important point we provide in Bernhardt et al. (*in review*) is that there is an unusually high level of synchrony in the conductivity level point-of-decline of many species, including rare ones i.e., the conductivity level at which each taxonomic group declined precipitously was virtually the same. This allowed us to truly identify a community threshold

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[6] Pond, G.J., M.E. Passmore, F.A. Borsuk, L. Reynolds, and C.J. Rose. (2008) Downstream effects of mountaintop coal mining: comparing biological conditions using family- and genus-level macroinvertebrate bioassessment tools. J North Amer Benthological Soc. 27: 717-737.

[7] Baker, M. E. and R. S. King. 2010. A new method for identifying and interpreting biodiversity and ecological community thresholds. Methods in Ecology and Evolution 1.25-37.

[8] Cormier, S.M., G.W. Suter, L.L. Yaun, L.L. Zheng. 20010. A Field-based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams. U.S. EPA Office of Research and Development, National Center for Environmental Assessment, Washington, DC. EPA/600/R-10/023A.

response to conductivity that is quite robust statistically.

Finally, EPA estimated different conductivity benchmarks for spring, summer, and combined spring/summer data ("all year"). The 300 uS/cm benchmark EPA set was found using the "all year" data. The 5th percentile hazardous concentration value EPA found in the summer was 479 uS/cm but in the spring when runoff is higher and presumably ion concentrations more dilute, they found a value of 322 uS/cm. We used summer-only data and found the TITAN conductivity threshold was 277 uS/cm (Bernhardt et al. in review). Because the all-year EPA benchmark was based on samples spanning periods of lower conductivity (in spring), the TITAN result we found would almost certainly be even lower than 277 uS/cm if we had analyzed taxa responses to the all-year conductivity data. Thus, we again suggest that there is considerable evidence that the true level of conductivity that causes sharp biological degradation is much lower than 500 uS/cm.

2. A sequenced permitting process is not sufficiently protective of Appalachian streams and rivers. Under Section IV. C 2 (page 22) of the Detailed Guidance, EPA recommends a "sequenced permitting process" in which permits would be allowed so long as post-mining monitoring does not demonstrate that conductivity levels exceed 500 µS/cm. However, once the mining has occurred and conductivity levels exceed 500 µS/cm, the damage to streams has already occurred and to date there is no evidence that it can be reversed. Recovery of the biological communities in mining waste impacted streams has not been documented and sulfate pollution[9] is known to persist long after mining activities in a watershed cease[10]. Additionally, the EPA's Detailed Guidance provides no examples and, we know of no published examples that exist, that document that a large coal surface mine and valley fill operation has ever been accomplished without generating substantial increases in conductivity that typically exceed 500 µS/cm. In our own field research efforts in the region which include sampling the conductivity of 3rd and 4th order streams that receive the drainage from valley fills more than 20 years old, we measure conductivities that typically exceed 1000 µS/cm. In the face of abundant evidence to the contrary, it is hard to understand how EPA can continue to permit the same sorts of surface mining operations and valley fills as have been done in the past with any legitimate expectation of a different water quality outcome.

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[9] Sulfate concentration has been used by scientists including USGS and the WV DEP, as an indicator of mining impact. Bernhardt et al. (*in review)* similarly found it was highly correlated with amount of mining in a watershed and conductivity.

[10] J.I. Sams, K.M. Beer. U.S. G.S. Water Resources Report 99-4208 (2000). http://pa.water.usgs.gov/reports/wrir_99-4208.pdf

3. Functional assessments must be completed to determine mitigation requirements; however, stream creation is not a scientifically supported mitigation method. With regard to Section IV C 6 of the Detailed Guidance, we support the use of functional impact assessment requirements; however, we object strongly to parts of the "expectations for compensatory mitigation." Specifically, item d. – "stream establishment – created stream channels should be designed to develop good water quality, healthy and diverse biological communities and similar hydrologic regimes as streams impacted by mining activities." There is no evidence that streams can be "created" that support the suite of structural and functional attributes of healthy streams despite multiple attempts both by mining companies and researchers from the University of Kentucky. The latter has involved rigorous and well designed research at "the Guy Cove project" site to create headwater streams on an old mine fill site that has conductivity effluent levels of> 1900 µS/cm. Guy Cove researchers have reported at a number of conferences that they were successful in "creating" surface flows by lining a newly dug channel and that using a "wetland bioreactor" they were able to reduce conductivity in the crown of the fill; however, as the authors acknowledged in conference talks, streamwater conductivity at the toe slope of the valley fill is typically > 1000 µS/cm - indicating that the created channel is not mitigating the contaminant loading to downstream ecosystems from this reclaimed mine. Further, creating surface flows in a lined ditch does not replace an ecologically healthy stream that supports the full suite of ecological functions expected for this region of the country.

In summary, we applaud the rigorous scientific efforts EPA is seeking to finalize the Guidance Document and we urge the EPA to apply the best available science in their implementation of the guidance. Based on what is currently known about surface coal mining operations in the Central Appalachians, it is clear that mining-derived runoff leads to impaired water quality and biological communities in receiving streams; that contaminant loads from mining accumulate in river networks and propagate downstream; and that new mining activities are associated with new contaminant loading against a background of historic surface mining contaminant loads that are not demonstrably abating over time. To date, there is little evidence in the peer reviewed literature that efforts to mitigate for these water quality impacts through mine reclamation, stream creation, stream restoration or chemical treatment have been effective.

Sincerely yours,

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How many mountains can we mine? Ecological thresholds for freshwater ecosystems of the Central Appalachians

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ABSTRACT

Over the last decade, an estimated 2000km of streams in the Central Appalachians have been buried beneath the excess rock waste generated from surface coal mining. In addition to the streams permanently lost through valley filling, many more kilometers of streams throughout the region are impacted by the higher flows and chemical concentrations exported to downstream waters from surface mining operations. Here we estimate for the first time the areal extent of mining that can occur in a watershed before significant ecological impacts are observed in receiving streams. Using new remote sensing analyses together with field sampling data for 283 stream reaches located across a 14 county region in southern West Virginia we demonstrate that changes in streamwater conductivity were strongly positively correlated with the extent of watershed surface mining.. We detected a significant community threshold response to altered ionic strength, with many sensitive taxa declining precipitously and synchronously in abundance at a conductivity of 277μS cm^{-1} (95% CI of 176 to 344 μS cm^{-1}). Our analysis is the first to demonstrate that the rapid increase in mining activity within regional headwaters is degrading water quality and freshwater ecosystems at very low mining intensities and over very large geographic scales. We find that stream water quality and benthic communities are significantly altered when as little as ~3% of the upstream watershed is converted to surface mining operations.

INTRODUCTION

In order to compete with western states in supplying inexpensive, low sulfur coal to the US energy market, mining companies throughout the Central Appalachians are increasingly turning to mountaintop mining to access shallow seams of coal[1,2]. Mountaintop mining is now the most widespread form of coal surface mining across the central Appalachian Mountains, and is particularly intense in southern West Virginia, eastern Kentucky and Tennessee, and southwestern Virginia[3,4]. In this sparsely populated region, surface mining and mine reclamation activities are the dominant driver of land use change[5] and as a result of surface coal mining the area has the highest rates of sediment movement in the United States [6]. To reach the coal seams which can be hundreds of feet below the surface, ridge tops are removed creating large quantities of waste rock and coal debris ("overburden") that must be disposed of to maximize mining efficiency (Figure 1). In the steep topography of the region, stream valleys become the obvious location for disposing of rocks from the mined ridgetops. The resulting valley fills[3] can bury either headwater streams or once forested valley slopes under 10s to 100s of meters of overburden[7]. Because MTM operations are less constrained by topography than more traditional contour mining, MTM techniques have allowed surface coal mining operations to expand greatly in size[4].

The central Appalachian forests that are affected by surface coal mining support among the highest levels of biodiversity and endemism in the temperate zone[8] leading to significant concerns about the loss of forest biodiversity and ecosystem functions as a result of mining[4,9]. Much recent attention has been paid to the burial of headwater streams beneath valley fills and the downstream impacts to waters below surface mines[10](Figure 1), in part, because of high profile federal court cases and widely publicized exchanges between the U.S. Environmental Protection Agency (US EPA) and the U.S. Army Corps of Engineers (USACE) over permitting decisions[11]. Under the authority of the Clean Water Act (CWA; 33 U.S.C. 1252) the US ACE (or a delegated state) must approve regulatory permits to allow mining operations that will result in impacts to waters of the U.S. Prior to authorizing a stream fill operation, the US ACE must assure, among other things, that these activities will not cause significant degradation of the environment (40 C.F.R. § 230.10). To meet this requirement, permittees are required to mitigate for harm done to streams. Typically this is accomplished through the construction of channels on nearby reclaimed mines, the restoration of degraded streams within the watershed, or payment into an in lieu fee mitigation program[2,12,13]. The

extent to which these actions are sufficient to mitigate for the impacts that MTM have on waterways has been central to legal challenges and environmental advocacy protests calling for tighter regulations on this form of mining[11,14].

Scientific studies to inform such cases have been of great interest and have established that impacts can be substantial[10,12,15,16]. Rain that falls on mined and reclaimed watersheds flows through coal residues and rock overburden rather than surface soils. When exposed to air, pyrite minerals in coal residue release sulfuric acid[17], and the production of this strong acid within a matrix of fragmented rock leads to high rates of rock weathering. Throughout much of the central Appalachians, the high buffering potential of carbonate bedrock neutralizes the acidity generated by pyrite dissolution and releases high concentrations of coal-derived SO_4^{2-} accompanied by elevated concentrations of Ca^{2+}, Mg^{2+}, HCO_3^- derived from parent material[18]. The natural acid buffering potential of parent material in much of the region thus generates alkaline mine drainage, characterized by an increase in pH, alkalinity and electrical conductivity in receiving streams[18]. The concentration of trace metals and metalloids also tend to be correlated with SO_4^{2-} and conductivity[12,19], and in this region elevated concentrations of manganese (Mn) and selenium (Se) are of particular concern due to their known toxicity[20]. Selenium, weathered from coal minerals, is more soluble at high pH and thus is a particularly problematic toxin in the alkaline mine drainage common to most mountaintop mines[21]. A number of recent studies have documented significant changes in stream macroinvertebrate and fish communities directly downstream of surface mining operations[10,16,22] and have attributed these declines to the combined effects of heightened concentrations of ions and trace metals delivered from upstream mines.

In response to growing concerns and scientific documentation of the impacts of surface coal mining, on April 1, 2010, the US EPA released their own scientific report and announced new actions to strengthen the permitting process and protect Appalachian waters[23]. This included a draft guidance document that set benchmarks for unacceptable levels of conductivity in waters associated with surface mining. Specifically, their research identified conductivity levels of 300 $\mu S\ cm^{-1}$ in Appalachian headwater streams as the maximum acceptable levels to prevent substantial impacts to native invertebrates[23]. This draft benchmark has been challenged by various groups including the National Mining Association (NMA) who filed a lawsuit in U.S. District Court for the

District of Columbia[24]. While most of NMA's arguments question the legality of EPA's actions, the lawsuit also argues that the conductivity water quality standard is arbitrary and based on unsupported "presumptions" that background levels of conductivity (i.e., non-mining related) are below the benchmark and that significant adverse impacts are related to the length of stream impacted or the number of fills[24].

The challenges on both sides highlight the need to fill several scientific gaps that are critical to decisions by regulators and to those the regulations influence. Thus our goal was to address the following questions:

1. Is there a clear relationship between conductivity and surface coal mining extent in the central Appalachians that cannot be attributed to other impacts such as development in a watershed?

2. Does the latest state-of-the-art approach designed to statistically detect biological thresholds support the concept of a benchmark and if so, at what conductivity level?

Previously there has been no effort to quantify the areal extent of surface mining and link that to downstream water quality and aquatic community structure at river basin scales. Since the dominant solutes derived from surface mining that generate high conductivity in receiving streams are conservative ions that do not readily precipitate from solution except at supersaturated concentrations (SO_4^{2-}, Cl, Ca^{2+}, Mg^{2+}, HCO_3^-), high conductivity (and associated biological impacts) should be correlated with the total spatial extent of upstream mining activity. Thus, we analyzed whether there was a statistically significant relationship between the proportion of surface mining in watersheds of southern WV and dissolved ion concentrations or between the extent of surface mining and alterations in stream biota. To determine whether or not there were threshold relationships between stream invertebrates and conductivity, we employed a new form of analysis (Threshold Indicator Taxa Analysis, TITAN[25]). TITAN is unique in that it first characterizes the responses of individual taxa to an environmental gradient and secondarily aggregates taxa into a community-level metric only after distinguishing the magnitude, direction, and uncertainty in the responses of individual members of the community. Thus, TITAN has distinct advantages over more commonly used community metrics, in that it allows the investigator to identify both taxon-specific and community-level threshold responses to anthropogenic environmental gradients[26].

RESULTS & DISCUSSION:

We compiled existing datasets that provided determinations of the spatial extent of surface mining in the region over time by obtaining nonpoint discharge elimination system (NPDES) permit records for mining activities (maintained by WVDEP accessed online 6/24/2010), land cover classification data determined from National Landcover dataset (NLCD 2001), and surface mining maps derived from multidecade (1975, 1985, 1995, 2005) Landsat satellite data for a 59-county area spanning much of the Central Appalachian Coal Region (Figure 2A). We obtained data on water quality and macroinvertebrates that were collected and analyzed by the WV Department of Environmental Protection (WVDEP 2010 provided 6/30/10). Field samples and remote sensing derived mine mapping overlapped for a 14 county study area in southern WV (Figure 2B) from which we acquired a final dataset consisting of 283 stream reaches for which both stream water sample analysis and stream benthic invertebrate collection data were available from summer collection efforts. We delineated watersheds draining to each of these 283 sampling points and estimated the total surface area covered by forests, development of by surface mining operations. Surface mining operations were further classified as mountaintop removal mines (MTM), non MTM surface mines (~contour or strip mines), or valley fills. Our estimates of cumulative surface mining in the region derived from remote sensing image analysis are in close agreement with the cumulative extent of area disturbed through mining reported by NPDES permit inspectors (Figure 2C). It is important to acknowledge that the precision of our remote sensing derived estimates of surface mining has not yet been estimated through ground-truthing. Rigorous evaluation and cross validation of mining maps is a priority for our ongoing research effort.

Within this dataset, 231 streams drained watersheds with some amount of mining (0.03 to 95.7% mined) and 212 streams drained watersheds with >1% of their watershed developed (1 to 20% developed). A total of 19 stream samples were classified from the land use data as forested watersheds (no surface mining or NPDES permits, <1% developed) and the dataset included 12 streams classified as reference watersheds by the state of WV. Stream stations sampled by the WVDEP drained watersheds that had up to 95% (18±21%, mean ±sd) of their surface area in active or reclaimed surface mines and up to 20% (3 ± 3% mean ±sd) of their watershed area classified as developed..

To determine if watersheds having a greater proportion of mining have higher significantly higher streamwater conductivity (Question 1), we examined statistical relationships between the areal extent of surface mining and conductivity and solute (sulfate and nitrate) concentrations. We found that the total surface area mined within a watershed, regardless of what year the mining activity was delineated from Landsat imagery, correlated most strongly with water quality metrics.. Analyses that only used the most recent 2005 surface mining delineation, or which excluded all but MTM surface mining operations were less strongly correlated with water quality metrics. As a result of these comparisons, we chose to examine how the cumulative extent of all surface mining within a watershed (across all years and all types) was related to water quality and biological changes in the region. We also examined whether variation in the extent of watershed development was a good predictor of water quality changes.

We found that the proportion of watersheds that were mined was strongly positively correlated with streamwater sulfate and nitrate concentrations and with the electrical conductivity of the water in draining streams (Figure 3). Mined streams had higher alkalinity and pH than unmined streams in the region (Table 1). There were insufficient records of trace metal and metalloid concentrations within our dataset to examine relationships with mining, however analysis of the entire WVDEP database (beyond the 14 county area to which our analyses were restricted) showed that sulfate was strongly positively correlated with trace metals (Mn, Fe, Al) and the metalloid Se[12]. In contrast, development activities within the 14 county area were not correlated with conductivity or nitrate and were slightly negatively correlated with sulfate concentrations (Figure 3) and did not lead to significant alterations of pH or alkalinity (Table 1). The negative relationship observed between conductivity and water quality for the upper quantiles of the dataset (Figure 3) occurs because some of the watersheds with little development had large mining impacts whose water quality impacts far exceed that of development in this region (Figure 3). Variation in sulfate, nitrate and conductivity in undeveloped watersheds is highly correlated with the extent of mining in those watersheds.

To assess the macro-invertebrate response to increased mining extent and streamwater conductivity (Question 2), we first examined changes in stream benthic macroinvertebrate diversity and biotic integrity scores by one way ANOVA and Tukey's HSD to compare WV reference streams with the 231 mined streams, split into 5 equally populated bins of increasing mining intensity. We also

performed TITAN[25] to examine taxon specific and community level responses to both gradients within this dataset. We found that watershed surface mining leads to substantial changes in stream biota that are much more dramatic than changes attributable solely to development. The diversity of intolerant taxa declined precipitously with mining (Figure 4, supplemental Figure 2) and as a result both types of bioassessment scores developed for West Virginia streams declined with the spatial extent of mining in their watershed. The family level WV Stream Condition Index (WVSCI) and the Genus Level Index of Most Probable Stream Status (GLIMPSS) were significantly lower in mined watersheds compared to state reference sites (Figure 4). For all three metrics, significant declines in diversity and stream ecological health metrics were observed even in the lowest mining category (<3.5% of watershed in surface mines) (Figure 4), suggesting that water pollution associated with even small amounts of surface mining is sufficient to reduce or eliminate many stream taxa.

Using TITAN analysis to examine the aquatic invertebrate responses to the spatial extent of mining revealed statistically significant declines for 39 of the 196 taxa in the data set (Figure 5A). The taxa most sensitive to mining represent a variety of mayfly, stonefly, caddisfly and beetle larvae that are all characteristic to central Appalachian streams and known to be sensitive to water pollution. All negatively responding taxa appeared to be very sensitive to the mining gradient, with all showing sharp declines in abundance at less than 10% mining (Figure 5, Supplemental Figure 1). Prior research has demonstrated that mayflies are especially sensitive to mining-derived contaminants[10,27] and our results support this, with even the highly tolerant mayfly genus *Baetis* showing a negative response to the mining gradient. The nearly synchronous declines of taxa (SI Figure 1) was consistent with a community-level threshold[26], suggesting that surface mining of as little as ~3% (95% CI of 0 to 2.4%) of the upstream watershed results in sharp nonlinear declines in the abundance of many taxa comprising downstream communities (Figure 5B, SI Figure 1). Several taxa increased in relative abundance along the mining gradient, primarily several genera of highly tolerant midges (Chironomidae) the tolerant caddisflies *Chimarra*, *Ceratopsyche* and *Hydropsyche*, and the blackfly *Simulium* (Figure 5A, SI Figure 2). This suite of tolerant organisms is entirely consistent with earlier impact studies[10,16], suggesting that the same impacts observed immediately below valley fills are also apparent at the scale of 10-100km^2 catchments.

Because of the uncertainty surrounding the precision of our surface mining delineation, we performed sensitivity analyses to examine how the TITAN threshold determination was affected by introducing random or systematic error into our % mining estimates (SI Section 2). We found that our cumulative threshold estimate was robust to introduced error, and could only generate a significant increase in the threshold estimate by systematically increasing the estimates of mining area. This is a type of land cover classification error that could be introduced by edge effects, where landcover pixels at the edges of mines are systematically classified as forest cover. Even if we assumed that all mined areas should be expanded by 250m along all edges, we still estimated a community level threshold at 4.6% of the watershed in surface mine (95% CI of 0.34 to 11.85%) (SI Section 2).

Variation in the extent of development is not statistically correlated with the extent of mining within this dataset, yet the majority of watersheds experience both forms of land use change. We reran TITAN analyses on the same dataset oriented along a development rather than the mining gradient and found that many fewer taxa declined significantly with development than with mining (Figure 5C). Those taxa that did respond declined at very low levels of development (0-5%). However, the results of this analysis are complicated by the fact that many of the low development watersheds have variable and sometimes high amounts of surface mining within their boundaries. Indeed, many of the taxa that declined with mining increased in abundance along the development gradient because of the negative relationship between % development and % mining (Figure 5C). While negative response of the invertebrate community peaked at similar values of % development and % mining, the magnitude of the sum of z- scores was much higher for mining (290.3) than for development (134.9). This indicates that more taxa exhibited a more abrupt decline across the mining gradient than across the development gradient (Figure 5B, D).

TITAN analysis of the same dataset across a conductivity gradient found that increases in streamwater conductivity led to significant declines in 50 of the 196 total taxa and explained a larger amount of the variation in abundance data than either land cover variable (sum z =379.1). The threshold at which community changes are most drastic was at 277μS cm^{-1} (95% CI of 176 to 344 μS cm^{-1}), a number which is remarkably consistent with the EPA Guidance[23] recommended maximum conductivity of 300 μS cm^{-1}. Across this region, conductivity is highly correlated with

the areal extent of mining (Figure 3). Our analyses suggest that this conductivity threshold is typically reached when <5% of the upstream watershed is impacted by surface mining.

In our analyses we did not distinguish between old or new surface mining because we were unable to find any statistical evidence that the impacts of mining are ameliorated through time. We also did not distinguish between mountaintop mining operations and more traditional surface strip or contour mines in the region because we were unable to detect statistical differences between these two types of mining. Similarly, our efforts to weight impacts based on hydrologic connection to the stream channel (inverse distance weighting approaches) did not improve statistical relationships. The stream sampling dataset acquired from the WVDEP was not collected with the purpose of examining the efficacy of mine reclamation or mining configurations in ameliorating downstream impacts and thus we do not view inability to detect such subtleties in the current dataset as conclusive. Instead we urge that new spatial data on mining activities be used to guide rigorous field sampling campaigns to make these critical comparisons.

CONCLUSIONS

This work demonstrates for the first time a statistically significant relationship between the areal extent of surface mining in the Central Appalachians and variation in both the chemistry and biological community structure of receiving streams. Our analyses demonstrate that even small amounts of surface mining can dramatically increase streamwater conductivity, pH and alkalinity and dramatically reduce the abundance of many aquatic insects. Our community threshold analyses suggest that macroinvertebrate community composition shifts dramatically once streams reach conductivities of ~300 µS/cm – a level achieved with very low levels of watershed surface mining. An important argument for a casual pathway from mining to conductivity to community thresholds is the large proportion of shared taxa that declined in response to both watershed mining and conductivity. Of the 39 taxa that significantly declined along the mining gradient, 24 significantly declined with increasing conductivity. Conversely, few of the taxa that responded negatively to the development gradient declined with increasing conductivity.

These results have important policy implications. First, the fact that the cumulative impacts of MTM on water quality and on the biological condition of streams are readily quantifiable and

cannot be attributed to development have the potential to inform decisions on the amount of mining regulators allow in a given watershed. Second, using a novel and rigorous method of data analysis to test for thresholds (TITAN), we found a threshold conductivity level (277µS cm^{-1} with 95% CI of 176 -344 µS cm^{-1}) that is remarkably similar to the benchmark of 300 uS/cm that the US EPA has proposed to be protective of aquatic life in their recently issued guidance document, lending support to their draft conductivity benchmark.

METHODS

Regional Mapping of Surface Mining: Surface mining activity was mapped from digital multispectral images collected by the Multispectral Scanner (MSS) and Thematic Mapper (TM) sensors carried by the Landsat series of remote-sensing satellites. Historical images in the Landsat archive[28] were reviewed for cloud cover, smog and haze. Mid-summer images were favored to facilitate the identification of disturbed areas and minimize seasonal variations in solar illumination. To ensure detection of mining disturbance since the 1970s while minimizing the total volume of data for analysis, mid-decade imagery was chosen (SI Section II). Digital elevation data were also acquired for topographic analysis, enabling the identification of ridges and mountaintops throughout the study area as a means of discriminating MTR operations from other types of surface mining. We opted to use 3-arc-second (1x1 minute) DEM data compiled by the U.S. Defense Mapping Agency. This series was distributed as 1x1 degree areas that corresponding to the east or west half of the USGS 1:250,000 scale topographic quadrangle map series. These elevation data are from topographic surveys that mostly pre-date 1976 and therefore provide the best available representation of topography in the study area prior to the advent of mountaintop removal mining. The horizontal position error of this elevation dataset is generally stated to be 100 meters or less. Other supporting digital GIS data included detailed transportation features and populated areas derived from USGS 1:24,000-scale topographic maps[29]. The river and stream vectors that comprise regional hydrology were compiled from the 1:24,000-scale National Hydrography dataset[30].

Image Processing: Image processing and analysis was performed using Erdas IMAGINE image processing and GIS software on a standard Windows-based workstation. All images were placed into a common map projection (UTM Zone 17 North – WGS84 datum) using standard techniques that included the selection of image-to-map tie points by an experienced operator, and digital resampling of the images using a nearest-neighbor algorithm to preserve the original spectral information. Additional processing included the creation of same-date, path-oriented mosaics to simplify the classification

process. The georectified mosaics were then cropped to the study area boundary to reduce computer processing time.

An iterative, two-stage process was developed to identify and delineate areas disturbed by traditional surface mining and by mountaintop removal mining (MTR). First, land cover classification was performed for each date of imagery. Classification followed a two-step process: pixel-based spectral signatures of various land-cover types were identified; then a decision-tree analysis was used to classify areas of active surface mining. Pixel-based classification was performed using the supervised maximum likelihood technique[31]. Given the rugged terrain of the region, the image data were first spectrally enhanced to reduce albedo-related variations in illumination and spectral characteristics using the hyperspherical direction cosine (HSDC) method[32]. Training samples were selected for each date of imagery to yield land-cover classes compatible with the Anderson Level II system[33], such as bare rock, soil, forest, grasses/crops, water, clouds, etc. The results of this procedure were then modified by classifying any bare rock and soil outside of a 400 meter buffer zone around rivers, highways and agricultural areas. This separates areas of bare soil and rock likely attributable to active mining from areas naturally devoid of vegetation, such as river banks and channels, paved surfaces, and plowed or fallow fields.

Second, topographic analysis was performed to subdivide the classified mining areas into "MTR" and "Other Surface Mining" categories. While the legal definition of MTM as defined by the U.S. Office of Surface Mining is too vague to implement directly into a GIS model, their definition did guide the development of a reproducible, rule-based method by SkyTruth for identifying MTR areas. We started from the perspective that, to qualify as MTR, an individual mining operation had to 1) cross a ridge top or peak, and 2) impact an area significantly larger than a typical conventional strip mine.

Using digital elevation data from the U.S. Geological Survey 1:100,000 series, the terrain parameters that characterize ridge tops and peaks, slopes and valleys were calculated. We defined a ridge top or peak as a point that lies on a local convexity that is orthogonal to a line with no convexity or concavity. After ridge tops and peaks were identified and delineated from the elevation dataset using these criteria, contiguous areas encompassing fewer than 40 acres were eliminated to minimize noise in the analysis.

MTR operations were identified in the mining land-cover class by calculating the percentage of ridge top that comprised the mine's total area. We produced two categories of MTR mines: contiguous mining

area spanning more than 320 acres and containing more than 40 acres of ridge top, and contiguous mining areas between 40 and 320 acres that contain at least 10 - 40 acres of ridge top in the mined area. Digital boundaries delineating the MTR areas, and the other surface mining areas identified by this analysis were analyzed for the entire region (SI Table 2) and files were exported in GIS-compatible shapefile format.

Water Quality and Stream Benthic Samples: We obtained data on water quality and macroinvertebrates collected and analyzed by the WV Department of Environmental Protection (WVDEP 2010 provided 6/30/10 in response to FOIA request). The full dataset includes water quality, stream habitat and stream benthos information on 6463 stream reaches. Samples were collected between 1996 and 2009. From this large dataset we extracted all sample data that met the following selection criteria: streams <10m wide draining watersheds completely contained within the 14 county area of southern WV for which we had mapped the extent of surface mining; samples for which benthic macroinvertebrate samples were collected during summer surveys and identified to genus; and samples for which at least streamwater conductivity and sulfate concentrations were recorded.

Watershed Delineation for Stream Sampling Stations: Geospatial analysis to determine the areas of surface mining and developed lands upstream of water quality sample locations was performed using Environmental Systems Research Institute's (ESRI's) ArcGIS software, version 9.3.1. Digital elevation model (DEM), hydrography, land cover, surface mining, and water quality sample location data for the entire area draining into the 14 West Virginia counties examined were assembled into a geographic information system (GIS) with all data georeferenced to the Albers Equal Area projection. The DEM data, a subset of the National Elevation Dataset[34], were obtained from the National Hydrography Dataset Plus (NHD+)[30] and represent elevation as 30 x 30 m pixels. We also obtained flow direction, a derivative of the elevation dataset, as well as 1:100,000 scale stream flow-lines from the NHD+ and added them to our GIS database. The land cover data we obtained are part of the 2001 National Land Cover Database[35] and were obtained from the USGS Multi-Resolution Land Characteristics Consortium (MLRC)[i]. The DEM, hydrography, and land cover data were all obtained as ArcGIS formatted files in the Albers projection and needed no further processing to be added to our spatial database.

Stream sampling point coordinates were used to construct an ArcGIS point file referenced to a geographic coordinate system (WGS 84), which was then projected into the same Albers coordinate system used by the other spatial datasets. Water quality point locations had to be snapped to areas of high flow accumulation (i.e. stream cells) to properly calculate upstream areas. ArcGIS has a tool, "*snap pour point",* designed to do this, but it worked too coarsely, snapping some points to the wrong stream while unable to snap other points to correct locations. We therefore developed an iterative snapping algorithm that gradually moves a point along routes of higher flow accumulation until a stream cell is met. With all sample points snapped to the nearest stream location, we used the ArcGIS *watershed* tool to identify all cells upstream of a given point. We then calculated the area of historical surface mining and of developed areas by tabulating the number of mined cells (from the mining delineation dataset) and the number of developed cells (from the "Developed" classes in the NLCD 2001 dataset) , respectively.

Statistical Analyses:

For the data analysis to address question 1, we estimated the total watershed area that had ever been mined (active and past surface mining) and used that estimate of cumulative mining extent as a predictor variable. We examined statistical relationships between solute concentrations along both mining and development gradients using quantile regression. We also split the full mining dataset into 5 equal categories of mining extent and examined changes in water quality and in macroinvertebrate taxa richness and in two benthic indicator scores developed for Central Appalachian streams by one way ANOVA and Tukey's HSD.

TITAN Analysis: To address question 2, we performed Threshold Indicator Taxa Analysis (TITAN[36]) to examine taxon specific and community level responses to both gradients within this dataset. First, TITAN estimates the value of the environmental variable that produces the greatest change in both the abundance and frequency of occurrence of each individual taxon with a minimum of 5 occurrences within a sample population. Since TITAN requires only 5 occurrences for analysis it is sensitive to rare species, a distinct advantage for detecting local biodiversity loss. The magnitude of the response is quantified as an indicator value z score[37]. The observed change point for a taxon is the value where the indicator score reaches its maximum. Individual taxa change points are bootstrapped to assess consistency in the direction (negative or positive) and

location of response (confidence intervals) to the gradient. Because indicator scores are standardized to z scores, taxa that do not respond to the gradient achieve very low or negative z scores thus provide minimal weight (or noise) to the assessment of community response.

Potential community-level thresholds are assessed by separating negative (z-) and positive (z-) taxa responses, summing the z+ and z- taxa separately, and tracking these aggregate responses for every potential change point value along the environmental gradient. Synchronous change points among multiple taxa within a narrow range of environmental values results in a distinct peak in the sum of the taxa z-scores (sum(z-) for negative responses, sum(z+) for positive responses). The magnitude of the sum(z) scores are also a direct measure of the magnitude of the effect of an environmental predictor. Collectively, a large, sharp peak in sum(z) values, obvious synchrony in numerous taxa change points, and evolutionary and life-history relationships among responsive taxa that are consistent with known sensitivities to anthropogenic gradients serve as empirical evidence for a community-level threshold[26]. While uncertainty may be relatively high about the location of low-frequency individual taxa thresholds, synchrony in the conductivity level point-of-decline of many species, including rare ones, bolsters confidence in the robustness of the community threshold.

TABLE 1: Comparison of water quality between land cover categories. Within this table, developed watersheds are watersheds without any evidence of surface mining. Not all environmental variables were collected or recorded for all samples in the dataset, leading to slightly different numbers of replicates within a category.

Category	Criteria	pH		Alkalinity		Conductivity	
		n	n ± SE	n	Mean ± SE	n	Mean ± SE
WV Reference Sites	•Identified in WDEP database as Reference site	11	7.0±0.2[a]	9	17.4±5.7[a]	11	68±13[a]
Reference	•> 95% Forested •<1% Developed •No surface mining mapped •No NPDES Permits	13	7.2±0.2[ab]	3	***32.6±28.2***	13	289±100[ab]
Surface Mining	•All watersheds with mapped surface mining in any year						
<3.5%		*46*	7.7 ±0.1[bc]	23	65.1±9.4[ab]	46	431±76[a]
3.5 to 11%		*46*	7.7 ±0.1[bc]	31	81.2±12.6[ab]	46	550±40[ab]
11 to 21%		*46*	7.9 ±0.1[c]	20	120.4±18.3[b]	46	750±69[bc]
21 to 38%		*45*	7.9 ±0.1[c]	17	118.3±22.2[b]	45	863±79[c]
>38%		*47*	7.7 ±0.1[bc]	22	126.5±15.8[b]	47	1370±123[d]
Developed	•>1% Developed						
1 to 5%	•Developed + Forested > 80%	14	7.1 ±0.2[a]	9	45.6±14.1[ab]	14	191±31[a]
>5%	•No surface mining mapped •No NPDES permits	15	7.6 ±0.2[abc]	3	***20.1±5.5***	15	350±53[ab]

*Values that share the same letters as subscripts are not statistically different based Upon Tukey-Kramer HSD posthoc comparisons.** indicates low sample size – statistics not included. ANOVA showed that categories were significantly different at p<0.0001 for all three metrics.*

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FIGURE 1 – Photos from the Hobet mine, a 40mi2 surface mine in southern WV. (A) An aerial view of a portion of the mine above Laurel Fork during active mining in 2006 (Vivian Stockman, OVEC); (B) a closeup view of the reclaimed mine surface above Laurel Fork in June 2010; (C) a filled tributary to Laurel Fork in 2010; a settling pond below the valley fill in C; (D) a closeup of the sediments of the valley fill drainage showing carbonate deposits. All photos except A by ESB.

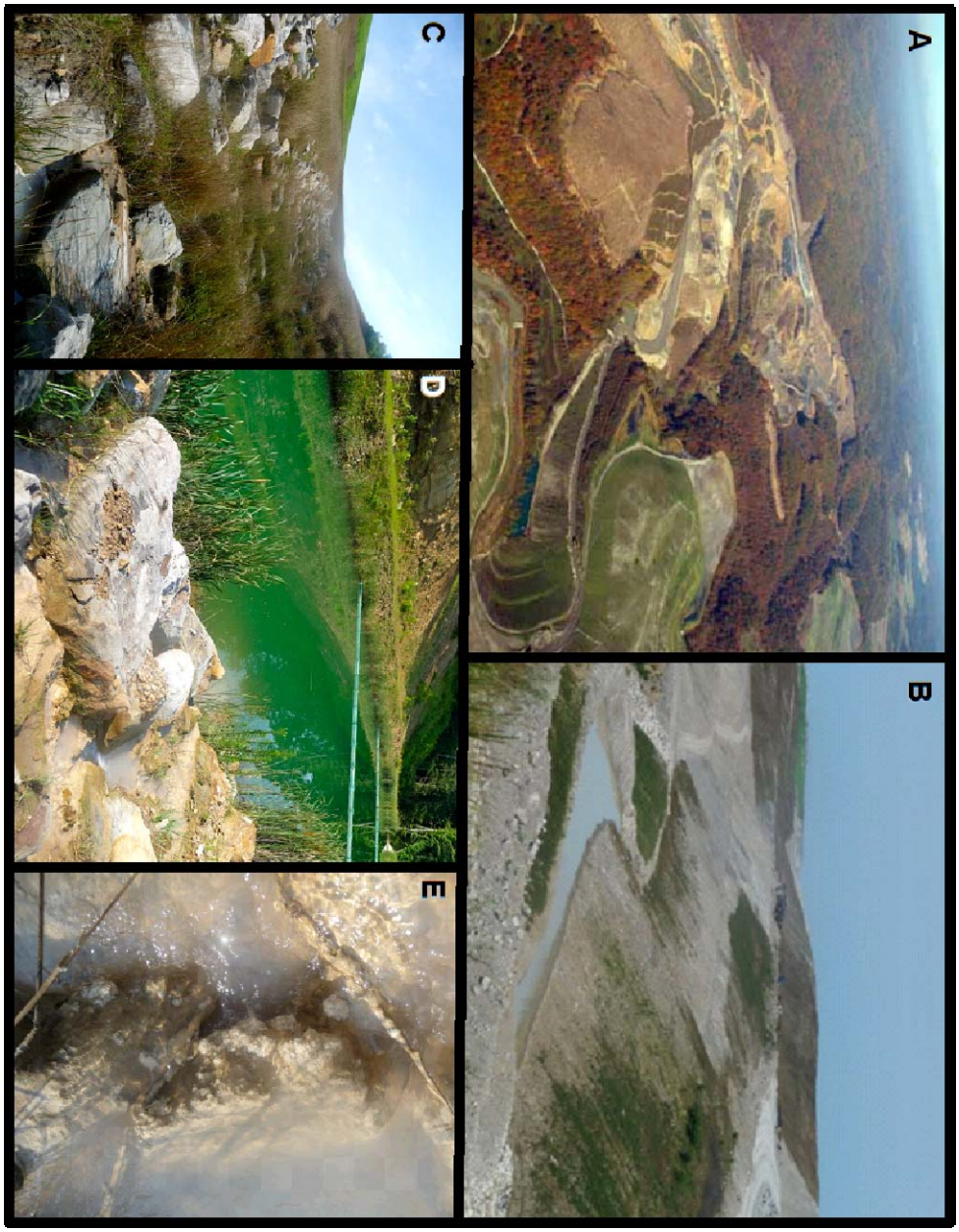


FIGURE 2: *(A) Surface mining activity delineated through analysis of remote sensing imagery collected in 1975, 1985, 1995 and 2005. Color progresses from older mining (1976 delineation) in light yellow to recent mining (2005 delineation) mining in burgundy. (B) shows the location of sampling sites used in our in depth analyses. (C) shows the spatial extent of mining reported by SkyTruth (red triangles) relative to that reported based on permit records (black triangles)*

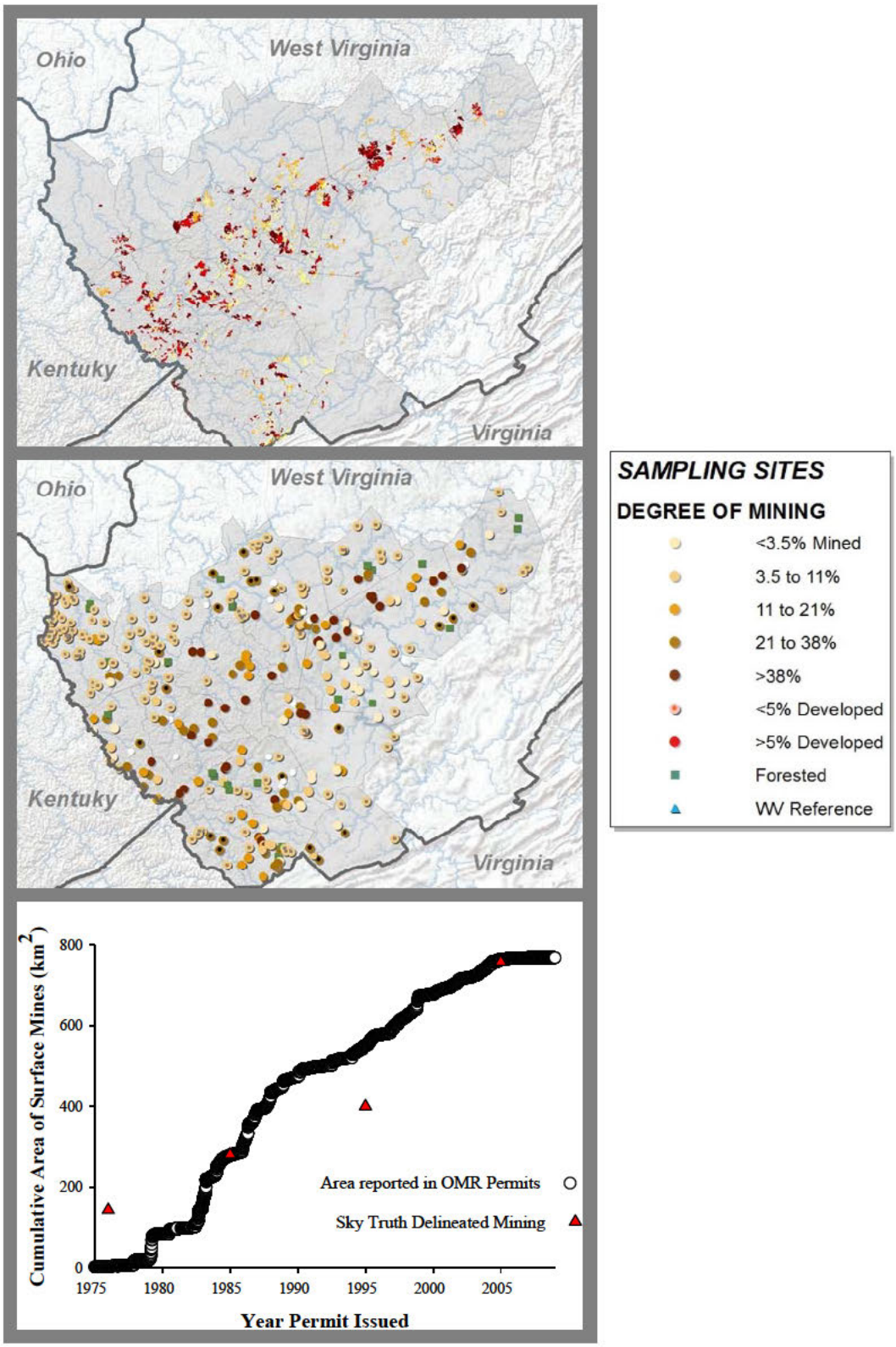


Figure 3. Quantile regressions for streamwater conductivity, nitrate and sulfate across the two dominant land cover gradients, surface mining (A&B) and development (C&D).

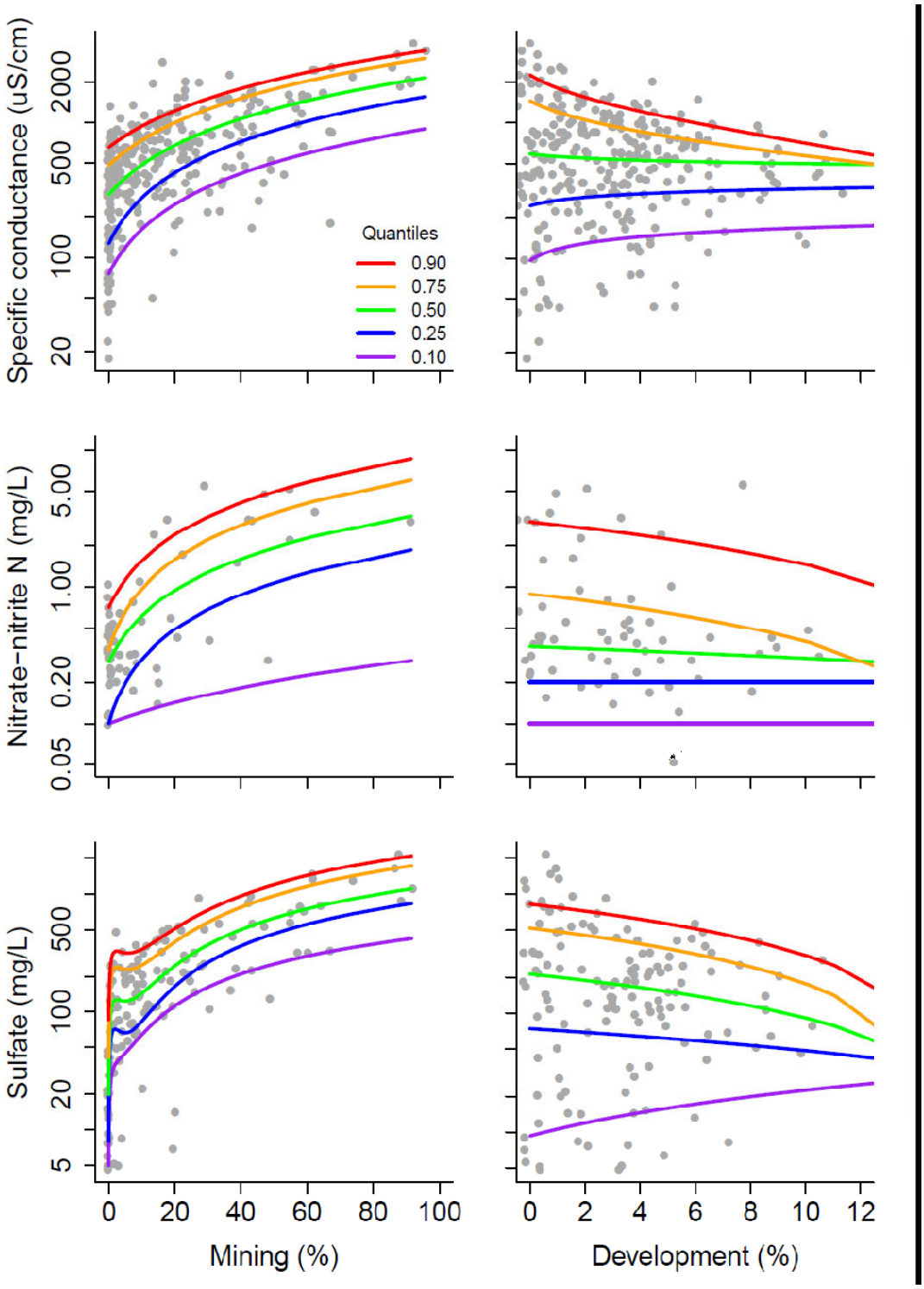


Figure 4. Effects of mining and development on macroinvertebrate community composition metrics. Here boxplots show the median as the black line within the box, the gray box extends between the 25th to 75th percentile distribution of datapoints, the whiskers delineate the 95% confidence interval and all outliers are shown as points outside of this distribution. The alphabetical superscripts indicate statistical differences between categorical variables, categories which share a letter are not significantly different from one another based on Tukey's HSD post hoc comparisons at p=0.05 adjusted for multiple comparisons. The ms superscript in panel A means marginally significant from control (p=0.054)

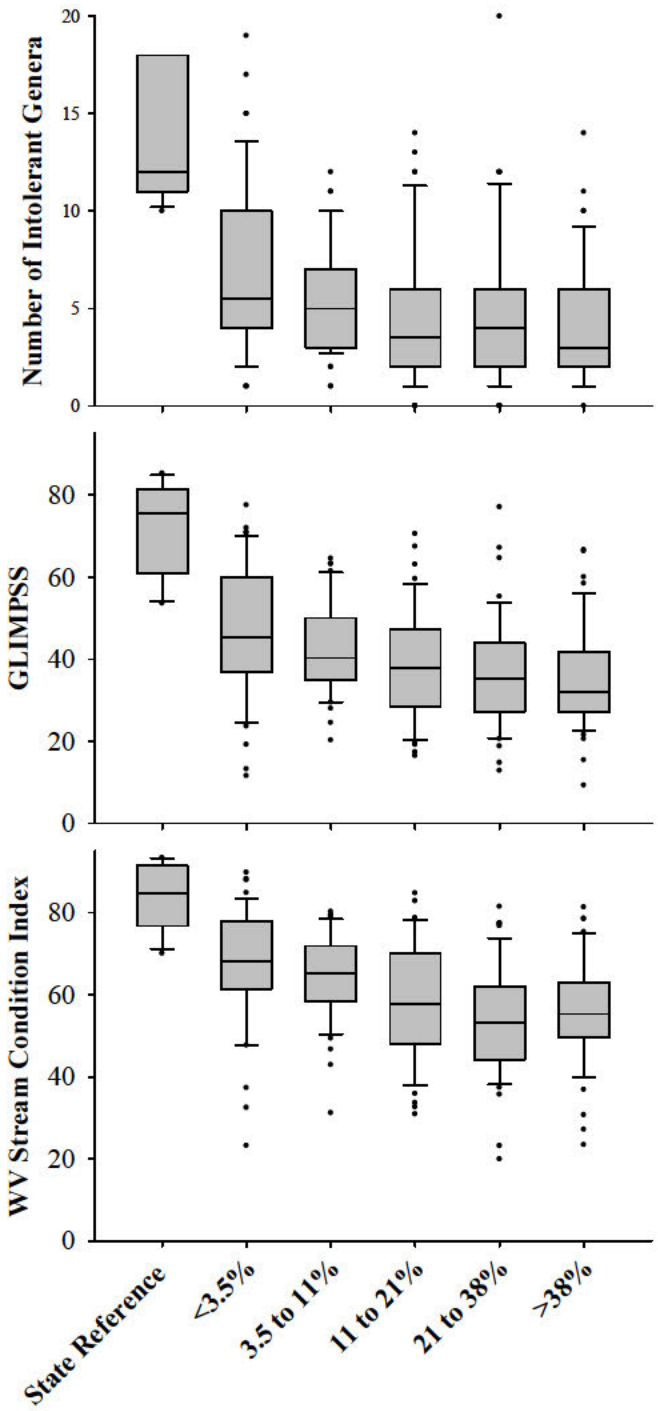


FIGURE 5.TITAN results for taxa having both high purity and reliability when run against either percent mining (A) or percent development (B) as the environmental gradient. Points are centered on the estimated change point for each taxa, horizontal lines indicate 95% CI based on 500 bootstrap replicates, and point size is proportional to the taxa z-score. Taxa which respond negatively across both the mining and develoment gradients are denoted with (*); Taxa which respond positively across both the mining and development gradients are denoted with (**); Taxa which respond negatively to the mining gradient and positively across the development gradient are denoted with (***); Taxa which respond positively to the development gradient but negatively to the mining gradient are denoted with (****).

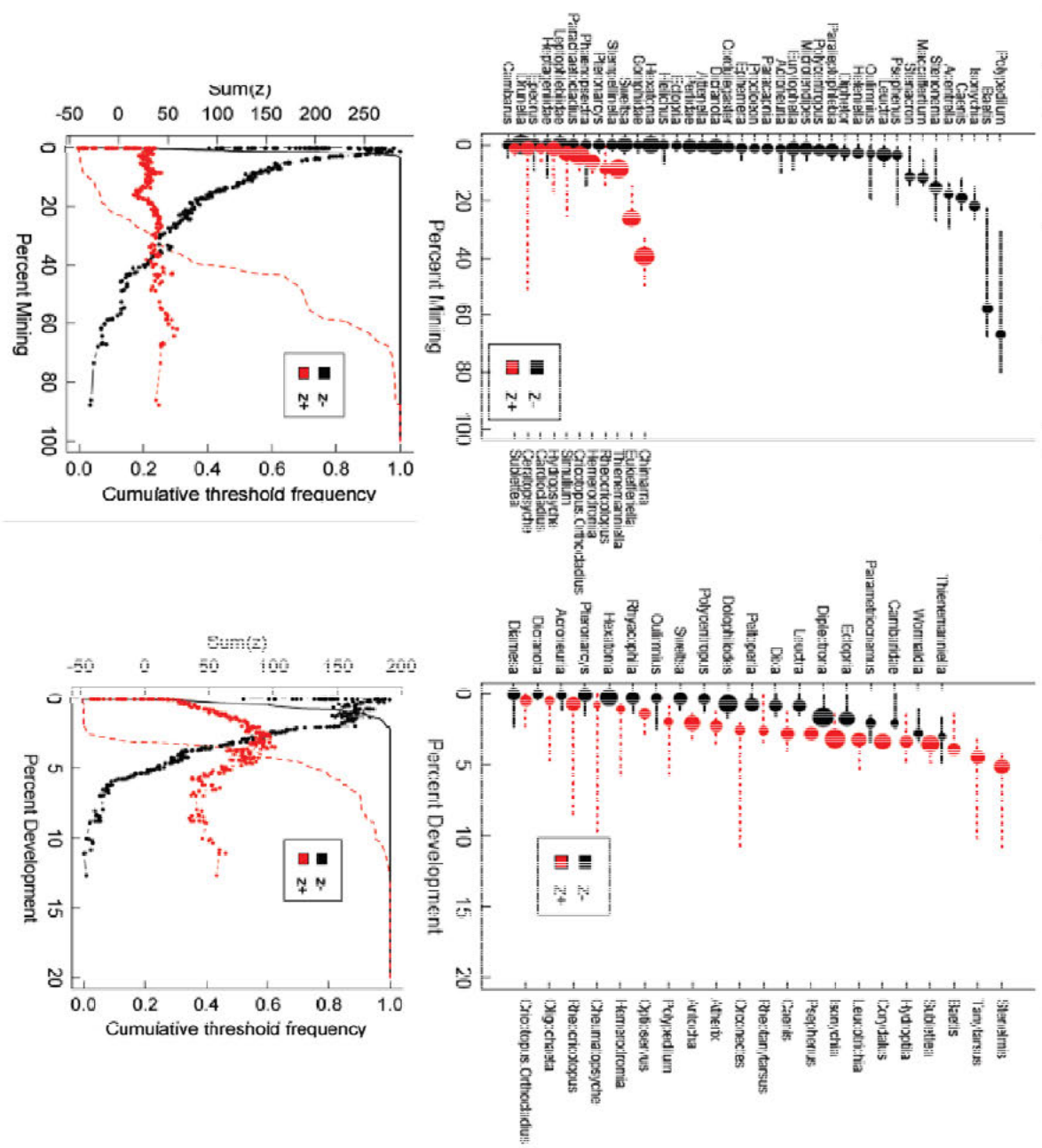
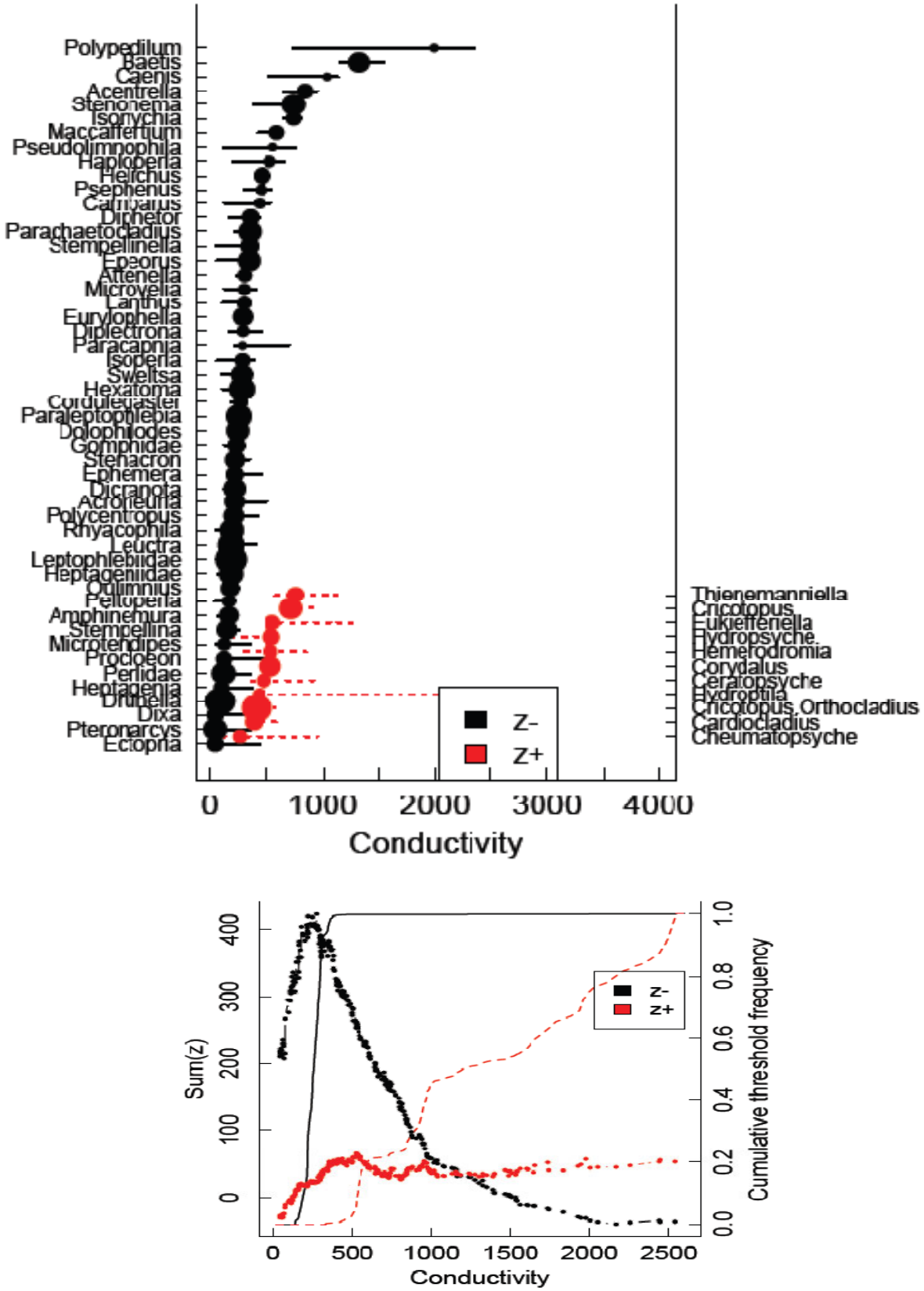


FIGURE 6.TITAN results for taxa having both high purity and reliability when run against conductivity Points are centered on the estimated change point for each taxa, horizontal lines indicate 95% CI based on 500 bootstrap replicates, and point size is proportional to the taxa z-score.



Supplemental Material to be online

(to accompany Bernhardt et al. "How many mountains can we mine…")

This Supplement Includes two figures (Figures 1 and 2) and one table (Table 2) that are directly referenced in the text as well as a detailed description of sensitivity analyses that we performed to test the robustness of our TITAN estimates. The section on sensitivity analyses is referred to in the present manuscript as "SI Section 2"

Figure Headings

Supplemental Figure 1: Abundance patterns for individual taxa determined to respond significantly and negatively to the extent of surface mining in their catchment.

Supplemental Figure 2: Abundance patterns for individual macroinvertebrate taxa that evidenced a positive response to the extent of surface mining in their catchments.

Figure 1 Part 1

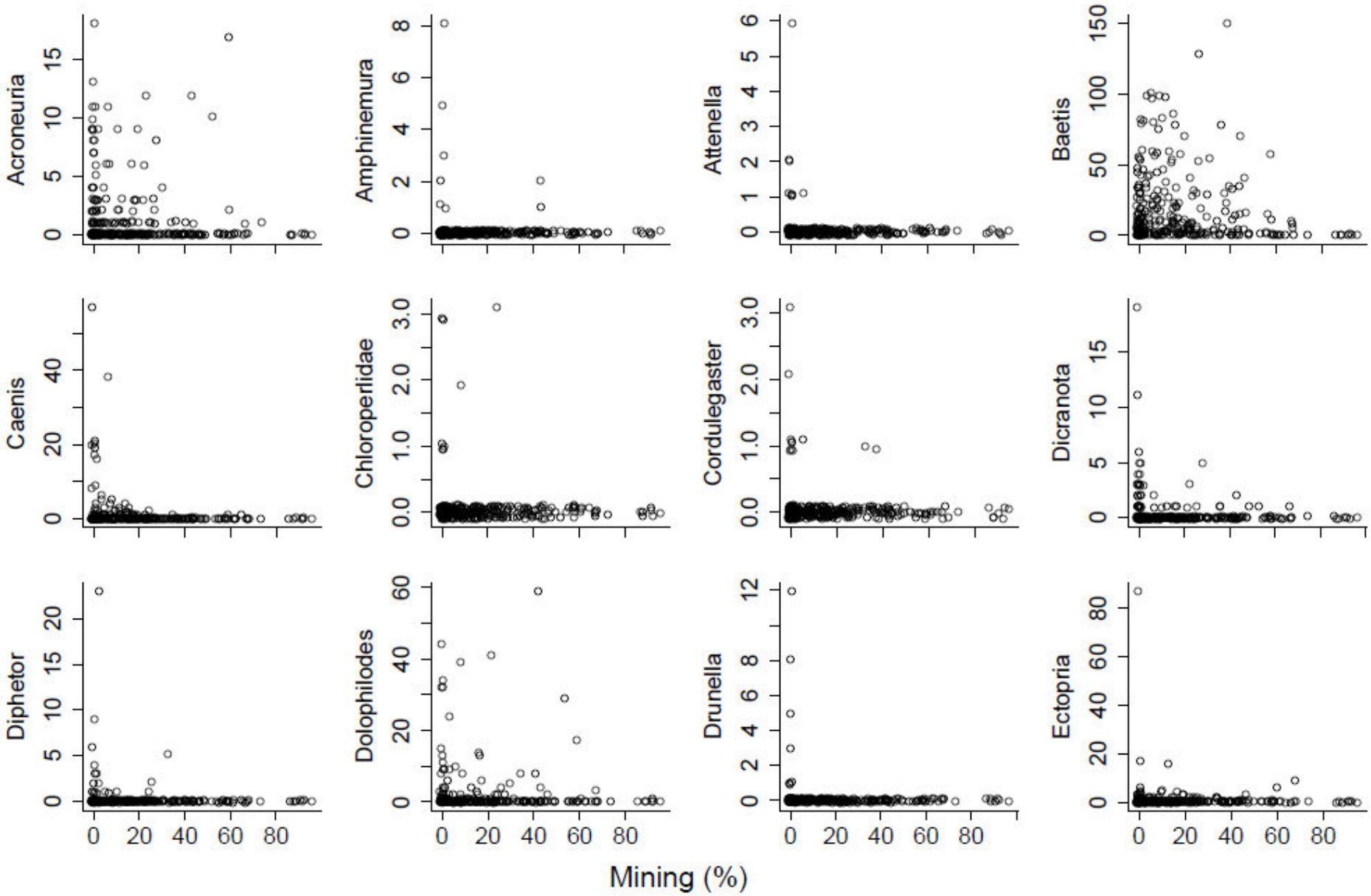


Figure 1 Part 2

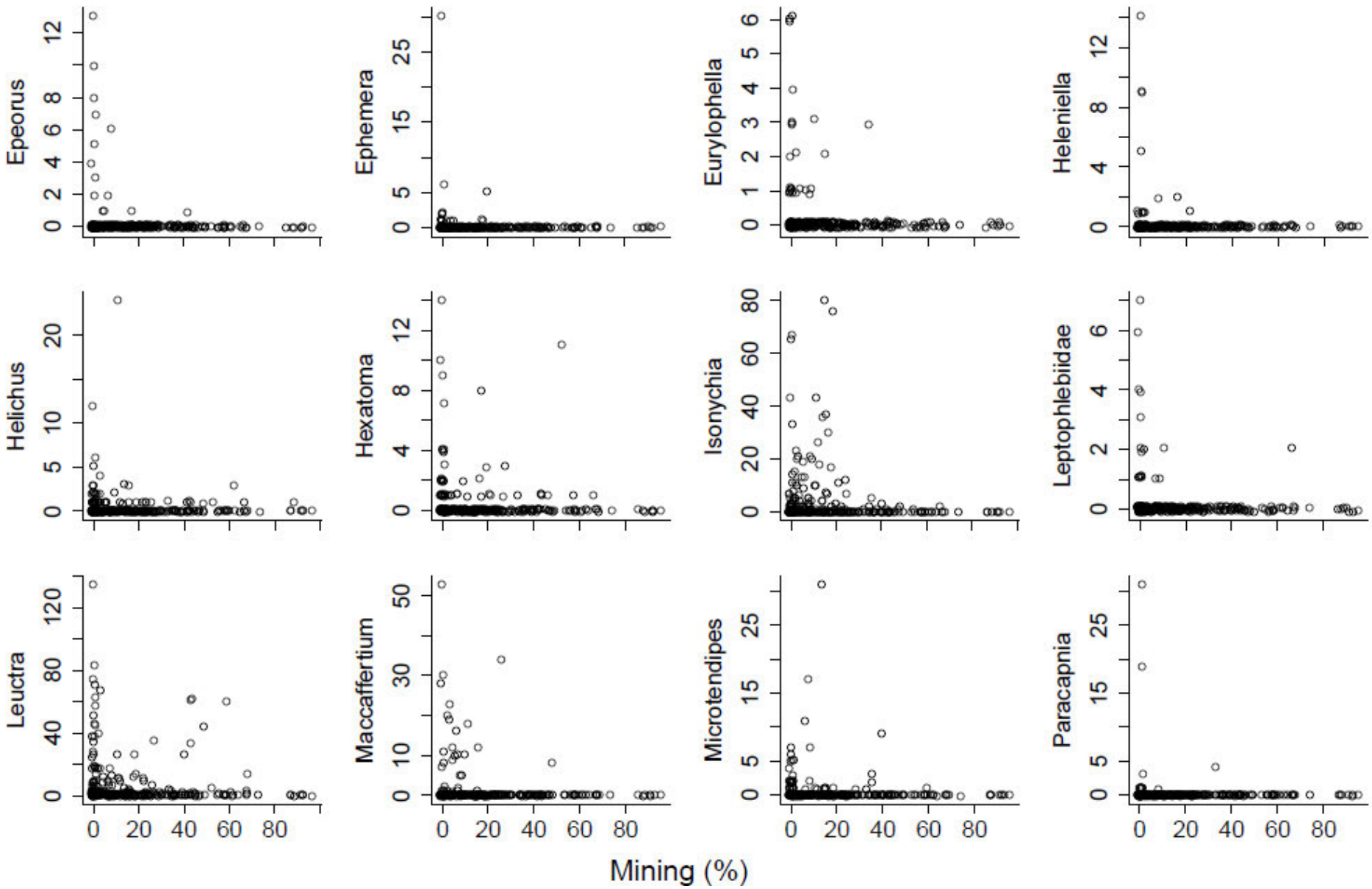


Figure 1 Part 3

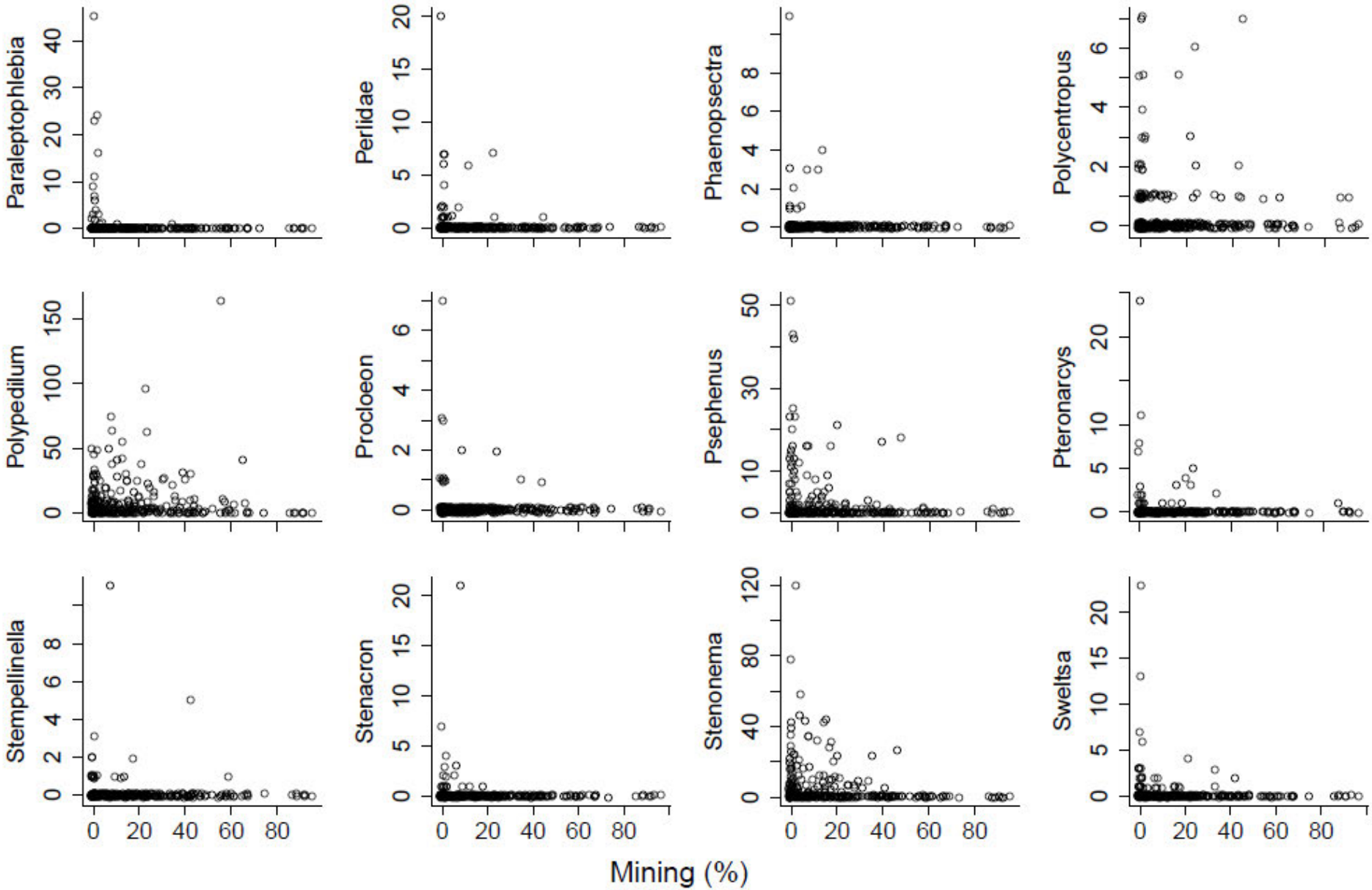
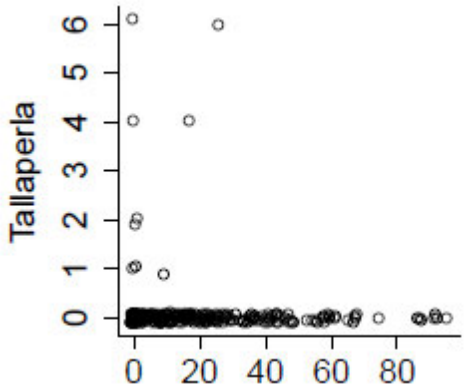


Figure 1 Part 4



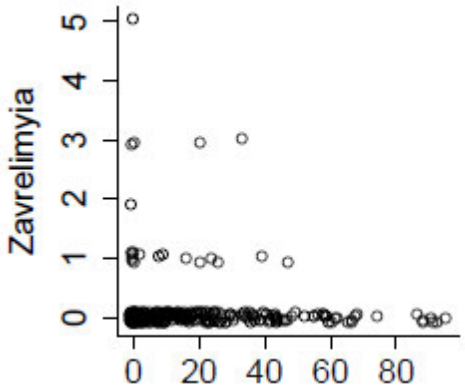
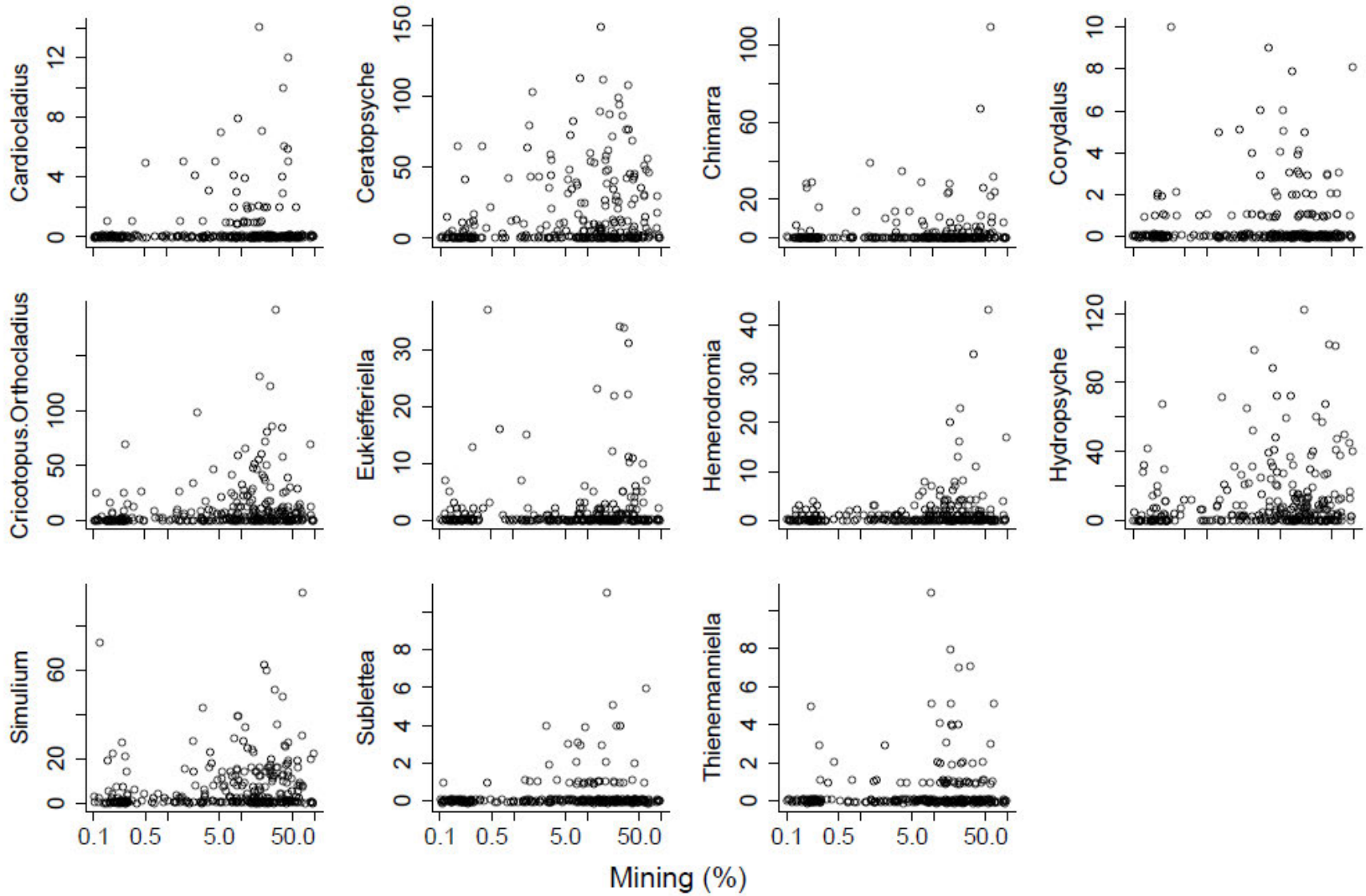
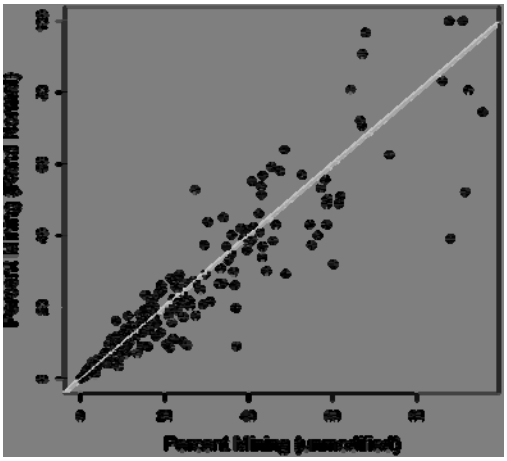


Figure 2


Cardiocladius
Ceratopsyche
Chimarra
Corydalus
Cricotopus.Orthocladius
Eukiefferiella
Hemerodromia
Hydropsyche
Simulium
Sublettea
Thienemanniella
0.1
0.5
5.0
50.0
Mining (%)

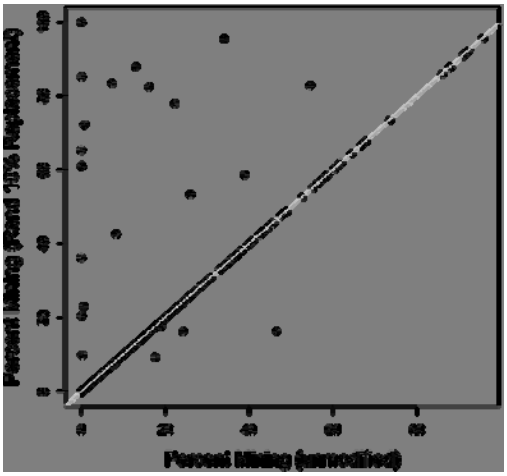
SI Section 2: Sensitivity Analyses with TITAN

Because we do not yet have estimates of the precision of our areal estimates of surface mining activity, we performed a series of sensitivity analyses with TITAN to determine whether our estimates of a mining threshold were robust to several types of possible error in surface mining estimates. We introduced error to the dataset using 3 different approaches.



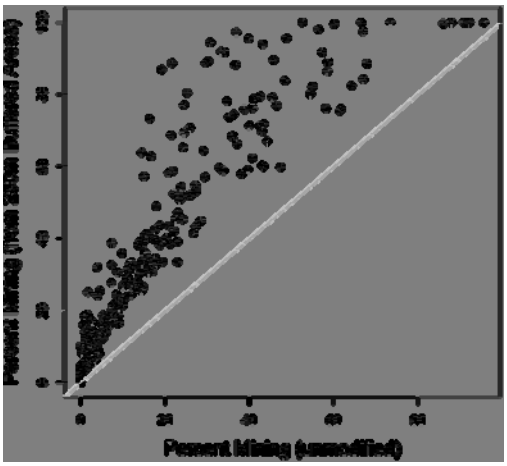
Method I: Random inflation/deflation of %mining (Figure 3)

We created a vector of values from random normal distribution (μ = 10, sd = 3) equal in length to %mining gradient and then divided vector by 10 (to give values from -1 to 1, centered around 0). We multiplied this vector value by %mining and summed with %mining. This introduces random scatter into the %mining estimates, with the scatter increasing proportional to the absolute %mining value.



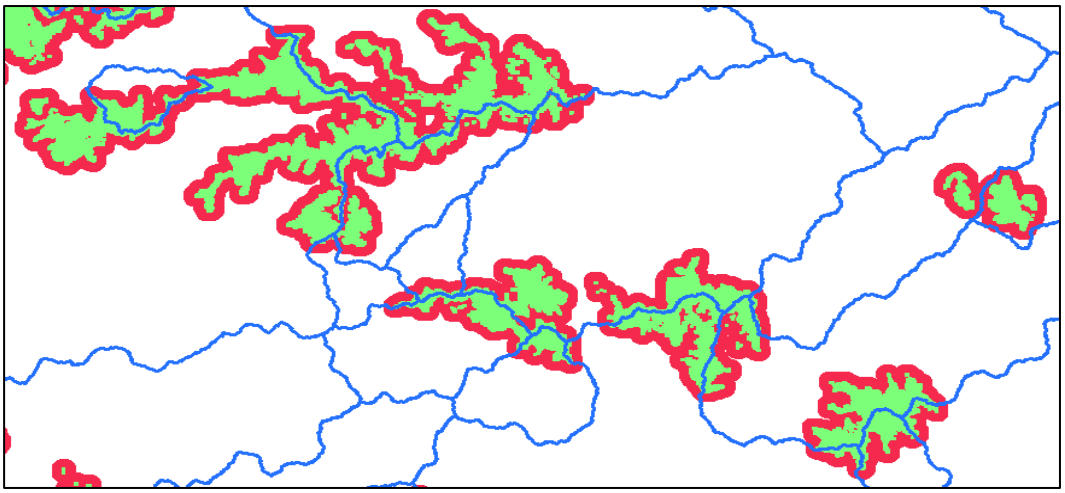
Method II: Replacement of 10% of data w/ random values (Figure 4)

We randomly selected 10% of the total observations and assigned them a random %mining value between 0-100%



Method III: 250m Buffer around all mined areas (Figure 5)

We assume that the largest uncertainty in the satellite imagery processing is the accuracty in determining the the perimeter of mined areas. Based on the geometry and total area of each watershed, as well as the geometry of the mined area within or near the watershed, uncertainty at the edge of mined areas can impact each watershed differently. We added 250m buffers (~8pixels) to the edge of every mined area (Figure 6), recalculated %mining within each watershed, and re-ran TITAN with these values.



Supplemental Figure 6. Example of buffered mine delineations. Green = SkyTruth Mining extent; Red = Buffered extension of mining delineation; Blue lines = watershed boundaries.

We found that TITAN results are robust when we introduce a moderate amount of random variation in the %mining values (Method 1, Supplemental Table 1, Supplemental Figure 7). The estimated change point value and CI are very similar to non-modified result (Supplemental Table 1).

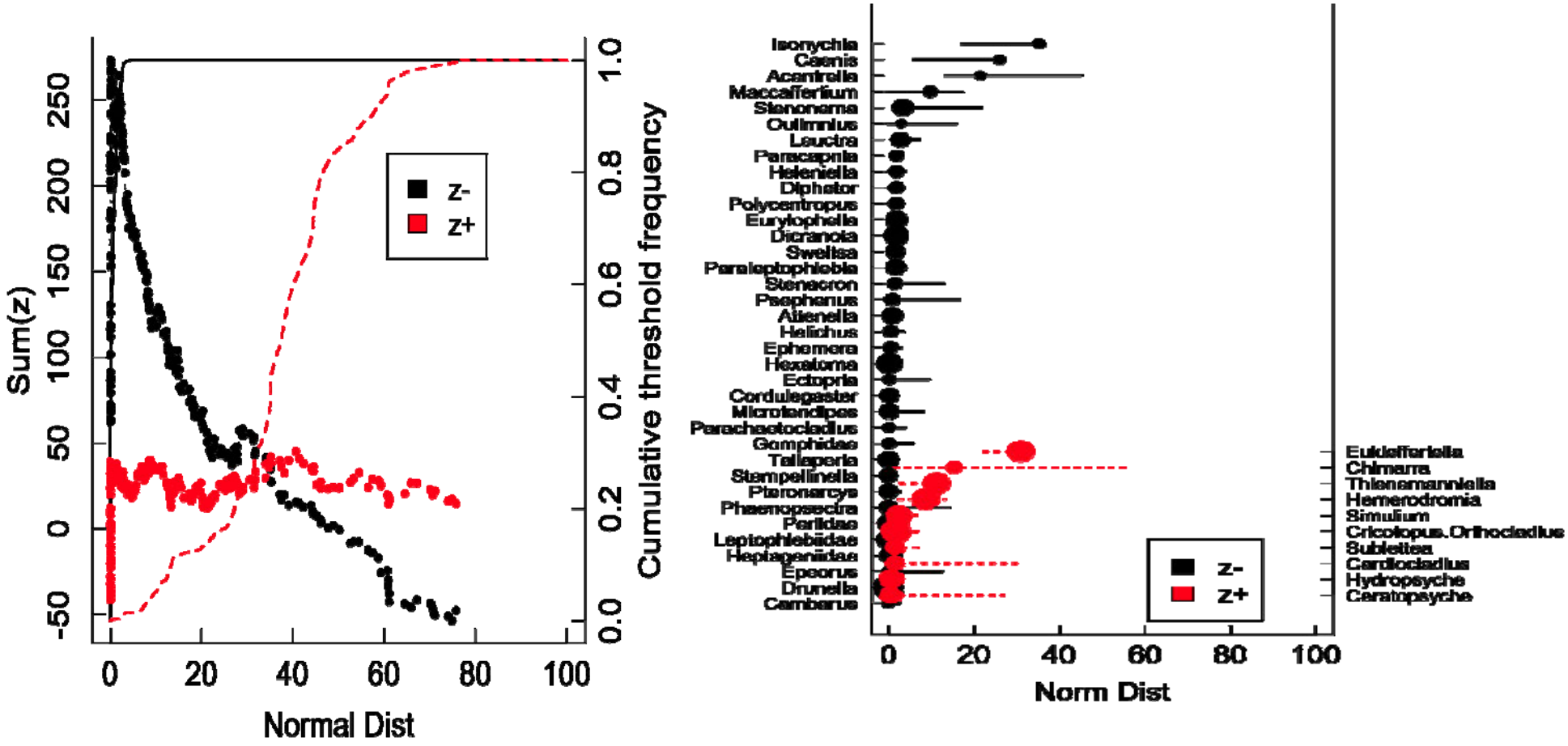
Supplemental Table 1. Change point values (+/- 95% boostrap CI) for each TITAN run.

		Change Point	Lower 95% CI	Upper 95% CI
No Modifications				
	sumz-	1.28	0.00	2.43
	sumz+	63.08	15.36	67.47
Random Change 10% Sites				
	sumz-	0.04	0.00	2.06
	sumz+	65.45	27.01	91.27
Normal Distribution Modifier				
	sumz-	0.06	0.00	2.36
	sumz+	41.04	10.09	61.02
Buffered Areas by 250m				
	sumz-	4.66	0.34	11.85
	sumz+	100.00	59.69	100.00

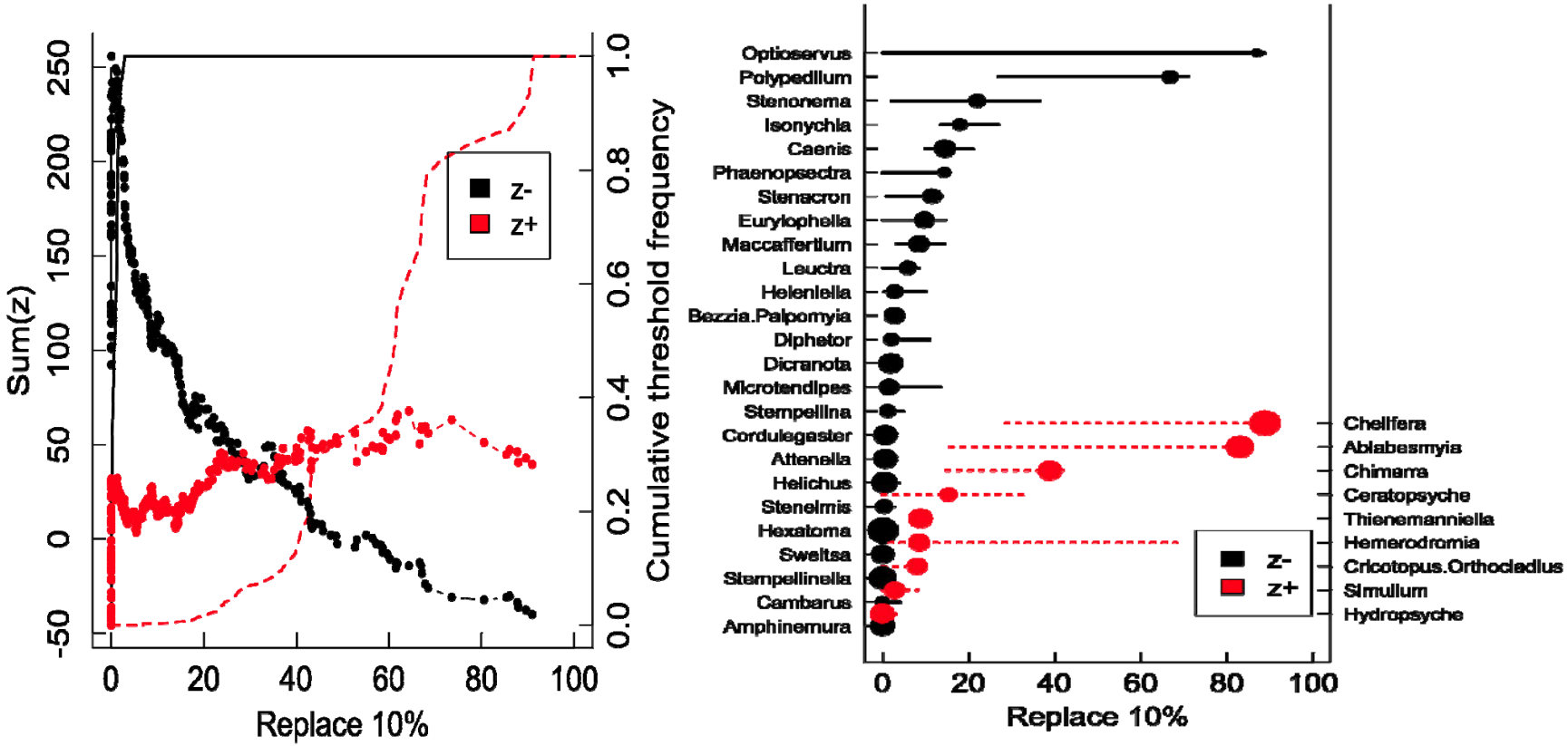
Similarly, when we replaced 10% of the observations with a random % mining value (Method 2), the overall community response value remains unchanged (Supplemental Table 1) but the number of taxa responding negatively decreases. (Supplemental Figure 8). This is likely because the random reassignment led to assigning rare taxa found only at a small number of unmined sites to some mined sites. This reassignment can introduce enough uncertainty in the patterns of abundance for rare taxa that a change point for that taxa cannot be determined

When we introduced systematic error by increasing the size of mined areas by 250m along all edges (Method 3) we were able to increase the change point estimate and confidence interval values (Supplemental Table 1, Supplemental Figure 9). We expected the values would increase (because we added mining area without changing patterns of taxa abundance). We found this error slightly inflated the estimated change point (from 1.3 to 4.7% mining) and increased the 95% confidence interval around this estimate. While such error causes the change point to be broader, there is still a clearly defined negative response (Supplemental Figure 9).

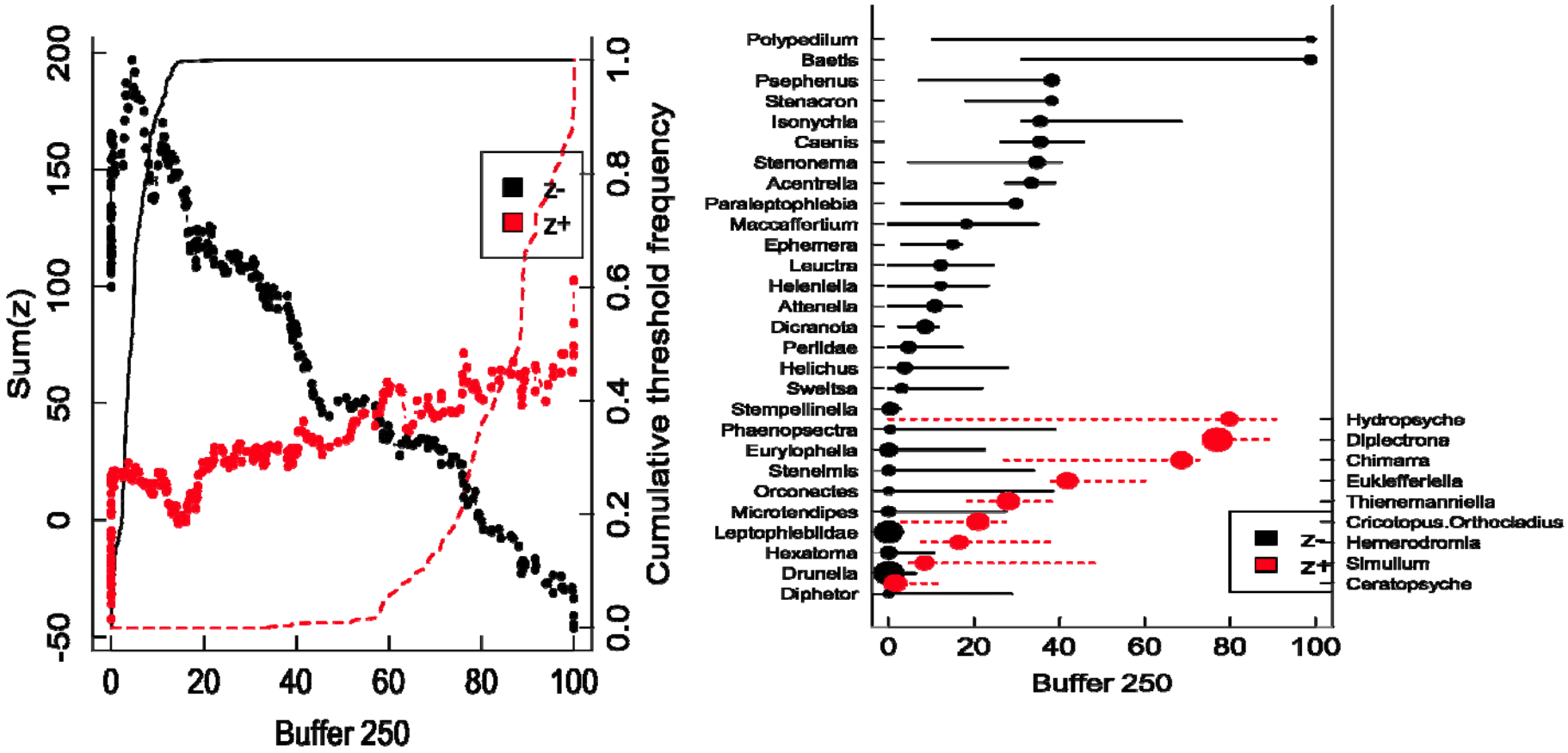
Supplemental Figure 7



Supplemental Figure 8



Supplemental Figure 9



Supplemental Table 2. Satellite image data used for this study (*p* and *r* refer to path/row location)

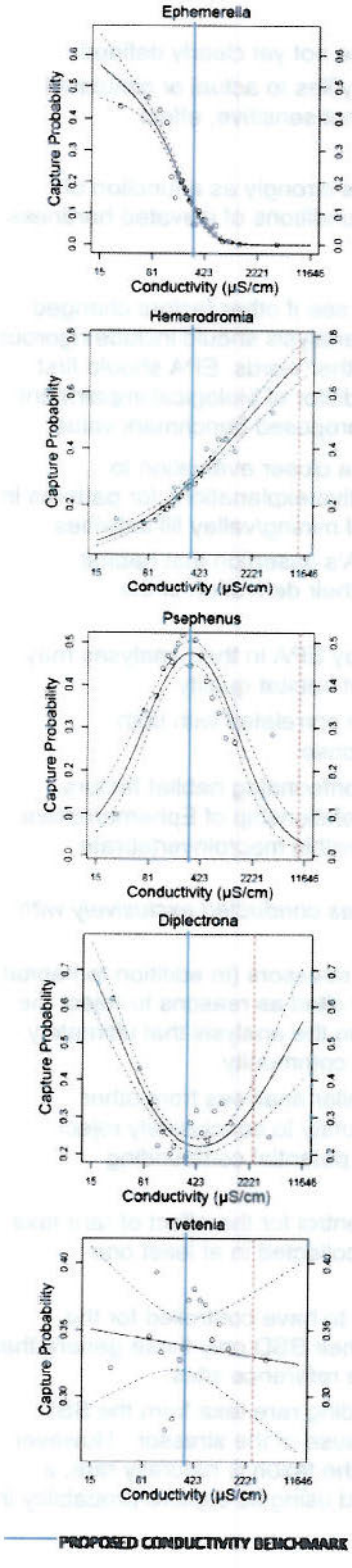
Landsat 5 (TM)							
p19r35	p19r34	p19r33		p18r34	p18r33		p17r33
7/3/2006	7/3/2006	7/3/2006		9/11/2005	9/11/2005		5/31/2005
9/7/1995	9/7/1995	9/7/1995		8/31/1995	8/31/1995		10/11/1995
9/8/1984	9/8/1984	9/8/1984		9/17/1984	9/17/1984		7/8/1984
Landsats 1-2 (MSS)							
p21r35		p20r35	p20r34	p20r33		p19r34	p19r33
8/20/1976		8/19/1976	8/19/1976	9/6/1976		6/7/1976	5/20/1976

Congressional Caucus on Coal
Staff Briefing
"Eastern Coal Forum: Effects of Federal Regulations on Appalachia Coal Mining"
Wednesday, December 1, 2010

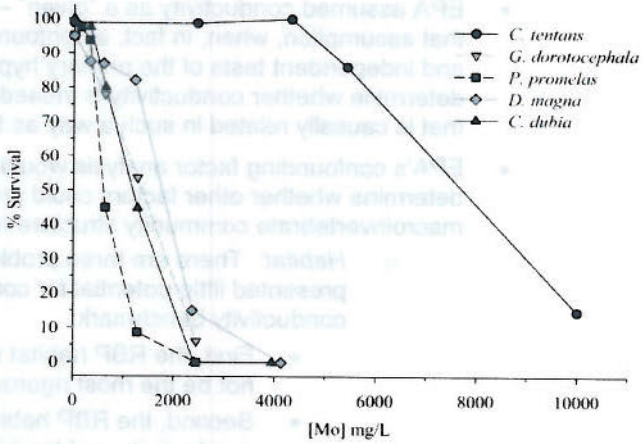
Background/Moderator:	Karen Bennett Vice President, Environmental Affairs National Mining Association
Regulatory Summary:	Greg Peck Chief of Staff, Office of Wetlands, Oceans and Watersheds US Environmental Protection Agency
	Meg Gaffney-Smith Chief, Regulatory Community of Practice US Army Corps of Engineers
	Glenda Owens Deputy Director Office of Surface Mining Department of Interior
Scientific Summary:	Steve Canton GEI Consultants
Economic Impacts:	Hans Daniel Vice President, Marketing Analysis & Strategy Alpha Natural Resources
	Duane Feagley Pennsylvania Anthracite Council

Primary Technical Concerns with Proposed EPA Conductivity Benchmark

1. Issues with conflicting stressor-response profiles and species-sensitivity methods



- As outlined in GEI (2010), the prime underlying principle governing the use of a species-sensitivity distribution (SSD) is that all of the organisms in the distribution exhibit a consistent response to the stressor.
- Specifically, each of the taxa should respond negatively to the stressor – only differing in their degree of sensitivity – as shown below (Canton et al. 2010).



- However, as illustrated to the left (from EPA 2010), there are five different ways the organisms used to derive EPA's benchmark respond to conductivity.
  - These differences do not reflect varying levels of sensitivity over a consistent response profile – rather, they are fundamentally different types of stressor-response profiles.
- These five stressor-response profiles provide substantially different answers to the question "*what conductivity concentration is necessary to provide the level of protection used by EPA?*"
  - Decreasing (*Ephemerella*): <300 µs/cm
  - Increasing (*Hemerodromia*): >300 µs/cm
  - Optimum (*Psephenus*): >75 <u>and</u> <2,500 µs/cm
  - Bimodal (*Diplectrona*): <200 <u>and</u> >2,000 µs/cm
  - No response/bimodal (*Tvetenia*): *None needed*
- There is no way to reconcile these widely conflicting stressor-responses into a single benchmark protective of the entire macroinvertebrate community.

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2. **Issues with EPA's "causal analysis"**
   - Although EPA conducted a relatively formal causal analysis, the weight of evidence scoring for each causal element was relatively subjective and open to clearly reasonable alternative interpretations.
   - The taxonomic patterns of sensitivity to conductivity are not yet clearly defined.
     - Although laboratory toxicity data exposing mayflies to actual or simulated mining effluents suggest they may be somewhat sensitive, effect concentrations are highly variable.
   - Toxicity to ions associated with conductivity also varies strongly as a function of specific ion composition and can be mitigated under conditions of elevated hardness.
3. **Issues with EPA's confounding factor analysis**
   - EPA assumed conductivity as a "given" – then tried to see if other factors changed that assumption, when, in fact, a confounding factors analysis should include rigorous and independent tests of the primary hypothesis. In other words, EPA should first determine whether conductivity is indeed the best predictor of biological impairment that is causally related in such a way as to justify the proposed benchmark value.
   - EPA's confounding factor analysis would benefit from a closer evaluation to determine whether other factors could provide alternative explanations for patterns in macroinvertebrate community structure relative to coal mining/valley fill activities:
     - *Habitat*: There are three problems with EPA's assertion that habitat presented little potential for confounding in their derivation of the conductivity benchmark:
       - First, the RBP habitat scores used by EPA in their analyses may not be the most rigorous measure of habitat quality.
       - Second, the RBP habitat scores are correlated with both conductivity and the biological response.
       - Third, EPA's analysis of potential confounding habitat factors focused almost exclusively on the relationship of Ephemeroptera, to the exclusion of the rest of the benthic macroinvertebrate community.
     - *In fact, their confounding factors analysis was conducted exclusively with Ephemeroptera*:
       - Relationships between all potential stressors (in addition to habitat) and Ephemeroptera were generally cited as reasons to reject the stressors as potential confounders in the analysis that ultimately relates to the entire aquatic benthic community.
       - There is a clear need to include similar analyses from other members of the invertebrate community to conclusively reject additional environmental factors as potential confounding stressors.
     - *Influence of rare taxa*: EPA attempted to control for the effect of rare taxa by including only those taxa that had been collected in at least one reference site and at least 30 general sites.
       - It may have been more appropriate to have controlled for the effects of rare taxa by including in their SSD only those genera that had a high capture probability in the reference sites.
       - A plausible argument against excluding rare taxa from the SSD would be that the taxon is rare because of the stressor. However, this argument would not be valid if the taxon is naturally rare, a phenomenon that could be analyzed using its capture probability in reference sites.

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4. **Issues with ecological relevance of the proposed conductivity benchmark**

- GEI evaluated trends in macroinvertebrate community structure and function relative to conductivity using the data presented in EPA (2010). There are few observed changes in the proportional abundance of functional feeding groups within the regional pool of taxa at conductivity levels below approximately 2,500 µS/cm to 5,000 µS/cm.
- EPA's proposed conductivity benchmark does not evaluate any other type of aquatic life, so levels of protection for the entire aquatic community is unknown.

Independent Statistical Evaluation

In addition to the aforementioned technical concerns associated with a detailed review of EPA (2010), GEI conducted an independent statistical evaluation of ecological factors most closely associated with patterns in benthic macroinvertebrate community structure using the WABbase dataset; i.e., the same West Virginia database used to derive EPA's proposed conductivity benchmark (GEI 2010). GEI's analysis indicated the following:

- Conductivity alone is not the most appropriate parameter when trying to explain the variation observed among the Central Appalachian macroinvertebrate communities with respect to water quality and physical habitat.
- Rather, a combination of ionic composition, substrate composition, and channel features appear to be more appropriate stressor variables to consider.
    - Total suspended solids, dissolved oxygen, and fecal coliforms appear to be additional variables to consider, as they are strong indicators of other anthropogenic disturbances in the watersheds.
- These analyses also indicate that other metrics, like total taxa and percent EPT abundance, may be better response variables, as opposed to a singular focus on Ephemeroptera.

References

Canton SP, Guenzel LG, Pargee S. 2010. Acute and chronic toxicity of molybdenum to the fathead minnow and four aquatic invertebrates. *In preparation.*

GEI Consultants, Inc. (GEI). 2010. Final Technical Review: A Field-based Aquatic Life Benchmark for Conductivity. Available at http://www.nma.org/pdf/legal/092110_gei.pdf. GEI Consultants, Inc., Denver, CO.

U.S. Environmental Protection Agency (EPA). 2010. *A Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams.* Draft EPA/600/R-10/023A, U.S. Environmental Protection Agency, Washington, DC.

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4. Issues with ecological relevance of the proposed conductivity benchmark

- GEI evaluated trends in macroinvertebrate community structure and function relative to conductivity using the data presented in EPA (2010). There are few observed changes in the proportional abundance of functional feeding groups within the ecological range of TMDs at conductivity levels below approximately 2,500 µS/cm to 5,000 µS/cm.
- EPA's proposed conductivity benchmark does not evaluate any other type of adverse effects, so levels of protection for the entire aquatic community is unknown.

Independent Statistical Evaluation

In addition to the aforementioned technical concerns associated with a potential waiver of EPA (2010), GEI conducted an independent statistical evaluation of ecological factors most closely associated with variations in benthic macroinvertebrate community structure using the WV-Biosis database, the same West Virginia database used to derive EPA's proposed conductivity benchmark (GEI 2010). GEI's analysis indicated the following:

- Conductivity alone is not the most appropriate parameter when trying to explain the variation observed among the Central Appalachian macroinvertebrate communities with respect to water quality and physical habitat.
- Rather, a combination of ionic composition, substrate composition, and riparian features appear to be more appropriate stressor variables to consider.
  - Total suspended solids, dissolved oxygen, and local calcareous geology to be additional variables to consider, as they are strong indicators of other anthropogenic disturbances in the watersheds.
- These analyses also indicate that other metrics, like total TDS and percent EPT taxa/abundance, may be better response variables, as opposed to a singular focus on conductivity.

References

Cormier SM, Cormier LC, Farquhar S. 2010. Acute and chronic toxicity of molybdenum to the fathead minnow and four aquatic invertebrates. In preparation.

GEI Consultants, Inc. (GEI). 2010. Final Technical Review: A Field-based Aquatic Life Benchmark for Conductivity. Available at http://www.epa.gov/wqs/pubs/conductivity.html. GEI Consultants, Inc., Denver, CO.

U.S. Environmental Protection Agency (EPA). 2010. A Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams. Final EPA/822/R-10/023A. U.S. Environmental Protection Agency, Washington, DC.

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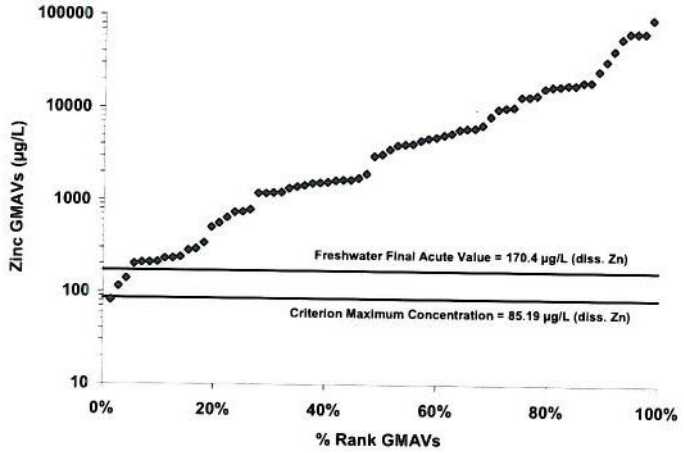
EPA Ambient Water Quality Criteria (AWQC) Derivation Procedures

- The national AWQC, developed by USEPA for protection of aquatic life, set maximum threshold contaminant concentrations for both freshwater and marine environments.
  - These criteria are derived from empirical toxicity data and are designed to be stringent enough to protect most sensitive species potentially exposed to a contaminant in any water body in the United States.
  - Below these thresholds, no adverse effects on aquatic community function are anticipated, although if present, the most sensitive species could be impacted as the AWQC are designed to protect all but the most sensitive 5% of species.
  - If data suggest that a commercially or recreationally important species is not protected at this level, then an AWQC can be adjusted to provide sufficient protection for these species as well.
- To understand how AWQC are developed, it is useful to review the guidelines provided in USEPA (1985)[1], but the general approach is briefly summarized below.
  - The first step is to compile acute and chronic toxicity data that meet the USEPA (1985) guidelines for the relevance and reliability of each study.
    - A minimum database of acceptable studies representing at least 8 specific taxonomic families of aquatic organisms is also required.
  - For each species with acceptable acute toxicity data, the species mean acute value (SMAV) is calculated as the geometric mean of available 48 to 96-hr median lethal concentrations (LC50s) or median effect concentrations (EC50s) for each species.
  - The genus mean acute value (GMAV) is then calculated as the geometric mean of available SMAVs for each genus.
  - The lowest 5th percentile of the distribution of available GMAVs is identified as the final acute value (FAV), which is divided by two to determine the criterion maximum concentration (CMC) which is more commonly termed the "acute criterion." (see zinc example below)
    - The FAV is divided by two because USEPA determined setting the CMC equal to the FAV (i.e., without dividing by two) was not sufficiently protective since it could induce up to 50% mortality to sensitive species.
    - It is important to note that the 5th percentile is calculated based solely on the four most sensitive GMAVs and the total number of GMAVs in the toxicity database (USEPA 1985).



  - The chronic criterion may be derived in a manner similar to the CMC, but chronic toxicity data are typically unavailable for a sufficient number of species to meet the "8-family rule".
    - It is thus typically necessary to apply an acute-chronic ratio (ACR) to the FAV to estimate the final chronic value (FCV).
    - Unless other data are available to suggest the FCV is under-protective of the aquatic community (including aquatic plants and protection from bioaccumulative substances), the criterion continuous concentration (CCC), or chronic criterion, is set equal to the FCV.

[1] USEPA. 1985. Guidelines for deriving numerical national water quality criteria for the protection of aquatic organisms and their uses. U.S. EPA, Washington, D.C. NTIS No. PB85-227049. 98 pages.

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Alpha Natural Resources

Congressional Caucus on Coal
Eastern Coal Forum

Economic Contributions of Appalachian Coal

Hans Daniels – VP, Market Analysis and Strategy
December 1, 2010

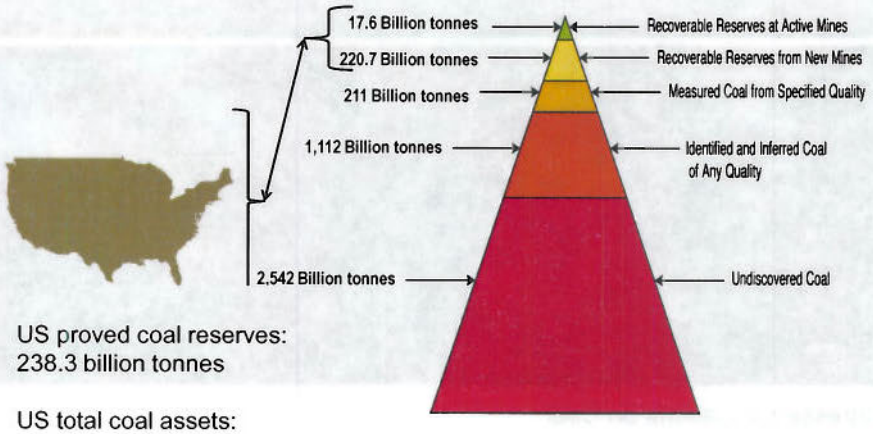
Alpha Natural Resources

Global Coal Reserves

Countries resized relative to coal reserves (tonnes)	
World Total	826.0 billion
United States	238.3 billion
Russia	157.0 billion
China	114.5 billion
Australia	76.2 billion
India	58.6 billion
Ukraine	33.9 billion
Kazakhstan	31.3 billion
South Africa	30.4 billion

Sources: EIA, BP Statistical Review of World Energy 2010, show.mappingworlds.com

US Coal Assets



US proved coal reserves:
238.3 billion tonnes

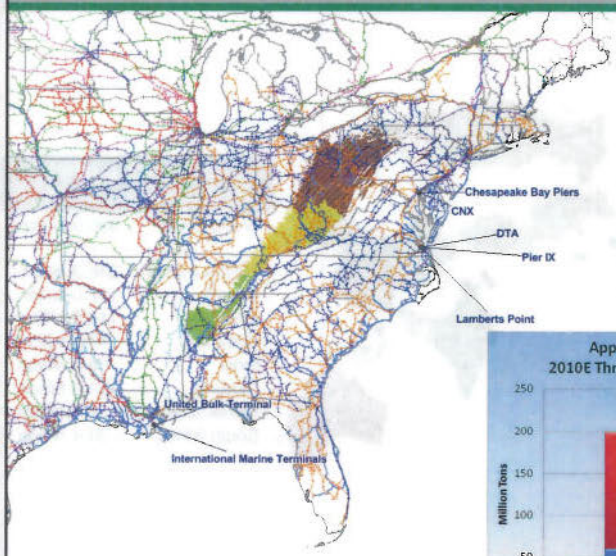
US total coal assets:
4,103 billion tonnes

1.0 Billion tonnes of U.S Coal Mined in 2009

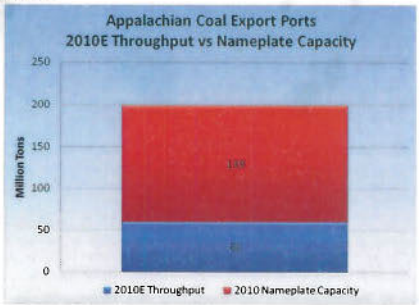
Stylized, Not to Scale

Sources: EIA, BP Statistical Review of World Energy 2010, North Dakota Geological Survey

Appalachian Coal Exports

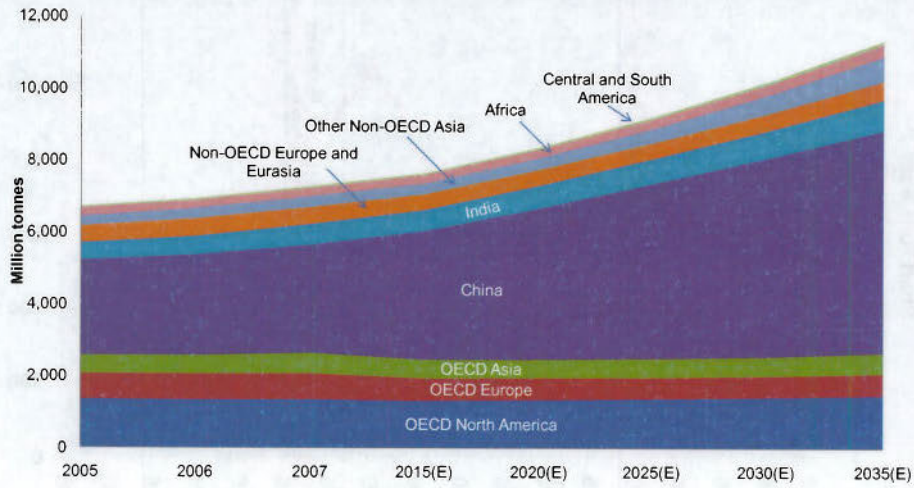


- Export infrastructure is well-developed
- Expected throughput from eastern ports is 60 million tons, with capacity for additional 139 million tons



Sources: Anders Williams, T. Parker Host, Ventyx Velocity Suite, internal

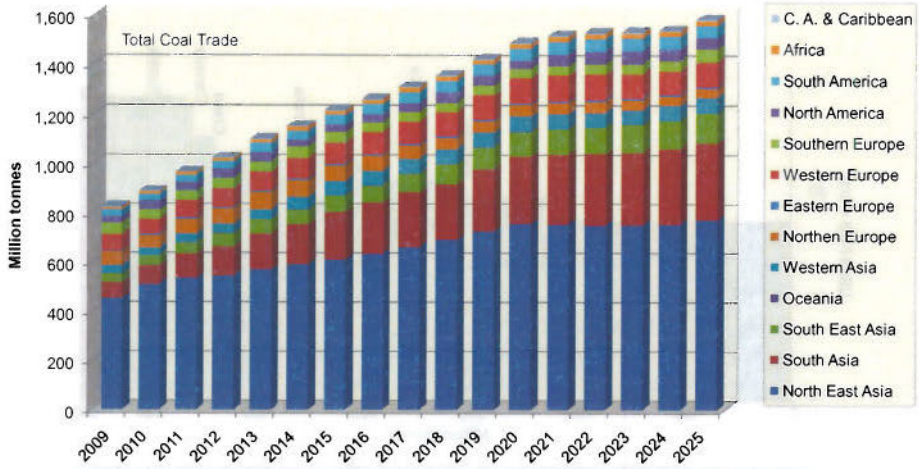
New Capacity Will Increase Coal Demand



- New coal-fired generation will drive up the worldwide demand for coal
- According to EIA, international coal demand will rise 48% between 2015 and 2035

Source: EIA – IEO 2010, assumed 10,000Btu/lb coal

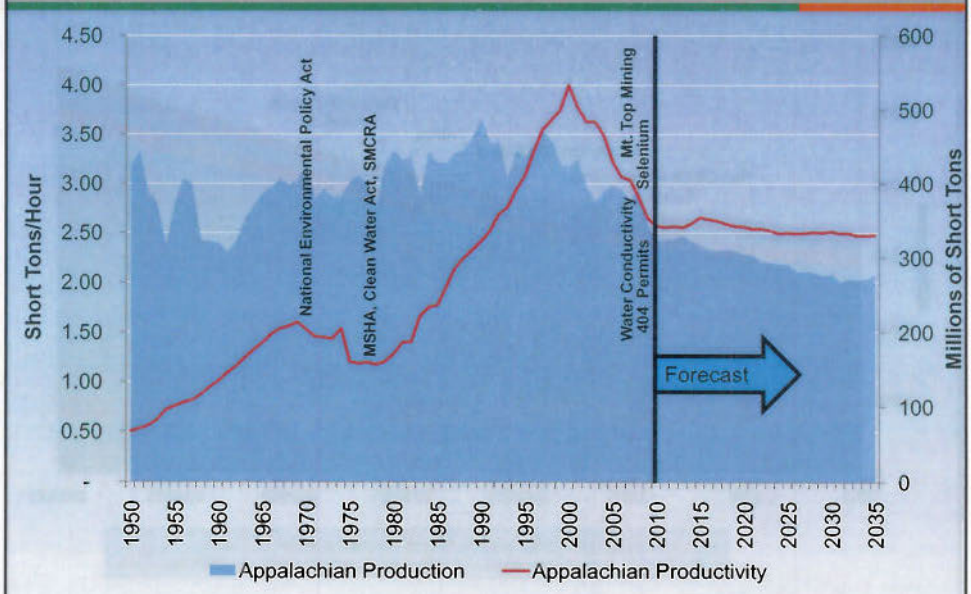
Seaborne Coal Demand Will Grow



- Increases in international coal demand will drive activity in the seaborne coal trade markets
- Seaborne coal activity is projected to expand over 70% in the next 15 years

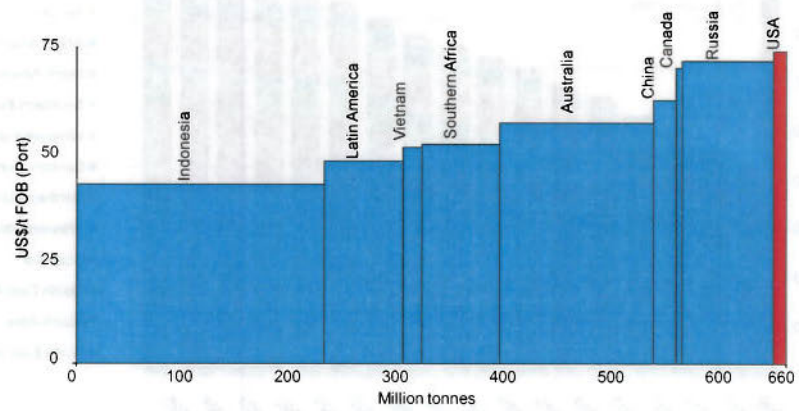
Source: Wood Mackenzie Coal Market Service

Appalachian Production and Productivity



Sources: EIA, USGS, Velocity Suite, Internal

US is Marginally-priced Supplier



- As international demand for coal increases, supply is typically met by the lowest cost suppliers first
- As the marginally-priced supplier of coal to the seaborne thermal market, the US is poised to gain significantly from increases in seaborne thermal trade

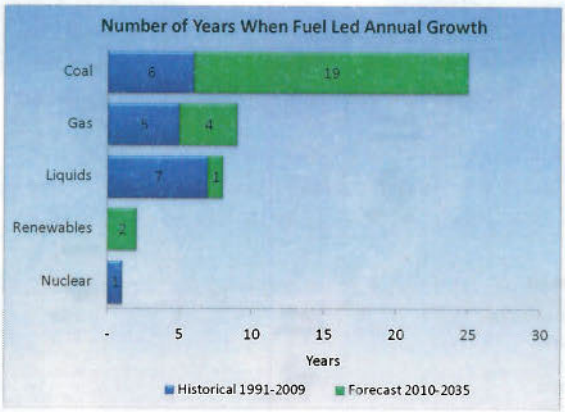
Source: Wood Mackenzie Coal Supply Service – 2010 Seaborne Thermal Coal Cost Curve

Conclusions

- US coal deposits are abundant
- US coal transportation infrastructure is well-developed
- Global demand for coal is forecast to grow substantially
- US stands to benefit economically from coal exports
- However, productivity is falling and costs are rising
- As a result, the US is the marginally-priced supplier of coal to the export market

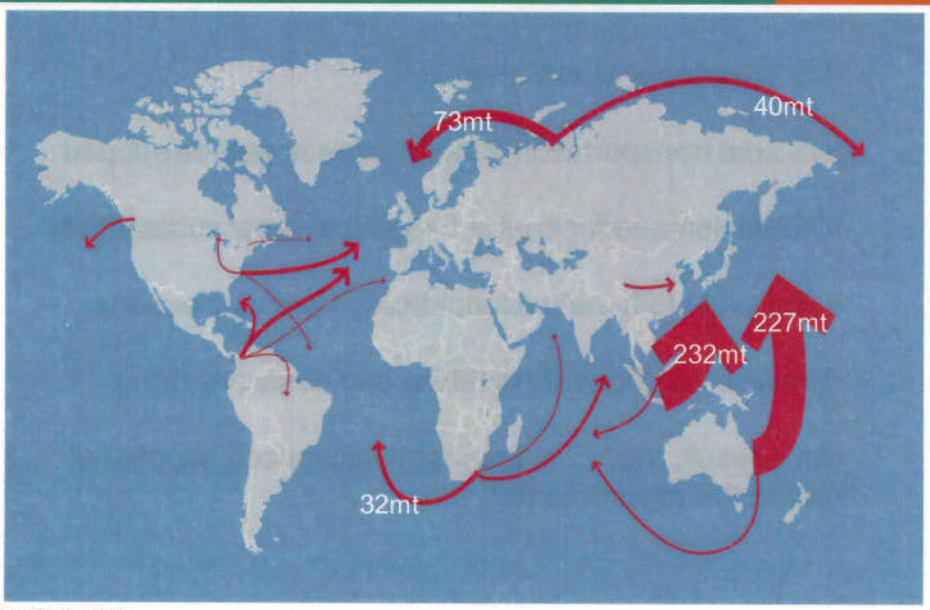
Coal - World's Fastest Growing Fuel

- World coal use grew more than gas, liquids, nuclear and renewables in 6 of the 18 years between 1991 and 2009
- Coal use is forecasted to grow more than competing fuels in 19 of the 26 years between 2010 and 2035



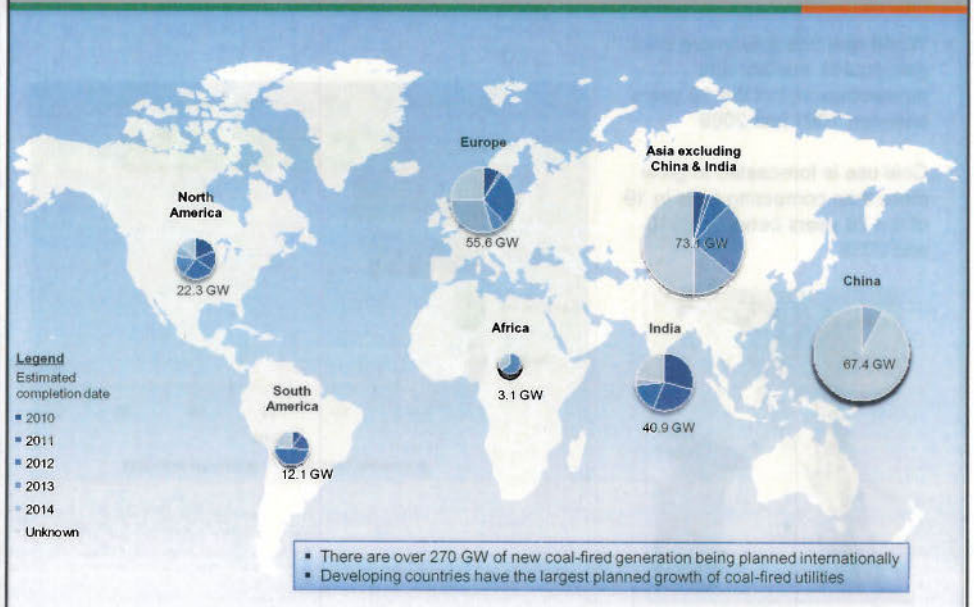
Source: EIA

2009 Trends in Seaborne Trading



Source: EIA, IEA, ABARE

Planned New Coal-Fired Generation Capacity



- There are over 270 GW of new coal-fired generation being planned internationally
- Developing countries have the largest planned growth of coal-fired utilities

Sources: Wood Mackenzie Coal Market Service, Ventyx Velocity Suite, McCloskey Steam Coal Forecaster

EPA's Attempt to Revoke an Existing 404 Permit

December 2010

Background: The Environmental Protection Agency is unlawfully trying to revoke Mingo Logan's Clean Water Act (CWA) Section 404 permit. The permit was issued in 2007 after an extensive 10-year review that included an Environmental Impact Statement (EIS), which is unprecedented with a mining operation on private lands that cost millions of dollars. Mingo Logan has fully complied with the permit for the three years it has had the permit. EPA not only participated in the comprehensive permitting process, it also agreed to the provisions and findings of the permit that it now claims are reasons to revoke the permit. **EPA claims that Section 404(c) authorizes it to revoke the permit, but EPA's action is a clear violation of the CWA.** Not only does Section 404(c) not authorize EPA to veto a permit once it has been issued, EPA is trying to use the section 404(c) process to impose, and in some instances overturn, water quality decisions expressly reserved under the CWA to the State of West Virginia. EPA's actions against Mingo Logan are unprecedented in view of the fact that since the CWA was enacted in 1972, **EPA has never before attempted to revoke an issued CWA 404 permit.**

Status: EPA initiated this process by asking the U.S. Army Corps of Engineers (Corps) to suspend the permit in September 2009. After studying the record and determining that there were no grounds for revocation or modification, the Corps refused. EPA Region III then published its Proposed Recommendation on April 2, 2010, and Mingo Logan brought suit against EPA the same day. Mingo Logan asserts that EPA's 404(c) authority must be exercised before a permit has been issued. Once a permit is issued, only the Corps may revoke or modify it, and then only under certain prescribed circumstances. After publishing the Proposed Determination and receiving numerous comments from groups concerned about EPA's unprecedented authority to veto an existing permit, EPA granted itself an extension of several months, and on Sept. 24, 2010, EPA Region III forwarded a Recommended Determination to EPA headquarters, recommending that Administrator Lisa Jackson revoke Mingo Logan's Section 404 permit. Mingo Logan filed comments in response to the Recommended Determination on Nov. 29, 2010. The D.C. District Court has not yet acted on Mingo Logan's challenge to EPA's authority under 404(c) or on the government's motion to dismiss the suit. Meanwhile, EPA has given itself until Feb. 22, 2011, to issue a Final Determination

What is at Stake for Other Permittees: Every holder of a 404 permit should be gravely concerned about EPA's action. If EPA prevails, every 404 permit would be subject to unilateral, after-the-fact revocation by EPA. In Mingo Logan's case, revocation of the permit will not only cost the company millions of dollars, but will also cost the State of West Virginia and Logan County millions in tax revenues and result in serious job loss. Likewise, any permittee will face the possibility of EPA arbitrarily destroying its investment and projected revenues. EPA is seeking a perpetual permitting authority, which it can use whenever it pleases to upend any project that requires a 404 permit.

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EPA's action threatens all industries, businesses and individuals that need 404 permits. Agricultural, residential, commercial and industrial development, road and transportation construction, mining, shipping and public works projects are all potentially subject to EPA's claimed revocation authority. **The implications for the American economy and jobs are significant. The Corps' 404 regulatory program authorizes $220 billion in economic activity annually, all of which will be subject to EPA's after-the-fact veto if EPA persists in its present course.**

Matthew Klasen/DC/USEPA/US
12/07/2010 08:27 AM

To Jim Pendergast
cc
bcc
Subject Re: Updated shot at #3 language for OSM

Thanks Jim; I'll make those changes now.

I'll wait for Greg, Mike, or Ross to add any suggestions, and I'll work with Greg to get this up to Denise, Kevin, Nancy, and Bob (through Greg) when appropriate.

Thanks,
Matt

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

Jim Pendergast (b) (5) [redacted] 12/07/2010 08:01:02 AM

From: Jim Pendergast/DC/USEPA/US
To: Matthew Klasen/DC/USEPA/US@EPA
Date: 12/07/2010 08:01 AM
Subject: Re: Updated shot at #3 language for OSM

(b) (5) [redacted]

- [redacted]
- [redacted]

[redacted]

Jim

Matthew Klasen Greg, Jim, Ross, and Mike: Apologies for the de... 12/06/2010 11:50:24 PM

From: Matthew Klasen/DC/USEPA/US
To: Gregory Peck/DC/USEPA/US@EPA, Ross Geredien/DC/USEPA/US@EPA, MichaelG Lee/DC/USEPA/US@EPA, Jim Pendergast/DC/USEPA/US@EPA
Date: 12/06/2010 11:50 PM
Subject: Updated shot at #3 language for OSM

Greg, Jim, Ross, and Mike:

(b) (5)

Thanks,
Matt

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229[attachment "2010-12-06 OSM Follow-Up.docx" deleted by Matthew Klasen/DC/USEPA/US]

Rachael Novak/DC/USEPA/US
12/07/2010 10:25 AM

To Joe Beaman
cc Lisa Huff
bcc
Subject Conductivity materials

I'm heading down to meet Susan. I'll have copies of everything.

AgendaConductivity12072010-1.doc Table4-PredictedConductConc.xls

ATTACHMENTS REDACTED - DELIBERATIVE

Rachael Novak/DC/USEPA/US
12/07/2010 02:03 PM

To Susan Cormier, Glenn Suter
cc Lisa Huff, Joe Beaman
bcc
Subject documents from today's meeting on conductivity criteria

Thanks for a productive meeting today. Attached is an updated timeline per our meeting today, today's agenda (for reference), a generic Table of Contents for the criteria document, and the "Table 4" from another somewhat related work assignment (b) (5) [redacted]

From the meeting today, it looks like

- (b) (5) [redacted]
- [redacted]
- [redacted]
- [redacted]

Thanks everyone!
Rachael

AgendaConductivity12072010-1.doc WorkPlanConductivity.xls Table of Contents12072010.doc Table4-PredictedConductConc.xls

ATTACHMENTS REDACTED - DELIBERATIVE

Matthew Klasen/DC/USEPA/US

12/07/2010 02:47 PM

To: Beth Walls, Brian Frazer, Brian Topping, Christopher Hunter, Cliff Rader, Duncan Powell, Heinz Mueller, Jeffrey Lapp, Jessica Martinsen, Kevin Minoli, KevinH Miller, MichaelG Lee, Philip Mancusi-Ungaro, Ross Geredien, Tom Welborn, Denise Keehner, William Early, Stan Meiburg, Gregory Peck, David Evans, Jim Giattina, John Pomponio

cc:

bcc:

Subject: Stacy Branch follow-up: Letter comments by noon tomorrow (Wednesday)

Hi everyone,

Thanks for your participation at our 1-2 pm call on Stacy Branch. Tom, we apologize again for keeping you away from the festivities.

For folks not on the call or folks who left early, the plan is for everyone to provide edits by **noon tomorrow (Wednesday)** to the most recent draft of the letter so that we can get a version ready for Bob/Nancy et al. by COB tomorrow. The most recent draft is attached, which is the same version that Greg circulated yesterday. Please send me your edits and I'll take the lead on compiling everything into one document.

Thanks again for the discussion at 1, and please let me know if you have any questions. We'll check up with the AO on scheduling the Bob-Nancy meeting.

Best,
Matt

ATTACHMENT REDACTED - DELIBERATIVE

2010-12-06_Draft_Leeco - Clean.docx

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

Matthew Klasen/DC/USEPA/US
12/07/2010 03:30 PM

To Gregory Peck
cc
bcc
Subject Fw: Stacy Branch follow-up: Letter comments by noon tomorrow (Wednesday)

Here's the most recent draft (same one you sent around yesterday).

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229
----- Forwarded by Matthew Klasen/DC/USEPA/US on 12/07/2010 03:30 PM -----

From: Matthew Klasen/DC/USEPA/US
To: Beth Walls/R4/USEPA/US@EPA, Brian Frazer/DC/USEPA/US@EPA, Brian Topping/DC/USEPA/US@EPA, Christopher Hunter/DC/USEPA/US@EPA, Cliff Rader/DC/USEPA/US@EPA, Duncan Powell/R4/USEPA/US@EPA, Heinz Mueller/R4/USEPA/US@EPA, Jeffrey Lapp/R3/USEPA/US@EPA, Jessica Martinsen/R3/USEPA/US@EPA, Kevin Minoli/DC/USEPA/US@EPA, KevinH Miller/R4/USEPA/US@EPA, MichaelG Lee/DC/USEPA/US@EPA, Philip Mancusi-Ungaro/R4/USEPA/US@EPA, Ross Geredien/DC/USEPA/US@EPA, Tom Welborn/R4/USEPA/US@EPA, Denise Keehner/DC/USEPA/US@EPA, William Early/R3/USEPA/US, Stan Meiburg/R4/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA, David Evans/DC/USEPA/US@EPA, Jim Giattina/R4/USEPA/US@EPA, John Pomponio/R3/USEPA/US@EPA
Date: 12/07/2010 02:47 PM
Subject: Stacy Branch follow-up: Letter comments by noon tomorrow (Wednesday)

Hi everyone,

Thanks for your participation at our 1-2 pm call on Stacy Branch. Tom, we apologize again for keeping you away from the festivities.

For folks not on the call or folks who left early, the plan is for everyone to provide edits by **noon tomorrow (Wednesday)** to the most recent draft of the letter so that we can get a version ready for Bob/Nancy et al. by COB tomorrow. The most recent draft is attached, which is the same version that Greg circulated yesterday. Please send me your edits and I'll take the lead on compiling everything into one document.

Thanks again for the discussion at 1, and please let me know if you have any questions. We'll check up with the AO on scheduling the Bob-Nancy meeting.

Best,
Matt

ATTACHMENT REDACTED - DELIBERATIVE

2010-12-06_Draft_Leeco - Clean.docx

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)

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cell (202) 380-7229

Matthew Klasen/DC/USEPA/US
12/07/2010 04:11 PM

To Js Wilson
cc Sharmin Syed
bcc
Subject Re: FYI -- OSM stream protection rule update and response doc

Thanks Scott. I'll copy you both on a slightly updated version shortly (just FYI).

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

Js Wilson | Matt: This looks good to me. I don't have any co... | 12/07/2010 03:48:34 PM

From: Js Wilson/DC/USEPA/US
To: Matthew Klasen/DC/USEPA/US@EPA
Cc: Sharmin Syed/DC/USEPA/US@EPA
Date: 12/07/2010 03:48 PM
Subject: Re: FYI -- OSM stream protection rule update and response doc

Matt:

This looks good to me. I don't have any comments.

Scott Wilson, Energy Coordinator
Industrial Permits Branch (4203M)
Office of Wastewater Management
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW
Washington, DC 20460
202-564-6087

Matthew Klasen | Scott and Sharmin: I wanted to give you both an... | 12/07/2010 09:43:08 AM

From: Matthew Klasen/DC/USEPA/US
To: Js Wilson/DC/USEPA/US@EPA, Sharmin Syed/DC/USEPA/US@EPA
Date: 12/07/2010 09:43 AM
Subject: FYI -- OSM stream protection rule update and response doc

Scott and Sharmin:

I wanted to give you both an update on where things are with our stream protection rule work with OSM (which has been fairly quiet as of late).

Bob, Nancy, and Joe Pizarchik had a meeting a couple weeks ago (Nov. 23) to discuss high-level policy issues with the draft rule. (b) (5) [redacted]

In response, Joe asked for specific regulatory text from EPA that we think would resolve these concerns.

(b) (5)
See attached for our most recent draft, which is almost identical to our previous comments on issues #1 and 2 and that only includes relevant new language on issue #3 (on BMPs).

Let me know if you have any comments on the current draft. We're hoping to get something to OSM by COB today (unlikely) or early tomorrow.

Thanks,
Matt

Matt Klasen
U.S. Environmental Protection Agency
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cell (202) 380-7229

----- Forwarded by Matthew Klasen/DC/USEPA/US on 12/07/2010 09:38 AM -----

From:	Matthew Klasen/DC/USEPA/US
To:	Gregory Peck/DC/USEPA/US@EPA, Ross Geredien/DC/USEPA/US@EPA, MichaelG Lee/DC/USEPA/US@EPA, Jim Pendergast/DC/USEPA/US@EPA
Date:	12/06/2010 11:50 PM
Subject:	Updated shot at #3 language for OSM

Greg, Jim, Ross, and Mike:

(b) (5)

(b) (5) [redacted]

[redacted]

Thanks,
Matt

Matt Klasen
U.S. Environmental Protection Agency
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[attachment "2010-12-07 OSM Follow-Up - Clean.docx" deleted by Js Wilson/DC/USEPA/US]

Matthew Klasen/DC/USEPA/US
12/07/2010 04:14 PM

To Ross Geredien
cc Gregory Peck, Jim Pendergast, MichaelG Lee, Sharmin Syed, Js Wilson
bcc
Subject Re: Updated shot at #3 language for OSM

Hi everyone,

Ross: thanks, these edits look good.

I've made a few (minor, I think) changes shown in the attached --- only showing edits from Ross's version -- and let me know if you have any concerns with these. I'll be talking to Greg about this version shortly.

Thanks,
Matt

ATTACHMENT REDACTED - DELIBERATIVE

2010-12-07 OSM Follow-Up - Compiled.docx

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

Ross Geredien | Some edits and additions. I also incorporated so... | 12/07/2010 11:58:18 AM

From: Ross Geredien/DC/USEPA/US
To: Matthew Klasen/DC/USEPA/US@EPA
Cc: Gregory Peck/DC/USEPA/US@EPA, Jim Pendergast/DC/USEPA/US@EPA, MichaelG Lee/DC/USEPA/US@EPA
Date: 12/07/2010 11:58 AM
Subject: Re: Updated shot at #3 language for OSM

Some edits and additions. I also incorporated some of Jim's suggestions.

[attachment "2010-12-06 OSM Follow-Up_RPG Edits.docx" deleted by Matthew Klasen/DC/USEPA/US]

Ross Geredien
ORISE Fellow
EPA Office of Wetlands, Oceans, and Watersheds
202-566-1466
Geredien.ross(AT)epa.gov

Matthew Klasen | Greg, Jim, Ross, and Mike: Apologies for the de... | 12/06/2010 11:50:24 PM

From: Matthew Klasen/DC/USEPA/US
To: Gregory Peck/DC/USEPA/US@EPA, Ross Geredien/DC/USEPA/US@EPA, MichaelG Lee/DC/USEPA/US@EPA, Jim Pendergast/DC/USEPA/US@EPA
Date: 12/06/2010 11:50 PM
Subject: Updated shot at #3 language for OSM

Greg, Jim, Ross, and Mike:

(b) (5)

Thanks,
Matt

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229[attachment "2010-12-06 OSM Follow-Up.docx" deleted by Ross Geredien/DC/USEPA/US]

Matthew Klasen/DC/USEPA/US
12/07/2010 05:48 PM

To Matthew Klasen
cc
bcc
Subject

2010-12-01 Hill Coal Summit Docs.pdf

2010-12-06_Draft_Leeco - TCdkedits.docx

2010-12-07 Leeco Notes.docx

Matt Klasen
U.S. Environmental Protection Agency
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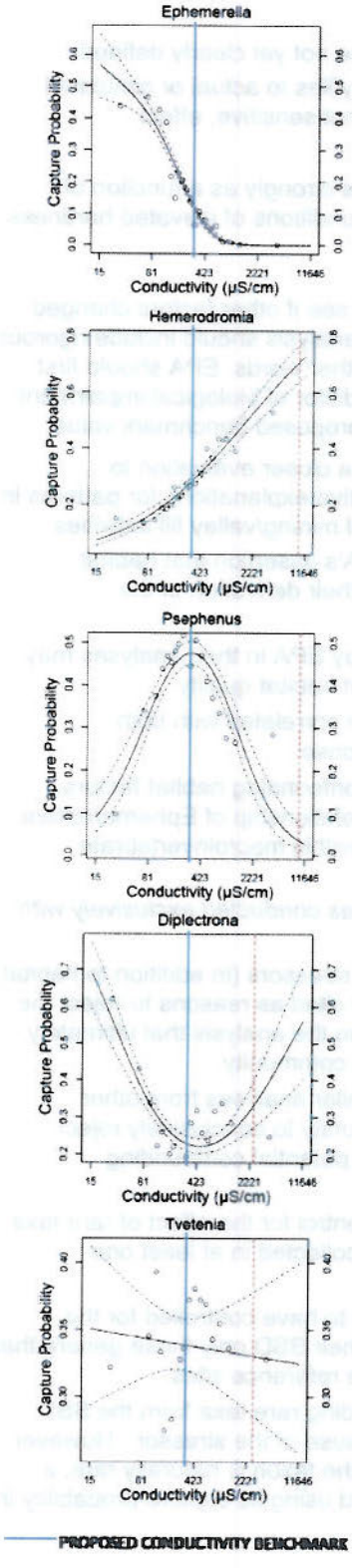
WORD ATTACHMENTS REDACTED - DELIBERATIVE

Congressional Caucus on Coal
Staff Briefing
"Eastern Coal Forum: Effects of Federal Regulations on Appalachia Coal Mining"
Wednesday, December 1, 2010

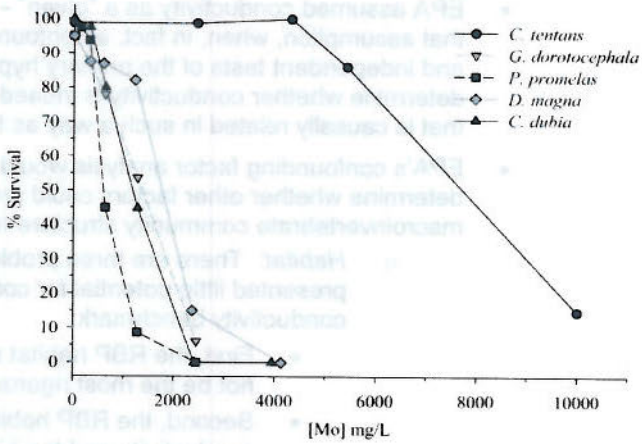
Background/Moderator:	Karen Bennett Vice President, Environmental Affairs National Mining Association
Regulatory Summary:	Greg Peck Chief of Staff, Office of Wetlands, Oceans and Watersheds US Environmental Protection Agency
	Meg Gaffney-Smith Chief, Regulatory Community of Practice US Army Corps of Engineers
	Glenda Owens Deputy Director Office of Surface Mining Department of Interior
Scientific Summary:	Steve Canton GEI Consultants
Economic Impacts:	Hans Daniel Vice President, Marketing Analysis & Strategy Alpha Natural Resources
	Duane Feagley Pennsylvania Anthracite Council

Primary Technical Concerns with Proposed EPA Conductivity Benchmark

1. Issues with conflicting stressor-response profiles and species-sensitivity methods



- As outlined in GEI (2010), the prime underlying principle governing the use of a species-sensitivity distribution (SSD) is that all of the organisms in the distribution exhibit a consistent response to the stressor.
- Specifically, each of the taxa should respond negatively to the stressor – only differing in their degree of sensitivity – as shown below (Canton et al. 2010).



- However, as illustrated to the left (from EPA 2010), there are five different ways the organisms used to derive EPA's benchmark respond to conductivity.
  - These differences do not reflect varying levels of sensitivity over a consistent response profile – rather, they are fundamentally different types of stressor-response profiles.
- These five stressor-response profiles provide substantially different answers to the question "*what conductivity concentration is necessary to provide the level of protection used by EPA?*"
  - Decreasing (*Ephemerella*): <300 µs/cm
  - Increasing (*Hemerodromia*): >300 µs/cm
  - Optimum (*Psephenus*): >75 <u>and</u> <2,500 µs/cm
  - Bimodal (*Diplectrona*): <200 <u>and</u> >2,000 µs/cm
  - No response/bimodal (*Tvetenia*): *None needed*
- There is no way to reconcile these widely conflicting stressor-responses into a single benchmark protective of the entire macroinvertebrate community.

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4601 DTC Boulevard, Suite 900, Denver, CO 80237
303.662.0100 fax: 303.662.8757
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2. **Issues with EPA's "causal analysis"**
   - Although EPA conducted a relatively formal causal analysis, the weight of evidence scoring for each causal element was relatively subjective and open to clearly reasonable alternative interpretations.
   - The taxonomic patterns of sensitivity to conductivity are not yet clearly defined.
     - Although laboratory toxicity data exposing mayflies to actual or simulated mining effluents suggest they may be somewhat sensitive, effect concentrations are highly variable.
   - Toxicity to ions associated with conductivity also varies strongly as a function of specific ion composition and can be mitigated under conditions of elevated hardness.
3. **Issues with EPA's confounding factor analysis**
   - EPA assumed conductivity as a "given" – then tried to see if other factors changed that assumption, when, in fact, a confounding factors analysis should include rigorous and independent tests of the primary hypothesis. In other words, EPA should first determine whether conductivity is indeed the best predictor of biological impairment that is causally related in such a way as to justify the proposed benchmark value.
   - EPA's confounding factor analysis would benefit from a closer evaluation to determine whether other factors could provide alternative explanations for patterns in macroinvertebrate community structure relative to coal mining/valley fill activities:
     - *Habitat*: There are three problems with EPA's assertion that habitat presented little potential for confounding in their derivation of the conductivity benchmark:
       - First, the RBP habitat scores used by EPA in their analyses may not be the most rigorous measure of habitat quality.
       - Second, the RBP habitat scores are correlated with both conductivity and the biological response.
       - Third, EPA's analysis of potential confounding habitat factors focused almost exclusively on the relationship of Ephemeroptera, to the exclusion of the rest of the benthic macroinvertebrate community.
     - *In fact, their confounding factors analysis was conducted exclusively with Ephemeroptera*:
       - Relationships between all potential stressors (in addition to habitat) and Ephemeroptera were generally cited as reasons to reject the stressors as potential confounders in the analysis that ultimately relates to the entire aquatic benthic community.
       - There is a clear need to include similar analyses from other members of the invertebrate community to conclusively reject additional environmental factors as potential confounding stressors.
     - *Influence of rare taxa*: EPA attempted to control for the effect of rare taxa by including only those taxa that had been collected in at least one reference site and at least 30 general sites.
       - It may have been more appropriate to have controlled for the effects of rare taxa by including in their SSD only those genera that had a high capture probability in the reference sites.
       - A plausible argument against excluding rare taxa from the SSD would be that the taxon is rare because of the stressor. However, this argument would not be valid if the taxon is naturally rare, a phenomenon that could be analyzed using its capture probability in reference sites.

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4. **Issues with ecological relevance of the proposed conductivity benchmark**

- GEI evaluated trends in macroinvertebrate community structure and function relative to conductivity using the data presented in EPA (2010). There are few observed changes in the proportional abundance of functional feeding groups within the regional pool of taxa at conductivity levels below approximately 2,500 µS/cm to 5,000 µS/cm.
- EPA's proposed conductivity benchmark does not evaluate any other type of aquatic life, so levels of protection for the entire aquatic community is unknown.

Independent Statistical Evaluation

In addition to the aforementioned technical concerns associated with a detailed review of EPA (2010), GEI conducted an independent statistical evaluation of ecological factors most closely associated with patterns in benthic macroinvertebrate community structure using the WABbase dataset; i.e., the same West Virginia database used to derive EPA's proposed conductivity benchmark (GEI 2010). GEI's analysis indicated the following:

- Conductivity alone is not the most appropriate parameter when trying to explain the variation observed among the Central Appalachian macroinvertebrate communities with respect to water quality and physical habitat.
- Rather, a combination of ionic composition, substrate composition, and channel features appear to be more appropriate stressor variables to consider.
    - Total suspended solids, dissolved oxygen, and fecal coliforms appear to be additional variables to consider, as they are strong indicators of other anthropogenic disturbances in the watersheds.
- These analyses also indicate that other metrics, like total taxa and percent EPT abundance, may be better response variables, as opposed to a singular focus on Ephemeroptera.

References

Canton SP, Guenzel LG, Pargee S. 2010. Acute and chronic toxicity of molybdenum to the fathead minnow and four aquatic invertebrates. *In preparation.*

GEI Consultants, Inc. (GEI). 2010. Final Technical Review: A Field-based Aquatic Life Benchmark for Conductivity. Available at http://www.nma.org/pdf/legal/092110_gei.pdf. GEI Consultants, Inc., Denver, CO.

U.S. Environmental Protection Agency (EPA). 2010. *A Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams.* Draft EPA/600/R-10/023A, U.S. Environmental Protection Agency, Washington, DC.

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4. Issues with ecological relevance of the proposed conductivity benchmark

- GEI evaluated trends in macroinvertebrate community structure and function relative to conductivity using the data presented in EPA (2010). There are few observed changes in the proportional abundance of functional feeding groups within the ecological range of TMDs at conductivity levels below approximately 2,500 µS/cm to 5,000 µS/cm.
- EPA's proposed conductivity benchmark does not evaluate any other type of adverse effects, so levels of protection for the entire aquatic community is unknown.

Independent Statistical Evaluation

In addition to the aforementioned technical concerns associated with a potential waiver of EPA (2010), GEI conducted an independent statistical evaluation of ecological factors most closely associated with variations in benthic macroinvertebrate community structure using the WV-Biosis database, the same West Virginia database used to derive EPA's proposed conductivity benchmark (GEI 2010). GEI's analysis indicated the following:

- Conductivity alone is not the most appropriate parameter when trying to explain the variation observed among the Central Appalachian macroinvertebrate communities with respect to water quality and physical habitat.
- Rather, a combination of ionic composition, substrate composition, and riparian features appear to be more appropriate stressor variables to consider.
  - Total suspended solids, dissolved oxygen, and local calcareous geology to be additional variables to consider, as they are strong indicators of other anthropogenic disturbances in the watersheds.
- These analyses also indicate that other metrics, like total TDS and percent EPT taxa/abundance, may be better response variables, as opposed to a singular focus on conductivity.

References

Cormier SM, Cormier LC, Farquhar S. 2010. Acute and chronic toxicity of molybdenum to the fathead minnow and four aquatic invertebrates. In preparation.

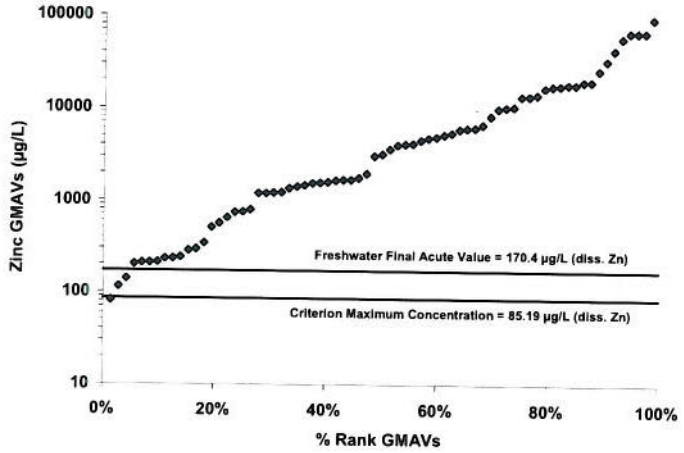
GEI Consultants, Inc. (GEI). 2010. Final Technical Review: A Field-based Aquatic Life Benchmark for Conductivity. Available at http://www.epa.gov/wqs/pubs/conductivity.html. GEI Consultants, Inc., Denver, CO.

U.S. Environmental Protection Agency (EPA). 2010. A Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams. Final EPA/822/R-10/023A. U.S. Environmental Protection Agency, Washington, DC.

GEI Consultants

EPA Ambient Water Quality Criteria (AWQC) Derivation Procedures

- The national AWQC, developed by USEPA for protection of aquatic life, set maximum threshold contaminant concentrations for both freshwater and marine environments.
  - These criteria are derived from empirical toxicity data and are designed to be stringent enough to protect most sensitive species potentially exposed to a contaminant in any water body in the United States.
  - Below these thresholds, no adverse effects on aquatic community function are anticipated, although if present, the most sensitive species could be impacted as the AWQC are designed to protect all but the most sensitive 5% of species.
  - If data suggest that a commercially or recreationally important species is not protected at this level, then an AWQC can be adjusted to provide sufficient protection for these species as well.
- To understand how AWQC are developed, it is useful to review the guidelines provided in USEPA (1985)[1], but the general approach is briefly summarized below.
  - The first step is to compile acute and chronic toxicity data that meet the USEPA (1985) guidelines for the relevance and reliability of each study.
    - A minimum database of acceptable studies representing at least 8 specific taxonomic families of aquatic organisms is also required.
  - For each species with acceptable acute toxicity data, the species mean acute value (SMAV) is calculated as the geometric mean of available 48 to 96-hr median lethal concentrations (LC50s) or median effect concentrations (EC50s) for each species.
  - The genus mean acute value (GMAV) is then calculated as the geometric mean of available SMAVs for each genus.
  - The lowest 5th percentile of the distribution of available GMAVs is identified as the final acute value (FAV), which is divided by two to determine the criterion maximum concentration (CMC) which is more commonly termed the "acute criterion." (see zinc example below)
    - The FAV is divided by two because USEPA determined setting the CMC equal to the FAV (i.e., without dividing by two) was not sufficiently protective since it could induce up to 50% mortality to sensitive species.
    - It is important to note that the 5th percentile is calculated based solely on the four most sensitive GMAVs and the total number of GMAVs in the toxicity database (USEPA 1985).



  - The chronic criterion may be derived in a manner similar to the CMC, but chronic toxicity data are typically unavailable for a sufficient number of species to meet the "8-family rule".
    - It is thus typically necessary to apply an acute-chronic ratio (ACR) to the FAV to estimate the final chronic value (FCV).
    - Unless other data are available to suggest the FCV is under-protective of the aquatic community (including aquatic plants and protection from bioaccumulative substances), the criterion continuous concentration (CCC), or chronic criterion, is set equal to the FCV.

[1] USEPA. 1985. Guidelines for deriving numerical national water quality criteria for the protection of aquatic organisms and their uses. U.S. EPA, Washington, D.C. NTIS No. PB85-227049. 98 pages.

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Alpha Natural Resources

Congressional Caucus on Coal
Eastern Coal Forum

Economic Contributions of Appalachian Coal

Hans Daniels – VP, Market Analysis and Strategy
December 1, 2010

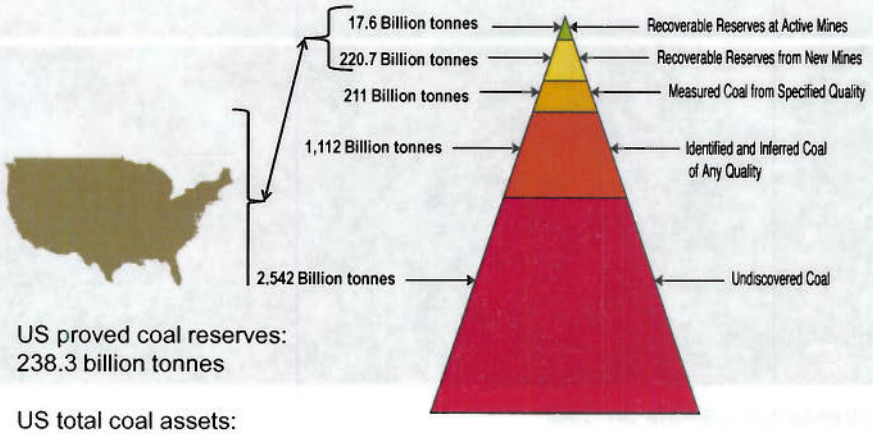
Alpha Natural Resources

Global Coal Reserves

Countries resized relative to coal reserves (tonnes)	
World Total	826.0 billion
United States	238.3 billion
Russia	157.0 billion
China	114.5 billion
Australia	76.2 billion
India	58.6 billion
Ukraine	33.9 billion
Kazakhstan	31.3 billion
South Africa	30.4 billion

Sources: EIA, BP Statistical Review of World Energy 2010, show.mappingworlds.com

US Coal Assets



US proved coal reserves:
238.3 billion tonnes

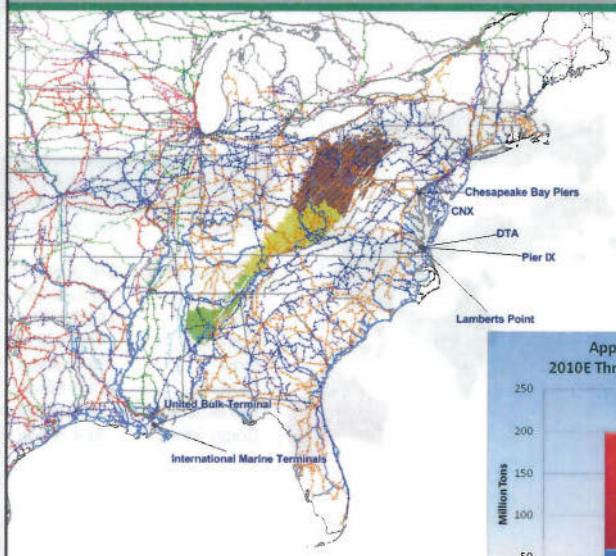
US total coal assets:
4,103 billion tonnes

1.0 Billion tonnes of U.S Coal Mined in 2009

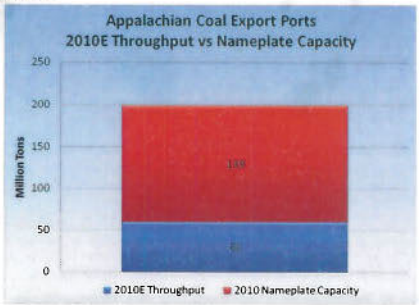
Stylized, Not to Scale

Sources: EIA, BP Statistical Review of World Energy 2010, North Dakota Geological Survey

Appalachian Coal Exports

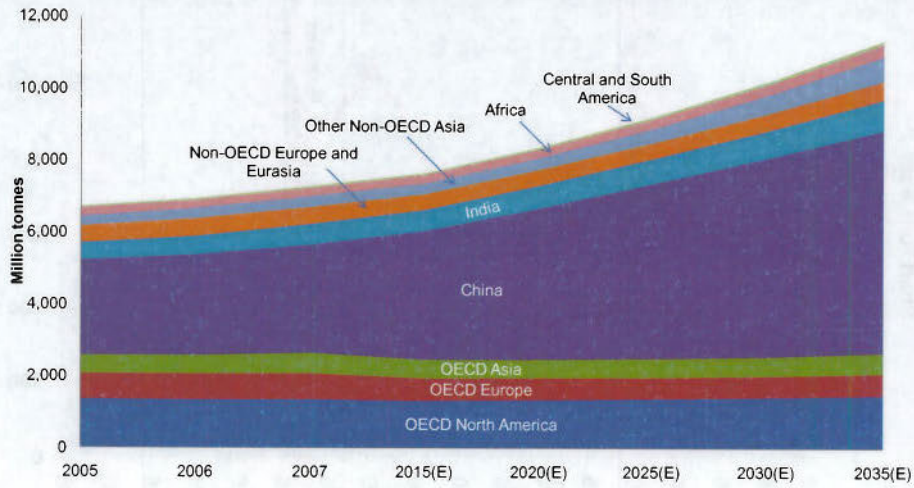


- Export infrastructure is well-developed
- Expected throughput from eastern ports is 60 million tons, with capacity for additional 139 million tons



Sources: Anders Williams, T. Parker Host, Ventyx Velocity Suite, internal

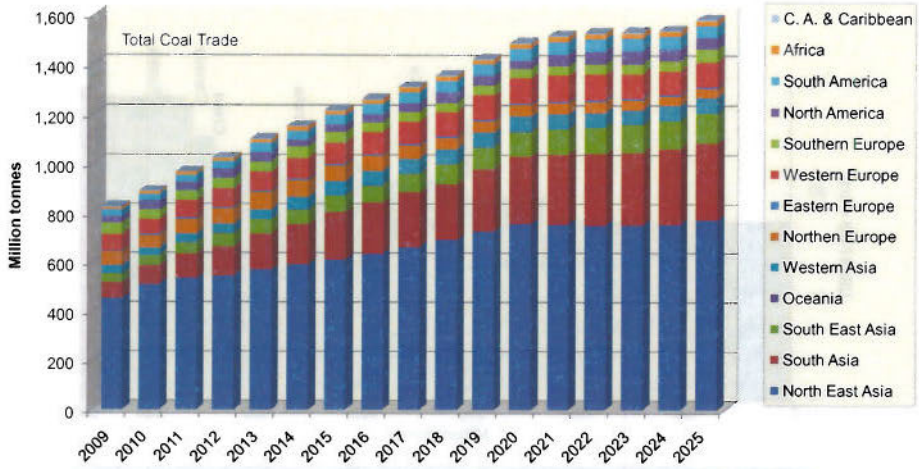
New Capacity Will Increase Coal Demand



- New coal-fired generation will drive up the worldwide demand for coal
- According to EIA, international coal demand will rise 48% between 2015 and 2035

Source: EIA – IEO 2010, assumed 10,000Btu/lb coal

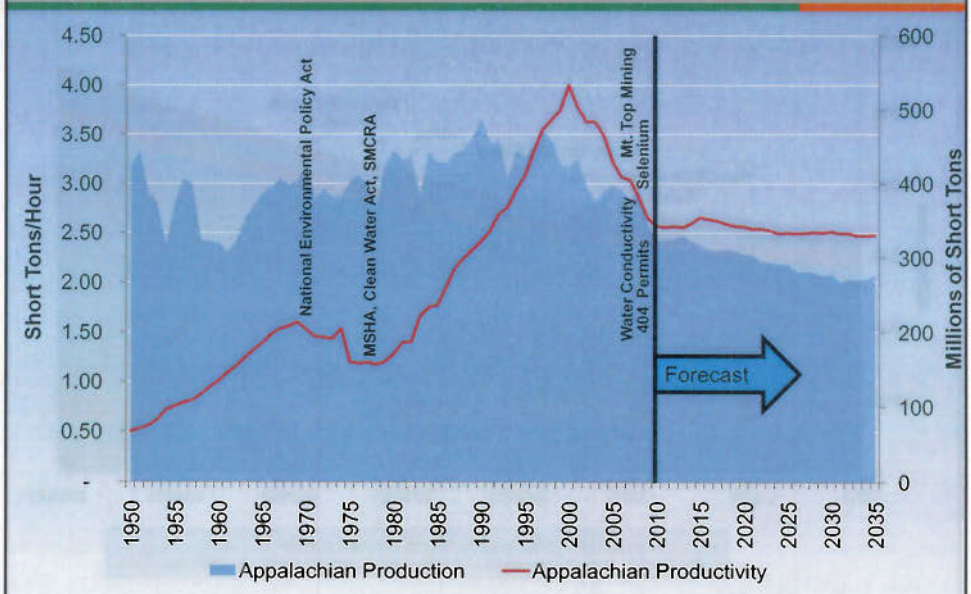
Seaborne Coal Demand Will Grow



- Increases in international coal demand will drive activity in the seaborne coal trade markets
- Seaborne coal activity is projected to expand over 70% in the next 15 years

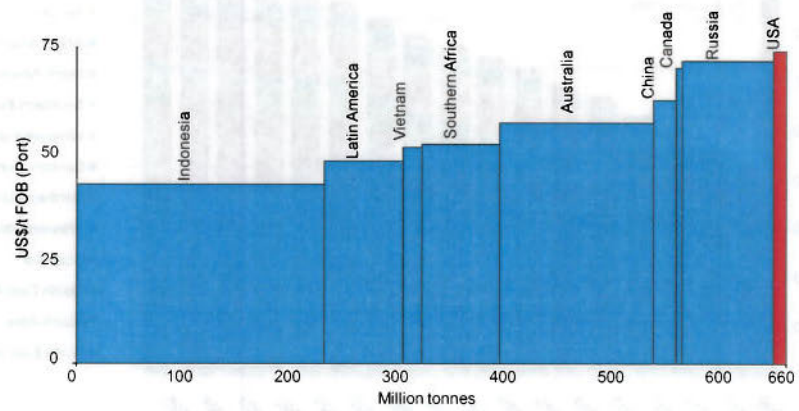
Source: Wood Mackenzie Coal Market Service

Appalachian Production and Productivity



Sources: EIA, USGS, Velocity Suite, Internal

US is Marginally-priced Supplier



- As international demand for coal increases, supply is typically met by the lowest cost suppliers first
- As the marginally-priced supplier of coal to the seaborne thermal market, the US is poised to gain significantly from increases in seaborne thermal trade

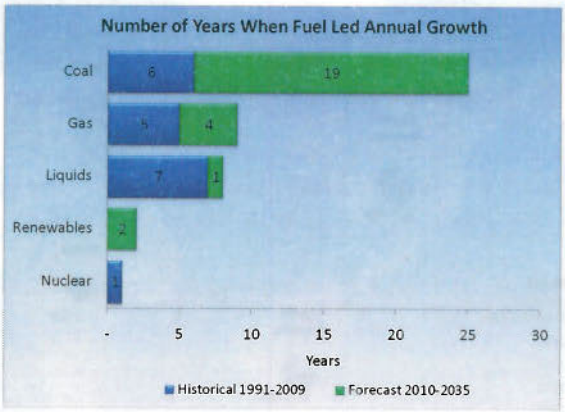
Source: Wood Mackenzie Coal Supply Service – 2010 Seaborne Thermal Coal Cost Curve

Conclusions

- US coal deposits are abundant
- US coal transportation infrastructure is well-developed
- Global demand for coal is forecast to grow substantially
- US stands to benefit economically from coal exports
- However, productivity is falling and costs are rising
- As a result, the US is the marginally-priced supplier of coal to the export market

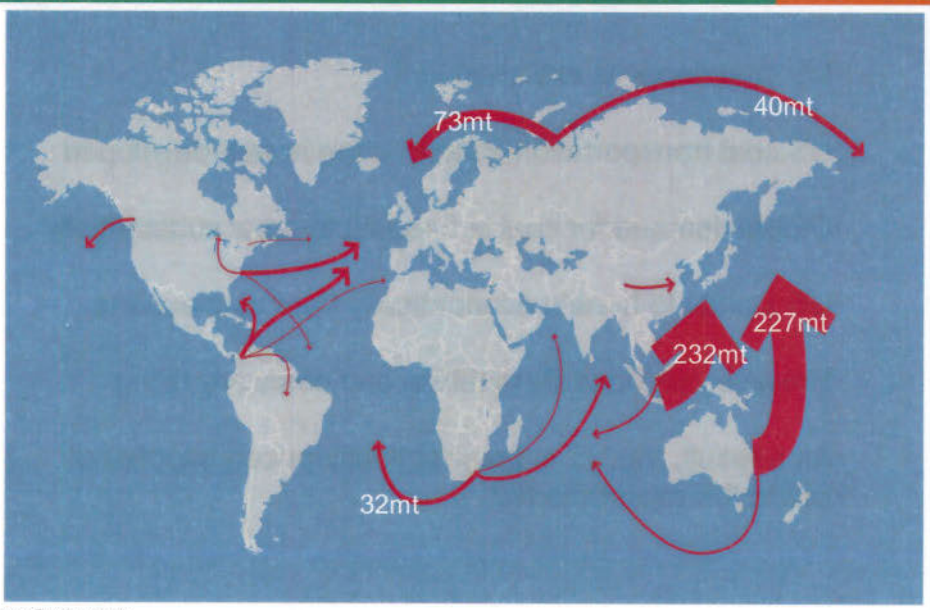
Coal - World's Fastest Growing Fuel

- World coal use grew more than gas, liquids, nuclear and renewables in 6 of the 18 years between 1991 and 2009
- Coal use is forecasted to grow more than competing fuels in 19 of the 26 years between 2010 and 2035



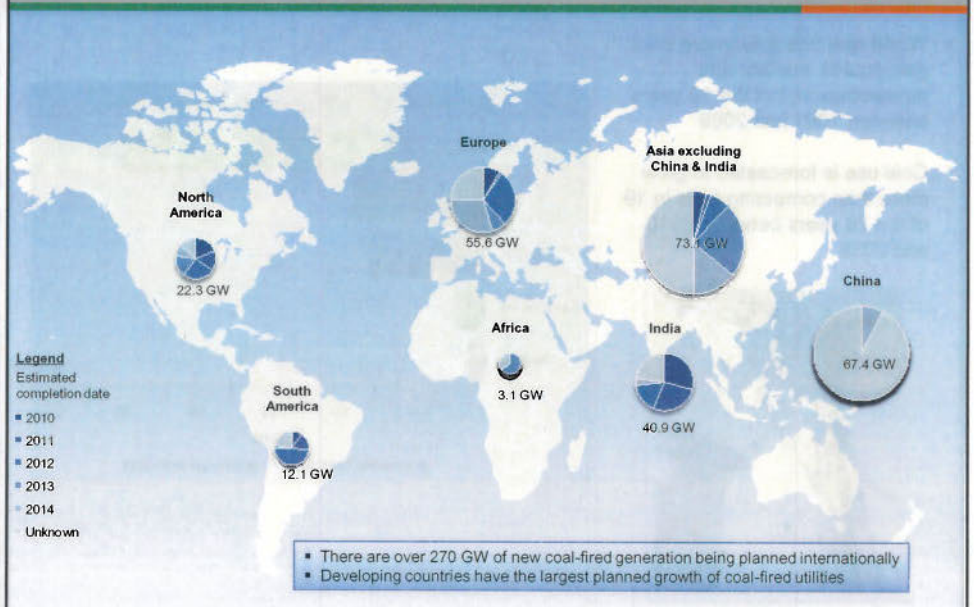
Source: EIA

2009 Trends in Seaborne Trading



Source: EIA, IEA, ABARE

Planned New Coal-Fired Generation Capacity



- There are over 270 GW of new coal-fired generation being planned internationally
- Developing countries have the largest planned growth of coal-fired utilities

Sources: Wood Mackenzie Coal Market Service, Ventyx Velocity Suite, McCloskey Steam Coal Forecaster

EPA's Attempt to Revoke an Existing 404 Permit

December 2010

Background: The Environmental Protection Agency is unlawfully trying to revoke Mingo Logan's Clean Water Act (CWA) Section 404 permit. The permit was issued in 2007 after an extensive 10-year review that included an Environmental Impact Statement (EIS), which is unprecedented with a mining operation on private lands that cost millions of dollars. Mingo Logan has fully complied with the permit for the three years it has had the permit. EPA not only participated in the comprehensive permitting process, it also agreed to the provisions and findings of the permit that it now claims are reasons to revoke the permit. **EPA claims that Section 404(c) authorizes it to revoke the permit, but EPA's action is a clear violation of the CWA.** Not only does Section 404(c) not authorize EPA to veto a permit once it has been issued, EPA is trying to use the section 404(c) process to impose, and in some instances overturn, water quality decisions expressly reserved under the CWA to the State of West Virginia. EPA's actions against Mingo Logan are unprecedented in view of the fact that since the CWA was enacted in 1972, **EPA has never before attempted to revoke an issued CWA 404 permit.**

Status: EPA initiated this process by asking the U.S. Army Corps of Engineers (Corps) to suspend the permit in September 2009. After studying the record and determining that there were no grounds for revocation or modification, the Corps refused. EPA Region III then published its Proposed Recommendation on April 2, 2010, and Mingo Logan brought suit against EPA the same day. Mingo Logan asserts that EPA's 404(c) authority must be exercised before a permit has been issued. Once a permit is issued, only the Corps may revoke or modify it, and then only under certain prescribed circumstances. After publishing the Proposed Determination and receiving numerous comments from groups concerned about EPA's unprecedented authority to veto an existing permit, EPA granted itself an extension of several months, and on Sept. 24, 2010, EPA Region III forwarded a Recommended Determination to EPA headquarters, recommending that Administrator Lisa Jackson revoke Mingo Logan's Section 404 permit. Mingo Logan filed comments in response to the Recommended Determination on Nov. 29, 2010. The D.C. District Court has not yet acted on Mingo Logan's challenge to EPA's authority under 404(c) or on the government's motion to dismiss the suit. Meanwhile, EPA has given itself until Feb. 22, 2011, to issue a Final Determination

What is at Stake for Other Permittees: Every holder of a 404 permit should be gravely concerned about EPA's action. If EPA prevails, every 404 permit would be subject to unilateral, after-the-fact revocation by EPA. In Mingo Logan's case, revocation of the permit will not only cost the company millions of dollars, but will also cost the State of West Virginia and Logan County millions in tax revenues and result in serious job loss. Likewise, any permittee will face the possibility of EPA arbitrarily destroying its investment and projected revenues. EPA is seeking a perpetual permitting authority, which it can use whenever it pleases to upend any project that requires a 404 permit.

EPA's Attempt to Revoke an Existing 404 Permit

December 2010

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EPA's action threatens all industries, businesses and individuals that need 404 permits. Agricultural, residential, commercial and industrial development, road and transportation construction, mining, shipping and public works projects are all potentially subject to EPA's claimed revocation authority. **The implications for the American economy and jobs are significant. The Corps' 404 regulatory program authorizes $220 billion in economic activity annually, all of which will be subject to EPA's after-the-fact veto if EPA persists in its present course.**

Matthew Klasen/DC/USEPA/US
12/07/2010 05:46 PM

To Gregory Peck
cc
bcc
Subject Updated OSM SPR issues doc, + language for cover note re: DEIS and RIA

Includes both clean and Track Changes since our conversation.

In the note you send to OSM, I'd recommend including the following language about the RIA and EIS:

(b) (5)
[redacted]

Thanks,
Matt

ATTACHMENT REDACTED - DELIBERATIVE

2010-12-07 OSM Follow-Up - Compiled Clean.docx 2010-12-07 OSM Follow-Up - Compiled TC.docx

---
Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

Gregory Peck/DC/USEPA/US	To	Matthew Klasen
12/08/2010 09:22 AM	cc	
	bcc	
	Subject	Fw: Time Sensitive Request :Fw: Meeting with Bob P. Next Week

Lynn is working this too.
----- Forwarded by Gregory Peck/DC/USEPA/US on 12/08/2010 09:22 AM -----

From:	Ephraim King/DC/USEPA/US
To:	Joe Beaman/DC/USEPA/US@EPA
Cc:	Cynthia Simbanin/DC/USEPA/US@EPA, Kendra Scott/DC/USEPA/US@EPA, Jeff Lape/CBP/USEPA/US@EPA, Ephraim King/DC/USEPA/US@EPA, Betsy Behl/DC/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA
Date:	12/08/2010 08:44 AM
Subject:	Time Sensitive Request :Fw: Meeting with Bob P. Next Week
Sent by:	Lynn Zipf

Joe - (b) (5) [redacted]

ATTACHMENT REDACTED - DELIBERATIVE

OST_MTM_FS_WDD OCTOBER2010.doc

Lynn Zipf for

Ephraim King
Director
Office of Science & Technology
1200 Pennsylvania Ave., NW
Mail Code 4301T
Washington, DC 20460
Voice: (202) 566-0430
Fax: (202) 566-0441
king.ephraim@epa.gov
----- Forwarded by Lynn Zipf/DC/USEPA/US on 12/08/2010 08:38 AM -----

From:	Nancy Stoner/DC/USEPA/US
To:	"Greg Peck" <peck.gregory@epa.gov>, "Denise Keehner" <keehner.denise@epa.gov>, "Ephraim King" <king.ephraim@epa.gov>
Date:	12/08/2010 07:56 AM
Subject:	Fw: Meeting with Bob P. Next Week

Looks like we have our work cut out for us over the next 24 hrs

Ephraim -- (b) (5) [redacted]
Ann Campbell

----- Original Message -----
From: Ann Campbell
Sent: 12/08/2010 07:07 AM EST
To: Gregory Peck
Cc: Nancy Stoner; Jordan Dorfman
Subject: Fw: Meeting with Bob P. Next Week

My apologies for the delay in getting a response to you, Bob only told me yesterday that you had sent an loose set of topics that the enviros may wish to discuss at tomorrow's meeting. He asks that materials be prepared on the following topics:

(b) (5)

If there are any questions, please let me know. Thanks.

Ann Campbell
Special Assistant
Office of the Administrator
U.S. Environmental Protection Agency
Mail Code: 1101

P: (202) 566-1370
C: (202) 657-3117
F: (202) 501-1428

----- Forwarded by Ann Campbell/DC/USEPA/US on 12/08/2010 06:59 AM -----

From: Bob Sussman/DC/USEPA/US
To: Ann Campbell/DC/USEPA/US@EPA
Date: 12/07/2010 04:04 PM
Subject: Fw: Meeting with Bob P. Next Week

Robert M. Sussman
Senior Policy Counsel to the Administrator
Office of the Administrator
(202)-564-7397
US Environmental Protection Agency

----- Forwarded by Jordan Dorfman/DC/USEPA/US on 12/07/2010 04:04 PM -----

From: Gregory Peck/DC/USEPA/US
To: Nancy Stoner/DC/USEPA/US@EPA
Cc: Bob Sussman/DC/USEPA/US@EPA
Date: 12/03/2010 10:56 AM
Subject: Meeting with Bob P. Next Week

Nancy:

Here's what folks want to discuss at the meeting with Bob P. next week. Do we need background or TPs for any of this?

Thanks
Greg

Key Issues:

(b) (5)

Matthew Klasen/DC/USEPA/US
12/08/2010 09:24 AM

To Joe Beaman
cc Lynn Zipf, Gregory Peck
bcc
Subject Fw: By 3 pm today: Mat'ls needed for Bob P enviros mtg tomorrow: Elkhorn, Leeco, and conductivity criterion

Hey Joe,

Just got forwarded a note from Lynn on this too, so looks like this is already moving. Apologies for adding to the email volume.

mk

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229
----- Forwarded by Matthew Klasen/DC/USEPA/US on 12/08/2010 09:23 AM -----

From: Matthew Klasen/DC/USEPA/US
To: Tom Welborn/R4/USEPA/US@EPA, Brian Frazer/DC/USEPA/US@EPA, Joe Beaman/DC/USEPA/US@EPA
Cc: Gregory Peck/DC/USEPA/US@EPA, Karyn Wendelowski/DC/USEPA/US@EPA, Tanya Code/DC/USEPA/US@EPA, Lynn Zipf/DC/USEPA/US@EPA
Date: 12/08/2010 09:23 AM
Subject: By 3 pm today: Mat'ls needed for Bob P enviros mtg tomorrow: Elkhorn, Leeco, and conductivity criterion

---

Hi everyone,

Bob P. has a meeting tomorrow with enviros on MTM, and the AO has asked us to pull together background today on a list of three topics. See below for a note from Nancy to Denise, Ephraim, and Greg.

We have three topics to prepare:
(b) (5)
[redacted]

Please send Greg and I materials by **3 pm** and we'll compile for forwarding to the AO. Call me if you have any questions.

Thanks,
Matt

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780

cell (202) 380-7229

From: Nancy Stoner/DC/USEPA/US
To: "Greg Peck" <peck.gregory@epa.gov>, "Denise Keehner" <keehner.denise@epa.gov>, "Ephraim King" <king.ephraim@epa.gov>
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(202)-564-7397
US Environmental Protection Agency
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From:	Gregory Peck/DC/USEPA/US
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Cc:	Bob Sussman/DC/USEPA/US@EPA
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Subject:	Meeting with Bob P. Next Week

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Thanks
Greg

Key Issues:

(b) (5)
[redacted]

Stefania Shamet/R3/USEPA/US

12/08/2010 09:36 AM

To Margaret Passmore

cc Brian Topping, Christopher Hunter, David Rider, Greg Pond, Jennifer Fulton, John Forren, Joy Gillespie, Julia McCarthy, Louis Reynolds, Marcel Tchaou, Palmer Hough, Ross Geredien

bcc

Subject Re: FD comments

Thanks for picking that up Maggie. It was on my list of things to double-check,but I hadn't gotten to it yet.

Margaret Passmore Chris,(b) (5) [redacted] 12/08/2010 09:32:53 AM

From: Margaret Passmore/R3/USEPA/US
To: Christopher Hunter/DC/USEPA/US@EPA
Cc: Brian Topping/DC/USEPA/US@EPA, David Rider/R3/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA, Julia McCarthy/R8/USEPA/US@EPA, Louis Reynolds/R3/USEPA/US@EPA, Marcel Tchaou/DC/USEPA/US@EPA, Palmer Hough/DC/USEPA/US@EPA, Ross Geredien/DC/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA, Jennifer Fulton/R3/USEPA/US@EPA, Joy Gillespie/R3/USEPA/US@EPA, Greg Pond/R3/USEPA/US@EPA
Date: 12/08/2010 09:32 AM
Subject: Re: FD comments

Chris,

(b) (5) [redacted]

Maggie

[attachment "Spruce 1 Downstream Influence Equation Worksheet_102010.xls" deleted by Stefania Shamet/R3/USEPA/US]

Margaret Passmore
Freshwater Biology Team
Office of Monitoring and Assessment (3EA50)
Environmental Assessment and Innovation Division

USEPA Region 3
1060 Chapline Street, Suite 303
Wheeling, WV 26003-2995
(p) 304-234-0245
(f) 304-234-0260
passmore.margaret@epa.gov

Visit our website at http://epa.gov/reg3esd1/3ea50.htm

Greg Pond	Chris et al, I read the FD. Most things I was invo...	12/08/2010 08:40:34 AM

From: Greg Pond/R3/USEPA/US
To: Christopher Hunter/DC/USEPA/US@EPA
Cc: Brian Topping/DC/USEPA/US@EPA, Julia McCarthy/R8/USEPA/US@EPA, Marcel Tchaou/DC/USEPA/US@EPA, Palmer Hough/DC/USEPA/US@EPA, Ross Geredien/DC/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA, John Forren/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Louis Reynolds/R3/USEPA/US@EPA, David Rider/R3/USEPA/US@EPA
Date: 12/08/2010 08:40 AM
Subject: FD comments

(b) (5) [redacted]

Greg

Greg Pond
Office of Monitoring and Assessment
U.S. EPA Region 3
1060 Chapline Street, Suite 303

Wheeling, WV 26003-2995
(p) 304-234-0243
(f) 304-234-0260
pond.greg@epa.gov
Visit our website at http://epa.gov/reg3esd1/3ea50.htm

Karen Gude/DC/USEPA/US	To	Marcus Zobrist, Gary Hudiburgh
12/08/2010 10:13 AM	cc	Deborah Nagle, Js Wilson
	bcc	
	Subject	Questions regarding current stance on MTM and Conductivity Standards for BNA Interview with Pete

Marcus/Gary,

Hi. Every year BNA conducts an interview with our AA to discuss upcoming major issues and actions for the coming year. In requesting this year's interview, the BNA reporter has identified a number of questions/issues that they would like for us to address. Two involve MTM and the use of conductivity standards. Do either of you have a few minutes later today or tomorrow to touch base with me on these issues, so that I can figure out a plan forward for what, if anything, we might be saying on these issues? We may not be lead on either of these issues -- I just need to better understand where we are, what we've been saying (if anything), and who's involved.

BNA is trying to schedule the interview for Tuesday, Dec 14th, which means we'll need to have background and TPs developed sooner. I should have a better idea on a deadline later today.

Thanks,
Karen
(202) 564-9567

Questions:

- State regulators are increasingly angry at EPA over water regulations and guidance on the permitting of mines, especially mountaintop coal mines. Some of the states say EPA is failing to respect the delegation of Clean Water Act regulatory authority to states. Is EPA digging in and anticipating prolonged fighting with the states, in and out of court? A rockier general relationship with the states?
- Does EPA plan a push to use conductivity standards for various pollutants in waters throughout the United States? EPA has been asking the SAB about that. What is EPA's own view about the practical extent of such an approach to measuring various dissolved solids?

OW IO-Programs First Communications Meeting

Wed 12/08/2010 1:00 PM - 2:00 PM

Attendance is for Karen Gude

Chair: **Amy Han/DC/USEPA/US**
Location: 2379 East

This entry has an alarm. The alarm will go off before the entry starts.

Required:	Cara Lalley/DC/USEPA/US@EPA, Karen Gude/DC/USEPA/US@EPA, Keara Moore/DC/USEPA/US@EPA, Robert Gunter/DC/USEPA/US@EPA, Sonia Altieri/DC/USEPA/US@EPA, tloop@chesapeakebay.net
Optional:	Patricia Scott/DC/USEPA/US@EPA, Tanya Code/DC/USEPA/US@EPA, Tomeka Nelson/DC/USEPA/US@EPA

Description

Introductions - Travis and each of the different programs
IO and programs communications
Media (e.g. BNA request for AA talking points this week); hot topics

MEDIA INQUIRY: BNA--requests for interview with Water AA --Deadline 12/14

Jalil Isa to: Peter Silva, Cynthia Dougherty 12/07/2010 12:57 PM

Cc: Amy Han, Keara Moore, Karen Gude, Cara Lalley, Travis Loop, Robert Gunter

(b) (5)

[redacted]

Here are a few general questions for the Outlook interviews.
My piece will address Clean Water Act issues in 2011.

What are EPA's most significant Clean Water Act priorities and challenges for 2011? Any new focus, program or policy changes?

Clean Water Act jurisdiction. I understand EPA at this point is not ready to make an announcement, eg. whether the agency will issue a rule. However, how will EPA deal with jurisdictional challenges in the coming year? What might be some options? Is a regulation a possibility? Administrator Jackson has called for legislation. However, the chief sponsors were just voted out of office. What are the agency's concerns. Would like some comments on this issue, even if no action is decided yet.

Key Clean Water Act regulations the agency will be working on in 2011 and why they are important. Comments on most significant regulations.
EPA is working on proposing a rule to curb sanitary sewer overflows. Where does this stand. What will EPA be doing on this rule in 2011, and what is being considered?

Comments on status of other regulatory work in 2011, including planned stormwater rule on developed sites; cooling water intake rule; and on just announced planned rule for 2012 on coal-fired power plants.

Nutrients: EPA just issued a big rule setting numeric limits

for nutrients in Florida, which will take some time to implement. Is the agency looking to do the same in some other states, such as those in the Mississippi Basin. Some time ago, I was told EPA was considering a similar move in Wisconsin. What does EPA want to do? Efforts in 2011 to address nonpoint source pollution.

Possible questions for Peter Silva:

What do you see as the primary policy issues in 2011 for drinking water?

Is there much that EPA can do about planning for water quantity (separate from quality) -- for sustainability of supply in the face of increasing demand? This gets mentioned often, but the practical tools at EPA's disposal may be very limited. The WaterSense program, for example--is it making a fundamental difference?

State regulators are increasingly angry at EPA over water regulations and guidance on the permitting of mines, especially mountaintop coal mines. Some of the states say EPA is failing to respect the delegation of Clean Water Act regulatory authority to states. Is EPA digging in and anticipating prolonged fighting with the states, in and out of court? A rockier general relationship with the states?

Does EPA plan a push to use conductivity standards for various pollutants in waters throughout the United States? EPA has been asking the SAB about that. What is EPA's own view about the practical extent of such an approach to measuring various dissolved solids?

There is high anxiety over the draft update of the cancer risk assessment for inorganic arsenic. Any sense yet of what impact that will have on regulations for drinking water?

Possible questions for Cynthia Dougherty:

What do you see as the primary policy issues in 2011 for

drinking water?

An enhanced effort to regulate contaminants in groups rather than individually got started in 2010. How is that likely to go in 2011? Anything that could be noted as a prominent result of that effort?

So-called "emerging contaminants," including possible endocrine disruptors, draw a lot of attention. Is the research on such subjects inherently too complex and lengthy for us to expect any significant regulatory issues to emerge in 2011, or is there something in that category on the horizon?

There is high anxiety over the draft update of the cancer risk assessment for inorganic arsenic. Any sense yet of what impact that will have on regulations for drinking water?

There is a draft microbial risk assessment guideline planned. There already has been a move toward creating a protocol that was revised and re-labeled and maybe not finished yet as some sort of risk assessment framework. Where is that framework? How will the guideline differ from the framework? And is the guideline coming out in 2011?

Will perchlorate still be a lingering regulatory question in 2011, or will that be over and done with?

Personal Notes

Matthew Klasen/DC/USEPA/US
12/08/2010 10:15 AM

To Lynn Zipf
cc
bcc
Subject Re: Fw: By 3 pm today: Mat'ls needed for Bob P enviros mtg tomorrow: Elkhorn, Leeco, and conductivity criterion

Definitely -- it makes me wonder what my job even is sometimes.

(b) (5) [redacted] I'm sure this will be on the agenda, and Greg and I owe everyone a note on that shortly.

mk

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

Lynn Zipf | Are we good or what? _____... | 12/08/2010 09:29:57 AM

From: Lynn Zipf/DC/USEPA/US
To: Matthew Klasen/DC/USEPA/US@EPA
Cc: Gregory Peck/DC/USEPA/US@EPA, Joe Beaman/DC/USEPA/US@EPA
Date: 12/08/2010 09:29 AM
Subject: Re: Fw: By 3 pm today: Mat'ls needed for Bob P enviros mtg tomorrow: Elkhorn, Leeco, and conductivity criterion

Are we good or what?

_____
Lynn Zipf
Special Assistant
Office of Science and Technology
Office of Water
MC: 4301T

P: (202) 564-1509

Matthew Klasen | Hey Joe, Just got forwarded a note from Lynn on... | 12/08/2010 09:24:42 AM

From: Matthew Klasen/DC/USEPA/US
To: Joe Beaman/DC/USEPA/US@EPA
Cc: Lynn Zipf/DC/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA
Date: 12/08/2010 09:24 AM
Subject: Fw: By 3 pm today: Mat'ls needed for Bob P enviros mtg tomorrow: Elkhorn, Leeco, and conductivity criterion

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Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229
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To:	Tom Welborn/R4/USEPA/US@EPA, Brian Frazer/DC/USEPA/US@EPA, Joe Beaman/DC/USEPA/US@EPA
Cc:	Gregory Peck/DC/USEPA/US@EPA, Karyn Wendelowski/DC/USEPA/US@EPA, Tanya Code/DC/USEPA/US@EPA, Lynn Zipf/DC/USEPA/US@EPA
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Please send Greg and I materials by **3 pm** and we'll compile for forwarding to the AO. Call me if you have any questions.

Thanks,
Matt

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

From:	Nancy Stoner/DC/USEPA/US
To:	"Greg Peck" <peck.gregory@epa.gov>, "Denise Keehner" <keehner.denise@epa.gov>, "Ephraim King" <king.ephraim@epa.gov>
Date:	12/08/2010 07:56 AM
Subject:	Fw: Meeting with Bob P. Next Week

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Ephraim -- (b) (5) [redacted]
Ann Campbell

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Ann Campbell
Special Assistant
Office of the Administrator
U.S. Environmental Protection Agency
Mail Code: 1101

P: (202) 566-1370
C: (202) 657-3117
F: (202) 501-1428

----- Forwarded by Ann Campbell/DC/USEPA/US on 12/08/2010 06:59 AM -----

From:	Bob Sussman/DC/USEPA/US
To:	Ann Campbell/DC/USEPA/US@EPA
Date:	12/07/2010 04:04 PM
Subject:	Fw: Meeting with Bob P. Next Week

Robert M. Sussman
Senior Policy Counsel to the Administrator
Office of the Administrator
(202)-564-7397
US Environmental Protection Agency

----- Forwarded by Jordan Dorfman/DC/USEPA/US on 12/07/2010 04:04 PM -----

From:	Gregory Peck/DC/USEPA/US
To:	Nancy Stoner/DC/USEPA/US@EPA
Cc:	Bob Sussman/DC/USEPA/US@EPA
Date:	12/03/2010 10:56 AM
Subject:	Meeting with Bob P. Next Week

Nancy:

Here's what folks want to discuss at the meeting with Bob P. next week. Do we need background or TPs for any of this?

Thanks
Greg

Key Issues:

(b) (5)
[redacted]

[redacted]

[redacted]

[redacted]

Cliff Rader/DC/USEPA/US
12/08/2010 10:57 AM

To Matthew Klasen
cc
bcc
Subject Re: MTM Cumulative Impacts Meeting

barely...

check this out from R3 - not optimal....

still waiting for a schedule from R3

also put together an agenda...

call if you want to talk.

ATTACHMENT REDACTED - DELIBERATIVE

agenda - Cumulative Impact Assessment for Surface Coal Mining in Appalachia.docx

ATTACHMENT REDACTED - DELIBERATIVE

MTMCumulative Effects Proposal_description12_5_10 bj edits-CRedits.docx

Matthew Klasen	All set. Are we at all on track to send a summary...	12/08/2010 10:43:19 AM

From: Matthew Klasen/DC/USEPA/US
To: Cliff Rader/DC/USEPA/US@EPA
Date: 12/08/2010 10:43 AM
Subject: Re: MTM Cumulative Impacts Meeting

All set. Are we at all on track to send a summary of activities by COB today?

Matt Klasen
U.S. Environmental Protection Agency
Office of Water
(202) 566-0780
Cell (202) 380-7229

Cliff Rader

----- Original Message -----
From: Cliff Rader
Sent: 12/08/2010 10:30 AM EST
To: peck.gregory@epa.gov; Matthew Klasen; Brian Frazer; Christopher Hunter; Timothy Landers
Subject: Fw: MTM Cumulative Impacts Meeting
Just wanted to make sure this was on your calendar!

----- Forwarded by Cliff Rader/DC/USEPA/US on 12/08/2010 10:30 AM -----

MTM Cumulative Impacts Meeting

Mon 12/13/2010 12:30 PM - 3:00 PM

Attendance is for Susan Bromm

Chair: **Cynthia Giles-AA/DC/USEPA/US**
Sent By: **Linda Huffman/DC/USEPA/US**
Location: EPA Headquarters, 1200 Pennsylvania Avenue, N.W., Washington, D.C., Room 3216 Ariel Rios South Building

Required:	chip.smith@us.army.mil, Christy_JohnsonHughes@fws.gov, Cliff Rader/DC/USEPA/US@EPA, Dave_Stout@fws.gov, John Pomponio/R3/USEPA/US@EPA, (b) (6) [redacted], Matthew Klasen/DC/USEPA/US@EPA, (b) (6) [redacted] mccabe.catherine@epa.gov, (b) (6) [redacted], Susan Bromm/DC/USEPA/US@EPA
Optional:	Doreen Cantor/DC/USEPA/US@EPA, Kyndall Barry/DC/USEPA/US@EPA

Description

As agreed to on the Principals conference call last week, we are expanding the schedule for our upcoming December 13 meeting to allow time for more detailed discussions about our work on cumulative impact assessment (new time: 12:30 pm - 3:00 pm).

We also agreed that each agency (EPA, COE, OSM) will circulate a short outline by December 8 of what methodology/approach they are working on (5 pages or less would be best), a schedule for what is proposed to be accomplished, and how the methodology/approach will be used.

At the December 13 meeting, both Principals and staff will attend; the meeting will start with 15 minute summaries from each of the three agencies, followed by clarifying questions.

(b) (5) [redacted]

Please confirm your attendance for the meeting with Linda Huffman at Huffman.Linda@epa.gov or 202-564-2440.

Personal Notes

Tom Welborn/R4/USEPA/US
12/08/2010 12:11 PM

To Matthew Klasen, KevinH Miller, Brian Frazer
cc Daniel Holliman, Wanda Hudson, Heinz Mueller, Philip Mancusi-Ungaro
bcc
Subject Fw: Draft Leeco combined changes

We have combined R4 comments but haven't had chance to look for overlap or contradictions in them. Should be interesting discussion at 2 pm.

Tom Welborn, Chief
Wetlands, Coastal and Oceans Branch
EPA Region 4
61 Forsyth Street, SW
Atlanta, GA 30303
404-562-9354
404-562-9343(FAX)
404-895-6312(cell)

----- Forwarded by Tom Welborn/R4/USEPA/US on 12/08/2010 12:04 PM -----

From: Angela Ellis/R4/USEPA/US
To: Tom Welborn/R4/USEPA/US@EPA
Date: 12/08/2010 12:04 PM
Subject: Draft Leeco combined changes

Changes combined

ATTACHMENT REDACTED - DELIBERATIVE

2010-12-06_Draft_Leeco - Clean R4 comments revised.docx

Angela F. Ellis, Staffing Assistant
US Environmental Protection Agency, R4
Water Protection Division
Atlanta Federal Center
61 Forsyth Street
Atlanta, Georgia 30303
(404) 562-9368
FAX (404) 562-9343
ellis.angela@epa.gov

Matthew Klasen/DC/USEPA/US
12/08/2010 04:42 PM

To Joe Beaman
cc
bcc
Subject Re: By 3 pm today: Mat'ls needed for Bob P enviros mtg tomorrow: Elkhorn, Leeco, and conductivity criterion

Thanks!

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

Joe Beaman	Here it is Joe Beaman, Chief Ecological Risk As...	12/08/2010 04:41:23 PM

From: Joe Beaman/DC/USEPA/US
To: Matthew Klasen/DC/USEPA/US@EPA
Date: 12/08/2010 04:41 PM
Subject: Re: By 3 pm today: Mat'ls needed for Bob P enviros mtg tomorrow: Elkhorn, Leeco, and conductivity criterion

---

Here it is

[attachment "Conductivity Status for the Bobs rough draft1.doc" deleted by Matthew Klasen/DC/USEPA/US]
Joe Beaman, Chief
Ecological Risk Assessment Branch
202-566-0420
202-566-1139/1140: FAX

Postal Mail Address
US EPA
Office of Water
Office of Science and Technology
Health and Ecological Criteria Division (4304T)
1200 Pennsylvania Avenue, NW
Washington, DC 20640

Courier/FEDEX Address
USEPA
Office of Water
Office of Science and Technology
Health and Ecological Criteria Division
Room 7233R
7th Floor Connecting Wing
1301 Constitution Avenue, NW
Washington DC 20460
http://epa.gov/waterscience/

Matthew Klasen	Hi Joe, Just wanted to check on status of the co...	12/08/2010 04:37:43 PM

From: Matthew Klasen/DC/USEPA/US
To: Joe Beaman/DC/USEPA/US@EPA
Cc: Lynn Zipf/DC/USEPA/US@EPA
Date: 12/08/2010 04:37 PM
Subject: Re: By 3 pm today: Mat'ls needed for Bob P enviros mtg tomorrow: Elkhorn, Leeco, and conductivity criterion

---

Hi Joe,

Just wanted to check on status of the conductivity piece? We're pulling together things for Bob and probably need to provide by 5 or so.

Thanks,
Matt

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

Joe Beaman	I am working the conductivity piece and will have...	12/08/2010 11:30:03 AM

From: Joe Beaman/DC/USEPA/US
To: Brian Frazer/DC/USEPA/US@EPA
Cc: Gregory Peck/DC/USEPA/US@EPA, Karyn Wendelowski/DC/USEPA/US@EPA, Lynn Zipf/DC/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA, Tanya Code/DC/USEPA/US@EPA, Tom Welborn/R4/USEPA/US@EPA
Date: 12/08/2010 11:30 AM
Subject: Re: By 3 pm today: Mat'ls needed for Bob P enviros mtg tomorrow: Elkhorn, Leeco, and conductivity criterion

---

I am working the conductivity piece and will have it to share later this afternoon.

Joe Beaman, Chief
Ecological Risk Assessment Branch
202-566-0420
202-566-1139/1140: FAX

Postal Mail Address
US EPA
Office of Water
Office of Science and Technology
Health and Ecological Criteria Division (4304T)
1200 Pennsylvania Avenue, NW
Washington, DC 20640

Courier/FEDEX Address
USEPA
Office of Water
Office of Science and Technology
Health and Ecological Criteria Division
Room 7233R
7th Floor Connecting Wing
1301 Constitution Avenue, NW
Washington DC 20460

http://epa.gov/waterscience/

Brian Frazer | Thanks Matt. Tom - I'll take the lead on Leeco a... | 12/08/2010 10:56:00 AM

From: Brian Frazer/DC/USEPA/US
To: Matthew Klasen/DC/USEPA/US@EPA
Cc: Gregory Peck/DC/USEPA/US@EPA, Joe Beaman/DC/USEPA/US@EPA, Karyn Wendelowski/DC/USEPA/US@EPA, Lynn Zipf/DC/USEPA/US@EPA, Tanya Code/DC/USEPA/US@EPA, Tom Welborn/R4/USEPA/US@EPA
Date: 12/08/2010 10:56 AM
Subject: Re: By 3 pm today: Mat'ls needed for Bob P enviros mtg tomorrow: Elkhorn, Leeco, and conductivity criterion

Thanks Matt.

Tom - I'll take the lead on Leeco and and will share with you once finished.

bf

****
Brian M. Frazer, Chief
Wetlands & Aquatic Resources Regulatory Branch
Office of Wetlands, Oceans and Watersheds
U.S. EPA
1200 Pennsylvania Avenue, NW (MC 4502T)
Washington, DC 20460
202-566-1652

Matthew Klasen | Hi everyone, Bob P. has a meeting tomorrow wit... | 12/08/2010 09:23:21 AM

From: Matthew Klasen/DC/USEPA/US
To: Tom Welborn/R4/USEPA/US@EPA, Brian Frazer/DC/USEPA/US@EPA, Joe Beaman/DC/USEPA/US@EPA
Cc: Gregory Peck/DC/USEPA/US@EPA, Karyn Wendelowski/DC/USEPA/US@EPA, Tanya Code/DC/USEPA/US@EPA, Lynn Zipf/DC/USEPA/US@EPA
Date: 12/08/2010 09:23 AM
Subject: By 3 pm today: Mat'ls needed for Bob P enviros mtg tomorrow: Elkhorn, Leeco, and conductivity criterion

Hi everyone,

Bob P. has a meeting tomorrow with enviros on MTM, and the AO has asked us to pull together background today on a list of three topics. See below for a note from Nancy to Denise, Ephraim, and Greg.

We have three topics to prepare:
(b) (5)
[redacted]

Please send Greg and I materials by **3 pm** and we'll compile for forwarding to the AO. Call me if you have any questions.

Thanks,
Matt

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

From:	Nancy Stoner/DC/USEPA/US
To:	"Greg Peck" <peck.gregory@epa.gov>, "Denise Keehner" <keehner.denise@epa.gov>, "Ephraim King" <king.ephraim@epa.gov>
Date:	12/08/2010 07:56 AM
Subject:	Fw: Meeting with Bob P. Next Week

Looks like we have our work cut out for us over the next 24 hrs

Ephraim -- (b) (5) [redacted]
Ann Campbell

----- Original Message -----
From: Ann Campbell
Sent: 12/08/2010 07:07 AM EST
To: Gregory Peck
Cc: Nancy Stoner; Jordan Dorfman
Subject: Fw: Meeting with Bob P. Next Week

My apologies for the delay in getting a response to you, Bob only told me yesterday that you had sent an loose set of topics that the enviros may wish to discuss at tomorrow's meeting. He asks that materials be prepared on the following topics:

(b) (5) [redacted]

If there are any questions, please let me know. Thanks.

Ann Campbell
Special Assistant
Office of the Administrator
U.S. Environmental Protection Agency
Mail Code: 1101

P: (202) 566-1370
C: (202) 657-3117
F: (202) 501-1428

----- Forwarded by Ann Campbell/DC/USEPA/US on 12/08/2010 06:59 AM -----

From: Bob Sussman/DC/USEPA/US
To: Ann Campbell/DC/USEPA/US@EPA
Date: 12/07/2010 04:04 PM
Subject: Fw: Meeting with Bob P. Next Week

Robert M. Sussman
Senior Policy Counsel to the Administrator
Office of the Administrator
(202)-564-7397
US Environmental Protection Agency

----- Forwarded by Jordan Dorfman/DC/USEPA/US on 12/07/2010 04:04 PM -----

From: Gregory Peck/DC/USEPA/US
To: Nancy Stoner/DC/USEPA/US@EPA
Cc: Bob Sussman/DC/USEPA/US@EPA
Date: 12/03/2010 10:56 AM
Subject: Meeting with Bob P. Next Week

Nancy:

Here's what folks want to discuss at the meeting with Bob P. next week. Do we need background or TPs for any of this?

Thanks
Greg

Key Issues:

(b) (5)
[redacted]

[redacted]

[redacted]

[redacted]

Matthew Klasen/DC/USEPA/US
12/08/2010 05:30 PM

To Gregory Peck
cc
bcc
Subject Bob P-enviros materials

Hey Greg,

Here's what I think is a full set of draft materials for the Bob P. - enviros meeting tomorrow.

First document is the key bullets on major issues; the remaining documents are supplemental materials referenced in each section of the bullets. I was able to include the conductivity criterion doc and WV/KY petitions information fully within the background and talking points.

Thanks,
Matt

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

Overall Talking Points

2010-12-08 Bob P Materials.docx

ATTACHMENT REDACTED - DELIBERATIVE

Supplemental Information: Premier Elkhorn (fact sheet and Nov. 2 closeout letter)

Briefing for Premier Elkhorn Lil Fork (12-8-10).doc LRL-2007-0594_Elkhorn_11-2-10.pdf r

WORD ATTACHMENT REDACTED - DELIBERATIVE

Supplemental Information: Leeco Stacy Branch (fact sheet and draft closeout letter)

Leeco - Stacy Branch fact sheet.docx 2010-12-08_Draft_Leeco - Clean R4 comments.docx

ATTACHMENTS REDACTED - DELIBERATIVE

Supplemental Information: Cumulative Effects (summary of Bernhardt et al. 2010 paper, and annotated paper)

2010-12-08 Summary of Bernhardt et al 2010 re cumulative impacts.docx

Bernhardt et al 2010 (conductivity, cumulative impacts) - highlighted.pdf

ATTACHMENTS REDACTED - DELIBERATIVE

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

NOV - 2 2010

Colonel Keith A. Landry
District Engineer
Louisville District Corps of Engineers
Attn: Todd Hagman (Regulatory Branch)
OP-FN, Room 752
P.O. Box 59
Louisville, Kentucky 40201-0059

Subject: Premier Elkhorn Coal Company, Little Fork Surface Mine
U.S. Army Corps of Engineers LRL-2007-0594
Kentucky Division of Mine Permits #898-0800

Dear Colonel Landry:

The U.S. Environmental Protection Agency (EPA), Region 4, has reviewed the information submitted by or on behalf of the Premier Elkhorn Coal Company for impacts to jurisdictional waters of the U.S. as a result of proposed surface coal mining activities associated with its Little Fork Surface Mine in Pike County, Kentucky (LRL-2007-0594; #898-0800). Our review has included the original April 24, 2007, U.S. Army Corps of Engineers (Corps) Clean Water Act (CWA) Section 404 permit application as well as several additional documents provided by or on behalf of the permit applicant. EPA is concerned that the permit, as proposed, is not consistent with requirements of the agencies' regulations, including the Section 404(b)(1) Guidelines, and therefore recommends that changes to the project identified in this letter be incorporated before authorization is provided. EPA is also recommending that an Environmental Impact Statement should be prepared for this permit to assess potential environmental impacts under the National Environmental Policy Act.

The applicant originally sought authorization to impact 6,845 linear feet (lf) of ephemeral and intermittent streams to facilitate construction of six hollow fills and four in-stream sediment ponds in unnamed jurisdictional tributaries to Little Fork, Robinson Creek, and Indian Creek. Little Fork discharges into Robinson Creek, and both Robinson Creek and Indian Creek discharge directly into Shelby Creek in the Levisa Fork watershed. Subsequently, the applicant revised the mine plan and presently proposes five hollow fills and three in-stream sediment control ponds. Anticipated impacts to jurisdictional waters now comprise 5,560 lf of ephemeral and intermittent streams, including 4,415 lf as a result of the hollow fills and 1,145 lf as a result of sediment control ponds and a "drainage corridor" between the toe of HF#3 and Pond#3.

EPA has been coordinating closely with your staff and the permit applicant since the 60-day ECP review period began on August 19, 2010, (including a 15-day extension of the review period). On September 30, 2010, EPA submitted a comment letter to the Corps providing additional detail on our informal comments of August 20, 2010, and requesting a meeting with

the Corps and the applicant to initiate efforts to resolve these concerns. EPA and the Corps subsequently held a conference call on October 6, 2010, to discuss EPA's letter and outline a path towards resolution of the concerns described therein. On October 14, 2010, EPA, the Corps, and the applicant held the first of numerous conference calls to discuss additional information requirements and opportunities to resolve ongoing concerns with the proposed project.

EPA is appreciative of the applicant's efforts during this process, which have included compilation and submittal of additional information substantiating the position that use of the adjacent reclaimed impoundment to store spoil material is not a practicable alternative for the proposed Little Fork Surface Mine. The applicant has also agreed to implement best management practices (BMP's) to minimize erosion and sedimentation from disturbed areas, retain existing vegetation to the maximum extent practicable, and take efforts to first identify and then isolate the most highly reactive spoil material likely to generate excessive total dissolved solids (TDS) and contribute to elevated specific conductivity (SC). Additionally, the applicant has agreed to amend its mitigation plan to add payment of an in-lieu-fee (ILF) to the Kentucky Department of Fish and Wildlife Resources Wetland and Stream Mitigation Program for authorized impacts to jurisdictional streams adversely affected due to construction of in-stream sediment ponds. Previously, the applicant had proposed an ILF payment for proposed permanent impacts, but planned to mitigate for sediment pond impacts simply via removal of the ponds and restoration of affected streams many years following the impacts themselves.

Despite the changes described above, EPA has significant remaining environmental concerns regarding this project as currently proposed. EPA's review is intended to ensure that the proposed project meets the requirements of the CWA. The CWA Section 404(b)(l) Guidelines promulgated in regulations by EPA in conjunction with the Secretary of the Army establish the substantive environmental standards applied in the review of projects proposing to discharge dredged or fill material into waters of the United States. The Guidelines establish a sequence of review requiring: (1) an evaluation of practicable alternatives that meet the project's basic purpose to ensure selection of the least environmentally damaging practicable alternative so long as that alternative will not result in significant environmental degradation); (2) taking all appropriate and practicable steps to minimize potential adverse impacts; and (3) compensation for all remaining unavoidable impacts to waters of the United States. In addition, the Guidelines require that no discharge may be permitted that would cause or contribute to significant degradation of the waters of the United States.

Scientific literature has increasingly recognized the relationship between discharges from surface coal mining operations and downstream water quality impairments. A 2005 published study, "Evaluation of Ionic Contribution to the Toxicity of a Coal-Mine Effluent Using *Ceriodaphnia dubia*" by Kennedy, et al. linked impairment of aquatic life to TDS levels. EPA also notes that in previous technical reports, the Commonwealth of Kentucky has recognized the potential detriment to stream biota in headwater streams in the Eastern Kentucky Coal Field correlated with specific conductivity levels above 400 µS/cm (Pond and McMurray, 2002[1]). A

[1] Pond, G.J. and S.E. McMurray. 2002. A Macroinvertebrate Bioassessment Index for Headwater Streams of the Eastern Kentucky Coalfield Region, Kentucky. Kentucky Department for Environmental Protection, Division of Water. Frankfort, KY.

2008 published study, "Downstream effects of mountaintop coal mining: comparing biological conditions using family- and genus-level macroinvertebrate bioassessment tools," by Pond, et al. found evidence indicating that mining activities have subtle to severe impacts on aquatic life and the biological conditions of a stream. A 2010 published study by Pond, "Patterns of *Ephemeroptera* taxa loss in Appalachian headwater streams (Kentucky, USA)," links conductivity as the most strongly correlated factor to *Ephemeroptera* abundance in streams impacted by mining and residential development. A draft report by EPA, "The Effects of Mountaintop Mines and Valley Fills on Aquatic Ecosystems of the Central Appalachian Coalfields," recognizes that surface coal mining causes effects that include resource loss, water quality impairment, and adverse effects on aquatic resources. Finally, another draft report by EPA, "A Field-based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams" recognizes stream-life impacts associated with elevated levels of conductivity.

As part of its permit application, the applicant collected water quality data from project streams in March 2007 and reported specific conductivity values ranging from 469 to 1,777 µS/cm. EPA collected similar data in February 2010 and found specific conductivity in these same streams to range from 57 to 988 µS/cm. In addition, EPA documented specific conductivity in receiving waters downstream of the surface mine site itself ranging from 497 to1,008 µS/cm (e.g. Little Fork, Robinson Creek, and Indian Creek). EPA further notes that Indian Creek, which is the receiving water body for 6 of the applicant's 37 proposed National Pollutant Discharge Elimination System (NPDES) outfalls, is on the KY 2006, 2008, and draft 2010 CWA 303(d) list (partially supporting warm water aquatic habitat) for sedimentation/siltation and TDS.

EPA believes that additional improvements must be made to the proposed mine's design, management practices, and monitoring plan in order to ensure compliance with the 404(b)(1) Guidelines. These improvements are designed to yield an overall improvement in the condition of the watershed, which has been significantly impacted by historic mining activities. EPA believes that the following conditions should be incorporated into any final authorization under Section 404 in order to ensure that the discharges will not cause or contribute to a violation of State water quality standards (WQS), or cause or contribute to significant degradation of waters of the United States consistent with the Guidelines (40 C.F.R. § 230.10(b) and (c)).

Fill Sequencing and Best Management Practices

EPA recommends that the proposed hollow fills be constructed sequentially (one at a time) with sufficient time between the construction of subsequent fills for water quality monitoring to demonstrate that the discharge of fill material does not result in adverse impacts to the downstream aquatic ecosystem. While the applicant has provided some information to suggest that construction of fills in a sequenced approach would not be feasible, the information provided to EPA has not demonstrated that this approach is not practicable. More importantly, we are concerned that without sequencing and associated monitoring, the project may result in the violation of water quality standards and cause significant degradation of stream functions and biodiversity. The applicant should be required to submit a practicability analysis of alternatives involving a sequenced approach for valley fill construction – including individual fill construction and construction of valley fills in two or three phases – before the proposed project is authorized.

EPA believes that if water quality or biological monitoring downstream of one "sequenced" valley fill demonstrates adverse impacts to the downstream aquatic ecosystem – as determined by exceedances of specific numeric thresholds – the permit should trigger implementation of an adaptive water quality management plan (AMP) prior to construction of the next hollow fill, as described in the enclosed special permit condition (see Enclosure 1). Construction of the next hollow fill would not be authorized if the monthly flow-weighted specific conductivity measured at the representative outfall downstream of the first hollow fill exceeds the applicable water quality criteria for more than one consecutive month, or if the overall trend in conductivity levels are increasing such that the linear trend demonstrates likely future exceedance of such criteria.[2] To support this demonstration, supplemental monitoring requirements, including both chemical and biological monitoring parameters, should also be included as special conditions.

EPA believes that several demonstrated BMPs and fill construction practices for surface coal mining operations have the potential to reduce existing downstream levels of conductivity and TDS. These practices include efforts to identify and then isolate TDS- or sulfate-producing materials to minimize the likelihood that these materials will come into contact with groundwater or precipitation and therefore impact downstream waters. The proper implementation of similar BMPs has been shown to reduce specific conductance in streams draining a Magoffin County, Kentucky surface coal mine by as much as 75 percent over elevated background conditions in re-mined valleys.

EPA is appreciative of the applicant's recent endorsement of measures to identify and isolate TDS and/or sulfate producing materials in the field, as memorialized in their November 1, 2010, list of revised BMP's. EPA recommends that these measures be included as special conditions into any final authorization under Section 404 for disposal of dredged or fill material into waters of the U.S. for the Little Fork Surface Mine. These special conditions should include, at a minimum, the following:

- Identification via field-based testing of TDS and/or sulfate-producing materials that must then be isolated;
- Implementation of hollow fill design alternatives that reduce infiltration (e.g. compact surface lifts, crown the fill surface) and controls flow through the fill to avoid contact time between water and reactive materials (i.e. TDS and/or sulfate producing geologic strata); and
- Use of only low-reactive or non-reactive durable rock to construct underdrains and place only these same materials adjacent to the sides of the highwalls and hollow fills.

EPA notes that the BMPs described above relate directly to fill activities in waters of the United States that are likely to have impacts on downstream water quality. The Section 404

[2] With respect to conductivity, EPA would be satisfied with using 500 µS/cm as an numeric interpretation of the narrative standards relevant here. This value represents best-available scientific information on the relationship between conductivity levels and aquatic life in central Appalachian streams, as described in the scientific literature described earlier in this letter.

regulations establish a requirement at 40 C.F.R. 230(10)(b) that no permit may be issued that would cause or contribute to a violation of WQS. This requirement must be met regardless of whether actions necessary to meet this provision would trigger changes to permits issued under other Federal or State regulatory programs.

Adaptive Management Plan (AMP)

EPA believes that special conditions should include an AMP – described above – based on robust water quality and biological monitoring to identify trends in these parameters and to define specific thresholds of concern. If such thresholds are reached, the AMP would require specific response actions. EPA also believes the AMP should include a phased approach, such that increased impacts to downstream waters would trigger increased remedial actions until such time as water quality goals are met.

Existing scientific literature has demonstrated a strong relationship between elevated levels of specific conductance, surface coal mining activities, and degradation of aquatic communities. Therefore, EPA believes that levels of SC should be included as trigger points within the AMP. Recognizing that conductivity levels in on-site streams are already elevated, and anticipating that specific conductance in affected streams will experience at least a short-term increase during land clearing, initial excavation, and hollow fill construction, the trigger for development of the AMP will be applicable only after the initial six (6) months following the discharge of dredged or fill material into waters of the U.S. (I.4(v)). This initial 6-month period would require notification to both the Corps and EPA if monitoring indicates that the trend in monthly flow-weighted conductivity, defined in Special Condition I.4(iii), will exceed background levels or an acceptable numeric interpretation of the applicable narrative water quality standards[3], whichever is greater. Background conditions should be defined as the lesser of values measured in the field in March 2007 and February 2010 (Table 1).

If, however, during any 3 consecutive months during the subsequent 12 months of monitoring, the trend defined at proposed Special Condition I.4(iii) indicates that the monthly flow-weighted conductivity values will not likely fall below levels incompatible with meeting applicable water quality standards, or if any 3 consecutive monthly flow-weighted conductivity values exceed such levels,[4] then the permittee will conduct an analysis of the sources of effluent conductivity and develop Phase I of the AMP to reduce effluent conductivity (measured as specific conductivity) and TDS (see Enclosures 1 and 2). This AMP, to be developed by the applicant and approved by the Corps, should be based on the most technologically advanced and effective approaches available, and assumes that efforts to identify and isolate TDS- and sulfate-producing geologic strata are implemented as part of mine design and hollow fill construction, as outlined above.

If water quality goals are not met after an additional six months of implementation of the AMP, then Phase II of the AMP will be initiated. This plan will also be developed by the applicant and approved by the Corps. If Phase II of the AMP also fails to result in water quality conditions consistent with the goals outlined herein, it is EPA's recommendation that the applicant be

[3] See, supra, footnote 2.
[4] See, supra, footnote 2.

required by the permit special conditions to provide additional compensatory mitigation, either on-site or within the 12-digit hydrologic unit code (HUC) sub-watershed, aimed at addressing adverse chemical water quality conditions.

Table 1. Background specific conductivity in project streams.

Station I.D.	Station Location	Date	Investigator	Specific Conductivity (uS/cm)	BACKGROUND CONDITIONS [1]
UT Little Fork	HF#1	March 2007	Applicant	638	638
ROB02	UT HF#1	Feb 2010	EPA R4	769	
UT Little Robinson Crk	HF#3	March 2007	Applicant	1777	988
ROB07	UT HF#3	Feb 2010	EPA R4	988	
UT Little Robinson Crk	HF#4	March 2007	Applicant	785	785 [2]
ROB09	UT HF#4	Feb 2010	EPA R4	57 [2]	
UT Indian Crk	Pond#21 (HF#5/6)	March 2007	Applicant	469	191 [3]
UT Indian Crk	HF#5	March 2007	Applicant	681	
UT Indian Crk	HF#6	March 2007	Applicant	681	
ROB12	UT HF#5/6	Feb 2010	EPA R4	191	

1 Background specific conductivity is determined as the lesser of *in-situ* specific conductivity measured by the permit applicant in March 2007 and by EPA Region 4 in February 2010.

2 Field conditions at HF#4 in February 2010 were not representative of hydrologic conditions required to form the channel present in this valley. As a result, data collected in this valley in February 2010 is considered anomalous.

3 HF#5 and HF#6 are proposed to be built in two forks of a single valley. The toe of each of these proposed fills will lie approximately 140 feet apart, effectively rendering them a single large fill. The two fills will share a single sediment pond (Pond #21), and it is the specific conductivity measured in the field at the proposed location of this pond that will be considered background conditions in this valley.

In addition to concerns regarding conductivity levels directly downstream of proposed valley fills, EPA remains concerned about the overall cumulative impacts of the proposed Little Fork Surface Mine on an already degraded watershed. Therefore, EPA believes the AMP should require monitoring of conductivity levels downstream of the proposed operation in Robinson Creek and Indian Creek. Despite currently elevated conductivity levels in streams adjacent to the project site, as described above, EPA has reason to believe that several streams in the project area currently contribute freshwater dilution to downstream waters. Increasing conductivity levels in these streams, therefore, could make conditions in an already impaired watershed worse.

Therefore, the AMP should require monitoring downstream of the project in Indian Creek and Robinson Creek to ensure that baseline conductivity levels are not exceeded. If monitoring demonstrates increased levels of conductivity in these receiving streams that are attributable or likely attributable to the proposed project, the applicant should be required to implement corrective actions within the watershed to ensure that conductivity levels do not exceed pre-

mining levels. Such opportunities may include remediation of previously mined areas within the watershed, implementing additional BMPs within the project site, or additional contributions to the Kentucky ILF program for projects undertaken within the watershed. Without imposing such a condition in the AMP, EPA is concerned that the project has the potential to cause or contribute to violations of downstream WQS and continuing impairment of downstream waters.

Water Quality

The proposed project would impact more than 1 mile of streams, including the permanent loss of 4,415 lf of streams located in the Robinson Creek and Indian Creek watersheds. Both Robinson Creek and Indian Creek discharge directly into Shelby Creek in the Levisa Fork watershed. Based on our preliminary review of the available water quality data, we believe that the proposed project may cause or contribute to exceedances of WQS in streams that are already known or suspected to be impacted by mining-related (and other) causes. Furthermore, the Kentucky Pollutant Discharge Elimination System (KPDES) General Permit previously issued for this project does not set numeric limits for parameters of concern, such as conductivity, which scientific literature has demonstrated have significant effects on downstream biological communities.

EPA notes that Indian Creek is the receiving water body for 6 of the applicant's 37 NPDES outfalls for this project (authorized under a Kentucky NPDES General Permit, KPDES No. KYG046229). Additionally, nine outfalls discharge to unnamed tributaries of Indian Creek. Indian Creek is on the Kentucky 2006, 2008, and draft 2010 CWA§303(d) lists (partially supporting warm water aquatic habitat) for sedimentation/siltation and TDS. The CWA§303(d) list shows one of the suspected sources of the impairment in Indian Creek to be surface mining. The KPDES General Permit under which the project initially received coverage has expired and has been replaced by the most recent KPDES General Permit to Discharge Treated Wastewater into Waters of the Commonwealth applicable for coal mining (KYG040000; July 1, 2009).

The 2009 KPDES General Permit under which this project is (apparently) covered expressly excludes from coverage operations discharging directly to waters that are listed for coal-mining related pollutants. Such pollutants are defined to include sedimentation, total suspended solids, TDS, conductivity, iron, manganese, and metals. This project will discharge directly to waters that are listed as impaired due to TDS and sedimentation. Therefore, EPA believes that general permit for these outfalls is inappropriate and therefore the Section 402 permit as written does not protect WQS.

The 404(b)(1) Guidelines prohibit permitting a discharge of dredged or fill material if such discharge would cause or contribute to violations of any applicable WQS. In light of this provision, EPA believes that no Section 404 permit should be issued that would authorize discharges to Indian Creek or its tributaries until these inconsistencies are resolved. Alternatively, if the Corps determines that issuing a permit associated with discharges to these streams is appropriate, then the permit should include limits for specific conductance that are protective of water quality. These limits should be based on the conclusions of the scientific studies described above, which reflect best-available scientific information.

National Environmental Policy Act / Environmental Justice

Based on our review of the information available, including a Cumulative Impact Assessment (CIA) for the Upper Levisa, EPA believes it may be appropriate for the Corps to prepare an Environmental Impact Statement (EIS) concerning this proposed project. In making the determination regarding the need to prepare an EIS, we recommend that you consider the relatively large scale of the impacts associated with proposed project, e.g., the loss of over 4,400 lf of stream and the construction of 5 valley fills, as well as questions concerning how effective the proposed mitigation will be at reducing the severity of the potential direct, indirect, and cumulative impacts. In that light, EPA is uncertain that the current mitigation proposal would serve as a basis to support a Finding of No Significant Impact. With regard to the CIA, we are particularly concerned that the geographic boundary (HUC-8) may be too large spatially to provide a meaningful analysis of impacts from mining in the affected watershed. In addition, we are concerned that the CIA does not address potential cumulative human health impacts, and that the CIA presents several instances of incomplete information.

Consistent with Executive Order 12898 entitled "Federal Actions to Address Environmental Justice In Minority Populations and Low-income Populations" and the accompanying Presidential Memorandum, EPA recommends that the Corps' Section 404(b)(1) Guidelines and NEPA reviews analyze the potential for disproportionately high and adverse effects on low-income or minority populations in the area. Specifically, a characterization of the economic status of residents near the site and the conditions they face including any effects relating to the proximity of the blasting zone, locations of discharges of fill material, truck traffic, noise, fugitive dust, and habitat loss needs to be conducted to adequately assess the potential impact to EJ communities. Additional information is also needed concerning sources of drinking water for the affected populations (including municipal water supplies and private sources of drinking water including streams and/or wells). EPA also recommends that you take steps to ensure meaningful engagement of affected communities.

Conclusion

While EPA appreciates the applicant's willingness to discuss the adoption of certain BMP's into their mine plan, we believe that the Corps should incorporate further required special conditions before issuing any final authorization. Without including such conditions, EPA believes the proposed project is inconsistent with the 404(b)(1) Guidelines and will likely cause violations of WQS and associated significant degradation of stream life. EPA's recommended special conditions are outlined above, and detailed in the enclosed document. EPA also requests that we have the opportunity to review and comment on the draft permit and special conditions prior to finalization.

I want to thank you and your staff for your cooperation and willingness to address our issues. We look forward to continue working closely with you and the applicant as the permit is finalized. If you have any questions, please call me at (404) 562-9470 or Eric Somerville of my staff at (706) 355-8514.

Sincerely,

Gail Mitchell, for

James D. Giattina
Director
Water Protection Division

Enclosures

cc: Jim Townsend, Louisville District, Louisville, KY
Lee Anne Devine, Louisville District, Louisville, KY
Justin Branham, Louisville District, Sassafras, KY
Joe Blackburn, Office of Surface Mining, Lexington, KY
Lee Andrews, U.S. Fish and Wildlife Service, Frankfort, KY
Carl Campbell, Kentucky Department of Natural Resources, Frankfort, KY
Bruce Scott, Kentucky Department of Environmental Protection, Frankfort, KY
Sandy Gruzesky, Kentucky Division of Water, Frankfort, KY

Enclosure 1
Proposed Clean Water Act Section 404 Permit Special Conditions

I. Best Management Practices & Adaptive Management Plan

1. The permittee shall submit a detailed plan to the U.S. Army Corps of Engineers (Corps) Louisville District and the U.S. Environmental Protection Agency, Region 4 (EPA) for implementing mine design and hollow fill construction alternatives and best management practices (BMPs) to minimize TDS and specific conductivity during the placement of fill material into waters of the United States (U.S.) during the construction of the hollow fills. The objective of these procedures is to ensure that effluent discharging from the mine does not have a monthly flow-weighted specific conductivity greater than that which would violate applicable water quality standards,[1] consistent with best-available science on the relationship between conductivity and aquatic life. This plan must be approved by the Corps, and transmitted to EPA, prior to discharge of any dredged or fill material into any water of the U.S. Proposed actions should include, but are not necessarily limited to:

    - Identification via field-based testing of TDS and/or sulfate producing materials that must then be isolated;
    - Implementation of hollow fill design alternatives that reduce infiltration (e.g. compact surface lifts, crown the fill surface) and controls flow through the fill to avoid contact time between water and reactive materials (i.e. TDS and/or sulfate producing geologic strata);
    - Use of only low-reactive or non-reactive durable rock to construct underdrains and place only these same materials adjacent to the sides of the highwalls and hollow fills.

2. The permittee shall construct hollow fills individually, one at a time, with an adequate monitoring period between completion of one fill to demonstrate water quality is protected. Construction of the next hollow fill would not be authorized if the monthly flow-weighted specific conductivity measured at the representative outfall downstream of the first hollow fill exceeds levels consistent with applicable water quality standards for more than one consecutive month, or if the overall trend in conductivity levels are increasing such that the linear trend demonstrates likely future exceedance of such levels.[2]

3. The permittee shall submit documentation to the Corps and EPA indicating all BMPs employed in each hollow fill within 30 days of site preparation and commencement of construction of the rock underdrain.

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[1] See, supra, footnote 2.
[2] See, supra, footnote 2.

4. (i) The permittee must submit monthly flow-weighted conductivity, $\overline{K}$, to the Corps and EPA for the effluent of Pond#1, Pond#3, Pond#15, and Pond#21 following the commencement of discharges of fill material into waters of the U.S. using data collected as part of the applicable Kentucky NPDES permit, augmented as necessary to meet the special condition requirement below. Monthly flow-weighted conductivity shall be calculated as follows:

$$\overline{K} = \frac{\sum_i (Q_i \times K_i)}{\sum_i Q_i}$$

where:

$\overline{K}$ = monthly flow-weighted conductivity, µS/cm
Qi = flow for the ith sample per month, cfs
K_i = conductivity for the ith sample per month, µS/cm.

(ii) Specific conductivity will be measured no less frequently than two (2) times per month following the initial discharge of dredged or fill material into waters of the U.S. in each valley where such discharges occur through final bond release.

(iii) The monthly flow-weighted conductivity, $\overline{K}$, will be plotted as a time series and the trend in effluent conductivity calculated by linear regression. If the trend indicates that the monthly flow-weighted conductivity will exceed background levels, as defined below, or another acceptable numeric interpretation compatible with applicable narrative water quality standards,[3] whichever is greater, during the first six months following the initial discharge of dredged or fill material into any water of the U.S., the applicant will promptly notify both the Corps and EPA. All data will be provided to both the Corps and EPA within 15 days of the final monthly measurement used to calculate flow-weighted conductivity.

(iv) Background specific conductivity levels are defined as the lesser value recorded *in-situ* by the permit applicant in March 2007 and EPA in February 2010, except at HF#4 where anomalous conditions in February 2010 affected data integrity:

Tributary draining HF#1:	638 µS/cm
Tributary draining HF#3:	988 µS/cm
Tributary draining HF#4:	785 µS/cm
Tributary draining HF#5/6:	191 µS/cm

(v) If during any three (3) consecutive months during the subsequent twelve (12) months following the monitoring period outlined in I.4(iii), the trend defined therein indicates that the monthly flow-weighted conductivity values will not

[3] See, supra, footnote 2.

likely be less than necessary to satisfy applicable water quality standards by the end of this 12-month monitoring period, or if any three (3) consecutive monthly flow-weighted conductivity values exceed such levels,[4] then the permittee will conduct an analysis of the sources of effluent conductivity and develop an adaptive management plan (AMP) Phase I to reduce effluent conductivity (measured as specific conductivity) and TDS.

(vi) The conductivity trend analysis and adaptive management plan shall be submitted to the Corps for approval, and transmitted to EPA, within 30 days of conditions defined in I.4(v). The plan shall be implemented within 30 days of written approval by the Corps. Implementation of the plan will continue until the monthly flow-weighted conductivity falls below the levels described in paragraph (v), above, for three (3) consecutive months. If after cessation of AMP I implementation, conductivity trends defined in I.4(v) begin to rise, implementation of the AMP will be reinitiated.

5. If monthly flow-weighted conductivity values exceed the levels described in paragraph (v), above, continually for three months after implementation of AMP Phase I, the permittee shall prepare, within 30 days, recommendations for additional actions to reduce effluent conductivity (AMP Phase II). These recommendations shall be implemented within 30 days of written approval by the Corps.

II. Effluent and In-stream Chemical and Biological Monitoring

A. Effluent Monitoring

The permittee shall perform effluent monitoring from representative outfalls on Pond#1, Pond#3, Pond#15, and Pond#21, as these ponds are established. Effluent monitoring samples are to be collected at the outlet of each pond. Where the following monitoring conditions include additional monitoring parameters or monitoring events, these data shall augment, but not replace monitoring requirements in the Kentucky NPDES permit.

a. Parameters and Test Methods

i) Hydrologic permanence of outflow from the ponds should be monitored and logged by a continuously recording data logger.

ii) The permittee should perform effluent monitoring of the parameters listed in Table 1, analyzed using EPA Test Methods in 40 CFR Part 136 by an approved licensed laboratory.

b. Sampling Location

The sampling should be conducted at each representative outfall at Pond#1, Pond#3, Pond#15, and Pond#21.

c. Sampling Frequency

[4] See, supra, footnote 2.

The sampling frequency is as noted in Table 1. Samples required quarterly should be no fewer that five (5) days apart, and the amount of precipitation for the previous 24 hour period should be recorded on-site and reported (to the nearest 0.1 inch) as part of the sampling report. Samples required twice per month should be no fewer than five (5) days apart, and the amount of precipitation for the previous 48 hour period should be recorded on-site and reported (to the nearest 0.1 inch) as part of the sampling report. Monitoring will continue through final bond release.

Reporting

Reports shall contain tabulated data (including sample station I.D., date, and time) and graphs necessary to present information clearly and concisely, including all such tables and graphs necessary to summarize and present the entire period of record for each parameter and sample station. Latitude and longitude coordinates of all water quality monitoring locations with the applicable datum identified must be provided along with photographs and figures illustrating all sample locations. Calibration records of all *in-situ* multi-probe or single-probe water quality instruments and laboratory reports showing the analytical results must also be submitted.

All results should be clearly labeled with the applicable CWA permit number and KDNR DMP number and submitted KDOW, the Corps, and EPA Region 4.

Table 1. Supplemental effluent and in-stream water quality monitoring parameters.

Parameter	Units	Method	Sample Frequency
Bicarbonate Alkalinity	mg/l		Quarterly
Chlorides	mg/l	EPA300.0	Quarterly
Discharge	cfs	DOWSOP03019	Twice per month
Dissolved oxygen	mg/l	DOWSOP03014	Twice per month
Duration of discharge[1]	days		Continuous
Hardness (as $CaCO_3$)	mg/l	SM 2340B	Quarterly
pH	s.u.	DOWSOP03014	Quarterly
Precipitation	inches		Continuous
Sulfates	mg/l	EPA300.0	Quarterly
Specific conductance[2]	uS/cm	EPA120.1	Twice per month
Temperature	Deg C	DOWSOP03014	Twice per month
Turbidity	ntu	DOWSOP03014	Twice per month
Total Dissolved Solids (TDS)	mg/l	SM 2540C	Quarterly
Total Calcium	ug/l	EPA200.7	Quarterly
Total Magnesium	ug/l	EPA200.7	Quarterly
Total Potassium	ug/l		Quarterly
Total Sodium	ug/l		Quarterly
Total Recoverable Antimony	ug/l	EPA200.8	Quarterly
Total Recoverable Arsenic	ug/l	EPA200.8	Quarterly
Total Recoverable Beryllium	ug/l	EPA200.8	Quarterly
Total Recoverable Cadmium	ug/l	EPA200.8	Quarterly
Total Recoverable Chromium (III)	ug/l		
Total Recoverable Chromium (IV)	ug/l		

Total Recoverable Copper	ug/l	EPA200.8	Quarterly
Total Recoverable Iron[2]	ug/l	EPA200.8	Quarterly
Total Recoverable Lead	ug/l	EPA200.8	Quarterly
Total Recoverable Manganese[2]	ug/l	EPA200.8	Quarterly
Total Recoverable Mercury	ug/l	EPA1631E or 245.7	Quarterly
Total Recoverable Nickel	ug/l	EPA200.8	Quarterly
Total Recoverable Selenium	ug/l	EPA200.8	Quarterly
Total Recoverable Silver	ug/l	EPA200.8	Quarterly
Total Recoverable Thallium	ug/l	EPA200.8	Quarterly
Total Recoverable Zinc	ug/l	EPA200.8	Quarterly

[1] Duration of discharge from pond should be measured using a continuously recording data logger.
[2] Specific conductance, manganese, and iron need to be sampled at in-stream chemical monitoring locations only, unless otherwise stated in the applicable Kentucky NPDES permit.

B. WET Monitoring

Beginning at the initiation of discharge from representative outfalls (as specified above under "Effluent Monitoring"), EPA believes coal mine permits should require the permittee to perform either acute or chronic WET tests on the representative outfalls based on the duration of the discharge as documented by the continuously recording data loggers referenced in II.A(a)(i). The results of WET monitoring will be used to determine the effectiveness of the BMPs.

In cases where hydrologic permanence monitoring data indicate a sediment pond with any volume of discharge lasting more than 4 consecutive days, chronic WET tests should be performed using *Ceriodaphnia dubia* and *Pimephales promelas* and using a dilution series that includes 100 percent effluent and the in-stream waste concentration.[5] The end points should be reported as the inhibition concentration that affects 25% of the test organisms compared to the control (IC_{25}). Sampling should be performed quarterly. The operator should use WET testing procedures outlined in EPA's document entitled, "Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms" (October 2002).

In cases where the effluent discharge may be short in duration, it may be necessary to collect a high volume effluent sample and properly preserve it for use in the static-renewal test. Please refer to Section 8.5.4 on page 32 of EPA's document entitled, "Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms" (October 2002). Alternative acute WET test organisms are either *Daphnia magna* or *D. pulex* and *Pimaphales promelas*. In addition to reporting these results to the Corps, all results should be reported to EPA and KDOW.

C. In-stream Water Quality Monitoring

The permittee should perform in-stream monitoring for the parameters listed above in Table 1, in accordance with 40 CFR §122.44(d)(1)(vi)(C)(3). Sample collection and quality assurance / quality control should follow Kentucky Standard Operating Procedures at DOWSOP03014 and DOWSOP03015. EPA Test Methods in 40 CFR Part 136 should be used for analytical analysis.

a. Sample Type
Grab samples should be taken whenever possible.

b. Sampling Locations
Samples should be taken from the following locations:

[5] EPA notes that approved invertebrate WET test species are relatively insensitive to conductivity, as compared to in situ aquatic macroinvertebrates in central Appalachian streams. Nevertheless, EPA believes that WET tests can help identify significant water quality impairments as a result of surface coal mining operations, which can complement numeric conductivity measurements.

i. One sampling point located upstream of the sediment pond for each representative outfall, as specified above under "Effluent Monitoring" at paragraph II.A. If there is no upstream location, an appropriate background location within the 12-digit hydrologic unit code should be used.

ii. One in-stream monitoring site located immediately below the toe of the sediment pond for each representative outfall (i.e. ≤25 feet from outfall), as specified above under "Effluent Monitoring."

iii. One sampling point located *the further* of 200 meters (656 feet) downstream of each representative outfall or the furthest downstream location that is upstream of any tributary confluence. The sampling point should be downstream of riprap and other disturbance and located within a relatively natural and intact riparian zone where possible.

iv. One sampling point located in the receiving waterbody that is within 50 feet of the first confluence necessary to increase the stream order above that stream in which the outfall is located (e.g. if the outfall is located in a 1st order stream, this sample point should be located no greater than 50 feet downstream of the first confluence that elevates the stream order below the confluence to at least a 2nd order stream)

c. Sample Frequency

The sampling frequency is as noted in Table 1. Samples required quarterly should be no fewer that five (5) days apart, and the amount of precipitation for the previous 24 hour period should be recorded on-site and reported (to the nearest 0.1 inch) as part of the sampling report. In the event that in-stream monitoring results show in-stream specific conductivity levels above those necessary to satisfy applicable water quality standards,[6] the permittee is required to increase the monitoring frequency for all parameters to two times per month. Samples required twice per month should be no fewer than five (5) days apart, and the amount of precipitation for the previous 48 hour period should be recorded on-site and reported (to the nearest 0.1 inch) as part of the sampling report. Monitoring will continue through final bond release.

d. Conditions for Taking Samples

Samples should be collected during low- or base-flow conditions (e.g., not during, or within 48 hours after, a precipitation event exceeding 0.2 inches).

e. Reporting

Reports shall contain tabulated data (including sample station I.D., date, and time) and graphs necessary to present information clearly and concisely, including all such tables and graphs necessary to summarize and present the entire period of record for each parameter and sample station. Latitude and longitude coordinates of

[6] See, supra, footnote 2.

all water quality monitoring locations with the applicable datum identified must be provided along with photographs and figures illustrating all sample locations. Calibration records of all *in-situ* multi-probe or single-probe water quality instruments and laboratory reports showing the analytical results must also be submitted.

All results should be clearly labeled with the applicable CWA permit number and KDNR DMP number and submitted KDOW, the Corps, and EPA Region 4.

D. In-stream Biological Monitoring

The permittee should implement an annual benthic macroinvertebrate study plan using approved State protocols for benthic macroinvertebrate sampling.

a. Concurrent in-stream monitoring
In-stream samples for specific conductivity, TDS, pH, temperature and dissolved oxygen should be measured at the same locations as the benthic samples using properly calibrated instruments.

b. Methods
The permittee should implement an annual benthic macroinvertebrate study plan using approved state-protocols for benthic macroinvertebrate sampling.

c. Sampling Locations
Use the same locations as shown above for in-stream water quality monitoring.

d. Sampling Frequency
Sampling times will occur consistent with accepted Kentucky protocols (i.e. sample index periods). Sampling will occur annually through final bond release. Sampling should be avoided during periods of excessive precipitation and scouring floods. In cases where a large flow rate of the receiving water does not lend itself to a benthic assessment (i.e., non-wadeable sites), the permittee should perform a bioassessment using fish. Both fish and benthic macroinvertebrate studies should be performed for receiving waterbodies that are conducive to fish assessments. Results from sampling either of the two assemblages may be used to determine if the water body is impaired.

e. Reporting
The permittee should submit the results of the study, including summary tables, appropriate indices of biotic integrity, color photographs and figures showing sample locations, calibration records, etc. to the KDOW, the Corps, and EPA no later than 30 days following the permittee's receipt of the final report.

Enclosure 2
Adaptive Management Plan Implementation Timeline

Phase	Action	Time allowed	Elapsed time since initial discharge of fill material into waters of the U.S.
Pre-AMP	Initial land clearing, excavation, hollow fill construction, and water quality monitoring	6 months	6 months
	Initial post-construction monitoring	3 to 12 months	Up to 18 months
AMP Phase I (if applicable)	Submit AMP I	30 days after AMP I trigger (SC I.4(v))	Up to 19 months
	Approve AMP I	Not specified in Special Condition, estimate 30 days	Up to 20 months
	Implement AMP I	30 days after AMP I Approval	Up to 21 months
	Monitor AMP I	3 to 6 months	Up to 27 months
AMP Phase II (if applicable)	Develop and submit AMP II	30 days after AMP II trigger (SC I.5)	Up to 28 months
	Approve AMP II	Not specified in Special Condition, estimate 30 days	Up to 29 months
	Implement AMP II	30 days after AMP II approval	Up to 30 months
	Monitor AMP II	6 months	Up to 36 months
Additional Mitigation Required (if applicable)	Submit mitigation plan	45 days after end of AMP II	Up to 37.5 months
	Approve mitigation plan	Not specified in Special Condition, estimate 30 days	Up to 38.5 months
	Implement mitigation plan	30 days after mitigation plan approval	Up to 39.5 months

Gregory Peck/DC/USEPA/US
12/08/2010 06:42 PM

To Nancy Stoner
cc Ann Campbell, Kevin Minoli, Matthew Klasen
bcc
Subject Materials for Bob P. Meeting Thursday

Nancy:

Attached are draft materials for you, Bob P. and Bob S. for the mining meeting tomorrow with the environmental community reps. These materials address each of the issues raised in Ann's request plus a few more Joe raised with me. Thanks to OST, OWOW and Matt for responding so quickly today.

Please review and let me know if you have questions or want to make changes. I'll copy Kevin too so OGC can review. The key document is the first one - the rest is background.

Thanks,
Greg

2010-12-08 Bob P Materials.docx

WORD ATTACHMENTS REDACTED - DELIBERATIVE

Supplemental Information: Premier Elkhorn (fact sheet and Nov. 2 closeout letter)

Briefing for Premier Elkhorn Lil Fork (12-8-10).doc LRL-2007-0594_Elkhorn_11-2-10.pdf r

Supplemental Information: Leeco Stacy Branch (fact sheet and draft closeout letter)

Leeco - Stacy Branch fact sheet.docx 2010-12-08_Draft_Leeco - Clean R4 comments.docx

Supplemental Information: Cumulative Effects (summary of Bernhardt et al. 2010 paper, and annotated paper)

2010-12-08 Summary of Bernhardt et al 2010 re cumulative impacts.docx

Bernhardt et al 2010 (conductivity, cumulative impacts) - highlighted.pdf

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

NOV - 2 2010

Colonel Keith A. Landry
District Engineer
Louisville District Corps of Engineers
Attn: Todd Hagman (Regulatory Branch)
OP-FN, Room 752
P.O. Box 59
Louisville, Kentucky 40201-0059

Subject: Premier Elkhorn Coal Company, Little Fork Surface Mine
U.S. Army Corps of Engineers LRL-2007-0594
Kentucky Division of Mine Permits #898-0800

Dear Colonel Landry:

The U.S. Environmental Protection Agency (EPA), Region 4, has reviewed the information submitted by or on behalf of the Premier Elkhorn Coal Company for impacts to jurisdictional waters of the U.S. as a result of proposed surface coal mining activities associated with its Little Fork Surface Mine in Pike County, Kentucky (LRL-2007-0594; #898-0800). Our review has included the original April 24, 2007, U.S. Army Corps of Engineers (Corps) Clean Water Act (CWA) Section 404 permit application as well as several additional documents provided by or on behalf of the permit applicant. EPA is concerned that the permit, as proposed, is not consistent with requirements of the agencies' regulations, including the Section 404(b)(1) Guidelines, and therefore recommends that changes to the project identified in this letter be incorporated before authorization is provided. EPA is also recommending that an Environmental Impact Statement should be prepared for this permit to assess potential environmental impacts under the National Environmental Policy Act.

The applicant originally sought authorization to impact 6,845 linear feet (lf) of ephemeral and intermittent streams to facilitate construction of six hollow fills and four in-stream sediment ponds in unnamed jurisdictional tributaries to Little Fork, Robinson Creek, and Indian Creek. Little Fork discharges into Robinson Creek, and both Robinson Creek and Indian Creek discharge directly into Shelby Creek in the Levisa Fork watershed. Subsequently, the applicant revised the mine plan and presently proposes five hollow fills and three in-stream sediment control ponds. Anticipated impacts to jurisdictional waters now comprise 5,560 lf of ephemeral and intermittent streams, including 4,415 lf as a result of the hollow fills and 1,145 lf as a result of sediment control ponds and a "drainage corridor" between the toe of HF#3 and Pond#3.

EPA has been coordinating closely with your staff and the permit applicant since the 60-day ECP review period began on August 19, 2010, (including a 15-day extension of the review period). On September 30, 2010, EPA submitted a comment letter to the Corps providing additional detail on our informal comments of August 20, 2010, and requesting a meeting with

the Corps and the applicant to initiate efforts to resolve these concerns. EPA and the Corps subsequently held a conference call on October 6, 2010, to discuss EPA's letter and outline a path towards resolution of the concerns described therein. On October 14, 2010, EPA, the Corps, and the applicant held the first of numerous conference calls to discuss additional information requirements and opportunities to resolve ongoing concerns with the proposed project.

EPA is appreciative of the applicant's efforts during this process, which have included compilation and submittal of additional information substantiating the position that use of the adjacent reclaimed impoundment to store spoil material is not a practicable alternative for the proposed Little Fork Surface Mine. The applicant has also agreed to implement best management practices (BMP's) to minimize erosion and sedimentation from disturbed areas, retain existing vegetation to the maximum extent practicable, and take efforts to first identify and then isolate the most highly reactive spoil material likely to generate excessive total dissolved solids (TDS) and contribute to elevated specific conductivity (SC). Additionally, the applicant has agreed to amend its mitigation plan to add payment of an in-lieu-fee (ILF) to the Kentucky Department of Fish and Wildlife Resources Wetland and Stream Mitigation Program for authorized impacts to jurisdictional streams adversely affected due to construction of in-stream sediment ponds. Previously, the applicant had proposed an ILF payment for proposed permanent impacts, but planned to mitigate for sediment pond impacts simply via removal of the ponds and restoration of affected streams many years following the impacts themselves.

Despite the changes described above, EPA has significant remaining environmental concerns regarding this project as currently proposed. EPA's review is intended to ensure that the proposed project meets the requirements of the CWA. The CWA Section 404(b)(l) Guidelines promulgated in regulations by EPA in conjunction with the Secretary of the Army establish the substantive environmental standards applied in the review of projects proposing to discharge dredged or fill material into waters of the United States. The Guidelines establish a sequence of review requiring: (1) an evaluation of practicable alternatives that meet the project's basic purpose to ensure selection of the least environmentally damaging practicable alternative so long as that alternative will not result in significant environmental degradation); (2) taking all appropriate and practicable steps to minimize potential adverse impacts; and (3) compensation for all remaining unavoidable impacts to waters of the United States. In addition, the Guidelines require that no discharge may be permitted that would cause or contribute to significant degradation of the waters of the United States.

Scientific literature has increasingly recognized the relationship between discharges from surface coal mining operations and downstream water quality impairments. A 2005 published study, "Evaluation of Ionic Contribution to the Toxicity of a Coal-Mine Effluent Using *Ceriodaphnia dubia*" by Kennedy, et al. linked impairment of aquatic life to TDS levels. EPA also notes that in previous technical reports, the Commonwealth of Kentucky has recognized the potential detriment to stream biota in headwater streams in the Eastern Kentucky Coal Field correlated with specific conductivity levels above 400 µS/cm (Pond and McMurray, 2002[1]). A

[1] Pond, G.J. and S.E. McMurray. 2002. A Macroinvertebrate Bioassessment Index for Headwater Streams of the Eastern Kentucky Coalfield Region, Kentucky. Kentucky Department for Environmental Protection, Division of Water. Frankfort, KY.

2008 published study, "Downstream effects of mountaintop coal mining: comparing biological conditions using family- and genus-level macroinvertebrate bioassessment tools," by Pond, et al. found evidence indicating that mining activities have subtle to severe impacts on aquatic life and the biological conditions of a stream. A 2010 published study by Pond, "Patterns of *Ephemeroptera* taxa loss in Appalachian headwater streams (Kentucky, USA)," links conductivity as the most strongly correlated factor to *Ephemeroptera* abundance in streams impacted by mining and residential development. A draft report by EPA, "The Effects of Mountaintop Mines and Valley Fills on Aquatic Ecosystems of the Central Appalachian Coalfields," recognizes that surface coal mining causes effects that include resource loss, water quality impairment, and adverse effects on aquatic resources. Finally, another draft report by EPA, "A Field-based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams" recognizes stream-life impacts associated with elevated levels of conductivity.

As part of its permit application, the applicant collected water quality data from project streams in March 2007 and reported specific conductivity values ranging from 469 to 1,777 µS/cm. EPA collected similar data in February 2010 and found specific conductivity in these same streams to range from 57 to 988 µS/cm. In addition, EPA documented specific conductivity in receiving waters downstream of the surface mine site itself ranging from 497 to1,008 µS/cm (e.g. Little Fork, Robinson Creek, and Indian Creek). EPA further notes that Indian Creek, which is the receiving water body for 6 of the applicant's 37 proposed National Pollutant Discharge Elimination System (NPDES) outfalls, is on the KY 2006, 2008, and draft 2010 CWA 303(d) list (partially supporting warm water aquatic habitat) for sedimentation/siltation and TDS.

EPA believes that additional improvements must be made to the proposed mine's design, management practices, and monitoring plan in order to ensure compliance with the 404(b)(1) Guidelines. These improvements are designed to yield an overall improvement in the condition of the watershed, which has been significantly impacted by historic mining activities. EPA believes that the following conditions should be incorporated into any final authorization under Section 404 in order to ensure that the discharges will not cause or contribute to a violation of State water quality standards (WQS), or cause or contribute to significant degradation of waters of the United States consistent with the Guidelines (40 C.F.R. § 230.10(b) and (c)).

Fill Sequencing and Best Management Practices

EPA recommends that the proposed hollow fills be constructed sequentially (one at a time) with sufficient time between the construction of subsequent fills for water quality monitoring to demonstrate that the discharge of fill material does not result in adverse impacts to the downstream aquatic ecosystem. While the applicant has provided some information to suggest that construction of fills in a sequenced approach would not be feasible, the information provided to EPA has not demonstrated that this approach is not practicable. More importantly, we are concerned that without sequencing and associated monitoring, the project may result in the violation of water quality standards and cause significant degradation of stream functions and biodiversity. The applicant should be required to submit a practicability analysis of alternatives involving a sequenced approach for valley fill construction – including individual fill construction and construction of valley fills in two or three phases – before the proposed project is authorized.

EPA believes that if water quality or biological monitoring downstream of one "sequenced" valley fill demonstrates adverse impacts to the downstream aquatic ecosystem – as determined by exceedances of specific numeric thresholds – the permit should trigger implementation of an adaptive water quality management plan (AMP) prior to construction of the next hollow fill, as described in the enclosed special permit condition (see Enclosure 1). Construction of the next hollow fill would not be authorized if the monthly flow-weighted specific conductivity measured at the representative outfall downstream of the first hollow fill exceeds the applicable water quality criteria for more than one consecutive month, or if the overall trend in conductivity levels are increasing such that the linear trend demonstrates likely future exceedance of such criteria.[2] To support this demonstration, supplemental monitoring requirements, including both chemical and biological monitoring parameters, should also be included as special conditions.

EPA believes that several demonstrated BMPs and fill construction practices for surface coal mining operations have the potential to reduce existing downstream levels of conductivity and TDS. These practices include efforts to identify and then isolate TDS- or sulfate-producing materials to minimize the likelihood that these materials will come into contact with groundwater or precipitation and therefore impact downstream waters. The proper implementation of similar BMPs has been shown to reduce specific conductance in streams draining a Magoffin County, Kentucky surface coal mine by as much as 75 percent over elevated background conditions in re-mined valleys.

EPA is appreciative of the applicant's recent endorsement of measures to identify and isolate TDS and/or sulfate producing materials in the field, as memorialized in their November 1, 2010, list of revised BMP's. EPA recommends that these measures be included as special conditions into any final authorization under Section 404 for disposal of dredged or fill material into waters of the U.S. for the Little Fork Surface Mine. These special conditions should include, at a minimum, the following:

- Identification via field-based testing of TDS and/or sulfate-producing materials that must then be isolated;
- Implementation of hollow fill design alternatives that reduce infiltration (e.g. compact surface lifts, crown the fill surface) and controls flow through the fill to avoid contact time between water and reactive materials (i.e. TDS and/or sulfate producing geologic strata); and
- Use of only low-reactive or non-reactive durable rock to construct underdrains and place only these same materials adjacent to the sides of the highwalls and hollow fills.

EPA notes that the BMPs described above relate directly to fill activities in waters of the United States that are likely to have impacts on downstream water quality. The Section 404

[2] With respect to conductivity, EPA would be satisfied with using 500 µS/cm as an numeric interpretation of the narrative standards relevant here. This value represents best-available scientific information on the relationship between conductivity levels and aquatic life in central Appalachian streams, as described in the scientific literature described earlier in this letter.

regulations establish a requirement at 40 C.F.R. 230(10)(b) that no permit may be issued that would cause or contribute to a violation of WQS. This requirement must be met regardless of whether actions necessary to meet this provision would trigger changes to permits issued under other Federal or State regulatory programs.

Adaptive Management Plan (AMP)

EPA believes that special conditions should include an AMP – described above – based on robust water quality and biological monitoring to identify trends in these parameters and to define specific thresholds of concern. If such thresholds are reached, the AMP would require specific response actions. EPA also believes the AMP should include a phased approach, such that increased impacts to downstream waters would trigger increased remedial actions until such time as water quality goals are met.

Existing scientific literature has demonstrated a strong relationship between elevated levels of specific conductance, surface coal mining activities, and degradation of aquatic communities. Therefore, EPA believes that levels of SC should be included as trigger points within the AMP. Recognizing that conductivity levels in on-site streams are already elevated, and anticipating that specific conductance in affected streams will experience at least a short-term increase during land clearing, initial excavation, and hollow fill construction, the trigger for development of the AMP will be applicable only after the initial six (6) months following the discharge of dredged or fill material into waters of the U.S. (I.4(v)). This initial 6-month period would require notification to both the Corps and EPA if monitoring indicates that the trend in monthly flow-weighted conductivity, defined in Special Condition I.4(iii), will exceed background levels or an acceptable numeric interpretation of the applicable narrative water quality standards[3], whichever is greater. Background conditions should be defined as the lesser of values measured in the field in March 2007 and February 2010 (Table 1).

If, however, during any 3 consecutive months during the subsequent 12 months of monitoring, the trend defined at proposed Special Condition I.4(iii) indicates that the monthly flow-weighted conductivity values will not likely fall below levels incompatible with meeting applicable water quality standards, or if any 3 consecutive monthly flow-weighted conductivity values exceed such levels,[4] then the permittee will conduct an analysis of the sources of effluent conductivity and develop Phase I of the AMP to reduce effluent conductivity (measured as specific conductivity) and TDS (see Enclosures 1 and 2). This AMP, to be developed by the applicant and approved by the Corps, should be based on the most technologically advanced and effective approaches available, and assumes that efforts to identify and isolate TDS- and sulfate-producing geologic strata are implemented as part of mine design and hollow fill construction, as outlined above.

If water quality goals are not met after an additional six months of implementation of the AMP, then Phase II of the AMP will be initiated. This plan will also be developed by the applicant and approved by the Corps. If Phase II of the AMP also fails to result in water quality conditions consistent with the goals outlined herein, it is EPA's recommendation that the applicant be

[3] See, supra, footnote 2.
[4] See, supra, footnote 2.

required by the permit special conditions to provide additional compensatory mitigation, either on-site or within the 12-digit hydrologic unit code (HUC) sub-watershed, aimed at addressing adverse chemical water quality conditions.

Table 1. Background specific conductivity in project streams.

Station I.D.	Station Location	Date	Investigator	Specific Conductivity (uS/cm)	BACKGROUND CONDITIONS [1]
UT Little Fork	HF#1	March 2007	Applicant	638	638
ROB02	UT HF#1	Feb 2010	EPA R4	769	
UT Little Robinson Crk	HF#3	March 2007	Applicant	1777	988
ROB07	UT HF#3	Feb 2010	EPA R4	988	
UT Little Robinson Crk	HF#4	March 2007	Applicant	785	785 [2]
ROB09	UT HF#4	Feb 2010	EPA R4	57 [2]	
UT Indian Crk	Pond#21 (HF#5/6)	March 2007	Applicant	469	191 [3]
UT Indian Crk	HF#5	March 2007	Applicant	681	
UT Indian Crk	HF#6	March 2007	Applicant	681	
ROB12	UT HF#5/6	Feb 2010	EPA R4	191	

1 Background specific conductivity is determined as the lesser of *in-situ* specific conductivity measured by the permit applicant in March 2007 and by EPA Region 4 in February 2010.

2 Field conditions at HF#4 in February 2010 were not representative of hydrologic conditions required to form the channel present in this valley. As a result, data collected in this valley in February 2010 is considered anomalous.

3 HF#5 and HF#6 are proposed to be built in two forks of a single valley. The toe of each of these proposed fills will lie approximately 140 feet apart, effectively rendering them a single large fill. The two fills will share a single sediment pond (Pond #21), and it is the specific conductivity measured in the field at the proposed location of this pond that will be considered background conditions in this valley.

In addition to concerns regarding conductivity levels directly downstream of proposed valley fills, EPA remains concerned about the overall cumulative impacts of the proposed Little Fork Surface Mine on an already degraded watershed. Therefore, EPA believes the AMP should require monitoring of conductivity levels downstream of the proposed operation in Robinson Creek and Indian Creek. Despite currently elevated conductivity levels in streams adjacent to the project site, as described above, EPA has reason to believe that several streams in the project area currently contribute freshwater dilution to downstream waters. Increasing conductivity levels in these streams, therefore, could make conditions in an already impaired watershed worse.

Therefore, the AMP should require monitoring downstream of the project in Indian Creek and Robinson Creek to ensure that baseline conductivity levels are not exceeded. If monitoring demonstrates increased levels of conductivity in these receiving streams that are attributable or likely attributable to the proposed project, the applicant should be required to implement corrective actions within the watershed to ensure that conductivity levels do not exceed pre-

mining levels. Such opportunities may include remediation of previously mined areas within the watershed, implementing additional BMPs within the project site, or additional contributions to the Kentucky ILF program for projects undertaken within the watershed. Without imposing such a condition in the AMP, EPA is concerned that the project has the potential to cause or contribute to violations of downstream WQS and continuing impairment of downstream waters.

Water Quality

The proposed project would impact more than 1 mile of streams, including the permanent loss of 4,415 lf of streams located in the Robinson Creek and Indian Creek watersheds. Both Robinson Creek and Indian Creek discharge directly into Shelby Creek in the Levisa Fork watershed. Based on our preliminary review of the available water quality data, we believe that the proposed project may cause or contribute to exceedances of WQS in streams that are already known or suspected to be impacted by mining-related (and other) causes. Furthermore, the Kentucky Pollutant Discharge Elimination System (KPDES) General Permit previously issued for this project does not set numeric limits for parameters of concern, such as conductivity, which scientific literature has demonstrated have significant effects on downstream biological communities.

EPA notes that Indian Creek is the receiving water body for 6 of the applicant's 37 NPDES outfalls for this project (authorized under a Kentucky NPDES General Permit, KPDES No. KYG046229). Additionally, nine outfalls discharge to unnamed tributaries of Indian Creek. Indian Creek is on the Kentucky 2006, 2008, and draft 2010 CWA§303(d) lists (partially supporting warm water aquatic habitat) for sedimentation/siltation and TDS. The CWA§303(d) list shows one of the suspected sources of the impairment in Indian Creek to be surface mining. The KPDES General Permit under which the project initially received coverage has expired and has been replaced by the most recent KPDES General Permit to Discharge Treated Wastewater into Waters of the Commonwealth applicable for coal mining (KYG040000; July 1, 2009).

The 2009 KPDES General Permit under which this project is (apparently) covered expressly excludes from coverage operations discharging directly to waters that are listed for coal-mining related pollutants. Such pollutants are defined to include sedimentation, total suspended solids, TDS, conductivity, iron, manganese, and metals. This project will discharge directly to waters that are listed as impaired due to TDS and sedimentation. Therefore, EPA believes that general permit for these outfalls is inappropriate and therefore the Section 402 permit as written does not protect WQS.

The 404(b)(1) Guidelines prohibit permitting a discharge of dredged or fill material if such discharge would cause or contribute to violations of any applicable WQS. In light of this provision, EPA believes that no Section 404 permit should be issued that would authorize discharges to Indian Creek or its tributaries until these inconsistencies are resolved. Alternatively, if the Corps determines that issuing a permit associated with discharges to these streams is appropriate, then the permit should include limits for specific conductance that are protective of water quality. These limits should be based on the conclusions of the scientific studies described above, which reflect best-available scientific information.

National Environmental Policy Act / Environmental Justice

Based on our review of the information available, including a Cumulative Impact Assessment (CIA) for the Upper Levisa, EPA believes it may be appropriate for the Corps to prepare an Environmental Impact Statement (EIS) concerning this proposed project. In making the determination regarding the need to prepare an EIS, we recommend that you consider the relatively large scale of the impacts associated with proposed project, e.g., the loss of over 4,400 lf of stream and the construction of 5 valley fills, as well as questions concerning how effective the proposed mitigation will be at reducing the severity of the potential direct, indirect, and cumulative impacts. In that light, EPA is uncertain that the current mitigation proposal would serve as a basis to support a Finding of No Significant Impact. With regard to the CIA, we are particularly concerned that the geographic boundary (HUC-8) may be too large spatially to provide a meaningful analysis of impacts from mining in the affected watershed. In addition, we are concerned that the CIA does not address potential cumulative human health impacts, and that the CIA presents several instances of incomplete information.

Consistent with Executive Order 12898 entitled "Federal Actions to Address Environmental Justice In Minority Populations and Low-income Populations" and the accompanying Presidential Memorandum, EPA recommends that the Corps' Section 404(b)(1) Guidelines and NEPA reviews analyze the potential for disproportionately high and adverse effects on low-income or minority populations in the area. Specifically, a characterization of the economic status of residents near the site and the conditions they face including any effects relating to the proximity of the blasting zone, locations of discharges of fill material, truck traffic, noise, fugitive dust, and habitat loss needs to be conducted to adequately assess the potential impact to EJ communities. Additional information is also needed concerning sources of drinking water for the affected populations (including municipal water supplies and private sources of drinking water including streams and/or wells). EPA also recommends that you take steps to ensure meaningful engagement of affected communities.

Conclusion

While EPA appreciates the applicant's willingness to discuss the adoption of certain BMP's into their mine plan, we believe that the Corps should incorporate further required special conditions before issuing any final authorization. Without including such conditions, EPA believes the proposed project is inconsistent with the 404(b)(1) Guidelines and will likely cause violations of WQS and associated significant degradation of stream life. EPA's recommended special conditions are outlined above, and detailed in the enclosed document. EPA also requests that we have the opportunity to review and comment on the draft permit and special conditions prior to finalization.

I want to thank you and your staff for your cooperation and willingness to address our issues. We look forward to continue working closely with you and the applicant as the permit is finalized. If you have any questions, please call me at (404) 562-9470 or Eric Somerville of my staff at (706) 355-8514.

Sincerely,

Gail Mitchell, for

James D. Giattina
Director
Water Protection Division

Enclosures

cc: Jim Townsend, Louisville District, Louisville, KY
Lee Anne Devine, Louisville District, Louisville, KY
Justin Branham, Louisville District, Sassafras, KY
Joe Blackburn, Office of Surface Mining, Lexington, KY
Lee Andrews, U.S. Fish and Wildlife Service, Frankfort, KY
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Enclosure 1
Proposed Clean Water Act Section 404 Permit Special Conditions

I. Best Management Practices & Adaptive Management Plan

1. The permittee shall submit a detailed plan to the U.S. Army Corps of Engineers (Corps) Louisville District and the U.S. Environmental Protection Agency, Region 4 (EPA) for implementing mine design and hollow fill construction alternatives and best management practices (BMPs) to minimize TDS and specific conductivity during the placement of fill material into waters of the United States (U.S.) during the construction of the hollow fills. The objective of these procedures is to ensure that effluent discharging from the mine does not have a monthly flow-weighted specific conductivity greater than that which would violate applicable water quality standards,[1] consistent with best-available science on the relationship between conductivity and aquatic life. This plan must be approved by the Corps, and transmitted to EPA, prior to discharge of any dredged or fill material into any water of the U.S. Proposed actions should include, but are not necessarily limited to:

    - Identification via field-based testing of TDS and/or sulfate producing materials that must then be isolated;
    - Implementation of hollow fill design alternatives that reduce infiltration (e.g. compact surface lifts, crown the fill surface) and controls flow through the fill to avoid contact time between water and reactive materials (i.e. TDS and/or sulfate producing geologic strata);
    - Use of only low-reactive or non-reactive durable rock to construct underdrains and place only these same materials adjacent to the sides of the highwalls and hollow fills.

2. The permittee shall construct hollow fills individually, one at a time, with an adequate monitoring period between completion of one fill to demonstrate water quality is protected. Construction of the next hollow fill would not be authorized if the monthly flow-weighted specific conductivity measured at the representative outfall downstream of the first hollow fill exceeds levels consistent with applicable water quality standards for more than one consecutive month, or if the overall trend in conductivity levels are increasing such that the linear trend demonstrates likely future exceedance of such levels.[2]

3. The permittee shall submit documentation to the Corps and EPA indicating all BMPs employed in each hollow fill within 30 days of site preparation and commencement of construction of the rock underdrain.

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[1] See, supra, footnote 2.
[2] See, supra, footnote 2.

4. (i) The permittee must submit monthly flow-weighted conductivity, $\overline{K}$, to the Corps and EPA for the effluent of Pond#1, Pond#3, Pond#15, and Pond#21 following the commencement of discharges of fill material into waters of the U.S. using data collected as part of the applicable Kentucky NPDES permit, augmented as necessary to meet the special condition requirement below. Monthly flow-weighted conductivity shall be calculated as follows:

$$\overline{K} = \frac{\sum_i (Q_i \times K_i)}{\sum_i Q_i}$$

where:

$\overline{K}$ = monthly flow-weighted conductivity, µS/cm
Qi = flow for the ith sample per month, cfs
K_i = conductivity for the ith sample per month, µS/cm.

(ii) Specific conductivity will be measured no less frequently than two (2) times per month following the initial discharge of dredged or fill material into waters of the U.S. in each valley where such discharges occur through final bond release.

(iii) The monthly flow-weighted conductivity, $\overline{K}$, will be plotted as a time series and the trend in effluent conductivity calculated by linear regression. If the trend indicates that the monthly flow-weighted conductivity will exceed background levels, as defined below, or another acceptable numeric interpretation compatible with applicable narrative water quality standards,[3] whichever is greater, during the first six months following the initial discharge of dredged or fill material into any water of the U.S., the applicant will promptly notify both the Corps and EPA. All data will be provided to both the Corps and EPA within 15 days of the final monthly measurement used to calculate flow-weighted conductivity.

(iv) Background specific conductivity levels are defined as the lesser value recorded *in-situ* by the permit applicant in March 2007 and EPA in February 2010, except at HF#4 where anomalous conditions in February 2010 affected data integrity:

Tributary draining HF#1:	638 µS/cm
Tributary draining HF#3:	988 µS/cm
Tributary draining HF#4:	785 µS/cm
Tributary draining HF#5/6:	191 µS/cm

(v) If during any three (3) consecutive months during the subsequent twelve (12) months following the monitoring period outlined in I.4(iii), the trend defined therein indicates that the monthly flow-weighted conductivity values will not

[3] See, supra, footnote 2.

likely be less than necessary to satisfy applicable water quality standards by the end of this 12-month monitoring period, or if any three (3) consecutive monthly flow-weighted conductivity values exceed such levels,[4] then the permittee will conduct an analysis of the sources of effluent conductivity and develop an adaptive management plan (AMP) Phase I to reduce effluent conductivity (measured as specific conductivity) and TDS.

(vi) The conductivity trend analysis and adaptive management plan shall be submitted to the Corps for approval, and transmitted to EPA, within 30 days of conditions defined in I.4(v). The plan shall be implemented within 30 days of written approval by the Corps. Implementation of the plan will continue until the monthly flow-weighted conductivity falls below the levels described in paragraph (v), above, for three (3) consecutive months. If after cessation of AMP I implementation, conductivity trends defined in I.4(v) begin to rise, implementation of the AMP will be reinitiated.

5. If monthly flow-weighted conductivity values exceed the levels described in paragraph (v), above, continually for three months after implementation of AMP Phase I, the permittee shall prepare, within 30 days, recommendations for additional actions to reduce effluent conductivity (AMP Phase II). These recommendations shall be implemented within 30 days of written approval by the Corps.

II. Effluent and In-stream Chemical and Biological Monitoring

A. Effluent Monitoring

The permittee shall perform effluent monitoring from representative outfalls on Pond#1, Pond#3, Pond#15, and Pond#21, as these ponds are established. Effluent monitoring samples are to be collected at the outlet of each pond. Where the following monitoring conditions include additional monitoring parameters or monitoring events, these data shall augment, but not replace monitoring requirements in the Kentucky NPDES permit.

a. Parameters and Test Methods

i) Hydrologic permanence of outflow from the ponds should be monitored and logged by a continuously recording data logger.

ii) The permittee should perform effluent monitoring of the parameters listed in Table 1, analyzed using EPA Test Methods in 40 CFR Part 136 by an approved licensed laboratory.

b. Sampling Location

The sampling should be conducted at each representative outfall at Pond#1, Pond#3, Pond#15, and Pond#21.

c. Sampling Frequency

[4] See, supra, footnote 2.

The sampling frequency is as noted in Table 1. Samples required quarterly should be no fewer that five (5) days apart, and the amount of precipitation for the previous 24 hour period should be recorded on-site and reported (to the nearest 0.1 inch) as part of the sampling report. Samples required twice per month should be no fewer than five (5) days apart, and the amount of precipitation for the previous 48 hour period should be recorded on-site and reported (to the nearest 0.1 inch) as part of the sampling report. Monitoring will continue through final bond release.

Reporting

Reports shall contain tabulated data (including sample station I.D., date, and time) and graphs necessary to present information clearly and concisely, including all such tables and graphs necessary to summarize and present the entire period of record for each parameter and sample station. Latitude and longitude coordinates of all water quality monitoring locations with the applicable datum identified must be provided along with photographs and figures illustrating all sample locations. Calibration records of all *in-situ* multi-probe or single-probe water quality instruments and laboratory reports showing the analytical results must also be submitted.

All results should be clearly labeled with the applicable CWA permit number and KDNR DMP number and submitted KDOW, the Corps, and EPA Region 4.

Table 1. Supplemental effluent and in-stream water quality monitoring parameters.

Parameter	Units	Method	Sample Frequency
Bicarbonate Alkalinity	mg/l		Quarterly
Chlorides	mg/l	EPA300.0	Quarterly
Discharge	cfs	DOWSOP03019	Twice per month
Dissolved oxygen	mg/l	DOWSOP03014	Twice per month
Duration of discharge[1]	days		Continuous
Hardness (as $CaCO_3$)	mg/l	SM 2340B	Quarterly
pH	s.u.	DOWSOP03014	Quarterly
Precipitation	inches		Continuous
Sulfates	mg/l	EPA300.0	Quarterly
Specific conductance[2]	uS/cm	EPA120.1	Twice per month
Temperature	Deg C	DOWSOP03014	Twice per month
Turbidity	ntu	DOWSOP03014	Twice per month
Total Dissolved Solids (TDS)	mg/l	SM 2540C	Quarterly
Total Calcium	ug/l	EPA200.7	Quarterly
Total Magnesium	ug/l	EPA200.7	Quarterly
Total Potassium	ug/l		Quarterly
Total Sodium	ug/l		Quarterly
Total Recoverable Antimony	ug/l	EPA200.8	Quarterly
Total Recoverable Arsenic	ug/l	EPA200.8	Quarterly
Total Recoverable Beryllium	ug/l	EPA200.8	Quarterly
Total Recoverable Cadmium	ug/l	EPA200.8	Quarterly
Total Recoverable Chromium (III)	ug/l		
Total Recoverable Chromium (IV)	ug/l		

Total Recoverable Copper	ug/l	EPA200.8	Quarterly
Total Recoverable Iron[2]	ug/l	EPA200.8	Quarterly
Total Recoverable Lead	ug/l	EPA200.8	Quarterly
Total Recoverable Manganese[2]	ug/l	EPA200.8	Quarterly
Total Recoverable Mercury	ug/l	EPA1631E or 245.7	Quarterly
Total Recoverable Nickel	ug/l	EPA200.8	Quarterly
Total Recoverable Selenium	ug/l	EPA200.8	Quarterly
Total Recoverable Silver	ug/l	EPA200.8	Quarterly
Total Recoverable Thallium	ug/l	EPA200.8	Quarterly
Total Recoverable Zinc	ug/l	EPA200.8	Quarterly

[1] Duration of discharge from pond should be measured using a continuously recording data logger.
[2] Specific conductance, manganese, and iron need to be sampled at in-stream chemical monitoring locations only, unless otherwise stated in the applicable Kentucky NPDES permit.

B. WET Monitoring

Beginning at the initiation of discharge from representative outfalls (as specified above under "Effluent Monitoring"), EPA believes coal mine permits should require the permittee to perform either acute or chronic WET tests on the representative outfalls based on the duration of the discharge as documented by the continuously recording data loggers referenced in II.A(a)(i). The results of WET monitoring will be used to determine the effectiveness of the BMPs.

In cases where hydrologic permanence monitoring data indicate a sediment pond with any volume of discharge lasting more than 4 consecutive days, chronic WET tests should be performed using *Ceriodaphnia dubia* and *Pimephales promelas* and using a dilution series that includes 100 percent effluent and the in-stream waste concentration.[5] The end points should be reported as the inhibition concentration that affects 25% of the test organisms compared to the control (IC_{25}). Sampling should be performed quarterly. The operator should use WET testing procedures outlined in EPA's document entitled, "Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms" (October 2002).

In cases where the effluent discharge may be short in duration, it may be necessary to collect a high volume effluent sample and properly preserve it for use in the static-renewal test. Please refer to Section 8.5.4 on page 32 of EPA's document entitled, "Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms" (October 2002). Alternative acute WET test organisms are either *Daphnia magna* or *D. pulex* and *Pimaphales promelas*. In addition to reporting these results to the Corps, all results should be reported to EPA and KDOW.

C. In-stream Water Quality Monitoring

The permittee should perform in-stream monitoring for the parameters listed above in Table 1, in accordance with 40 CFR §122.44(d)(1)(vi)(C)(3). Sample collection and quality assurance / quality control should follow Kentucky Standard Operating Procedures at DOWSOP03014 and DOWSOP03015. EPA Test Methods in 40 CFR Part 136 should be used for analytical analysis.

a. Sample Type
Grab samples should be taken whenever possible.

b. Sampling Locations
Samples should be taken from the following locations:

[5] EPA notes that approved invertebrate WET test species are relatively insensitive to conductivity, as compared to in situ aquatic macroinvertebrates in central Appalachian streams. Nevertheless, EPA believes that WET tests can help identify significant water quality impairments as a result of surface coal mining operations, which can complement numeric conductivity measurements.

i. One sampling point located upstream of the sediment pond for each representative outfall, as specified above under "Effluent Monitoring" at paragraph II.A. If there is no upstream location, an appropriate background location within the 12-digit hydrologic unit code should be used.

ii. One in-stream monitoring site located immediately below the toe of the sediment pond for each representative outfall (i.e. ≤25 feet from outfall), as specified above under "Effluent Monitoring."

iii. One sampling point located *the further* of 200 meters (656 feet) downstream of each representative outfall or the furthest downstream location that is upstream of any tributary confluence. The sampling point should be downstream of riprap and other disturbance and located within a relatively natural and intact riparian zone where possible.

iv. One sampling point located in the receiving waterbody that is within 50 feet of the first confluence necessary to increase the stream order above that stream in which the outfall is located (e.g. if the outfall is located in a 1st order stream, this sample point should be located no greater than 50 feet downstream of the first confluence that elevates the stream order below the confluence to at least a 2nd order stream)

c. Sample Frequency

The sampling frequency is as noted in Table 1. Samples required quarterly should be no fewer that five (5) days apart, and the amount of precipitation for the previous 24 hour period should be recorded on-site and reported (to the nearest 0.1 inch) as part of the sampling report. In the event that in-stream monitoring results show in-stream specific conductivity levels above those necessary to satisfy applicable water quality standards,[6] the permittee is required to increase the monitoring frequency for all parameters to two times per month. Samples required twice per month should be no fewer than five (5) days apart, and the amount of precipitation for the previous 48 hour period should be recorded on-site and reported (to the nearest 0.1 inch) as part of the sampling report. Monitoring will continue through final bond release.

d. Conditions for Taking Samples

Samples should be collected during low- or base-flow conditions (e.g., not during, or within 48 hours after, a precipitation event exceeding 0.2 inches).

e. Reporting

Reports shall contain tabulated data (including sample station I.D., date, and time) and graphs necessary to present information clearly and concisely, including all such tables and graphs necessary to summarize and present the entire period of record for each parameter and sample station. Latitude and longitude coordinates of

[6] See, supra, footnote 2.

all water quality monitoring locations with the applicable datum identified must be provided along with photographs and figures illustrating all sample locations. Calibration records of all *in-situ* multi-probe or single-probe water quality instruments and laboratory reports showing the analytical results must also be submitted.

All results should be clearly labeled with the applicable CWA permit number and KDNR DMP number and submitted KDOW, the Corps, and EPA Region 4.

D. In-stream Biological Monitoring

The permittee should implement an annual benthic macroinvertebrate study plan using approved State protocols for benthic macroinvertebrate sampling.

a. Concurrent in-stream monitoring
In-stream samples for specific conductivity, TDS, pH, temperature and dissolved oxygen should be measured at the same locations as the benthic samples using properly calibrated instruments.

b. Methods
The permittee should implement an annual benthic macroinvertebrate study plan using approved state-protocols for benthic macroinvertebrate sampling.

c. Sampling Locations
Use the same locations as shown above for in-stream water quality monitoring.

d. Sampling Frequency
Sampling times will occur consistent with accepted Kentucky protocols (i.e. sample index periods). Sampling will occur annually through final bond release. Sampling should be avoided during periods of excessive precipitation and scouring floods. In cases where a large flow rate of the receiving water does not lend itself to a benthic assessment (i.e., non-wadeable sites), the permittee should perform a bioassessment using fish. Both fish and benthic macroinvertebrate studies should be performed for receiving waterbodies that are conducive to fish assessments. Results from sampling either of the two assemblages may be used to determine if the water body is impaired.

e. Reporting
The permittee should submit the results of the study, including summary tables, appropriate indices of biotic integrity, color photographs and figures showing sample locations, calibration records, etc. to the KDOW, the Corps, and EPA no later than 30 days following the permittee's receipt of the final report.

Enclosure 2
Adaptive Management Plan Implementation Timeline

Phase	Action	Time allowed	Elapsed time since initial discharge of fill material into waters of the U.S.
Pre-AMP	Initial land clearing, excavation, hollow fill construction, and water quality monitoring	6 months	6 months
	Initial post-construction monitoring	3 to 12 months	Up to 18 months
AMP Phase I (if applicable)	Submit AMP I	30 days after AMP I trigger (SC I.4(v))	Up to 19 months
	Approve AMP I	Not specified in Special Condition, estimate 30 days	Up to 20 months
	Implement AMP I	30 days after AMP I Approval	Up to 21 months
	Monitor AMP I	3 to 6 months	Up to 27 months
AMP Phase II (if applicable)	Develop and submit AMP II	30 days after AMP II trigger (SC I.5)	Up to 28 months
	Approve AMP II	Not specified in Special Condition, estimate 30 days	Up to 29 months
	Implement AMP II	30 days after AMP II approval	Up to 30 months
	Monitor AMP II	6 months	Up to 36 months
Additional Mitigation Required (if applicable)	Submit mitigation plan	45 days after end of AMP II	Up to 37.5 months
	Approve mitigation plan	Not specified in Special Condition, estimate 30 days	Up to 38.5 months
	Implement mitigation plan	30 days after mitigation plan approval	Up to 39.5 months

How many mountains can we mine? Ecological thresholds for freshwater ecosystems of the Central Appalachians

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ABSTRACT

Over the last decade, an estimated 2000km of streams in the Central Appalachians have been buried beneath the excess rock waste generated from surface coal mining. In addition to the streams permanently lost through valley filling, many more kilometers of streams throughout the region are impacted by the higher flows and chemical concentrations exported to downstream waters from surface mining operations. Here we estimate for the first time the areal extent of mining that can occur in a watershed before significant ecological impacts are observed in receiving streams. Using new remote sensing analyses together with field sampling data for 283 stream reaches located across a 14 county region in southern West Virginia we demonstrate that changes in streamwater conductivity were strongly positively correlated with the extent of watershed surface mining.. We detected a significant community threshold response to altered ionic strength, with many sensitive taxa declining precipitously and synchronously in abundance at a conductivity of 277μS cm^{-1} (95% CI of 176 to 344 μS cm^{-1}). Our analysis is the first to demonstrate that the rapid increase in mining activity within regional headwaters is degrading water quality and freshwater ecosystems at very low mining intensities and over very large geographic scales. We find that stream water quality and benthic communities are significantly altered when as little as ~3% of the upstream watershed is converted to surface mining operations.

INTRODUCTION

In order to compete with western states in supplying inexpensive, low sulfur coal to the US energy market, mining companies throughout the Central Appalachians are increasingly turning to mountaintop mining to access shallow seams of coal[1,2]. Mountaintop mining is now the most widespread form of coal surface mining across the central Appalachian Mountains, and is particularly intense in southern West Virginia, eastern Kentucky and Tennessee, and southwestern Virginia[3,4]. In this sparsely populated region, surface mining and mine reclamation activities are the dominant driver of land use change[5] and as a result of surface coal mining the area has the highest rates of sediment movement in the United States [6]. To reach the coal seams which can be hundreds of feet below the surface, ridge tops are removed creating large quantities of waste rock and coal debris ("overburden") that must be disposed of to maximize mining efficiency (Figure 1). In the steep topography of the region, stream valleys become the obvious location for disposing of rocks from the mined ridgetops. The resulting valley fills[3] can bury either headwater streams or once forested valley slopes under 10s to 100s of meters of overburden[7]. Because MTM operations are less constrained by topography than more traditional contour mining, MTM techniques have allowed surface coal mining operations to expand greatly in size[4].

The central Appalachian forests that are affected by surface coal mining support among the highest levels of biodiversity and endemism in the temperate zone[8] leading to significant concerns about the loss of forest biodiversity and ecosystem functions as a result of mining[4,9]. Much recent attention has been paid to the burial of headwater streams beneath valley fills and the downstream impacts to waters below surface mines[10](Figure 1), in part, because of high profile federal court cases and widely publicized exchanges between the U.S. Environmental Protection Agency (US EPA) and the U.S. Army Corps of Engineers (USACE) over permitting decisions[11]. Under the authority of the Clean Water Act (CWA; 33 U.S.C. 1252) the US ACE (or a delegated state) must approve regulatory permits to allow mining operations that will result in impacts to waters of the U.S. Prior to authorizing a stream fill operation, the US ACE must assure, among other things, that these activities will not cause significant degradation of the environment (40 C.F.R. § 230.10). To meet this requirement, permittees are required to mitigate for harm done to streams. Typically this is accomplished through the construction of channels on nearby reclaimed mines, the restoration of degraded streams within the watershed, or payment into an in lieu fee mitigation program[2,12,13]. The

extent to which these actions are sufficient to mitigate for the impacts that MTM have on waterways has been central to legal challenges and environmental advocacy protests calling for tighter regulations on this form of mining[11,14].

Scientific studies to inform such cases have been of great interest and have established that impacts can be substantial[10,12,15,16]. Rain that falls on mined and reclaimed watersheds flows through coal residues and rock overburden rather than surface soils. When exposed to air, pyrite minerals in coal residue release sulfuric acid[17], and the production of this strong acid within a matrix of fragmented rock leads to high rates of rock weathering. Throughout much of the central Appalachians, the high buffering potential of carbonate bedrock neutralizes the acidity generated by pyrite dissolution and releases high concentrations of coal-derived SO_4^{2-} accompanied by elevated concentrations of Ca^{2+}, Mg^{2+}, HCO_3^- derived from parent material[18]. The natural acid buffering potential of parent material in much of the region thus generates alkaline mine drainage, characterized by an increase in pH, alkalinity and electrical conductivity in receiving streams[18]. The concentration of trace metals and metalloids also tend to be correlated with SO_4^{2-} and conductivity[12,19], and in this region elevated concentrations of manganese (Mn) and selenium (Se) are of particular concern due to their known toxicity[20]. Selenium, weathered from coal minerals, is more soluble at high pH and thus is a particularly problematic toxin in the alkaline mine drainage common to most mountaintop mines[21]. A number of recent studies have documented significant changes in stream macroinvertebrate and fish communities directly downstream of surface mining operations[10,16,22] and have attributed these declines to the combined effects of heightened concentrations of ions and trace metals delivered from upstream mines.

In response to growing concerns and scientific documentation of the impacts of surface coal mining, on April 1, 2010, the US EPA released their own scientific report and announced new actions to strengthen the permitting process and protect Appalachian waters[23]. This included a draft guidance document that set benchmarks for unacceptable levels of conductivity in waters associated with surface mining. Specifically, their research identified conductivity levels of 300 $\mu S\ cm^{-1}$ in Appalachian headwater streams as the maximum acceptable levels to prevent substantial impacts to native invertebrates[23]. This draft benchmark has been challenged by various groups including the National Mining Association (NMA) who filed a lawsuit in U.S. District Court for the

District of Columbia[24]. While most of NMA's arguments question the legality of EPA's actions, the lawsuit also argues that the conductivity water quality standard is arbitrary and based on unsupported "presumptions" that background levels of conductivity (i.e., non-mining related) are below the benchmark and that significant adverse impacts are related to the length of stream impacted or the number of fills[24].

The challenges on both sides highlight the need to fill several scientific gaps that are critical to decisions by regulators and to those the regulations influence. Thus our goal was to address the following questions:

1. Is there a clear relationship between conductivity and surface coal mining extent in the central Appalachians that cannot be attributed to other impacts such as development in a watershed?

2. Does the latest state-of-the-art approach designed to statistically detect biological thresholds support the concept of a benchmark and if so, at what conductivity level?

Previously there has been no effort to quantify the areal extent of surface mining and link that to downstream water quality and aquatic community structure at river basin scales. Since the dominant solutes derived from surface mining that generate high conductivity in receiving streams are conservative ions that do not readily precipitate from solution except at supersaturated concentrations (SO_4^{2-}, Cl, Ca^{2+}, Mg^{2+}, HCO_3^-), high conductivity (and associated biological impacts) should be correlated with the total spatial extent of upstream mining activity. Thus, we analyzed whether there was a statistically significant relationship between the proportion of surface mining in watersheds of southern WV and dissolved ion concentrations or between the extent of surface mining and alterations in stream biota. To determine whether or not there were threshold relationships between stream invertebrates and conductivity, we employed a new form of analysis (Threshold Indicator Taxa Analysis, TITAN[25]). TITAN is unique in that it first characterizes the responses of individual taxa to an environmental gradient and secondarily aggregates taxa into a community-level metric only after distinguishing the magnitude, direction, and uncertainty in the responses of individual members of the community. Thus, TITAN has distinct advantages over more commonly used community metrics, in that it allows the investigator to identify both taxon-specific and community-level threshold responses to anthropogenic environmental gradients[26].

RESULTS & DISCUSSION:

We compiled existing datasets that provided determinations of the spatial extent of surface mining in the region over time by obtaining nonpoint discharge elimination system (NPDES) permit records for mining activities (maintained by WVDEP accessed online 6/24/2010), land cover classification data determined from National Landcover dataset (NLCD 2001), and surface mining maps derived from multidecade (1975, 1985, 1995, 2005) Landsat satellite data for a 59-county area spanning much of the Central Appalachian Coal Region (Figure 2A). We obtained data on water quality and macroinvertebrates that were collected and analyzed by the WV Department of Environmental Protection (WVDEP 2010 provided 6/30/10). Field samples and remote sensing derived mine mapping overlapped for a 14 county study area in southern WV (Figure 2B) from which we acquired a final dataset consisting of 283 stream reaches for which both stream water sample analysis and stream benthic invertebrate collection data were available from summer collection efforts. We delineated watersheds draining to each of these 283 sampling points and estimated the total surface area covered by forests, development of by surface mining operations. Surface mining operations were further classified as mountaintop removal mines (MTM), non MTM surface mines (~contour or strip mines), or valley fills. Our estimates of cumulative surface mining in the region derived from remote sensing image analysis are in close agreement with the cumulative extent of area disturbed through mining reported by NPDES permit inspectors (Figure 2C). It is important to acknowledge that the precision of our remote sensing derived estimates of surface mining has not yet been estimated through ground-truthing. Rigorous evaluation and cross validation of mining maps is a priority for our ongoing research effort.

Within this dataset, 231 streams drained watersheds with some amount of mining (0.03 to 95.7% mined) and 212 streams drained watersheds with >1% of their watershed developed (1 to 20% developed). A total of 19 stream samples were classified from the land use data as forested watersheds (no surface mining or NPDES permits, <1% developed) and the dataset included 12 streams classified as reference watersheds by the state of WV. Stream stations sampled by the WVDEP drained watersheds that had up to 95% (18±21%, mean ±sd) of their surface area in active or reclaimed surface mines and up to 20% (3 ± 3% mean ±sd) of their watershed area classified as developed..

To determine if watersheds having a greater proportion of mining have higher significantly higher streamwater conductivity (Question 1), we examined statistical relationships between the areal extent of surface mining and conductivity and solute (sulfate and nitrate) concentrations. We found that the total surface area mined within a watershed, regardless of what year the mining activity was delineated from Landsat imagery, correlated most strongly with water quality metrics.. Analyses that only used the most recent 2005 surface mining delineation, or which excluded all but MTM surface mining operations were less strongly correlated with water quality metrics. As a result of these comparisons, we chose to examine how the cumulative extent of all surface mining within a watershed (across all years and all types) was related to water quality and biological changes in the region. We also examined whether variation in the extent of watershed development was a good predictor of water quality changes.

We found that the proportion of watersheds that were mined was strongly positively correlated with streamwater sulfate and nitrate concentrations and with the electrical conductivity of the water in draining streams (Figure 3). Mined streams had higher alkalinity and pH than unmined streams in the region (Table 1). There were insufficient records of trace metal and metalloid concentrations within our dataset to examine relationships with mining, however analysis of the entire WVDEP database (beyond the 14 county area to which our analyses were restricted) showed that sulfate was strongly positively correlated with trace metals (Mn, Fe, Al) and the metalloid Se[12]. In contrast, development activities within the 14 county area were not correlated with conductivity or nitrate and were slightly negatively correlated with sulfate concentrations (Figure 3) and did not lead to significant alterations of pH or alkalinity (Table 1). The negative relationship observed between conductivity and water quality for the upper quantiles of the dataset (Figure 3) occurs because some of the watersheds with little development had large mining impacts whose water quality impacts far exceed that of development in this region (Figure 3). Variation in sulfate, nitrate and conductivity in undeveloped watersheds is highly correlated with the extent of mining in those watersheds.

To assess the macro-invertebrate response to increased mining extent and streamwater conductivity (Question 2), we first examined changes in stream benthic macroinvertebrate diversity and biotic integrity scores by one way ANOVA and Tukey's HSD to compare WV reference streams with the 231 mined streams, split into 5 equally populated bins of increasing mining intensity. We also

performed TITAN[25] to examine taxon specific and community level responses to both gradients within this dataset. We found that watershed surface mining leads to substantial changes in stream biota that are much more dramatic than changes attributable solely to development. The diversity of intolerant taxa declined precipitously with mining (Figure 4, supplemental Figure 2) and as a result both types of bioassessment scores developed for West Virginia streams declined with the spatial extent of mining in their watershed. The family level WV Stream Condition Index (WVSCI) and the Genus Level Index of Most Probable Stream Status (GLIMPSS) were significantly lower in mined watersheds compared to state reference sites (Figure 4). For all three metrics, significant declines in diversity and stream ecological health metrics were observed even in the lowest mining category (<3.5% of watershed in surface mines) (Figure 4), suggesting that water pollution associated with even small amounts of surface mining is sufficient to reduce or eliminate many stream taxa.

Using TITAN analysis to examine the aquatic invertebrate responses to the spatial extent of mining revealed statistically significant declines for 39 of the 196 taxa in the data set (Figure 5A). The taxa most sensitive to mining represent a variety of mayfly, stonefly, caddisfly and beetle larvae that are all characteristic to central Appalachian streams and known to be sensitive to water pollution. All negatively responding taxa appeared to be very sensitive to the mining gradient, with all showing sharp declines in abundance at less than 10% mining (Figure 5, Supplemental Figure 1). Prior research has demonstrated that mayflies are especially sensitive to mining-derived contaminants[10,27] and our results support this, with even the highly tolerant mayfly genus *Baetis* showing a negative response to the mining gradient. The nearly synchronous declines of taxa (SI Figure 1) was consistent with a community-level threshold[26], suggesting that surface mining of as little as ~3% (95% CI of 0 to 2.4%) of the upstream watershed results in sharp nonlinear declines in the abundance of many taxa comprising downstream communities (Figure 5B, SI Figure 1). Several taxa increased in relative abundance along the mining gradient, primarily several genera of highly tolerant midges (Chironomidae) the tolerant caddisflies *Chimarra*, *Ceratopsyche* and *Hydropsyche*, and the blackfly *Simulium* (Figure 5A, SI Figure 2). This suite of tolerant organisms is entirely consistent with earlier impact studies[10,16], suggesting that the same impacts observed immediately below valley fills are also apparent at the scale of 10-100km^2 catchments.

Because of the uncertainty surrounding the precision of our surface mining delineation, we performed sensitivity analyses to examine how the TITAN threshold determination was affected by introducing random or systematic error into our % mining estimates (SI Section 2). We found that our cumulative threshold estimate was robust to introduced error, and could only generate a significant increase in the threshold estimate by systematically increasing the estimates of mining area. This is a type of land cover classification error that could be introduced by edge effects, where landcover pixels at the edges of mines are systematically classified as forest cover. Even if we assumed that all mined areas should be expanded by 250m along all edges, we still estimated a community level threshold at 4.6% of the watershed in surface mine (95% CI of 0.34 to 11.85%) (SI Section 2).

Variation in the extent of development is not statistically correlated with the extent of mining within this dataset, yet the majority of watersheds experience both forms of land use change. We reran TITAN analyses on the same dataset oriented along a development rather than the mining gradient and found that many fewer taxa declined significantly with development than with mining (Figure 5C). Those taxa that did respond declined at very low levels of development (0-5%). However, the results of this analysis are complicated by the fact that many of the low development watersheds have variable and sometimes high amounts of surface mining within their boundaries. Indeed, many of the taxa that declined with mining increased in abundance along the development gradient because of the negative relationship between % development and % mining (Figure 5C). While negative response of the invertebrate community peaked at similar values of % development and % mining, the magnitude of the sum of z- scores was much higher for mining (290.3) than for development (134.9). This indicates that more taxa exhibited a more abrupt decline across the mining gradient than across the development gradient (Figure 5B, D).

TITAN analysis of the same dataset across a conductivity gradient found that increases in streamwater conductivity led to significant declines in 50 of the 196 total taxa and explained a larger amount of the variation in abundance data than either land cover variable (sum z =379.1). The threshold at which community changes are most drastic was at 277μS cm^{-1} (95% CI of 176 to 344 μS cm^{-1}), a number which is remarkably consistent with the EPA Guidance[23] recommended maximum conductivity of 300 μS cm^{-1}. Across this region, conductivity is highly correlated with

the areal extent of mining (Figure 3). Our analyses suggest that this conductivity threshold is typically reached when <5% of the upstream watershed is impacted by surface mining.

In our analyses we did not distinguish between old or new surface mining because we were unable to find any statistical evidence that the impacts of mining are ameliorated through time. We also did not distinguish between mountaintop mining operations and more traditional surface strip or contour mines in the region because we were unable to detect statistical differences between these two types of mining. Similarly, our efforts to weight impacts based on hydrologic connection to the stream channel (inverse distance weighting approaches) did not improve statistical relationships. The stream sampling dataset acquired from the WVDEP was not collected with the purpose of examining the efficacy of mine reclamation or mining configurations in ameliorating downstream impacts and thus we do not view inability to detect such subtleties in the current dataset as conclusive. Instead we urge that new spatial data on mining activities be used to guide rigorous field sampling campaigns to make these critical comparisons.

CONCLUSIONS

This work demonstrates for the first time a statistically significant relationship between the areal extent of surface mining in the Central Appalachians and variation in both the chemistry and biological community structure of receiving streams. Our analyses demonstrate that even small amounts of surface mining can dramatically increase streamwater conductivity, pH and alkalinity and dramatically reduce the abundance of many aquatic insects. Our community threshold analyses suggest that macroinvertebrate community composition shifts dramatically once streams reach conductivities of ~300 µS/cm – a level achieved with very low levels of watershed surface mining. An important argument for a casual pathway from mining to conductivity to community thresholds is the large proportion of shared taxa that declined in response to both watershed mining and conductivity. Of the 39 taxa that significantly declined along the mining gradient, 24 significantly declined with increasing conductivity. Conversely, few of the taxa that responded negatively to the development gradient declined with increasing conductivity.

These results have important policy implications. First, the fact that the cumulative impacts of MTM on water quality and on the biological condition of streams are readily quantifiable and

cannot be attributed to development have the potential to inform decisions on the amount of mining regulators allow in a given watershed. Second, using a novel and rigorous method of data analysis to test for thresholds (TITAN), we found a threshold conductivity level (277µS cm^{-1} with 95% CI of 176 -344 µS cm^{-1}) that is remarkably similar to the benchmark of 300 uS/cm that the US EPA has proposed to be protective of aquatic life in their recently issued guidance document, lending support to their draft conductivity benchmark.

METHODS

Regional Mapping of Surface Mining: Surface mining activity was mapped from digital multispectral images collected by the Multispectral Scanner (MSS) and Thematic Mapper (TM) sensors carried by the Landsat series of remote-sensing satellites. Historical images in the Landsat archive[28] were reviewed for cloud cover, smog and haze. Mid-summer images were favored to facilitate the identification of disturbed areas and minimize seasonal variations in solar illumination. To ensure detection of mining disturbance since the 1970s while minimizing the total volume of data for analysis, mid-decade imagery was chosen (SI Section II). Digital elevation data were also acquired for topographic analysis, enabling the identification of ridges and mountaintops throughout the study area as a means of discriminating MTR operations from other types of surface mining. We opted to use 3-arc-second (1x1 minute) DEM data compiled by the U.S. Defense Mapping Agency. This series was distributed as 1x1 degree areas that corresponding to the east or west half of the USGS 1:250,000 scale topographic quadrangle map series. These elevation data are from topographic surveys that mostly pre-date 1976 and therefore provide the best available representation of topography in the study area prior to the advent of mountaintop removal mining. The horizontal position error of this elevation dataset is generally stated to be 100 meters or less. Other supporting digital GIS data included detailed transportation features and populated areas derived from USGS 1:24,000-scale topographic maps[29]. The river and stream vectors that comprise regional hydrology were compiled from the 1:24,000-scale National Hydrography dataset[30].

Image Processing: Image processing and analysis was performed using Erdas IMAGINE image processing and GIS software on a standard Windows-based workstation. All images were placed into a common map projection (UTM Zone 17 North – WGS84 datum) using standard techniques that included the selection of image-to-map tie points by an experienced operator, and digital resampling of the images using a nearest-neighbor algorithm to preserve the original spectral information. Additional processing included the creation of same-date, path-oriented mosaics to simplify the classification

process. The georectified mosaics were then cropped to the study area boundary to reduce computer processing time.

An iterative, two-stage process was developed to identify and delineate areas disturbed by traditional surface mining and by mountaintop removal mining (MTR). First, land cover classification was performed for each date of imagery. Classification followed a two-step process: pixel-based spectral signatures of various land-cover types were identified; then a decision-tree analysis was used to classify areas of active surface mining. Pixel-based classification was performed using the supervised maximum likelihood technique[31]. Given the rugged terrain of the region, the image data were first spectrally enhanced to reduce albedo-related variations in illumination and spectral characteristics using the hyperspherical direction cosine (HSDC) method[32]. Training samples were selected for each date of imagery to yield land-cover classes compatible with the Anderson Level II system[33], such as bare rock, soil, forest, grasses/crops, water, clouds, etc. The results of this procedure were then modified by classifying any bare rock and soil outside of a 400 meter buffer zone around rivers, highways and agricultural areas. This separates areas of bare soil and rock likely attributable to active mining from areas naturally devoid of vegetation, such as river banks and channels, paved surfaces, and plowed or fallow fields.

Second, topographic analysis was performed to subdivide the classified mining areas into "MTR" and "Other Surface Mining" categories. While the legal definition of MTM as defined by the U.S. Office of Surface Mining is too vague to implement directly into a GIS model, their definition did guide the development of a reproducible, rule-based method by SkyTruth for identifying MTR areas. We started from the perspective that, to qualify as MTR, an individual mining operation had to 1) cross a ridge top or peak, and 2) impact an area significantly larger than a typical conventional strip mine.

Using digital elevation data from the U.S. Geological Survey 1:100,000 series, the terrain parameters that characterize ridge tops and peaks, slopes and valleys were calculated. We defined a ridge top or peak as a point that lies on a local convexity that is orthogonal to a line with no convexity or concavity. After ridge tops and peaks were identified and delineated from the elevation dataset using these criteria, contiguous areas encompassing fewer than 40 acres were eliminated to minimize noise in the analysis.

MTR operations were identified in the mining land-cover class by calculating the percentage of ridge top that comprised the mine's total area. We produced two categories of MTR mines: contiguous mining

area spanning more than 320 acres and containing more than 40 acres of ridge top, and contiguous mining areas between 40 and 320 acres that contain at least 10 - 40 acres of ridge top in the mined area. Digital boundaries delineating the MTR areas, and the other surface mining areas identified by this analysis were analyzed for the entire region (SI Table 2) and files were exported in GIS-compatible shapefile format.

Water Quality and Stream Benthic Samples: We obtained data on water quality and macroinvertebrates collected and analyzed by the WV Department of Environmental Protection (WVDEP 2010 provided 6/30/10 in response to FOIA request). The full dataset includes water quality, stream habitat and stream benthos information on 6463 stream reaches. Samples were collected between 1996 and 2009. From this large dataset we extracted all sample data that met the following selection criteria: streams <10m wide draining watersheds completely contained within the 14 county area of southern WV for which we had mapped the extent of surface mining; samples for which benthic macroinvertebrate samples were collected during summer surveys and identified to genus; and samples for which at least streamwater conductivity and sulfate concentrations were recorded.

Watershed Delineation for Stream Sampling Stations: Geospatial analysis to determine the areas of surface mining and developed lands upstream of water quality sample locations was performed using Environmental Systems Research Institute's (ESRI's) ArcGIS software, version 9.3.1. Digital elevation model (DEM), hydrography, land cover, surface mining, and water quality sample location data for the entire area draining into the 14 West Virginia counties examined were assembled into a geographic information system (GIS) with all data georeferenced to the Albers Equal Area projection. The DEM data, a subset of the National Elevation Dataset[34], were obtained from the National Hydrography Dataset Plus (NHD+)[30] and represent elevation as 30 x 30 m pixels. We also obtained flow direction, a derivative of the elevation dataset, as well as 1:100,000 scale stream flow-lines from the NHD+ and added them to our GIS database. The land cover data we obtained are part of the 2001 National Land Cover Database[35] and were obtained from the USGS Multi-Resolution Land Characteristics Consortium (MLRC)[i]. The DEM, hydrography, and land cover data were all obtained as ArcGIS formatted files in the Albers projection and needed no further processing to be added to our spatial database.

Stream sampling point coordinates were used to construct an ArcGIS point file referenced to a geographic coordinate system (WGS 84), which was then projected into the same Albers coordinate system used by the other spatial datasets. Water quality point locations had to be snapped to areas of high flow accumulation (i.e. stream cells) to properly calculate upstream areas. ArcGIS has a tool, "*snap pour point",* designed to do this, but it worked too coarsely, snapping some points to the wrong stream while unable to snap other points to correct locations. We therefore developed an iterative snapping algorithm that gradually moves a point along routes of higher flow accumulation until a stream cell is met. With all sample points snapped to the nearest stream location, we used the ArcGIS *watershed* tool to identify all cells upstream of a given point. We then calculated the area of historical surface mining and of developed areas by tabulating the number of mined cells (from the mining delineation dataset) and the number of developed cells (from the "Developed" classes in the NLCD 2001 dataset) , respectively.

Statistical Analyses:

For the data analysis to address question 1, we estimated the total watershed area that had ever been mined (active and past surface mining) and used that estimate of cumulative mining extent as a predictor variable. We examined statistical relationships between solute concentrations along both mining and development gradients using quantile regression. We also split the full mining dataset into 5 equal categories of mining extent and examined changes in water quality and in macroinvertebrate taxa richness and in two benthic indicator scores developed for Central Appalachian streams by one way ANOVA and Tukey's HSD.

TITAN Analysis: To address question 2, we performed Threshold Indicator Taxa Analysis (TITAN[36]) to examine taxon specific and community level responses to both gradients within this dataset. First, TITAN estimates the value of the environmental variable that produces the greatest change in both the abundance and frequency of occurrence of each individual taxon with a minimum of 5 occurrences within a sample population. Since TITAN requires only 5 occurrences for analysis it is sensitive to rare species, a distinct advantage for detecting local biodiversity loss. The magnitude of the response is quantified as an indicator value z score[37]. The observed change point for a taxon is the value where the indicator score reaches its maximum. Individual taxa change points are bootstrapped to assess consistency in the direction (negative or positive) and

location of response (confidence intervals) to the gradient. Because indicator scores are standardized to z scores, taxa that do not respond to the gradient achieve very low or negative z scores thus provide minimal weight (or noise) to the assessment of community response.

Potential community-level thresholds are assessed by separating negative (z-) and positive (z-) taxa responses, summing the z+ and z- taxa separately, and tracking these aggregate responses for every potential change point value along the environmental gradient. Synchronous change points among multiple taxa within a narrow range of environmental values results in a distinct peak in the sum of the taxa z-scores (sum(z-) for negative responses, sum(z+) for positive responses). The magnitude of the sum(z) scores are also a direct measure of the magnitude of the effect of an environmental predictor. Collectively, a large, sharp peak in sum(z) values, obvious synchrony in numerous taxa change points, and evolutionary and life-history relationships among responsive taxa that are consistent with known sensitivities to anthropogenic gradients serve as empirical evidence for a community-level threshold[26]. While uncertainty may be relatively high about the location of low-frequency individual taxa thresholds, synchrony in the conductivity level point-of-decline of many species, including rare ones, bolsters confidence in the robustness of the community threshold.

TABLE 1: Comparison of water quality between land cover categories. Within this table, developed watersheds are watersheds without any evidence of surface mining. Not all environmental variables were collected or recorded for all samples in the dataset, leading to slightly different numbers of replicates within a category.

Category	Criteria	pH		Alkalinity		Conductivity	
		n	n ± SE	n	Mean ± SE	n	Mean ± SE
WV Reference Sites	•Identified in WDEP database as Reference site	11	7.0±0.2[a]	9	17.4±5.7[a]	11	68±13[a]
Reference	•> 95% Forested •<1% Developed •No surface mining mapped •No NPDES Permits	13	7.2±0.2[ab]	3	***32.6±28.2***	13	289±100[ab]
Surface Mining	•All watersheds with mapped surface mining in any year						
<3.5%		*46*	7.7 ±0.1[bc]	23	65.1±9.4[ab]	46	431±76[a]
3.5 to 11%		*46*	7.7 ±0.1[bc]	31	81.2±12.6[ab]	46	550±40[ab]
11 to 21%		*46*	7.9 ±0.1[c]	20	120.4±18.3[b]	46	750±69[bc]
21 to 38%		*45*	7.9 ±0.1[c]	17	118.3±22.2[b]	45	863±79[c]
>38%		*47*	7.7 ±0.1[bc]	22	126.5±15.8[b]	47	1370±123[d]
Developed	•>1% Developed						
1 to 5%	•Developed + Forested > 80%	14	7.1 ±0.2[a]	9	45.6±14.1[ab]	14	191±31[a]
>5%	•No surface mining mapped •No NPDES permits	15	7.6 ±0.2[abc]	3	***20.1±5.5***	15	350±53[ab]

*Values that share the same letters as subscripts are not statistically different based Upon Tukey-Kramer HSD posthoc comparisons.** indicates low sample size – statistics not included. ANOVA showed that categories were significantly different at p<0.0001 for all three metrics.*

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FIGURE 1 – Photos from the Hobet mine, a 40mi2 surface mine in southern WV. (A) An aerial view of a portion of the mine above Laurel Fork during active mining in 2006 (Vivian Stockman, OVEC); (B) a closeup view of the reclaimed mine surface above Laurel Fork in June 2010; (C) a filled tributary to Laurel Fork in 2010; a settling pond below the valley fill in C; (D) a closeup of the sediments of the valley fill drainage showing carbonate deposits. All photos except A by ESB.

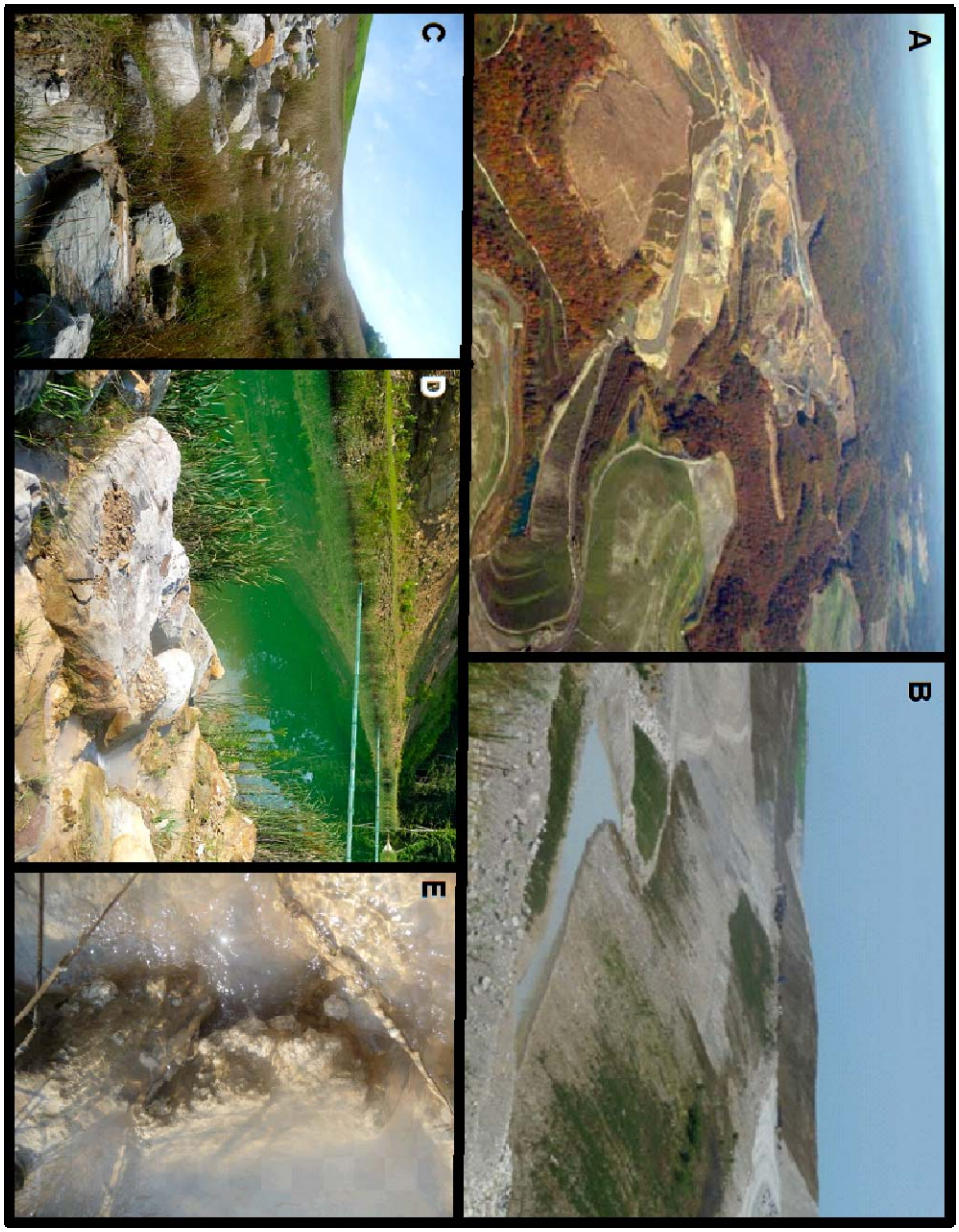


FIGURE 2: *(A) Surface mining activity delineated through analysis of remote sensing imagery collected in 1975, 1985, 1995 and 2005. Color progresses from older mining (1976 delineation) in light yellow to recent mining (2005 delineation) mining in burgundy. (B) shows the location of sampling sites used in our in depth analyses. (C) shows the spatial extent of mining reported by SkyTruth (red triangles) relative to that reported based on permit records (black triangles)*

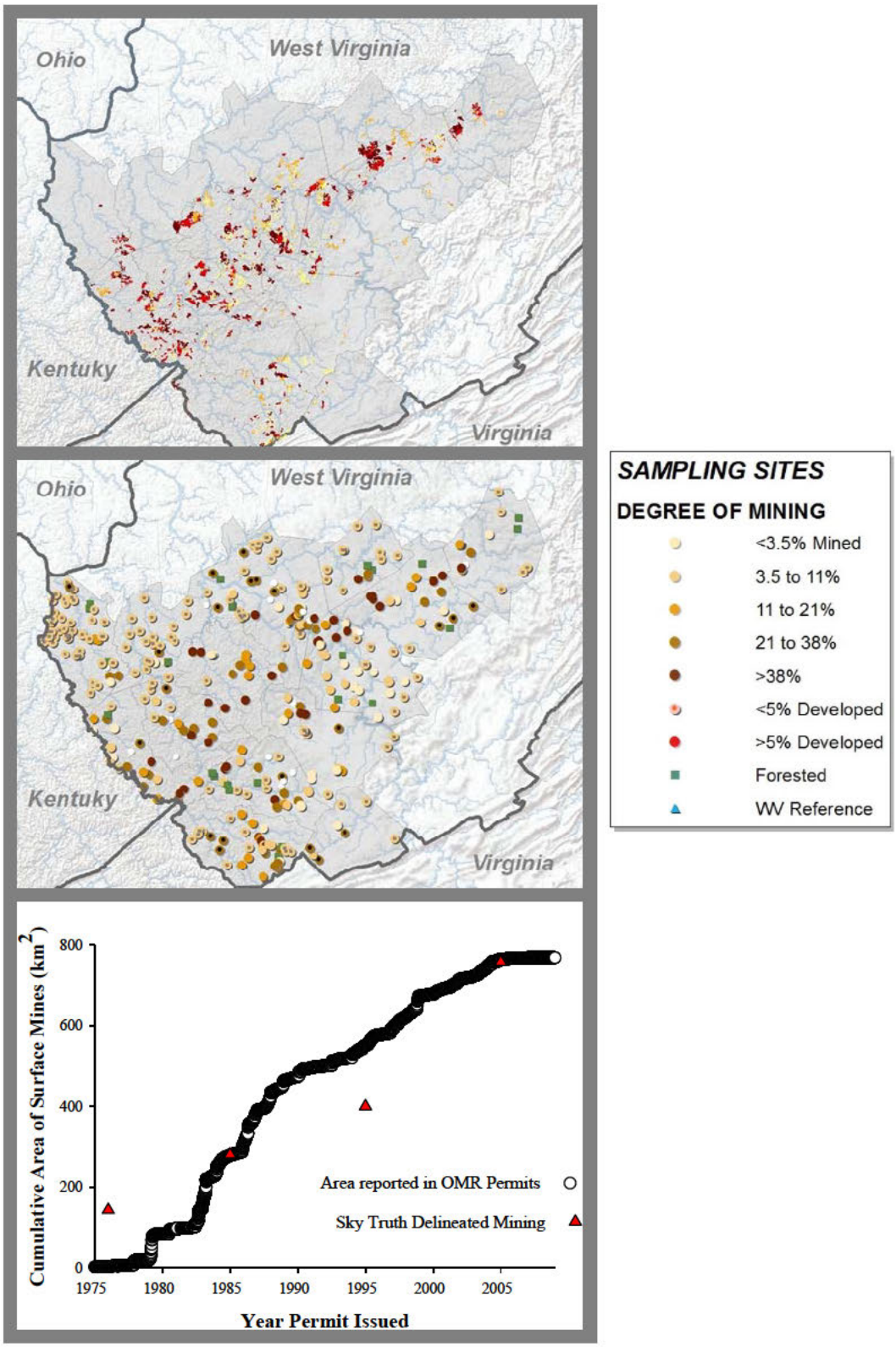


Figure 3. Quantile regressions for streamwater conductivity, nitrate and sulfate across the two dominant land cover gradients, surface mining (A&B) and development (C&D).

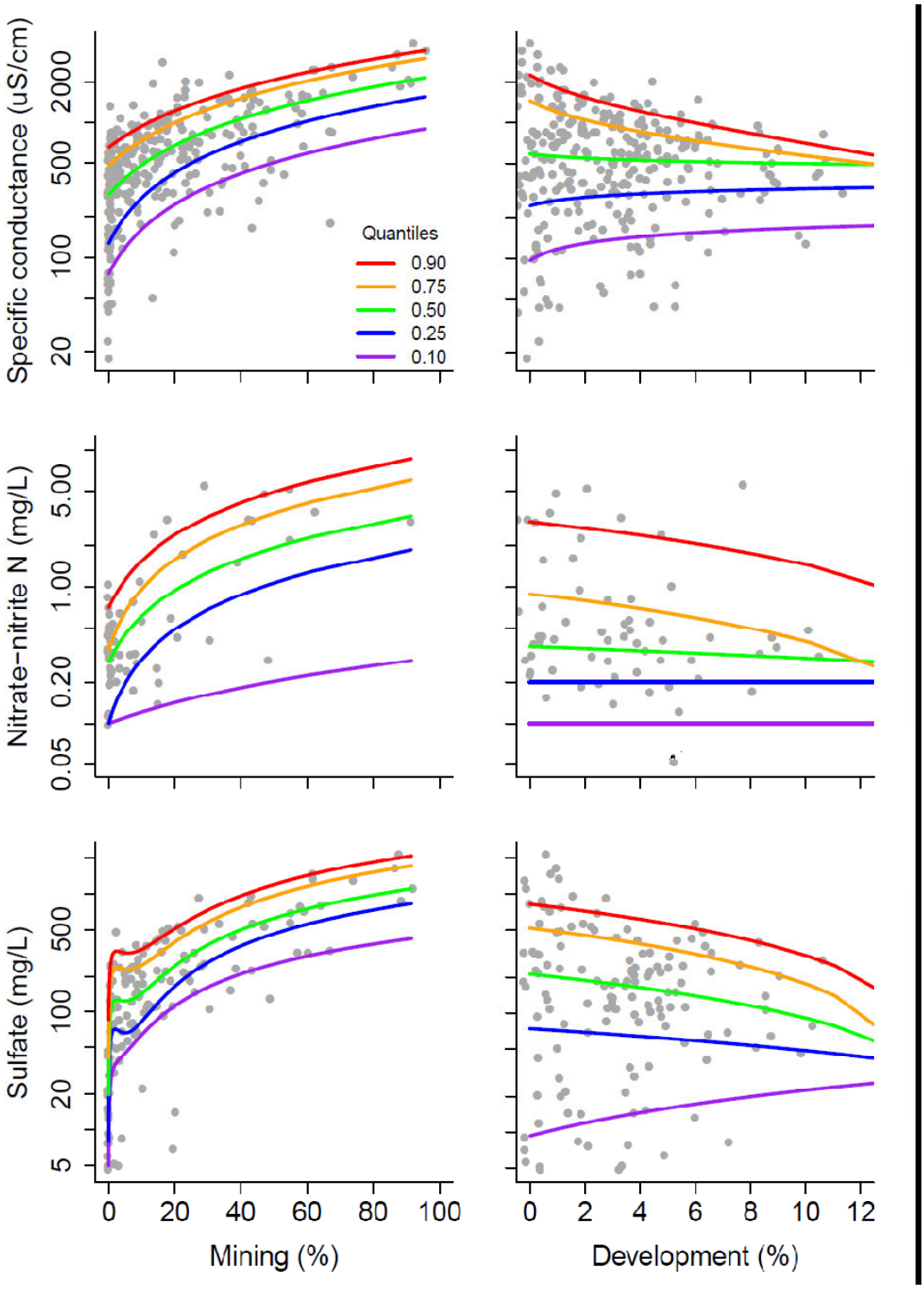


Figure 4. Effects of mining and development on macroinvertebrate community composition metrics. Here boxplots show the median as the black line within the box, the gray box extends between the 25th to 75th percentile distribution of datapoints, the whiskers delineate the 95% confidence interval and all outliers are shown as points outside of this distribution. The alphabetical superscripts indicate statistical differences between categorical variables, categories which share a letter are not significantly different from one another based on Tukey's HSD post hoc comparisons at p=0.05 adjusted for multiple comparisons. The ms superscript in panel A means marginally significant from control (p=0.054)

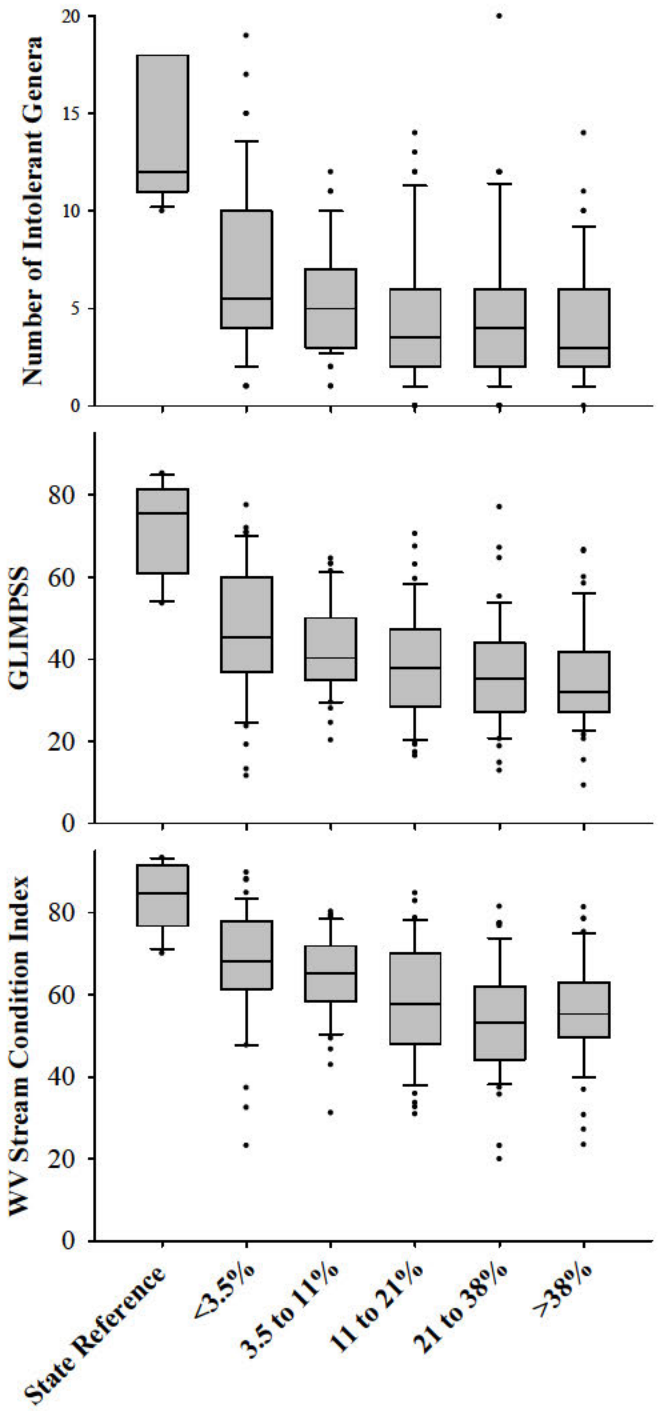


FIGURE 5.TITAN results for taxa having both high purity and reliability when run against either percent mining (A) or percent development (B) as the environmental gradient. Points are centered on the estimated change point for each taxa, horizontal lines indicate 95% CI based on 500 bootstrap replicates, and point size is proportional to the taxa z-score. Taxa which respond negatively across both the mining and develoment gradients are denoted with (*); Taxa which respond positively across both the mining and development gradients are denoted with (**); Taxa which respond negatively to the mining gradient and positively across the development gradient are denoted with (***); Taxa which respond positively to the development gradient but negatively to the mining gradient are denoted with (****).

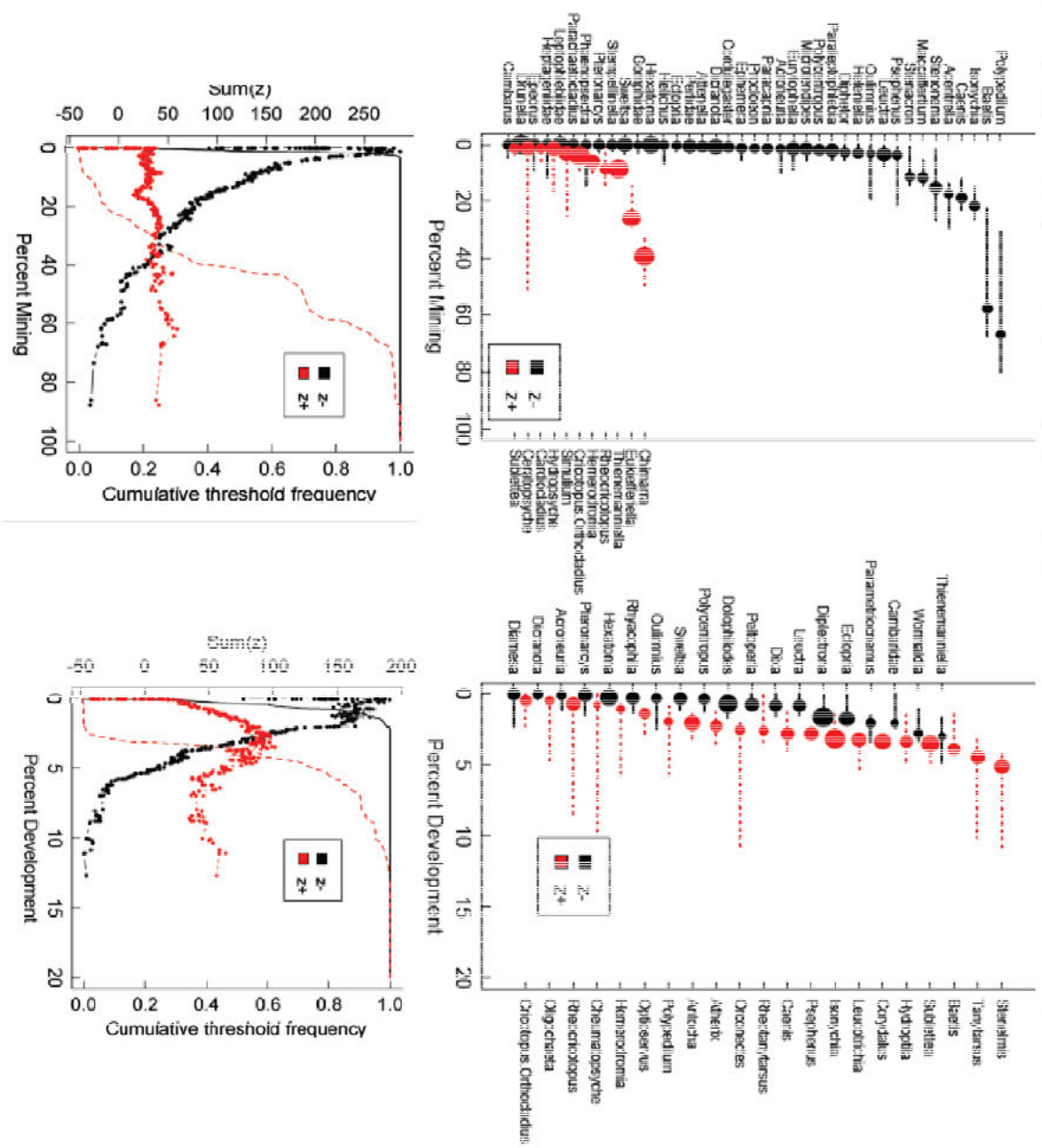
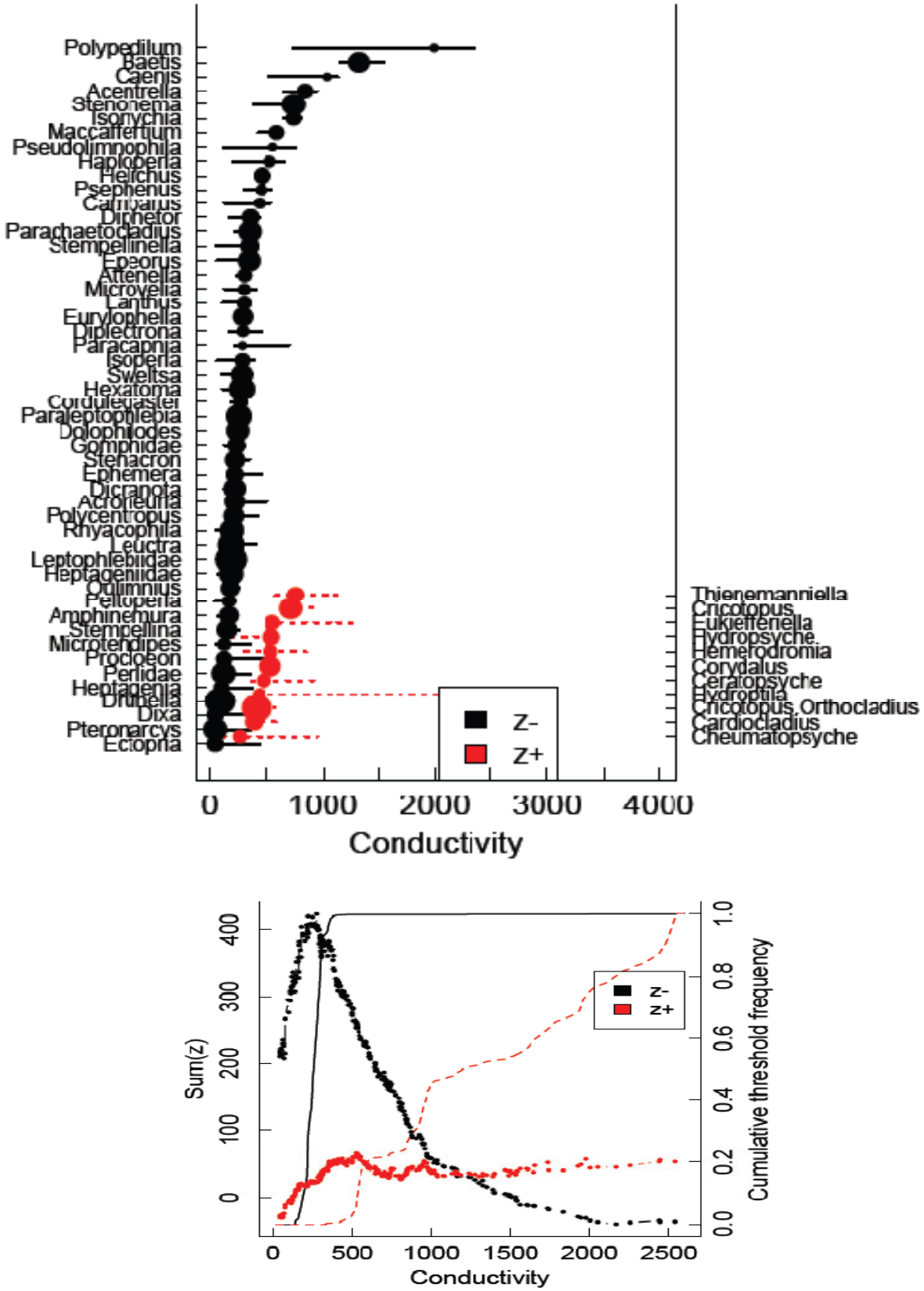


FIGURE 6.TITAN results for taxa having both high purity and reliability when run against conductivity Points are centered on the estimated change point for each taxa, horizontal lines indicate 95% CI based on 500 bootstrap replicates, and point size is proportional to the taxa z-score.



Supplemental Material to be online

(to accompany Bernhardt et al. "How many mountains can we mine…")

This Supplement Includes two figures (Figures 1 and 2) and one table (Table 2) that are directly referenced in the text as well as a detailed description of sensitivity analyses that we performed to test the robustness of our TITAN estimates. The section on sensitivity analyses is referred to in the present manuscript as "SI Section 2"

Figure Headings

Supplemental Figure 1: Abundance patterns for individual taxa determined to respond significantly and negatively to the extent of surface mining in their catchment.

Supplemental Figure 2: Abundance patterns for individual macroinvertebrate taxa that evidenced a positive response to the extent of surface mining in their catchments.

Figure 1 Part 1

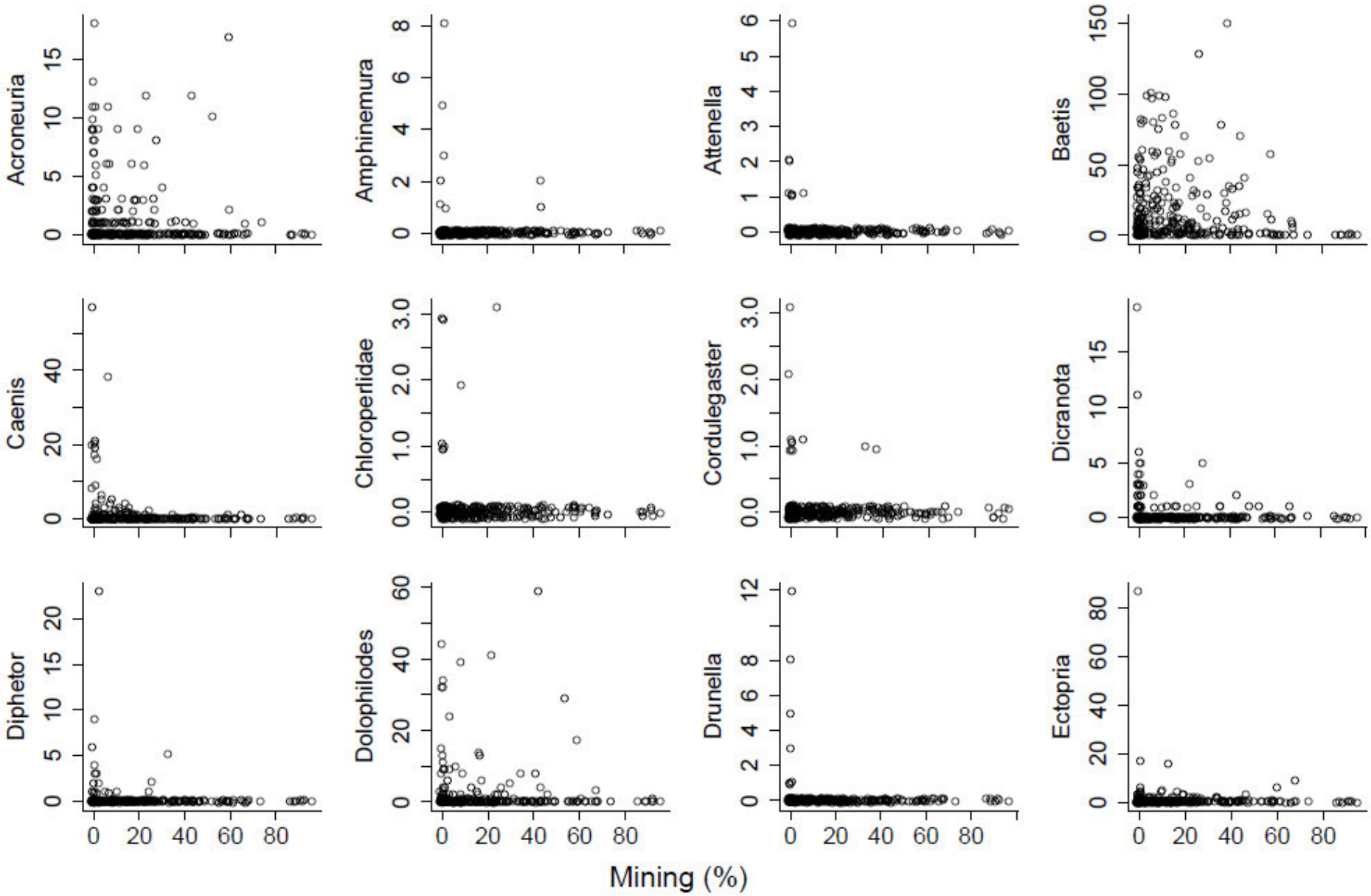


Figure 1 Part 2

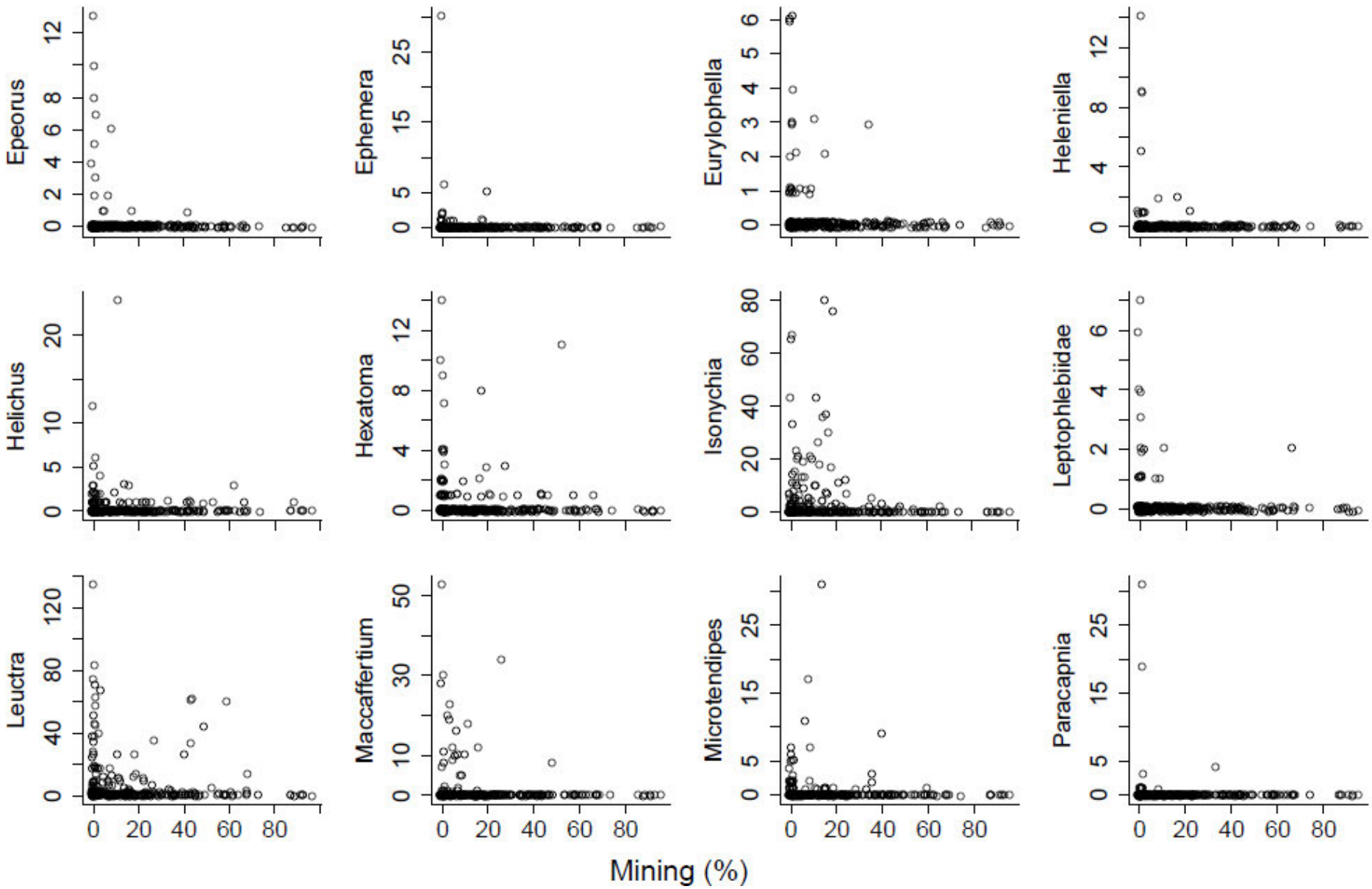


Figure 1 Part 3

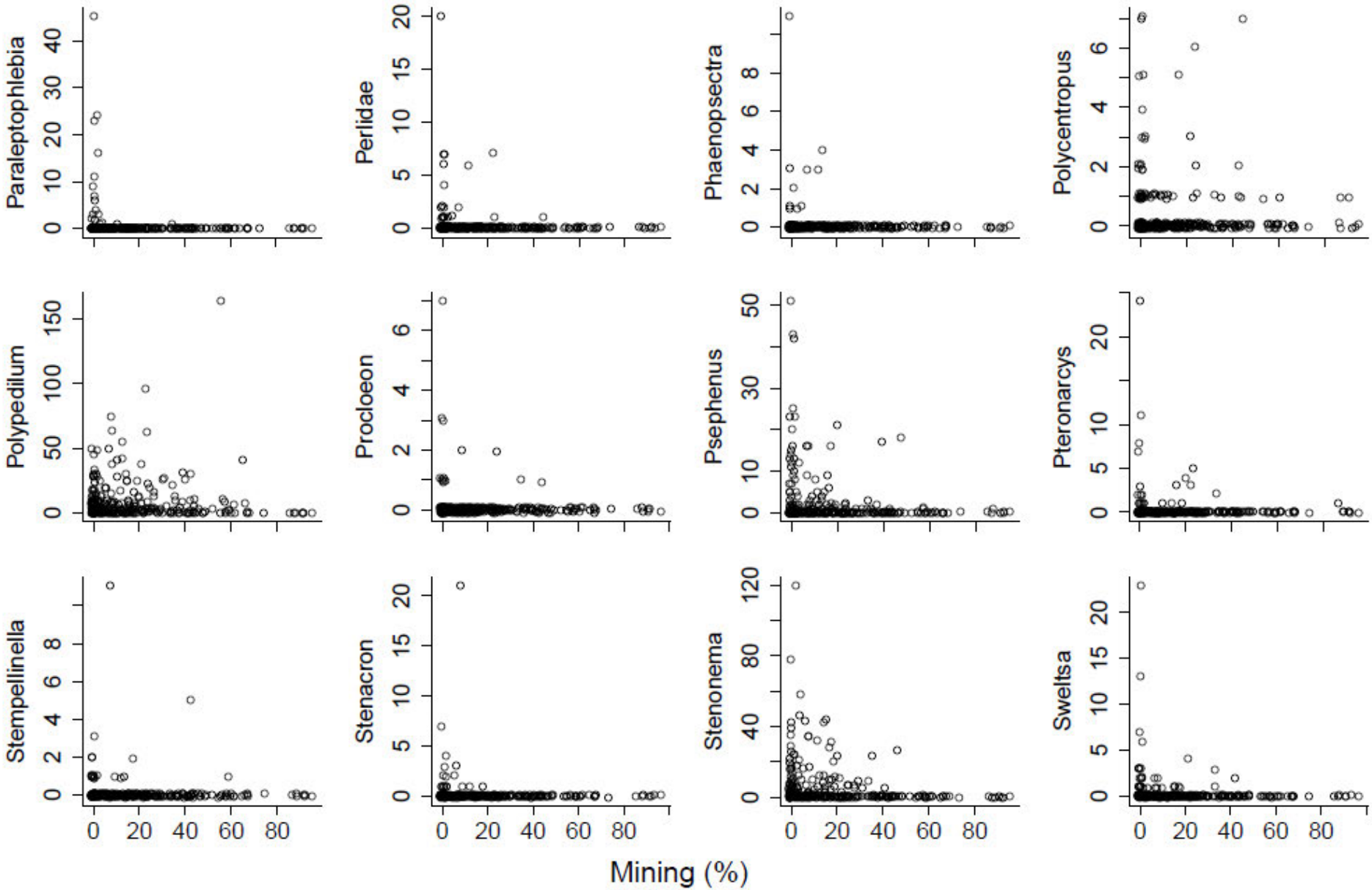
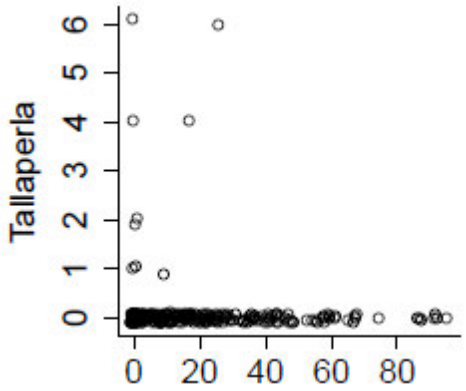


Figure 1 Part 4



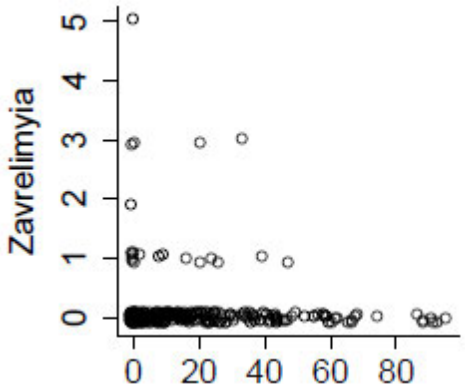
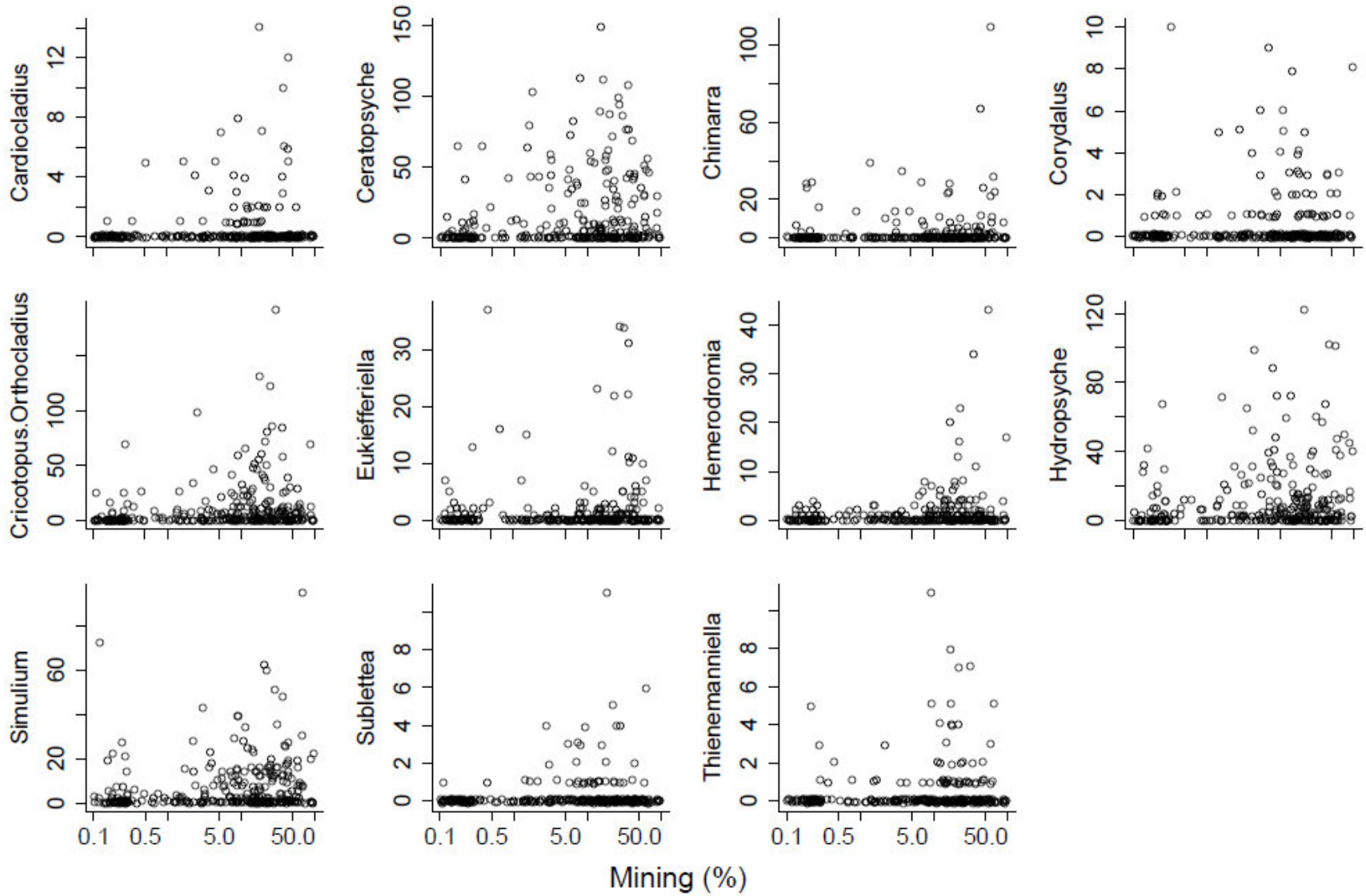
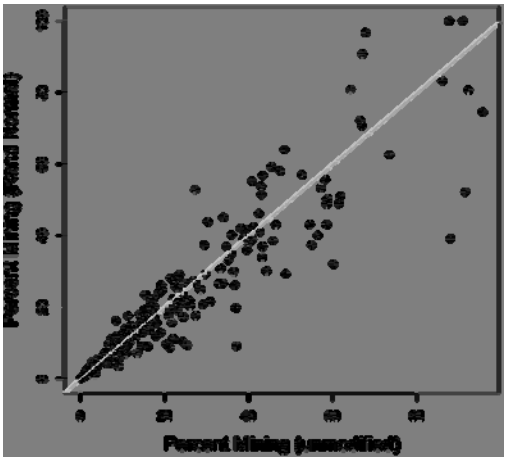


Figure 2


Cardiocladius
Ceratopsyche
Chimarra
Corydalus
Cricotopus.Orthocladius
Eukiefferiella
Hemerodromia
Hydropsyche
Simulium
Sublettea
Thienemanniella
0.1
0.5
5.0
50.0
Mining (%)

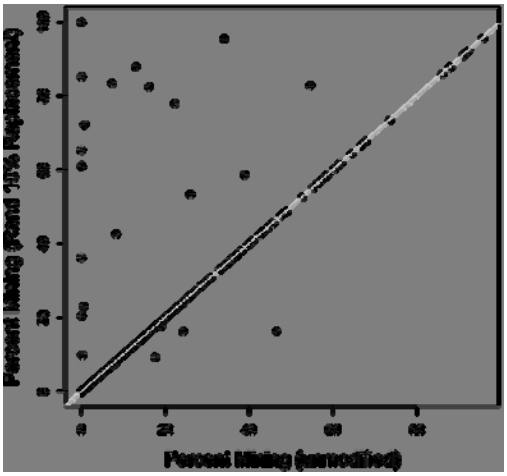
SI Section 2: Sensitivity Analyses with TITAN

Because we do not yet have estimates of the precision of our areal estimates of surface mining activity, we performed a series of sensitivity analyses with TITAN to determine whether our estimates of a mining threshold were robust to several types of possible error in surface mining estimates. We introduced error to the dataset using 3 different approaches.



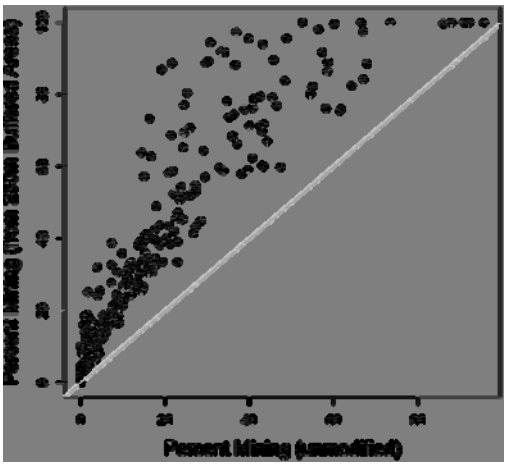
Method I: Random inflation/deflation of %mining (Figure 3)

We created a vector of values from random normal distribution (μ = 10, sd = 3) equal in length to %mining gradient and then divided vector by 10 (to give values from -1 to 1, centered around 0). We multiplied this vector value by %mining and summed with %mining. This introduces random scatter into the %mining estimates, with the scatter increasing proportional to the absolute %mining value.



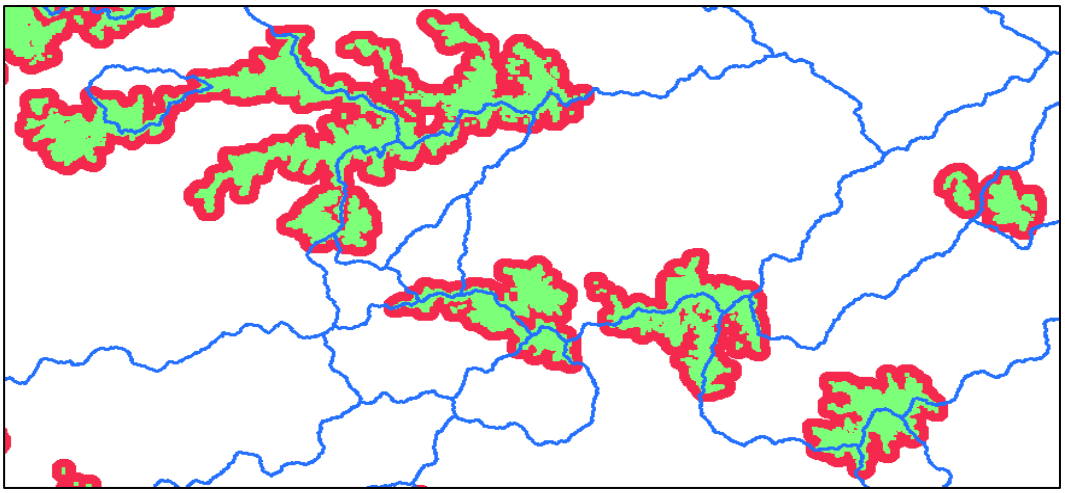
Method II: Replacement of 10% of data w/ random values (Figure 4)

We randomly selected 10% of the total observations and assigned them a random %mining value between 0-100%



Method III: 250m Buffer around all mined areas (Figure 5)

We assume that the largest uncertainty in the satellite imagery processing is the accuracty in determining the the perimeter of mined areas. Based on the geometry and total area of each watershed, as well as the geometry of the mined area within or near the watershed, uncertainty at the edge of mined areas can impact each watershed differently. We added 250m buffers (~8pixels) to the edge of every mined area (Figure 6), recalculated %mining within each watershed, and re-ran TITAN with these values.



Supplemental Figure 6. Example of buffered mine delineations. Green = SkyTruth Mining extent; Red = Buffered extension of mining delineation; Blue lines = watershed boundaries.

We found that TITAN results are robust when we introduce a moderate amount of random variation in the %mining values (Method 1, Supplemental Table 1, Supplemental Figure 7). The estimated change point value and CI are very similar to non-modified result (Supplemental Table 1).

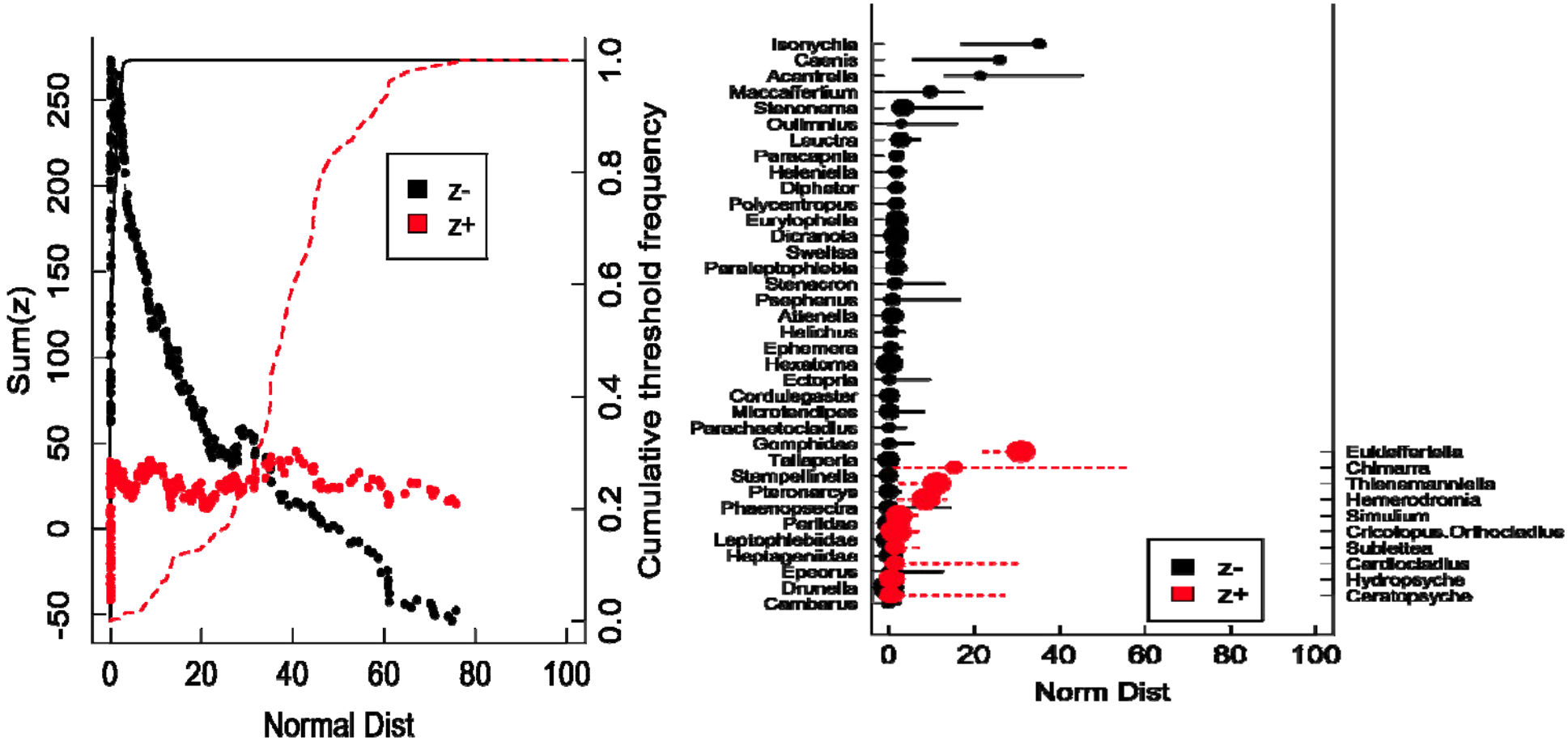
Supplemental Table 1. Change point values (+/- 95% boostrap CI) for each TITAN run.

		Change Point	Lower 95% CI	Upper 95% CI
No Modifications				
	sumz-	1.28	0.00	2.43
	sumz+	63.08	15.36	67.47
Random Change 10% Sites				
	sumz-	0.04	0.00	2.06
	sumz+	65.45	27.01	91.27
Normal Distribution Modifier				
	sumz-	0.06	0.00	2.36
	sumz+	41.04	10.09	61.02
Buffered Areas by 250m				
	sumz-	4.66	0.34	11.85
	sumz+	100.00	59.69	100.00

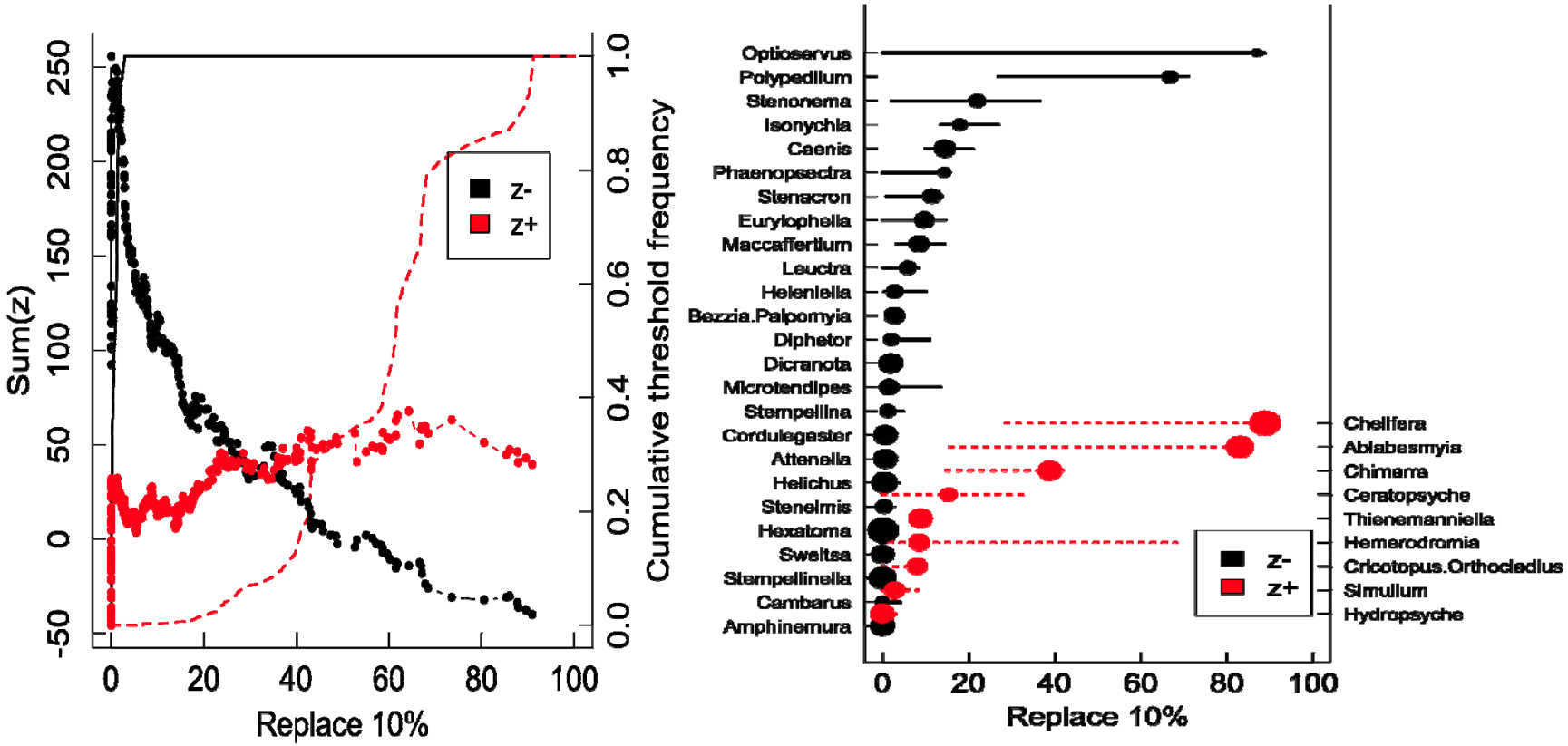
Similarly, when we replaced 10% of the observations with a random % mining value (Method 2), the overall community response value remains unchanged (Supplemental Table 1) but the number of taxa responding negatively decreases. (Supplemental Figure 8). This is likely because the random reassignment led to assigning rare taxa found only at a small number of unmined sites to some mined sites. This reassignment can introduce enough uncertainty in the patterns of abundance for rare taxa that a change point for that taxa cannot be determined

When we introduced systematic error by increasing the size of mined areas by 250m along all edges (Method 3) we were able to increase the change point estimate and confidence interval values (Supplemental Table 1, Supplemental Figure 9). We expected the values would increase (because we added mining area without changing patterns of taxa abundance). We found this error slightly inflated the estimated change point (from 1.3 to 4.7% mining) and increased the 95% confidence interval around this estimate. While such error causes the change point to be broader, there is still a clearly defined negative response (Supplemental Figure 9).

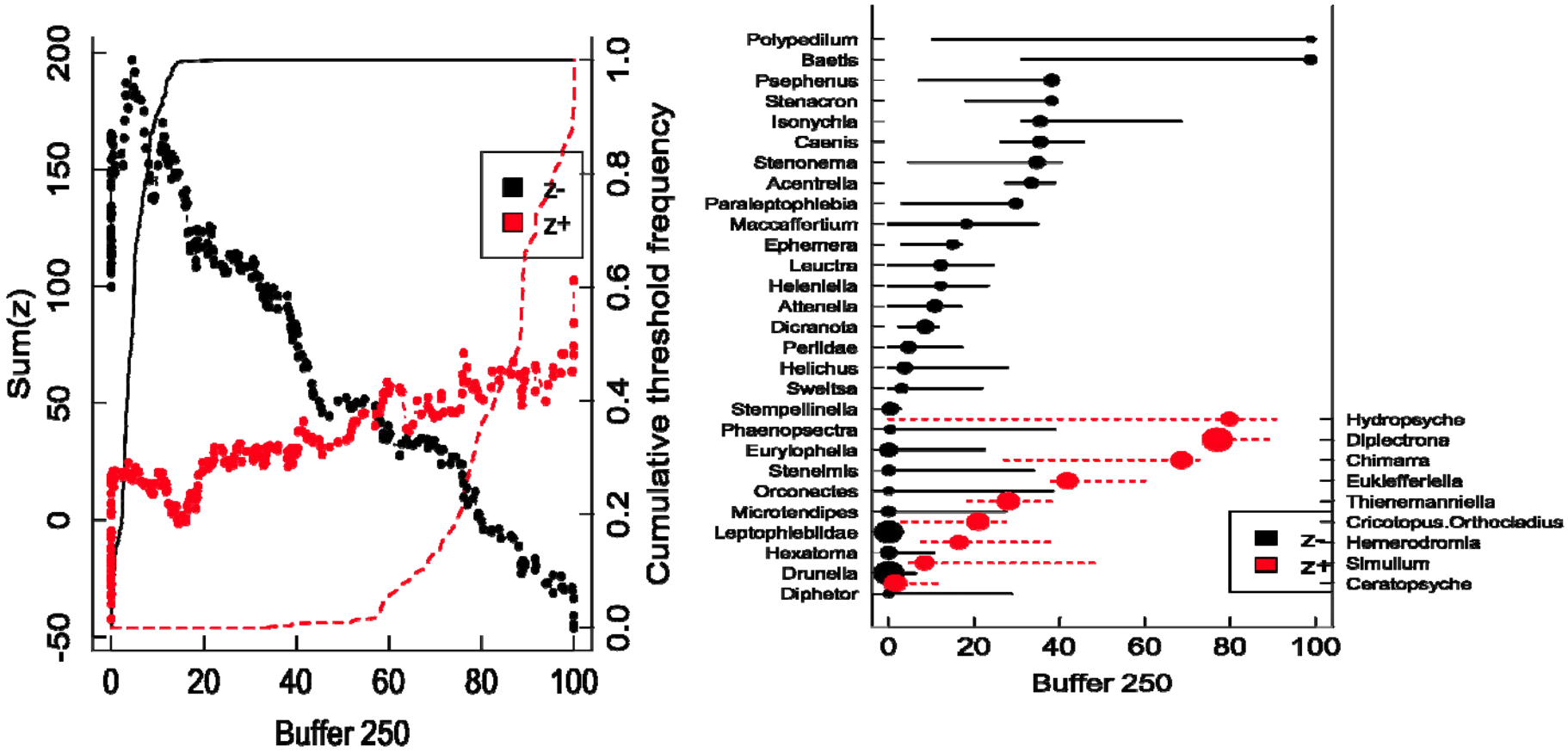
Supplemental Figure 7



Supplemental Figure 8



Supplemental Figure 9



Supplemental Table 2. Satellite image data used for this study (*p* and *r* refer to path/row location)

Landsat 5 (TM)							
p19r35	p19r34	p19r33		p18r34	p18r33		p17r33
7/3/2006	7/3/2006	7/3/2006		9/11/2005	9/11/2005		5/31/2005
9/7/1995	9/7/1995	9/7/1995		8/31/1995	8/31/1995		10/11/1995
9/8/1984	9/8/1984	9/8/1984		9/17/1984	9/17/1984		7/8/1984
Landsats 1-2 (MSS)							
p21r35		p20r35	p20r34	p20r33		p19r34	p19r33
8/20/1976		8/19/1976	8/19/1976	9/6/1976		6/7/1976	5/20/1976

Brian Topping/DC/USEPA/US
12/09/2010 07:51 AM

To Christopher Hunter, Palmer Hough, Ross Geredien
cc
bcc
Subject spruce

FYI

----- Forwarded by Brian Topping/DC/USEPA/US on 12/09/2010 07:50 AM -----

From: Louis Reynolds/R3/USEPA/US
To: Brian Topping/DC/USEPA/US@EPA
Cc: Margaret Passmore/R3/USEPA/US, Greg Pond/R3/USEPA/US@EPA
Date: 12/08/2010 12:02 PM
Subject:

Brian,

I made changes to a couple sentences on page 27. Added a table and deleted a table on page 32. And added the following citation on page 57.

Easton, R.S., D.J. Orth, and J.R. Voshell Jr. 1996 Spatial and annual variation in the diets fo juvenile smallmouth bass, *Micropterus dolomieu*. Environmental Biology of Fishes 46: 383-392.

ATTACHMENT REDACTED - DELIBERATIVE

Spruce FD draft 120110_LR.doc

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P 304-234-0244
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Matthew Klasen/DC/USEPA/US
12/09/2010 08:02 AM

To Brian Frazer
cc
bcc
Subject Fw: Materials for Bob P. Meeting Thursday

Here's what went up; no idea if things got changed by Nancy, OGC, AO, etc.

The key summary is the "Bob P Materials" doc, which includes brief background and TPs on each project. Supplementing that are the fact sheets we worked up on Elkhorn and Leeco.

mk

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

(See attached file: 2010-12-08 Bob P Materials.docx)

Supplemental Information: Premier Elkhorn (fact sheet and Nov. 2 closeout letter)
(See attached file: Briefing for Premier Elkhorn Lil Fork (12-8-10).doc)(See attached file: LRL-2007-0594_Elkhorn_11-2-10.pdf) r

Supplemental Information: Leeco Stacy Branch (fact sheet and draft closeout letter)
(See attached file: Leeco - Stacy Branch fact sheet.docx) (See attached file: 2010-12-08_Draft_Leeco - Clean R4 comments.docx)

Supplemental Information: Cumulative Effects (summary of Bernhardt et al. 2010 paper, and annotated paper)
(See attached file: 2010-12-08 Summary of Bernhardt et al 2010 re cumulative impacts.docx) (See attached file: Bernhardt et al 2010 (conductivity, cumulative impacts) - highlighted.pdf)

- 2010-12-08 Bob P Materials.docx - Briefing for Premier Elkhorn Lil Fork (12-8-10).doc - ATTB2M5D.pdf - Leeco - Stacy Branch fact sheet.docx - 2010-12-08_Draft_Leeco - Clean R4 comments.docx - 2010-12-08 Summary of Bernhardt et al 2010 re cumulative impacts.docx - Bernhardt et al 2010 (conductivity, cumulative impacts) - highlighted.pdf

WORD ATTACHMENTS REDACTED - DELIBERATIVE

How many mountains can we mine? Ecological thresholds for freshwater ecosystems of the Central Appalachians

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ABSTRACT

Over the last decade, an estimated 2000km of streams in the Central Appalachians have been buried beneath the excess rock waste generated from surface coal mining. In addition to the streams permanently lost through valley filling, many more kilometers of streams throughout the region are impacted by the higher flows and chemical concentrations exported to downstream waters from surface mining operations. Here we estimate for the first time the areal extent of mining that can occur in a watershed before significant ecological impacts are observed in receiving streams. Using new remote sensing analyses together with field sampling data for 283 stream reaches located across a 14 county region in southern West Virginia we demonstrate that changes in streamwater conductivity were strongly positively correlated with the extent of watershed surface mining.. We detected a significant community threshold response to altered ionic strength, with many sensitive taxa declining precipitously and synchronously in abundance at a conductivity of 277μS cm^{-1} (95% CI of 176 to 344 μS cm^{-1}). Our analysis is the first to demonstrate that the rapid increase in mining activity within regional headwaters is degrading water quality and freshwater ecosystems at very low mining intensities and over very large geographic scales. We find that stream water quality and benthic communities are significantly altered when as little as ~3% of the upstream watershed is converted to surface mining operations.

INTRODUCTION

In order to compete with western states in supplying inexpensive, low sulfur coal to the US energy market, mining companies throughout the Central Appalachians are increasingly turning to mountaintop mining to access shallow seams of coal[1,2]. Mountaintop mining is now the most widespread form of coal surface mining across the central Appalachian Mountains, and is particularly intense in southern West Virginia, eastern Kentucky and Tennessee, and southwestern Virginia[3,4]. In this sparsely populated region, surface mining and mine reclamation activities are the dominant driver of land use change[5] and as a result of surface coal mining the area has the highest rates of sediment movement in the United States [6]. To reach the coal seams which can be hundreds of feet below the surface, ridge tops are removed creating large quantities of waste rock and coal debris ("overburden") that must be disposed of to maximize mining efficiency (Figure 1). In the steep topography of the region, stream valleys become the obvious location for disposing of rocks from the mined ridgetops. The resulting valley fills[3] can bury either headwater streams or once forested valley slopes under 10s to 100s of meters of overburden[7]. Because MTM operations are less constrained by topography than more traditional contour mining, MTM techniques have allowed surface coal mining operations to expand greatly in size[4].

The central Appalachian forests that are affected by surface coal mining support among the highest levels of biodiversity and endemism in the temperate zone[8] leading to significant concerns about the loss of forest biodiversity and ecosystem functions as a result of mining[4,9]. Much recent attention has been paid to the burial of headwater streams beneath valley fills and the downstream impacts to waters below surface mines[10](Figure 1), in part, because of high profile federal court cases and widely publicized exchanges between the U.S. Environmental Protection Agency (US EPA) and the U.S. Army Corps of Engineers (USACE) over permitting decisions[11]. Under the authority of the Clean Water Act (CWA; 33 U.S.C. 1252) the US ACE (or a delegated state) must approve regulatory permits to allow mining operations that will result in impacts to waters of the U.S. Prior to authorizing a stream fill operation, the US ACE must assure, among other things, that these activities will not cause significant degradation of the environment (40 C.F.R. § 230.10). To meet this requirement, permittees are required to mitigate for harm done to streams. Typically this is accomplished through the construction of channels on nearby reclaimed mines, the restoration of degraded streams within the watershed, or payment into an in lieu fee mitigation program[2,12,13]. The

extent to which these actions are sufficient to mitigate for the impacts that MTM have on waterways has been central to legal challenges and environmental advocacy protests calling for tighter regulations on this form of mining[11,14].

Scientific studies to inform such cases have been of great interest and have established that impacts can be substantial[10,12,15,16]. Rain that falls on mined and reclaimed watersheds flows through coal residues and rock overburden rather than surface soils. When exposed to air, pyrite minerals in coal residue release sulfuric acid[17], and the production of this strong acid within a matrix of fragmented rock leads to high rates of rock weathering. Throughout much of the central Appalachians, the high buffering potential of carbonate bedrock neutralizes the acidity generated by pyrite dissolution and releases high concentrations of coal-derived SO_4^{2-} accompanied by elevated concentrations of Ca^{2+}, Mg^{2+}, HCO_3^- derived from parent material[18]. The natural acid buffering potential of parent material in much of the region thus generates alkaline mine drainage, characterized by an increase in pH, alkalinity and electrical conductivity in receiving streams[18]. The concentration of trace metals and metalloids also tend to be correlated with SO_4^{2-} and conductivity[12,19], and in this region elevated concentrations of manganese (Mn) and selenium (Se) are of particular concern due to their known toxicity[20]. Selenium, weathered from coal minerals, is more soluble at high pH and thus is a particularly problematic toxin in the alkaline mine drainage common to most mountaintop mines[21]. A number of recent studies have documented significant changes in stream macroinvertebrate and fish communities directly downstream of surface mining operations[10,16,22] and have attributed these declines to the combined effects of heightened concentrations of ions and trace metals delivered from upstream mines.

In response to growing concerns and scientific documentation of the impacts of surface coal mining, on April 1, 2010, the US EPA released their own scientific report and announced new actions to strengthen the permitting process and protect Appalachian waters[23]. This included a draft guidance document that set benchmarks for unacceptable levels of conductivity in waters associated with surface mining. Specifically, their research identified conductivity levels of 300 $\mu S\ cm^{-1}$ in Appalachian headwater streams as the maximum acceptable levels to prevent substantial impacts to native invertebrates[23]. This draft benchmark has been challenged by various groups including the National Mining Association (NMA) who filed a lawsuit in U.S. District Court for the

District of Columbia[24]. While most of NMA's arguments question the legality of EPA's actions, the lawsuit also argues that the conductivity water quality standard is arbitrary and based on unsupported "presumptions" that background levels of conductivity (i.e., non-mining related) are below the benchmark and that significant adverse impacts are related to the length of stream impacted or the number of fills[24].

The challenges on both sides highlight the need to fill several scientific gaps that are critical to decisions by regulators and to those the regulations influence. Thus our goal was to address the following questions:

1. Is there a clear relationship between conductivity and surface coal mining extent in the central Appalachians that cannot be attributed to other impacts such as development in a watershed?

2. Does the latest state-of-the-art approach designed to statistically detect biological thresholds support the concept of a benchmark and if so, at what conductivity level?

Previously there has been no effort to quantify the areal extent of surface mining and link that to downstream water quality and aquatic community structure at river basin scales. Since the dominant solutes derived from surface mining that generate high conductivity in receiving streams are conservative ions that do not readily precipitate from solution except at supersaturated concentrations (SO_4^{2-}, Cl, Ca^{2+}, Mg^{2+}, HCO_3^-), high conductivity (and associated biological impacts) should be correlated with the total spatial extent of upstream mining activity. Thus, we analyzed whether there was a statistically significant relationship between the proportion of surface mining in watersheds of southern WV and dissolved ion concentrations or between the extent of surface mining and alterations in stream biota. To determine whether or not there were threshold relationships between stream invertebrates and conductivity, we employed a new form of analysis (Threshold Indicator Taxa Analysis, TITAN[25]). TITAN is unique in that it first characterizes the responses of individual taxa to an environmental gradient and secondarily aggregates taxa into a community-level metric only after distinguishing the magnitude, direction, and uncertainty in the responses of individual members of the community. Thus, TITAN has distinct advantages over more commonly used community metrics, in that it allows the investigator to identify both taxon-specific and community-level threshold responses to anthropogenic environmental gradients[26].

RESULTS & DISCUSSION:

We compiled existing datasets that provided determinations of the spatial extent of surface mining in the region over time by obtaining nonpoint discharge elimination system (NPDES) permit records for mining activities (maintained by WVDEP accessed online 6/24/2010), land cover classification data determined from National Landcover dataset (NLCD 2001), and surface mining maps derived from multidecade (1975, 1985, 1995, 2005) Landsat satellite data for a 59-county area spanning much of the Central Appalachian Coal Region (Figure 2A). We obtained data on water quality and macroinvertebrates that were collected and analyzed by the WV Department of Environmental Protection (WVDEP 2010 provided 6/30/10). Field samples and remote sensing derived mine mapping overlapped for a 14 county study area in southern WV (Figure 2B) from which we acquired a final dataset consisting of 283 stream reaches for which both stream water sample analysis and stream benthic invertebrate collection data were available from summer collection efforts. We delineated watersheds draining to each of these 283 sampling points and estimated the total surface area covered by forests, development of by surface mining operations. Surface mining operations were further classified as mountaintop removal mines (MTM), non MTM surface mines (~contour or strip mines), or valley fills. Our estimates of cumulative surface mining in the region derived from remote sensing image analysis are in close agreement with the cumulative extent of area disturbed through mining reported by NPDES permit inspectors (Figure 2C). It is important to acknowledge that the precision of our remote sensing derived estimates of surface mining has not yet been estimated through ground-truthing. Rigorous evaluation and cross validation of mining maps is a priority for our ongoing research effort.

Within this dataset, 231 streams drained watersheds with some amount of mining (0.03 to 95.7% mined) and 212 streams drained watersheds with >1% of their watershed developed (1 to 20% developed). A total of 19 stream samples were classified from the land use data as forested watersheds (no surface mining or NPDES permits, <1% developed) and the dataset included 12 streams classified as reference watersheds by the state of WV. Stream stations sampled by the WVDEP drained watersheds that had up to 95% (18±21%, mean ±sd) of their surface area in active or reclaimed surface mines and up to 20% (3 ± 3% mean ±sd) of their watershed area classified as developed..

To determine if watersheds having a greater proportion of mining have higher significantly higher streamwater conductivity (Question 1), we examined statistical relationships between the areal extent of surface mining and conductivity and solute (sulfate and nitrate) concentrations. We found that the total surface area mined within a watershed, regardless of what year the mining activity was delineated from Landsat imagery, correlated most strongly with water quality metrics.. Analyses that only used the most recent 2005 surface mining delineation, or which excluded all but MTM surface mining operations were less strongly correlated with water quality metrics. As a result of these comparisons, we chose to examine how the cumulative extent of all surface mining within a watershed (across all years and all types) was related to water quality and biological changes in the region. We also examined whether variation in the extent of watershed development was a good predictor of water quality changes.

We found that the proportion of watersheds that were mined was strongly positively correlated with streamwater sulfate and nitrate concentrations and with the electrical conductivity of the water in draining streams (Figure 3). Mined streams had higher alkalinity and pH than unmined streams in the region (Table 1). There were insufficient records of trace metal and metalloid concentrations within our dataset to examine relationships with mining, however analysis of the entire WVDEP database (beyond the 14 county area to which our analyses were restricted) showed that sulfate was strongly positively correlated with trace metals (Mn, Fe, Al) and the metalloid Se[12]. In contrast, development activities within the 14 county area were not correlated with conductivity or nitrate and were slightly negatively correlated with sulfate concentrations (Figure 3) and did not lead to significant alterations of pH or alkalinity (Table 1). The negative relationship observed between conductivity and water quality for the upper quantiles of the dataset (Figure 3) occurs because some of the watersheds with little development had large mining impacts whose water quality impacts far exceed that of development in this region (Figure 3). Variation in sulfate, nitrate and conductivity in undeveloped watersheds is highly correlated with the extent of mining in those watersheds.

To assess the macro-invertebrate response to increased mining extent and streamwater conductivity (Question 2), we first examined changes in stream benthic macroinvertebrate diversity and biotic integrity scores by one way ANOVA and Tukey's HSD to compare WV reference streams with the 231 mined streams, split into 5 equally populated bins of increasing mining intensity. We also

performed TITAN[25] to examine taxon specific and community level responses to both gradients within this dataset. We found that watershed surface mining leads to substantial changes in stream biota that are much more dramatic than changes attributable solely to development. The diversity of intolerant taxa declined precipitously with mining (Figure 4, supplemental Figure 2) and as a result both types of bioassessment scores developed for West Virginia streams declined with the spatial extent of mining in their watershed. The family level WV Stream Condition Index (WVSCI) and the Genus Level Index of Most Probable Stream Status (GLIMPSS) were significantly lower in mined watersheds compared to state reference sites (Figure 4). For all three metrics, significant declines in diversity and stream ecological health metrics were observed even in the lowest mining category (<3.5% of watershed in surface mines) (Figure 4), suggesting that water pollution associated with even small amounts of surface mining is sufficient to reduce or eliminate many stream taxa.

Using TITAN analysis to examine the aquatic invertebrate responses to the spatial extent of mining revealed statistically significant declines for 39 of the 196 taxa in the data set (Figure 5A). The taxa most sensitive to mining represent a variety of mayfly, stonefly, caddisfly and beetle larvae that are all characteristic to central Appalachian streams and known to be sensitive to water pollution. All negatively responding taxa appeared to be very sensitive to the mining gradient, with all showing sharp declines in abundance at less than 10% mining (Figure 5, Supplemental Figure 1). Prior research has demonstrated that mayflies are especially sensitive to mining-derived contaminants[10,27] and our results support this, with even the highly tolerant mayfly genus *Baetis* showing a negative response to the mining gradient. The nearly synchronous declines of taxa (SI Figure 1) was consistent with a community-level threshold[26], suggesting that surface mining of as little as ~3% (95% CI of 0 to 2.4%) of the upstream watershed results in sharp nonlinear declines in the abundance of many taxa comprising downstream communities (Figure 5B, SI Figure 1). Several taxa increased in relative abundance along the mining gradient, primarily several genera of highly tolerant midges (Chironomidae) the tolerant caddisflies *Chimarra*, *Ceratopsyche* and *Hydropsyche*, and the blackfly *Simulium* (Figure 5A, SI Figure 2). This suite of tolerant organisms is entirely consistent with earlier impact studies[10,16], suggesting that the same impacts observed immediately below valley fills are also apparent at the scale of 10-100km^2 catchments.

Because of the uncertainty surrounding the precision of our surface mining delineation, we performed sensitivity analyses to examine how the TITAN threshold determination was affected by introducing random or systematic error into our % mining estimates (SI Section 2). We found that our cumulative threshold estimate was robust to introduced error, and could only generate a significant increase in the threshold estimate by systematically increasing the estimates of mining area. This is a type of land cover classification error that could be introduced by edge effects, where landcover pixels at the edges of mines are systematically classified as forest cover. Even if we assumed that all mined areas should be expanded by 250m along all edges, we still estimated a community level threshold at 4.6% of the watershed in surface mine (95% CI of 0.34 to 11.85%) (SI Section 2).

Variation in the extent of development is not statistically correlated with the extent of mining within this dataset, yet the majority of watersheds experience both forms of land use change. We reran TITAN analyses on the same dataset oriented along a development rather than the mining gradient and found that many fewer taxa declined significantly with development than with mining (Figure 5C). Those taxa that did respond declined at very low levels of development (0-5%). However, the results of this analysis are complicated by the fact that many of the low development watersheds have variable and sometimes high amounts of surface mining within their boundaries. Indeed, many of the taxa that declined with mining increased in abundance along the development gradient because of the negative relationship between % development and % mining (Figure 5C). While negative response of the invertebrate community peaked at similar values of % development and % mining, the magnitude of the sum of z- scores was much higher for mining (290.3) than for development (134.9). This indicates that more taxa exhibited a more abrupt decline across the mining gradient than across the development gradient (Figure 5B, D).

TITAN analysis of the same dataset across a conductivity gradient found that increases in streamwater conductivity led to significant declines in 50 of the 196 total taxa and explained a larger amount of the variation in abundance data than either land cover variable (sum z =379.1). The threshold at which community changes are most drastic was at 277μS cm^{-1} (95% CI of 176 to 344 μS cm^{-1}), a number which is remarkably consistent with the EPA Guidance[23] recommended maximum conductivity of 300 μS cm^{-1}. Across this region, conductivity is highly correlated with

the areal extent of mining (Figure 3). Our analyses suggest that this conductivity threshold is typically reached when <5% of the upstream watershed is impacted by surface mining.

In our analyses we did not distinguish between old or new surface mining because we were unable to find any statistical evidence that the impacts of mining are ameliorated through time. We also did not distinguish between mountaintop mining operations and more traditional surface strip or contour mines in the region because we were unable to detect statistical differences between these two types of mining. Similarly, our efforts to weight impacts based on hydrologic connection to the stream channel (inverse distance weighting approaches) did not improve statistical relationships. The stream sampling dataset acquired from the WVDEP was not collected with the purpose of examining the efficacy of mine reclamation or mining configurations in ameliorating downstream impacts and thus we do not view inability to detect such subtleties in the current dataset as conclusive. Instead we urge that new spatial data on mining activities be used to guide rigorous field sampling campaigns to make these critical comparisons.

CONCLUSIONS

This work demonstrates for the first time a statistically significant relationship between the areal extent of surface mining in the Central Appalachians and variation in both the chemistry and biological community structure of receiving streams. Our analyses demonstrate that even small amounts of surface mining can dramatically increase streamwater conductivity, pH and alkalinity and dramatically reduce the abundance of many aquatic insects. Our community threshold analyses suggest that macroinvertebrate community composition shifts dramatically once streams reach conductivities of ~300 µS/cm – a level achieved with very low levels of watershed surface mining. An important argument for a casual pathway from mining to conductivity to community thresholds is the large proportion of shared taxa that declined in response to both watershed mining and conductivity. Of the 39 taxa that significantly declined along the mining gradient, 24 significantly declined with increasing conductivity. Conversely, few of the taxa that responded negatively to the development gradient declined with increasing conductivity.

These results have important policy implications. First, the fact that the cumulative impacts of MTM on water quality and on the biological condition of streams are readily quantifiable and

cannot be attributed to development have the potential to inform decisions on the amount of mining regulators allow in a given watershed. Second, using a novel and rigorous method of data analysis to test for thresholds (TITAN), we found a threshold conductivity level (277µS cm^{-1} with 95% CI of 176 -344 µS cm^{-1}) that is remarkably similar to the benchmark of 300 uS/cm that the US EPA has proposed to be protective of aquatic life in their recently issued guidance document, lending support to their draft conductivity benchmark.

METHODS

Regional Mapping of Surface Mining: Surface mining activity was mapped from digital multispectral images collected by the Multispectral Scanner (MSS) and Thematic Mapper (TM) sensors carried by the Landsat series of remote-sensing satellites. Historical images in the Landsat archive[28] were reviewed for cloud cover, smog and haze. Mid-summer images were favored to facilitate the identification of disturbed areas and minimize seasonal variations in solar illumination. To ensure detection of mining disturbance since the 1970s while minimizing the total volume of data for analysis, mid-decade imagery was chosen (SI Section II). Digital elevation data were also acquired for topographic analysis, enabling the identification of ridges and mountaintops throughout the study area as a means of discriminating MTR operations from other types of surface mining. We opted to use 3-arc-second (1x1 minute) DEM data compiled by the U.S. Defense Mapping Agency. This series was distributed as 1x1 degree areas that corresponding to the east or west half of the USGS 1:250,000 scale topographic quadrangle map series. These elevation data are from topographic surveys that mostly pre-date 1976 and therefore provide the best available representation of topography in the study area prior to the advent of mountaintop removal mining. The horizontal position error of this elevation dataset is generally stated to be 100 meters or less. Other supporting digital GIS data included detailed transportation features and populated areas derived from USGS 1:24,000-scale topographic maps[29]. The river and stream vectors that comprise regional hydrology were compiled from the 1:24,000-scale National Hydrography dataset[30].

Image Processing: Image processing and analysis was performed using Erdas IMAGINE image processing and GIS software on a standard Windows-based workstation. All images were placed into a common map projection (UTM Zone 17 North – WGS84 datum) using standard techniques that included the selection of image-to-map tie points by an experienced operator, and digital resampling of the images using a nearest-neighbor algorithm to preserve the original spectral information. Additional processing included the creation of same-date, path-oriented mosaics to simplify the classification

process. The georectified mosaics were then cropped to the study area boundary to reduce computer processing time.

An iterative, two-stage process was developed to identify and delineate areas disturbed by traditional surface mining and by mountaintop removal mining (MTR). First, land cover classification was performed for each date of imagery. Classification followed a two-step process: pixel-based spectral signatures of various land-cover types were identified; then a decision-tree analysis was used to classify areas of active surface mining. Pixel-based classification was performed using the supervised maximum likelihood technique[31]. Given the rugged terrain of the region, the image data were first spectrally enhanced to reduce albedo-related variations in illumination and spectral characteristics using the hyperspherical direction cosine (HSDC) method[32]. Training samples were selected for each date of imagery to yield land-cover classes compatible with the Anderson Level II system[33], such as bare rock, soil, forest, grasses/crops, water, clouds, etc. The results of this procedure were then modified by classifying any bare rock and soil outside of a 400 meter buffer zone around rivers, highways and agricultural areas. This separates areas of bare soil and rock likely attributable to active mining from areas naturally devoid of vegetation, such as river banks and channels, paved surfaces, and plowed or fallow fields.

Second, topographic analysis was performed to subdivide the classified mining areas into "MTR" and "Other Surface Mining" categories. While the legal definition of MTM as defined by the U.S. Office of Surface Mining is too vague to implement directly into a GIS model, their definition did guide the development of a reproducible, rule-based method by SkyTruth for identifying MTR areas. We started from the perspective that, to qualify as MTR, an individual mining operation had to 1) cross a ridge top or peak, and 2) impact an area significantly larger than a typical conventional strip mine.

Using digital elevation data from the U.S. Geological Survey 1:100,000 series, the terrain parameters that characterize ridge tops and peaks, slopes and valleys were calculated. We defined a ridge top or peak as a point that lies on a local convexity that is orthogonal to a line with no convexity or concavity. After ridge tops and peaks were identified and delineated from the elevation dataset using these criteria, contiguous areas encompassing fewer than 40 acres were eliminated to minimize noise in the analysis.

MTR operations were identified in the mining land-cover class by calculating the percentage of ridge top that comprised the mine's total area. We produced two categories of MTR mines: contiguous mining

area spanning more than 320 acres and containing more than 40 acres of ridge top, and contiguous mining areas between 40 and 320 acres that contain at least 10 - 40 acres of ridge top in the mined area. Digital boundaries delineating the MTR areas, and the other surface mining areas identified by this analysis were analyzed for the entire region (SI Table 2) and files were exported in GIS-compatible shapefile format.

Water Quality and Stream Benthic Samples: We obtained data on water quality and macroinvertebrates collected and analyzed by the WV Department of Environmental Protection (WVDEP 2010 provided 6/30/10 in response to FOIA request). The full dataset includes water quality, stream habitat and stream benthos information on 6463 stream reaches. Samples were collected between 1996 and 2009. From this large dataset we extracted all sample data that met the following selection criteria: streams <10m wide draining watersheds completely contained within the 14 county area of southern WV for which we had mapped the extent of surface mining; samples for which benthic macroinvertebrate samples were collected during summer surveys and identified to genus; and samples for which at least streamwater conductivity and sulfate concentrations were recorded.

Watershed Delineation for Stream Sampling Stations: Geospatial analysis to determine the areas of surface mining and developed lands upstream of water quality sample locations was performed using Environmental Systems Research Institute's (ESRI's) ArcGIS software, version 9.3.1. Digital elevation model (DEM), hydrography, land cover, surface mining, and water quality sample location data for the entire area draining into the 14 West Virginia counties examined were assembled into a geographic information system (GIS) with all data georeferenced to the Albers Equal Area projection. The DEM data, a subset of the National Elevation Dataset[34], were obtained from the National Hydrography Dataset Plus (NHD+)[30] and represent elevation as 30 x 30 m pixels. We also obtained flow direction, a derivative of the elevation dataset, as well as 1:100,000 scale stream flow-lines from the NHD+ and added them to our GIS database. The land cover data we obtained are part of the 2001 National Land Cover Database[35] and were obtained from the USGS Multi-Resolution Land Characteristics Consortium (MLRC)[i]. The DEM, hydrography, and land cover data were all obtained as ArcGIS formatted files in the Albers projection and needed no further processing to be added to our spatial database.

Stream sampling point coordinates were used to construct an ArcGIS point file referenced to a geographic coordinate system (WGS 84), which was then projected into the same Albers coordinate system used by the other spatial datasets. Water quality point locations had to be snapped to areas of high flow accumulation (i.e. stream cells) to properly calculate upstream areas. ArcGIS has a tool, "*snap pour point",* designed to do this, but it worked too coarsely, snapping some points to the wrong stream while unable to snap other points to correct locations. We therefore developed an iterative snapping algorithm that gradually moves a point along routes of higher flow accumulation until a stream cell is met. With all sample points snapped to the nearest stream location, we used the ArcGIS *watershed* tool to identify all cells upstream of a given point. We then calculated the area of historical surface mining and of developed areas by tabulating the number of mined cells (from the mining delineation dataset) and the number of developed cells (from the "Developed" classes in the NLCD 2001 dataset) , respectively.

Statistical Analyses:

For the data analysis to address question 1, we estimated the total watershed area that had ever been mined (active and past surface mining) and used that estimate of cumulative mining extent as a predictor variable. We examined statistical relationships between solute concentrations along both mining and development gradients using quantile regression. We also split the full mining dataset into 5 equal categories of mining extent and examined changes in water quality and in macroinvertebrate taxa richness and in two benthic indicator scores developed for Central Appalachian streams by one way ANOVA and Tukey's HSD.

TITAN Analysis: To address question 2, we performed Threshold Indicator Taxa Analysis (TITAN[36]) to examine taxon specific and community level responses to both gradients within this dataset. First, TITAN estimates the value of the environmental variable that produces the greatest change in both the abundance and frequency of occurrence of each individual taxon with a minimum of 5 occurrences within a sample population. Since TITAN requires only 5 occurrences for analysis it is sensitive to rare species, a distinct advantage for detecting local biodiversity loss. The magnitude of the response is quantified as an indicator value z score[37]. The observed change point for a taxon is the value where the indicator score reaches its maximum. Individual taxa change points are bootstrapped to assess consistency in the direction (negative or positive) and

location of response (confidence intervals) to the gradient. Because indicator scores are standardized to z scores, taxa that do not respond to the gradient achieve very low or negative z scores thus provide minimal weight (or noise) to the assessment of community response.

Potential community-level thresholds are assessed by separating negative (z-) and positive (z-) taxa responses, summing the z+ and z- taxa separately, and tracking these aggregate responses for every potential change point value along the environmental gradient. Synchronous change points among multiple taxa within a narrow range of environmental values results in a distinct peak in the sum of the taxa z-scores (sum(z-) for negative responses, sum(z+) for positive responses). The magnitude of the sum(z) scores are also a direct measure of the magnitude of the effect of an environmental predictor. Collectively, a large, sharp peak in sum(z) values, obvious synchrony in numerous taxa change points, and evolutionary and life-history relationships among responsive taxa that are consistent with known sensitivities to anthropogenic gradients serve as empirical evidence for a community-level threshold[26]. While uncertainty may be relatively high about the location of low-frequency individual taxa thresholds, synchrony in the conductivity level point-of-decline of many species, including rare ones, bolsters confidence in the robustness of the community threshold.

TABLE 1: Comparison of water quality between land cover categories. Within this table, developed watersheds are watersheds without any evidence of surface mining. Not all environmental variables were collected or recorded for all samples in the dataset, leading to slightly different numbers of replicates within a category.

Category	Criteria	pH		Alkalinity		Conductivity	
		n	n ± SE	n	Mean ± SE	n	Mean ± SE
WV Reference Sites	•Identified in WDEP database as Reference site	11	7.0±0.2[a]	9	17.4±5.7[a]	11	68±13[a]
Reference	•> 95% Forested •<1% Developed •No surface mining mapped •No NPDES Permits	13	7.2±0.2[ab]	3	***32.6±28.2***	13	289±100[ab]
Surface Mining	•All watersheds with mapped surface mining in any year						
<3.5%		*46*	7.7 ±0.1[bc]	23	65.1±9.4[ab]	46	431±76[a]
3.5 to 11%		*46*	7.7 ±0.1[bc]	31	81.2±12.6[ab]	46	550±40[ab]
11 to 21%		*46*	7.9 ±0.1[c]	20	120.4±18.3[b]	46	750±69[bc]
21 to 38%		*45*	7.9 ±0.1[c]	17	118.3±22.2[b]	45	863±79[c]
>38%		*47*	7.7 ±0.1[bc]	22	126.5±15.8[b]	47	1370±123[d]
Developed	•>1% Developed						
1 to 5%	•Developed + Forested > 80%	14	7.1 ±0.2[a]	9	45.6±14.1[ab]	14	191±31[a]
>5%	•No surface mining mapped •No NPDES permits	15	7.6 ±0.2[abc]	3	***20.1±5.5***	15	350±53[ab]

*Values that share the same letters as subscripts are not statistically different based Upon Tukey-Kramer HSD posthoc comparisons.** indicates low sample size – statistics not included. ANOVA showed that categories were significantly different at p<0.0001 for all three metrics.*

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FIGURE 1 – Photos from the Hobet mine, a 40mi2 surface mine in southern WV. (A) An aerial view of a portion of the mine above Laurel Fork during active mining in 2006 (Vivian Stockman, OVEC); (B) a closeup view of the reclaimed mine surface above Laurel Fork in June 2010; (C) a filled tributary to Laurel Fork in 2010; a settling pond below the valley fill in C; (D) a closeup of the sediments of the valley fill drainage showing carbonate deposits. All photos except A by ESB.

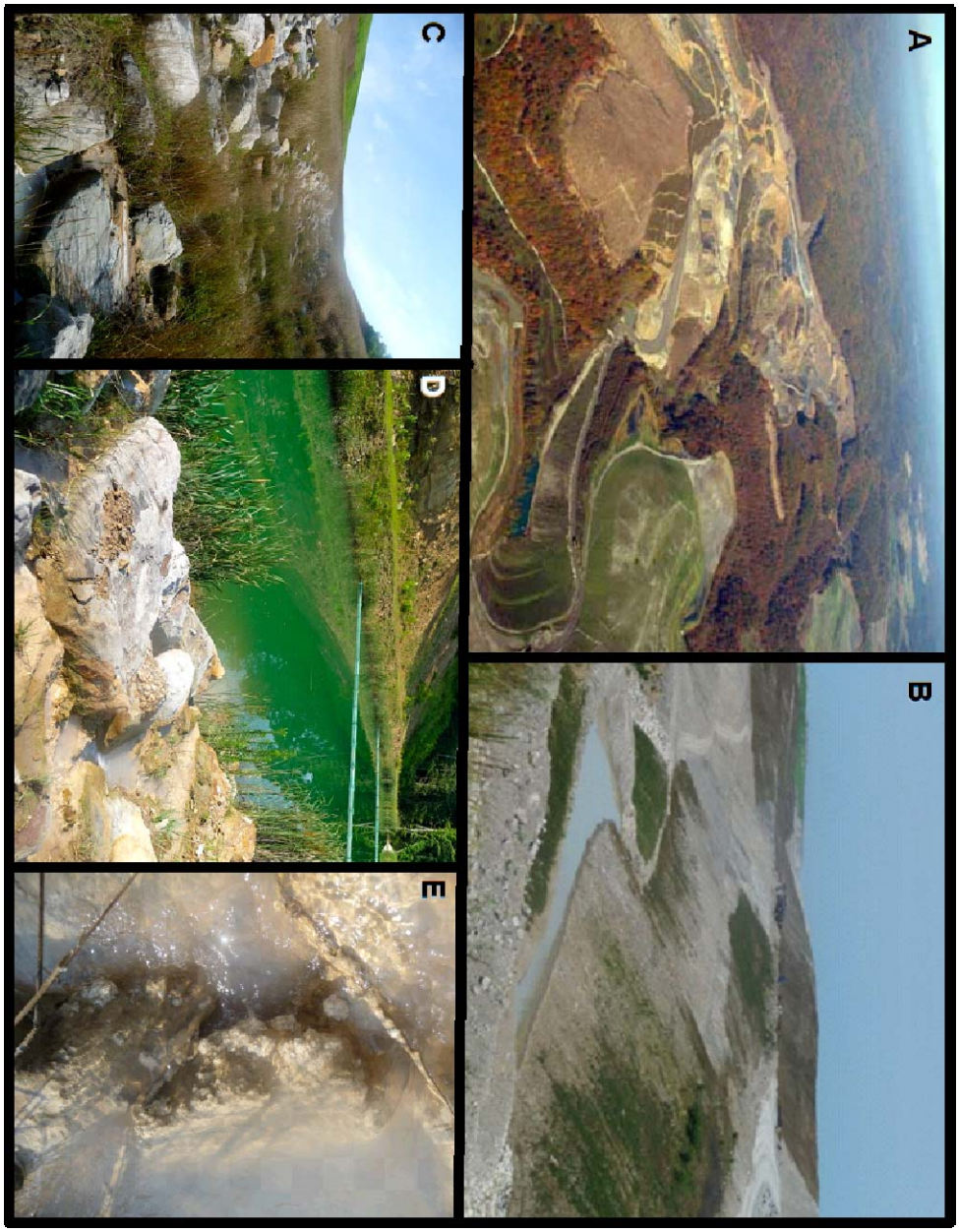


FIGURE 2: *(A) Surface mining activity delineated through analysis of remote sensing imagery collected in 1975, 1985, 1995 and 2005. Color progresses from older mining (1976 delineation) in light yellow to recent mining (2005 delineation) mining in burgundy. (B) shows the location of sampling sites used in our in depth analyses. (C) shows the spatial extent of mining reported by SkyTruth (red triangles) relative to that reported based on permit records (black triangles)*

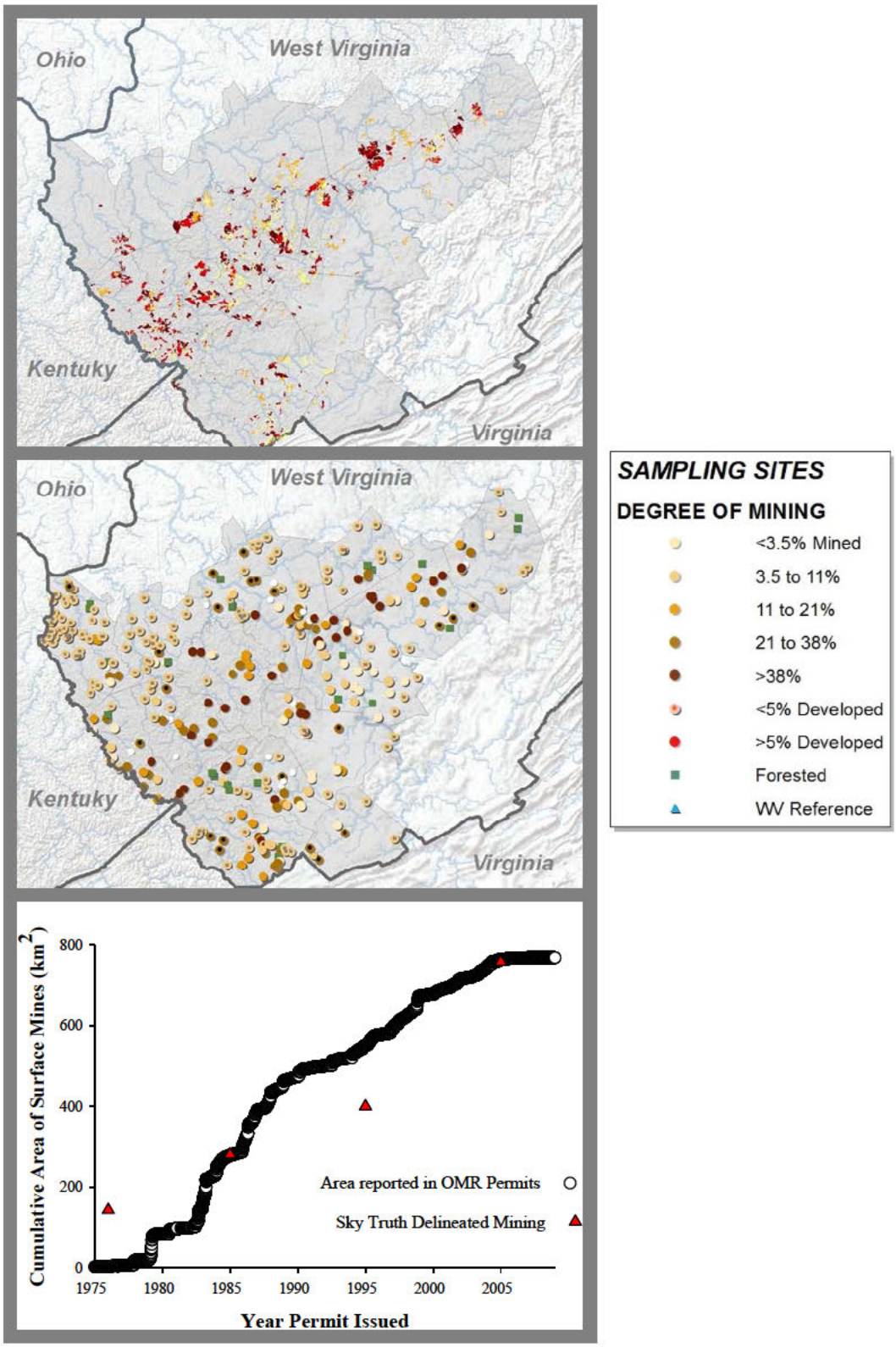


Figure 3. Quantile regressions for streamwater conductivity, nitrate and sulfate across the two dominant land cover gradients, surface mining (A&B) and development (C&D).

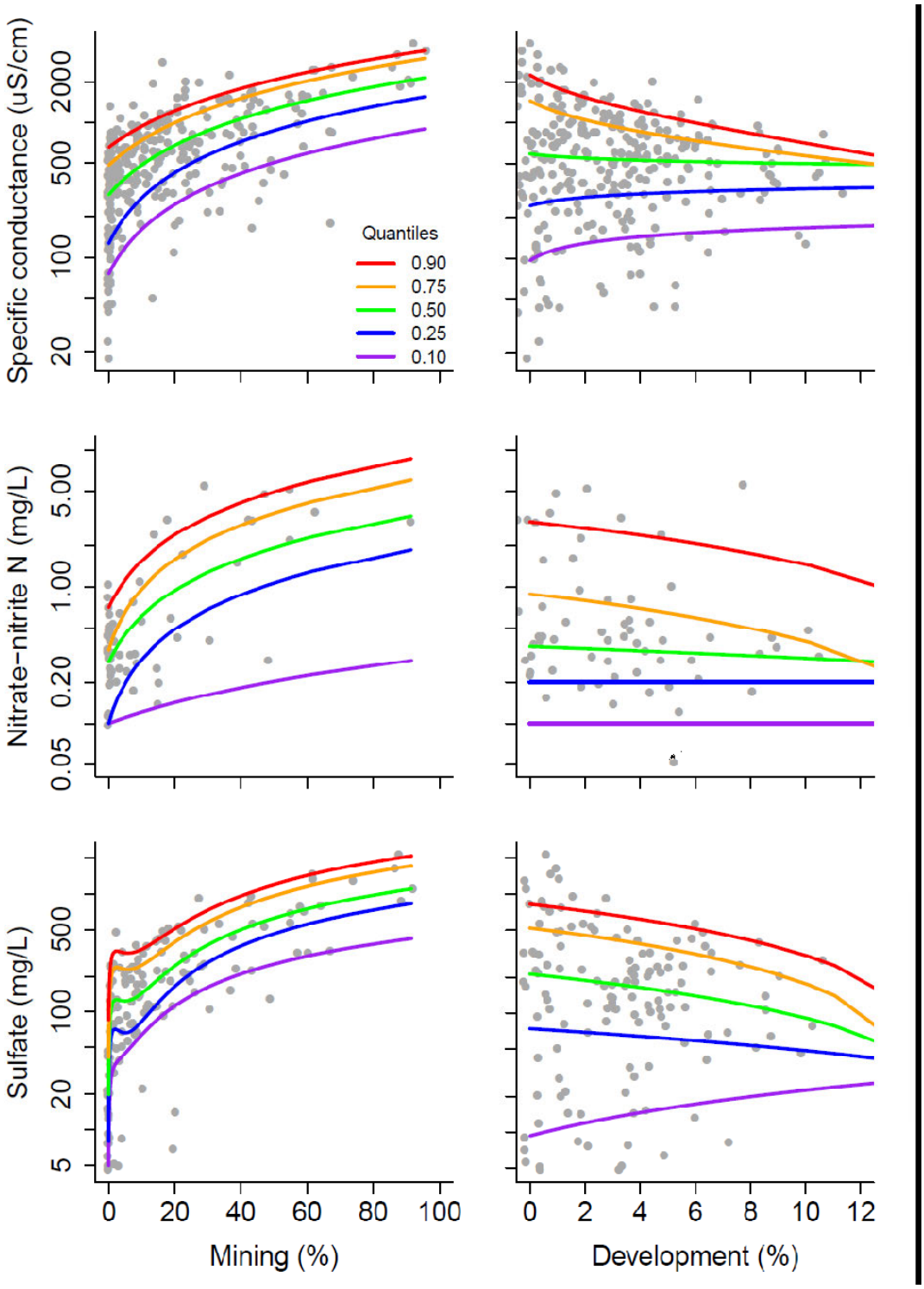


Figure 4. Effects of mining and development on macroinvertebrate community composition metrics. Here boxplots show the median as the black line within the box, the gray box extends between the 25th to 75th percentile distribution of datapoints, the whiskers delineate the 95% confidence interval and all outliers are shown as points outside of this distribution. The alphabetical superscripts indicate statistical differences between categorical variables, categories which share a letter are not significantly different from one another based on Tukey's HSD post hoc comparisons at p=0.05 adjusted for multiple comparisons. The ms superscript in panel A means marginally significant from control (p=0.054)

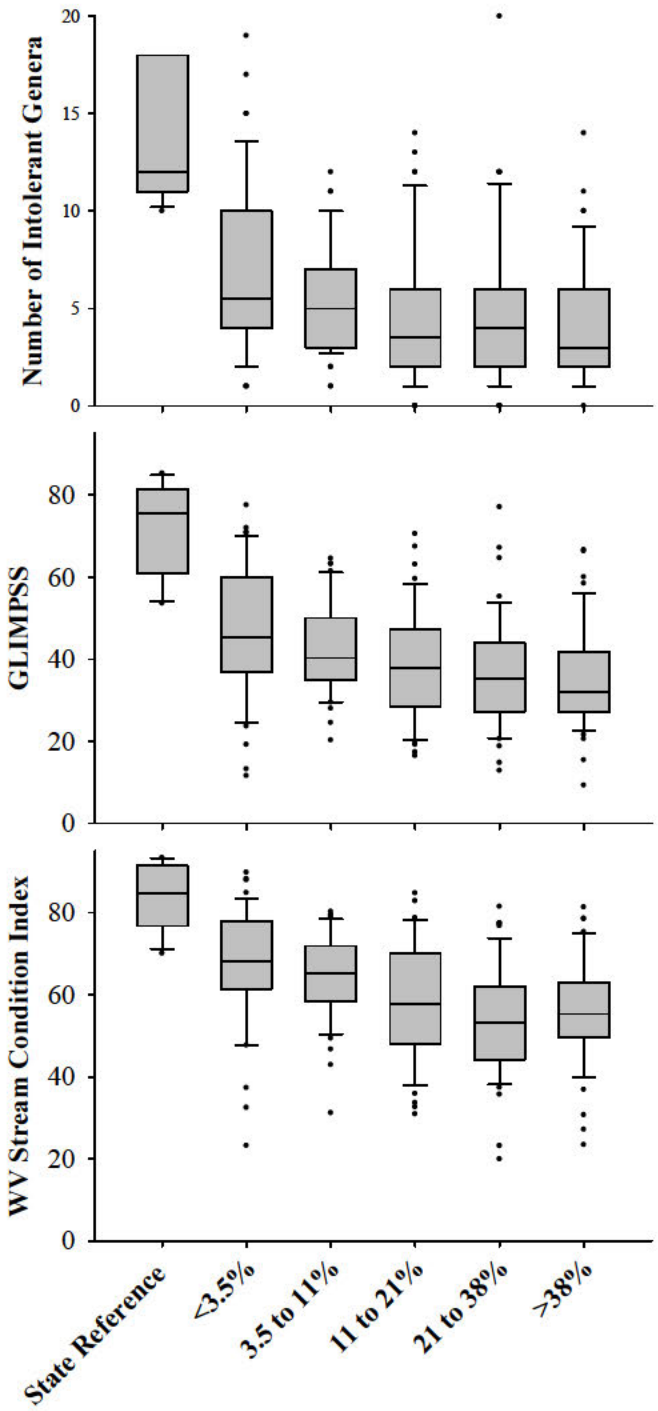


FIGURE 5.TITAN results for taxa having both high purity and reliability when run against either percent mining (A) or percent development (B) as the environmental gradient. Points are centered on the estimated change point for each taxa, horizontal lines indicate 95% CI based on 500 bootstrap replicates, and point size is proportional to the taxa z-score. Taxa which respond negatively across both the mining and develoment gradients are denoted with (*); Taxa which respond positively across both the mining and development gradients are denoted with (**); Taxa which respond negatively to the mining gradient and positively across the development gradient are denoted with (***); Taxa which respond positively to the development gradient but negatively to the mining gradient are denoted with (****).

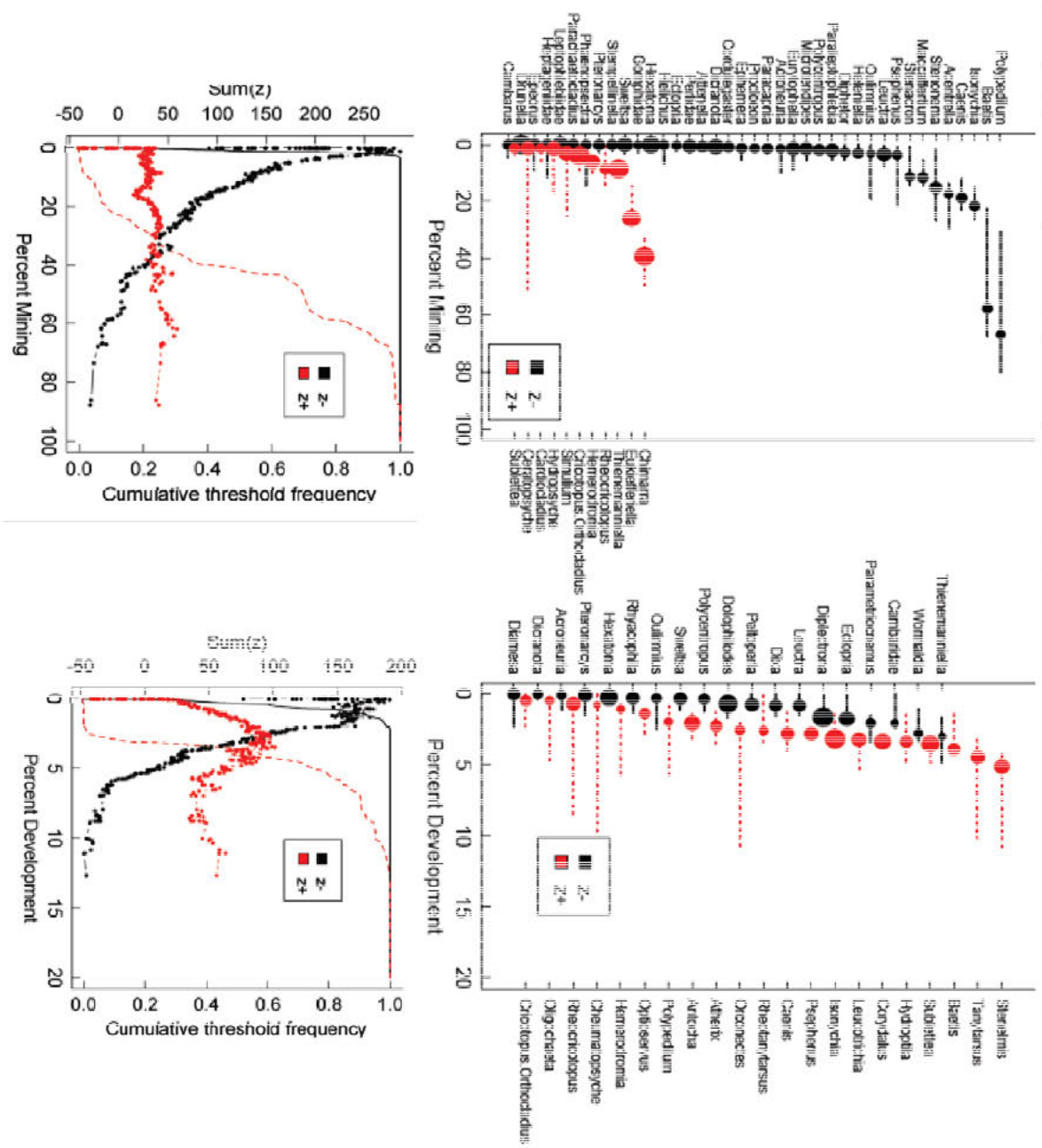
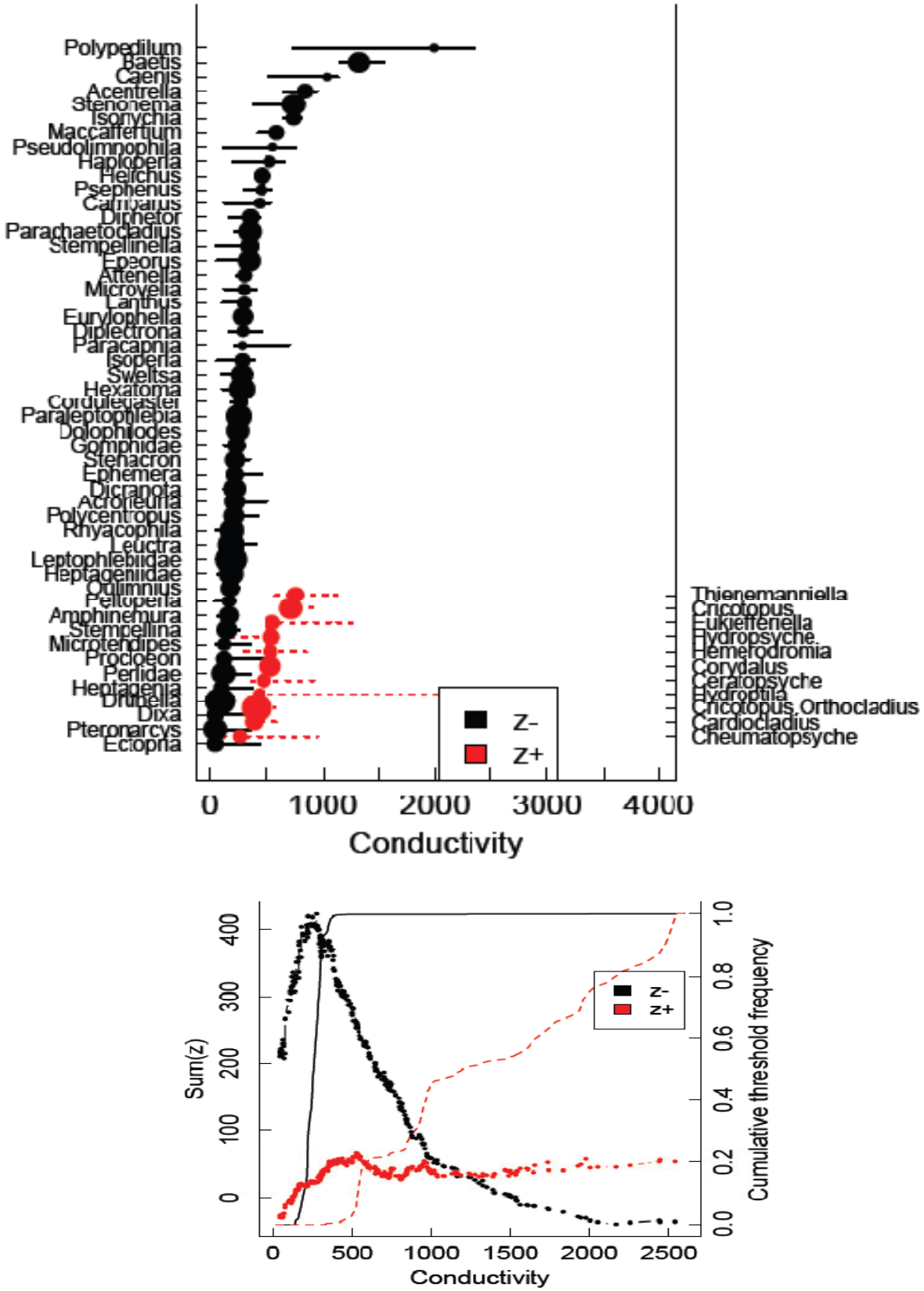


FIGURE 6.TITAN results for taxa having both high purity and reliability when run against conductivity Points are centered on the estimated change point for each taxa, horizontal lines indicate 95% CI based on 500 bootstrap replicates, and point size is proportional to the taxa z-score.



Supplemental Material to be online

(to accompany Bernhardt et al. "How many mountains can we mine…")

This Supplement Includes two figures (Figures 1 and 2) and one table (Table 2) that are directly referenced in the text as well as a detailed description of sensitivity analyses that we performed to test the robustness of our TITAN estimates. The section on sensitivity analyses is referred to in the present manuscript as "SI Section 2"

Figure Headings

Supplemental Figure 1: Abundance patterns for individual taxa determined to respond significantly and negatively to the extent of surface mining in their catchment.

Supplemental Figure 2: Abundance patterns for individual macroinvertebrate taxa that evidenced a positive response to the extent of surface mining in their catchments.

Figure 1 Part 1

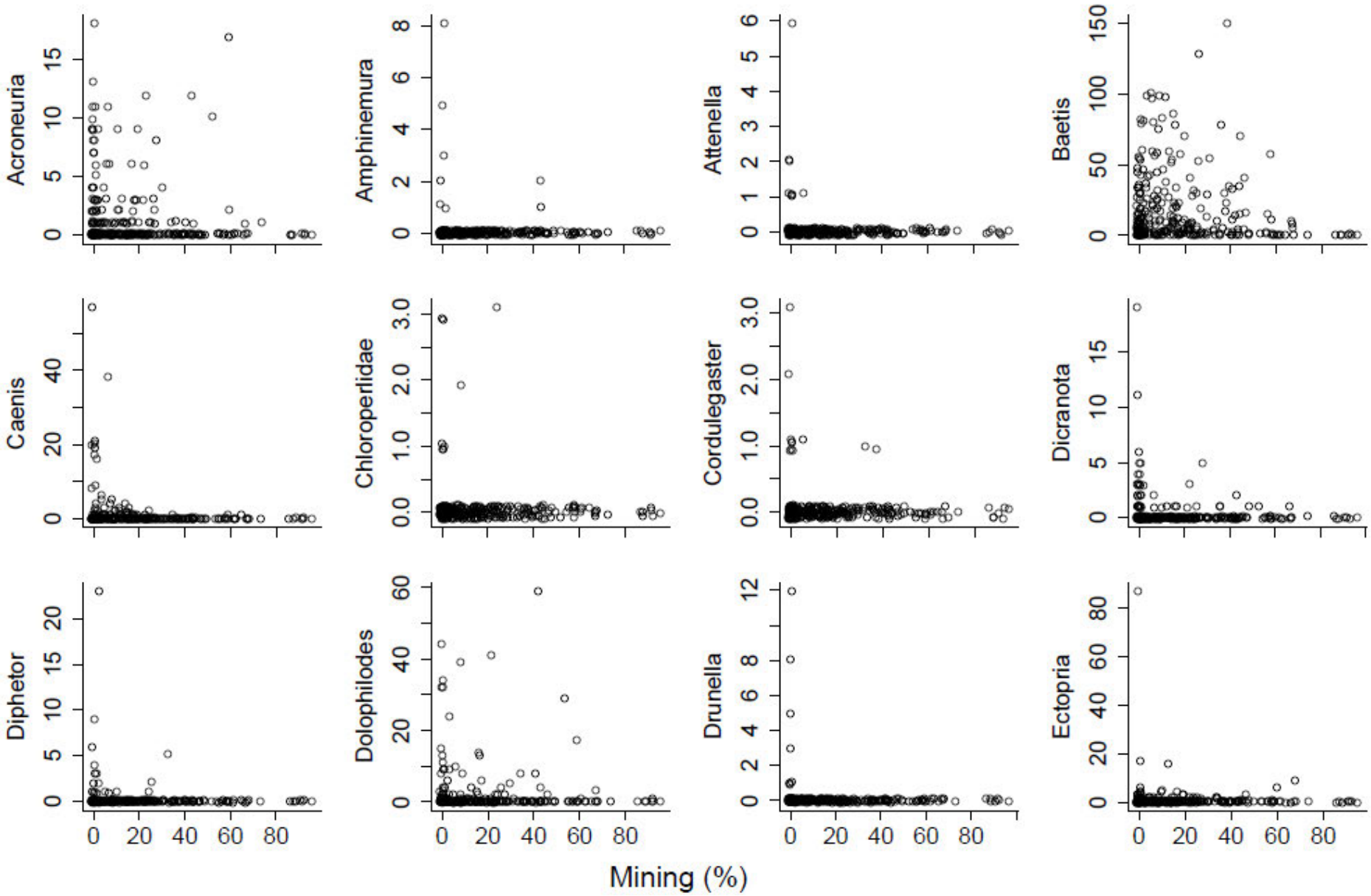


Figure 1 Part 2

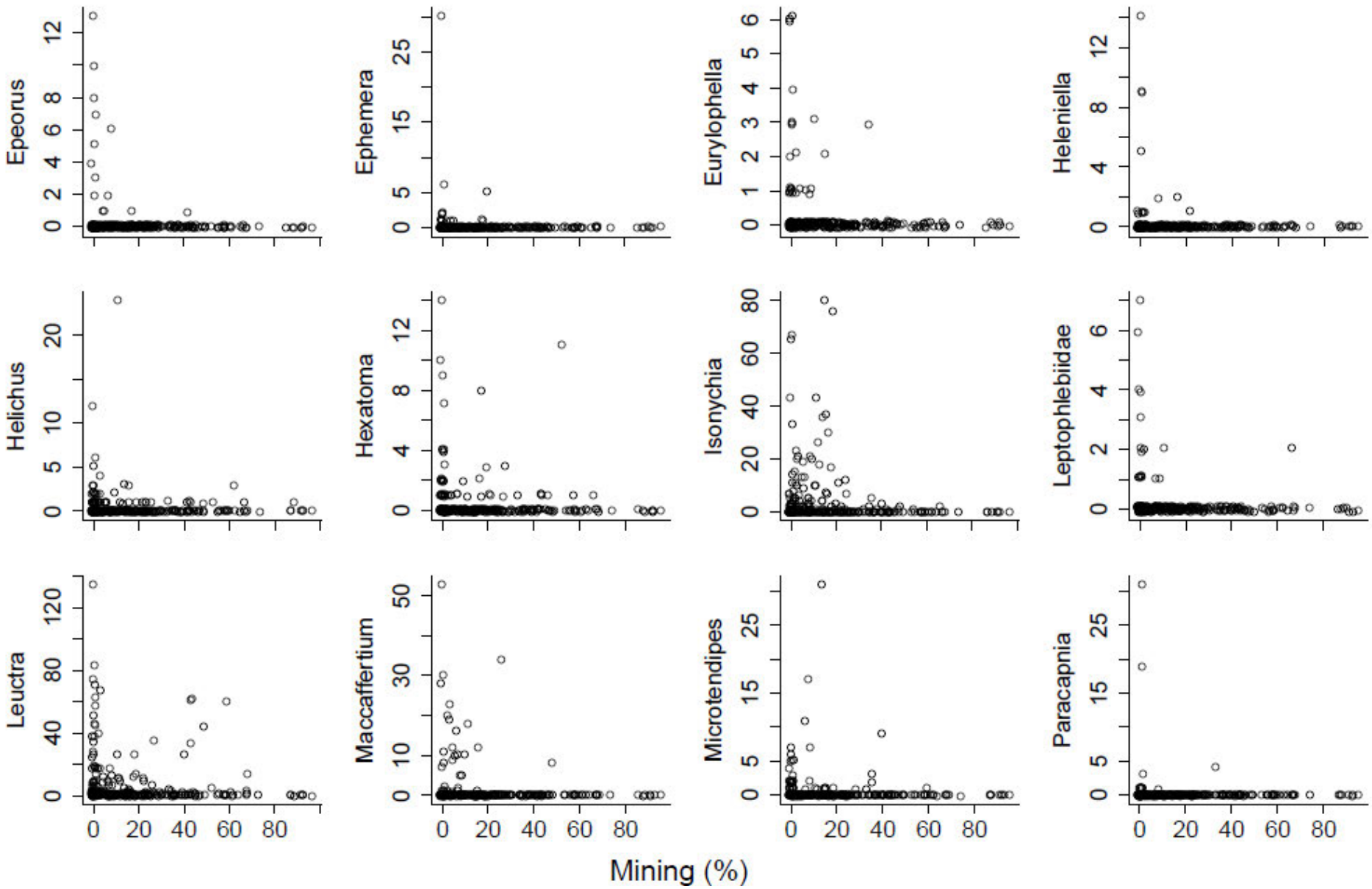


Figure 1 Part 3

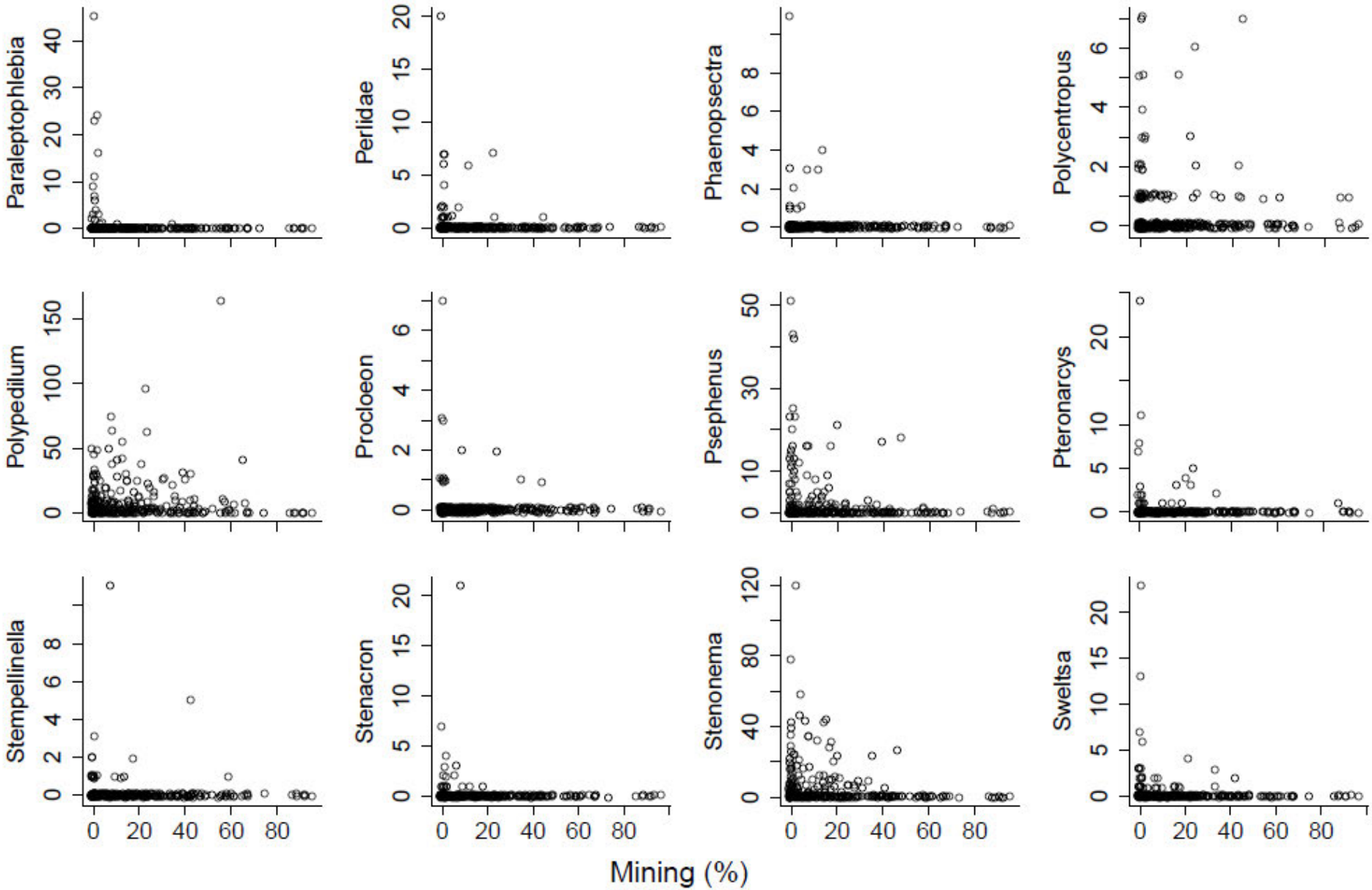
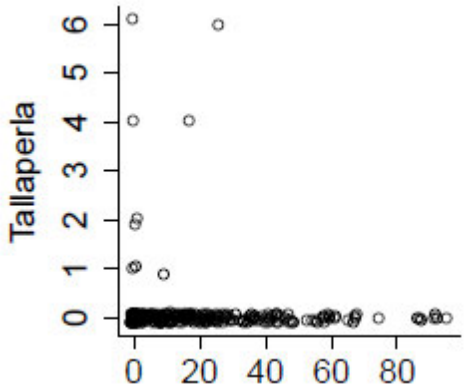


Figure 1 Part 4



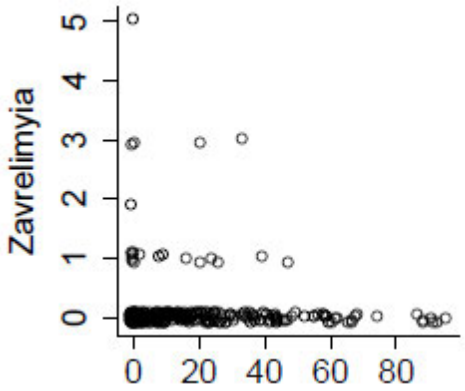
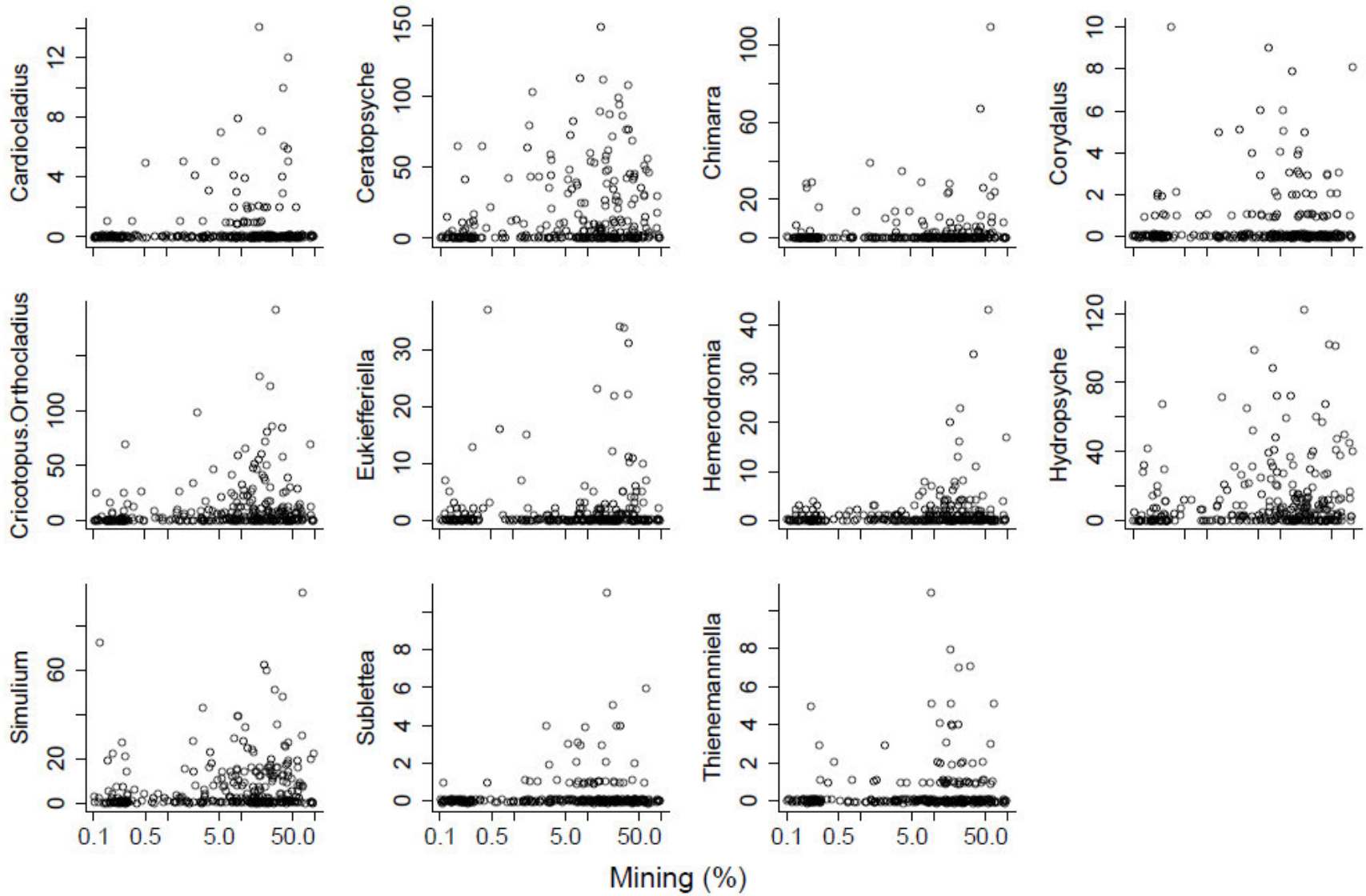
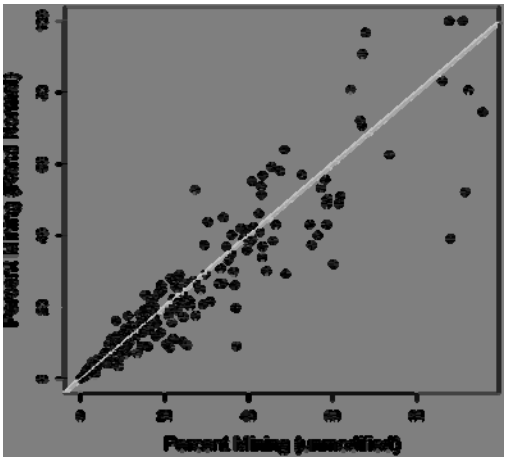


Figure 2


Cardiocladius
Ceratopsyche
Chimarra
Corydalus
Cricotopus.Orthocladius
Eukiefferiella
Hemerodromia
Hydropsyche
Simulium
Sublettea
Thienemanniella
0.1
0.5
5.0
50.0
Mining (%)

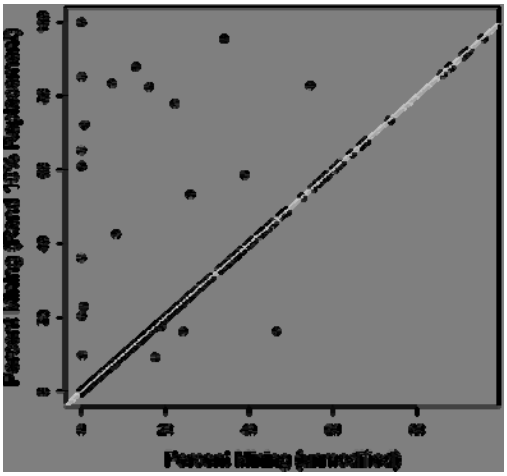
SI Section 2: Sensitivity Analyses with TITAN

Because we do not yet have estimates of the precision of our areal estimates of surface mining activity, we performed a series of sensitivity analyses with TITAN to determine whether our estimates of a mining threshold were robust to several types of possible error in surface mining estimates. We introduced error to the dataset using 3 different approaches.



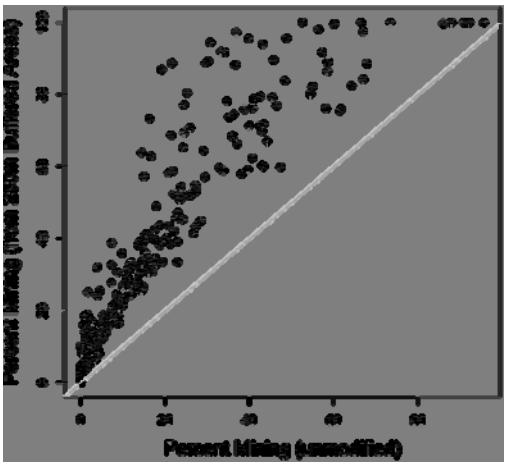
Method I: Random inflation/deflation of %mining (Figure 3)

We created a vector of values from random normal distribution (μ = 10, sd = 3) equal in length to %mining gradient and then divided vector by 10 (to give values from -1 to 1, centered around 0). We multiplied this vector value by %mining and summed with %mining. This introduces random scatter into the %mining estimates, with the scatter increasing proportional to the absolute %mining value.



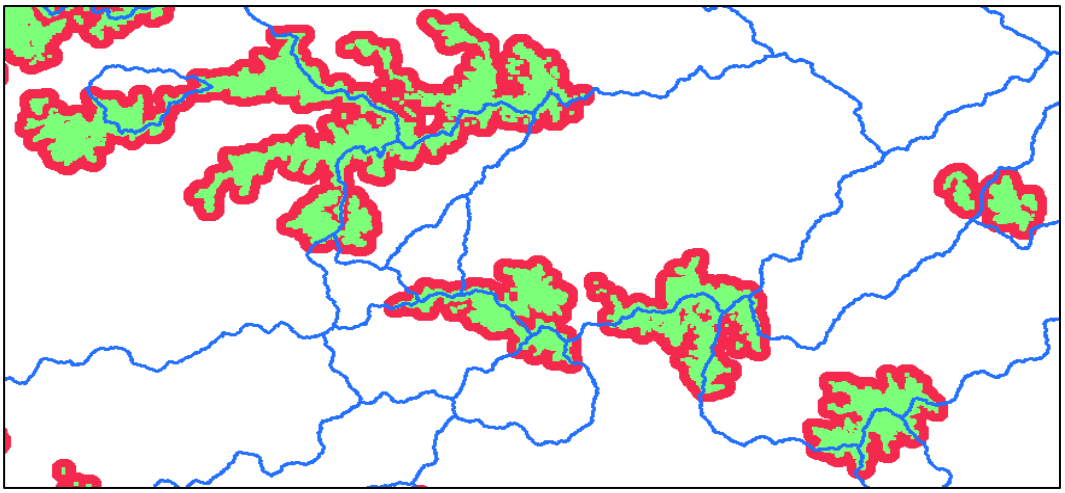
Method II: Replacement of 10% of data w/ random values (Figure 4)

We randomly selected 10% of the total observations and assigned them a random %mining value between 0-100%



Method III: 250m Buffer around all mined areas (Figure 5)

We assume that the largest uncertainty in the satellite imagery processing is the accuracty in determining the the perimeter of mined areas. Based on the geometry and total area of each watershed, as well as the geometry of the mined area within or near the watershed, uncertainty at the edge of mined areas can impact each watershed differently. We added 250m buffers (~8pixels) to the edge of every mined area (Figure 6), recalculated %mining within each watershed, and re-ran TITAN with these values.



Supplemental Figure 6. Example of buffered mine delineations. Green = SkyTruth Mining extent; Red = Buffered extension of mining delineation; Blue lines = watershed boundaries.

We found that TITAN results are robust when we introduce a moderate amount of random variation in the %mining values (Method 1, Supplemental Table 1, Supplemental Figure 7). The estimated change point value and CI are very similar to non-modified result (Supplemental Table 1).

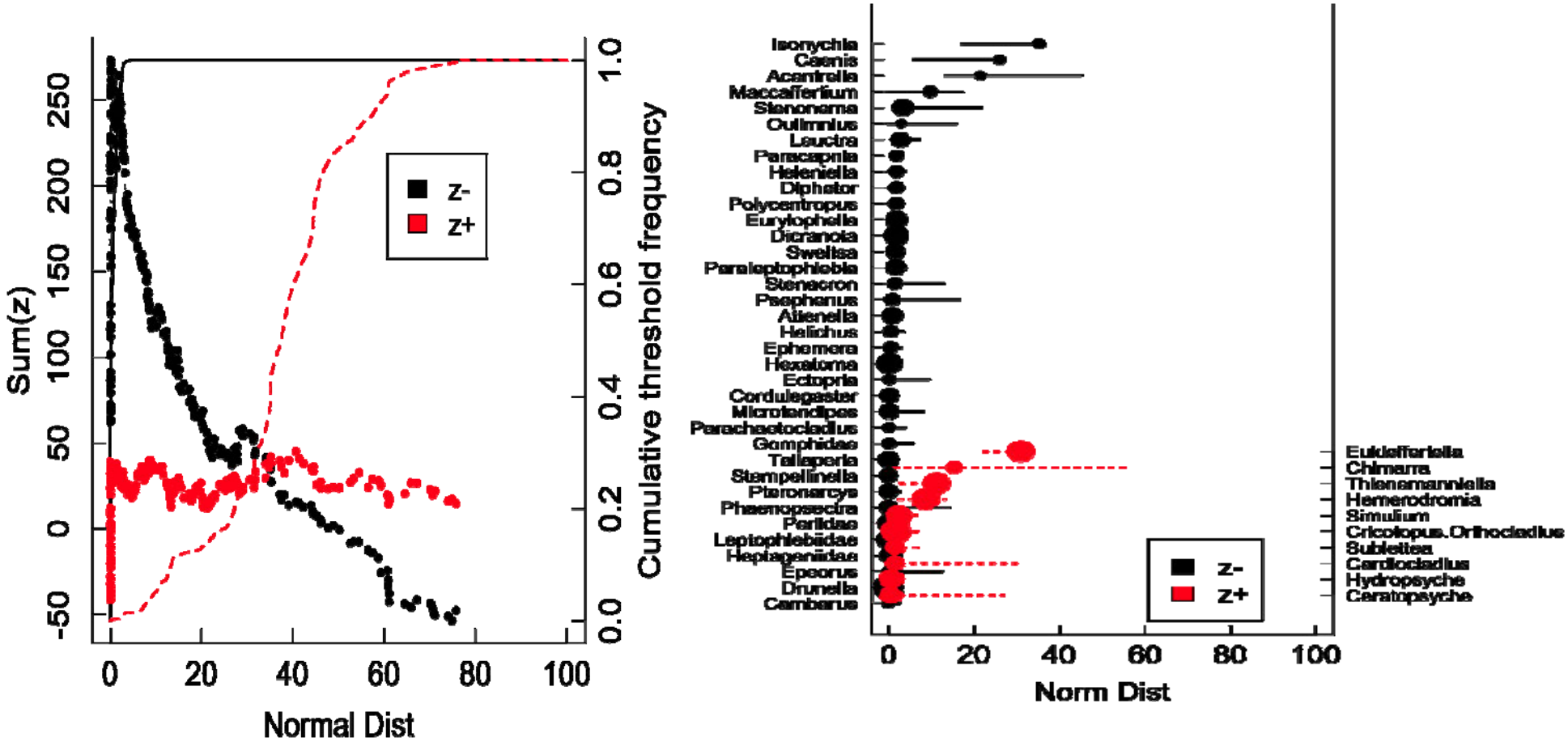
Supplemental Table 1. Change point values (+/- 95% boostrap CI) for each TITAN run.

		Change Point	Lower 95% CI	Upper 95% CI
No Modifications				
	sumz-	1.28	0.00	2.43
	sumz+	63.08	15.36	67.47
Random Change 10% Sites				
	sumz-	0.04	0.00	2.06
	sumz+	65.45	27.01	91.27
Normal Distribution Modifier				
	sumz-	0.06	0.00	2.36
	sumz+	41.04	10.09	61.02
Buffered Areas by 250m				
	sumz-	4.66	0.34	11.85
	sumz+	100.00	59.69	100.00

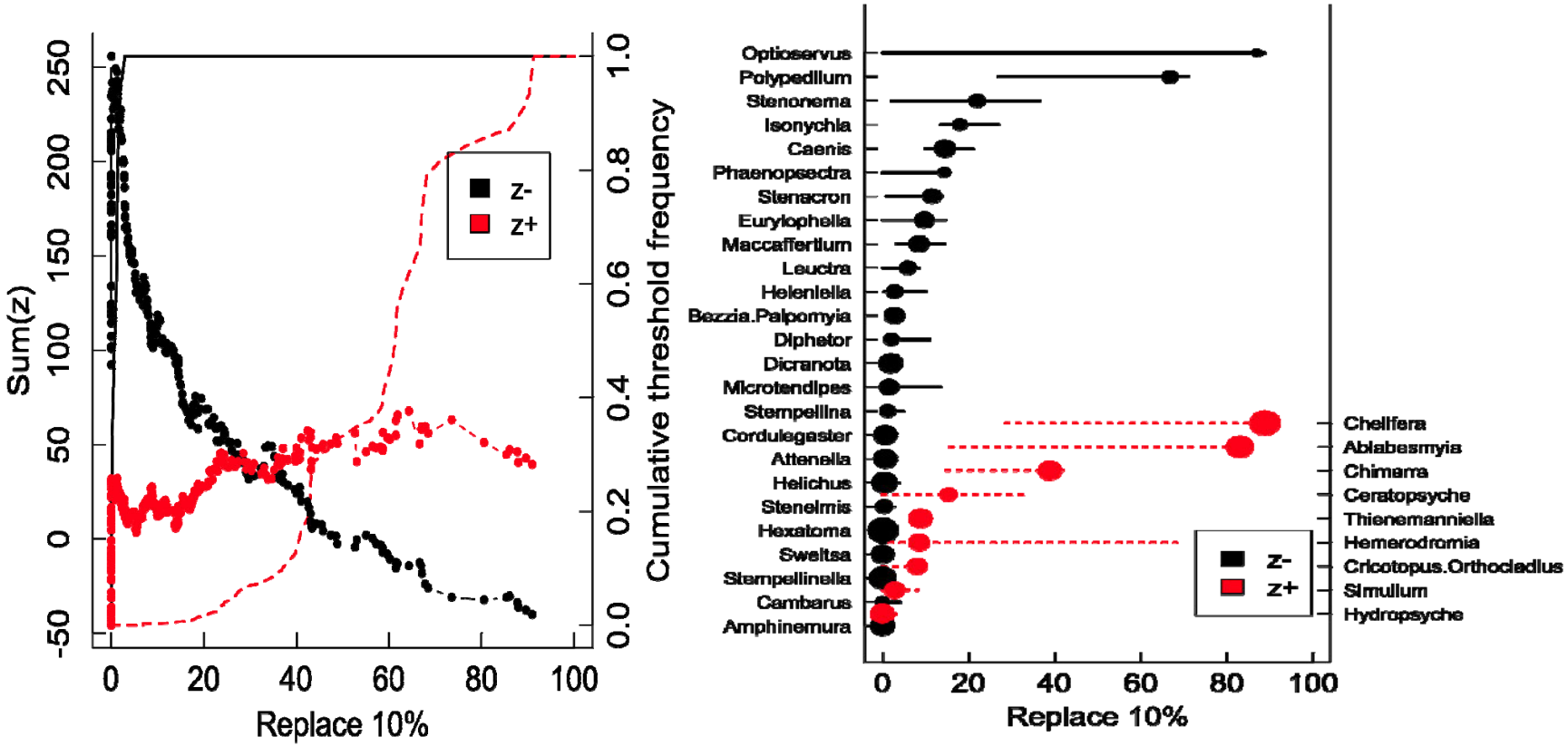
Similarly, when we replaced 10% of the observations with a random % mining value (Method 2), the overall community response value remains unchanged (Supplemental Table 1) but the number of taxa responding negatively decreases. (Supplemental Figure 8). This is likely because the random reassignment led to assigning rare taxa found only at a small number of unmined sites to some mined sites. This reassignment can introduce enough uncertainty in the patterns of abundance for rare taxa that a change point for that taxa cannot be determined

When we introduced systematic error by increasing the size of mined areas by 250m along all edges (Method 3) we were able to increase the change point estimate and confidence interval values (Supplemental Table 1, Supplemental Figure 9). We expected the values would increase (because we added mining area without changing patterns of taxa abundance). We found this error slightly inflated the estimated change point (from 1.3 to 4.7% mining) and increased the 95% confidence interval around this estimate. While such error causes the change point to be broader, there is still a clearly defined negative response (Supplemental Figure 9).

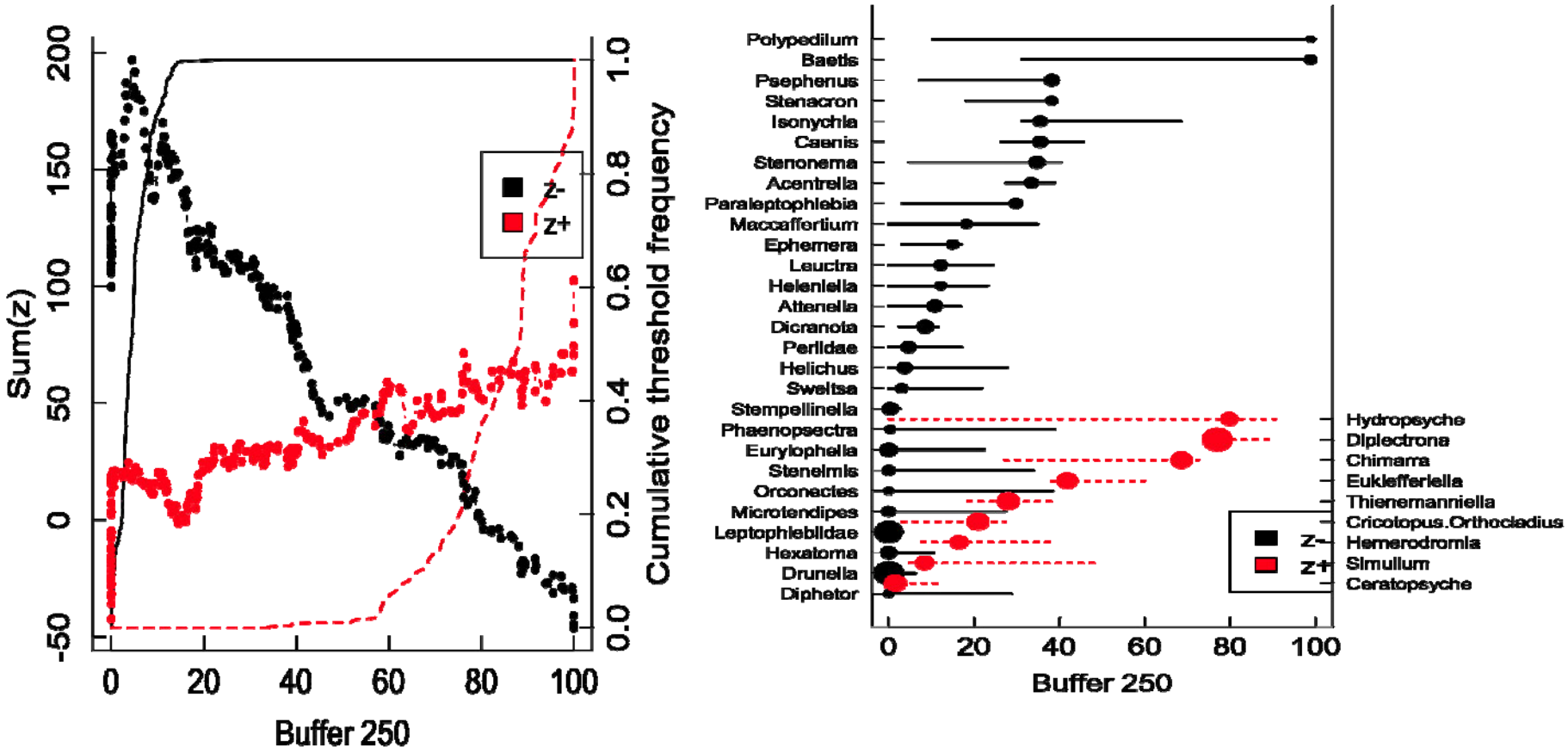
Supplemental Figure 7



Supplemental Figure 8



Supplemental Figure 9



Supplemental Table 2. Satellite image data used for this study (*p* and *r* refer to path/row location)

Landsat 5 (TM)							
p19r35	p19r34	p19r33		p18r34	p18r33		p17r33
7/3/2006	7/3/2006	7/3/2006		9/11/2005	9/11/2005		5/31/2005
9/7/1995	9/7/1995	9/7/1995		8/31/1995	8/31/1995		10/11/1995
9/8/1984	9/8/1984	9/8/1984		9/17/1984	9/17/1984		7/8/1984
Landsats 1-2 (MSS)							
p21r35		p20r35	p20r34	p20r33		p19r34	p19r33
8/20/1976		8/19/1976	8/19/1976	9/6/1976		6/7/1976	5/20/1976

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

NOV - 2 2010

Colonel Keith A. Landry
District Engineer
Louisville District Corps of Engineers
Attn: Todd Hagman (Regulatory Branch)
OP-FN, Room 752
P.O. Box 59
Louisville, Kentucky 40201-0059

Subject: Premier Elkhorn Coal Company, Little Fork Surface Mine
U.S. Army Corps of Engineers LRL-2007-0594
Kentucky Division of Mine Permits #898-0800

Dear Colonel Landry:

The U.S. Environmental Protection Agency (EPA), Region 4, has reviewed the information submitted by or on behalf of the Premier Elkhorn Coal Company for impacts to jurisdictional waters of the U.S. as a result of proposed surface coal mining activities associated with its Little Fork Surface Mine in Pike County, Kentucky (LRL-2007-0594; #898-0800). Our review has included the original April 24, 2007, U.S. Army Corps of Engineers (Corps) Clean Water Act (CWA) Section 404 permit application as well as several additional documents provided by or on behalf of the permit applicant. EPA is concerned that the permit, as proposed, is not consistent with requirements of the agencies' regulations, including the Section 404(b)(1) Guidelines, and therefore recommends that changes to the project identified in this letter be incorporated before authorization is provided. EPA is also recommending that an Environmental Impact Statement should be prepared for this permit to assess potential environmental impacts under the National Environmental Policy Act.

The applicant originally sought authorization to impact 6,845 linear feet (lf) of ephemeral and intermittent streams to facilitate construction of six hollow fills and four in-stream sediment ponds in unnamed jurisdictional tributaries to Little Fork, Robinson Creek, and Indian Creek. Little Fork discharges into Robinson Creek, and both Robinson Creek and Indian Creek discharge directly into Shelby Creek in the Levisa Fork watershed. Subsequently, the applicant revised the mine plan and presently proposes five hollow fills and three in-stream sediment control ponds. Anticipated impacts to jurisdictional waters now comprise 5,560 lf of ephemeral and intermittent streams, including 4,415 lf as a result of the hollow fills and 1,145 lf as a result of sediment control ponds and a "drainage corridor" between the toe of HF#3 and Pond#3.

EPA has been coordinating closely with your staff and the permit applicant since the 60-day ECP review period began on August 19, 2010, (including a 15-day extension of the review period). On September 30, 2010, EPA submitted a comment letter to the Corps providing additional detail on our informal comments of August 20, 2010, and requesting a meeting with

the Corps and the applicant to initiate efforts to resolve these concerns. EPA and the Corps subsequently held a conference call on October 6, 2010, to discuss EPA's letter and outline a path towards resolution of the concerns described therein. On October 14, 2010, EPA, the Corps, and the applicant held the first of numerous conference calls to discuss additional information requirements and opportunities to resolve ongoing concerns with the proposed project.

EPA is appreciative of the applicant's efforts during this process, which have included compilation and submittal of additional information substantiating the position that use of the adjacent reclaimed impoundment to store spoil material is not a practicable alternative for the proposed Little Fork Surface Mine. The applicant has also agreed to implement best management practices (BMP's) to minimize erosion and sedimentation from disturbed areas, retain existing vegetation to the maximum extent practicable, and take efforts to first identify and then isolate the most highly reactive spoil material likely to generate excessive total dissolved solids (TDS) and contribute to elevated specific conductivity (SC). Additionally, the applicant has agreed to amend its mitigation plan to add payment of an in-lieu-fee (ILF) to the Kentucky Department of Fish and Wildlife Resources Wetland and Stream Mitigation Program for authorized impacts to jurisdictional streams adversely affected due to construction of in-stream sediment ponds. Previously, the applicant had proposed an ILF payment for proposed permanent impacts, but planned to mitigate for sediment pond impacts simply via removal of the ponds and restoration of affected streams many years following the impacts themselves.

Despite the changes described above, EPA has significant remaining environmental concerns regarding this project as currently proposed. EPA's review is intended to ensure that the proposed project meets the requirements of the CWA. The CWA Section 404(b)(l) Guidelines promulgated in regulations by EPA in conjunction with the Secretary of the Army establish the substantive environmental standards applied in the review of projects proposing to discharge dredged or fill material into waters of the United States. The Guidelines establish a sequence of review requiring: (1) an evaluation of practicable alternatives that meet the project's basic purpose to ensure selection of the least environmentally damaging practicable alternative so long as that alternative will not result in significant environmental degradation); (2) taking all appropriate and practicable steps to minimize potential adverse impacts; and (3) compensation for all remaining unavoidable impacts to waters of the United States. In addition, the Guidelines require that no discharge may be permitted that would cause or contribute to significant degradation of the waters of the United States.

Scientific literature has increasingly recognized the relationship between discharges from surface coal mining operations and downstream water quality impairments. A 2005 published study, "Evaluation of Ionic Contribution to the Toxicity of a Coal-Mine Effluent Using *Ceriodaphnia dubia*" by Kennedy, et al. linked impairment of aquatic life to TDS levels. EPA also notes that in previous technical reports, the Commonwealth of Kentucky has recognized the potential detriment to stream biota in headwater streams in the Eastern Kentucky Coal Field correlated with specific conductivity levels above 400 µS/cm (Pond and McMurray, 2002[1]). A

[1] Pond, G.J. and S.E. McMurray. 2002. A Macroinvertebrate Bioassessment Index for Headwater Streams of the Eastern Kentucky Coalfield Region, Kentucky. Kentucky Department for Environmental Protection, Division of Water. Frankfort, KY.

2008 published study, "Downstream effects of mountaintop coal mining: comparing biological conditions using family- and genus-level macroinvertebrate bioassessment tools," by Pond, et al. found evidence indicating that mining activities have subtle to severe impacts on aquatic life and the biological conditions of a stream. A 2010 published study by Pond, "Patterns of *Ephemeroptera* taxa loss in Appalachian headwater streams (Kentucky, USA)," links conductivity as the most strongly correlated factor to *Ephemeroptera* abundance in streams impacted by mining and residential development. A draft report by EPA, "The Effects of Mountaintop Mines and Valley Fills on Aquatic Ecosystems of the Central Appalachian Coalfields," recognizes that surface coal mining causes effects that include resource loss, water quality impairment, and adverse effects on aquatic resources. Finally, another draft report by EPA, "A Field-based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams" recognizes stream-life impacts associated with elevated levels of conductivity.

As part of its permit application, the applicant collected water quality data from project streams in March 2007 and reported specific conductivity values ranging from 469 to 1,777 µS/cm. EPA collected similar data in February 2010 and found specific conductivity in these same streams to range from 57 to 988 µS/cm. In addition, EPA documented specific conductivity in receiving waters downstream of the surface mine site itself ranging from 497 to1,008 µS/cm (e.g. Little Fork, Robinson Creek, and Indian Creek). EPA further notes that Indian Creek, which is the receiving water body for 6 of the applicant's 37 proposed National Pollutant Discharge Elimination System (NPDES) outfalls, is on the KY 2006, 2008, and draft 2010 CWA 303(d) list (partially supporting warm water aquatic habitat) for sedimentation/siltation and TDS.

EPA believes that additional improvements must be made to the proposed mine's design, management practices, and monitoring plan in order to ensure compliance with the 404(b)(1) Guidelines. These improvements are designed to yield an overall improvement in the condition of the watershed, which has been significantly impacted by historic mining activities. EPA believes that the following conditions should be incorporated into any final authorization under Section 404 in order to ensure that the discharges will not cause or contribute to a violation of State water quality standards (WQS), or cause or contribute to significant degradation of waters of the United States consistent with the Guidelines (40 C.F.R. § 230.10(b) and (c)).

Fill Sequencing and Best Management Practices

EPA recommends that the proposed hollow fills be constructed sequentially (one at a time) with sufficient time between the construction of subsequent fills for water quality monitoring to demonstrate that the discharge of fill material does not result in adverse impacts to the downstream aquatic ecosystem. While the applicant has provided some information to suggest that construction of fills in a sequenced approach would not be feasible, the information provided to EPA has not demonstrated that this approach is not practicable. More importantly, we are concerned that without sequencing and associated monitoring, the project may result in the violation of water quality standards and cause significant degradation of stream functions and biodiversity. The applicant should be required to submit a practicability analysis of alternatives involving a sequenced approach for valley fill construction – including individual fill construction and construction of valley fills in two or three phases – before the proposed project is authorized.

EPA believes that if water quality or biological monitoring downstream of one "sequenced" valley fill demonstrates adverse impacts to the downstream aquatic ecosystem – as determined by exceedances of specific numeric thresholds – the permit should trigger implementation of an adaptive water quality management plan (AMP) prior to construction of the next hollow fill, as described in the enclosed special permit condition (see Enclosure 1). Construction of the next hollow fill would not be authorized if the monthly flow-weighted specific conductivity measured at the representative outfall downstream of the first hollow fill exceeds the applicable water quality criteria for more than one consecutive month, or if the overall trend in conductivity levels are increasing such that the linear trend demonstrates likely future exceedance of such criteria.[2] To support this demonstration, supplemental monitoring requirements, including both chemical and biological monitoring parameters, should also be included as special conditions.

EPA believes that several demonstrated BMPs and fill construction practices for surface coal mining operations have the potential to reduce existing downstream levels of conductivity and TDS. These practices include efforts to identify and then isolate TDS- or sulfate-producing materials to minimize the likelihood that these materials will come into contact with groundwater or precipitation and therefore impact downstream waters. The proper implementation of similar BMPs has been shown to reduce specific conductance in streams draining a Magoffin County, Kentucky surface coal mine by as much as 75 percent over elevated background conditions in re-mined valleys.

EPA is appreciative of the applicant's recent endorsement of measures to identify and isolate TDS and/or sulfate producing materials in the field, as memorialized in their November 1, 2010, list of revised BMP's. EPA recommends that these measures be included as special conditions into any final authorization under Section 404 for disposal of dredged or fill material into waters of the U.S. for the Little Fork Surface Mine. These special conditions should include, at a minimum, the following:

- Identification via field-based testing of TDS and/or sulfate-producing materials that must then be isolated;
- Implementation of hollow fill design alternatives that reduce infiltration (e.g. compact surface lifts, crown the fill surface) and controls flow through the fill to avoid contact time between water and reactive materials (i.e. TDS and/or sulfate producing geologic strata); and
- Use of only low-reactive or non-reactive durable rock to construct underdrains and place only these same materials adjacent to the sides of the highwalls and hollow fills.

EPA notes that the BMPs described above relate directly to fill activities in waters of the United States that are likely to have impacts on downstream water quality. The Section 404

[2] With respect to conductivity, EPA would be satisfied with using 500 µS/cm as an numeric interpretation of the narrative standards relevant here. This value represents best-available scientific information on the relationship between conductivity levels and aquatic life in central Appalachian streams, as described in the scientific literature described earlier in this letter.

regulations establish a requirement at 40 C.F.R. 230(10)(b) that no permit may be issued that would cause or contribute to a violation of WQS. This requirement must be met regardless of whether actions necessary to meet this provision would trigger changes to permits issued under other Federal or State regulatory programs.

Adaptive Management Plan (AMP)

EPA believes that special conditions should include an AMP – described above – based on robust water quality and biological monitoring to identify trends in these parameters and to define specific thresholds of concern. If such thresholds are reached, the AMP would require specific response actions. EPA also believes the AMP should include a phased approach, such that increased impacts to downstream waters would trigger increased remedial actions until such time as water quality goals are met.

Existing scientific literature has demonstrated a strong relationship between elevated levels of specific conductance, surface coal mining activities, and degradation of aquatic communities. Therefore, EPA believes that levels of SC should be included as trigger points within the AMP. Recognizing that conductivity levels in on-site streams are already elevated, and anticipating that specific conductance in affected streams will experience at least a short-term increase during land clearing, initial excavation, and hollow fill construction, the trigger for development of the AMP will be applicable only after the initial six (6) months following the discharge of dredged or fill material into waters of the U.S. (I.4(v)). This initial 6-month period would require notification to both the Corps and EPA if monitoring indicates that the trend in monthly flow-weighted conductivity, defined in Special Condition I.4(iii), will exceed background levels or an acceptable numeric interpretation of the applicable narrative water quality standards[3], whichever is greater. Background conditions should be defined as the lesser of values measured in the field in March 2007 and February 2010 (Table 1).

If, however, during any 3 consecutive months during the subsequent 12 months of monitoring, the trend defined at proposed Special Condition I.4(iii) indicates that the monthly flow-weighted conductivity values will not likely fall below levels incompatible with meeting applicable water quality standards, or if any 3 consecutive monthly flow-weighted conductivity values exceed such levels,[4] then the permittee will conduct an analysis of the sources of effluent conductivity and develop Phase I of the AMP to reduce effluent conductivity (measured as specific conductivity) and TDS (see Enclosures 1 and 2). This AMP, to be developed by the applicant and approved by the Corps, should be based on the most technologically advanced and effective approaches available, and assumes that efforts to identify and isolate TDS- and sulfate-producing geologic strata are implemented as part of mine design and hollow fill construction, as outlined above.

If water quality goals are not met after an additional six months of implementation of the AMP, then Phase II of the AMP will be initiated. This plan will also be developed by the applicant and approved by the Corps. If Phase II of the AMP also fails to result in water quality conditions consistent with the goals outlined herein, it is EPA's recommendation that the applicant be

[3] See, supra, footnote 2.
[4] See, supra, footnote 2.

required by the permit special conditions to provide additional compensatory mitigation, either on-site or within the 12-digit hydrologic unit code (HUC) sub-watershed, aimed at addressing adverse chemical water quality conditions.

Table 1. Background specific conductivity in project streams.

Station I.D.	Station Location	Date	Investigator	Specific Conductivity (uS/cm)	BACKGROUND CONDITIONS [1]
UT Little Fork	HF#1	March 2007	Applicant	638	638
ROB02	UT HF#1	Feb 2010	EPA R4	769	
UT Little Robinson Crk	HF#3	March 2007	Applicant	1777	988
ROB07	UT HF#3	Feb 2010	EPA R4	988	
UT Little Robinson Crk	HF#4	March 2007	Applicant	785	785 [2]
ROB09	UT HF#4	Feb 2010	EPA R4	57 [2]	
UT Indian Crk	Pond#21 (HF#5/6)	March 2007	Applicant	469	191 [3]
UT Indian Crk	HF#5	March 2007	Applicant	681	
UT Indian Crk	HF#6	March 2007	Applicant	681	
ROB12	UT HF#5/6	Feb 2010	EPA R4	191	

1 Background specific conductivity is determined as the lesser of *in-situ* specific conductivity measured by the permit applicant in March 2007 and by EPA Region 4 in February 2010.

2 Field conditions at HF#4 in February 2010 were not representative of hydrologic conditions required to form the channel present in this valley. As a result, data collected in this valley in February 2010 is considered anomalous.

3 HF#5 and HF#6 are proposed to be built in two forks of a single valley. The toe of each of these proposed fills will lie approximately 140 feet apart, effectively rendering them a single large fill. The two fills will share a single sediment pond (Pond #21), and it is the specific conductivity measured in the field at the proposed location of this pond that will be considered background conditions in this valley.

In addition to concerns regarding conductivity levels directly downstream of proposed valley fills, EPA remains concerned about the overall cumulative impacts of the proposed Little Fork Surface Mine on an already degraded watershed. Therefore, EPA believes the AMP should require monitoring of conductivity levels downstream of the proposed operation in Robinson Creek and Indian Creek. Despite currently elevated conductivity levels in streams adjacent to the project site, as described above, EPA has reason to believe that several streams in the project area currently contribute freshwater dilution to downstream waters. Increasing conductivity levels in these streams, therefore, could make conditions in an already impaired watershed worse.

Therefore, the AMP should require monitoring downstream of the project in Indian Creek and Robinson Creek to ensure that baseline conductivity levels are not exceeded. If monitoring demonstrates increased levels of conductivity in these receiving streams that are attributable or likely attributable to the proposed project, the applicant should be required to implement corrective actions within the watershed to ensure that conductivity levels do not exceed pre-

mining levels. Such opportunities may include remediation of previously mined areas within the watershed, implementing additional BMPs within the project site, or additional contributions to the Kentucky ILF program for projects undertaken within the watershed. Without imposing such a condition in the AMP, EPA is concerned that the project has the potential to cause or contribute to violations of downstream WQS and continuing impairment of downstream waters.

Water Quality

The proposed project would impact more than 1 mile of streams, including the permanent loss of 4,415 lf of streams located in the Robinson Creek and Indian Creek watersheds. Both Robinson Creek and Indian Creek discharge directly into Shelby Creek in the Levisa Fork watershed. Based on our preliminary review of the available water quality data, we believe that the proposed project may cause or contribute to exceedances of WQS in streams that are already known or suspected to be impacted by mining-related (and other) causes. Furthermore, the Kentucky Pollutant Discharge Elimination System (KPDES) General Permit previously issued for this project does not set numeric limits for parameters of concern, such as conductivity, which scientific literature has demonstrated have significant effects on downstream biological communities.

EPA notes that Indian Creek is the receiving water body for 6 of the applicant's 37 NPDES outfalls for this project (authorized under a Kentucky NPDES General Permit, KPDES No. KYG046229). Additionally, nine outfalls discharge to unnamed tributaries of Indian Creek. Indian Creek is on the Kentucky 2006, 2008, and draft 2010 CWA§303(d) lists (partially supporting warm water aquatic habitat) for sedimentation/siltation and TDS. The CWA§303(d) list shows one of the suspected sources of the impairment in Indian Creek to be surface mining. The KPDES General Permit under which the project initially received coverage has expired and has been replaced by the most recent KPDES General Permit to Discharge Treated Wastewater into Waters of the Commonwealth applicable for coal mining (KYG040000; July 1, 2009).

The 2009 KPDES General Permit under which this project is (apparently) covered expressly excludes from coverage operations discharging directly to waters that are listed for coal-mining related pollutants. Such pollutants are defined to include sedimentation, total suspended solids, TDS, conductivity, iron, manganese, and metals. This project will discharge directly to waters that are listed as impaired due to TDS and sedimentation. Therefore, EPA believes that general permit for these outfalls is inappropriate and therefore the Section 402 permit as written does not protect WQS.

The 404(b)(1) Guidelines prohibit permitting a discharge of dredged or fill material if such discharge would cause or contribute to violations of any applicable WQS. In light of this provision, EPA believes that no Section 404 permit should be issued that would authorize discharges to Indian Creek or its tributaries until these inconsistencies are resolved. Alternatively, if the Corps determines that issuing a permit associated with discharges to these streams is appropriate, then the permit should include limits for specific conductance that are protective of water quality. These limits should be based on the conclusions of the scientific studies described above, which reflect best-available scientific information.

National Environmental Policy Act / Environmental Justice

Based on our review of the information available, including a Cumulative Impact Assessment (CIA) for the Upper Levisa, EPA believes it may be appropriate for the Corps to prepare an Environmental Impact Statement (EIS) concerning this proposed project. In making the determination regarding the need to prepare an EIS, we recommend that you consider the relatively large scale of the impacts associated with proposed project, e.g., the loss of over 4,400 lf of stream and the construction of 5 valley fills, as well as questions concerning how effective the proposed mitigation will be at reducing the severity of the potential direct, indirect, and cumulative impacts. In that light, EPA is uncertain that the current mitigation proposal would serve as a basis to support a Finding of No Significant Impact. With regard to the CIA, we are particularly concerned that the geographic boundary (HUC-8) may be too large spatially to provide a meaningful analysis of impacts from mining in the affected watershed. In addition, we are concerned that the CIA does not address potential cumulative human health impacts, and that the CIA presents several instances of incomplete information.

Consistent with Executive Order 12898 entitled "Federal Actions to Address Environmental Justice In Minority Populations and Low-income Populations" and the accompanying Presidential Memorandum, EPA recommends that the Corps' Section 404(b)(1) Guidelines and NEPA reviews analyze the potential for disproportionately high and adverse effects on low-income or minority populations in the area. Specifically, a characterization of the economic status of residents near the site and the conditions they face including any effects relating to the proximity of the blasting zone, locations of discharges of fill material, truck traffic, noise, fugitive dust, and habitat loss needs to be conducted to adequately assess the potential impact to EJ communities. Additional information is also needed concerning sources of drinking water for the affected populations (including municipal water supplies and private sources of drinking water including streams and/or wells). EPA also recommends that you take steps to ensure meaningful engagement of affected communities.

Conclusion

While EPA appreciates the applicant's willingness to discuss the adoption of certain BMP's into their mine plan, we believe that the Corps should incorporate further required special conditions before issuing any final authorization. Without including such conditions, EPA believes the proposed project is inconsistent with the 404(b)(1) Guidelines and will likely cause violations of WQS and associated significant degradation of stream life. EPA's recommended special conditions are outlined above, and detailed in the enclosed document. EPA also requests that we have the opportunity to review and comment on the draft permit and special conditions prior to finalization.

I want to thank you and your staff for your cooperation and willingness to address our issues. We look forward to continue working closely with you and the applicant as the permit is finalized. If you have any questions, please call me at (404) 562-9470 or Eric Somerville of my staff at (706) 355-8514.

Sincerely,

Gail Mitchell, for

James D. Giattina
Director
Water Protection Division

Enclosures

cc: Jim Townsend, Louisville District, Louisville, KY
Lee Anne Devine, Louisville District, Louisville, KY
Justin Branham, Louisville District, Sassafras, KY
Joe Blackburn, Office of Surface Mining, Lexington, KY
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Carl Campbell, Kentucky Department of Natural Resources, Frankfort, KY
Bruce Scott, Kentucky Department of Environmental Protection, Frankfort, KY
Sandy Gruzesky, Kentucky Division of Water, Frankfort, KY

Enclosure 1
Proposed Clean Water Act Section 404 Permit Special Conditions

I. Best Management Practices & Adaptive Management Plan

1. The permittee shall submit a detailed plan to the U.S. Army Corps of Engineers (Corps) Louisville District and the U.S. Environmental Protection Agency, Region 4 (EPA) for implementing mine design and hollow fill construction alternatives and best management practices (BMPs) to minimize TDS and specific conductivity during the placement of fill material into waters of the United States (U.S.) during the construction of the hollow fills. The objective of these procedures is to ensure that effluent discharging from the mine does not have a monthly flow-weighted specific conductivity greater than that which would violate applicable water quality standards,[1] consistent with best-available science on the relationship between conductivity and aquatic life. This plan must be approved by the Corps, and transmitted to EPA, prior to discharge of any dredged or fill material into any water of the U.S. Proposed actions should include, but are not necessarily limited to:

    - Identification via field-based testing of TDS and/or sulfate producing materials that must then be isolated;
    - Implementation of hollow fill design alternatives that reduce infiltration (e.g. compact surface lifts, crown the fill surface) and controls flow through the fill to avoid contact time between water and reactive materials (i.e. TDS and/or sulfate producing geologic strata);
    - Use of only low-reactive or non-reactive durable rock to construct underdrains and place only these same materials adjacent to the sides of the highwalls and hollow fills.

2. The permittee shall construct hollow fills individually, one at a time, with an adequate monitoring period between completion of one fill to demonstrate water quality is protected. Construction of the next hollow fill would not be authorized if the monthly flow-weighted specific conductivity measured at the representative outfall downstream of the first hollow fill exceeds levels consistent with applicable water quality standards for more than one consecutive month, or if the overall trend in conductivity levels are increasing such that the linear trend demonstrates likely future exceedance of such levels.[2]

3. The permittee shall submit documentation to the Corps and EPA indicating all BMPs employed in each hollow fill within 30 days of site preparation and commencement of construction of the rock underdrain.

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[1] See, supra, footnote 2.
[2] See, supra, footnote 2.

4. (i) The permittee must submit monthly flow-weighted conductivity, $\overline{K}$, to the Corps and EPA for the effluent of Pond#1, Pond#3, Pond#15, and Pond#21 following the commencement of discharges of fill material into waters of the U.S. using data collected as part of the applicable Kentucky NPDES permit, augmented as necessary to meet the special condition requirement below. Monthly flow-weighted conductivity shall be calculated as follows:

$$\overline{K} = \frac{\sum_i (Q_i \times K_i)}{\sum_i Q_i}$$

where:

$\overline{K}$ = monthly flow-weighted conductivity, µS/cm
Qi = flow for the ith sample per month, cfs
K_i = conductivity for the ith sample per month, µS/cm.

(ii) Specific conductivity will be measured no less frequently than two (2) times per month following the initial discharge of dredged or fill material into waters of the U.S. in each valley where such discharges occur through final bond release.

(iii) The monthly flow-weighted conductivity, $\overline{K}$, will be plotted as a time series and the trend in effluent conductivity calculated by linear regression. If the trend indicates that the monthly flow-weighted conductivity will exceed background levels, as defined below, or another acceptable numeric interpretation compatible with applicable narrative water quality standards,[3] whichever is greater, during the first six months following the initial discharge of dredged or fill material into any water of the U.S., the applicant will promptly notify both the Corps and EPA. All data will be provided to both the Corps and EPA within 15 days of the final monthly measurement used to calculate flow-weighted conductivity.

(iv) Background specific conductivity levels are defined as the lesser value recorded *in-situ* by the permit applicant in March 2007 and EPA in February 2010, except at HF#4 where anomalous conditions in February 2010 affected data integrity:

Tributary draining HF#1:	638 µS/cm
Tributary draining HF#3:	988 µS/cm
Tributary draining HF#4:	785 µS/cm
Tributary draining HF#5/6:	191 µS/cm

(v) If during any three (3) consecutive months during the subsequent twelve (12) months following the monitoring period outlined in I.4(iii), the trend defined therein indicates that the monthly flow-weighted conductivity values will not

[3] See, supra, footnote 2.

likely be less than necessary to satisfy applicable water quality standards by the end of this 12-month monitoring period, or if any three (3) consecutive monthly flow-weighted conductivity values exceed such levels,[4] then the permittee will conduct an analysis of the sources of effluent conductivity and develop an adaptive management plan (AMP) Phase I to reduce effluent conductivity (measured as specific conductivity) and TDS.

(vi) The conductivity trend analysis and adaptive management plan shall be submitted to the Corps for approval, and transmitted to EPA, within 30 days of conditions defined in I.4(v). The plan shall be implemented within 30 days of written approval by the Corps. Implementation of the plan will continue until the monthly flow-weighted conductivity falls below the levels described in paragraph (v), above, for three (3) consecutive months. If after cessation of AMP I implementation, conductivity trends defined in I.4(v) begin to rise, implementation of the AMP will be reinitiated.

5. If monthly flow-weighted conductivity values exceed the levels described in paragraph (v), above, continually for three months after implementation of AMP Phase I, the permittee shall prepare, within 30 days, recommendations for additional actions to reduce effluent conductivity (AMP Phase II). These recommendations shall be implemented within 30 days of written approval by the Corps.

II. Effluent and In-stream Chemical and Biological Monitoring

A. Effluent Monitoring

The permittee shall perform effluent monitoring from representative outfalls on Pond#1, Pond#3, Pond#15, and Pond#21, as these ponds are established. Effluent monitoring samples are to be collected at the outlet of each pond. Where the following monitoring conditions include additional monitoring parameters or monitoring events, these data shall augment, but not replace monitoring requirements in the Kentucky NPDES permit.

a. Parameters and Test Methods

i) Hydrologic permanence of outflow from the ponds should be monitored and logged by a continuously recording data logger.

ii) The permittee should perform effluent monitoring of the parameters listed in Table 1, analyzed using EPA Test Methods in 40 CFR Part 136 by an approved licensed laboratory.

b. Sampling Location

The sampling should be conducted at each representative outfall at Pond#1, Pond#3, Pond#15, and Pond#21.

c. Sampling Frequency

[4] See, supra, footnote 2.

The sampling frequency is as noted in Table 1. Samples required quarterly should be no fewer that five (5) days apart, and the amount of precipitation for the previous 24 hour period should be recorded on-site and reported (to the nearest 0.1 inch) as part of the sampling report. Samples required twice per month should be no fewer than five (5) days apart, and the amount of precipitation for the previous 48 hour period should be recorded on-site and reported (to the nearest 0.1 inch) as part of the sampling report. Monitoring will continue through final bond release.

Reporting

Reports shall contain tabulated data (including sample station I.D., date, and time) and graphs necessary to present information clearly and concisely, including all such tables and graphs necessary to summarize and present the entire period of record for each parameter and sample station. Latitude and longitude coordinates of all water quality monitoring locations with the applicable datum identified must be provided along with photographs and figures illustrating all sample locations. Calibration records of all *in-situ* multi-probe or single-probe water quality instruments and laboratory reports showing the analytical results must also be submitted.

All results should be clearly labeled with the applicable CWA permit number and KDNR DMP number and submitted KDOW, the Corps, and EPA Region 4.

Table 1. Supplemental effluent and in-stream water quality monitoring parameters.

Parameter	Units	Method	Sample Frequency
Bicarbonate Alkalinity	mg/l		Quarterly
Chlorides	mg/l	EPA300.0	Quarterly
Discharge	cfs	DOWSOP03019	Twice per month
Dissolved oxygen	mg/l	DOWSOP03014	Twice per month
Duration of discharge[1]	days		Continuous
Hardness (as $CaCO_3$)	mg/l	SM 2340B	Quarterly
pH	s.u.	DOWSOP03014	Quarterly
Precipitation	inches		Continuous
Sulfates	mg/l	EPA300.0	Quarterly
Specific conductance[2]	uS/cm	EPA120.1	Twice per month
Temperature	Deg C	DOWSOP03014	Twice per month
Turbidity	ntu	DOWSOP03014	Twice per month
Total Dissolved Solids (TDS)	mg/l	SM 2540C	Quarterly
Total Calcium	ug/l	EPA200.7	Quarterly
Total Magnesium	ug/l	EPA200.7	Quarterly
Total Potassium	ug/l		Quarterly
Total Sodium	ug/l		Quarterly
Total Recoverable Antimony	ug/l	EPA200.8	Quarterly
Total Recoverable Arsenic	ug/l	EPA200.8	Quarterly
Total Recoverable Beryllium	ug/l	EPA200.8	Quarterly
Total Recoverable Cadmium	ug/l	EPA200.8	Quarterly
Total Recoverable Chromium (III)	ug/l		
Total Recoverable Chromium (IV)	ug/l		

Total Recoverable Copper	ug/l	EPA200.8	Quarterly
Total Recoverable Iron[2]	ug/l	EPA200.8	Quarterly
Total Recoverable Lead	ug/l	EPA200.8	Quarterly
Total Recoverable Manganese[2]	ug/l	EPA200.8	Quarterly
Total Recoverable Mercury	ug/l	EPA1631E or 245.7	Quarterly
Total Recoverable Nickel	ug/l	EPA200.8	Quarterly
Total Recoverable Selenium	ug/l	EPA200.8	Quarterly
Total Recoverable Silver	ug/l	EPA200.8	Quarterly
Total Recoverable Thallium	ug/l	EPA200.8	Quarterly
Total Recoverable Zinc	ug/l	EPA200.8	Quarterly

[1] Duration of discharge from pond should be measured using a continuously recording data logger.
[2] Specific conductance, manganese, and iron need to be sampled at in-stream chemical monitoring locations only, unless otherwise stated in the applicable Kentucky NPDES permit.

B. WET Monitoring

Beginning at the initiation of discharge from representative outfalls (as specified above under "Effluent Monitoring"), EPA believes coal mine permits should require the permittee to perform either acute or chronic WET tests on the representative outfalls based on the duration of the discharge as documented by the continuously recording data loggers referenced in II.A(a)(i). The results of WET monitoring will be used to determine the effectiveness of the BMPs.

In cases where hydrologic permanence monitoring data indicate a sediment pond with any volume of discharge lasting more than 4 consecutive days, chronic WET tests should be performed using *Ceriodaphnia dubia* and *Pimephales promelas* and using a dilution series that includes 100 percent effluent and the in-stream waste concentration.[5] The end points should be reported as the inhibition concentration that affects 25% of the test organisms compared to the control (IC_{25}). Sampling should be performed quarterly. The operator should use WET testing procedures outlined in EPA's document entitled, "Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms" (October 2002).

In cases where the effluent discharge may be short in duration, it may be necessary to collect a high volume effluent sample and properly preserve it for use in the static-renewal test. Please refer to Section 8.5.4 on page 32 of EPA's document entitled, "Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms" (October 2002). Alternative acute WET test organisms are either *Daphnia magna* or *D. pulex* and *Pimaphales promelas*. In addition to reporting these results to the Corps, all results should be reported to EPA and KDOW.

C. In-stream Water Quality Monitoring

The permittee should perform in-stream monitoring for the parameters listed above in Table 1, in accordance with 40 CFR §122.44(d)(1)(vi)(C)(3). Sample collection and quality assurance / quality control should follow Kentucky Standard Operating Procedures at DOWSOP03014 and DOWSOP03015. EPA Test Methods in 40 CFR Part 136 should be used for analytical analysis.

a. Sample Type
Grab samples should be taken whenever possible.

b. Sampling Locations
Samples should be taken from the following locations:

[5] EPA notes that approved invertebrate WET test species are relatively insensitive to conductivity, as compared to in situ aquatic macroinvertebrates in central Appalachian streams. Nevertheless, EPA believes that WET tests can help identify significant water quality impairments as a result of surface coal mining operations, which can complement numeric conductivity measurements.

i. One sampling point located upstream of the sediment pond for each representative outfall, as specified above under "Effluent Monitoring" at paragraph II.A. If there is no upstream location, an appropriate background location within the 12-digit hydrologic unit code should be used.

ii. One in-stream monitoring site located immediately below the toe of the sediment pond for each representative outfall (i.e. ≤25 feet from outfall), as specified above under "Effluent Monitoring."

iii. One sampling point located *the further* of 200 meters (656 feet) downstream of each representative outfall or the furthest downstream location that is upstream of any tributary confluence. The sampling point should be downstream of riprap and other disturbance and located within a relatively natural and intact riparian zone where possible.

iv. One sampling point located in the receiving waterbody that is within 50 feet of the first confluence necessary to increase the stream order above that stream in which the outfall is located (e.g. if the outfall is located in a 1st order stream, this sample point should be located no greater than 50 feet downstream of the first confluence that elevates the stream order below the confluence to at least a 2nd order stream)

c. Sample Frequency

The sampling frequency is as noted in Table 1. Samples required quarterly should be no fewer that five (5) days apart, and the amount of precipitation for the previous 24 hour period should be recorded on-site and reported (to the nearest 0.1 inch) as part of the sampling report. In the event that in-stream monitoring results show in-stream specific conductivity levels above those necessary to satisfy applicable water quality standards,[6] the permittee is required to increase the monitoring frequency for all parameters to two times per month. Samples required twice per month should be no fewer than five (5) days apart, and the amount of precipitation for the previous 48 hour period should be recorded on-site and reported (to the nearest 0.1 inch) as part of the sampling report. Monitoring will continue through final bond release.

d. Conditions for Taking Samples

Samples should be collected during low- or base-flow conditions (e.g., not during, or within 48 hours after, a precipitation event exceeding 0.2 inches).

e. Reporting

Reports shall contain tabulated data (including sample station I.D., date, and time) and graphs necessary to present information clearly and concisely, including all such tables and graphs necessary to summarize and present the entire period of record for each parameter and sample station. Latitude and longitude coordinates of

[6] See, supra, footnote 2.

all water quality monitoring locations with the applicable datum identified must be provided along with photographs and figures illustrating all sample locations. Calibration records of all *in-situ* multi-probe or single-probe water quality instruments and laboratory reports showing the analytical results must also be submitted.

All results should be clearly labeled with the applicable CWA permit number and KDNR DMP number and submitted KDOW, the Corps, and EPA Region 4.

D. In-stream Biological Monitoring

The permittee should implement an annual benthic macroinvertebrate study plan using approved State protocols for benthic macroinvertebrate sampling.

a. Concurrent in-stream monitoring
In-stream samples for specific conductivity, TDS, pH, temperature and dissolved oxygen should be measured at the same locations as the benthic samples using properly calibrated instruments.

b. Methods
The permittee should implement an annual benthic macroinvertebrate study plan using approved state-protocols for benthic macroinvertebrate sampling.

c. Sampling Locations
Use the same locations as shown above for in-stream water quality monitoring.

d. Sampling Frequency
Sampling times will occur consistent with accepted Kentucky protocols (i.e. sample index periods). Sampling will occur annually through final bond release. Sampling should be avoided during periods of excessive precipitation and scouring floods. In cases where a large flow rate of the receiving water does not lend itself to a benthic assessment (i.e., non-wadeable sites), the permittee should perform a bioassessment using fish. Both fish and benthic macroinvertebrate studies should be performed for receiving waterbodies that are conducive to fish assessments. Results from sampling either of the two assemblages may be used to determine if the water body is impaired.

e. Reporting
The permittee should submit the results of the study, including summary tables, appropriate indices of biotic integrity, color photographs and figures showing sample locations, calibration records, etc. to the KDOW, the Corps, and EPA no later than 30 days following the permittee's receipt of the final report.

Enclosure 2
Adaptive Management Plan Implementation Timeline

Phase	Action	Time allowed	Elapsed time since initial discharge of fill material into waters of the U.S.
Pre-AMP	Initial land clearing, excavation, hollow fill construction, and water quality monitoring	6 months	6 months
	Initial post-construction monitoring	3 to 12 months	Up to 18 months
AMP Phase I (if applicable)	Submit AMP I	30 days after AMP I trigger (SC I.4(v))	Up to 19 months
	Approve AMP I	Not specified in Special Condition, estimate 30 days	Up to 20 months
	Implement AMP I	30 days after AMP I Approval	Up to 21 months
	Monitor AMP I	3 to 6 months	Up to 27 months
AMP Phase II (if applicable)	Develop and submit AMP II	30 days after AMP II trigger (SC I.5)	Up to 28 months
	Approve AMP II	Not specified in Special Condition, estimate 30 days	Up to 29 months
	Implement AMP II	30 days after AMP II approval	Up to 30 months
	Monitor AMP II	6 months	Up to 36 months
Additional Mitigation Required (if applicable)	Submit mitigation plan	45 days after end of AMP II	Up to 37.5 months
	Approve mitigation plan	Not specified in Special Condition, estimate 30 days	Up to 38.5 months
	Implement mitigation plan	30 days after mitigation plan approval	Up to 39.5 months

Brian Frazer/DC/USEPA/US
12/09/2010 08:05 AM

To David Evans
cc Denise Keehner
bcc
Subject Materials for Bob P. Meeting Thursday

Dave - Below are the attachments that went up to the AO for Bob P.'s meeting with the enviros. Not sure if Nancy or OGC made any changes. Let me know if you need moreinformation.

****

Brian M. Frazer, Chief
Wetlands & Aquatic Resources Regulatory Branch
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U.S. EPA
1200 Pennsylvania Avenue, NW (MC 4502T)
Washington, DC 20460
202-566-1652

Supplemental Information: Premier Elkhorn (fact sheet and Nov. 2 closeout letter)
(See attached file: Briefing for Premier Elkhorn Lil Fork (12-8-10).doc) (See attached file: LRL-2007-0594_Elkhorn_11-2-10.pdf) r

Supplemental Information: Leeco Stacy Branch (fact sheet and draft closeout letter)
(See attached file: Leeco - Stacy Branch fact sheet.docx) (See attached file: 2010-12-08_Draft_Leeco - Clean R4 comments.docx)

Supplemental Information: Cumulative Effects (summary of Bernhardt et al. 2010 paper, and annotated paper)
(See attached file: 2010-12-08 Summary of Bernhardt et al 2010 re cumulative impacts.docx) (See attached file: Bernhardt et al 2010 (conductivity, cumulative impacts) - highlighted.pdf)

2010-12-08 Bob P Materials.docx Briefing for Premier Elkhorn Lil Fork (12-8-10).doc ATTB2M5D.pdf

Leeco - Stacy Branch fact sheet.docx 2010-12-08_Draft_Leeco - Clean R4 comments.docx

2010-12-08 Summary of Bernhardt et al 2010 re cumulative impacts.docx

Bernhardt et al 2010 (conductivity, cumulative impacts) - highlighted.pdf

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How many mountains can we mine? Ecological thresholds for freshwater ecosystems of the Central Appalachians

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ABSTRACT

Over the last decade, an estimated 2000km of streams in the Central Appalachians have been buried beneath the excess rock waste generated from surface coal mining. In addition to the streams permanently lost through valley filling, many more kilometers of streams throughout the region are impacted by the higher flows and chemical concentrations exported to downstream waters from surface mining operations. Here we estimate for the first time the areal extent of mining that can occur in a watershed before significant ecological impacts are observed in receiving streams. Using new remote sensing analyses together with field sampling data for 283 stream reaches located across a 14 county region in southern West Virginia we demonstrate that changes in streamwater conductivity were strongly positively correlated with the extent of watershed surface mining.. We detected a significant community threshold response to altered ionic strength, with many sensitive taxa declining precipitously and synchronously in abundance at a conductivity of 277μS cm^{-1} (95% CI of 176 to 344 μS cm^{-1}). Our analysis is the first to demonstrate that the rapid increase in mining activity within regional headwaters is degrading water quality and freshwater ecosystems at very low mining intensities and over very large geographic scales. We find that stream water quality and benthic communities are significantly altered when as little as ~3% of the upstream watershed is converted to surface mining operations.

INTRODUCTION

In order to compete with western states in supplying inexpensive, low sulfur coal to the US energy market, mining companies throughout the Central Appalachians are increasingly turning to mountaintop mining to access shallow seams of coal[1,2]. Mountaintop mining is now the most widespread form of coal surface mining across the central Appalachian Mountains, and is particularly intense in southern West Virginia, eastern Kentucky and Tennessee, and southwestern Virginia[3,4]. In this sparsely populated region, surface mining and mine reclamation activities are the dominant driver of land use change[5] and as a result of surface coal mining the area has the highest rates of sediment movement in the United States [6]. To reach the coal seams which can be hundreds of feet below the surface, ridge tops are removed creating large quantities of waste rock and coal debris ("overburden") that must be disposed of to maximize mining efficiency (Figure 1). In the steep topography of the region, stream valleys become the obvious location for disposing of rocks from the mined ridgetops. The resulting valley fills[3] can bury either headwater streams or once forested valley slopes under 10s to 100s of meters of overburden[7]. Because MTM operations are less constrained by topography than more traditional contour mining, MTM techniques have allowed surface coal mining operations to expand greatly in size[4].

The central Appalachian forests that are affected by surface coal mining support among the highest levels of biodiversity and endemism in the temperate zone[8] leading to significant concerns about the loss of forest biodiversity and ecosystem functions as a result of mining[4,9]. Much recent attention has been paid to the burial of headwater streams beneath valley fills and the downstream impacts to waters below surface mines[10](Figure 1), in part, because of high profile federal court cases and widely publicized exchanges between the U.S. Environmental Protection Agency (US EPA) and the U.S. Army Corps of Engineers (USACE) over permitting decisions[11]. Under the authority of the Clean Water Act (CWA; 33 U.S.C. 1252) the US ACE (or a delegated state) must approve regulatory permits to allow mining operations that will result in impacts to waters of the U.S. Prior to authorizing a stream fill operation, the US ACE must assure, among other things, that these activities will not cause significant degradation of the environment (40 C.F.R. § 230.10). To meet this requirement, permittees are required to mitigate for harm done to streams. Typically this is accomplished through the construction of channels on nearby reclaimed mines, the restoration of degraded streams within the watershed, or payment into an in lieu fee mitigation program[2,12,13]. The

extent to which these actions are sufficient to mitigate for the impacts that MTM have on waterways has been central to legal challenges and environmental advocacy protests calling for tighter regulations on this form of mining[11,14].

Scientific studies to inform such cases have been of great interest and have established that impacts can be substantial[10,12,15,16]. Rain that falls on mined and reclaimed watersheds flows through coal residues and rock overburden rather than surface soils. When exposed to air, pyrite minerals in coal residue release sulfuric acid[17], and the production of this strong acid within a matrix of fragmented rock leads to high rates of rock weathering. Throughout much of the central Appalachians, the high buffering potential of carbonate bedrock neutralizes the acidity generated by pyrite dissolution and releases high concentrations of coal-derived SO_4^{2-} accompanied by elevated concentrations of Ca^{2+}, Mg^{2+}, HCO_3^- derived from parent material[18]. The natural acid buffering potential of parent material in much of the region thus generates alkaline mine drainage, characterized by an increase in pH, alkalinity and electrical conductivity in receiving streams[18]. The concentration of trace metals and metalloids also tend to be correlated with SO_4^{2-} and conductivity[12,19], and in this region elevated concentrations of manganese (Mn) and selenium (Se) are of particular concern due to their known toxicity[20]. Selenium, weathered from coal minerals, is more soluble at high pH and thus is a particularly problematic toxin in the alkaline mine drainage common to most mountaintop mines[21]. A number of recent studies have documented significant changes in stream macroinvertebrate and fish communities directly downstream of surface mining operations[10,16,22] and have attributed these declines to the combined effects of heightened concentrations of ions and trace metals delivered from upstream mines.

In response to growing concerns and scientific documentation of the impacts of surface coal mining, on April 1, 2010, the US EPA released their own scientific report and announced new actions to strengthen the permitting process and protect Appalachian waters[23]. This included a draft guidance document that set benchmarks for unacceptable levels of conductivity in waters associated with surface mining. Specifically, their research identified conductivity levels of 300 $\mu S\ cm^{-1}$ in Appalachian headwater streams as the maximum acceptable levels to prevent substantial impacts to native invertebrates[23]. This draft benchmark has been challenged by various groups including the National Mining Association (NMA) who filed a lawsuit in U.S. District Court for the

District of Columbia[24]. While most of NMA's arguments question the legality of EPA's actions, the lawsuit also argues that the conductivity water quality standard is arbitrary and based on unsupported "presumptions" that background levels of conductivity (i.e., non-mining related) are below the benchmark and that significant adverse impacts are related to the length of stream impacted or the number of fills[24].

The challenges on both sides highlight the need to fill several scientific gaps that are critical to decisions by regulators and to those the regulations influence. Thus our goal was to address the following questions:

1. Is there a clear relationship between conductivity and surface coal mining extent in the central Appalachians that cannot be attributed to other impacts such as development in a watershed?

2. Does the latest state-of-the-art approach designed to statistically detect biological thresholds support the concept of a benchmark and if so, at what conductivity level?

Previously there has been no effort to quantify the areal extent of surface mining and link that to downstream water quality and aquatic community structure at river basin scales. Since the dominant solutes derived from surface mining that generate high conductivity in receiving streams are conservative ions that do not readily precipitate from solution except at supersaturated concentrations (SO_4^{2-}, Cl, Ca^{2+}, Mg^{2+}, HCO_3^-), high conductivity (and associated biological impacts) should be correlated with the total spatial extent of upstream mining activity. Thus, we analyzed whether there was a statistically significant relationship between the proportion of surface mining in watersheds of southern WV and dissolved ion concentrations or between the extent of surface mining and alterations in stream biota. To determine whether or not there were threshold relationships between stream invertebrates and conductivity, we employed a new form of analysis (Threshold Indicator Taxa Analysis, TITAN[25]). TITAN is unique in that it first characterizes the responses of individual taxa to an environmental gradient and secondarily aggregates taxa into a community-level metric only after distinguishing the magnitude, direction, and uncertainty in the responses of individual members of the community. Thus, TITAN has distinct advantages over more commonly used community metrics, in that it allows the investigator to identify both taxon-specific and community-level threshold responses to anthropogenic environmental gradients[26].

RESULTS & DISCUSSION:

We compiled existing datasets that provided determinations of the spatial extent of surface mining in the region over time by obtaining nonpoint discharge elimination system (NPDES) permit records for mining activities (maintained by WVDEP accessed online 6/24/2010), land cover classification data determined from National Landcover dataset (NLCD 2001), and surface mining maps derived from multidecade (1975, 1985, 1995, 2005) Landsat satellite data for a 59-county area spanning much of the Central Appalachian Coal Region (Figure 2A). We obtained data on water quality and macroinvertebrates that were collected and analyzed by the WV Department of Environmental Protection (WVDEP 2010 provided 6/30/10). Field samples and remote sensing derived mine mapping overlapped for a 14 county study area in southern WV (Figure 2B) from which we acquired a final dataset consisting of 283 stream reaches for which both stream water sample analysis and stream benthic invertebrate collection data were available from summer collection efforts. We delineated watersheds draining to each of these 283 sampling points and estimated the total surface area covered by forests, development of by surface mining operations. Surface mining operations were further classified as mountaintop removal mines (MTM), non MTM surface mines (~contour or strip mines), or valley fills. Our estimates of cumulative surface mining in the region derived from remote sensing image analysis are in close agreement with the cumulative extent of area disturbed through mining reported by NPDES permit inspectors (Figure 2C). It is important to acknowledge that the precision of our remote sensing derived estimates of surface mining has not yet been estimated through ground-truthing. Rigorous evaluation and cross validation of mining maps is a priority for our ongoing research effort.

Within this dataset, 231 streams drained watersheds with some amount of mining (0.03 to 95.7% mined) and 212 streams drained watersheds with >1% of their watershed developed (1 to 20% developed). A total of 19 stream samples were classified from the land use data as forested watersheds (no surface mining or NPDES permits, <1% developed) and the dataset included 12 streams classified as reference watersheds by the state of WV. Stream stations sampled by the WVDEP drained watersheds that had up to 95% (18±21%, mean ±sd) of their surface area in active or reclaimed surface mines and up to 20% (3 ± 3% mean ±sd) of their watershed area classified as developed..

To determine if watersheds having a greater proportion of mining have higher significantly higher streamwater conductivity (Question 1), we examined statistical relationships between the areal extent of surface mining and conductivity and solute (sulfate and nitrate) concentrations. We found that the total surface area mined within a watershed, regardless of what year the mining activity was delineated from Landsat imagery, correlated most strongly with water quality metrics.. Analyses that only used the most recent 2005 surface mining delineation, or which excluded all but MTM surface mining operations were less strongly correlated with water quality metrics. As a result of these comparisons, we chose to examine how the cumulative extent of all surface mining within a watershed (across all years and all types) was related to water quality and biological changes in the region. We also examined whether variation in the extent of watershed development was a good predictor of water quality changes.

We found that the proportion of watersheds that were mined was strongly positively correlated with streamwater sulfate and nitrate concentrations and with the electrical conductivity of the water in draining streams (Figure 3). Mined streams had higher alkalinity and pH than unmined streams in the region (Table 1). There were insufficient records of trace metal and metalloid concentrations within our dataset to examine relationships with mining, however analysis of the entire WVDEP database (beyond the 14 county area to which our analyses were restricted) showed that sulfate was strongly positively correlated with trace metals (Mn, Fe, Al) and the metalloid Se[12]. In contrast, development activities within the 14 county area were not correlated with conductivity or nitrate and were slightly negatively correlated with sulfate concentrations (Figure 3) and did not lead to significant alterations of pH or alkalinity (Table 1). The negative relationship observed between conductivity and water quality for the upper quantiles of the dataset (Figure 3) occurs because some of the watersheds with little development had large mining impacts whose water quality impacts far exceed that of development in this region (Figure 3). Variation in sulfate, nitrate and conductivity in undeveloped watersheds is highly correlated with the extent of mining in those watersheds.

To assess the macro-invertebrate response to increased mining extent and streamwater conductivity (Question 2), we first examined changes in stream benthic macroinvertebrate diversity and biotic integrity scores by one way ANOVA and Tukey's HSD to compare WV reference streams with the 231 mined streams, split into 5 equally populated bins of increasing mining intensity. We also

performed TITAN[25] to examine taxon specific and community level responses to both gradients within this dataset. We found that watershed surface mining leads to substantial changes in stream biota that are much more dramatic than changes attributable solely to development. The diversity of intolerant taxa declined precipitously with mining (Figure 4, supplemental Figure 2) and as a result both types of bioassessment scores developed for West Virginia streams declined with the spatial extent of mining in their watershed. The family level WV Stream Condition Index (WVSCI) and the Genus Level Index of Most Probable Stream Status (GLIMPSS) were significantly lower in mined watersheds compared to state reference sites (Figure 4). For all three metrics, significant declines in diversity and stream ecological health metrics were observed even in the lowest mining category (<3.5% of watershed in surface mines) (Figure 4), suggesting that water pollution associated with even small amounts of surface mining is sufficient to reduce or eliminate many stream taxa.

Using TITAN analysis to examine the aquatic invertebrate responses to the spatial extent of mining revealed statistically significant declines for 39 of the 196 taxa in the data set (Figure 5A). The taxa most sensitive to mining represent a variety of mayfly, stonefly, caddisfly and beetle larvae that are all characteristic to central Appalachian streams and known to be sensitive to water pollution. All negatively responding taxa appeared to be very sensitive to the mining gradient, with all showing sharp declines in abundance at less than 10% mining (Figure 5, Supplemental Figure 1). Prior research has demonstrated that mayflies are especially sensitive to mining-derived contaminants[10,27] and our results support this, with even the highly tolerant mayfly genus *Baetis* showing a negative response to the mining gradient. The nearly synchronous declines of taxa (SI Figure 1) was consistent with a community-level threshold[26], suggesting that surface mining of as little as ~3% (95% CI of 0 to 2.4%) of the upstream watershed results in sharp nonlinear declines in the abundance of many taxa comprising downstream communities (Figure 5B, SI Figure 1). Several taxa increased in relative abundance along the mining gradient, primarily several genera of highly tolerant midges (Chironomidae) the tolerant caddisflies *Chimarra*, *Ceratopsyche* and *Hydropsyche*, and the blackfly *Simulium* (Figure 5A, SI Figure 2). This suite of tolerant organisms is entirely consistent with earlier impact studies[10,16], suggesting that the same impacts observed immediately below valley fills are also apparent at the scale of 10-100km^2 catchments.

Because of the uncertainty surrounding the precision of our surface mining delineation, we performed sensitivity analyses to examine how the TITAN threshold determination was affected by introducing random or systematic error into our % mining estimates (SI Section 2). We found that our cumulative threshold estimate was robust to introduced error, and could only generate a significant increase in the threshold estimate by systematically increasing the estimates of mining area. This is a type of land cover classification error that could be introduced by edge effects, where landcover pixels at the edges of mines are systematically classified as forest cover. Even if we assumed that all mined areas should be expanded by 250m along all edges, we still estimated a community level threshold at 4.6% of the watershed in surface mine (95% CI of 0.34 to 11.85%) (SI Section 2).

Variation in the extent of development is not statistically correlated with the extent of mining within this dataset, yet the majority of watersheds experience both forms of land use change. We reran TITAN analyses on the same dataset oriented along a development rather than the mining gradient and found that many fewer taxa declined significantly with development than with mining (Figure 5C). Those taxa that did respond declined at very low levels of development (0-5%). However, the results of this analysis are complicated by the fact that many of the low development watersheds have variable and sometimes high amounts of surface mining within their boundaries. Indeed, many of the taxa that declined with mining increased in abundance along the development gradient because of the negative relationship between % development and % mining (Figure 5C). While negative response of the invertebrate community peaked at similar values of % development and % mining, the magnitude of the sum of z- scores was much higher for mining (290.3) than for development (134.9). This indicates that more taxa exhibited a more abrupt decline across the mining gradient than across the development gradient (Figure 5B, D).

TITAN analysis of the same dataset across a conductivity gradient found that increases in streamwater conductivity led to significant declines in 50 of the 196 total taxa and explained a larger amount of the variation in abundance data than either land cover variable (sum z =379.1). The threshold at which community changes are most drastic was at 277μS cm^{-1} (95% CI of 176 to 344 μS cm^{-1}), a number which is remarkably consistent with the EPA Guidance[23] recommended maximum conductivity of 300 μS cm^{-1}. Across this region, conductivity is highly correlated with

the areal extent of mining (Figure 3). Our analyses suggest that this conductivity threshold is typically reached when <5% of the upstream watershed is impacted by surface mining.

In our analyses we did not distinguish between old or new surface mining because we were unable to find any statistical evidence that the impacts of mining are ameliorated through time. We also did not distinguish between mountaintop mining operations and more traditional surface strip or contour mines in the region because we were unable to detect statistical differences between these two types of mining. Similarly, our efforts to weight impacts based on hydrologic connection to the stream channel (inverse distance weighting approaches) did not improve statistical relationships. The stream sampling dataset acquired from the WVDEP was not collected with the purpose of examining the efficacy of mine reclamation or mining configurations in ameliorating downstream impacts and thus we do not view inability to detect such subtleties in the current dataset as conclusive. Instead we urge that new spatial data on mining activities be used to guide rigorous field sampling campaigns to make these critical comparisons.

CONCLUSIONS

This work demonstrates for the first time a statistically significant relationship between the areal extent of surface mining in the Central Appalachians and variation in both the chemistry and biological community structure of receiving streams. Our analyses demonstrate that even small amounts of surface mining can dramatically increase streamwater conductivity, pH and alkalinity and dramatically reduce the abundance of many aquatic insects. Our community threshold analyses suggest that macroinvertebrate community composition shifts dramatically once streams reach conductivities of ~300 µS/cm – a level achieved with very low levels of watershed surface mining. An important argument for a casual pathway from mining to conductivity to community thresholds is the large proportion of shared taxa that declined in response to both watershed mining and conductivity. Of the 39 taxa that significantly declined along the mining gradient, 24 significantly declined with increasing conductivity. Conversely, few of the taxa that responded negatively to the development gradient declined with increasing conductivity.

These results have important policy implications. First, the fact that the cumulative impacts of MTM on water quality and on the biological condition of streams are readily quantifiable and

cannot be attributed to development have the potential to inform decisions on the amount of mining regulators allow in a given watershed. Second, using a novel and rigorous method of data analysis to test for thresholds (TITAN), we found a threshold conductivity level (277µS cm^{-1} with 95% CI of 176 -344 µS cm^{-1}) that is remarkably similar to the benchmark of 300 uS/cm that the US EPA has proposed to be protective of aquatic life in their recently issued guidance document, lending support to their draft conductivity benchmark.

METHODS

Regional Mapping of Surface Mining: Surface mining activity was mapped from digital multispectral images collected by the Multispectral Scanner (MSS) and Thematic Mapper (TM) sensors carried by the Landsat series of remote-sensing satellites. Historical images in the Landsat archive[28] were reviewed for cloud cover, smog and haze. Mid-summer images were favored to facilitate the identification of disturbed areas and minimize seasonal variations in solar illumination. To ensure detection of mining disturbance since the 1970s while minimizing the total volume of data for analysis, mid-decade imagery was chosen (SI Section II). Digital elevation data were also acquired for topographic analysis, enabling the identification of ridges and mountaintops throughout the study area as a means of discriminating MTR operations from other types of surface mining. We opted to use 3-arc-second (1x1 minute) DEM data compiled by the U.S. Defense Mapping Agency. This series was distributed as 1x1 degree areas that corresponding to the east or west half of the USGS 1:250,000 scale topographic quadrangle map series. These elevation data are from topographic surveys that mostly pre-date 1976 and therefore provide the best available representation of topography in the study area prior to the advent of mountaintop removal mining. The horizontal position error of this elevation dataset is generally stated to be 100 meters or less. Other supporting digital GIS data included detailed transportation features and populated areas derived from USGS 1:24,000-scale topographic maps[29]. The river and stream vectors that comprise regional hydrology were compiled from the 1:24,000-scale National Hydrography dataset[30].

Image Processing: Image processing and analysis was performed using Erdas IMAGINE image processing and GIS software on a standard Windows-based workstation. All images were placed into a common map projection (UTM Zone 17 North – WGS84 datum) using standard techniques that included the selection of image-to-map tie points by an experienced operator, and digital resampling of the images using a nearest-neighbor algorithm to preserve the original spectral information. Additional processing included the creation of same-date, path-oriented mosaics to simplify the classification

process. The georectified mosaics were then cropped to the study area boundary to reduce computer processing time.

An iterative, two-stage process was developed to identify and delineate areas disturbed by traditional surface mining and by mountaintop removal mining (MTR). First, land cover classification was performed for each date of imagery. Classification followed a two-step process: pixel-based spectral signatures of various land-cover types were identified; then a decision-tree analysis was used to classify areas of active surface mining. Pixel-based classification was performed using the supervised maximum likelihood technique[31]. Given the rugged terrain of the region, the image data were first spectrally enhanced to reduce albedo-related variations in illumination and spectral characteristics using the hyperspherical direction cosine (HSDC) method[32]. Training samples were selected for each date of imagery to yield land-cover classes compatible with the Anderson Level II system[33], such as bare rock, soil, forest, grasses/crops, water, clouds, etc. The results of this procedure were then modified by classifying any bare rock and soil outside of a 400 meter buffer zone around rivers, highways and agricultural areas. This separates areas of bare soil and rock likely attributable to active mining from areas naturally devoid of vegetation, such as river banks and channels, paved surfaces, and plowed or fallow fields.

Second, topographic analysis was performed to subdivide the classified mining areas into "MTR" and "Other Surface Mining" categories. While the legal definition of MTM as defined by the U.S. Office of Surface Mining is too vague to implement directly into a GIS model, their definition did guide the development of a reproducible, rule-based method by SkyTruth for identifying MTR areas. We started from the perspective that, to qualify as MTR, an individual mining operation had to 1) cross a ridge top or peak, and 2) impact an area significantly larger than a typical conventional strip mine.

Using digital elevation data from the U.S. Geological Survey 1:100,000 series, the terrain parameters that characterize ridge tops and peaks, slopes and valleys were calculated. We defined a ridge top or peak as a point that lies on a local convexity that is orthogonal to a line with no convexity or concavity. After ridge tops and peaks were identified and delineated from the elevation dataset using these criteria, contiguous areas encompassing fewer than 40 acres were eliminated to minimize noise in the analysis.

MTR operations were identified in the mining land-cover class by calculating the percentage of ridge top that comprised the mine's total area. We produced two categories of MTR mines: contiguous mining

area spanning more than 320 acres and containing more than 40 acres of ridge top, and contiguous mining areas between 40 and 320 acres that contain at least 10 - 40 acres of ridge top in the mined area. Digital boundaries delineating the MTR areas, and the other surface mining areas identified by this analysis were analyzed for the entire region (SI Table 2) and files were exported in GIS-compatible shapefile format.

Water Quality and Stream Benthic Samples: We obtained data on water quality and macroinvertebrates collected and analyzed by the WV Department of Environmental Protection (WVDEP 2010 provided 6/30/10 in response to FOIA request). The full dataset includes water quality, stream habitat and stream benthos information on 6463 stream reaches. Samples were collected between 1996 and 2009. From this large dataset we extracted all sample data that met the following selection criteria: streams <10m wide draining watersheds completely contained within the 14 county area of southern WV for which we had mapped the extent of surface mining; samples for which benthic macroinvertebrate samples were collected during summer surveys and identified to genus; and samples for which at least streamwater conductivity and sulfate concentrations were recorded.

Watershed Delineation for Stream Sampling Stations: Geospatial analysis to determine the areas of surface mining and developed lands upstream of water quality sample locations was performed using Environmental Systems Research Institute's (ESRI's) ArcGIS software, version 9.3.1. Digital elevation model (DEM), hydrography, land cover, surface mining, and water quality sample location data for the entire area draining into the 14 West Virginia counties examined were assembled into a geographic information system (GIS) with all data georeferenced to the Albers Equal Area projection. The DEM data, a subset of the National Elevation Dataset[34], were obtained from the National Hydrography Dataset Plus (NHD+)[30] and represent elevation as 30 x 30 m pixels. We also obtained flow direction, a derivative of the elevation dataset, as well as 1:100,000 scale stream flow-lines from the NHD+ and added them to our GIS database. The land cover data we obtained are part of the 2001 National Land Cover Database[35] and were obtained from the USGS Multi-Resolution Land Characteristics Consortium (MLRC)[i]. The DEM, hydrography, and land cover data were all obtained as ArcGIS formatted files in the Albers projection and needed no further processing to be added to our spatial database.

Stream sampling point coordinates were used to construct an ArcGIS point file referenced to a geographic coordinate system (WGS 84), which was then projected into the same Albers coordinate system used by the other spatial datasets. Water quality point locations had to be snapped to areas of high flow accumulation (i.e. stream cells) to properly calculate upstream areas. ArcGIS has a tool, "*snap pour point",* designed to do this, but it worked too coarsely, snapping some points to the wrong stream while unable to snap other points to correct locations. We therefore developed an iterative snapping algorithm that gradually moves a point along routes of higher flow accumulation until a stream cell is met. With all sample points snapped to the nearest stream location, we used the ArcGIS *watershed* tool to identify all cells upstream of a given point. We then calculated the area of historical surface mining and of developed areas by tabulating the number of mined cells (from the mining delineation dataset) and the number of developed cells (from the "Developed" classes in the NLCD 2001 dataset) , respectively.

Statistical Analyses:

For the data analysis to address question 1, we estimated the total watershed area that had ever been mined (active and past surface mining) and used that estimate of cumulative mining extent as a predictor variable. We examined statistical relationships between solute concentrations along both mining and development gradients using quantile regression. We also split the full mining dataset into 5 equal categories of mining extent and examined changes in water quality and in macroinvertebrate taxa richness and in two benthic indicator scores developed for Central Appalachian streams by one way ANOVA and Tukey's HSD.

TITAN Analysis: To address question 2, we performed Threshold Indicator Taxa Analysis (TITAN[36]) to examine taxon specific and community level responses to both gradients within this dataset. First, TITAN estimates the value of the environmental variable that produces the greatest change in both the abundance and frequency of occurrence of each individual taxon with a minimum of 5 occurrences within a sample population. Since TITAN requires only 5 occurrences for analysis it is sensitive to rare species, a distinct advantage for detecting local biodiversity loss. The magnitude of the response is quantified as an indicator value z score[37]. The observed change point for a taxon is the value where the indicator score reaches its maximum. Individual taxa change points are bootstrapped to assess consistency in the direction (negative or positive) and

location of response (confidence intervals) to the gradient. Because indicator scores are standardized to z scores, taxa that do not respond to the gradient achieve very low or negative z scores thus provide minimal weight (or noise) to the assessment of community response.

Potential community-level thresholds are assessed by separating negative (z-) and positive (z-) taxa responses, summing the z+ and z- taxa separately, and tracking these aggregate responses for every potential change point value along the environmental gradient. Synchronous change points among multiple taxa within a narrow range of environmental values results in a distinct peak in the sum of the taxa z-scores (sum(z-) for negative responses, sum(z+) for positive responses). The magnitude of the sum(z) scores are also a direct measure of the magnitude of the effect of an environmental predictor. Collectively, a large, sharp peak in sum(z) values, obvious synchrony in numerous taxa change points, and evolutionary and life-history relationships among responsive taxa that are consistent with known sensitivities to anthropogenic gradients serve as empirical evidence for a community-level threshold[26]. While uncertainty may be relatively high about the location of low-frequency individual taxa thresholds, synchrony in the conductivity level point-of-decline of many species, including rare ones, bolsters confidence in the robustness of the community threshold.

TABLE 1: Comparison of water quality between land cover categories. Within this table, developed watersheds are watersheds without any evidence of surface mining. Not all environmental variables were collected or recorded for all samples in the dataset, leading to slightly different numbers of replicates within a category.

Category	Criteria	pH		Alkalinity		Conductivity	
		n	n ± SE	n	Mean ± SE	n	Mean ± SE
WV Reference Sites	•Identified in WDEP database as Reference site	11	7.0±0.2[a]	9	17.4±5.7[a]	11	68±13[a]
Reference	•> 95% Forested •<1% Developed •No surface mining mapped •No NPDES Permits	13	7.2±0.2[ab]	3	***32.6±28.2***	13	289±100[ab]
Surface Mining	•All watersheds with mapped surface mining in any year						
<3.5%		*46*	7.7 ±0.1[bc]	23	65.1±9.4[ab]	46	431±76[a]
3.5 to 11%		*46*	7.7 ±0.1[bc]	31	81.2±12.6[ab]	46	550±40[ab]
11 to 21%		*46*	7.9 ±0.1[c]	20	120.4±18.3[b]	46	750±69[bc]
21 to 38%		*45*	7.9 ±0.1[c]	17	118.3±22.2[b]	45	863±79[c]
>38%		*47*	7.7 ±0.1[bc]	22	126.5±15.8[b]	47	1370±123[d]
Developed	•>1% Developed						
1 to 5%	•Developed + Forested > 80%	14	7.1 ±0.2[a]	9	45.6±14.1[ab]	14	191±31[a]
>5%	•No surface mining mapped •No NPDES permits	15	7.6 ±0.2[abc]	3	***20.1±5.5***	15	350±53[ab]

*Values that share the same letters as subscripts are not statistically different based Upon Tukey-Kramer HSD posthoc comparisons.** indicates low sample size – statistics not included. ANOVA showed that categories were significantly different at p<0.0001 for all three metrics.*

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FIGURE 1 – Photos from the Hobet mine, a 40mi2 surface mine in southern WV. (A) An aerial view of a portion of the mine above Laurel Fork during active mining in 2006 (Vivian Stockman, OVEC); (B) a closeup view of the reclaimed mine surface above Laurel Fork in June 2010; (C) a filled tributary to Laurel Fork in 2010; a settling pond below the valley fill in C; (D) a closeup of the sediments of the valley fill drainage showing carbonate deposits. All photos except A by ESB.

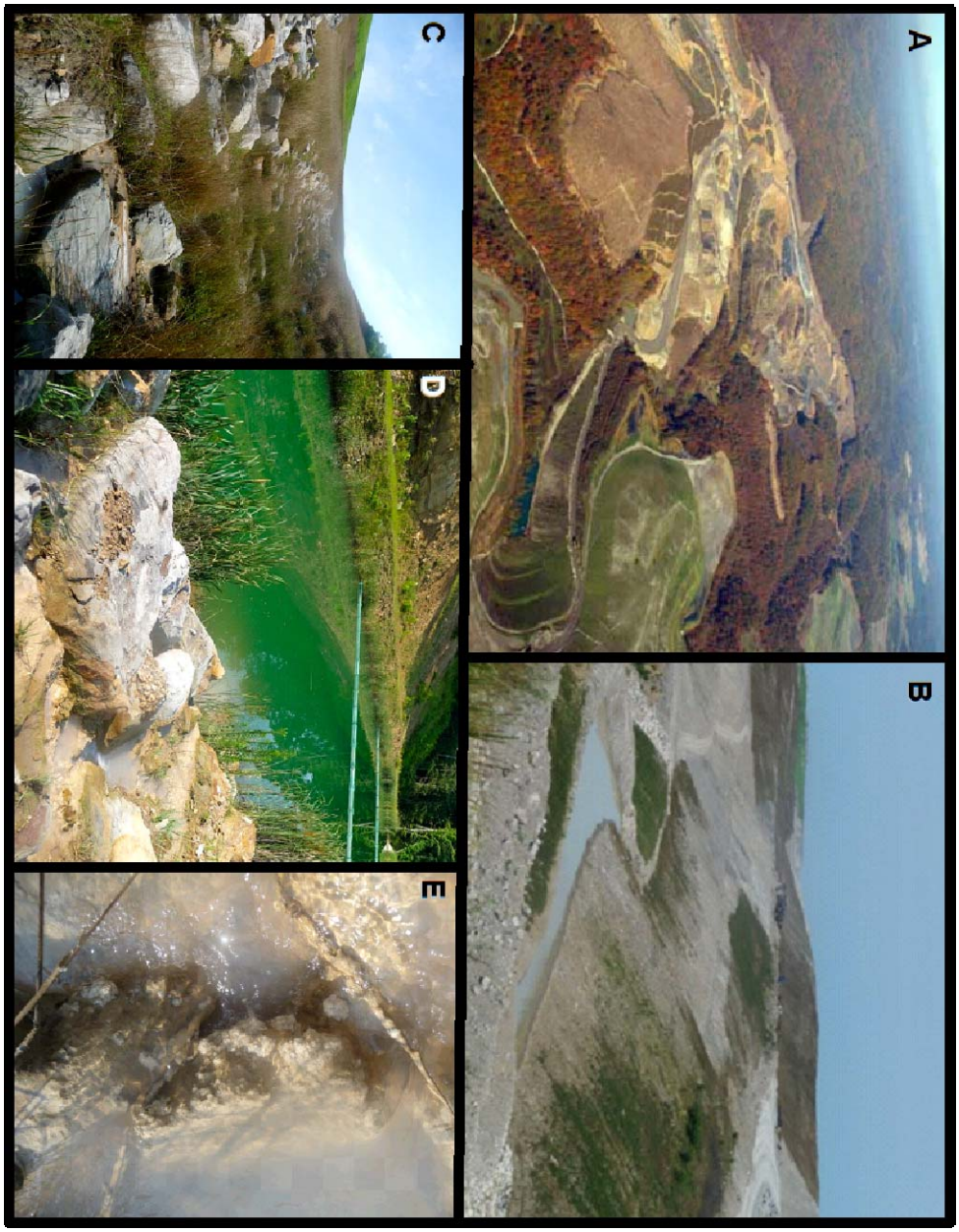


FIGURE 2: *(A) Surface mining activity delineated through analysis of remote sensing imagery collected in 1975, 1985, 1995 and 2005. Color progresses from older mining (1976 delineation) in light yellow to recent mining (2005 delineation) mining in burgundy. (B) shows the location of sampling sites used in our in depth analyses. (C) shows the spatial extent of mining reported by SkyTruth (red triangles) relative to that reported based on permit records (black triangles)*

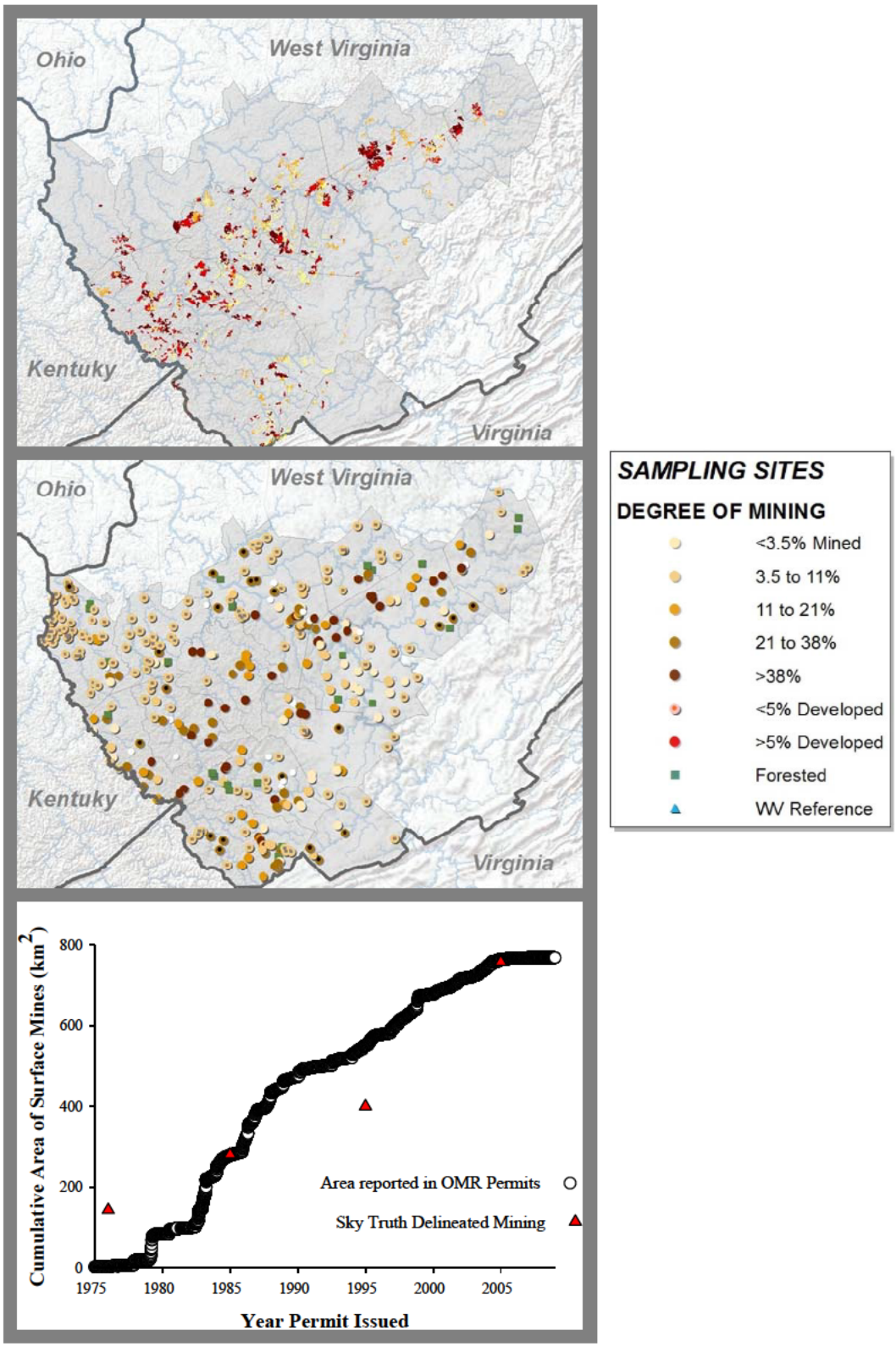


Figure 3. Quantile regressions for streamwater conductivity, nitrate and sulfate across the two dominant land cover gradients, surface mining (A&B) and development (C&D).

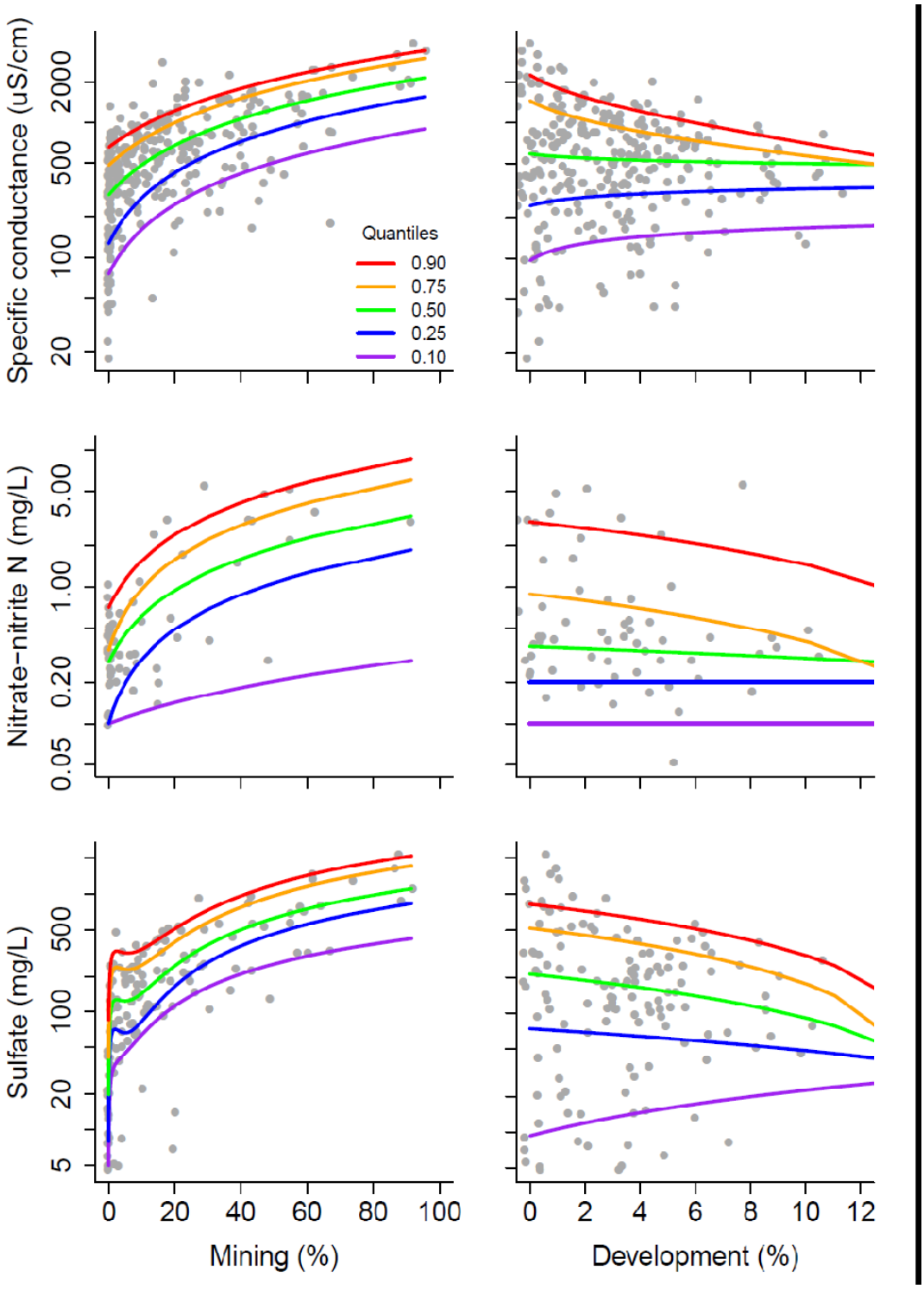


Figure 4. Effects of mining and development on macroinvertebrate community composition metrics. Here boxplots show the median as the black line within the box, the gray box extends between the 25th to 75th percentile distribution of datapoints, the whiskers delineate the 95% confidence interval and all outliers are shown as points outside of this distribution. The alphabetical superscripts indicate statistical differences between categorical variables, categories which share a letter are not significantly different from one another based on Tukey's HSD post hoc comparisons at p=0.05 adjusted for multiple comparisons. The ms superscript in panel A means marginally significant from control (p=0.054)

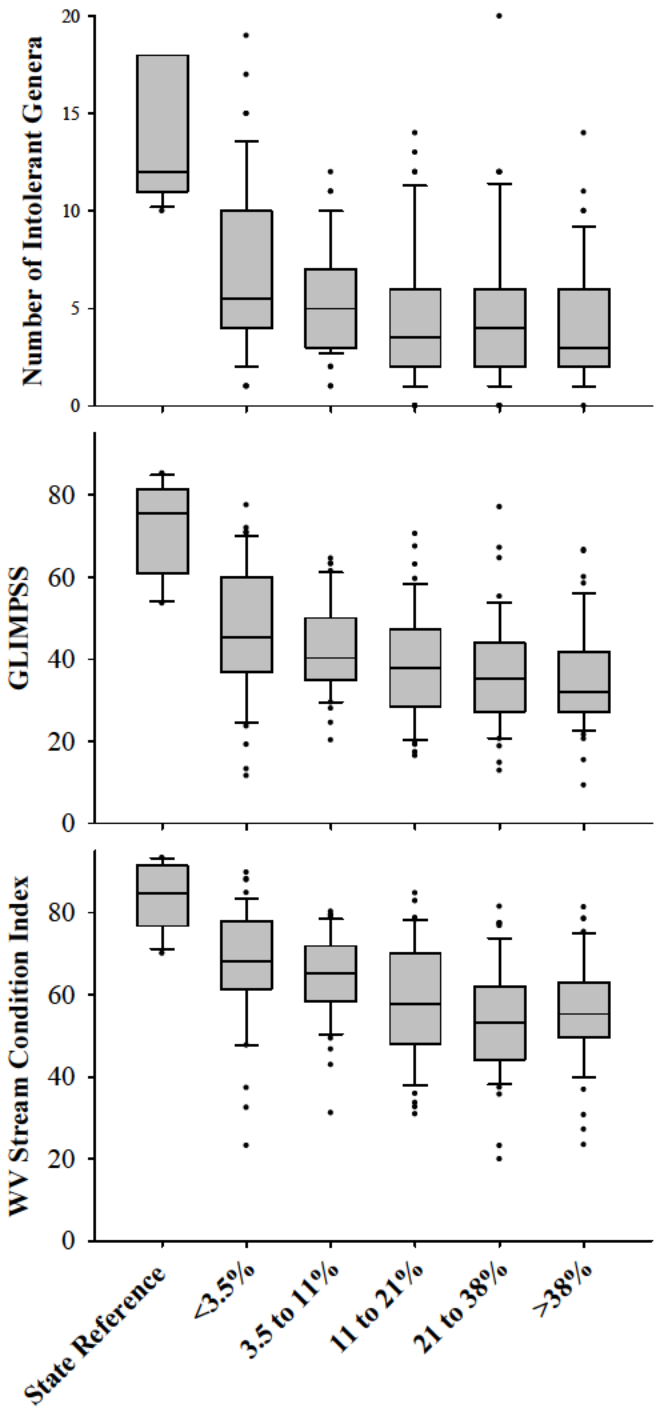


FIGURE 5.TITAN results for taxa having both high purity and reliability when run against either percent mining (A) or percent development (B) as the environmental gradient. Points are centered on the estimated change point for each taxa, horizontal lines indicate 95% CI based on 500 bootstrap replicates, and point size is proportional to the taxa z-score. Taxa which respond negatively across both the mining and develoment gradients are denoted with (*); Taxa which respond positively across both the mining and development gradients are denoted with (**); Taxa which respond negatively to the mining gradient and positively across the development gradient are denoted with (***); Taxa which respond positively to the development gradient but negatively to the mining gradient are denoted with (****).

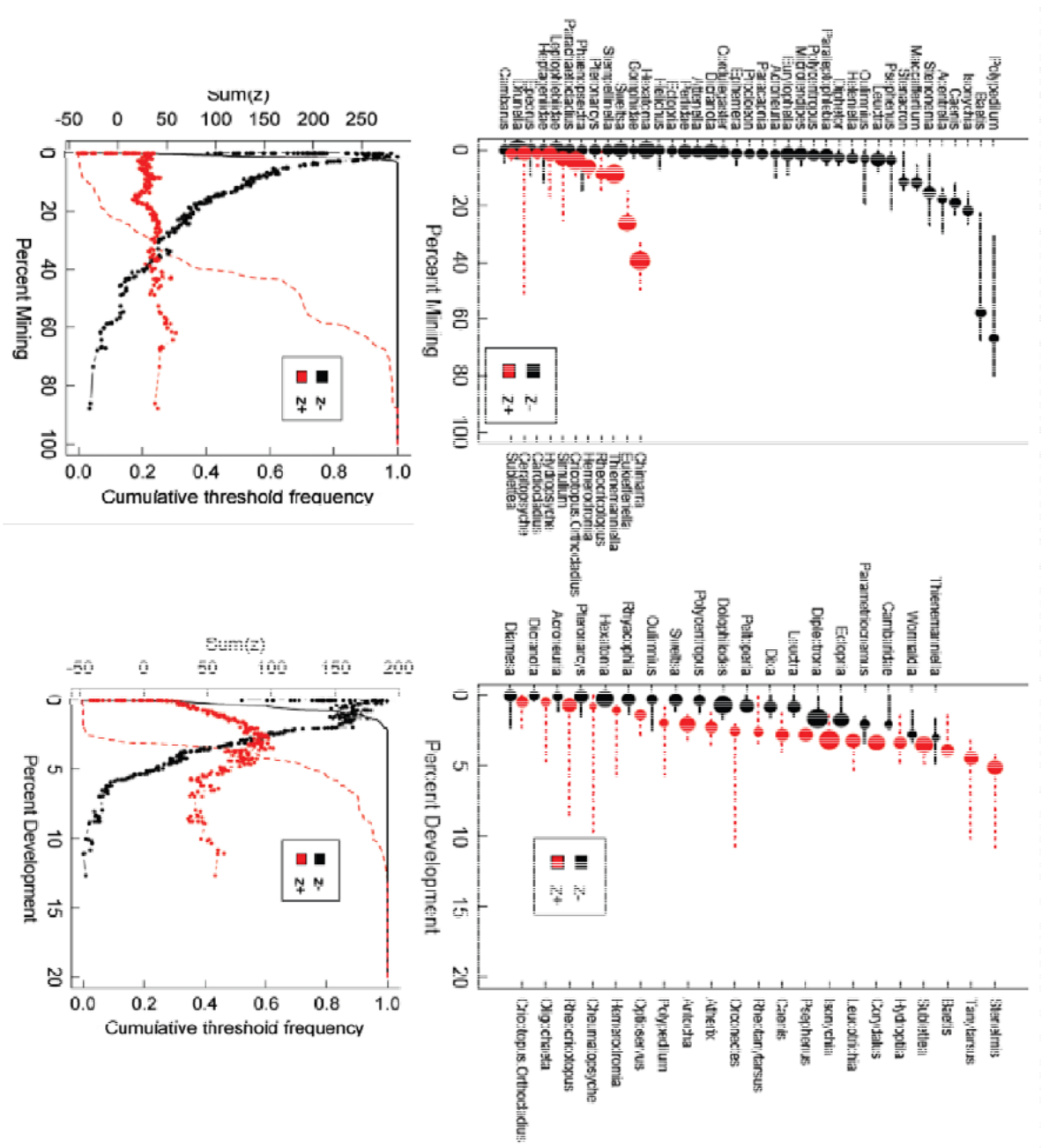
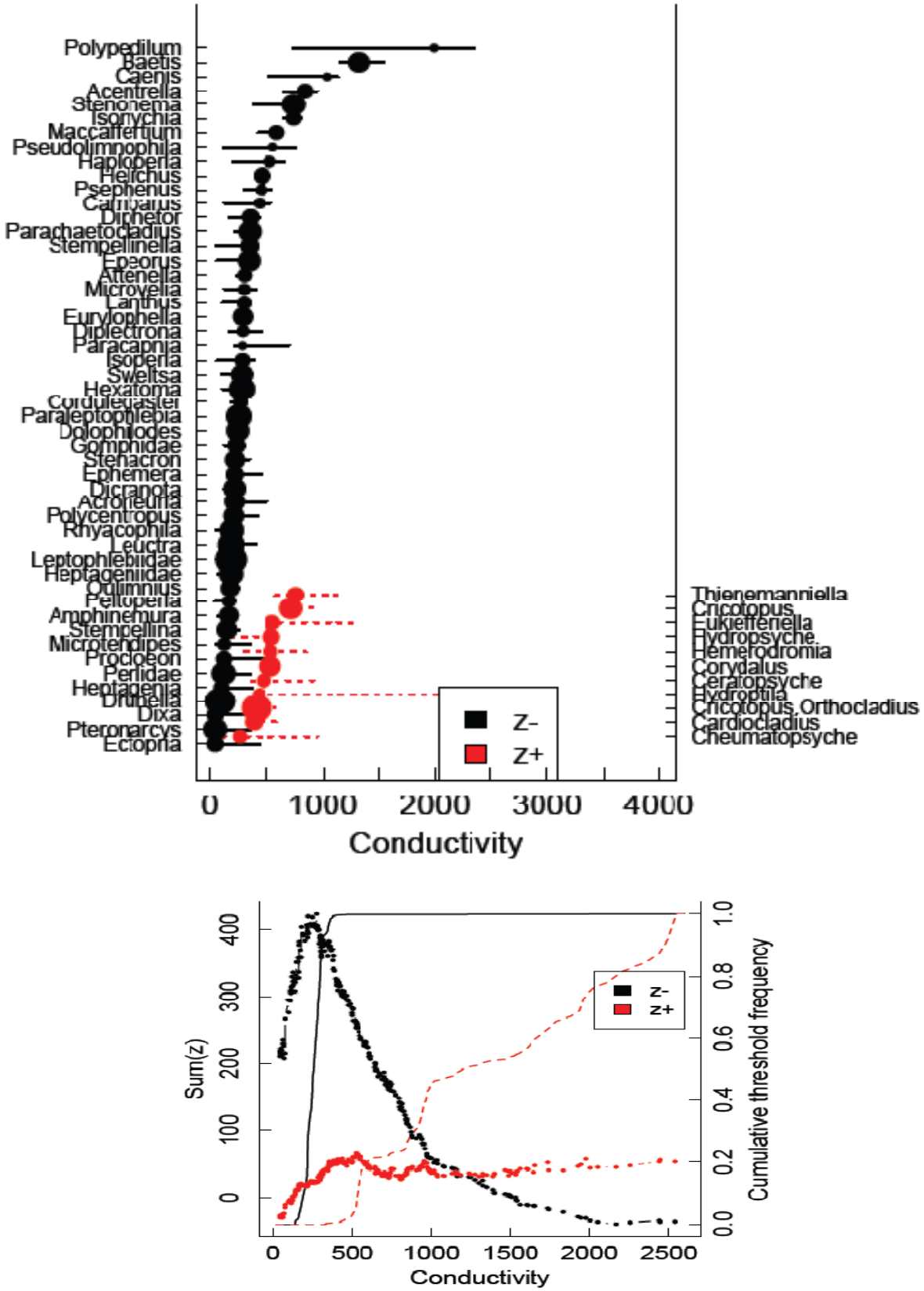


FIGURE 6.TITAN results for taxa having both high purity and reliability when run against conductivity Points are centered on the estimated change point for each taxa, horizontal lines indicate 95% CI based on 500 bootstrap replicates, and point size is proportional to the taxa z-score.



Supplemental Material to be online

(to accompany Bernhardt et al. "How many mountains can we mine…")

This Supplement Includes two figures (Figures 1 and 2) and one table (Table 2) that are directly referenced in the text as well as a detailed description of sensitivity analyses that we performed to test the robustness of our TITAN estimates. The section on sensitivity analyses is referred to in the present manuscript as "SI Section 2"

Figure Headings

Supplemental Figure 1: Abundance patterns for individual taxa determined to respond significantly and negatively to the extent of surface mining in their catchment.

Supplemental Figure 2: Abundance patterns for individual macroinvertebrate taxa that evidenced a positive response to the extent of surface mining in their catchments.

Figure 1 Part 1

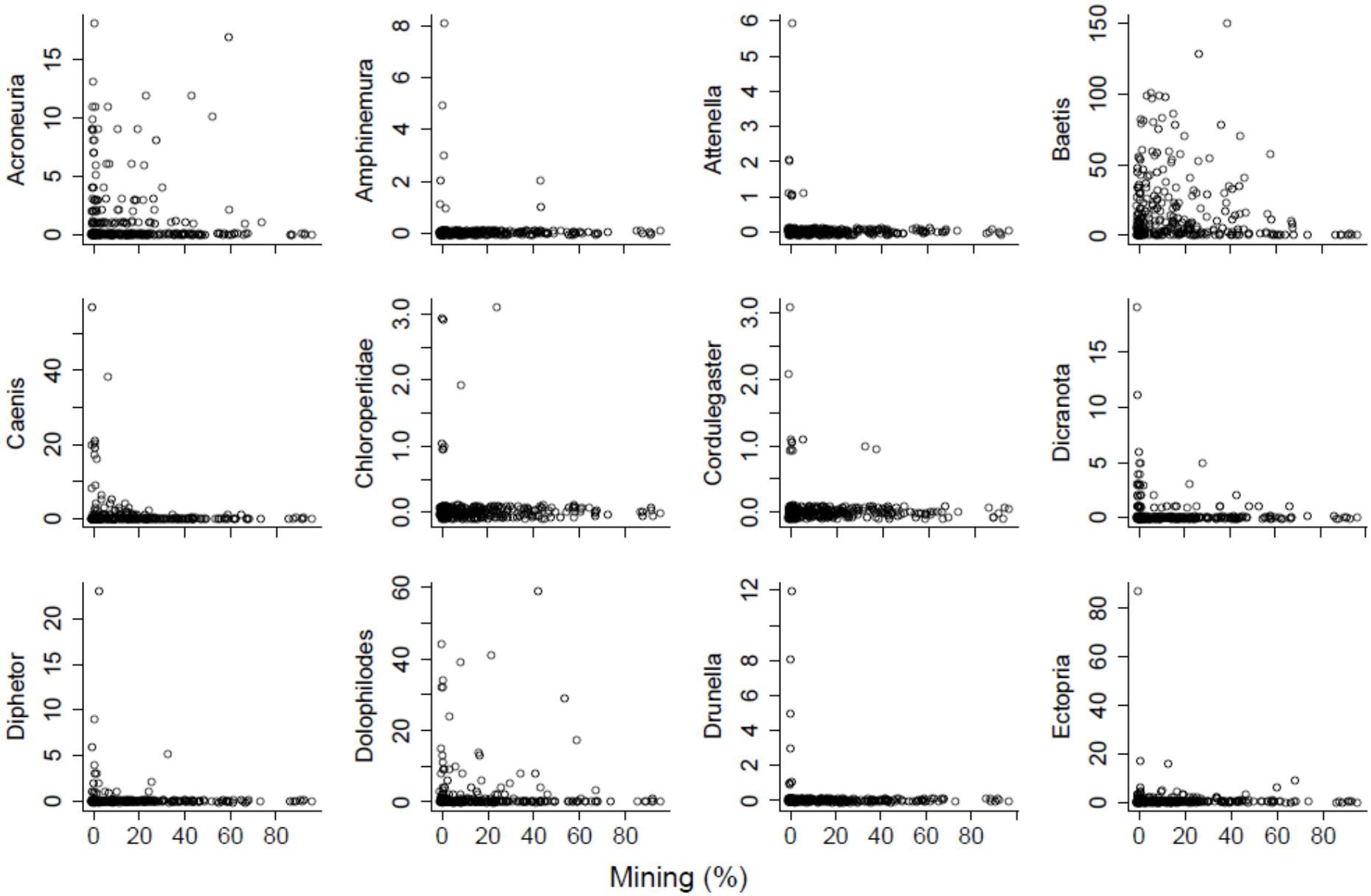


Figure 1 Part 2

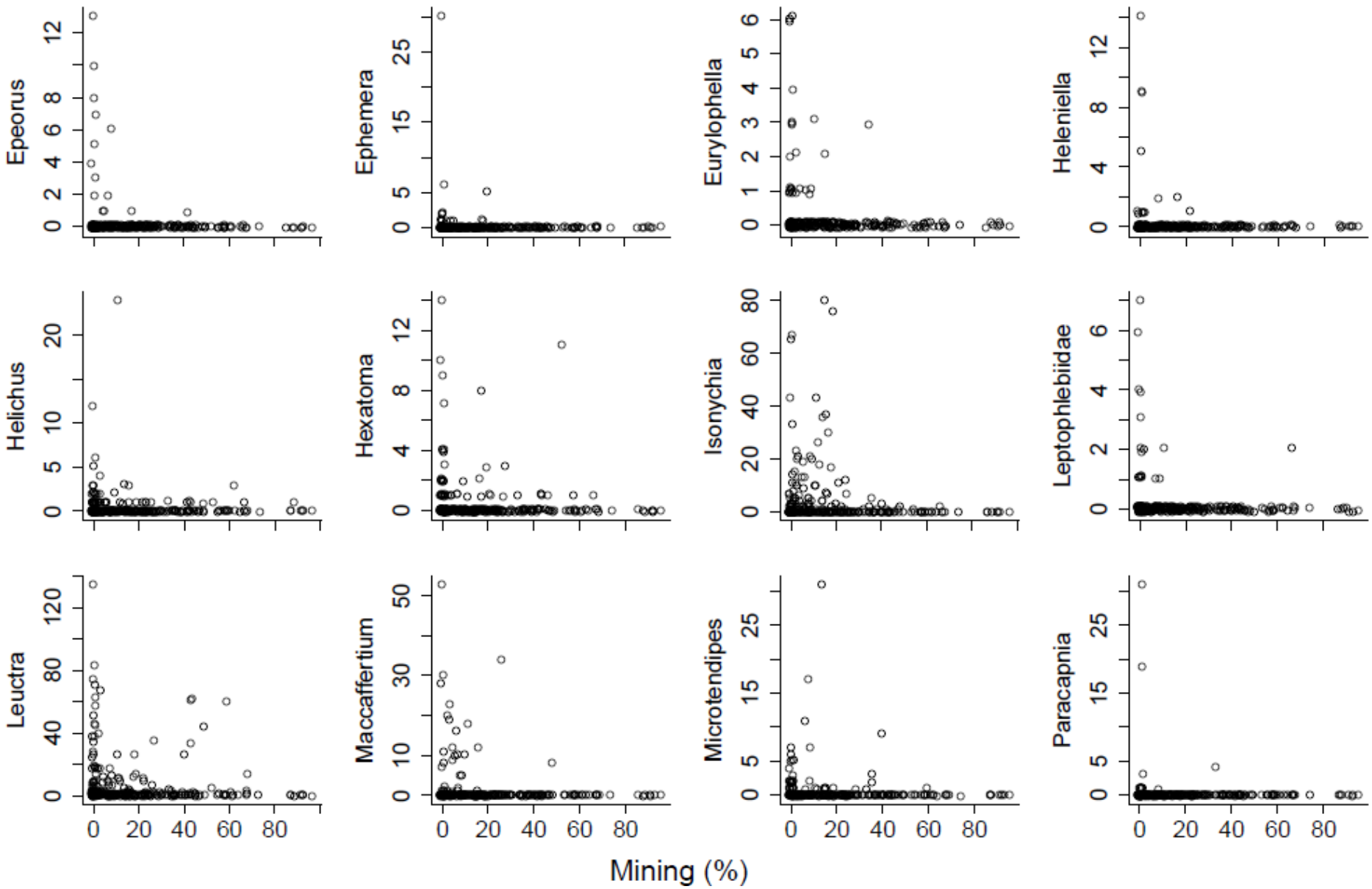


Figure 1 Part 3

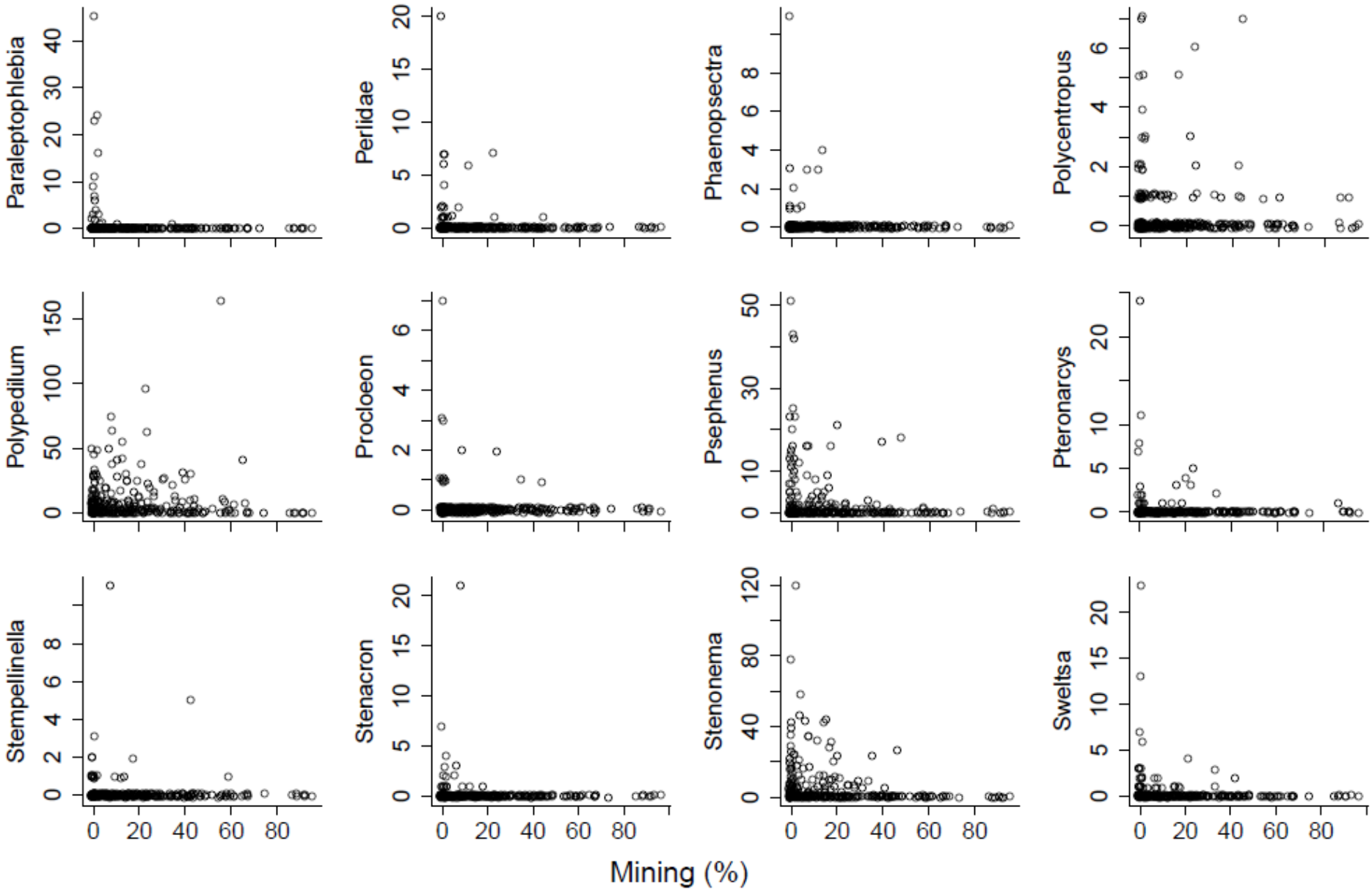


Figure 1 Part 4

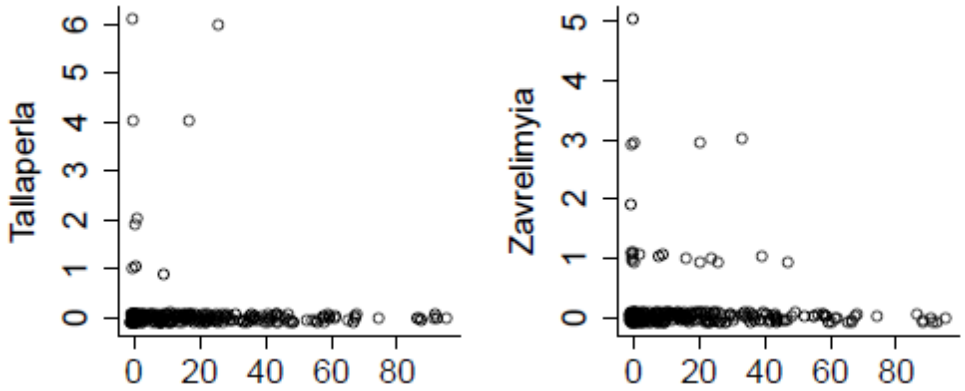
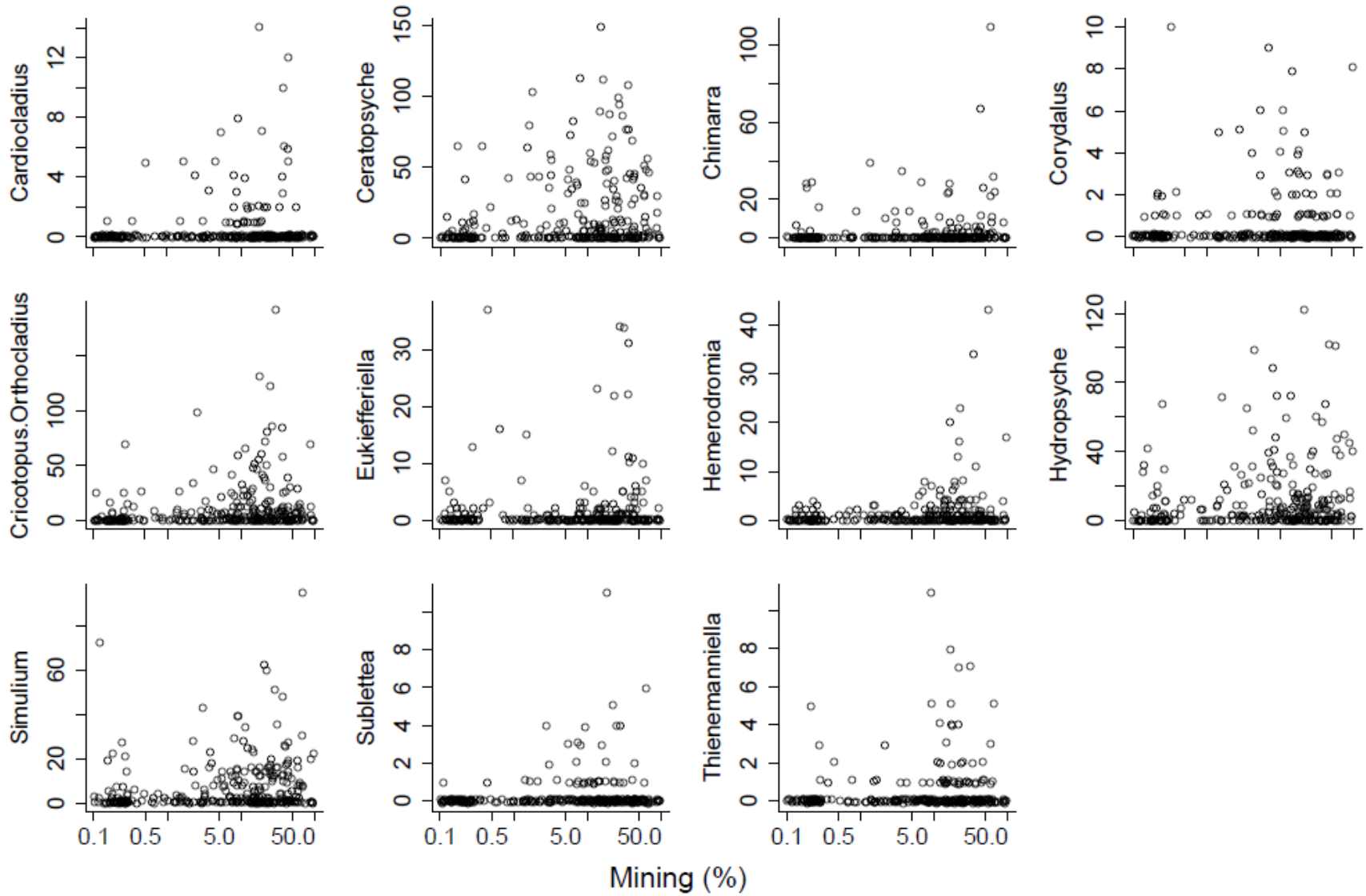
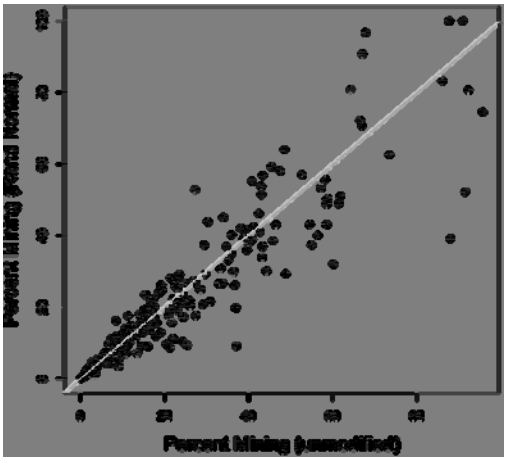


Figure 2


Cardiocladius
Ceratopsyche
Chimarra
Corydalus
Cricotopus.Orthocladius
Eukiefferiella
Hemerodromia
Hydropsyche
Simulium
Sublettea
Thienemanniella
0.1
0.5
5.0
50.0
Mining (%)

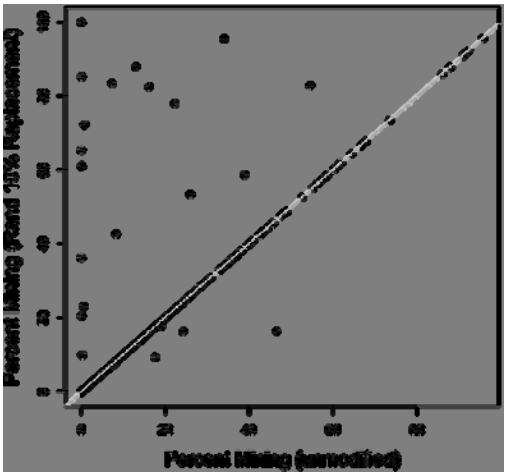
SI Section 2: Sensitivity Analyses with TITAN

Because we do not yet have estimates of the precision of our areal estimates of surface mining activity, we performed a series of sensitivity analyses with TITAN to determine whether our estimates of a mining threshold were robust to several types of possible error in surface mining estimates. We introduced error to the dataset using 3 different approaches.



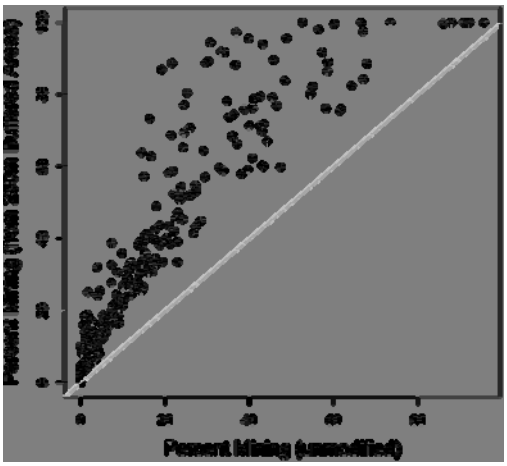
Method I: Random inflation/deflation of %mining (Figure 3)

We created a vector of values from random normal distribution (μ = 10, sd = 3) equal in length to %mining gradient and then divided vector by 10 (to give values from -1 to 1, centered around 0). We multiplied this vector value by %mining and summed with %mining. This introduces random scatter into the %mining estimates, with the scatter increasing proportional to the absolute %mining value.



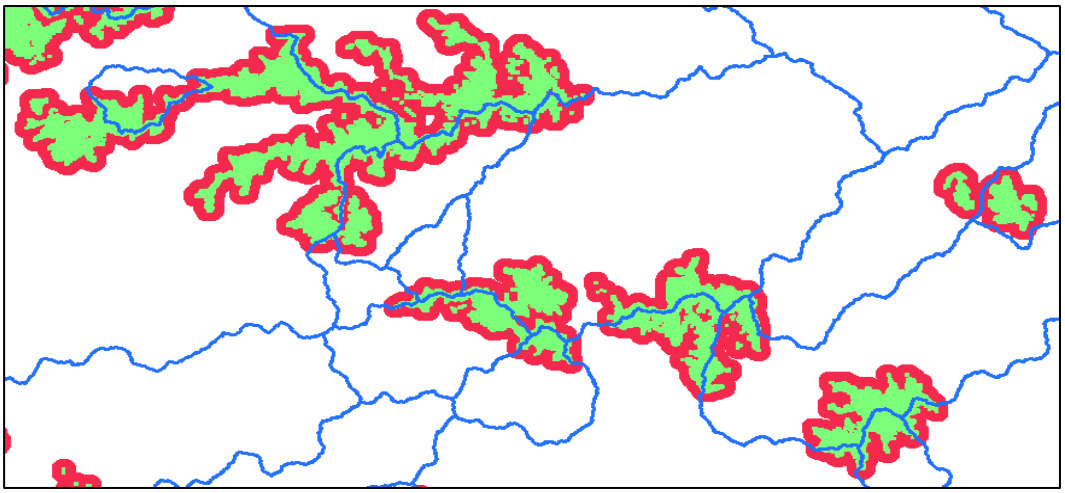
Method II: Replacement of 10% of data w/ random values (Figure 4)

We randomly selected 10% of the total observations and assigned them a random %mining value between 0-100%



Method III: 250m Buffer around all mined areas (Figure 5)

We assume that the largest uncertainty in the satellite imagery processing is the accuracty in determining the the perimeter of mined areas. Based on the geometry and total area of each watershed, as well as the geometry of the mined area within or near the watershed, uncertainty at the edge of mined areas can impact each watershed differently. We added 250m buffers (~8pixels) to the edge of every mined area (Figure 6), recalculated %mining within each watershed, and re-ran TITAN with these values.



Supplemental Figure 6. Example of buffered mine delineations. Green = SkyTruth Mining extent; Red = Buffered extension of mining delineation; Blue lines = watershed boundaries.

We found that TITAN results are robust when we introduce a moderate amount of random variation in the %mining values (Method 1, Supplemental Table 1, Supplemental Figure 7). The estimated change point value and CI are very similar to non-modified result (Supplemental Table 1).

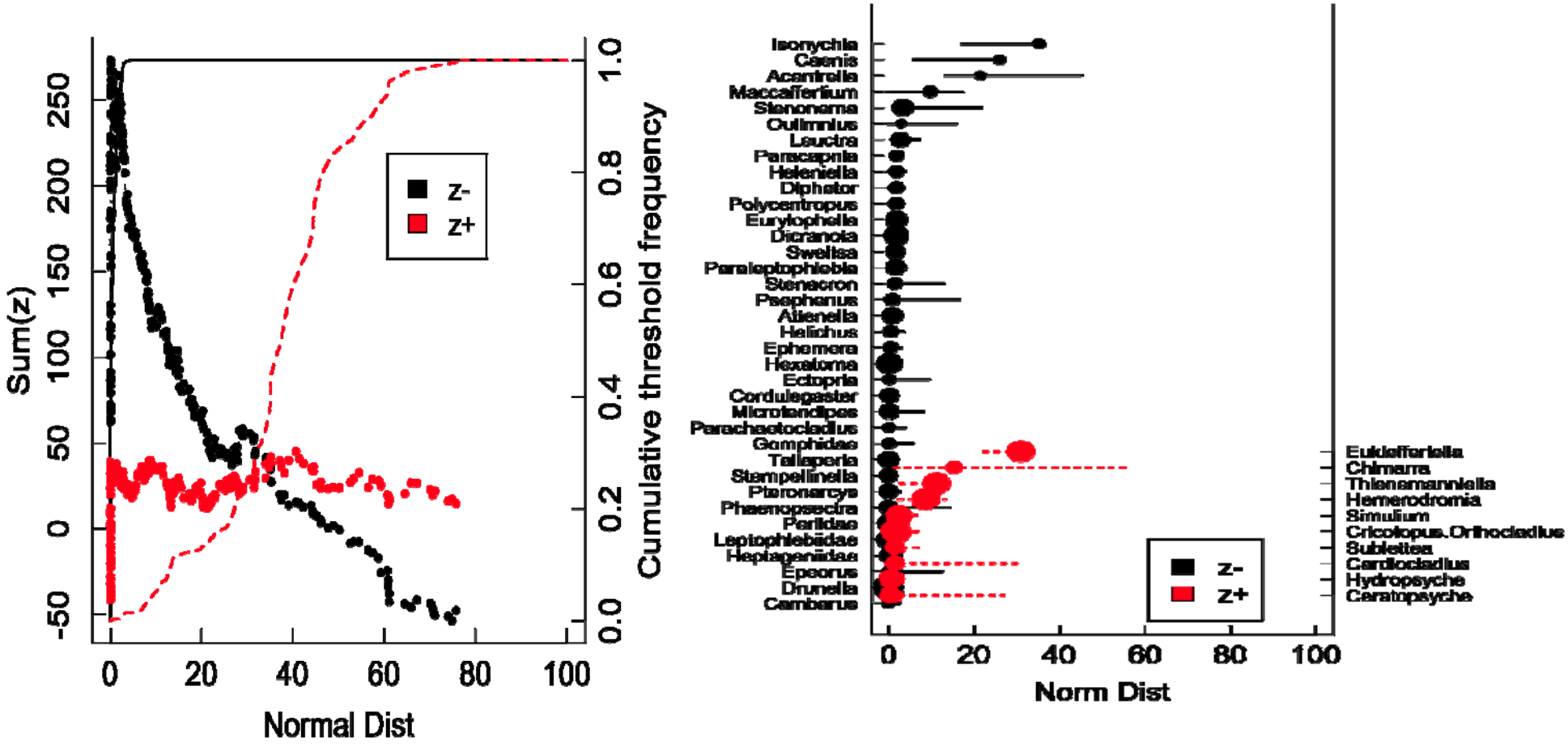
Supplemental Table 1. Change point values (+/- 95% boostrap CI) for each TITAN run.

		Change Point	Lower 95% CI	Upper 95% CI
No Modifications				
	sumz-	1.28	0.00	2.43
	sumz+	63.08	15.36	67.47
Random Change 10% Sites				
	sumz-	0.04	0.00	2.06
	sumz+	65.45	27.01	91.27
Normal Distribution Modifier				
	sumz-	0.06	0.00	2.36
	sumz+	41.04	10.09	61.02
Buffered Areas by 250m				
	sumz-	4.66	0.34	11.85
	sumz+	100.00	59.69	100.00

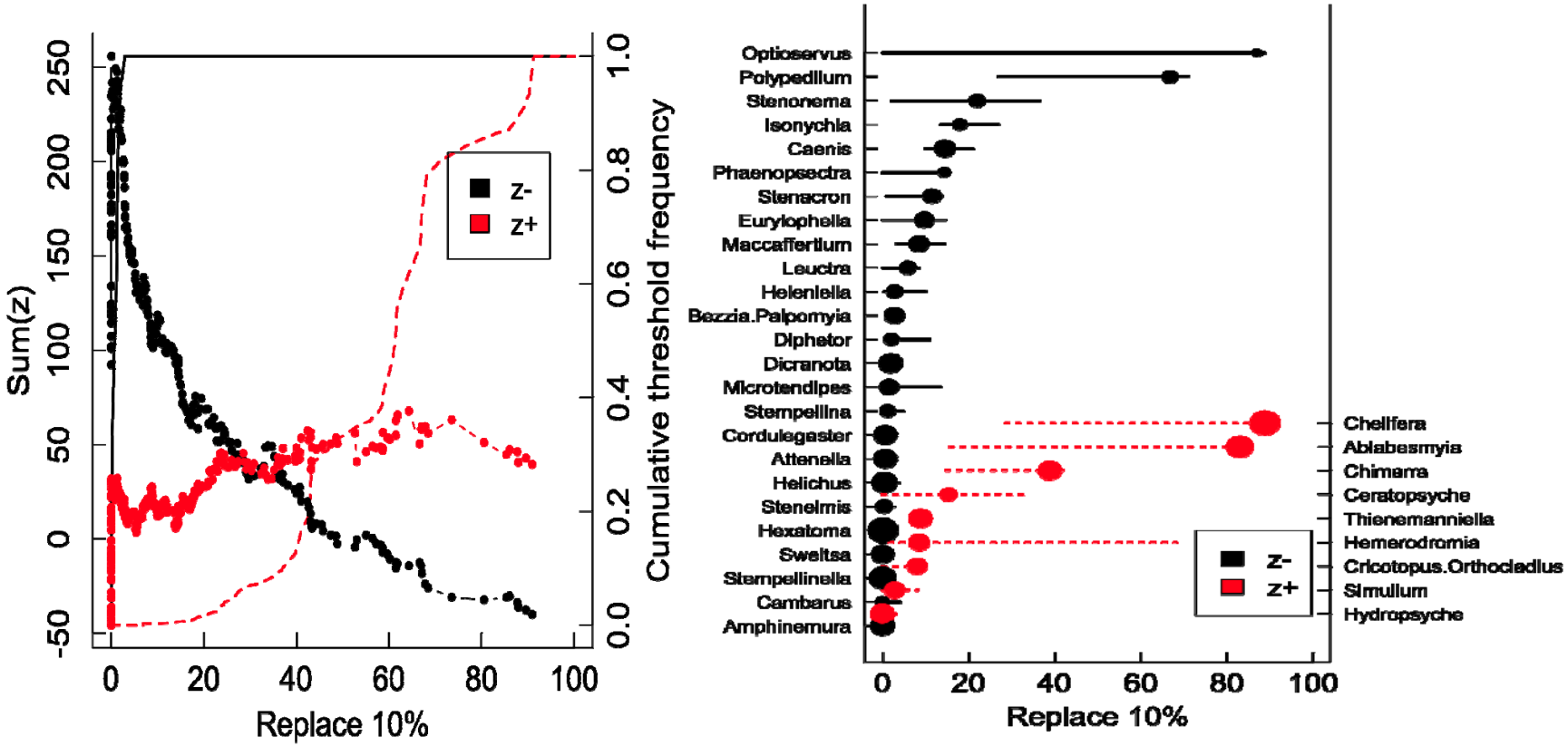
Similarly, when we replaced 10% of the observations with a random % mining value (Method 2), the overall community response value remains unchanged (Supplemental Table 1) but the number of taxa responding negatively decreases. (Supplemental Figure 8). This is likely because the random reassignment led to assigning rare taxa found only at a small number of unmined sites to some mined sites. This reassignment can introduce enough uncertainty in the patterns of abundance for rare taxa that a change point for that taxa cannot be determined

When we introduced systematic error by increasing the size of mined areas by 250m along all edges (Method 3) we were able to increase the change point estimate and confidence interval values (Supplemental Table 1, Supplemental Figure 9). We expected the values would increase (because we added mining area without changing patterns of taxa abundance). We found this error slightly inflated the estimated change point (from 1.3 to 4.7% mining) and increased the 95% confidence interval around this estimate. While such error causes the change point to be broader, there is still a clearly defined negative response (Supplemental Figure 9).

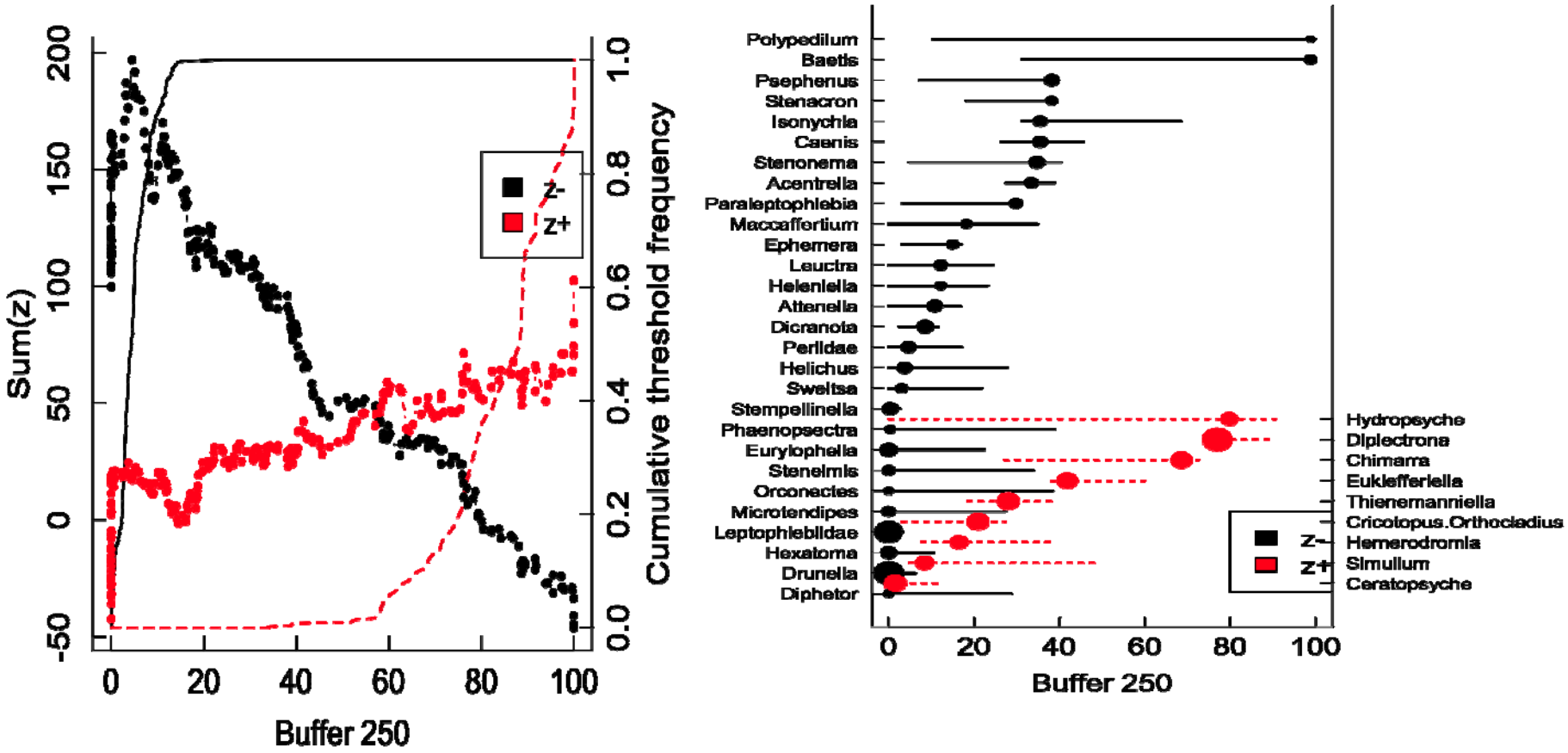
Supplemental Figure 7



Supplemental Figure 8



Supplemental Figure 9



Supplemental Table 2. Satellite image data used for this study (*p* and *r* refer to path/row location)

Landsat 5 (TM)							
p19r35	p19r34	p19r33		p18r34	p18r33		p17r33
7/3/2006	7/3/2006	7/3/2006		9/11/2005	9/11/2005		5/31/2005
9/7/1995	9/7/1995	9/7/1995		8/31/1995	8/31/1995		10/11/1995
9/8/1984	9/8/1984	9/8/1984		9/17/1984	9/17/1984		7/8/1984
Landsats 1-2 (MSS)							
p21r35		p20r35	p20r34	p20r33		p19r34	p19r33
8/20/1976		8/19/1976	8/19/1976	9/6/1976		6/7/1976	5/20/1976

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

NOV - 2 2010

Colonel Keith A. Landry
District Engineer
Louisville District Corps of Engineers
Attn: Todd Hagman (Regulatory Branch)
OP-FN, Room 752
P.O. Box 59
Louisville, Kentucky 40201-0059

Subject: Premier Elkhorn Coal Company, Little Fork Surface Mine
U.S. Army Corps of Engineers LRL-2007-0594
Kentucky Division of Mine Permits #898-0800

Dear Colonel Landry:

The U.S. Environmental Protection Agency (EPA), Region 4, has reviewed the information submitted by or on behalf of the Premier Elkhorn Coal Company for impacts to jurisdictional waters of the U.S. as a result of proposed surface coal mining activities associated with its Little Fork Surface Mine in Pike County, Kentucky (LRL-2007-0594; #898-0800). Our review has included the original April 24, 2007, U.S. Army Corps of Engineers (Corps) Clean Water Act (CWA) Section 404 permit application as well as several additional documents provided by or on behalf of the permit applicant. EPA is concerned that the permit, as proposed, is not consistent with requirements of the agencies' regulations, including the Section 404(b)(1) Guidelines, and therefore recommends that changes to the project identified in this letter be incorporated before authorization is provided. EPA is also recommending that an Environmental Impact Statement should be prepared for this permit to assess potential environmental impacts under the National Environmental Policy Act.

The applicant originally sought authorization to impact 6,845 linear feet (lf) of ephemeral and intermittent streams to facilitate construction of six hollow fills and four in-stream sediment ponds in unnamed jurisdictional tributaries to Little Fork, Robinson Creek, and Indian Creek. Little Fork discharges into Robinson Creek, and both Robinson Creek and Indian Creek discharge directly into Shelby Creek in the Levisa Fork watershed. Subsequently, the applicant revised the mine plan and presently proposes five hollow fills and three in-stream sediment control ponds. Anticipated impacts to jurisdictional waters now comprise 5,560 lf of ephemeral and intermittent streams, including 4,415 lf as a result of the hollow fills and 1,145 lf as a result of sediment control ponds and a "drainage corridor" between the toe of HF#3 and Pond#3.

EPA has been coordinating closely with your staff and the permit applicant since the 60-day ECP review period began on August 19, 2010, (including a 15-day extension of the review period). On September 30, 2010, EPA submitted a comment letter to the Corps providing additional detail on our informal comments of August 20, 2010, and requesting a meeting with

the Corps and the applicant to initiate efforts to resolve these concerns. EPA and the Corps subsequently held a conference call on October 6, 2010, to discuss EPA's letter and outline a path towards resolution of the concerns described therein. On October 14, 2010, EPA, the Corps, and the applicant held the first of numerous conference calls to discuss additional information requirements and opportunities to resolve ongoing concerns with the proposed project.

EPA is appreciative of the applicant's efforts during this process, which have included compilation and submittal of additional information substantiating the position that use of the adjacent reclaimed impoundment to store spoil material is not a practicable alternative for the proposed Little Fork Surface Mine. The applicant has also agreed to implement best management practices (BMP's) to minimize erosion and sedimentation from disturbed areas, retain existing vegetation to the maximum extent practicable, and take efforts to first identify and then isolate the most highly reactive spoil material likely to generate excessive total dissolved solids (TDS) and contribute to elevated specific conductivity (SC). Additionally, the applicant has agreed to amend its mitigation plan to add payment of an in-lieu-fee (ILF) to the Kentucky Department of Fish and Wildlife Resources Wetland and Stream Mitigation Program for authorized impacts to jurisdictional streams adversely affected due to construction of in-stream sediment ponds. Previously, the applicant had proposed an ILF payment for proposed permanent impacts, but planned to mitigate for sediment pond impacts simply via removal of the ponds and restoration of affected streams many years following the impacts themselves.

Despite the changes described above, EPA has significant remaining environmental concerns regarding this project as currently proposed. EPA's review is intended to ensure that the proposed project meets the requirements of the CWA. The CWA Section 404(b)(l) Guidelines promulgated in regulations by EPA in conjunction with the Secretary of the Army establish the substantive environmental standards applied in the review of projects proposing to discharge dredged or fill material into waters of the United States. The Guidelines establish a sequence of review requiring: (1) an evaluation of practicable alternatives that meet the project's basic purpose to ensure selection of the least environmentally damaging practicable alternative so long as that alternative will not result in significant environmental degradation); (2) taking all appropriate and practicable steps to minimize potential adverse impacts; and (3) compensation for all remaining unavoidable impacts to waters of the United States. In addition, the Guidelines require that no discharge may be permitted that would cause or contribute to significant degradation of the waters of the United States.

Scientific literature has increasingly recognized the relationship between discharges from surface coal mining operations and downstream water quality impairments. A 2005 published study, "Evaluation of Ionic Contribution to the Toxicity of a Coal-Mine Effluent Using *Ceriodaphnia dubia*" by Kennedy, et al. linked impairment of aquatic life to TDS levels. EPA also notes that in previous technical reports, the Commonwealth of Kentucky has recognized the potential detriment to stream biota in headwater streams in the Eastern Kentucky Coal Field correlated with specific conductivity levels above 400 µS/cm (Pond and McMurray, 2002[1]). A

[1] Pond, G.J. and S.E. McMurray. 2002. A Macroinvertebrate Bioassessment Index for Headwater Streams of the Eastern Kentucky Coalfield Region, Kentucky. Kentucky Department for Environmental Protection, Division of Water. Frankfort, KY.

2008 published study, "Downstream effects of mountaintop coal mining: comparing biological conditions using family- and genus-level macroinvertebrate bioassessment tools," by Pond, et al. found evidence indicating that mining activities have subtle to severe impacts on aquatic life and the biological conditions of a stream. A 2010 published study by Pond, "Patterns of *Ephemeroptera* taxa loss in Appalachian headwater streams (Kentucky, USA)," links conductivity as the most strongly correlated factor to *Ephemeroptera* abundance in streams impacted by mining and residential development. A draft report by EPA, "The Effects of Mountaintop Mines and Valley Fills on Aquatic Ecosystems of the Central Appalachian Coalfields," recognizes that surface coal mining causes effects that include resource loss, water quality impairment, and adverse effects on aquatic resources. Finally, another draft report by EPA, "A Field-based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams" recognizes stream-life impacts associated with elevated levels of conductivity.

As part of its permit application, the applicant collected water quality data from project streams in March 2007 and reported specific conductivity values ranging from 469 to 1,777 µS/cm. EPA collected similar data in February 2010 and found specific conductivity in these same streams to range from 57 to 988 µS/cm. In addition, EPA documented specific conductivity in receiving waters downstream of the surface mine site itself ranging from 497 to1,008 µS/cm (e.g. Little Fork, Robinson Creek, and Indian Creek). EPA further notes that Indian Creek, which is the receiving water body for 6 of the applicant's 37 proposed National Pollutant Discharge Elimination System (NPDES) outfalls, is on the KY 2006, 2008, and draft 2010 CWA 303(d) list (partially supporting warm water aquatic habitat) for sedimentation/siltation and TDS.

EPA believes that additional improvements must be made to the proposed mine's design, management practices, and monitoring plan in order to ensure compliance with the 404(b)(1) Guidelines. These improvements are designed to yield an overall improvement in the condition of the watershed, which has been significantly impacted by historic mining activities. EPA believes that the following conditions should be incorporated into any final authorization under Section 404 in order to ensure that the discharges will not cause or contribute to a violation of State water quality standards (WQS), or cause or contribute to significant degradation of waters of the United States consistent with the Guidelines (40 C.F.R. § 230.10(b) and (c)).

Fill Sequencing and Best Management Practices

EPA recommends that the proposed hollow fills be constructed sequentially (one at a time) with sufficient time between the construction of subsequent fills for water quality monitoring to demonstrate that the discharge of fill material does not result in adverse impacts to the downstream aquatic ecosystem. While the applicant has provided some information to suggest that construction of fills in a sequenced approach would not be feasible, the information provided to EPA has not demonstrated that this approach is not practicable. More importantly, we are concerned that without sequencing and associated monitoring, the project may result in the violation of water quality standards and cause significant degradation of stream functions and biodiversity. The applicant should be required to submit a practicability analysis of alternatives involving a sequenced approach for valley fill construction – including individual fill construction and construction of valley fills in two or three phases – before the proposed project is authorized.

EPA believes that if water quality or biological monitoring downstream of one "sequenced" valley fill demonstrates adverse impacts to the downstream aquatic ecosystem – as determined by exceedances of specific numeric thresholds – the permit should trigger implementation of an adaptive water quality management plan (AMP) prior to construction of the next hollow fill, as described in the enclosed special permit condition (see Enclosure 1). Construction of the next hollow fill would not be authorized if the monthly flow-weighted specific conductivity measured at the representative outfall downstream of the first hollow fill exceeds the applicable water quality criteria for more than one consecutive month, or if the overall trend in conductivity levels are increasing such that the linear trend demonstrates likely future exceedance of such criteria.[2] To support this demonstration, supplemental monitoring requirements, including both chemical and biological monitoring parameters, should also be included as special conditions.

EPA believes that several demonstrated BMPs and fill construction practices for surface coal mining operations have the potential to reduce existing downstream levels of conductivity and TDS. These practices include efforts to identify and then isolate TDS- or sulfate-producing materials to minimize the likelihood that these materials will come into contact with groundwater or precipitation and therefore impact downstream waters. The proper implementation of similar BMPs has been shown to reduce specific conductance in streams draining a Magoffin County, Kentucky surface coal mine by as much as 75 percent over elevated background conditions in re-mined valleys.

EPA is appreciative of the applicant's recent endorsement of measures to identify and isolate TDS and/or sulfate producing materials in the field, as memorialized in their November 1, 2010, list of revised BMP's. EPA recommends that these measures be included as special conditions into any final authorization under Section 404 for disposal of dredged or fill material into waters of the U.S. for the Little Fork Surface Mine. These special conditions should include, at a minimum, the following:

- Identification via field-based testing of TDS and/or sulfate-producing materials that must then be isolated;
- Implementation of hollow fill design alternatives that reduce infiltration (e.g. compact surface lifts, crown the fill surface) and controls flow through the fill to avoid contact time between water and reactive materials (i.e. TDS and/or sulfate producing geologic strata); and
- Use of only low-reactive or non-reactive durable rock to construct underdrains and place only these same materials adjacent to the sides of the highwalls and hollow fills.

EPA notes that the BMPs described above relate directly to fill activities in waters of the United States that are likely to have impacts on downstream water quality. The Section 404

[2] With respect to conductivity, EPA would be satisfied with using 500 µS/cm as an numeric interpretation of the narrative standards relevant here. This value represents best-available scientific information on the relationship between conductivity levels and aquatic life in central Appalachian streams, as described in the scientific literature described earlier in this letter.

regulations establish a requirement at 40 C.F.R. 230(10)(b) that no permit may be issued that would cause or contribute to a violation of WQS. This requirement must be met regardless of whether actions necessary to meet this provision would trigger changes to permits issued under other Federal or State regulatory programs.

Adaptive Management Plan (AMP)

EPA believes that special conditions should include an AMP – described above – based on robust water quality and biological monitoring to identify trends in these parameters and to define specific thresholds of concern. If such thresholds are reached, the AMP would require specific response actions. EPA also believes the AMP should include a phased approach, such that increased impacts to downstream waters would trigger increased remedial actions until such time as water quality goals are met.

Existing scientific literature has demonstrated a strong relationship between elevated levels of specific conductance, surface coal mining activities, and degradation of aquatic communities. Therefore, EPA believes that levels of SC should be included as trigger points within the AMP. Recognizing that conductivity levels in on-site streams are already elevated, and anticipating that specific conductance in affected streams will experience at least a short-term increase during land clearing, initial excavation, and hollow fill construction, the trigger for development of the AMP will be applicable only after the initial six (6) months following the discharge of dredged or fill material into waters of the U.S. (I.4(v)). This initial 6-month period would require notification to both the Corps and EPA if monitoring indicates that the trend in monthly flow-weighted conductivity, defined in Special Condition I.4(iii), will exceed background levels or an acceptable numeric interpretation of the applicable narrative water quality standards[3], whichever is greater. Background conditions should be defined as the lesser of values measured in the field in March 2007 and February 2010 (Table 1).

If, however, during any 3 consecutive months during the subsequent 12 months of monitoring, the trend defined at proposed Special Condition I.4(iii) indicates that the monthly flow-weighted conductivity values will not likely fall below levels incompatible with meeting applicable water quality standards, or if any 3 consecutive monthly flow-weighted conductivity values exceed such levels,[4] then the permittee will conduct an analysis of the sources of effluent conductivity and develop Phase I of the AMP to reduce effluent conductivity (measured as specific conductivity) and TDS (see Enclosures 1 and 2). This AMP, to be developed by the applicant and approved by the Corps, should be based on the most technologically advanced and effective approaches available, and assumes that efforts to identify and isolate TDS- and sulfate-producing geologic strata are implemented as part of mine design and hollow fill construction, as outlined above.

If water quality goals are not met after an additional six months of implementation of the AMP, then Phase II of the AMP will be initiated. This plan will also be developed by the applicant and approved by the Corps. If Phase II of the AMP also fails to result in water quality conditions consistent with the goals outlined herein, it is EPA's recommendation that the applicant be

[3] See, supra, footnote 2.
[4] See, supra, footnote 2.

required by the permit special conditions to provide additional compensatory mitigation, either on-site or within the 12-digit hydrologic unit code (HUC) sub-watershed, aimed at addressing adverse chemical water quality conditions.

Table 1. Background specific conductivity in project streams.

Station I.D.	Station Location	Date	Investigator	Specific Conductivity (uS/cm)	BACKGROUND CONDITIONS [1]
UT Little Fork	HF#1	March 2007	Applicant	638	638
ROB02	UT HF#1	Feb 2010	EPA R4	769	
UT Little Robinson Crk	HF#3	March 2007	Applicant	1777	988
ROB07	UT HF#3	Feb 2010	EPA R4	988	
UT Little Robinson Crk	HF#4	March 2007	Applicant	785	785 [2]
ROB09	UT HF#4	Feb 2010	EPA R4	57 [2]	
UT Indian Crk	Pond#21 (HF#5/6)	March 2007	Applicant	469	191 [3]
UT Indian Crk	HF#5	March 2007	Applicant	681	
UT Indian Crk	HF#6	March 2007	Applicant	681	
ROB12	UT HF#5/6	Feb 2010	EPA R4	191	

1 Background specific conductivity is determined as the lesser of *in-situ* specific conductivity measured by the permit applicant in March 2007 and by EPA Region 4 in February 2010.

2 Field conditions at HF#4 in February 2010 were not representative of hydrologic conditions required to form the channel present in this valley. As a result, data collected in this valley in February 2010 is considered anomalous.

3 HF#5 and HF#6 are proposed to be built in two forks of a single valley. The toe of each of these proposed fills will lie approximately 140 feet apart, effectively rendering them a single large fill. The two fills will share a single sediment pond (Pond #21), and it is the specific conductivity measured in the field at the proposed location of this pond that will be considered background conditions in this valley.

In addition to concerns regarding conductivity levels directly downstream of proposed valley fills, EPA remains concerned about the overall cumulative impacts of the proposed Little Fork Surface Mine on an already degraded watershed. Therefore, EPA believes the AMP should require monitoring of conductivity levels downstream of the proposed operation in Robinson Creek and Indian Creek. Despite currently elevated conductivity levels in streams adjacent to the project site, as described above, EPA has reason to believe that several streams in the project area currently contribute freshwater dilution to downstream waters. Increasing conductivity levels in these streams, therefore, could make conditions in an already impaired watershed worse.

Therefore, the AMP should require monitoring downstream of the project in Indian Creek and Robinson Creek to ensure that baseline conductivity levels are not exceeded. If monitoring demonstrates increased levels of conductivity in these receiving streams that are attributable or likely attributable to the proposed project, the applicant should be required to implement corrective actions within the watershed to ensure that conductivity levels do not exceed pre-

mining levels. Such opportunities may include remediation of previously mined areas within the watershed, implementing additional BMPs within the project site, or additional contributions to the Kentucky ILF program for projects undertaken within the watershed. Without imposing such a condition in the AMP, EPA is concerned that the project has the potential to cause or contribute to violations of downstream WQS and continuing impairment of downstream waters.

Water Quality

The proposed project would impact more than 1 mile of streams, including the permanent loss of 4,415 lf of streams located in the Robinson Creek and Indian Creek watersheds. Both Robinson Creek and Indian Creek discharge directly into Shelby Creek in the Levisa Fork watershed. Based on our preliminary review of the available water quality data, we believe that the proposed project may cause or contribute to exceedances of WQS in streams that are already known or suspected to be impacted by mining-related (and other) causes. Furthermore, the Kentucky Pollutant Discharge Elimination System (KPDES) General Permit previously issued for this project does not set numeric limits for parameters of concern, such as conductivity, which scientific literature has demonstrated have significant effects on downstream biological communities.

EPA notes that Indian Creek is the receiving water body for 6 of the applicant's 37 NPDES outfalls for this project (authorized under a Kentucky NPDES General Permit, KPDES No. KYG046229). Additionally, nine outfalls discharge to unnamed tributaries of Indian Creek. Indian Creek is on the Kentucky 2006, 2008, and draft 2010 CWA§303(d) lists (partially supporting warm water aquatic habitat) for sedimentation/siltation and TDS. The CWA§303(d) list shows one of the suspected sources of the impairment in Indian Creek to be surface mining. The KPDES General Permit under which the project initially received coverage has expired and has been replaced by the most recent KPDES General Permit to Discharge Treated Wastewater into Waters of the Commonwealth applicable for coal mining (KYG040000; July 1, 2009).

The 2009 KPDES General Permit under which this project is (apparently) covered expressly excludes from coverage operations discharging directly to waters that are listed for coal-mining related pollutants. Such pollutants are defined to include sedimentation, total suspended solids, TDS, conductivity, iron, manganese, and metals. This project will discharge directly to waters that are listed as impaired due to TDS and sedimentation. Therefore, EPA believes that general permit for these outfalls is inappropriate and therefore the Section 402 permit as written does not protect WQS.

The 404(b)(1) Guidelines prohibit permitting a discharge of dredged or fill material if such discharge would cause or contribute to violations of any applicable WQS. In light of this provision, EPA believes that no Section 404 permit should be issued that would authorize discharges to Indian Creek or its tributaries until these inconsistencies are resolved. Alternatively, if the Corps determines that issuing a permit associated with discharges to these streams is appropriate, then the permit should include limits for specific conductance that are protective of water quality. These limits should be based on the conclusions of the scientific studies described above, which reflect best-available scientific information.

National Environmental Policy Act / Environmental Justice

Based on our review of the information available, including a Cumulative Impact Assessment (CIA) for the Upper Levisa, EPA believes it may be appropriate for the Corps to prepare an Environmental Impact Statement (EIS) concerning this proposed project. In making the determination regarding the need to prepare an EIS, we recommend that you consider the relatively large scale of the impacts associated with proposed project, e.g., the loss of over 4,400 lf of stream and the construction of 5 valley fills, as well as questions concerning how effective the proposed mitigation will be at reducing the severity of the potential direct, indirect, and cumulative impacts. In that light, EPA is uncertain that the current mitigation proposal would serve as a basis to support a Finding of No Significant Impact. With regard to the CIA, we are particularly concerned that the geographic boundary (HUC-8) may be too large spatially to provide a meaningful analysis of impacts from mining in the affected watershed. In addition, we are concerned that the CIA does not address potential cumulative human health impacts, and that the CIA presents several instances of incomplete information.

Consistent with Executive Order 12898 entitled "Federal Actions to Address Environmental Justice In Minority Populations and Low-income Populations" and the accompanying Presidential Memorandum, EPA recommends that the Corps' Section 404(b)(1) Guidelines and NEPA reviews analyze the potential for disproportionately high and adverse effects on low-income or minority populations in the area. Specifically, a characterization of the economic status of residents near the site and the conditions they face including any effects relating to the proximity of the blasting zone, locations of discharges of fill material, truck traffic, noise, fugitive dust, and habitat loss needs to be conducted to adequately assess the potential impact to EJ communities. Additional information is also needed concerning sources of drinking water for the affected populations (including municipal water supplies and private sources of drinking water including streams and/or wells). EPA also recommends that you take steps to ensure meaningful engagement of affected communities.

Conclusion

While EPA appreciates the applicant's willingness to discuss the adoption of certain BMP's into their mine plan, we believe that the Corps should incorporate further required special conditions before issuing any final authorization. Without including such conditions, EPA believes the proposed project is inconsistent with the 404(b)(1) Guidelines and will likely cause violations of WQS and associated significant degradation of stream life. EPA's recommended special conditions are outlined above, and detailed in the enclosed document. EPA also requests that we have the opportunity to review and comment on the draft permit and special conditions prior to finalization.

I want to thank you and your staff for your cooperation and willingness to address our issues. We look forward to continue working closely with you and the applicant as the permit is finalized. If you have any questions, please call me at (404) 562-9470 or Eric Somerville of my staff at (706) 355-8514.

Sincerely,

Gail Mitchell, for

James D. Giattina
Director
Water Protection Division

Enclosures

cc: Jim Townsend, Louisville District, Louisville, KY
Lee Anne Devine, Louisville District, Louisville, KY
Justin Branham, Louisville District, Sassafras, KY
Joe Blackburn, Office of Surface Mining, Lexington, KY
Lee Andrews, U.S. Fish and Wildlife Service, Frankfort, KY
Carl Campbell, Kentucky Department of Natural Resources, Frankfort, KY
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Sandy Gruzesky, Kentucky Division of Water, Frankfort, KY

Enclosure 1
Proposed Clean Water Act Section 404 Permit Special Conditions

I. Best Management Practices & Adaptive Management Plan

1. The permittee shall submit a detailed plan to the U.S. Army Corps of Engineers (Corps) Louisville District and the U.S. Environmental Protection Agency, Region 4 (EPA) for implementing mine design and hollow fill construction alternatives and best management practices (BMPs) to minimize TDS and specific conductivity during the placement of fill material into waters of the United States (U.S.) during the construction of the hollow fills. The objective of these procedures is to ensure that effluent discharging from the mine does not have a monthly flow-weighted specific conductivity greater than that which would violate applicable water quality standards,[1] consistent with best-available science on the relationship between conductivity and aquatic life. This plan must be approved by the Corps, and transmitted to EPA, prior to discharge of any dredged or fill material into any water of the U.S. Proposed actions should include, but are not necessarily limited to:

    - Identification via field-based testing of TDS and/or sulfate producing materials that must then be isolated;
    - Implementation of hollow fill design alternatives that reduce infiltration (e.g. compact surface lifts, crown the fill surface) and controls flow through the fill to avoid contact time between water and reactive materials (i.e. TDS and/or sulfate producing geologic strata);
    - Use of only low-reactive or non-reactive durable rock to construct underdrains and place only these same materials adjacent to the sides of the highwalls and hollow fills.

2. The permittee shall construct hollow fills individually, one at a time, with an adequate monitoring period between completion of one fill to demonstrate water quality is protected. Construction of the next hollow fill would not be authorized if the monthly flow-weighted specific conductivity measured at the representative outfall downstream of the first hollow fill exceeds levels consistent with applicable water quality standards for more than one consecutive month, or if the overall trend in conductivity levels are increasing such that the linear trend demonstrates likely future exceedance of such levels.[2]

3. The permittee shall submit documentation to the Corps and EPA indicating all BMPs employed in each hollow fill within 30 days of site preparation and commencement of construction of the rock underdrain.

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[1] See, supra, footnote 2.
[2] See, supra, footnote 2.

4. (i) The permittee must submit monthly flow-weighted conductivity, $\overline{K}$, to the Corps and EPA for the effluent of Pond#1, Pond#3, Pond#15, and Pond#21 following the commencement of discharges of fill material into waters of the U.S. using data collected as part of the applicable Kentucky NPDES permit, augmented as necessary to meet the special condition requirement below. Monthly flow-weighted conductivity shall be calculated as follows:

$$\overline{K} = \frac{\sum_i (Q_i \times K_i)}{\sum_i Q_i}$$

where:

$\overline{K}$ = monthly flow-weighted conductivity, µS/cm
Qi = flow for the ith sample per month, cfs
K_i = conductivity for the ith sample per month, µS/cm.

(ii) Specific conductivity will be measured no less frequently than two (2) times per month following the initial discharge of dredged or fill material into waters of the U.S. in each valley where such discharges occur through final bond release.

(iii) The monthly flow-weighted conductivity, $\overline{K}$, will be plotted as a time series and the trend in effluent conductivity calculated by linear regression. If the trend indicates that the monthly flow-weighted conductivity will exceed background levels, as defined below, or another acceptable numeric interpretation compatible with applicable narrative water quality standards,[3] whichever is greater, during the first six months following the initial discharge of dredged or fill material into any water of the U.S., the applicant will promptly notify both the Corps and EPA. All data will be provided to both the Corps and EPA within 15 days of the final monthly measurement used to calculate flow-weighted conductivity.

(iv) Background specific conductivity levels are defined as the lesser value recorded *in-situ* by the permit applicant in March 2007 and EPA in February 2010, except at HF#4 where anomalous conditions in February 2010 affected data integrity:

Tributary draining HF#1:	638 µS/cm
Tributary draining HF#3:	988 µS/cm
Tributary draining HF#4:	785 µS/cm
Tributary draining HF#5/6:	191 µS/cm

(v) If during any three (3) consecutive months during the subsequent twelve (12) months following the monitoring period outlined in I.4(iii), the trend defined therein indicates that the monthly flow-weighted conductivity values will not

[3] See, supra, footnote 2.

likely be less than necessary to satisfy applicable water quality standards by the end of this 12-month monitoring period, or if any three (3) consecutive monthly flow-weighted conductivity values exceed such levels,[4] then the permittee will conduct an analysis of the sources of effluent conductivity and develop an adaptive management plan (AMP) Phase I to reduce effluent conductivity (measured as specific conductivity) and TDS.

(vi) The conductivity trend analysis and adaptive management plan shall be submitted to the Corps for approval, and transmitted to EPA, within 30 days of conditions defined in I.4(v). The plan shall be implemented within 30 days of written approval by the Corps. Implementation of the plan will continue until the monthly flow-weighted conductivity falls below the levels described in paragraph (v), above, for three (3) consecutive months. If after cessation of AMP I implementation, conductivity trends defined in I.4(v) begin to rise, implementation of the AMP will be reinitiated.

5. If monthly flow-weighted conductivity values exceed the levels described in paragraph (v), above, continually for three months after implementation of AMP Phase I, the permittee shall prepare, within 30 days, recommendations for additional actions to reduce effluent conductivity (AMP Phase II). These recommendations shall be implemented within 30 days of written approval by the Corps.

II. Effluent and In-stream Chemical and Biological Monitoring

A. Effluent Monitoring

The permittee shall perform effluent monitoring from representative outfalls on Pond#1, Pond#3, Pond#15, and Pond#21, as these ponds are established. Effluent monitoring samples are to be collected at the outlet of each pond. Where the following monitoring conditions include additional monitoring parameters or monitoring events, these data shall augment, but not replace monitoring requirements in the Kentucky NPDES permit.

a. Parameters and Test Methods

i) Hydrologic permanence of outflow from the ponds should be monitored and logged by a continuously recording data logger.

ii) The permittee should perform effluent monitoring of the parameters listed in Table 1, analyzed using EPA Test Methods in 40 CFR Part 136 by an approved licensed laboratory.

b. Sampling Location

The sampling should be conducted at each representative outfall at Pond#1, Pond#3, Pond#15, and Pond#21.

c. Sampling Frequency

[4] See, supra, footnote 2.

The sampling frequency is as noted in Table 1. Samples required quarterly should be no fewer that five (5) days apart, and the amount of precipitation for the previous 24 hour period should be recorded on-site and reported (to the nearest 0.1 inch) as part of the sampling report. Samples required twice per month should be no fewer than five (5) days apart, and the amount of precipitation for the previous 48 hour period should be recorded on-site and reported (to the nearest 0.1 inch) as part of the sampling report. Monitoring will continue through final bond release.

Reporting

Reports shall contain tabulated data (including sample station I.D., date, and time) and graphs necessary to present information clearly and concisely, including all such tables and graphs necessary to summarize and present the entire period of record for each parameter and sample station. Latitude and longitude coordinates of all water quality monitoring locations with the applicable datum identified must be provided along with photographs and figures illustrating all sample locations. Calibration records of all *in-situ* multi-probe or single-probe water quality instruments and laboratory reports showing the analytical results must also be submitted.

All results should be clearly labeled with the applicable CWA permit number and KDNR DMP number and submitted KDOW, the Corps, and EPA Region 4.

Table 1. Supplemental effluent and in-stream water quality monitoring parameters.

Parameter	Units	Method	Sample Frequency
Bicarbonate Alkalinity	mg/l		Quarterly
Chlorides	mg/l	EPA300.0	Quarterly
Discharge	cfs	DOWSOP03019	Twice per month
Dissolved oxygen	mg/l	DOWSOP03014	Twice per month
Duration of discharge[1]	days		Continuous
Hardness (as $CaCO_3$)	mg/l	SM 2340B	Quarterly
pH	s.u.	DOWSOP03014	Quarterly
Precipitation	inches		Continuous
Sulfates	mg/l	EPA300.0	Quarterly
Specific conductance[2]	uS/cm	EPA120.1	Twice per month
Temperature	Deg C	DOWSOP03014	Twice per month
Turbidity	ntu	DOWSOP03014	Twice per month
Total Dissolved Solids (TDS)	mg/l	SM 2540C	Quarterly
Total Calcium	ug/l	EPA200.7	Quarterly
Total Magnesium	ug/l	EPA200.7	Quarterly
Total Potassium	ug/l		Quarterly
Total Sodium	ug/l		Quarterly
Total Recoverable Antimony	ug/l	EPA200.8	Quarterly
Total Recoverable Arsenic	ug/l	EPA200.8	Quarterly
Total Recoverable Beryllium	ug/l	EPA200.8	Quarterly
Total Recoverable Cadmium	ug/l	EPA200.8	Quarterly
Total Recoverable Chromium (III)	ug/l		
Total Recoverable Chromium (IV)	ug/l		

Total Recoverable Copper	ug/l	EPA200.8	Quarterly
Total Recoverable Iron[2]	ug/l	EPA200.8	Quarterly
Total Recoverable Lead	ug/l	EPA200.8	Quarterly
Total Recoverable Manganese[2]	ug/l	EPA200.8	Quarterly
Total Recoverable Mercury	ug/l	EPA1631E or 245.7	Quarterly
Total Recoverable Nickel	ug/l	EPA200.8	Quarterly
Total Recoverable Selenium	ug/l	EPA200.8	Quarterly
Total Recoverable Silver	ug/l	EPA200.8	Quarterly
Total Recoverable Thallium	ug/l	EPA200.8	Quarterly
Total Recoverable Zinc	ug/l	EPA200.8	Quarterly

[1] Duration of discharge from pond should be measured using a continuously recording data logger.
[2] Specific conductance, manganese, and iron need to be sampled at in-stream chemical monitoring locations only, unless otherwise stated in the applicable Kentucky NPDES permit.

B. WET Monitoring

Beginning at the initiation of discharge from representative outfalls (as specified above under "Effluent Monitoring"), EPA believes coal mine permits should require the permittee to perform either acute or chronic WET tests on the representative outfalls based on the duration of the discharge as documented by the continuously recording data loggers referenced in II.A(a)(i). The results of WET monitoring will be used to determine the effectiveness of the BMPs.

In cases where hydrologic permanence monitoring data indicate a sediment pond with any volume of discharge lasting more than 4 consecutive days, chronic WET tests should be performed using *Ceriodaphnia dubia* and *Pimephales promelas* and using a dilution series that includes 100 percent effluent and the in-stream waste concentration.[5] The end points should be reported as the inhibition concentration that affects 25% of the test organisms compared to the control (IC_{25}). Sampling should be performed quarterly. The operator should use WET testing procedures outlined in EPA's document entitled, "Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms" (October 2002).

In cases where the effluent discharge may be short in duration, it may be necessary to collect a high volume effluent sample and properly preserve it for use in the static-renewal test. Please refer to Section 8.5.4 on page 32 of EPA's document entitled, "Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms" (October 2002). Alternative acute WET test organisms are either *Daphnia magna* or *D. pulex* and *Pimaphales promelas*. In addition to reporting these results to the Corps, all results should be reported to EPA and KDOW.

C. In-stream Water Quality Monitoring

The permittee should perform in-stream monitoring for the parameters listed above in Table 1, in accordance with 40 CFR §122.44(d)(1)(vi)(C)(3). Sample collection and quality assurance / quality control should follow Kentucky Standard Operating Procedures at DOWSOP03014 and DOWSOP03015. EPA Test Methods in 40 CFR Part 136 should be used for analytical analysis.

a. Sample Type
Grab samples should be taken whenever possible.

b. Sampling Locations
Samples should be taken from the following locations:

[5] EPA notes that approved invertebrate WET test species are relatively insensitive to conductivity, as compared to in situ aquatic macroinvertebrates in central Appalachian streams. Nevertheless, EPA believes that WET tests can help identify significant water quality impairments as a result of surface coal mining operations, which can complement numeric conductivity measurements.

i. One sampling point located upstream of the sediment pond for each representative outfall, as specified above under "Effluent Monitoring" at paragraph II.A. If there is no upstream location, an appropriate background location within the 12-digit hydrologic unit code should be used.

ii. One in-stream monitoring site located immediately below the toe of the sediment pond for each representative outfall (i.e. ≤25 feet from outfall), as specified above under "Effluent Monitoring."

iii. One sampling point located *the further* of 200 meters (656 feet) downstream of each representative outfall or the furthest downstream location that is upstream of any tributary confluence. The sampling point should be downstream of riprap and other disturbance and located within a relatively natural and intact riparian zone where possible.

iv. One sampling point located in the receiving waterbody that is within 50 feet of the first confluence necessary to increase the stream order above that stream in which the outfall is located (e.g. if the outfall is located in a 1st order stream, this sample point should be located no greater than 50 feet downstream of the first confluence that elevates the stream order below the confluence to at least a 2nd order stream)

c. Sample Frequency

The sampling frequency is as noted in Table 1. Samples required quarterly should be no fewer that five (5) days apart, and the amount of precipitation for the previous 24 hour period should be recorded on-site and reported (to the nearest 0.1 inch) as part of the sampling report. In the event that in-stream monitoring results show in-stream specific conductivity levels above those necessary to satisfy applicable water quality standards,[6] the permittee is required to increase the monitoring frequency for all parameters to two times per month. Samples required twice per month should be no fewer than five (5) days apart, and the amount of precipitation for the previous 48 hour period should be recorded on-site and reported (to the nearest 0.1 inch) as part of the sampling report. Monitoring will continue through final bond release.

d. Conditions for Taking Samples

Samples should be collected during low- or base-flow conditions (e.g., not during, or within 48 hours after, a precipitation event exceeding 0.2 inches).

e. Reporting

Reports shall contain tabulated data (including sample station I.D., date, and time) and graphs necessary to present information clearly and concisely, including all such tables and graphs necessary to summarize and present the entire period of record for each parameter and sample station. Latitude and longitude coordinates of

[6] See, supra, footnote 2.

all water quality monitoring locations with the applicable datum identified must be provided along with photographs and figures illustrating all sample locations. Calibration records of all *in-situ* multi-probe or single-probe water quality instruments and laboratory reports showing the analytical results must also be submitted.

All results should be clearly labeled with the applicable CWA permit number and KDNR DMP number and submitted KDOW, the Corps, and EPA Region 4.

D. In-stream Biological Monitoring

The permittee should implement an annual benthic macroinvertebrate study plan using approved State protocols for benthic macroinvertebrate sampling.

a. Concurrent in-stream monitoring
In-stream samples for specific conductivity, TDS, pH, temperature and dissolved oxygen should be measured at the same locations as the benthic samples using properly calibrated instruments.

b. Methods
The permittee should implement an annual benthic macroinvertebrate study plan using approved state-protocols for benthic macroinvertebrate sampling.

c. Sampling Locations
Use the same locations as shown above for in-stream water quality monitoring.

d. Sampling Frequency
Sampling times will occur consistent with accepted Kentucky protocols (i.e. sample index periods). Sampling will occur annually through final bond release. Sampling should be avoided during periods of excessive precipitation and scouring floods. In cases where a large flow rate of the receiving water does not lend itself to a benthic assessment (i.e., non-wadeable sites), the permittee should perform a bioassessment using fish. Both fish and benthic macroinvertebrate studies should be performed for receiving waterbodies that are conducive to fish assessments. Results from sampling either of the two assemblages may be used to determine if the water body is impaired.

e. Reporting
The permittee should submit the results of the study, including summary tables, appropriate indices of biotic integrity, color photographs and figures showing sample locations, calibration records, etc. to the KDOW, the Corps, and EPA no later than 30 days following the permittee's receipt of the final report.

Enclosure 2
Adaptive Management Plan Implementation Timeline

Phase	Action	Time allowed	Elapsed time since initial discharge of fill material into waters of the U.S.
Pre-AMP	Initial land clearing, excavation, hollow fill construction, and water quality monitoring	6 months	6 months
	Initial post-construction monitoring	3 to 12 months	Up to 18 months
AMP Phase I (if applicable)	Submit AMP I	30 days after AMP I trigger (SC I.4(v))	Up to 19 months
	Approve AMP I	Not specified in Special Condition, estimate 30 days	Up to 20 months
	Implement AMP I	30 days after AMP I Approval	Up to 21 months
	Monitor AMP I	3 to 6 months	Up to 27 months
AMP Phase II (if applicable)	Develop and submit AMP II	30 days after AMP II trigger (SC I.5)	Up to 28 months
	Approve AMP II	Not specified in Special Condition, estimate 30 days	Up to 29 months
	Implement AMP II	30 days after AMP II approval	Up to 30 months
	Monitor AMP II	6 months	Up to 36 months
Additional Mitigation Required (if applicable)	Submit mitigation plan	45 days after end of AMP II	Up to 37.5 months
	Approve mitigation plan	Not specified in Special Condition, estimate 30 days	Up to 38.5 months
	Implement mitigation plan	30 days after mitigation plan approval	Up to 39.5 months

Matthew Klasen/DC/USEPA/US
12/09/2010 08:17 AM

To KevinH Miller, Duncan Powell, Tom Welborn, Cliff Rader, Kevin Minoli, Heinz Mueller, Philip Mancusi-Ungaro, Brian Frazer, Ross Geredien, Brian Topping
cc Gregory Peck, David Evans, Jim Giattina
bcc
Subject Leeco-Stacy Branch next steps

Hi everyone,

As a follow-up to yesterday afternoon's call, I thought I'd suggest the following approach for moving forward on Stacy Branch. Let me know if this sounds OK.

Letter: I can take a shot later this morning / early afternoon at uniting all the comments we've received on the draft letter and sending an updated draft around. I could work off the R4-edited version we talked through yesterday (that version attached), and add in comments from the briefing, comments from Denise, and comments from OGC, plus technical input that Ross provided yesterday.

Special Conditions (enclosure to letter): Perhaps R4 could focus on the enclosure/special conditions section (Kevin, I think you were focusing on that yesterday?) Not sure if OWOW or others have looked at that section in detail too and might have thoughts. I know Kevin also had some edits from the R4 402 folks on the monitoring section.

Digest Summary for Bob/Nancy: I suggested yesterday that R4 could send a quick summary of key issues and proposed resolution for forwarding to Bob and Nancy (as a preliminary step given their absence at yesterday's briefing). I still think that would help, so please let us know if you'd like our input in pulling that together. We'd be happy to follow up with them after it's sent to identify how/when to set up a further conversation.

Let me know if this all sounds OK. I'm off to a long meeting this morning (with Brian, Cliff, Greg, and Kevin), so I'll be back in the office at about noon.

Thanks,
Matt

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229 - 2010-12-06_Draft_Leeco - Clean R4 comments revised.docx

ATTACHMENT REDACTED - DELIBERATIVE

David Evans/DC/USEPA/US
12/09/2010 08:44 AM

To Brian Frazer
cc Jim Pendergast
bcc
Subject Re: Materials for Bob P. Meeting Thursday

(b) (5) [redacted]

Dave

Also, where you're back, want to touch base on Spruce - (b) (5) [redacted]

David Evans, Director
Wetlands Division
Office of Wetlands, Oceans and Watersheds
(202) 566-0535

Brian Frazer	On my way to OMB.	12/09/2010 08:28:50 AM

From: Brian Frazer/DC/USEPA/US
To: David Evans/DC/USEPA/US@EPA
Date: 12/09/2010 08:28 AM
Subject: Re: Materials for Bob P. Meeting Thursday

On my way to OMB.

Brian Frazer
Chief, Wetlands & Aquatic Resources Regulatory Branch
O:202-566-1652
C:202-379-6906

Sent from my BlackBerry Wireless Handheld

David Evans

----- Original Message -----
From: David Evans
Sent: 12/09/2010 08:17 AM EST
To: Brian Frazer; Janice Peters
Subject: Re: Materials for Bob P. Meeting Thursday

Thanks Brian.,

Janice,

Please print these documents. Thanks,

Dave

David Evans, Director
Wetlands Division
Office of Wetlands, Oceans and Watersheds

(202) 566-0535

Brian Frazer	Dave - Below are the attachments that went up t...	12/09/2010 08:06:08 AM

From: Brian Frazer/DC/USEPA/US
To: David Evans/DC/USEPA/US@EPA
Cc: Denise Keehner/DC/USEPA/US@EPA
Date: 12/09/2010 08:06 AM
Subject: Materials for Bob P. Meeting Thursday

Dave - Below are the attachments that went up to the AO for Bob P.'s meeting with the enviros. Not sure if Nancy or OGC made any changes. Let me know if you need moreinformation.

****
Brian M. Frazer, Chief
Wetlands & Aquatic Resources Regulatory Branch
Office of Wetlands, Oceans and Watersheds
U.S. EPA
1200 Pennsylvania Avenue, NW (MC 4502T)
Washington, DC 20460
202-566-1652

Supplemental Information: Premier Elkhorn (fact sheet and Nov. 2 closeout letter)
(See attached file: Briefing for Premier Elkhorn Lil Fork (12-8-10).doc) (See attached file: LRL-2007-0594_Elkhorn_11-2-10.pdf) r

Supplemental Information: Leeco Stacy Branch (fact sheet and draft closeout letter)
(See attached file: Leeco - Stacy Branch fact sheet.docx) (See attached file: 2010-12-08_Draft_Leeco - Clean R4 comments.docx)

Supplemental Information: Cumulative Effects (summary of Bernhardt et al. 2010 paper, and annotated paper)
(See attached file: 2010-12-08 Summary of Bernhardt et al 2010 re cumulative impacts.docx) (See attached file: Bernhardt et al 2010 (conductivity, cumulative impacts) - highlighted.pdf)

[attachment "2010-12-08 Bob P Meeting.doc" deleted by Dave Evans /DC/USEPA/US] [attachment "Briefing for Premier Elkhorn Lil Fork (12-8-10).doc" deleted by Dave Evans/DC/USEPA/US] [attachment "ATTSEMED.pdf" deleted by Dave Evans/DC/USEPA/US] [attachment "Leeco - Stacy Branch fact sheet.docx" deleted by Dave Evans/DC/USEPA/US] [attachment "2010-12-08_Draft_Leeco - Clean R4 comments.docx" deleted by Dave Evans /DC/USEPA/US] [attachment "2010-12-08 Summary of Bernhardt et al2010 re cumulative impacts.docx" deleted by Dave Evans/DC/USEPA/US] [attachment "Bernhardt et al 2010 (conductivity, cumulative impacts) - highlighted.pdf" deleted by David Evans/DC/USEPA/US]

Cynthia Giles-AA/DC/USEPA/US
Sent by: Linda Huffman

12/09/2010 11:26 AM

To chip.smith, Christy_JohnsonHughes, Cliff Rader, Dave_Stout, John Pomponio, Lauren_D._Leuck, Matt Bogoshian, Matthew Klasen, mboots, mccabe.catherine, rock.salt, Susan Bromm

cc barbara.cassady, Beers.Samantha, Bill Jenkins, Brian Frazer, bwinters, Christopher Hunter, david.b.olson, dhartos, Doreen Cantor, Gregory Peck, Heather Case, Heinz Mueller, Kenneth Westlake, Kyndall Barry, Lisa Garcia, mthompson, pmcilwain, srideout, Suzi Ruhl, Tammy.R.Fudge, Tinka Hyde, Tom Marshall, Yong.J.Chung

bcc

Subject Information Update - Description has changed: MTM Cumulative Impacts Meeting

ATTACHMENT REDACTED - DELIBERATIVE

MTMCumulative Effects Proposal_description12_8_10 final.docx

As agreed to on the Principals conference call last week, we are expanding the schedule for our upcoming December 13 meeting to allow time for more detailed discussions about our work on cumulative impact assessment (new time: 12:30 pm – 3:00 pm).

We also agreed that each agency (EPA, COE, OSM) will circulate a short outline by December 8 of what methodology/approach they are working on (5 pages or less would be best), a schedule for what is proposed to be accomplished, and how the methodology/approach will be used.

At the December 13 meeting, both Principals and staff will attend; the meeting will start with 15 minute summaries from each of the three agencies, followed by clarifying questions.

(b) (5) [redacted]

Please confirm your attendance for the meeting with Linda Huffman at Huffman.Linda@epa.gov or 202-564-2440.

Jim Pendergast/DC/USEPA/US
12/09/2010 11:41 AM

To Ross Geredien
cc Brian Frazer, Christopher Hunter, Sonia Kassambara, Tanya Code
bcc
Subject Re: REMINDER: Talking points due 12:30 PM!

Ross -- Thanks. Very good short summarization of what is ongoing.

Sonia -- One thing to add to the Spruce point, and this came up at this morning's biweekly with Denise. "We will be sending a calendar that lays out the projected date for each step of the Spruce decision to OW."

Ross Geredien	Please let me know if you need anything else. T...	12/09/2010 11:38:27 AM

From: Ross Geredien/DC/USEPA/US
To: Sonia Kassambara/DC/USEPA/US@EPA
Cc: Jim Pendergast/DC/USEPA/US@EPA, Tanya Code/DC/USEPA/US@EPA, Brian Frazer/DC/USEPA/US@EPA, Christopher Hunter/DC/USEPA/US@EPA
Date: 12/09/2010 11:38 AM
Subject: Re: REMINDER: Talking points due 12:30 PM!

Please let me know if you need anything else. There is no change to the Permit List.

- Spruce FD: Region 3 science staff have reviewed the Draft FD and submitted their comments. Comments from OGC and other offices are still pending. (b) (5) [redacted]
- [redacted]
- [redacted]
- [redacted]

Ross Geredien
ORISE Fellow
EPA Office of Wetlands, Oceans, and Watersheds
202-566-1466
Geredien.ross(AT)epa.gov

Sonia Kassambara	If you need more time, please let me know. Talk...	12/09/2010 10:26:28 AM

From: Sonia Kassambara/DC/USEPA/US
To: OW-OWOW-WD
Date: 12/09/2010 10:26 AM
Subject: REMINDER: Talking points due 12:30 PM!

If you need more time, please let me know.

Talking points for Friday's OD meeting due to Sonia TODAY @ 11 AM

Note: Thanks for providing these talking points in a timely manner recently. It has really helped to have

(b) (5)

(b) (5)

(b) (5)

(b) (5)

(b) (5)

(b) (5)

(b) (5)

Cliff Rader/DC/USEPA/US
12/09/2010 01:35 PM

To Matthew Klasen
cc
bcc
Subject edits to leeco

(b) (5)

R4 NEPA are good with the edits....

ATTACHMENT REDACTED - DELIBERATIVE

CR edits 2010-12-06_Draft_Leeco - Clean R4 comments revised.docx

Jim Pendergast/DC/USEPA/US
12/09/2010 03:16 PM

To Tanya Code
cc Ross Geredien
bcc
Subject Re: REMINDER: Talking points due 12:30 PM!

Ross and I are in a meeting. Neither of us know if Greg and Matt are ready to send this up. We'll check$
Tanya Code

----- Original Message -----
From: Tanya Code
Sent: 12/09/2010 03:00 PM EST
To: Ross Geredien
Cc: Brian Frazer; Christopher Hunter; Jim Pendergast; Sonia Kassambara
Subject: Re: REMINDER: Talking points due 12:30 PM!

Hi Ross -

Thanks for sending these along. I had one follow-up quick question. Is/has the revised language for the SPR going up for OW/Bob S. review?

Thanks,

Tanya Code
Special Assistant
Office of Wetlands, Oceans and Watersheds
U.S. Environmental Protection Agency
Tel: 202.566.1063
Fax: 202.566.1147

Ross Geredien | Please let me know if you need anything else. T... | 12/09/2010 11:38:27 AM

From: Ross Geredien/DC/USEPA/US
To: Sonia Kassambara/DC/USEPA/US@EPA
Cc: Jim Pendergast/DC/USEPA/US@EPA, Tanya Code/DC/USEPA/US@EPA, Brian Frazer/DC/USEPA/US@EPA, Christopher Hunter/DC/USEPA/US@EPA
Date: 12/09/2010 11:38 AM
Subject: Re: REMINDER: Talking points due 12:30 PM!

Please let me know if you need anything else. There is no change to the Permit List.

- Spruce FD: Region 3 science staff have reviewed the Draft FD and submitted their comments. Comments from OGC and other offices are still pending. (b) (5) [redacted]
- [redacted]
- [redacted]
- [redacted]

Ross Geredien
ORISE Fellow

EPA Office of Wetlands, Oceans, and Watersheds
202-566-1466
Geredien.ross(AT)epa.gov

Sonia Kassambara	If you need more time, please let me know. Talk...	12/09/2010 10:26:28 AM

From: Sonia Kassambara/DC/USEPA/US
To: OW-OWOW-WD
Date: 12/09/2010 10:26 AM
Subject: REMINDER: Talking points due 12:30 PM!

If you need more time, please let me know.

Talking points for Friday's OD meeting due to Sonia TODAY @ 11 AM

Note: Thanks for providing these talking points in a timely manner recently. It has really helped to have time to sort and synthesize Wetlands' submission!

(b) (5) [redacted]

[redacted]

[redacted]

[redacted]

(b) (5)

(b) (5)

(b) (5)

(b) (5)

(b) (5)

(b) (5)

(b) (5)

Matthew Klasen/DC/USEPA/US
12/09/2010 03:21 PM

To KevinH Miller
cc
bcc
Subject Fw: Final Input on Leeco

FYI -- here are Ross's thoughts from yesterday. I'm still in process of compiling comments, and should send around an updated letter draft this afternoon.

mk

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229
----- Forwarded by Matthew Klasen/DC/USEPA/US on 12/09/2010 03:21 PM -----

From: Ross Geredien/DC/USEPA/US
To: Brian Frazer/DC/USEPA/US@EPA, Brian Topping/DC/USEPA/US@EPA, Christopher Hunter/DC/USEPA/US@EPA
Cc: David Evans/DC/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA
Date: 12/08/2010 05:12 PM
Subject: Final Input on Leeco

(b) (5)
[redacted]

Ross Geredien

ORISE Fellow
EPA Office of Wetlands, Oceans, and Watersheds
202-566-1466
Geredien.ross(AT)epa.gov

Matthew Klasen/DC/USEPA/US
12/09/2010 03:25 PM

To Jim Pendergast
cc Ross Geredien
bcc
Subject Fw: Updated OSM SPR issues doc, + language for cover note re: DEIS and RIA

FYI -- here's the most recent version of the SPR language. Not sure if it's gone to OSM or for more senior review yet. I'm checking now.

mk

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229
----- Forwarded by Matthew Klasen/DC/USEPA/US on 12/09/2010 03:25 PM -----

From: Matthew Klasen/DC/USEPA/US
To: Gregory Peck/DC/USEPA/US@EPA
Date: 12/07/2010 05:46 PM
Subject: Updated OSM SPR issues doc, + language for cover note re: DEIS and RIA

Includes both clean and Track Changes since our conversation.

In the note you send to OSM, I'd recommend including the following language about the RIA and EIS:

(b) (5) [redacted]

Thanks,
Matt

2010-12-07 OSM Follow-Up - Compiled Clean.docx 2010-12-07 OSM Follow-Up - Compiled TC.docx

ATTACHMENTS REDACTED - DELIBERATIVE

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

Matthew Klasen/DC/USEPA/US
12/09/2010 03:25 PM

To MichaelG Lee
cc
bcc
Subject Fw: Updated OSM SPR issues doc, + language for cover note re: DEIS and RIA

FYI -- here's the most recent language on OSM. I'm checking if it went over or not.

mk

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229
----- Forwarded by Matthew Klasen/DC/USEPA/US on 12/09/2010 03:24 PM -----

From: Matthew Klasen/DC/USEPA/US
To: Gregory Peck/DC/USEPA/US@EPA
Date: 12/07/2010 05:46 PM
Subject: Updated OSM SPR issues doc, + language for cover note re: DEIS and RIA

Includes both clean and Track Changes since our conversation.

In the note you send to OSM, I'd recommend including the following language about the RIA and EIS:

(b) (5)
[redacted]

Thanks,
Matt

ATTACHMENTS REDACTED - DELIBERATIVE

2010-12-07 OSM Follow-Up - Compiled Clean.docx 2010-12-07 OSM Follow-Up - Compiled TC.docx

---
Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

Jim Pendergast/DC/USEPA/US
12/09/2010 03:59 PM

To Tanya Code
cc Brian Frazer, Christopher Hunter, Ross Geredien, Sonia Kassambara
bcc
Subject Re: REMINDER: Talking points due 12:30 PM!

As of 30 minutes ago, Matt Klassen didn't know if the language has gone anywhere. I got a copy of the current language and emailed it to Denise.

Tanya Code | Hi Ross - Thanks for sending these along. I ha... | 12/09/2010 03:00:42 PM

From: Tanya Code/DC/USEPA/US
To: Ross Geredien/DC/USEPA/US@EPA
Cc: Brian Frazer/DC/USEPA/US@EPA, Christopher Hunter/DC/USEPA/US@EPA, Jim Pendergast/DC/USEPA/US@EPA, Sonia Kassambara/DC/USEPA/US@EPA
Date: 12/09/2010 03:00 PM
Subject: Re: REMINDER: Talking points due 12:30 PM!

Hi Ross -

Thanks for sending these along. I had one follow-up quick question. Is/has the revised language for the SPR going up for OW/Bob S. review?

Thanks,

Tanya Code
Special Assistant
Office of Wetlands, Oceans and Watersheds
U.S. Environmental Protection Agency
Tel: 202.566.1063
Fax: 202.566.1147

Ross Geredien | Please let me know if you need anything else. T... | 12/09/2010 11:38:27 AM

From: Ross Geredien/DC/USEPA/US
To: Sonia Kassambara/DC/USEPA/US@EPA
Cc: Jim Pendergast/DC/USEPA/US@EPA, Tanya Code/DC/USEPA/US@EPA, Brian Frazer/DC/USEPA/US@EPA, Christopher Hunter/DC/USEPA/US@EPA
Date: 12/09/2010 11:38 AM
Subject: Re: REMINDER: Talking points due 12:30 PM!

Please let me know if you need anything else. There is no change to the Permit List.

- Spruce FD: Region 3 science staff have reviewed the Draft FD and submitted their comments. Comments from OGC and other offices are still pending. (b) (5) [redacted]
- [redacted]
- [redacted]
- [redacted]

(b) (5) [redacted].

Ross Geredien
ORISE Fellow
EPA Office of Wetlands, Oceans, and Watersheds
202-566-1466
Geredien.ross(AT)epa.gov

Sonia Kassambara	If you need more time, please let me know. Talk...	12/09/2010 10:26:28 AM

From: Sonia Kassambara/DC/USEPA/US
To: OW-OWOW-WD
Date: 12/09/2010 10:26 AM
Subject: REMINDER: Talking points due 12:30 PM!

If you need more time, please let me know.

Talking points for Friday's OD meeting due to Sonia TODAY @ 11 AM
Note: Thanks for providing these talking points in a timely manner recently. It has really helped to have time to sort and synthesize Wetlands' submission!

(b) (5) [redacted]

[redacted].

(b) (5)

(b) (5)

(b) (5)

(b) (5)

(b) (5)

(b) (5)

(b) (5)

Gregory Peck/DC/USEPA/US
12/09/2010 04:39 PM

To Matthew Klasen, Kevin Minoli
cc
bcc
Subject Leeco Fact Sheet for Lisa

Can you peruse this quickly and let me know if you have any edits/concerns? I'll take a bight out of making changes!

Thanks

ATTACHMENT REDACTED - DELIBERATIVE

Leeco Stacy Branch Fact Sheet DEC 09 10.docx

Matthew Klasen/DC/USEPA/US
12/09/2010 04:59 PM

To Kevin Minoli
cc Gregory Peck
bcc
Subject Re: Leeco Fact Sheet for Lisa

Here are my thoughts.

mk

ATTACHMENT REDACTED - DELIBERATIVE

Leeco Stacy Branch Fact Sheet DEC 09 10ksm - mk.docx

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

Kevin Minoli	Ok, I spelled bite wrong... not like I don't know h...	12/09/2010 04:52:08 PM

From: Kevin Minoli/DC/USEPA/US
To: Gregory Peck/DC/USEPA/US@EPA
Cc: Matthew Klasen/DC/USEPA/US@EPA
Date: 12/09/2010 04:52 PM
Subject: Re: Leeco Fact Sheet for Lisa

Ok, I spelled bite wrong... not like I don't know how to spell it. I'll note I found several errors in this document if we are keeping score.... :)

[attachment "Leeco Stacy Branch Fact Sheet DEC 09 10.ksm.docx" deleted by Matthew Klasen/DC/USEPA/US]

Gregory Peck	Can you peruse this quickly and let me know if y...	12/09/2010 04:39:13 PM

From: Gregory Peck/DC/USEPA/US
To: Matthew Klasen/DC/USEPA/US@EPA, Kevin Minoli
Date: 12/09/2010 04:39 PM
Subject: Leeco Fact Sheet for Lisa

Can you peruse this quickly and let me know if you have any edits/concerns? I'll take a bight out of making changes!

Thanks

[attachment "Leeco Stacy Branch Fact Sheet DEC 09 10.docx" deleted by Matthew Klasen/DC/USEPA/US]

Gregory Peck/DC/USEPA/US
12/09/2010 05:12 PM

To Nancy Stoner, Bob Sussman, Ann Campbell
cc Kevin Minoli, Matthew Klasen, Gwendolyn KeyesFleming, Stan Meiburg
bcc
Subject Leeco/Stacy Branch Fact Sheet

An updated Leeco/Stacy Branch fact sheet for the Administrator. Let us know if you have any questions.

Best,
Greg

ATTACHMENT REDACTED - DELIBERATIVE

Leeco Stacy Branch Fact Sheet DEC 09 10 rev.docx

Gregory E. Peck
Chief of Staff
Office of Water
U.S. Environmental Protection Agency

Brian Topping/DC/USEPA/US
12/09/2010 05:37 PM

To Ross Geredien
cc Marcel Tchaou, Christopher Hunter, Brian Frazer
bcc
Subject Permit comparison spreadsheet

Ross,
The reformatted version can be found here G:\Wetlands Division\WARRB\Program Ops Team\Coal_MTM-VF\Permits
and is attached below:
Please continue with the ECP permits and I'll finish the ones I started.
Thanks,
Brian

Mining-Analysis_12-9-10.xlsx

ATTACHMENT REDACTED - DELIBERATIVE

Brian Topping
US Environmental Protection Agency
Wetlands Division, Room 7231
Office: 202-566-5680, FAX: 202-566-1375
Mail Code 4502T, 1200 Pennsylvania Avenue, NW, Washington, DC 20460
Deliveries: EPA West -- Room 7231-S, 1301 Constitution Avenue, NW, Washington, DC 20004
topping.brian@epa.gov

Ross Geredien	There's no folder for Czar/Scaffold Lick Branch i...	12/09/2010 01:41:00 PM

From: Ross Geredien/DC/USEPA/US
To: Brian Topping/DC/USEPA/US@EPA
Date: 12/09/2010 01:41 PM
Subject: No Czar?

There's no folder for Czar/Scaffold Lick Branch in here;

G:\Wetlands Division\WARRB\Program Ops Team\Coal_MTM-VF\Permits

Ross Geredien
ORISE Fellow
EPA Office of Wetlands, Oceans, and Watersheds
202-566-1466
Geredien.ross(AT)epa.gov

Stan Meiburg/R4/USEPA/US
12/09/2010 06:19 PM

To Gregory Peck
cc Ann Campbell, Bob Sussman, Gwendolyn KeyesFleming, Kevin Minoli, Matthew Klasen, Nancy Stoner, Jim Giattina
bcc
Subject Re: Leeco/Stacy Branch Fact Sheet

Greg, thanks for sharing this--very concise and well written. I had one note in reading it, (b) (5) [redacted]

Stan

A. Stanley Meiburg
Deputy Regional Administrator
EPA Region 4
Sam Nunn Atlanta Federal Center
61 Forsyth Street, SW
Atlanta, GA 30303

Office: (404) 562-8357
Fax: (404) 562-9961
Cell: (404) 435-4234
Email: meiburg.stan@epa.gov

Healthier Families, Cleaner Communities, A Stronger America
http://www.epa.gov/40th

Gregory Peck | An updated Leeco/Stacy Branch fact sheet for th... | 12/09/2010 05:12:14 PM

From: Gregory Peck/DC/USEPA/US
To: Nancy Stoner/DC/USEPA/US@EPA, Bob Sussman/DC/USEPA/US@EPA, Ann Campbell/DC/USEPA/US@EPA
Cc: Kevin Minoli, Matthew Klasen/DC/USEPA/US@EPA, Gwendolyn KeyesFleming/R4/USEPA/US@EPA, Stan Meiburg/R4/USEPA/US@EPA
Date: 12/09/2010 05:12 PM
Subject: Leeco/Stacy Branch Fact Sheet

An updated Leeco/Stacy Branch fact sheet for the Administrator. Let us know if you have any questions.

Best,
Greg

ATTACHMENT REDACTED - DELIBERATIVE

Leeco Stacy Branch Fact Sheet DEC 09 10 rev.docx

Gregory E. Peck
Chief of Staff
Office of Water

U.S. Environmental Protection Agency

Matthew Klasen/DC/USEPA/US
12/09/2010 06:46 PM

To Kevin Minoli, MichaelG Lee
cc Gregory Peck
bcc
Subject Fw: Updated draft Leeco-Stacy Branch letter

Mike and Kevin:

I know that we got a few OGC comments on an earlier version of this from Mike (at least on the initial section of the letter) but I realize that you probably haven't had a chance to take a close look. Feel free to take a shot at this version tomorrow.

Thanks,
Matt

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229
----- Forwarded by Matthew Klasen/DC/USEPA/US on 12/09/2010 06:44 PM -----

From: Matthew Klasen/DC/USEPA/US
To: Brian Frazer/DC/USEPA/US@EPA, Brian Topping/DC/USEPA/US@EPA, Cliff Rader/DC/USEPA/US@EPA, David Evans/DC/USEPA/US@EPA, Duncan Powell/R4/USEPA/US@EPA, Heinz Mueller/R4/USEPA/US@EPA, Jim Giattina/R4/USEPA/US@EPA, Kevin Minoli/DC/USEPA/US@EPA, KevinH Miller/R4/USEPA/US@EPA, Philip Mancusi-Ungaro/R4/USEPA/US@EPA, Ross Geredien/DC/USEPA/US@EPA, Tom Welborn/R4/USEPA/US@EPA, MichaelG Lee/DC/USEPA/US@EPA, Christopher Hunter/DC/USEPA/US@EPA
Cc: Stan Meiburg/R4/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA, Denise Keehner/DC/USEPA/US@EPA, John Pomponio/R3/USEPA/US@EPA, Jeffrey Lapp/R3/USEPA/US@EPA, William Early/R3/USEPA/US, Nancy Stoner/DC/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA
Date: 12/09/2010 06:44 PM
Subject: Updated draft Leeco-Stacy Branch letter

Hi everyone,

Please see attached for an updated draft of the Leeco-Stacy Branch letter (b) (5) [redacted]. I've attached both a clean version and a version showing changes since the R4-edited version discussed on yesterday's call.

I believe this letter incorporates all the comments that have arrived over the past two days. (b) (5) [redacted]

Please review this updated draft and let me know if you have any additional major concerns; if so, we could set up a meeting tomorrow to discuss. (b) (5) [redacted]

Let me know if you have any questions, and thanks for all your help.

Best,

ATTACHMENTS REDACTED - DELIBERATIVE

Matt

2010-12-09 Leeco Draft Closeout Letter.docx

2010-12-09 Leeco Draft Closeout Letter - Track Changes since 12-8.docx

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Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

Matthew Klasen/DC/USEPA/US
12/09/2010 06:50 PM

To David Evans
cc "Brian Frazer"
bcc
Subject Re: Leeco-Stacy Branch next steps

Thanks. In the note I just sent with an updated version, I made it clear that OWOW may still have some remaining issues, so hopefully we can tee those up at some point soon.

mk

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

David Evans	I think that's reasonable, and the final review an...	12/09/2010 06:22:58 PM

From: David Evans/DC/USEPA/US
To: Matthew Klasen/DC/USEPA/US@EPA
Cc: "Brian Frazer" <Frazer.Brian@epamail.epa.gov>
Date: 12/09/2010 06:22 PM
Subject: Re: Leeco-Stacy Branch next steps

I think that's reasonable, and the final review and comment will determine where we ultimately land on these issues. (b) (5) [redacted]

Dave
David Evans, Director
Wetlands Division
Office of Wetlands, Oceans and Watersheds
(202) 566-0535
(202) 725-6415 (cell)

----------Sent from my BlackBerry Wireless Handheld

Matthew Klasen

----- Original Message -----
From: Matthew Klasen
Sent: 12/09/2010 05:14 PM EST
To: David Evans
Cc: Brian Frazer
Subject: Re: Leeco-Stacy Branch next steps

Hi Dave,

(b) (5) [redacted]

[redacted]

(b) (5) [redacted]

[redacted]

[redacted]

Thanks,
Matt

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
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David Evans	(b) (5) [redacted]	12/09/2010 08:47:09 AM
Matthew Klasen	Hi everyone, As a follow-up to yesterday afterno...	12/09/2010 08:17:52 AM

Karyn Wendelowski/DC/USEPA/US
12/09/2010 10:14 PM

To Gregory Peck, David Evans, Matthew Klasen, Brian Frazer, Christopher Hunter
cc Kevin Minoli
bcc
Subject OGC comments on Spruce

We can talk through these tomorrow.

ATTACHMENT REDACTED - (b)(5) ACP

Spruce FD draft 120110 ogc edits.doc

Denise Keehner/DC/USEPA/US
Sent by: Tanya Code

12/10/2010 07:49 AM

To Tanya Code
cc
bcc
Subject Fw: Materials for Bob P. Meeting Thursday

Denise Keehner
Director
Office of Wetlands, Oceans, and Watersheds
Phone: 202-566-1146; Fax: 202-566-1147
Street address: 1301 Constitution Ave., N.W.
Room 7130E

----- Forwarded by Tanya Code/DC/USEPA/US on 12/10/2010 07:48 AM -----

From: Brian Frazer/DC/USEPA/US
To: David Evans/DC/USEPA/US@EPA
Cc: Denise Keehner/DC/USEPA/US@EPA
Date: 12/09/2010 08:06 AM
Subject: Materials for Bob P. Meeting Thursday

Dave - Below are the attachments that went up to the AO for Bob P.'s meeting with the enviros. Not sure if Nancy or OGC made any changes. Let me know if you need moreinformation.

****

Brian M. Frazer, Chief
Wetlands & Aquatic Resources Regulatory Branch
Office of Wetlands, Oceans and Watersheds
U.S. EPA
1200 Pennsylvania Avenue, NW (MC 4502T)
Washington, DC 20460
202-566-1652

Supplemental Information: Premier Elkhorn (fact sheet and Nov. 2 closeout letter)
(See attached file: Briefing for Premier Elkhorn Lil Fork (12-8-10).doc) (See attached file: LRL-2007-0594_Elkhorn_11-2-10.pdf) r

Supplemental Information: Leeco Stacy Branch (fact sheet and draft closeout letter)
(See attached file: Leeco - Stacy Branch fact sheet.docx) (See attached file: 2010-12-08_Draft_Leeco - Clean R4 comments.docx)

Supplemental Information: Cumulative Effects (summary of Bernhardt et al. 2010 paper, and annotated paper)
(See attached file: 2010-12-08 Summary of Bernhardt et al 2010 re cumulative impacts.docx) (See attached file: Bernhardt et al 2010 (conductivity, cumulative impacts) - highlighted.pdf)

2010-12-08 Bob P Materials.docx Briefing for Premier Elkhorn Lil Fork (12-8-10).doc ATTB2M5D.pdf

WORD ATTACHMENTS REDACTED - DELIBERATIVE

Leeco - Stacy Branch fact sheet.docx

2010-12-08_Draft_Leeco - Clean R4 comments.docx

2010-12-08 Summary of Bernhardt et al 2010 re cumulative impacts.docx

Bernhardt et al 2010 (conductivity, cumulative impacts) - highlighted.pdf

WORD ATTACHMENTS REDACTED - DELIBERATIVE

How many mountains can we mine? Ecological thresholds for freshwater ecosystems of the Central Appalachians

Emily S. Bernhardt[1]

Brian D. Lutz[1]

Catherine E. Carter[2,3]

John P. Fay[2]

Ryan S King[4]

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ABSTRACT

Over the last decade, an estimated 2000km of streams in the Central Appalachians have been buried beneath the excess rock waste generated from surface coal mining. In addition to the streams permanently lost through valley filling, many more kilometers of streams throughout the region are impacted by the higher flows and chemical concentrations exported to downstream waters from surface mining operations. Here we estimate for the first time the areal extent of mining that can occur in a watershed before significant ecological impacts are observed in receiving streams. Using new remote sensing analyses together with field sampling data for 283 stream reaches located across a 14 county region in southern West Virginia we demonstrate that changes in streamwater conductivity were strongly positively correlated with the extent of watershed surface mining.. We detected a significant community threshold response to altered ionic strength, with many sensitive taxa declining precipitously and synchronously in abundance at a conductivity of 277μS cm^{-1} (95% CI of 176 to 344 μS cm^{-1}). Our analysis is the first to demonstrate that the rapid increase in mining activity within regional headwaters is degrading water quality and freshwater ecosystems at very low mining intensities and over very large geographic scales. We find that stream water quality and benthic communities are significantly altered when as little as ~3% of the upstream watershed is converted to surface mining operations.

INTRODUCTION

In order to compete with western states in supplying inexpensive, low sulfur coal to the US energy market, mining companies throughout the Central Appalachians are increasingly turning to mountaintop mining to access shallow seams of coal[1,2]. Mountaintop mining is now the most widespread form of coal surface mining across the central Appalachian Mountains, and is particularly intense in southern West Virginia, eastern Kentucky and Tennessee, and southwestern Virginia[3,4]. In this sparsely populated region, surface mining and mine reclamation activities are the dominant driver of land use change[5] and as a result of surface coal mining the area has the highest rates of sediment movement in the United States [6]. To reach the coal seams which can be hundreds of feet below the surface, ridge tops are removed creating large quantities of waste rock and coal debris ("overburden") that must be disposed of to maximize mining efficiency (Figure 1). In the steep topography of the region, stream valleys become the obvious location for disposing of rocks from the mined ridgetops. The resulting valley fills[3] can bury either headwater streams or once forested valley slopes under 10s to 100s of meters of overburden[7]. Because MTM operations are less constrained by topography than more traditional contour mining, MTM techniques have allowed surface coal mining operations to expand greatly in size[4].

The central Appalachian forests that are affected by surface coal mining support among the highest levels of biodiversity and endemism in the temperate zone[8] leading to significant concerns about the loss of forest biodiversity and ecosystem functions as a result of mining[4,9]. Much recent attention has been paid to the burial of headwater streams beneath valley fills and the downstream impacts to waters below surface mines[10](Figure 1), in part, because of high profile federal court cases and widely publicized exchanges between the U.S. Environmental Protection Agency (US EPA) and the U.S. Army Corps of Engineers (USACE) over permitting decisions[11]. Under the authority of the Clean Water Act (CWA; 33 U.S.C. 1252) the US ACE (or a delegated state) must approve regulatory permits to allow mining operations that will result in impacts to waters of the U.S. Prior to authorizing a stream fill operation, the US ACE must assure, among other things, that these activities will not cause significant degradation of the environment (40 C.F.R. § 230.10). To meet this requirement, permittees are required to mitigate for harm done to streams. Typically this is accomplished through the construction of channels on nearby reclaimed mines, the restoration of degraded streams within the watershed, or payment into an in lieu fee mitigation program[2,12,13]. The

extent to which these actions are sufficient to mitigate for the impacts that MTM have on waterways has been central to legal challenges and environmental advocacy protests calling for tighter regulations on this form of mining[11,14].

Scientific studies to inform such cases have been of great interest and have established that impacts can be substantial[10,12,15,16]. Rain that falls on mined and reclaimed watersheds flows through coal residues and rock overburden rather than surface soils. When exposed to air, pyrite minerals in coal residue release sulfuric acid[17], and the production of this strong acid within a matrix of fragmented rock leads to high rates of rock weathering. Throughout much of the central Appalachians, the high buffering potential of carbonate bedrock neutralizes the acidity generated by pyrite dissolution and releases high concentrations of coal-derived SO_4^{2-} accompanied by elevated concentrations of Ca^{2+}, Mg^{2+}, HCO_3^- derived from parent material[18]. The natural acid buffering potential of parent material in much of the region thus generates alkaline mine drainage, characterized by an increase in pH, alkalinity and electrical conductivity in receiving streams[18]. The concentration of trace metals and metalloids also tend to be correlated with SO_4^{2-} and conductivity[12,19], and in this region elevated concentrations of manganese (Mn) and selenium (Se) are of particular concern due to their known toxicity[20]. Selenium, weathered from coal minerals, is more soluble at high pH and thus is a particularly problematic toxin in the alkaline mine drainage common to most mountaintop mines[21]. A number of recent studies have documented significant changes in stream macroinvertebrate and fish communities directly downstream of surface mining operations[10,16,22] and have attributed these declines to the combined effects of heightened concentrations of ions and trace metals delivered from upstream mines.

In response to growing concerns and scientific documentation of the impacts of surface coal mining, on April 1, 2010, the US EPA released their own scientific report and announced new actions to strengthen the permitting process and protect Appalachian waters[23]. This included a draft guidance document that set benchmarks for unacceptable levels of conductivity in waters associated with surface mining. Specifically, their research identified conductivity levels of 300 $\mu S\ cm^{-1}$ in Appalachian headwater streams as the maximum acceptable levels to prevent substantial impacts to native invertebrates[23]. This draft benchmark has been challenged by various groups including the National Mining Association (NMA) who filed a lawsuit in U.S. District Court for the

District of Columbia[24]. While most of NMA's arguments question the legality of EPA's actions, the lawsuit also argues that the conductivity water quality standard is arbitrary and based on unsupported "presumptions" that background levels of conductivity (i.e., non-mining related) are below the benchmark and that significant adverse impacts are related to the length of stream impacted or the number of fills[24].

The challenges on both sides highlight the need to fill several scientific gaps that are critical to decisions by regulators and to those the regulations influence. Thus our goal was to address the following questions:

1. Is there a clear relationship between conductivity and surface coal mining extent in the central Appalachians that cannot be attributed to other impacts such as development in a watershed?

2. Does the latest state-of-the-art approach designed to statistically detect biological thresholds support the concept of a benchmark and if so, at what conductivity level?

Previously there has been no effort to quantify the areal extent of surface mining and link that to downstream water quality and aquatic community structure at river basin scales. Since the dominant solutes derived from surface mining that generate high conductivity in receiving streams are conservative ions that do not readily precipitate from solution except at supersaturated concentrations (SO_4^{2-}, Cl, Ca^{2+}, Mg^{2+}, HCO_3^-), high conductivity (and associated biological impacts) should be correlated with the total spatial extent of upstream mining activity. Thus, we analyzed whether there was a statistically significant relationship between the proportion of surface mining in watersheds of southern WV and dissolved ion concentrations or between the extent of surface mining and alterations in stream biota. To determine whether or not there were threshold relationships between stream invertebrates and conductivity, we employed a new form of analysis (Threshold Indicator Taxa Analysis, TITAN[25]). TITAN is unique in that it first characterizes the responses of individual taxa to an environmental gradient and secondarily aggregates taxa into a community-level metric only after distinguishing the magnitude, direction, and uncertainty in the responses of individual members of the community. Thus, TITAN has distinct advantages over more commonly used community metrics, in that it allows the investigator to identify both taxon-specific and community-level threshold responses to anthropogenic environmental gradients[26].

RESULTS & DISCUSSION:

We compiled existing datasets that provided determinations of the spatial extent of surface mining in the region over time by obtaining nonpoint discharge elimination system (NPDES) permit records for mining activities (maintained by WVDEP accessed online 6/24/2010), land cover classification data determined from National Landcover dataset (NLCD 2001), and surface mining maps derived from multidecade (1975, 1985, 1995, 2005) Landsat satellite data for a 59-county area spanning much of the Central Appalachian Coal Region (Figure 2A). We obtained data on water quality and macroinvertebrates that were collected and analyzed by the WV Department of Environmental Protection (WVDEP 2010 provided 6/30/10). Field samples and remote sensing derived mine mapping overlapped for a 14 county study area in southern WV (Figure 2B) from which we acquired a final dataset consisting of 283 stream reaches for which both stream water sample analysis and stream benthic invertebrate collection data were available from summer collection efforts. We delineated watersheds draining to each of these 283 sampling points and estimated the total surface area covered by forests, development of by surface mining operations. Surface mining operations were further classified as mountaintop removal mines (MTM), non MTM surface mines (~contour or strip mines), or valley fills. Our estimates of cumulative surface mining in the region derived from remote sensing image analysis are in close agreement with the cumulative extent of area disturbed through mining reported by NPDES permit inspectors (Figure 2C). It is important to acknowledge that the precision of our remote sensing derived estimates of surface mining has not yet been estimated through ground-truthing. Rigorous evaluation and cross validation of mining maps is a priority for our ongoing research effort.

Within this dataset, 231 streams drained watersheds with some amount of mining (0.03 to 95.7% mined) and 212 streams drained watersheds with >1% of their watershed developed (1 to 20% developed). A total of 19 stream samples were classified from the land use data as forested watersheds (no surface mining or NPDES permits, <1% developed) and the dataset included 12 streams classified as reference watersheds by the state of WV. Stream stations sampled by the WVDEP drained watersheds that had up to 95% (18±21%, mean ±sd) of their surface area in active or reclaimed surface mines and up to 20% (3 ± 3% mean ±sd) of their watershed area classified as developed..

To determine if watersheds having a greater proportion of mining have higher significantly higher streamwater conductivity (Question 1), we examined statistical relationships between the areal extent of surface mining and conductivity and solute (sulfate and nitrate) concentrations. We found that the total surface area mined within a watershed, regardless of what year the mining activity was delineated from Landsat imagery, correlated most strongly with water quality metrics.. Analyses that only used the most recent 2005 surface mining delineation, or which excluded all but MTM surface mining operations were less strongly correlated with water quality metrics. As a result of these comparisons, we chose to examine how the cumulative extent of all surface mining within a watershed (across all years and all types) was related to water quality and biological changes in the region. We also examined whether variation in the extent of watershed development was a good predictor of water quality changes.

We found that the proportion of watersheds that were mined was strongly positively correlated with streamwater sulfate and nitrate concentrations and with the electrical conductivity of the water in draining streams (Figure 3). Mined streams had higher alkalinity and pH than unmined streams in the region (Table 1). There were insufficient records of trace metal and metalloid concentrations within our dataset to examine relationships with mining, however analysis of the entire WVDEP database (beyond the 14 county area to which our analyses were restricted) showed that sulfate was strongly positively correlated with trace metals (Mn, Fe, Al) and the metalloid Se[12]. In contrast, development activities within the 14 county area were not correlated with conductivity or nitrate and were slightly negatively correlated with sulfate concentrations (Figure 3) and did not lead to significant alterations of pH or alkalinity (Table 1). The negative relationship observed between conductivity and water quality for the upper quantiles of the dataset (Figure 3) occurs because some of the watersheds with little development had large mining impacts whose water quality impacts far exceed that of development in this region (Figure 3). Variation in sulfate, nitrate and conductivity in undeveloped watersheds is highly correlated with the extent of mining in those watersheds.

To assess the macro-invertebrate response to increased mining extent and streamwater conductivity (Question 2), we first examined changes in stream benthic macroinvertebrate diversity and biotic integrity scores by one way ANOVA and Tukey's HSD to compare WV reference streams with the 231 mined streams, split into 5 equally populated bins of increasing mining intensity. We also

performed TITAN[25] to examine taxon specific and community level responses to both gradients within this dataset. We found that watershed surface mining leads to substantial changes in stream biota that are much more dramatic than changes attributable solely to development. The diversity of intolerant taxa declined precipitously with mining (Figure 4, supplemental Figure 2) and as a result both types of bioassessment scores developed for West Virginia streams declined with the spatial extent of mining in their watershed. The family level WV Stream Condition Index (WVSCI) and the Genus Level Index of Most Probable Stream Status (GLIMPSS) were significantly lower in mined watersheds compared to state reference sites (Figure 4). For all three metrics, significant declines in diversity and stream ecological health metrics were observed even in the lowest mining category (<3.5% of watershed in surface mines) (Figure 4), suggesting that water pollution associated with even small amounts of surface mining is sufficient to reduce or eliminate many stream taxa.

Using TITAN analysis to examine the aquatic invertebrate responses to the spatial extent of mining revealed statistically significant declines for 39 of the 196 taxa in the data set (Figure 5A). The taxa most sensitive to mining represent a variety of mayfly, stonefly, caddisfly and beetle larvae that are all characteristic to central Appalachian streams and known to be sensitive to water pollution. All negatively responding taxa appeared to be very sensitive to the mining gradient, with all showing sharp declines in abundance at less than 10% mining (Figure 5, Supplemental Figure 1). Prior research has demonstrated that mayflies are especially sensitive to mining-derived contaminants[10,27] and our results support this, with even the highly tolerant mayfly genus *Baetis* showing a negative response to the mining gradient. The nearly synchronous declines of taxa (SI Figure 1) was consistent with a community-level threshold[26], suggesting that surface mining of as little as ~3% (95% CI of 0 to 2.4%) of the upstream watershed results in sharp nonlinear declines in the abundance of many taxa comprising downstream communities (Figure 5B, SI Figure 1). Several taxa increased in relative abundance along the mining gradient, primarily several genera of highly tolerant midges (Chironomidae) the tolerant caddisflies *Chimarra*, *Ceratopsyche* and *Hydropsyche*, and the blackfly *Simulium* (Figure 5A, SI Figure 2). This suite of tolerant organisms is entirely consistent with earlier impact studies[10,16], suggesting that the same impacts observed immediately below valley fills are also apparent at the scale of 10-100km^2 catchments.

Because of the uncertainty surrounding the precision of our surface mining delineation, we performed sensitivity analyses to examine how the TITAN threshold determination was affected by introducing random or systematic error into our % mining estimates (SI Section 2). We found that our cumulative threshold estimate was robust to introduced error, and could only generate a significant increase in the threshold estimate by systematically increasing the estimates of mining area. This is a type of land cover classification error that could be introduced by edge effects, where landcover pixels at the edges of mines are systematically classified as forest cover. Even if we assumed that all mined areas should be expanded by 250m along all edges, we still estimated a community level threshold at 4.6% of the watershed in surface mine (95% CI of 0.34 to 11.85%) (SI Section 2).

Variation in the extent of development is not statistically correlated with the extent of mining within this dataset, yet the majority of watersheds experience both forms of land use change. We reran TITAN analyses on the same dataset oriented along a development rather than the mining gradient and found that many fewer taxa declined significantly with development than with mining (Figure 5C). Those taxa that did respond declined at very low levels of development (0-5%). However, the results of this analysis are complicated by the fact that many of the low development watersheds have variable and sometimes high amounts of surface mining within their boundaries. Indeed, many of the taxa that declined with mining increased in abundance along the development gradient because of the negative relationship between % development and % mining (Figure 5C). While negative response of the invertebrate community peaked at similar values of % development and % mining, the magnitude of the sum of z- scores was much higher for mining (290.3) than for development (134.9). This indicates that more taxa exhibited a more abrupt decline across the mining gradient than across the development gradient (Figure 5B, D).

TITAN analysis of the same dataset across a conductivity gradient found that increases in streamwater conductivity led to significant declines in 50 of the 196 total taxa and explained a larger amount of the variation in abundance data than either land cover variable (sum z =379.1). The threshold at which community changes are most drastic was at 277μS cm^{-1} (95% CI of 176 to 344 μS cm^{-1}), a number which is remarkably consistent with the EPA Guidance[23] recommended maximum conductivity of 300 μS cm^{-1}. Across this region, conductivity is highly correlated with

the areal extent of mining (Figure 3). Our analyses suggest that this conductivity threshold is typically reached when <5% of the upstream watershed is impacted by surface mining.

In our analyses we did not distinguish between old or new surface mining because we were unable to find any statistical evidence that the impacts of mining are ameliorated through time. We also did not distinguish between mountaintop mining operations and more traditional surface strip or contour mines in the region because we were unable to detect statistical differences between these two types of mining. Similarly, our efforts to weight impacts based on hydrologic connection to the stream channel (inverse distance weighting approaches) did not improve statistical relationships. The stream sampling dataset acquired from the WVDEP was not collected with the purpose of examining the efficacy of mine reclamation or mining configurations in ameliorating downstream impacts and thus we do not view inability to detect such subtleties in the current dataset as conclusive. Instead we urge that new spatial data on mining activities be used to guide rigorous field sampling campaigns to make these critical comparisons.

CONCLUSIONS

This work demonstrates for the first time a statistically significant relationship between the areal extent of surface mining in the Central Appalachians and variation in both the chemistry and biological community structure of receiving streams. Our analyses demonstrate that even small amounts of surface mining can dramatically increase streamwater conductivity, pH and alkalinity and dramatically reduce the abundance of many aquatic insects. Our community threshold analyses suggest that macroinvertebrate community composition shifts dramatically once streams reach conductivities of ~300 µS/cm – a level achieved with very low levels of watershed surface mining. An important argument for a casual pathway from mining to conductivity to community thresholds is the large proportion of shared taxa that declined in response to both watershed mining and conductivity. Of the 39 taxa that significantly declined along the mining gradient, 24 significantly declined with increasing conductivity. Conversely, few of the taxa that responded negatively to the development gradient declined with increasing conductivity.

These results have important policy implications. First, the fact that the cumulative impacts of MTM on water quality and on the biological condition of streams are readily quantifiable and

cannot be attributed to development have the potential to inform decisions on the amount of mining regulators allow in a given watershed. Second, using a novel and rigorous method of data analysis to test for thresholds (TITAN), we found a threshold conductivity level (277µS cm^{-1} with 95% CI of 176 -344 µS cm^{-1}) that is remarkably similar to the benchmark of 300 uS/cm that the US EPA has proposed to be protective of aquatic life in their recently issued guidance document, lending support to their draft conductivity benchmark.

METHODS

Regional Mapping of Surface Mining: Surface mining activity was mapped from digital multispectral images collected by the Multispectral Scanner (MSS) and Thematic Mapper (TM) sensors carried by the Landsat series of remote-sensing satellites. Historical images in the Landsat archive[28] were reviewed for cloud cover, smog and haze. Mid-summer images were favored to facilitate the identification of disturbed areas and minimize seasonal variations in solar illumination. To ensure detection of mining disturbance since the 1970s while minimizing the total volume of data for analysis, mid-decade imagery was chosen (SI Section II). Digital elevation data were also acquired for topographic analysis, enabling the identification of ridges and mountaintops throughout the study area as a means of discriminating MTR operations from other types of surface mining. We opted to use 3-arc-second (1x1 minute) DEM data compiled by the U.S. Defense Mapping Agency. This series was distributed as 1x1 degree areas that corresponding to the east or west half of the USGS 1:250,000 scale topographic quadrangle map series. These elevation data are from topographic surveys that mostly pre-date 1976 and therefore provide the best available representation of topography in the study area prior to the advent of mountaintop removal mining. The horizontal position error of this elevation dataset is generally stated to be 100 meters or less. Other supporting digital GIS data included detailed transportation features and populated areas derived from USGS 1:24,000-scale topographic maps[29]. The river and stream vectors that comprise regional hydrology were compiled from the 1:24,000-scale National Hydrography dataset[30].

Image Processing: Image processing and analysis was performed using Erdas IMAGINE image processing and GIS software on a standard Windows-based workstation. All images were placed into a common map projection (UTM Zone 17 North – WGS84 datum) using standard techniques that included the selection of image-to-map tie points by an experienced operator, and digital resampling of the images using a nearest-neighbor algorithm to preserve the original spectral information. Additional processing included the creation of same-date, path-oriented mosaics to simplify the classification

process. The georectified mosaics were then cropped to the study area boundary to reduce computer processing time.

An iterative, two-stage process was developed to identify and delineate areas disturbed by traditional surface mining and by mountaintop removal mining (MTR). First, land cover classification was performed for each date of imagery. Classification followed a two-step process: pixel-based spectral signatures of various land-cover types were identified; then a decision-tree analysis was used to classify areas of active surface mining. Pixel-based classification was performed using the supervised maximum likelihood technique[31]. Given the rugged terrain of the region, the image data were first spectrally enhanced to reduce albedo-related variations in illumination and spectral characteristics using the hyperspherical direction cosine (HSDC) method[32]. Training samples were selected for each date of imagery to yield land-cover classes compatible with the Anderson Level II system[33], such as bare rock, soil, forest, grasses/crops, water, clouds, etc. The results of this procedure were then modified by classifying any bare rock and soil outside of a 400 meter buffer zone around rivers, highways and agricultural areas. This separates areas of bare soil and rock likely attributable to active mining from areas naturally devoid of vegetation, such as river banks and channels, paved surfaces, and plowed or fallow fields.

Second, topographic analysis was performed to subdivide the classified mining areas into "MTR" and "Other Surface Mining" categories. While the legal definition of MTM as defined by the U.S. Office of Surface Mining is too vague to implement directly into a GIS model, their definition did guide the development of a reproducible, rule-based method by SkyTruth for identifying MTR areas. We started from the perspective that, to qualify as MTR, an individual mining operation had to 1) cross a ridge top or peak, and 2) impact an area significantly larger than a typical conventional strip mine.

Using digital elevation data from the U.S. Geological Survey 1:100,000 series, the terrain parameters that characterize ridge tops and peaks, slopes and valleys were calculated. We defined a ridge top or peak as a point that lies on a local convexity that is orthogonal to a line with no convexity or concavity. After ridge tops and peaks were identified and delineated from the elevation dataset using these criteria, contiguous areas encompassing fewer than 40 acres were eliminated to minimize noise in the analysis.

MTR operations were identified in the mining land-cover class by calculating the percentage of ridge top that comprised the mine's total area. We produced two categories of MTR mines: contiguous mining

area spanning more than 320 acres and containing more than 40 acres of ridge top, and contiguous mining areas between 40 and 320 acres that contain at least 10 - 40 acres of ridge top in the mined area. Digital boundaries delineating the MTR areas, and the other surface mining areas identified by this analysis were analyzed for the entire region (SI Table 2) and files were exported in GIS-compatible shapefile format.

Water Quality and Stream Benthic Samples: We obtained data on water quality and macroinvertebrates collected and analyzed by the WV Department of Environmental Protection (WVDEP 2010 provided 6/30/10 in response to FOIA request). The full dataset includes water quality, stream habitat and stream benthos information on 6463 stream reaches. Samples were collected between 1996 and 2009. From this large dataset we extracted all sample data that met the following selection criteria: streams <10m wide draining watersheds completely contained within the 14 county area of southern WV for which we had mapped the extent of surface mining; samples for which benthic macroinvertebrate samples were collected during summer surveys and identified to genus; and samples for which at least streamwater conductivity and sulfate concentrations were recorded.

Watershed Delineation for Stream Sampling Stations: Geospatial analysis to determine the areas of surface mining and developed lands upstream of water quality sample locations was performed using Environmental Systems Research Institute's (ESRI's) ArcGIS software, version 9.3.1. Digital elevation model (DEM), hydrography, land cover, surface mining, and water quality sample location data for the entire area draining into the 14 West Virginia counties examined were assembled into a geographic information system (GIS) with all data georeferenced to the Albers Equal Area projection. The DEM data, a subset of the National Elevation Dataset[34], were obtained from the National Hydrography Dataset Plus (NHD+)[30] and represent elevation as 30 x 30 m pixels. We also obtained flow direction, a derivative of the elevation dataset, as well as 1:100,000 scale stream flow-lines from the NHD+ and added them to our GIS database. The land cover data we obtained are part of the 2001 National Land Cover Database[35] and were obtained from the USGS Multi-Resolution Land Characteristics Consortium (MLRC)[i]. The DEM, hydrography, and land cover data were all obtained as ArcGIS formatted files in the Albers projection and needed no further processing to be added to our spatial database.

Stream sampling point coordinates were used to construct an ArcGIS point file referenced to a geographic coordinate system (WGS 84), which was then projected into the same Albers coordinate system used by the other spatial datasets. Water quality point locations had to be snapped to areas of high flow accumulation (i.e. stream cells) to properly calculate upstream areas. ArcGIS has a tool, "*snap pour point",* designed to do this, but it worked too coarsely, snapping some points to the wrong stream while unable to snap other points to correct locations. We therefore developed an iterative snapping algorithm that gradually moves a point along routes of higher flow accumulation until a stream cell is met. With all sample points snapped to the nearest stream location, we used the ArcGIS *watershed* tool to identify all cells upstream of a given point. We then calculated the area of historical surface mining and of developed areas by tabulating the number of mined cells (from the mining delineation dataset) and the number of developed cells (from the "Developed" classes in the NLCD 2001 dataset) , respectively.

Statistical Analyses:

For the data analysis to address question 1, we estimated the total watershed area that had ever been mined (active and past surface mining) and used that estimate of cumulative mining extent as a predictor variable. We examined statistical relationships between solute concentrations along both mining and development gradients using quantile regression. We also split the full mining dataset into 5 equal categories of mining extent and examined changes in water quality and in macroinvertebrate taxa richness and in two benthic indicator scores developed for Central Appalachian streams by one way ANOVA and Tukey's HSD.

TITAN Analysis: To address question 2, we performed Threshold Indicator Taxa Analysis (TITAN[36]) to examine taxon specific and community level responses to both gradients within this dataset. First, TITAN estimates the value of the environmental variable that produces the greatest change in both the abundance and frequency of occurrence of each individual taxon with a minimum of 5 occurrences within a sample population. Since TITAN requires only 5 occurrences for analysis it is sensitive to rare species, a distinct advantage for detecting local biodiversity loss. The magnitude of the response is quantified as an indicator value z score[37]. The observed change point for a taxon is the value where the indicator score reaches its maximum. Individual taxa change points are bootstrapped to assess consistency in the direction (negative or positive) and

location of response (confidence intervals) to the gradient. Because indicator scores are standardized to z scores, taxa that do not respond to the gradient achieve very low or negative z scores thus provide minimal weight (or noise) to the assessment of community response.

Potential community-level thresholds are assessed by separating negative (z-) and positive (z-) taxa responses, summing the z+ and z- taxa separately, and tracking these aggregate responses for every potential change point value along the environmental gradient. Synchronous change points among multiple taxa within a narrow range of environmental values results in a distinct peak in the sum of the taxa z-scores (sum(z-) for negative responses, sum(z+) for positive responses). The magnitude of the sum(z) scores are also a direct measure of the magnitude of the effect of an environmental predictor. Collectively, a large, sharp peak in sum(z) values, obvious synchrony in numerous taxa change points, and evolutionary and life-history relationships among responsive taxa that are consistent with known sensitivities to anthropogenic gradients serve as empirical evidence for a community-level threshold[26]. While uncertainty may be relatively high about the location of low-frequency individual taxa thresholds, synchrony in the conductivity level point-of-decline of many species, including rare ones, bolsters confidence in the robustness of the community threshold.

TABLE 1: Comparison of water quality between land cover categories. Within this table, developed watersheds are watersheds without any evidence of surface mining. Not all environmental variables were collected or recorded for all samples in the dataset, leading to slightly different numbers of replicates within a category.

Category	Criteria	pH		Alkalinity		Conductivity	
		n	n ± SE	n	Mean ± SE	n	Mean ± SE
WV Reference Sites	•Identified in WDEP database as Reference site	11	7.0±0.2[a]	9	17.4±5.7[a]	11	68±13[a]
Reference	•> 95% Forested •<1% Developed •No surface mining mapped •No NPDES Permits	13	7.2±0.2[ab]	3	***32.6±28.2***	13	289±100[ab]
Surface Mining	•All watersheds with mapped surface mining in any year						
<3.5%		*46*	7.7 ±0.1[bc]	23	65.1±9.4[ab]	46	431±76[a]
3.5 to 11%		*46*	7.7 ±0.1[bc]	31	81.2±12.6[ab]	46	550±40[ab]
11 to 21%		*46*	7.9 ±0.1[c]	20	120.4±18.3[b]	46	750±69[bc]
21 to 38%		*45*	7.9 ±0.1[c]	17	118.3±22.2[b]	45	863±79[c]
>38%		*47*	7.7 ±0.1[bc]	22	126.5±15.8[b]	47	1370±123[d]
Developed	•>1% Developed						
1 to 5%	•Developed + Forested > 80%	14	7.1 ±0.2[a]	9	45.6±14.1[ab]	14	191±31[a]
>5%	•No surface mining mapped •No NPDES permits	15	7.6 ±0.2[abc]	3	***20.1±5.5***	15	350±53[ab]

*Values that share the same letters as subscripts are not statistically different based Upon Tukey-Kramer HSD posthoc comparisons.** indicates low sample size – statistics not included. ANOVA showed that categories were significantly different at p<0.0001 for all three metrics.*

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FIGURE 1 – Photos from the Hobet mine, a 40mi2 surface mine in southern WV. (A) An aerial view of a portion of the mine above Laurel Fork during active mining in 2006 (Vivian Stockman, OVEC); (B) a closeup view of the reclaimed mine surface above Laurel Fork in June 2010; (C) a filled tributary to Laurel Fork in 2010; a settling pond below the valley fill in C; (D) a closeup of the sediments of the valley fill drainage showing carbonate deposits. All photos except A by ESB.

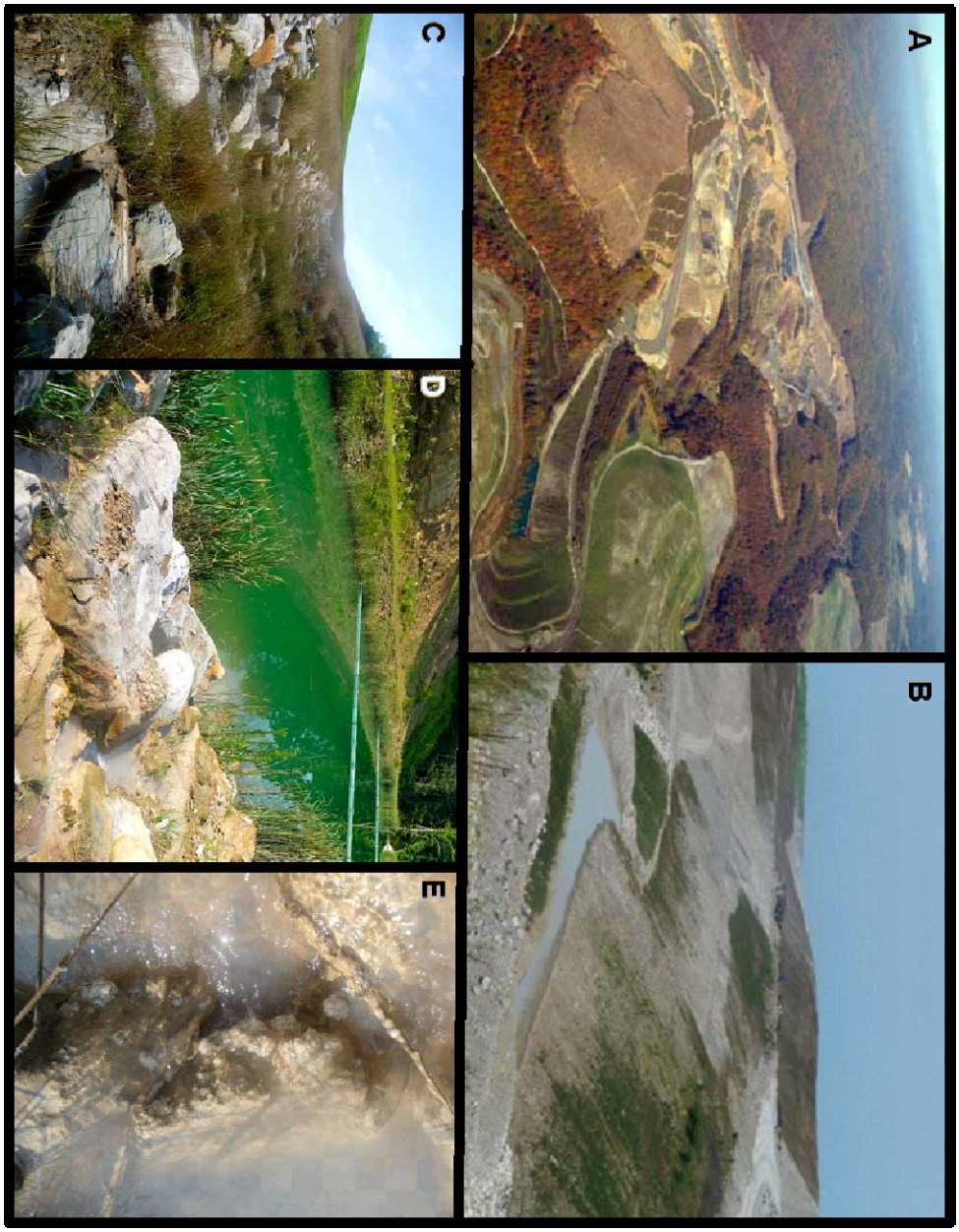


FIGURE 2: *(A) Surface mining activity delineated through analysis of remote sensing imagery collected in 1975, 1985, 1995 and 2005. Color progresses from older mining (1976 delineation) in light yellow to recent mining (2005 delineation) mining in burgundy. (B) shows the location of sampling sites used in our in depth analyses. (C) shows the spatial extent of mining reported by SkyTruth (red triangles) relative to that reported based on permit records (black triangles)*

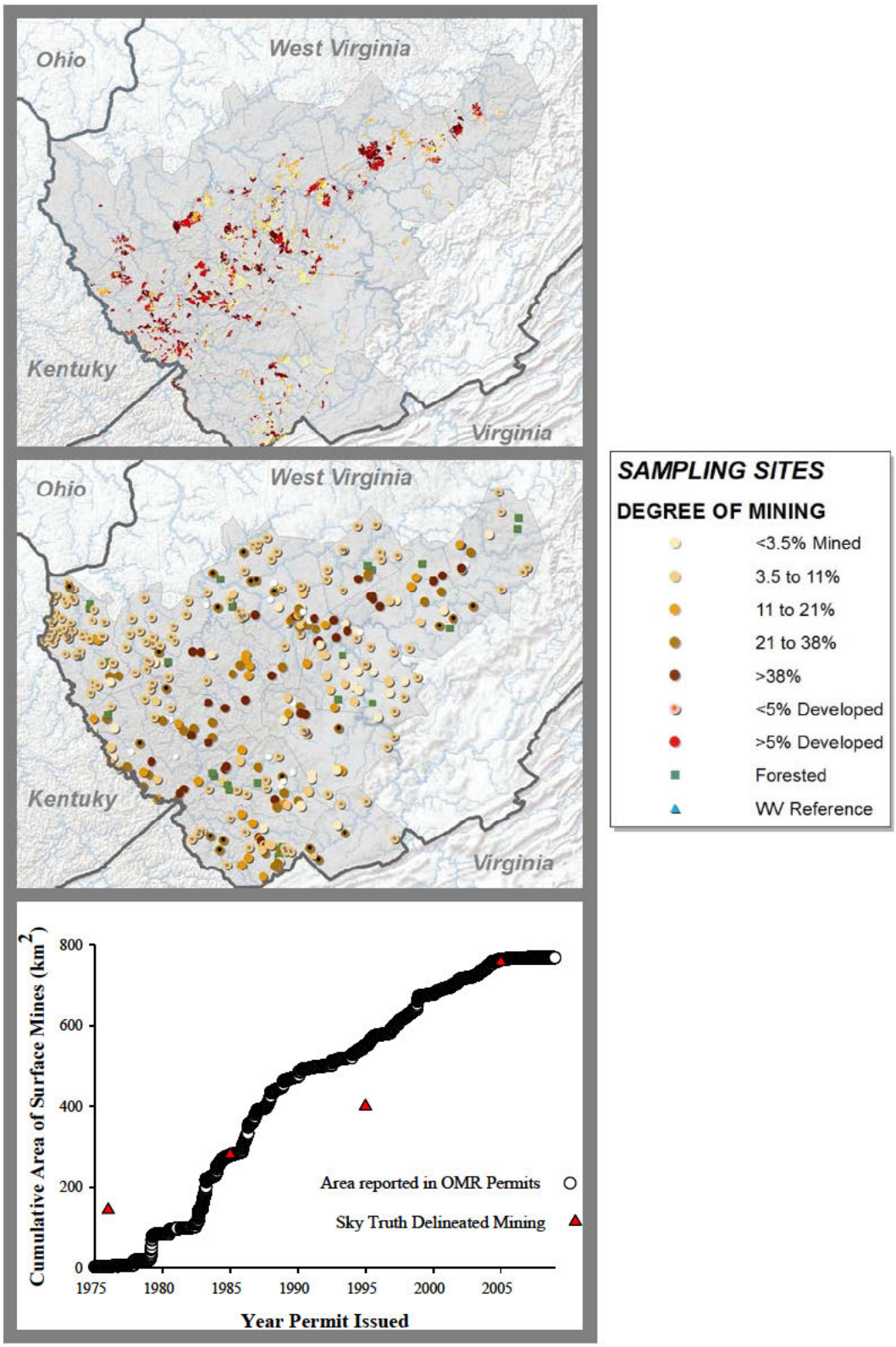


Figure 3. Quantile regressions for streamwater conductivity, nitrate and sulfate across the two dominant land cover gradients, surface mining (A&B) and development (C&D).

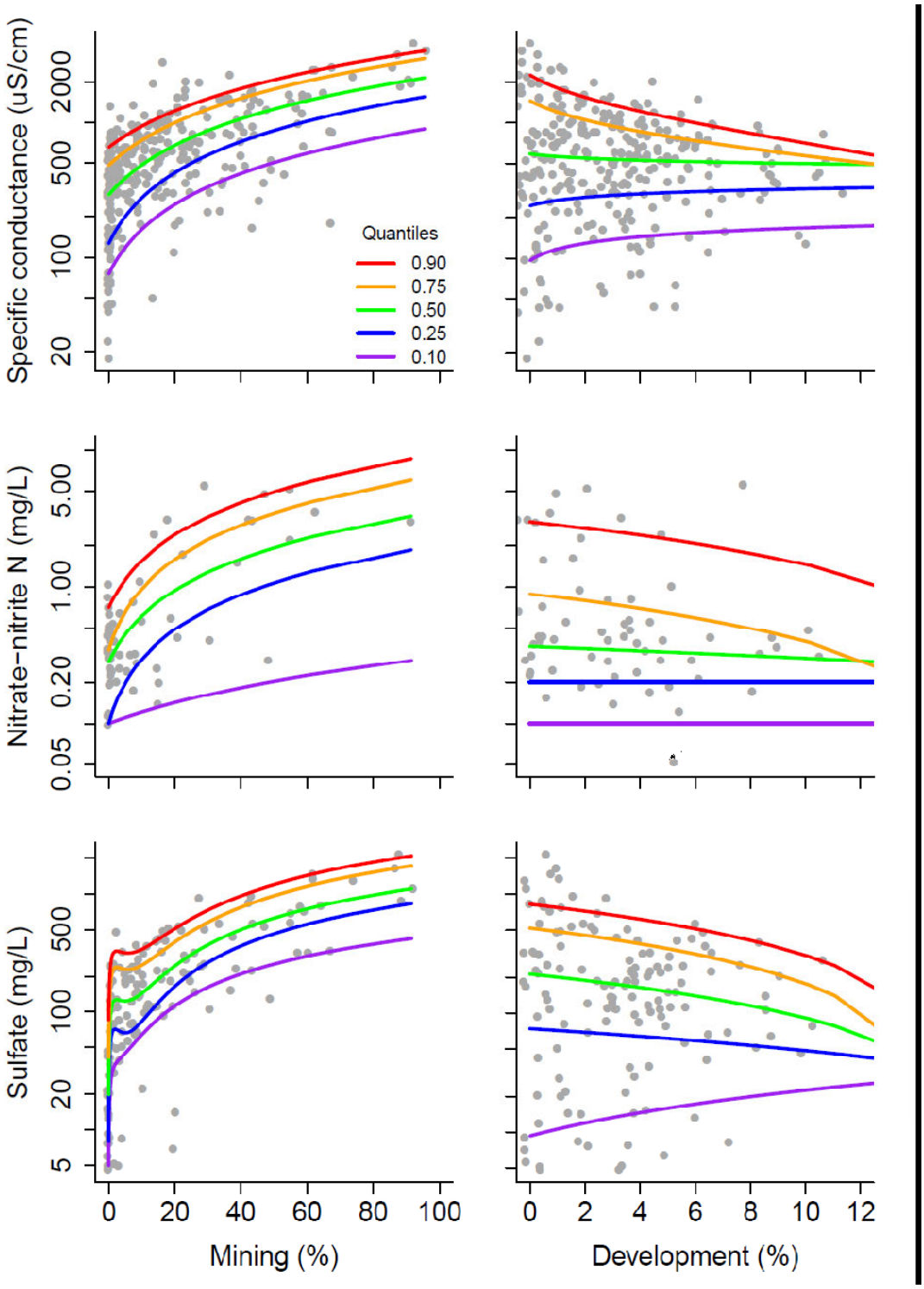


Figure 4. Effects of mining and development on macroinvertebrate community composition metrics. Here boxplots show the median as the black line within the box, the gray box extends between the 25th to 75th percentile distribution of datapoints, the whiskers delineate the 95% confidence interval and all outliers are shown as points outside of this distribution. The alphabetical superscripts indicate statistical differences between categorical variables, categories which share a letter are not significantly different from one another based on Tukey's HSD post hoc comparisons at p=0.05 adjusted for multiple comparisons. The ms superscript in panel A means marginally significant from control (p=0.054)

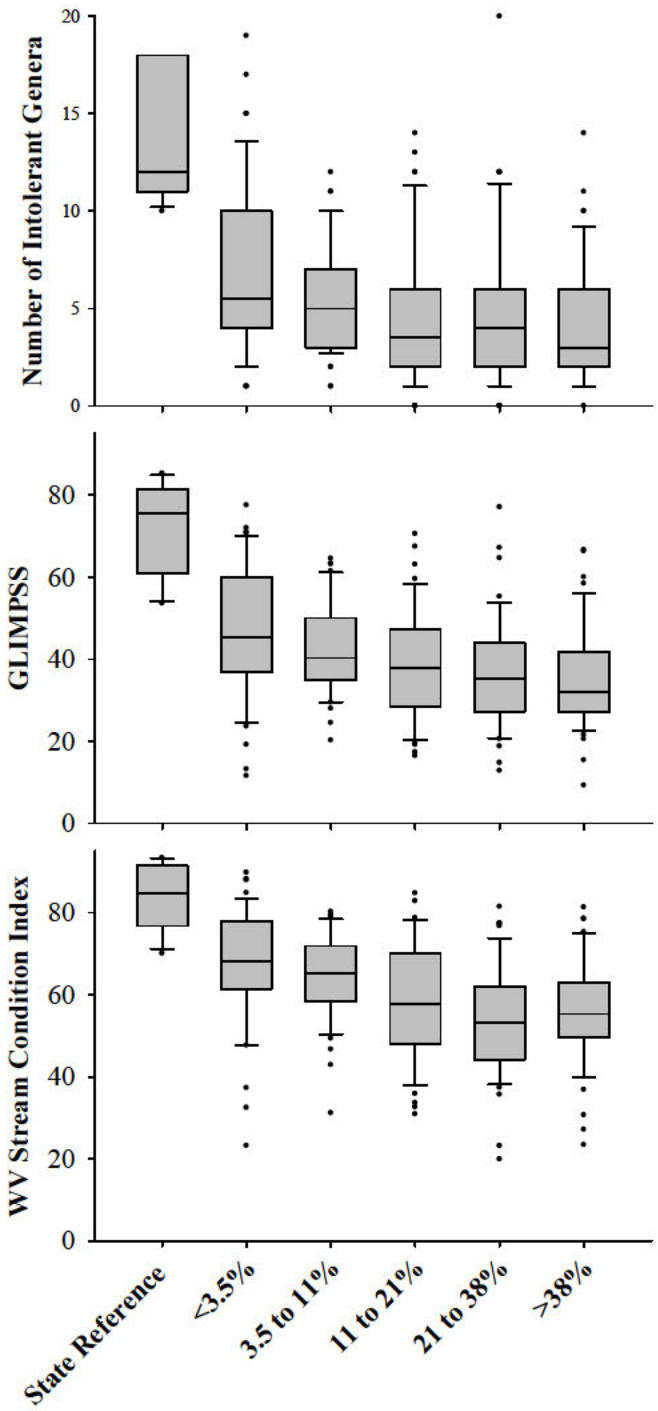


FIGURE 5.TITAN results for taxa having both high purity and reliability when run against either percent mining (A) or percent development (B) as the environmental gradient. Points are centered on the estimated change point for each taxa, horizontal lines indicate 95% CI based on 500 bootstrap replicates, and point size is proportional to the taxa z-score. Taxa which respond negatively across both the mining and develoment gradients are denoted with (*); Taxa which respond positively across both the mining and development gradients are denoted with (**); Taxa which respond negatively to the mining gradient and positively across the development gradient are denoted with (***); Taxa which respond positively to the development gradient but negatively to the mining gradient are denoted with (****).

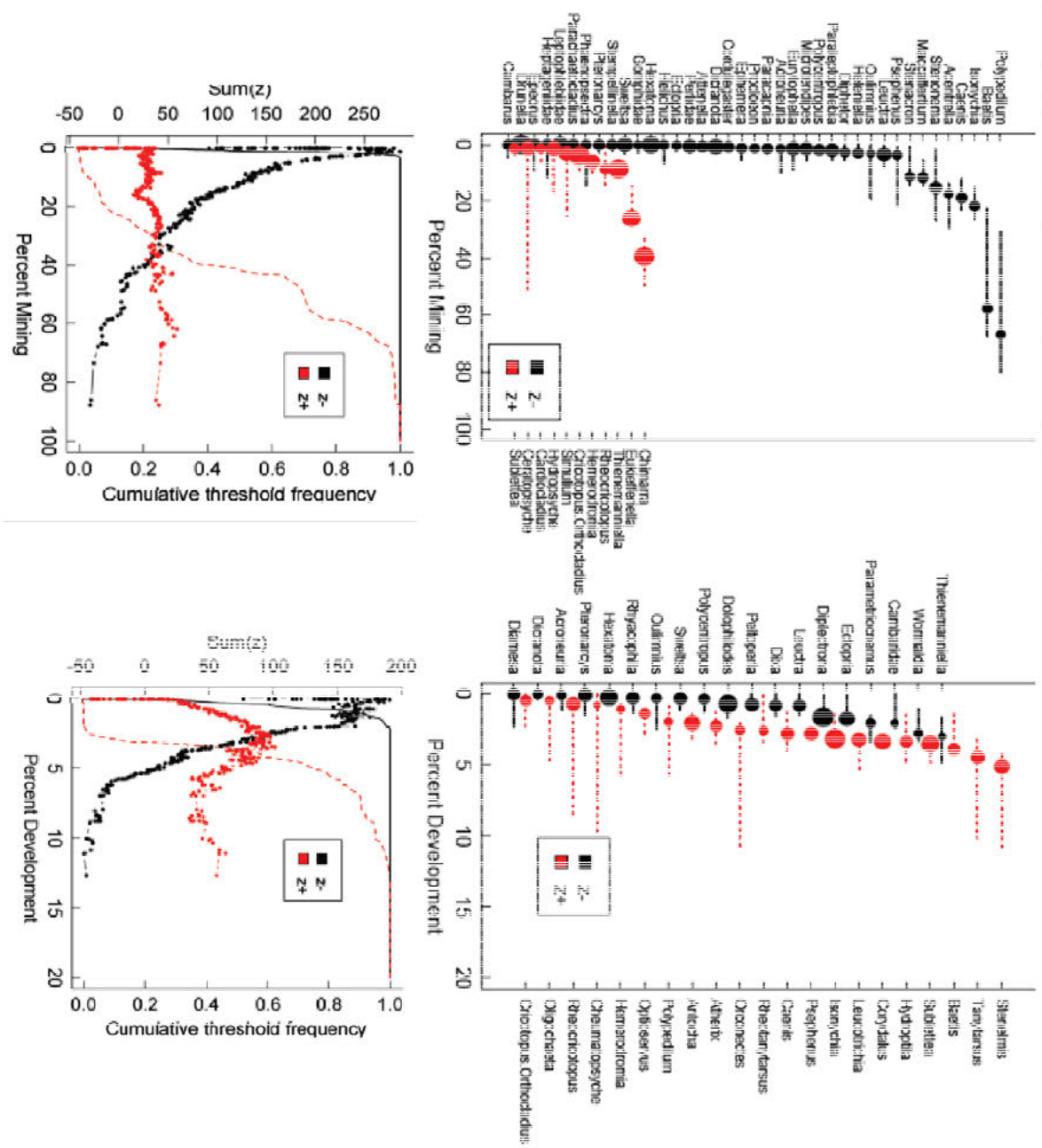
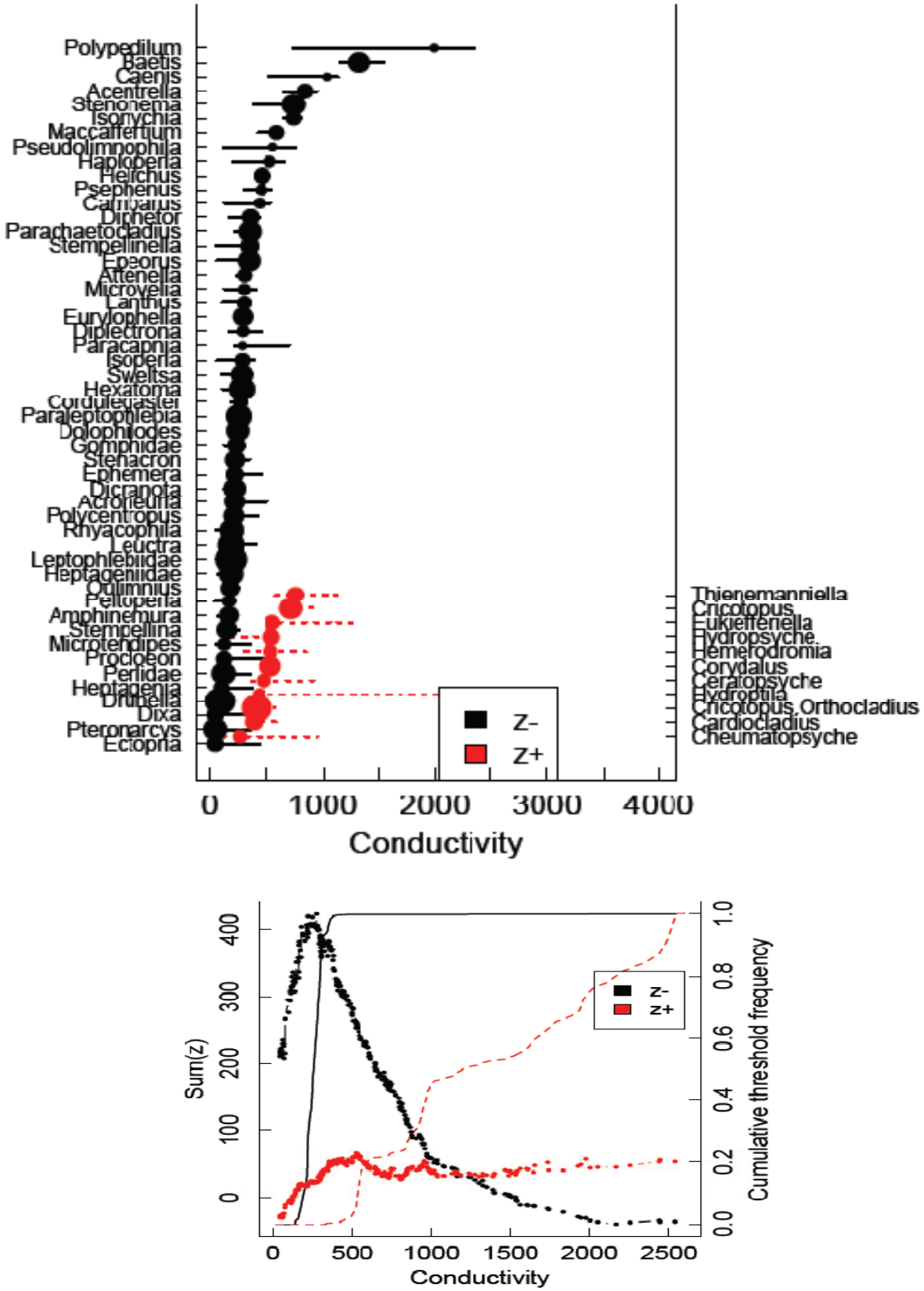


FIGURE 6.TITAN results for taxa having both high purity and reliability when run against conductivity Points are centered on the estimated change point for each taxa, horizontal lines indicate 95% CI based on 500 bootstrap replicates, and point size is proportional to the taxa z-score.



Supplemental Material to be online

(to accompany Bernhardt et al. "How many mountains can we mine…")

This Supplement Includes two figures (Figures 1 and 2) and one table (Table 2) that are directly referenced in the text as well as a detailed description of sensitivity analyses that we performed to test the robustness of our TITAN estimates. The section on sensitivity analyses is referred to in the present manuscript as "SI Section 2"

Figure Headings

Supplemental Figure 1: Abundance patterns for individual taxa determined to respond significantly and negatively to the extent of surface mining in their catchment.

Supplemental Figure 2: Abundance patterns for individual macroinvertebrate taxa that evidenced a positive response to the extent of surface mining in their catchments.

Figure 1 Part 1

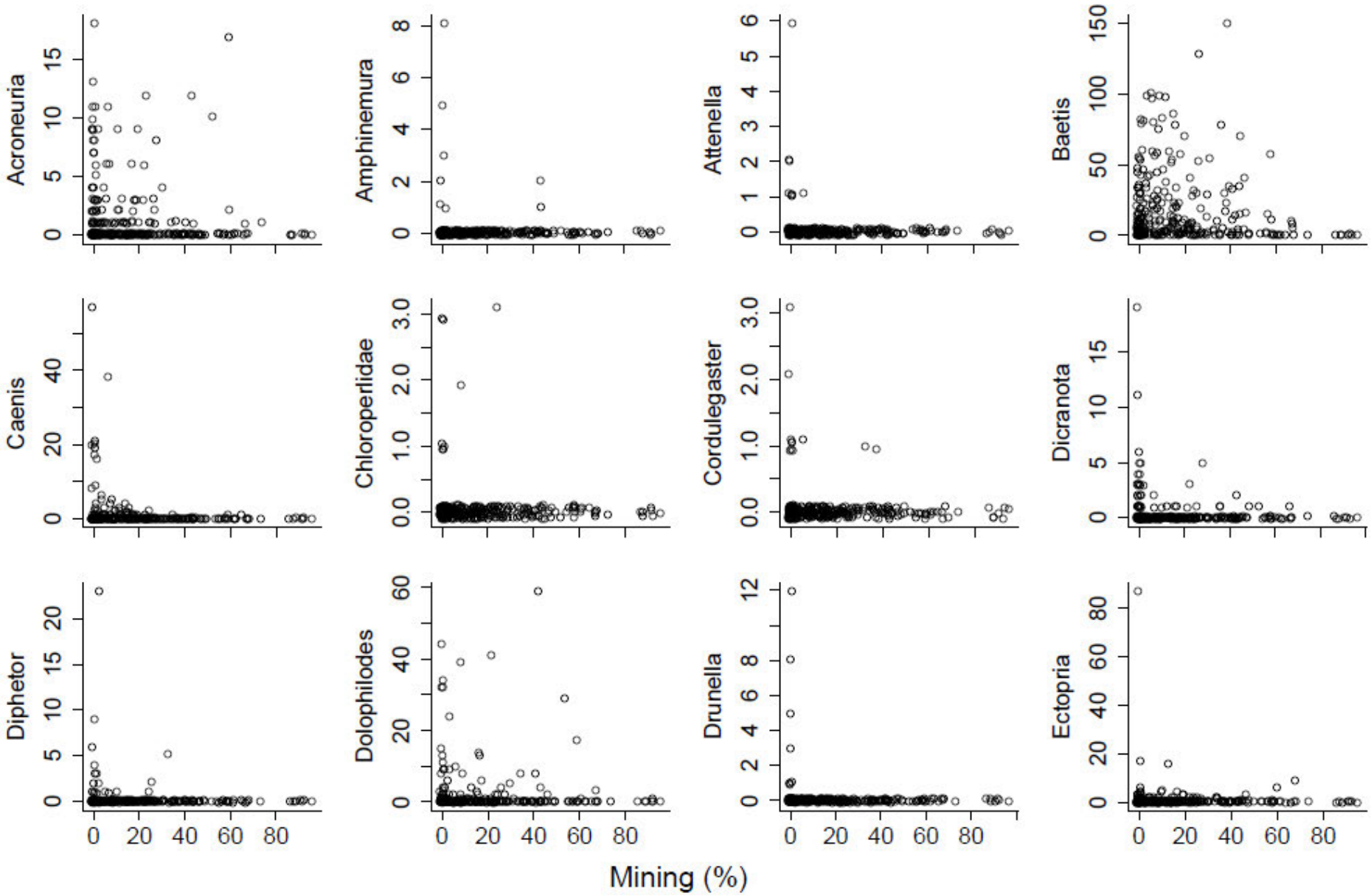


Figure 1 Part 2

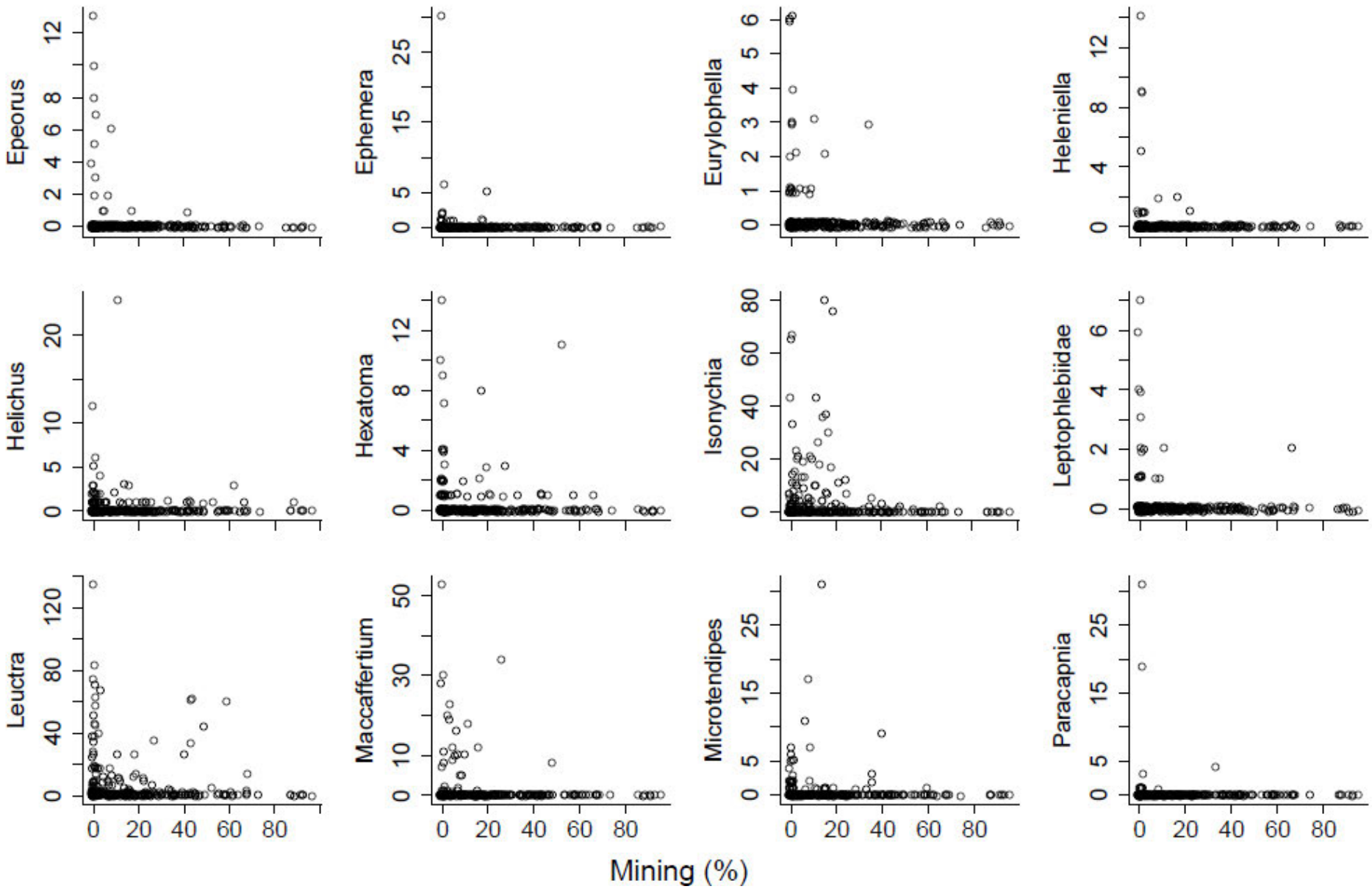


Figure 1 Part 3

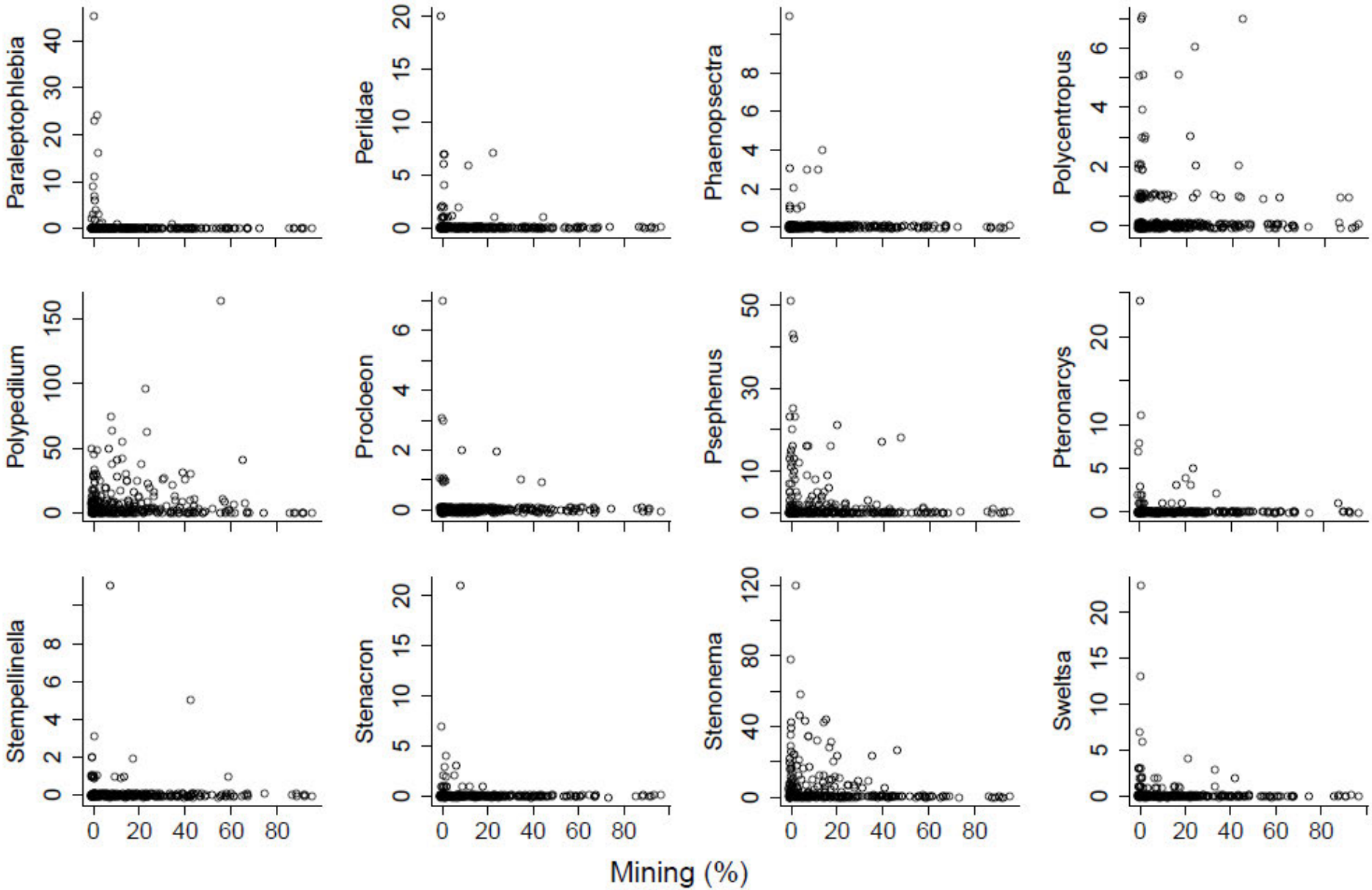
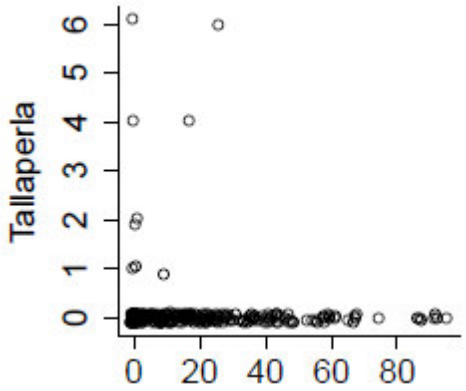


Figure 1 Part 4



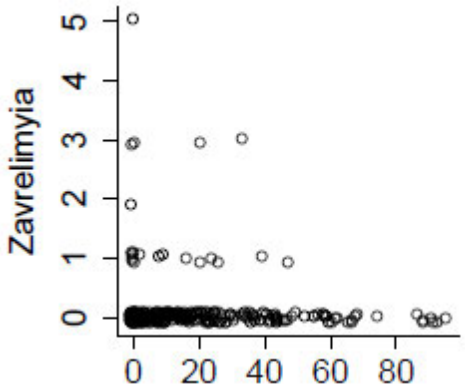
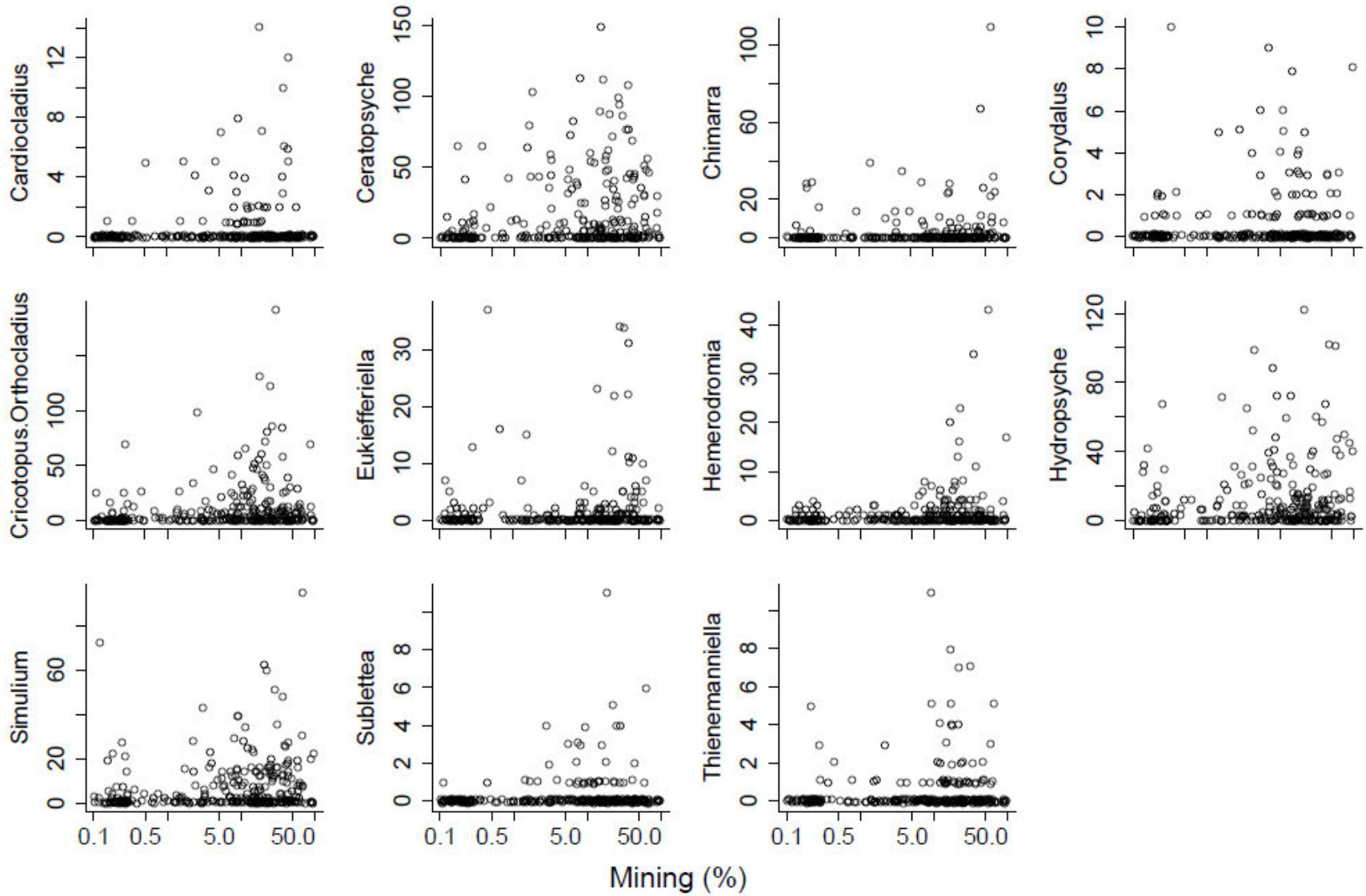
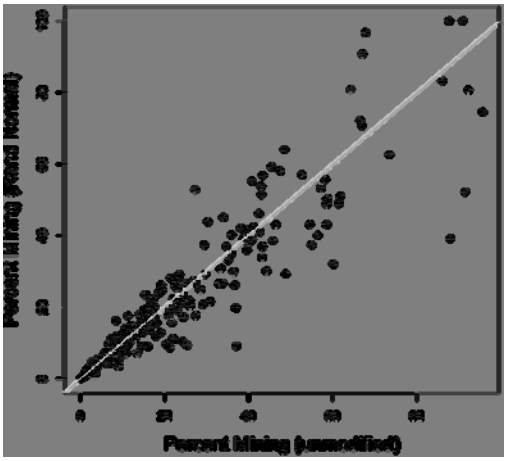


Figure 2


Cardiocladius
Ceratopsyche
Chimarra
Corydalus
Cricotopus.Orthocladius
Eukiefferiella
Hemerodromia
Hydropsyche
Simulium
Sublettea
Thienemanniella
0.1
0.5
5.0
50.0
Mining (%)

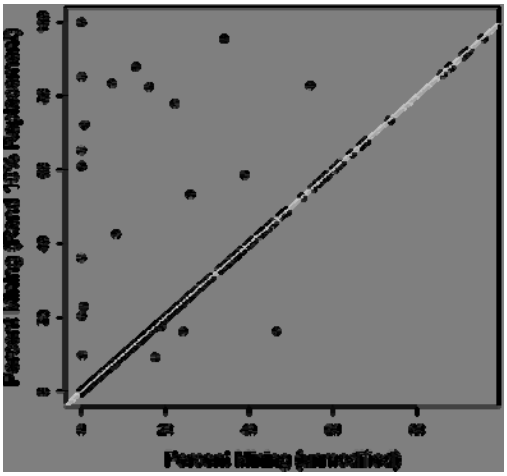
SI Section 2: Sensitivity Analyses with TITAN

Because we do not yet have estimates of the precision of our areal estimates of surface mining activity, we performed a series of sensitivity analyses with TITAN to determine whether our estimates of a mining threshold were robust to several types of possible error in surface mining estimates. We introduced error to the dataset using 3 different approaches.



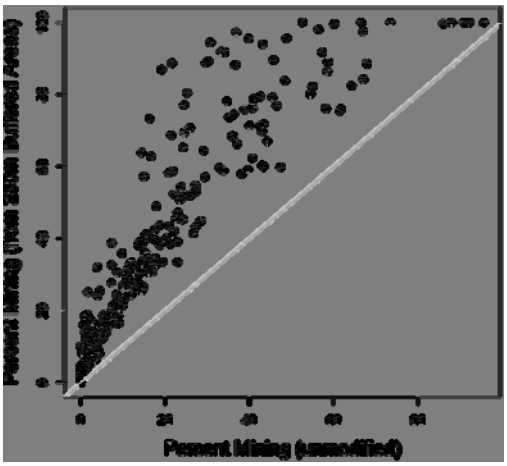
Method I: Random inflation/deflation of %mining (Figure 3)

We created a vector of values from random normal distribution (μ = 10, sd = 3) equal in length to %mining gradient and then divided vector by 10 (to give values from -1 to 1, centered around 0). We multiplied this vector value by %mining and summed with %mining. This introduces random scatter into the %mining estimates, with the scatter increasing proportional to the absolute %mining value.



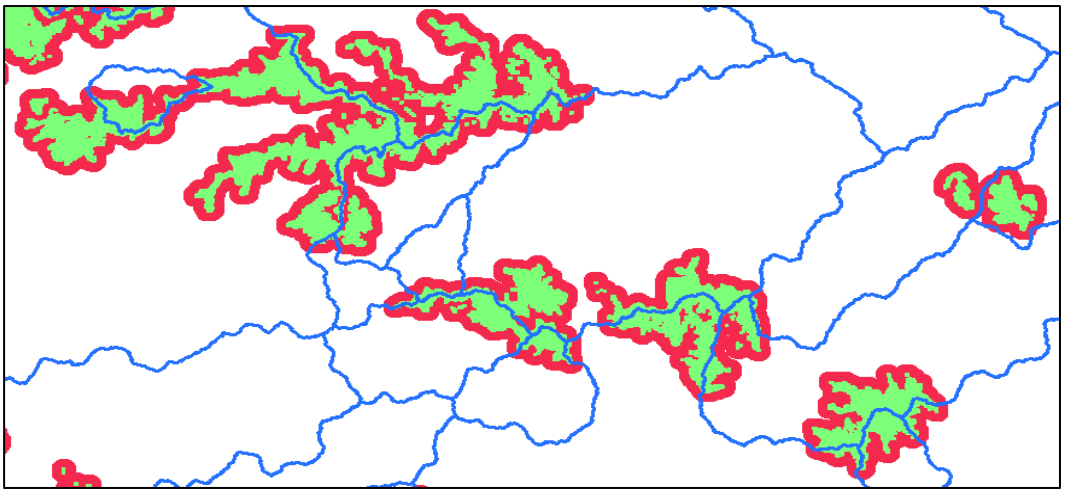
Method II: Replacement of 10% of data w/ random values (Figure 4)

We randomly selected 10% of the total observations and assigned them a random %mining value between 0-100%



Method III: 250m Buffer around all mined areas (Figure 5)

We assume that the largest uncertainty in the satellite imagery processing is the accuracty in determining the the perimeter of mined areas. Based on the geometry and total area of each watershed, as well as the geometry of the mined area within or near the watershed, uncertainty at the edge of mined areas can impact each watershed differently. We added 250m buffers (~8pixels) to the edge of every mined area (Figure 6), recalculated %mining within each watershed, and re-ran TITAN with these values.



Supplemental Figure 6. Example of buffered mine delineations. Green = SkyTruth Mining extent; Red = Buffered extension of mining delineation; Blue lines = watershed boundaries.

We found that TITAN results are robust when we introduce a moderate amount of random variation in the %mining values (Method 1, Supplemental Table 1, Supplemental Figure 7). The estimated change point value and CI are very similar to non-modified result (Supplemental Table 1).

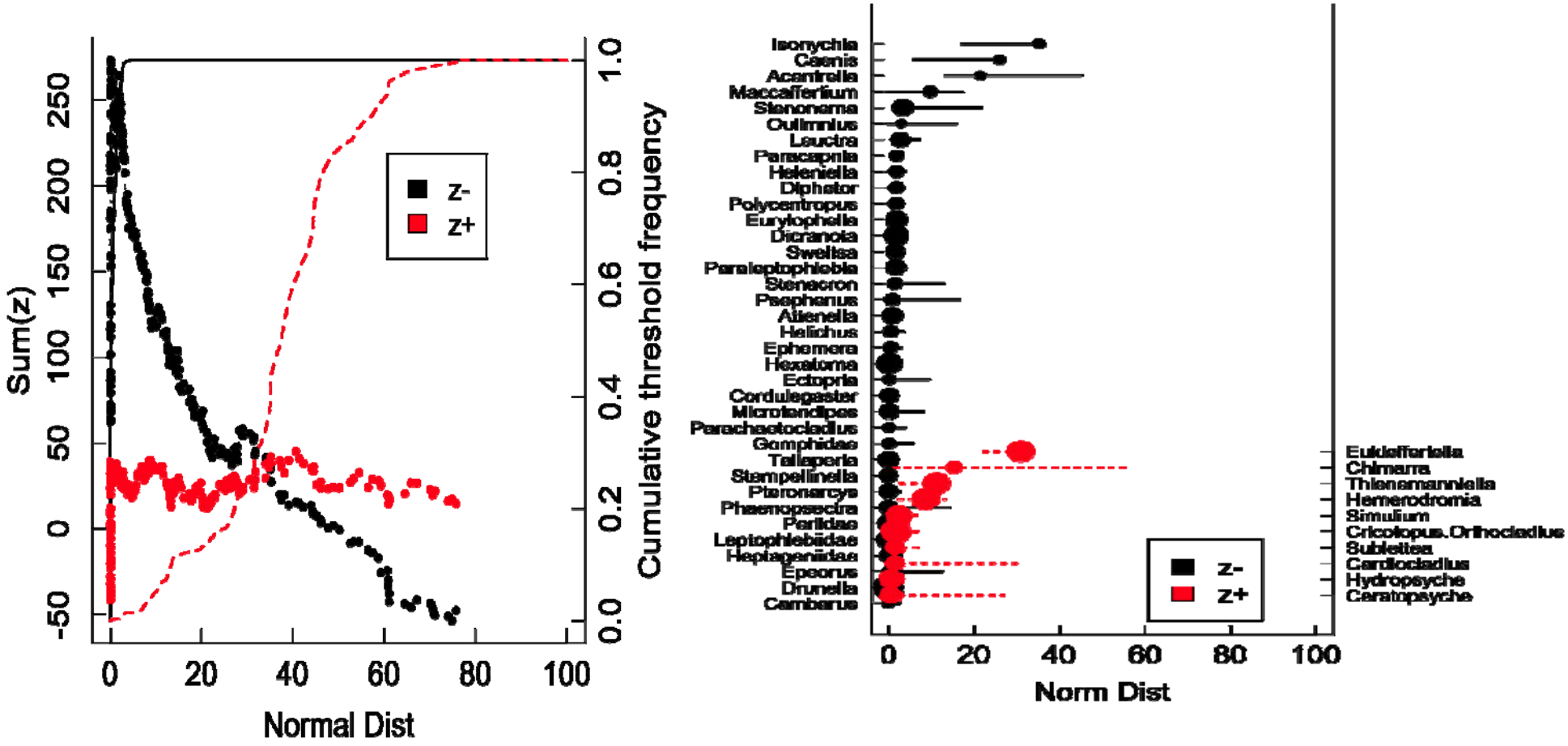
Supplemental Table 1. Change point values (+/- 95% boostrap CI) for each TITAN run.

		Change Point	Lower 95% CI	Upper 95% CI
No Modifications				
	sumz-	1.28	0.00	2.43
	sumz+	63.08	15.36	67.47
Random Change 10% Sites				
	sumz-	0.04	0.00	2.06
	sumz+	65.45	27.01	91.27
Normal Distribution Modifier				
	sumz-	0.06	0.00	2.36
	sumz+	41.04	10.09	61.02
Buffered Areas by 250m				
	sumz-	4.66	0.34	11.85
	sumz+	100.00	59.69	100.00

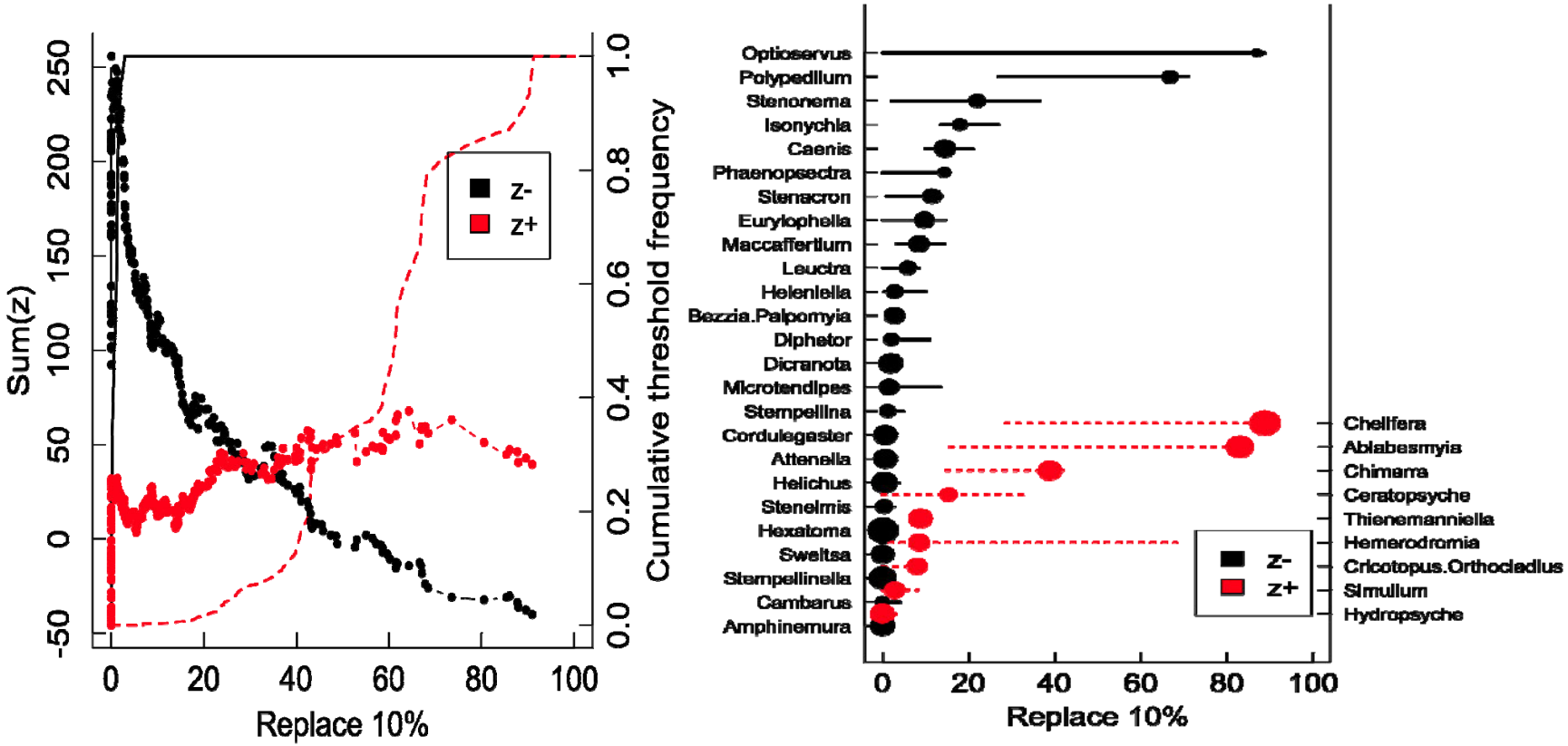
Similarly, when we replaced 10% of the observations with a random % mining value (Method 2), the overall community response value remains unchanged (Supplemental Table 1) but the number of taxa responding negatively decreases. (Supplemental Figure 8). This is likely because the random reassignment led to assigning rare taxa found only at a small number of unmined sites to some mined sites. This reassignment can introduce enough uncertainty in the patterns of abundance for rare taxa that a change point for that taxa cannot be determined

When we introduced systematic error by increasing the size of mined areas by 250m along all edges (Method 3) we were able to increase the change point estimate and confidence interval values (Supplemental Table 1, Supplemental Figure 9). We expected the values would increase (because we added mining area without changing patterns of taxa abundance). We found this error slightly inflated the estimated change point (from 1.3 to 4.7% mining) and increased the 95% confidence interval around this estimate. While such error causes the change point to be broader, there is still a clearly defined negative response (Supplemental Figure 9).

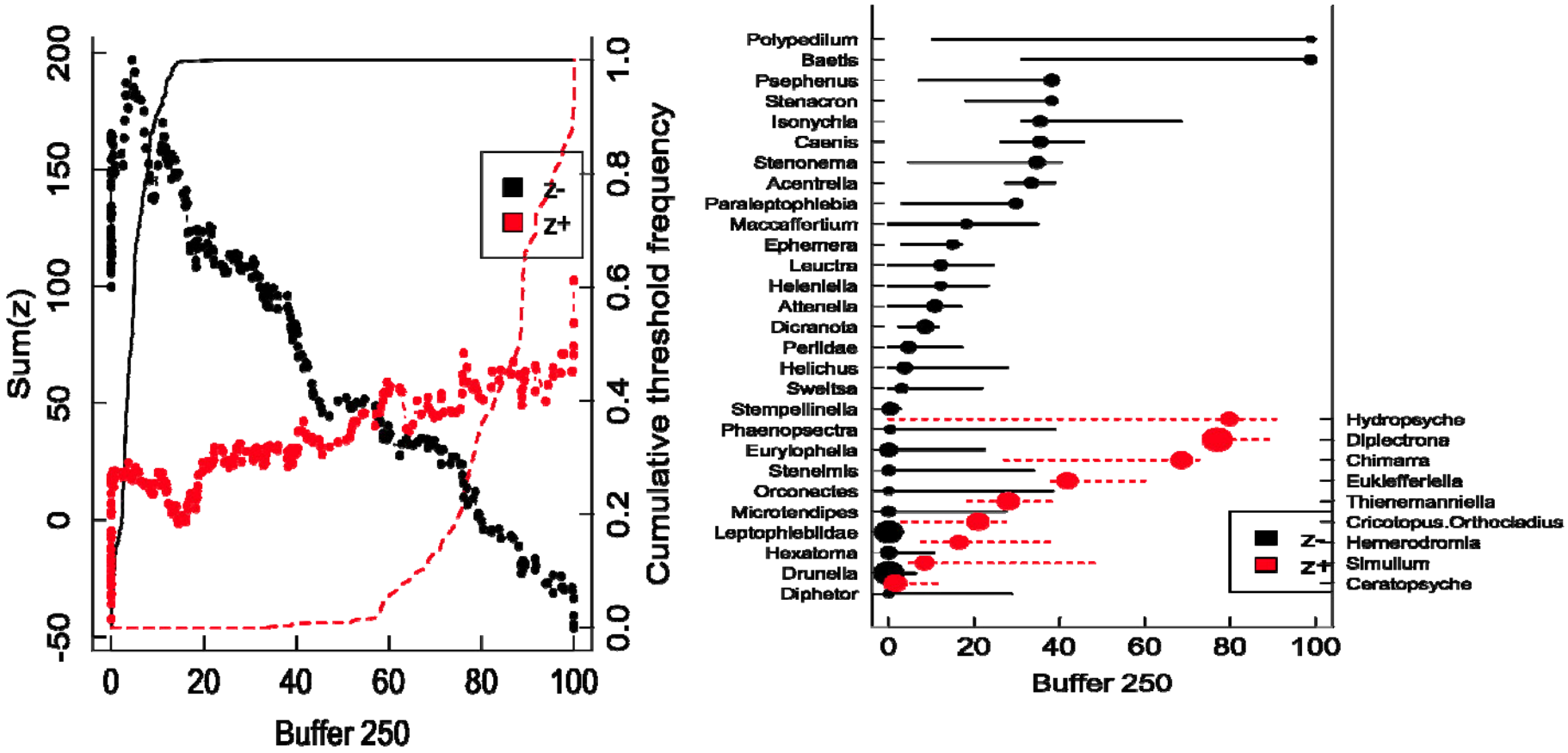
Supplemental Figure 7



Supplemental Figure 8



Supplemental Figure 9



Supplemental Table 2. Satellite image data used for this study (*p* and *r* refer to path/row location)

Landsat 5 (TM)							
p19r35	p19r34	p19r33		p18r34	p18r33		p17r33
7/3/2006	7/3/2006	7/3/2006		9/11/2005	9/11/2005		5/31/2005
9/7/1995	9/7/1995	9/7/1995		8/31/1995	8/31/1995		10/11/1995
9/8/1984	9/8/1984	9/8/1984		9/17/1984	9/17/1984		7/8/1984
Landsats 1-2 (MSS)							
p21r35		p20r35	p20r34	p20r33		p19r34	p19r33
8/20/1976		8/19/1976	8/19/1976	9/6/1976		6/7/1976	5/20/1976

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
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ATLANTA, GEORGIA 30303-8960

NOV - 2 2010

Colonel Keith A. Landry
District Engineer
Louisville District Corps of Engineers
Attn: Todd Hagman (Regulatory Branch)
OP-FN, Room 752
P.O. Box 59
Louisville, Kentucky 40201-0059

Subject: Premier Elkhorn Coal Company, Little Fork Surface Mine
U.S. Army Corps of Engineers LRL-2007-0594
Kentucky Division of Mine Permits #898-0800

Dear Colonel Landry:

The U.S. Environmental Protection Agency (EPA), Region 4, has reviewed the information submitted by or on behalf of the Premier Elkhorn Coal Company for impacts to jurisdictional waters of the U.S. as a result of proposed surface coal mining activities associated with its Little Fork Surface Mine in Pike County, Kentucky (LRL-2007-0594; #898-0800). Our review has included the original April 24, 2007, U.S. Army Corps of Engineers (Corps) Clean Water Act (CWA) Section 404 permit application as well as several additional documents provided by or on behalf of the permit applicant. EPA is concerned that the permit, as proposed, is not consistent with requirements of the agencies' regulations, including the Section 404(b)(1) Guidelines, and therefore recommends that changes to the project identified in this letter be incorporated before authorization is provided. EPA is also recommending that an Environmental Impact Statement should be prepared for this permit to assess potential environmental impacts under the National Environmental Policy Act.

The applicant originally sought authorization to impact 6,845 linear feet (lf) of ephemeral and intermittent streams to facilitate construction of six hollow fills and four in-stream sediment ponds in unnamed jurisdictional tributaries to Little Fork, Robinson Creek, and Indian Creek. Little Fork discharges into Robinson Creek, and both Robinson Creek and Indian Creek discharge directly into Shelby Creek in the Levisa Fork watershed. Subsequently, the applicant revised the mine plan and presently proposes five hollow fills and three in-stream sediment control ponds. Anticipated impacts to jurisdictional waters now comprise 5,560 lf of ephemeral and intermittent streams, including 4,415 lf as a result of the hollow fills and 1,145 lf as a result of sediment control ponds and a "drainage corridor" between the toe of HF#3 and Pond#3.

EPA has been coordinating closely with your staff and the permit applicant since the 60-day ECP review period began on August 19, 2010, (including a 15-day extension of the review period). On September 30, 2010, EPA submitted a comment letter to the Corps providing additional detail on our informal comments of August 20, 2010, and requesting a meeting with

the Corps and the applicant to initiate efforts to resolve these concerns. EPA and the Corps subsequently held a conference call on October 6, 2010, to discuss EPA's letter and outline a path towards resolution of the concerns described therein. On October 14, 2010, EPA, the Corps, and the applicant held the first of numerous conference calls to discuss additional information requirements and opportunities to resolve ongoing concerns with the proposed project.

EPA is appreciative of the applicant's efforts during this process, which have included compilation and submittal of additional information substantiating the position that use of the adjacent reclaimed impoundment to store spoil material is not a practicable alternative for the proposed Little Fork Surface Mine. The applicant has also agreed to implement best management practices (BMP's) to minimize erosion and sedimentation from disturbed areas, retain existing vegetation to the maximum extent practicable, and take efforts to first identify and then isolate the most highly reactive spoil material likely to generate excessive total dissolved solids (TDS) and contribute to elevated specific conductivity (SC). Additionally, the applicant has agreed to amend its mitigation plan to add payment of an in-lieu-fee (ILF) to the Kentucky Department of Fish and Wildlife Resources Wetland and Stream Mitigation Program for authorized impacts to jurisdictional streams adversely affected due to construction of in-stream sediment ponds. Previously, the applicant had proposed an ILF payment for proposed permanent impacts, but planned to mitigate for sediment pond impacts simply via removal of the ponds and restoration of affected streams many years following the impacts themselves.

Despite the changes described above, EPA has significant remaining environmental concerns regarding this project as currently proposed. EPA's review is intended to ensure that the proposed project meets the requirements of the CWA. The CWA Section 404(b)(l) Guidelines promulgated in regulations by EPA in conjunction with the Secretary of the Army establish the substantive environmental standards applied in the review of projects proposing to discharge dredged or fill material into waters of the United States. The Guidelines establish a sequence of review requiring: (1) an evaluation of practicable alternatives that meet the project's basic purpose to ensure selection of the least environmentally damaging practicable alternative so long as that alternative will not result in significant environmental degradation); (2) taking all appropriate and practicable steps to minimize potential adverse impacts; and (3) compensation for all remaining unavoidable impacts to waters of the United States. In addition, the Guidelines require that no discharge may be permitted that would cause or contribute to significant degradation of the waters of the United States.

Scientific literature has increasingly recognized the relationship between discharges from surface coal mining operations and downstream water quality impairments. A 2005 published study, "Evaluation of Ionic Contribution to the Toxicity of a Coal-Mine Effluent Using *Ceriodaphnia dubia*" by Kennedy, et al. linked impairment of aquatic life to TDS levels. EPA also notes that in previous technical reports, the Commonwealth of Kentucky has recognized the potential detriment to stream biota in headwater streams in the Eastern Kentucky Coal Field correlated with specific conductivity levels above 400 µS/cm (Pond and McMurray, 2002[1]). A

[1] Pond, G.J. and S.E. McMurray. 2002. A Macroinvertebrate Bioassessment Index for Headwater Streams of the Eastern Kentucky Coalfield Region, Kentucky. Kentucky Department for Environmental Protection, Division of Water. Frankfort, KY.

2008 published study, "Downstream effects of mountaintop coal mining: comparing biological conditions using family- and genus-level macroinvertebrate bioassessment tools," by Pond, et al. found evidence indicating that mining activities have subtle to severe impacts on aquatic life and the biological conditions of a stream. A 2010 published study by Pond, "Patterns of *Ephemeroptera* taxa loss in Appalachian headwater streams (Kentucky, USA)," links conductivity as the most strongly correlated factor to *Ephemeroptera* abundance in streams impacted by mining and residential development. A draft report by EPA, "The Effects of Mountaintop Mines and Valley Fills on Aquatic Ecosystems of the Central Appalachian Coalfields," recognizes that surface coal mining causes effects that include resource loss, water quality impairment, and adverse effects on aquatic resources. Finally, another draft report by EPA, "A Field-based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams" recognizes stream-life impacts associated with elevated levels of conductivity.

As part of its permit application, the applicant collected water quality data from project streams in March 2007 and reported specific conductivity values ranging from 469 to 1,777 µS/cm. EPA collected similar data in February 2010 and found specific conductivity in these same streams to range from 57 to 988 µS/cm. In addition, EPA documented specific conductivity in receiving waters downstream of the surface mine site itself ranging from 497 to1,008 µS/cm (e.g. Little Fork, Robinson Creek, and Indian Creek). EPA further notes that Indian Creek, which is the receiving water body for 6 of the applicant's 37 proposed National Pollutant Discharge Elimination System (NPDES) outfalls, is on the KY 2006, 2008, and draft 2010 CWA 303(d) list (partially supporting warm water aquatic habitat) for sedimentation/siltation and TDS.

EPA believes that additional improvements must be made to the proposed mine's design, management practices, and monitoring plan in order to ensure compliance with the 404(b)(1) Guidelines. These improvements are designed to yield an overall improvement in the condition of the watershed, which has been significantly impacted by historic mining activities. EPA believes that the following conditions should be incorporated into any final authorization under Section 404 in order to ensure that the discharges will not cause or contribute to a violation of State water quality standards (WQS), or cause or contribute to significant degradation of waters of the United States consistent with the Guidelines (40 C.F.R. § 230.10(b) and (c)).

Fill Sequencing and Best Management Practices

EPA recommends that the proposed hollow fills be constructed sequentially (one at a time) with sufficient time between the construction of subsequent fills for water quality monitoring to demonstrate that the discharge of fill material does not result in adverse impacts to the downstream aquatic ecosystem. While the applicant has provided some information to suggest that construction of fills in a sequenced approach would not be feasible, the information provided to EPA has not demonstrated that this approach is not practicable. More importantly, we are concerned that without sequencing and associated monitoring, the project may result in the violation of water quality standards and cause significant degradation of stream functions and biodiversity. The applicant should be required to submit a practicability analysis of alternatives involving a sequenced approach for valley fill construction – including individual fill construction and construction of valley fills in two or three phases – before the proposed project is authorized.

EPA believes that if water quality or biological monitoring downstream of one "sequenced" valley fill demonstrates adverse impacts to the downstream aquatic ecosystem – as determined by exceedances of specific numeric thresholds – the permit should trigger implementation of an adaptive water quality management plan (AMP) prior to construction of the next hollow fill, as described in the enclosed special permit condition (see Enclosure 1). Construction of the next hollow fill would not be authorized if the monthly flow-weighted specific conductivity measured at the representative outfall downstream of the first hollow fill exceeds the applicable water quality criteria for more than one consecutive month, or if the overall trend in conductivity levels are increasing such that the linear trend demonstrates likely future exceedance of such criteria.[2] To support this demonstration, supplemental monitoring requirements, including both chemical and biological monitoring parameters, should also be included as special conditions.

EPA believes that several demonstrated BMPs and fill construction practices for surface coal mining operations have the potential to reduce existing downstream levels of conductivity and TDS. These practices include efforts to identify and then isolate TDS- or sulfate-producing materials to minimize the likelihood that these materials will come into contact with groundwater or precipitation and therefore impact downstream waters. The proper implementation of similar BMPs has been shown to reduce specific conductance in streams draining a Magoffin County, Kentucky surface coal mine by as much as 75 percent over elevated background conditions in re-mined valleys.

EPA is appreciative of the applicant's recent endorsement of measures to identify and isolate TDS and/or sulfate producing materials in the field, as memorialized in their November 1, 2010, list of revised BMP's. EPA recommends that these measures be included as special conditions into any final authorization under Section 404 for disposal of dredged or fill material into waters of the U.S. for the Little Fork Surface Mine. These special conditions should include, at a minimum, the following:

- Identification via field-based testing of TDS and/or sulfate-producing materials that must then be isolated;
- Implementation of hollow fill design alternatives that reduce infiltration (e.g. compact surface lifts, crown the fill surface) and controls flow through the fill to avoid contact time between water and reactive materials (i.e. TDS and/or sulfate producing geologic strata); and
- Use of only low-reactive or non-reactive durable rock to construct underdrains and place only these same materials adjacent to the sides of the highwalls and hollow fills.

EPA notes that the BMPs described above relate directly to fill activities in waters of the United States that are likely to have impacts on downstream water quality. The Section 404

[2] With respect to conductivity, EPA would be satisfied with using 500 µS/cm as an numeric interpretation of the narrative standards relevant here. This value represents best-available scientific information on the relationship between conductivity levels and aquatic life in central Appalachian streams, as described in the scientific literature described earlier in this letter.

regulations establish a requirement at 40 C.F.R. 230(10)(b) that no permit may be issued that would cause or contribute to a violation of WQS. This requirement must be met regardless of whether actions necessary to meet this provision would trigger changes to permits issued under other Federal or State regulatory programs.

Adaptive Management Plan (AMP)

EPA believes that special conditions should include an AMP – described above – based on robust water quality and biological monitoring to identify trends in these parameters and to define specific thresholds of concern. If such thresholds are reached, the AMP would require specific response actions. EPA also believes the AMP should include a phased approach, such that increased impacts to downstream waters would trigger increased remedial actions until such time as water quality goals are met.

Existing scientific literature has demonstrated a strong relationship between elevated levels of specific conductance, surface coal mining activities, and degradation of aquatic communities. Therefore, EPA believes that levels of SC should be included as trigger points within the AMP. Recognizing that conductivity levels in on-site streams are already elevated, and anticipating that specific conductance in affected streams will experience at least a short-term increase during land clearing, initial excavation, and hollow fill construction, the trigger for development of the AMP will be applicable only after the initial six (6) months following the discharge of dredged or fill material into waters of the U.S. (I.4(v)). This initial 6-month period would require notification to both the Corps and EPA if monitoring indicates that the trend in monthly flow-weighted conductivity, defined in Special Condition I.4(iii), will exceed background levels or an acceptable numeric interpretation of the applicable narrative water quality standards[3], whichever is greater. Background conditions should be defined as the lesser of values measured in the field in March 2007 and February 2010 (Table 1).

If, however, during any 3 consecutive months during the subsequent 12 months of monitoring, the trend defined at proposed Special Condition I.4(iii) indicates that the monthly flow-weighted conductivity values will not likely fall below levels incompatible with meeting applicable water quality standards, or if any 3 consecutive monthly flow-weighted conductivity values exceed such levels,[4] then the permittee will conduct an analysis of the sources of effluent conductivity and develop Phase I of the AMP to reduce effluent conductivity (measured as specific conductivity) and TDS (see Enclosures 1 and 2). This AMP, to be developed by the applicant and approved by the Corps, should be based on the most technologically advanced and effective approaches available, and assumes that efforts to identify and isolate TDS- and sulfate-producing geologic strata are implemented as part of mine design and hollow fill construction, as outlined above.

If water quality goals are not met after an additional six months of implementation of the AMP, then Phase II of the AMP will be initiated. This plan will also be developed by the applicant and approved by the Corps. If Phase II of the AMP also fails to result in water quality conditions consistent with the goals outlined herein, it is EPA's recommendation that the applicant be

[3] See, supra, footnote 2.
[4] See, supra, footnote 2.

required by the permit special conditions to provide additional compensatory mitigation, either on-site or within the 12-digit hydrologic unit code (HUC) sub-watershed, aimed at addressing adverse chemical water quality conditions.

Table 1. Background specific conductivity in project streams.

Station I.D.	Station Location	Date	Investigator	Specific Conductivity (uS/cm)	BACKGROUND CONDITIONS [1]
UT Little Fork	HF#1	March 2007	Applicant	638	638
ROB02	UT HF#1	Feb 2010	EPA R4	769	
UT Little Robinson Crk	HF#3	March 2007	Applicant	1777	988
ROB07	UT HF#3	Feb 2010	EPA R4	988	
UT Little Robinson Crk	HF#4	March 2007	Applicant	785	785 [2]
ROB09	UT HF#4	Feb 2010	EPA R4	57 [2]	
UT Indian Crk	Pond#21 (HF#5/6)	March 2007	Applicant	469	191 [3]
UT Indian Crk	HF#5	March 2007	Applicant	681	
UT Indian Crk	HF#6	March 2007	Applicant	681	
ROB12	UT HF#5/6	Feb 2010	EPA R4	191	

1 Background specific conductivity is determined as the lesser of *in-situ* specific conductivity measured by the permit applicant in March 2007 and by EPA Region 4 in February 2010.

2 Field conditions at HF#4 in February 2010 were not representative of hydrologic conditions required to form the channel present in this valley. As a result, data collected in this valley in February 2010 is considered anomalous.

3 HF#5 and HF#6 are proposed to be built in two forks of a single valley. The toe of each of these proposed fills will lie approximately 140 feet apart, effectively rendering them a single large fill. The two fills will share a single sediment pond (Pond #21), and it is the specific conductivity measured in the field at the proposed location of this pond that will be considered background conditions in this valley.

In addition to concerns regarding conductivity levels directly downstream of proposed valley fills, EPA remains concerned about the overall cumulative impacts of the proposed Little Fork Surface Mine on an already degraded watershed. Therefore, EPA believes the AMP should require monitoring of conductivity levels downstream of the proposed operation in Robinson Creek and Indian Creek. Despite currently elevated conductivity levels in streams adjacent to the project site, as described above, EPA has reason to believe that several streams in the project area currently contribute freshwater dilution to downstream waters. Increasing conductivity levels in these streams, therefore, could make conditions in an already impaired watershed worse.

Therefore, the AMP should require monitoring downstream of the project in Indian Creek and Robinson Creek to ensure that baseline conductivity levels are not exceeded. If monitoring demonstrates increased levels of conductivity in these receiving streams that are attributable or likely attributable to the proposed project, the applicant should be required to implement corrective actions within the watershed to ensure that conductivity levels do not exceed pre-

mining levels. Such opportunities may include remediation of previously mined areas within the watershed, implementing additional BMPs within the project site, or additional contributions to the Kentucky ILF program for projects undertaken within the watershed. Without imposing such a condition in the AMP, EPA is concerned that the project has the potential to cause or contribute to violations of downstream WQS and continuing impairment of downstream waters.

Water Quality

The proposed project would impact more than 1 mile of streams, including the permanent loss of 4,415 lf of streams located in the Robinson Creek and Indian Creek watersheds. Both Robinson Creek and Indian Creek discharge directly into Shelby Creek in the Levisa Fork watershed. Based on our preliminary review of the available water quality data, we believe that the proposed project may cause or contribute to exceedances of WQS in streams that are already known or suspected to be impacted by mining-related (and other) causes. Furthermore, the Kentucky Pollutant Discharge Elimination System (KPDES) General Permit previously issued for this project does not set numeric limits for parameters of concern, such as conductivity, which scientific literature has demonstrated have significant effects on downstream biological communities.

EPA notes that Indian Creek is the receiving water body for 6 of the applicant's 37 NPDES outfalls for this project (authorized under a Kentucky NPDES General Permit, KPDES No. KYG046229). Additionally, nine outfalls discharge to unnamed tributaries of Indian Creek. Indian Creek is on the Kentucky 2006, 2008, and draft 2010 CWA§303(d) lists (partially supporting warm water aquatic habitat) for sedimentation/siltation and TDS. The CWA§303(d) list shows one of the suspected sources of the impairment in Indian Creek to be surface mining. The KPDES General Permit under which the project initially received coverage has expired and has been replaced by the most recent KPDES General Permit to Discharge Treated Wastewater into Waters of the Commonwealth applicable for coal mining (KYG040000; July 1, 2009).

The 2009 KPDES General Permit under which this project is (apparently) covered expressly excludes from coverage operations discharging directly to waters that are listed for coal-mining related pollutants. Such pollutants are defined to include sedimentation, total suspended solids, TDS, conductivity, iron, manganese, and metals. This project will discharge directly to waters that are listed as impaired due to TDS and sedimentation. Therefore, EPA believes that general permit for these outfalls is inappropriate and therefore the Section 402 permit as written does not protect WQS.

The 404(b)(1) Guidelines prohibit permitting a discharge of dredged or fill material if such discharge would cause or contribute to violations of any applicable WQS. In light of this provision, EPA believes that no Section 404 permit should be issued that would authorize discharges to Indian Creek or its tributaries until these inconsistencies are resolved. Alternatively, if the Corps determines that issuing a permit associated with discharges to these streams is appropriate, then the permit should include limits for specific conductance that are protective of water quality. These limits should be based on the conclusions of the scientific studies described above, which reflect best-available scientific information.

National Environmental Policy Act / Environmental Justice

Based on our review of the information available, including a Cumulative Impact Assessment (CIA) for the Upper Levisa, EPA believes it may be appropriate for the Corps to prepare an Environmental Impact Statement (EIS) concerning this proposed project. In making the determination regarding the need to prepare an EIS, we recommend that you consider the relatively large scale of the impacts associated with proposed project, e.g., the loss of over 4,400 lf of stream and the construction of 5 valley fills, as well as questions concerning how effective the proposed mitigation will be at reducing the severity of the potential direct, indirect, and cumulative impacts. In that light, EPA is uncertain that the current mitigation proposal would serve as a basis to support a Finding of No Significant Impact. With regard to the CIA, we are particularly concerned that the geographic boundary (HUC-8) may be too large spatially to provide a meaningful analysis of impacts from mining in the affected watershed. In addition, we are concerned that the CIA does not address potential cumulative human health impacts, and that the CIA presents several instances of incomplete information.

Consistent with Executive Order 12898 entitled "Federal Actions to Address Environmental Justice In Minority Populations and Low-income Populations" and the accompanying Presidential Memorandum, EPA recommends that the Corps' Section 404(b)(1) Guidelines and NEPA reviews analyze the potential for disproportionately high and adverse effects on low-income or minority populations in the area. Specifically, a characterization of the economic status of residents near the site and the conditions they face including any effects relating to the proximity of the blasting zone, locations of discharges of fill material, truck traffic, noise, fugitive dust, and habitat loss needs to be conducted to adequately assess the potential impact to EJ communities. Additional information is also needed concerning sources of drinking water for the affected populations (including municipal water supplies and private sources of drinking water including streams and/or wells). EPA also recommends that you take steps to ensure meaningful engagement of affected communities.

Conclusion

While EPA appreciates the applicant's willingness to discuss the adoption of certain BMP's into their mine plan, we believe that the Corps should incorporate further required special conditions before issuing any final authorization. Without including such conditions, EPA believes the proposed project is inconsistent with the 404(b)(1) Guidelines and will likely cause violations of WQS and associated significant degradation of stream life. EPA's recommended special conditions are outlined above, and detailed in the enclosed document. EPA also requests that we have the opportunity to review and comment on the draft permit and special conditions prior to finalization.

I want to thank you and your staff for your cooperation and willingness to address our issues. We look forward to continue working closely with you and the applicant as the permit is finalized. If you have any questions, please call me at (404) 562-9470 or Eric Somerville of my staff at (706) 355-8514.

Sincerely,

Gail Mitchell, for

James D. Giattina
Director
Water Protection Division

Enclosures

cc: Jim Townsend, Louisville District, Louisville, KY
Lee Anne Devine, Louisville District, Louisville, KY
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Lee Andrews, U.S. Fish and Wildlife Service, Frankfort, KY
Carl Campbell, Kentucky Department of Natural Resources, Frankfort, KY
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Sandy Gruzesky, Kentucky Division of Water, Frankfort, KY

Enclosure 1
Proposed Clean Water Act Section 404 Permit Special Conditions

I. Best Management Practices & Adaptive Management Plan

1. The permittee shall submit a detailed plan to the U.S. Army Corps of Engineers (Corps) Louisville District and the U.S. Environmental Protection Agency, Region 4 (EPA) for implementing mine design and hollow fill construction alternatives and best management practices (BMPs) to minimize TDS and specific conductivity during the placement of fill material into waters of the United States (U.S.) during the construction of the hollow fills. The objective of these procedures is to ensure that effluent discharging from the mine does not have a monthly flow-weighted specific conductivity greater than that which would violate applicable water quality standards,[1] consistent with best-available science on the relationship between conductivity and aquatic life. This plan must be approved by the Corps, and transmitted to EPA, prior to discharge of any dredged or fill material into any water of the U.S. Proposed actions should include, but are not necessarily limited to:

    - Identification via field-based testing of TDS and/or sulfate producing materials that must then be isolated;
    - Implementation of hollow fill design alternatives that reduce infiltration (e.g. compact surface lifts, crown the fill surface) and controls flow through the fill to avoid contact time between water and reactive materials (i.e. TDS and/or sulfate producing geologic strata);
    - Use of only low-reactive or non-reactive durable rock to construct underdrains and place only these same materials adjacent to the sides of the highwalls and hollow fills.

2. The permittee shall construct hollow fills individually, one at a time, with an adequate monitoring period between completion of one fill to demonstrate water quality is protected. Construction of the next hollow fill would not be authorized if the monthly flow-weighted specific conductivity measured at the representative outfall downstream of the first hollow fill exceeds levels consistent with applicable water quality standards for more than one consecutive month, or if the overall trend in conductivity levels are increasing such that the linear trend demonstrates likely future exceedance of such levels.[2]

3. The permittee shall submit documentation to the Corps and EPA indicating all BMPs employed in each hollow fill within 30 days of site preparation and commencement of construction of the rock underdrain.

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[1] See, supra, footnote 2.
[2] See, supra, footnote 2.

4. (i) The permittee must submit monthly flow-weighted conductivity, $\overline{K}$, to the Corps and EPA for the effluent of Pond#1, Pond#3, Pond#15, and Pond#21 following the commencement of discharges of fill material into waters of the U.S. using data collected as part of the applicable Kentucky NPDES permit, augmented as necessary to meet the special condition requirement below. Monthly flow-weighted conductivity shall be calculated as follows:

$$\overline{K} = \frac{\sum_i (Q_i \times K_i)}{\sum_i Q_i}$$

where:

$\overline{K}$ = monthly flow-weighted conductivity, µS/cm
Qi = flow for the ith sample per month, cfs
K_i = conductivity for the ith sample per month, µS/cm.

(ii) Specific conductivity will be measured no less frequently than two (2) times per month following the initial discharge of dredged or fill material into waters of the U.S. in each valley where such discharges occur through final bond release.

(iii) The monthly flow-weighted conductivity, $\overline{K}$, will be plotted as a time series and the trend in effluent conductivity calculated by linear regression. If the trend indicates that the monthly flow-weighted conductivity will exceed background levels, as defined below, or another acceptable numeric interpretation compatible with applicable narrative water quality standards,[3] whichever is greater, during the first six months following the initial discharge of dredged or fill material into any water of the U.S., the applicant will promptly notify both the Corps and EPA. All data will be provided to both the Corps and EPA within 15 days of the final monthly measurement used to calculate flow-weighted conductivity.

(iv) Background specific conductivity levels are defined as the lesser value recorded *in-situ* by the permit applicant in March 2007 and EPA in February 2010, except at HF#4 where anomalous conditions in February 2010 affected data integrity:

Tributary draining HF#1:	638 µS/cm
Tributary draining HF#3:	988 µS/cm
Tributary draining HF#4:	785 µS/cm
Tributary draining HF#5/6:	191 µS/cm

(v) If during any three (3) consecutive months during the subsequent twelve (12) months following the monitoring period outlined in I.4(iii), the trend defined therein indicates that the monthly flow-weighted conductivity values will not

[3] See, supra, footnote 2.

likely be less than necessary to satisfy applicable water quality standards by the end of this 12-month monitoring period, or if any three (3) consecutive monthly flow-weighted conductivity values exceed such levels,[4] then the permittee will conduct an analysis of the sources of effluent conductivity and develop an adaptive management plan (AMP) Phase I to reduce effluent conductivity (measured as specific conductivity) and TDS.

(vi) The conductivity trend analysis and adaptive management plan shall be submitted to the Corps for approval, and transmitted to EPA, within 30 days of conditions defined in I.4(v). The plan shall be implemented within 30 days of written approval by the Corps. Implementation of the plan will continue until the monthly flow-weighted conductivity falls below the levels described in paragraph (v), above, for three (3) consecutive months. If after cessation of AMP I implementation, conductivity trends defined in I.4(v) begin to rise, implementation of the AMP will be reinitiated.

5. If monthly flow-weighted conductivity values exceed the levels described in paragraph (v), above, continually for three months after implementation of AMP Phase I, the permittee shall prepare, within 30 days, recommendations for additional actions to reduce effluent conductivity (AMP Phase II). These recommendations shall be implemented within 30 days of written approval by the Corps.

II. Effluent and In-stream Chemical and Biological Monitoring

A. Effluent Monitoring

The permittee shall perform effluent monitoring from representative outfalls on Pond#1, Pond#3, Pond#15, and Pond#21, as these ponds are established. Effluent monitoring samples are to be collected at the outlet of each pond. Where the following monitoring conditions include additional monitoring parameters or monitoring events, these data shall augment, but not replace monitoring requirements in the Kentucky NPDES permit.

a. Parameters and Test Methods

i) Hydrologic permanence of outflow from the ponds should be monitored and logged by a continuously recording data logger.

ii) The permittee should perform effluent monitoring of the parameters listed in Table 1, analyzed using EPA Test Methods in 40 CFR Part 136 by an approved licensed laboratory.

b. Sampling Location

The sampling should be conducted at each representative outfall at Pond#1, Pond#3, Pond#15, and Pond#21.

c. Sampling Frequency

[4] See, supra, footnote 2.

The sampling frequency is as noted in Table 1. Samples required quarterly should be no fewer that five (5) days apart, and the amount of precipitation for the previous 24 hour period should be recorded on-site and reported (to the nearest 0.1 inch) as part of the sampling report. Samples required twice per month should be no fewer than five (5) days apart, and the amount of precipitation for the previous 48 hour period should be recorded on-site and reported (to the nearest 0.1 inch) as part of the sampling report. Monitoring will continue through final bond release.

Reporting

Reports shall contain tabulated data (including sample station I.D., date, and time) and graphs necessary to present information clearly and concisely, including all such tables and graphs necessary to summarize and present the entire period of record for each parameter and sample station. Latitude and longitude coordinates of all water quality monitoring locations with the applicable datum identified must be provided along with photographs and figures illustrating all sample locations. Calibration records of all *in-situ* multi-probe or single-probe water quality instruments and laboratory reports showing the analytical results must also be submitted.

All results should be clearly labeled with the applicable CWA permit number and KDNR DMP number and submitted KDOW, the Corps, and EPA Region 4.

Table 1. Supplemental effluent and in-stream water quality monitoring parameters.

Parameter	Units	Method	Sample Frequency
Bicarbonate Alkalinity	mg/l		Quarterly
Chlorides	mg/l	EPA300.0	Quarterly
Discharge	cfs	DOWSOP03019	Twice per month
Dissolved oxygen	mg/l	DOWSOP03014	Twice per month
Duration of discharge[1]	days		Continuous
Hardness (as $CaCO_3$)	mg/l	SM 2340B	Quarterly
pH	s.u.	DOWSOP03014	Quarterly
Precipitation	inches		Continuous
Sulfates	mg/l	EPA300.0	Quarterly
Specific conductance[2]	uS/cm	EPA120.1	Twice per month
Temperature	Deg C	DOWSOP03014	Twice per month
Turbidity	ntu	DOWSOP03014	Twice per month
Total Dissolved Solids (TDS)	mg/l	SM 2540C	Quarterly
Total Calcium	ug/l	EPA200.7	Quarterly
Total Magnesium	ug/l	EPA200.7	Quarterly
Total Potassium	ug/l		Quarterly
Total Sodium	ug/l		Quarterly
Total Recoverable Antimony	ug/l	EPA200.8	Quarterly
Total Recoverable Arsenic	ug/l	EPA200.8	Quarterly
Total Recoverable Beryllium	ug/l	EPA200.8	Quarterly
Total Recoverable Cadmium	ug/l	EPA200.8	Quarterly
Total Recoverable Chromium (III)	ug/l		
Total Recoverable Chromium (IV)	ug/l		

Total Recoverable Copper	ug/l	EPA200.8	Quarterly
Total Recoverable Iron[2]	ug/l	EPA200.8	Quarterly
Total Recoverable Lead	ug/l	EPA200.8	Quarterly
Total Recoverable Manganese[2]	ug/l	EPA200.8	Quarterly
Total Recoverable Mercury	ug/l	EPA1631E or 245.7	Quarterly
Total Recoverable Nickel	ug/l	EPA200.8	Quarterly
Total Recoverable Selenium	ug/l	EPA200.8	Quarterly
Total Recoverable Silver	ug/l	EPA200.8	Quarterly
Total Recoverable Thallium	ug/l	EPA200.8	Quarterly
Total Recoverable Zinc	ug/l	EPA200.8	Quarterly

[1] Duration of discharge from pond should be measured using a continuously recording data logger.
[2] Specific conductance, manganese, and iron need to be sampled at in-stream chemical monitoring locations only, unless otherwise stated in the applicable Kentucky NPDES permit.

B. WET Monitoring

Beginning at the initiation of discharge from representative outfalls (as specified above under "Effluent Monitoring"), EPA believes coal mine permits should require the permittee to perform either acute or chronic WET tests on the representative outfalls based on the duration of the discharge as documented by the continuously recording data loggers referenced in II.A(a)(i). The results of WET monitoring will be used to determine the effectiveness of the BMPs.

In cases where hydrologic permanence monitoring data indicate a sediment pond with any volume of discharge lasting more than 4 consecutive days, chronic WET tests should be performed using *Ceriodaphnia dubia* and *Pimephales promelas* and using a dilution series that includes 100 percent effluent and the in-stream waste concentration.[5] The end points should be reported as the inhibition concentration that affects 25% of the test organisms compared to the control (IC_{25}). Sampling should be performed quarterly. The operator should use WET testing procedures outlined in EPA's document entitled, "Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms" (October 2002).

In cases where the effluent discharge may be short in duration, it may be necessary to collect a high volume effluent sample and properly preserve it for use in the static-renewal test. Please refer to Section 8.5.4 on page 32 of EPA's document entitled, "Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms" (October 2002). Alternative acute WET test organisms are either *Daphnia magna* or *D. pulex* and *Pimaphales promelas*. In addition to reporting these results to the Corps, all results should be reported to EPA and KDOW.

C. In-stream Water Quality Monitoring

The permittee should perform in-stream monitoring for the parameters listed above in Table 1, in accordance with 40 CFR §122.44(d)(1)(vi)(C)(3). Sample collection and quality assurance / quality control should follow Kentucky Standard Operating Procedures at DOWSOP03014 and DOWSOP03015. EPA Test Methods in 40 CFR Part 136 should be used for analytical analysis.

a. Sample Type
Grab samples should be taken whenever possible.

b. Sampling Locations
Samples should be taken from the following locations:

[5] EPA notes that approved invertebrate WET test species are relatively insensitive to conductivity, as compared to in situ aquatic macroinvertebrates in central Appalachian streams. Nevertheless, EPA believes that WET tests can help identify significant water quality impairments as a result of surface coal mining operations, which can complement numeric conductivity measurements.

i. One sampling point located upstream of the sediment pond for each representative outfall, as specified above under "Effluent Monitoring" at paragraph II.A. If there is no upstream location, an appropriate background location within the 12-digit hydrologic unit code should be used.

ii. One in-stream monitoring site located immediately below the toe of the sediment pond for each representative outfall (i.e. ≤25 feet from outfall), as specified above under "Effluent Monitoring."

iii. One sampling point located *the further* of 200 meters (656 feet) downstream of each representative outfall or the furthest downstream location that is upstream of any tributary confluence. The sampling point should be downstream of riprap and other disturbance and located within a relatively natural and intact riparian zone where possible.

iv. One sampling point located in the receiving waterbody that is within 50 feet of the first confluence necessary to increase the stream order above that stream in which the outfall is located (e.g. if the outfall is located in a 1st order stream, this sample point should be located no greater than 50 feet downstream of the first confluence that elevates the stream order below the confluence to at least a 2nd order stream)

c. Sample Frequency

The sampling frequency is as noted in Table 1. Samples required quarterly should be no fewer that five (5) days apart, and the amount of precipitation for the previous 24 hour period should be recorded on-site and reported (to the nearest 0.1 inch) as part of the sampling report. In the event that in-stream monitoring results show in-stream specific conductivity levels above those necessary to satisfy applicable water quality standards,[6] the permittee is required to increase the monitoring frequency for all parameters to two times per month. Samples required twice per month should be no fewer than five (5) days apart, and the amount of precipitation for the previous 48 hour period should be recorded on-site and reported (to the nearest 0.1 inch) as part of the sampling report. Monitoring will continue through final bond release.

d. Conditions for Taking Samples

Samples should be collected during low- or base-flow conditions (e.g., not during, or within 48 hours after, a precipitation event exceeding 0.2 inches).

e. Reporting

Reports shall contain tabulated data (including sample station I.D., date, and time) and graphs necessary to present information clearly and concisely, including all such tables and graphs necessary to summarize and present the entire period of record for each parameter and sample station. Latitude and longitude coordinates of

[6] See, supra, footnote 2.

all water quality monitoring locations with the applicable datum identified must be provided along with photographs and figures illustrating all sample locations. Calibration records of all *in-situ* multi-probe or single-probe water quality instruments and laboratory reports showing the analytical results must also be submitted.

All results should be clearly labeled with the applicable CWA permit number and KDNR DMP number and submitted KDOW, the Corps, and EPA Region 4.

D. In-stream Biological Monitoring

The permittee should implement an annual benthic macroinvertebrate study plan using approved State protocols for benthic macroinvertebrate sampling.

a. Concurrent in-stream monitoring
In-stream samples for specific conductivity, TDS, pH, temperature and dissolved oxygen should be measured at the same locations as the benthic samples using properly calibrated instruments.

b. Methods
The permittee should implement an annual benthic macroinvertebrate study plan using approved state-protocols for benthic macroinvertebrate sampling.

c. Sampling Locations
Use the same locations as shown above for in-stream water quality monitoring.

d. Sampling Frequency
Sampling times will occur consistent with accepted Kentucky protocols (i.e. sample index periods). Sampling will occur annually through final bond release. Sampling should be avoided during periods of excessive precipitation and scouring floods. In cases where a large flow rate of the receiving water does not lend itself to a benthic assessment (i.e., non-wadeable sites), the permittee should perform a bioassessment using fish. Both fish and benthic macroinvertebrate studies should be performed for receiving waterbodies that are conducive to fish assessments. Results from sampling either of the two assemblages may be used to determine if the water body is impaired.

e. Reporting
The permittee should submit the results of the study, including summary tables, appropriate indices of biotic integrity, color photographs and figures showing sample locations, calibration records, etc. to the KDOW, the Corps, and EPA no later than 30 days following the permittee's receipt of the final report.

Enclosure 2
Adaptive Management Plan Implementation Timeline

Phase	Action	Time allowed	Elapsed time since initial discharge of fill material into waters of the U.S.
Pre-AMP	Initial land clearing, excavation, hollow fill construction, and water quality monitoring	6 months	6 months
	Initial post-construction monitoring	3 to 12 months	Up to 18 months
AMP Phase I (if applicable)	Submit AMP I	30 days after AMP I trigger (SC I.4(v))	Up to 19 months
	Approve AMP I	Not specified in Special Condition, estimate 30 days	Up to 20 months
	Implement AMP I	30 days after AMP I Approval	Up to 21 months
	Monitor AMP I	3 to 6 months	Up to 27 months
AMP Phase II (if applicable)	Develop and submit AMP II	30 days after AMP II trigger (SC I.5)	Up to 28 months
	Approve AMP II	Not specified in Special Condition, estimate 30 days	Up to 29 months
	Implement AMP II	30 days after AMP II approval	Up to 30 months
	Monitor AMP II	6 months	Up to 36 months
Additional Mitigation Required (if applicable)	Submit mitigation plan	45 days after end of AMP II	Up to 37.5 months
	Approve mitigation plan	Not specified in Special Condition, estimate 30 days	Up to 38.5 months
	Implement mitigation plan	30 days after mitigation plan approval	Up to 39.5 months

Brian Topping/DC/USEPA/US
12/10/2010 09:14 AM

To Brian Frazer
cc Ross Geredien, Christopher Hunter
bcc
Subject Lecco

Here is our initial comments(b) (5) [redacted]
Brian

ATTACHMENT REDACTED - DELIBERATIVE

2010-12-09 Leeco Draft Closeout Letter - Track Changes since 12-8_WD.docx

Brian Topping
US Environmental Protection Agency
Wetlands Division, Room 7231
Office: 202-566-5680, FAX: 202-566-1375
Mail Code 4502T, 1200 Pennsylvania Avenue, NW, Washington, DC 20460
Deliveries: EPA West -- Room 7231-S, 1301 Constitution Avenue, NW, Washington, DC 20004
topping.brian@epa.gov

Christopher Hunter/DC/USEPA/US
12/10/2010 09:17 AM

To Palmer Hough
cc
bcc
Subject Fw: OGC comments on Spruce

On the G drive as well

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454
hunter.christopher@epa.gov

----- Forwarded by Christopher Hunter/DC/USEPA/US on 12/10/2010 09:16 AM -----

From: Karyn Wendelowski/DC/USEPA/US
To: Gregory Peck/DC/USEPA/US@EPA, David Evans/DC/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA, Brian Frazer/DC/USEPA/US@EPA, Christopher Hunter/DC/USEPA/US@EPA
Cc: Kevin Minoli/DC/USEPA/US@EPA
Date: 12/09/2010 10:15 PM
Subject: OGC comments on Spruce

We can talk through these tomorrow.

ATTACHMENT REDACTED - (b)(5) ACP

Spruce FD draft 120110 ogc edits.doc

Gary Hudiburgh/DC/USEPA/US
12/10/2010 09:55 AM

To Karen Gude
cc Deborah Nagle, Js Wilson, Marcus Zobrist
bcc
Subject Re: Questions regarding current stance on MTM and Conductivity Standards for BNA Interview with Pete

have we responded to you yet? (I am certainly not the most up to date, but ...)

Gary Hudiburgh
Attorney
Water Permits Division (MC 4203M)
US Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Washington, DC 20460
202 564-0626
202 564-9544 (fax)
http://www.epa.gov/npdes

Karen Gude | Marcus/Gary, Hi. Every year BNA conducts an i... | 12/08/2010 10:13:59 AM

From: Karen Gude/DC/USEPA/US
To: Marcus Zobrist/DC/USEPA/US@EPA, Gary Hudiburgh/DC/USEPA/US@EPA
Cc: Deborah Nagle/DC/USEPA/US@EPA, Js Wilson/DC/USEPA/US@EPA
Date: 12/08/2010 10:13 AM
Subject: Questions regarding current stance on MTM and Conductivity Standards for BNA Interview with Pete

---

Marcus/Gary,

Hi. Every year BNA conducts an interview with our AA to discuss upcoming major issues and actions for the coming year. In requesting this year's interview, the BNA reporter has identified a number of questions/issues that they would like for us to address. Two involve MTM and the use of conductivity standards. Do either of you have a few minutes later today or tomorrow to touch base with me on these issues, so that I can figure out a plan forward for what, if anything, we might be saying on these issues? We may not be lead on either of these issues -- I just need to better understand where we are, what we've been saying (if anything), and who's involved.

BNA is trying to schedule the interview for Tuesday, Dec 14th, which means we'll need to have background and TPs developed sooner. I should have a better idea on a deadline later today.

Thanks,
Karen
(202) 564-9567

Questions:

- State regulators are increasingly angry at EPA over water regulations and guidance on the permitting of mines, especially mountaintop coal mines. Some of the states say EPA is failing to respect the delegation of Clean Water Act regulatory authority to states. Is EPA digging in and anticipating prolonged fighting with the states, in and out of court? A rockier general relationship with the states?
- Does EPA plan a push to use conductivity standards for various pollutants in waters throughout the United States? EPA has been asking the SAB about that. What is EPA's own view about the practical extent of such an approach to measuring various dissolved solids?

OW IO-Programs First Communications Meeting

Wed 12/08/2010 1:00 PM - 2:00 PM

Attendance is for Karen Gude

Chair: **Amy Han/DC/USEPA/US**
Location: 2379 East

This entry has an alarm. The alarm will go off before the entry starts.

Required:	Cara Lalley/DC/USEPA/US@EPA, Karen Gude/DC/USEPA/US@EPA, Keara Moore/DC/USEPA/US@EPA, Robert Gunter/DC/USEPA/US@EPA, Sonia Altieri/DC/USEPA/US@EPA, tloop@chesapeakebay.net
Optional:	Patricia Scott/DC/USEPA/US@EPA, Tanya Code/DC/USEPA/US@EPA, Tomeka Nelson/DC/USEPA/US@EPA

Description

Introductions - Travis and each of the different programs
IO and programs communications
Media (e.g. BNA request for AA talking points this week); hot topics

MEDIA INQUIRY: BNA--requests for interview with Water AA --Deadline 12/14

Jalil Isa to: Peter Silva, Cynthia Dougherty 12/07/2010 12:57 PM

Cc: Amy Han, Keara Moore, Karen Gude, Cara Lalley, Travis Loop, Robert Gunter

(b) (5)

[redacted]

Here are a few general questions for the Outlook interviews.
My piece will address Clean Water Act issues in 2011.

What are EPA's most significant Clean Water Act priorities and challenges for 2011? Any new focus, program or policy changes?

Clean Water Act jurisdiction. I understand EPA at this point

is not ready to make an announcement, eg. whether the agency will issue a rule. However, how will EPA deal with jurisdictional challenges in the coming year? What might be some options? Is a regulation a possibility? Administrator Jackson has called for legislation. However, the chief sponsors were just voted out of office. What are the agency's concerns. Would like some comments on this issue, even if no action is decided yet.

Key Clean Water Act regulations the agency will be working on in 2011 and why they are important. Comments on most significant regulations.
EPA is working on proposing a rule to curb sanitary sewer overflows. Where does this stand. What will EPA be doing on this rule in 2011, and what is being considered?

Comments on status of other regulatory work in 2011, including planned stormwater rule on developed sites; cooling water intake rule; and on just announced planned rule for 2012 on coal-fired power plants.

Nutrients: EPA just issued a big rule setting numeric limits for nutrients in Florida, which will take some time to implement. Is the agency looking to do the same in some other states, such as those in the Mississippi Basin. Some time ago, I was told EPA was considering a similar move in Wisconsin. What does EPA want to do? Efforts in 2011 to address nonpoint source pollution.

Possible questions for Peter Silva:

What do you see as the primary policy issues in 2011 for drinking water?

Is there much that EPA can do about planning for water quantity
(separate from quality) -- for sustainability of supply in the face of
increasing demand? This gets mentioned often, but the practical tools at
EPA's disposal may be very limited. The WaterSense program, for
example--is it making a fundamental difference?

State regulators are increasingly angry at EPA over water regulations
and guidance on the permitting of mines, especially mountaintop coal
mines. Some of the states say EPA is failing to respect the delegation
of Clean Water Act regulatory authority to states. Is EPA digging in and
anticipating prolonged fighting with the states, in and out

of court? A
rockier general relationship with the states?

Does EPA plan a push to use conductivity standards for various
pollutants in waters throughout the United States? EPA has been asking
the SAB about that. What is EPA's own view about the practical extent of
such an approach to measuring various dissolved solids?

There is high anxiety over the draft update of the cancer risk
assessment for inorganic arsenic. Any sense yet of what impact that will
have on regulations for drinking water?

Possible questions for Cynthia Dougherty:

What do you see as the primary policy issues in 2011 for drinking water?

An enhanced effort to regulate contaminants in groups rather than
individually got started in 2010. How is that likely to go in 2011?
Anything that could be noted as a prominent result of that effort?

So-called "emerging contaminants," including possible endocrine
disruptors, draw a lot of attention. Is the research on such subjects
inherently too complex and lengthy for us to expect any significant
regulatory issues to emerge in 2011, or is there something in that
category on the horizon?

There is high anxiety over the draft update of the cancer risk
assessment for inorganic arsenic. Any sense yet of what impact that will
have on regulations for drinking water?

There is a draft microbial risk assessment guideline planned. There
already has been a move toward creating a protocol that was revised and
re-labeled and maybe not finished yet as some sort of risk assessment
framework. Where is that framework? How will the guideline differ from
the framework? And is the guideline coming out in 2011?

Will perchlorate still be a lingering regulatory question in 2011, or
will that be over and done with?

Personal Notes

Ross Geredien/DC/USEPA/US
12/10/2010 10:10 AM

To Brian Topping
cc Brian Frazer, Christopher Hunter
bcc
Subject Re: Lecco

I had to make one change: there was a section that was repeated in the main graph, so i deleted it for clarity.

ATTACHMENT REDACTED - DELIBERATIVE

2010-12-10 Leeco Draft Closeout Letter - Track Changes since 12-8_WD.docx

Ross Geredien
ORISE Fellow
EPA Office of Wetlands, Oceans, and Watersheds
202-566-1466
Geredien.ross(AT)epa.gov

Brian Topping	Here is our initial comments to clear up the discu...	12/10/2010 09:14:59 AM

From: Brian Topping/DC/USEPA/US
To: Brian Frazer/DC/USEPA/US@EPA
Cc: Ross Geredien/DC/USEPA/US@EPA, Christopher Hunter/DC/USEPA/US@EPA
Date: 12/10/2010 09:14 AM
Subject: Lecco

Here is our initial comments(b) (5) [redacted]
Brian
[attachment "2010-12-09 Leeco Draft Closeout Letter - Track Changes since 12-8_WD.docx" deleted by Ross Geredien/DC/USEPA/US]

Brian Topping
US Environmental Protection Agency
Wetlands Division, Room 7231
Office: 202-566-5680, FAX: 202-566-1375
Mail Code 4502T, 1200 Pennsylvania Avenue, NW, Washington, DC 20460
Deliveries: EPA West -- Room 7231-S, 1301 Constitution Avenue, NW, Washington, DC 20004
topping.brian@epa.gov

KevinH Miller/R4/USEPA/US
12/10/2010 11:00 AM

To Stan Meiburg, Jim Giattina, Philip Mancusi-Ungaro, Tom Welborn
cc Duncan Powell, Matthew Klasen
bcc
Subject revised draft final letter for Leeco/Stacy Branch (LRL-2007-0217 897-0480)

Gentlemen,

I have revised the version of the letter Matt sent yesterday, as we have discussed. Track changes and clean versions attached.

Please feel free to call me if you have any questions. I will be driving back to Atlanta this afternoon, and working on the special conditions over the weekend.

Thanks, Kevin

Matt, after we spoke, all the things I came across seemed pretty clear, so I went ahead and made changes without the discussion we had planned for noon. But call me if you have any questions, or if you think I have misrepresented anything.

ATTACHMENT REDACTED - DELIBERATIVE

2010-12-09 Leeco Draft Closeout Letter khm edits.docx

ATTACHMENT REDACTED - DELIBERATIVE

2010-12-09 Leeco Draft Closeout Letter khm edits clean.docx

Kevin H. Miller
Physical Scientist/Landscape Ecologist
Mining Section/Wetlands, Coastal and Oceans Branch
Water Protection Division/EPA Region 4
Sam Nunn Atlanta Federal Center
Mail Code 9T25/61 Forsyth Street, SW
Atlanta, GA 30303-8960

404.562.9435/404.562.9343 (fax)
miller.kevinh@epa.gov
www.epa.gov/region4/water/wetlands

Christopher Hunter/DC/USEPA/US
12/10/2010 11:41 AM

To Christine Mazzarella
cc
bcc
Subject Re: Spruce Cumulative Effects

Thanks Christine. FYI - here's the version we'll be sending out for comment today, but including comments and questions from various people. Anything you can provide to answers these would be helpful.

Thanks,
Chris

ATTACHMENT REDACTED - DELIBERATIVE

Appendix 5 Cumulative Impacts_121010 with comments.doc

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454
hunter.christopher@epa.gov

Christine Mazzarella i'll take a look at some material and see what i... 12/09/2010 12:00:10 PM

From: Christine Mazzarella/R3/USEPA/US
To: Christopher Hunter/DC/USEPA/US@EPA
Date: 12/09/2010 12:00 PM
Subject: Re: Spruce Cumulative Effects

(b) (5) [redacted]

[redacted]

[redacted]

[redacted].

Christopher Hunter Hi Christine, hope you're doing well.(b) (5) [redacted] 12/09/2010 11:49:42 AM

From: Christopher Hunter/DC/USEPA/US
To: Christine Mazzarella/R3/USEPA/US
Date: 12/09/2010 11:49 AM
Subject: Spruce Cumulative Effects

Hi Christine, hope you're doing well.

(b) (5) [redacted]

(b) (5) [redacted]

[redacted]

[redacted]

[redacted]

Thanks,
Chris

202-566-1454

Brian Frazer/DC/USEPA/US
12/10/2010 11:51 AM

To Brian Frazer

cc Brian Topping, Christopher Hunter, Cliff Rader, David Evans, Denise Keehner, Duncan Powell, Gregory Peck, Heinz Mueller, Jeffrey Lapp, Jim Giattina, John Pomponio, Kevin Minoli, KevinH Miller, Matthew Klasen, MichaelG Lee, Nancy Stoner, Philip Mancusi-Ungaro, Ross Geredien, Stan Meiburg, Stefania Shamet, Tom Welborn, William Early

bcc

Subject Re: Updated draft Leeco-Stacy Branch letter

ATTACHMENT REDACTED - DELIBERATIVE

2010-12-10 Leeco Draft Closeout Letter - Track Changes since 12-8_WD.docx

Here is the letter,

****

Brian M. Frazer, Chief
Wetlands & Aquatic Resources Regulatory Branch
Office of Wetlands, Oceans and Watersheds
U.S. EPA
1200 Pennsylvania Avenue, NW (MC 4502T)
Washington, DC 20460
202-566-1652

Brian Frazer	Kevin and Matt, Based on a conversation I had...	12/10/2010 11:50:02 AM

From: Brian Frazer/DC/USEPA/US
To: KevinH Miller/R4/USEPA/US@EPA
Cc: Brian Topping/DC/USEPA/US@EPA, Christopher Hunter/DC/USEPA/US@EPA, Cliff Rader/DC/USEPA/US@EPA, David Evans/DC/USEPA/US@EPA, Denise Keehner/DC/USEPA/US@EPA, Duncan Powell/R4/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA, Heinz Mueller/R4/USEPA/US@EPA, Jeffrey Lapp/R3/USEPA/US@EPA, Jim Giattina/R4/USEPA/US@EPA, John Pomponio/R3/USEPA/US@EPA, Kevin Minoli/DC/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA, MichaelG Lee/DC/USEPA/US@EPA, Nancy Stoner/DC/USEPA/US@EPA, Philip Mancusi-Ungaro/R4/USEPA/US@EPA, Ross Geredien/DC/USEPA/US@EPA, Stan Meiburg/R4/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA, Tom Welborn/R4/USEPA/US@EPA, William Early/R3/USEPA/US
Date: 12/10/2010 11:50 AM
Subject: Re: Updated draft Leeco-Stacy Branch letter

Kevin and Matt,

Based on a conversation I had with Tom Welborn this morning regarding the alternative analysis section, I'm sending a revised version of the letter for your review. Let me know if you want to discuss.

Thanks,

bf

****

Brian M. Frazer, Chief
Wetlands & Aquatic Resources Regulatory Branch
Office of Wetlands, Oceans and Watersheds
U.S. EPA
1200 Pennsylvania Avenue, NW (MC 4502T)
Washington, DC 20460
202-566-1652

KevinH Miller	Thanks, Matt. I just spoke with Tom, and will be...	12/10/2010 07:38:00 AM

From: KevinH Miller/R4/USEPA/US
To: Matthew Klasen/DC/USEPA/US@EPA
Cc: Brian Frazer/DC/USEPA/US@EPA, Brian Topping/DC/USEPA/US@EPA, Christopher Hunter/DC/USEPA/US@EPA, Cliff Rader/DC/USEPA/US@EPA, David Evans/DC/USEPA/US@EPA, Denise Keehner/DC/USEPA/US@EPA, Duncan Powell/R4/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA, Heinz Mueller/R4/USEPA/US@EPA, Jeffrey Lapp/R3/USEPA/US@EPA, Jim Giattina/R4/USEPA/US@EPA, John Pomponio/R3/USEPA/US@EPA, Kevin Minoli/DC/USEPA/US@EPA, MichaelG Lee/DC/USEPA/US@EPA, Nancy Stoner/DC/USEPA/US@EPA, Philip Mancusi-Ungaro/R4/USEPA/US@EPA, Ross Geredien/DC/USEPA/US@EPA, Stan Meiburg/R4/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA, Tom Welborn/R4/USEPA/US@EPA, William Early/R3/USEPA/US
Date: 12/10/2010 07:38 AM
Subject: Re: Updated draft Leeco-Stacy Branch letter

Thanks, Matt. I just spoke with Tom, and will be finalizing the letter today (without the conditions--I'll work on those on Sunday after travelling back to Atlanta tomorrow).

Kevin H. Miller
Physical Scientist/Landscape Ecologist
Mining Section/Wetlands, Coastal and Oceans Branch
Water Protection Division/EPA Region 4
Sam Nunn Atlanta Federal Center
Mail Code 9T25/61 Forsyth Street, SW
Atlanta, GA 30303-8960

404.562.9435/404.562.9343 (fax)
miller.kevinh@epa.gov
www.epa.gov/region4/water/wetlands

Matthew Klasen	Hi everyone, Please see attached for an update...	12/09/2010 06:44:25 PM

From: Matthew Klasen/DC/USEPA/US
To: Brian Frazer/DC/USEPA/US@EPA, Brian Topping/DC/USEPA/US@EPA, Cliff Rader/DC/USEPA/US@EPA, David Evans/DC/USEPA/US@EPA, Duncan Powell/R4/USEPA/US@EPA, Heinz Mueller/R4/USEPA/US@EPA, Jim Giattina/R4/USEPA/US@EPA, Kevin Minoli/DC/USEPA/US@EPA, KevinH Miller/R4/USEPA/US@EPA, Philip Mancusi-Ungaro/R4/USEPA/US@EPA, Ross Geredien/DC/USEPA/US@EPA, Tom Welborn/R4/USEPA/US@EPA, MichaelG Lee/DC/USEPA/US@EPA, Christopher Hunter/DC/USEPA/US@EPA
Cc: Stan Meiburg/R4/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA, Denise Keehner/DC/USEPA/US@EPA, John Pomponio/R3/USEPA/US@EPA, Jeffrey Lapp/R3/USEPA/US@EPA, William Early/R3/USEPA/US, Nancy Stoner/DC/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA

Date: 12/09/2010 06:44 PM
Subject: Updated draft Leeco-Stacy Branch letter

Hi everyone,

Please see attached for an updated draft of the Leeco-Stacy Branch letter (b) (5) [redacted]. I've attached both a clean version and a version showing changes since the R4-edited version discussed on yesterday's call.

I believe this letter incorporates all the comments that have arrived over the past two days. (b) (5) [redacted]

Please review this updated draft and let me know if you have any additional major concerns; if so, we could set up a meeting tomorrow to discuss. (b) (5) [redacted]

Let me know if you have any questions, and thanks for all your help.

Best,
Matt

[attachment "2010-12-09 Leeco Draft Closeout Letter.docx" deleted by KevinH Miller/R4/USEPA/US]
[attachment "2010-12-09 Leeco Draft Closeout Letter - Track Changes since 12-8.docx" deleted by KevinH Miller/R4/USEPA/US]

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

Matthew Klasen/DC/USEPA/US
12/10/2010 11:51 AM

To "Brian Frazer"
cc
bcc
Subject Fw: revised draft final letter for Leeco/Stacy Branch (LRL-2007-0217 897-0480)

FYI -- not sure how your edits intersect with these.

Matt Klasen
U.S. Environmental Protection Agency
Office of Water
(202) 566-0780
Cell (202) 380-7229
KevinH Miller

----- Original Message -----
From: KevinH Miller
Sent: 12/10/2010 11:00 AM EST
To: Stan Meiburg; Jim Giattina; Philip Mancusi-Ungaro; Tom Welborn
Cc: Duncan Powell; Matthew Klasen
Subject: revised draft final letter for Leeco/Stacy Branch (LRL-2007-0217 897-0480)

Gentlemen,

I have revised the version of the letter Matt sent yesterday, as we have discussed. Track changes and clean versions attached.

Please feel free to call me if you have any questions. I will be driving back to Atlanta this afternoon, and working on the special conditions over the weekend.

Thanks, Kevin

Matt, after we spoke, all the things I came across seemed pretty clear, so I went ahead and made changes without the discussion we had planned for noon. But call me if you have any questions, or if you think I have misrepresented anything.

ATTACHMENT REDACTED - DELIBERATIVE

2010-12-09 Leeco Draft Closeout Letter khm edits.docx

ATTACHMENT REDACTED - DELIBERATIVE

2010-12-09 Leeco Draft Closeout Letter khm edits clean.docx

Kevin H. Miller
Physical Scientist/Landscape Ecologist
Mining Section/Wetlands, Coastal and Oceans Branch
Water Protection Division/EPA Region 4
Sam Nunn Atlanta Federal Center
Mail Code 9T25/61 Forsyth Street, SW
Atlanta, GA 30303-8960

404.562.9435/404.562.9343 (fax)
miller.kevinh@epa.gov

www.epa.gov/region4/water/wetlands

Matthew Klasen/DC/USEPA/US
12/10/2010 12:48 PM

To Gregory Peck
cc
bcc
Subject Spruce history

Here's the section from the draft FD. PD and RD language is the same or equivalent.

mk

ATTACHMENT REDACTED - DELIBERATIVE

2010-12-10 Spruce history sections.docx

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

Alaina DeGeorgio/R3/USEPA/US
12/10/2010 01:25 PM

To Jessica Martinsen
cc
bcc
Subject draft Tioga 3 letter

Jessica,

Attached is the draft Tioga 3 letter. I still have a lot of bullets to add in the technical comments attachment.

Thanks,

Alaina

Attachment Withheld - FOIA (b)(5)

Tioga3_PN Comments.doc

Alaina DeGeorgio
EPA Region III
1650 Arch St.
Philadelphia, PA
(215) 814-2741

Brian Frazer/DC/USEPA/US
12/10/2010 02:00 PM

To Brian Frazer
cc Duncan Powell, Jim Giattina, KevinH Miller, Matthew Klasen, Philip Mancusi-Ungaro, Stan Meiburg, Tom Welborn
bcc
Subject Re: revised draft final letter for Leeco/Stacy Branch (LRL-2007-0217 897-0480)

Here is the version I edited.

ATTACHMENT REDACTED - DELIBERATIVE

2010-12-10 Leeco Draft Closeout Letter khm edits clean.docx

****
Brian M. Frazer, Chief
Wetlands & Aquatic Resources Regulatory Branch
Office of Wetlands, Oceans and Watersheds
U.S. EPA
1200 Pennsylvania Avenue, NW (MC 4502T)
Washington, DC 20460
202-566-1652

Brian Frazer | Stan - Overall I think Kevin's is clearer and more... | 12/10/2010 01:58:17 PM

From: Brian Frazer/DC/USEPA/US
To: Stan Meiburg/R4/USEPA/US@EPA
Cc: Duncan Powell/R4/USEPA/US@EPA, Jim Giattina/R4/USEPA/US@EPA, KevinH Miller/R4/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA, Philip Mancusi-Ungaro/R4/USEPA/US@EPA, Tom Welborn/R4/USEPA/US@EPA
Date: 12/10/2010 01:58 PM
Subject: Re: revised draft final letter for Leeco/Stacy Branch (LRL-2007-0217 897-0480)

Stan - (b) (5) [redacted] There were three minor edits that is needed for clarity, Here is the last version is entitled 12-10 from me. Thanks

[attachment "2010-12-10 Leeco Draft Closeout Letter khm edits clean.docx" deleted by Brian Frazer/DC/USEPA/US]

****
Brian M. Frazer, Chief
Wetlands & Aquatic Resources Regulatory Branch
Office of Wetlands, Oceans and Watersheds
U.S. EPA
1200 Pennsylvania Avenue, NW (MC 4502T)
Washington, DC 20460
202-566-1652

Stan Meiburg	Brian, I read your version you sent this morning...	12/10/2010 01:06:38 PM

From: Stan Meiburg/R4/USEPA/US
To: KevinH Miller/R4/USEPA/US@EPA, Brian Frazer/DC/USEPA/US@EPA
Cc: Duncan Powell/R4/USEPA/US@EPA, Jim Giattina/R4/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA, Philip Mancusi-Ungaro/R4/USEPA/US@EPA, Tom Welborn/R4/USEPA/US@EPA
Date: 12/10/2010 01:06 PM
Subject: Re: revised draft final letter for Leeco/Stacy Branch (LRL-2007-0217 897-0480)

Brian, I read your version you sent this morning against this one. (b) (5) [redacted]

Stan

A. Stanley Meiburg
Deputy Regional Administrator
EPA Region 4
Sam Nunn Atlanta Federal Center
61 Forsyth Street, SW
Atlanta, GA 30303

Office: (404) 562-8357
Fax: (404) 562-9961
Cell: (404) 435-4234
Email: meiburg.stan@epa.gov

Healthier Families, Cleaner Communities, A Stronger America
http://www.epa.gov/40th

KevinH Miller	Gentlemen, I have revised the version of the lett...	12/10/2010 11:00:40 AM

From: KevinH Miller/R4/USEPA/US
To: Stan Meiburg/R4/USEPA/US@EPA, Jim Giattina/R4/USEPA/US@EPA, Philip Mancusi-Ungaro/R4/USEPA/US@EPA, Tom Welborn/R4/USEPA/US@EPA
Cc: Duncan Powell/R4/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA
Date: 12/10/2010 11:00 AM
Subject: revised draft final letter for Leeco/Stacy Branch (LRL-2007-0217 897-0480)

Gentlemen,

I have revised the version of the letter Matt sent yesterday, as we have discussed. Track changes and clean versions attached.

Please feel free to call me if you have any questions. I will be driving back to Atlanta this afternoon, and working on the special conditions over the weekend.

Thanks, Kevin

Matt, after we spoke, all the things I came across seemed pretty clear, so I went ahead and made changes without the discussion we had planned for noon. But call me if you have any questions, or if you think I have misrepresented anything.

[attachment "2010-12-09 Leeco Draft Closeout Letter khm edits.docx" deleted by Brian Frazer/DC/USEPA/US]
[attachment "2010-12-09 Leeco Draft Closeout Letter khm edits clean.docx" deleted by Brian Frazer/DC/USEPA/US]

Kevin H. Miller
Physical Scientist/Landscape Ecologist
Mining Section/Wetlands, Coastal and Oceans Branch
Water Protection Division/EPA Region 4
Sam Nunn Atlanta Federal Center
Mail Code 9T25/61 Forsyth Street, SW
Atlanta, GA 30303-8960

404.562.9435/404.562.9343 (fax)
miller.kevinh@epa.gov
www.epa.gov/region4/water/wetlands

Michael Moeykens/CI/USEPA/US
12/10/2010 02:11 PM

To Ronald Landy
cc Brent Johnson, David Kargbo
bcc
Subject Re: Fw: Region 5 comments on RESer Proposal

Ron et. al,

We have a very recent document we can tie the MTM/VF to negative effects, The Effects of Mountaintop Mines and Valley Fills on Aquatic Ecosystems of the Central Appalachian Coalfields. The report shows "MTM-VF lead directly to five principal alterations of stream ecosystems: (1) springs, intermittent streams, and small perennial streams are permanently lost with the removal of the mountain and from burial under fill, (2) concentrations of major chemical ions are persistently elevated downstream, (3) degraded water quality reaches levels that are acutely lethal to standard laboratory test organisms, (4) selenium concentrations are elevated, reaching concentrations that have caused toxic effects in fish and birds and (5) macroinvertebrate and fish communities are consistently and significantly degraded."

I am sure we can add something in.

~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Michael D. Moeykens, Ph.D.
Aquatic Biologist
USEPA
ERB/EERD/NERL/ORD/USEPA
26 West MLK Dr.
Cincinnati, OH 45268

513-569-7196
moeykens.michael@epa.gov
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

Ronald Landy	Mike and Brent	See the highlighted bullet. I...	12/10/2010 08:50:46 AM

From: Ronald Landy/ESC/R3/USEPA/US
To: Michael Moeykens/CI/USEPA/US@EPA, Brent Johnson/CI/USEPA/US@EPA
Cc: David Kargbo/R3/USEPA/US@EPA
Date: 12/10/2010 08:50 AM
Subject: Fw: Region 5 comments on RESer Proposal

Mike and Brent

See the highlighted bullet. I assume there would be some type of synthesis/assessment of existing data and past work, but would you have any problem adding a sentence to your section?

----- Forwarded by Ronald Landy/ESC/R3/USEPA/US on 12/10/2010 08:48 AM -----

From: Andrea Schaller/R5/USEPA/US
To: David Kargbo/R3/USEPA/US@EPA
Cc: Ronald Landy/ESC/R3/USEPA/US@EPA, Wendy Melgin/R5/USEPA/US@EPA, Peter

Swenson/R5/USEPA/US@EPA, Carole Braverman/R5/USEPA/US@EPA, Scott McWhorter/R5/USEPA/US@EPA, Kerryann Weaver/R5/USEPA/US@EPA, Wendy Drake/R5/USEPA/US@EPA, Jacqueline Clark/R5/USEPA/US@EPA
Date: 12/09/2010 11:26 AM
Subject: Region 5 comments on RESer Proposal

Dave,
Ron Landy asked that I copy you on Region 5 comments. He also asked us to provide a name for the Lead for Section 2 this would be Wendy Drake of our Ground Water Drinking Water Branch.

Her contact information is listed below

Wendy Drake
U.S. EPA Region 5 (WG-15J)
Ground Water and Drinking Water Branch
77 West Jackson Boulevard
Chicago, IL 60604
drake.wendy@epa.gov
312-886-6705

General Comments
(b) (5)
[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[attachment "VersiontoRegions2_R5comments.doc" deleted by Michael Moeykens/CI/USEPA/US]
[attachment "R5 drinking water comments summary.docx" deleted by Michael Moeykens/CI/USEPA/US]

Andrea Schaller
U.S. EPA Region 5 (WW-16J)
Wetlands and Watershed Branch
77 W. Jackson Blvd
Chicago, IL 60605
312-886-0746
schaller.andrea@epa.gov

Stefania Shamet/R3/USEPA/US
12/10/2010 03:12 PM

To Christopher Hunter
cc Palmer Hough, Stephen Field, Regina Poeske
bcc
Subject Spruce -- Hunton & Williams technical comments

Chris & Palmer -- Here's round 1. These docs are draft responses to comments 1-96, which respond to the "technical" comments (there are some policy/legal issues mixed in) provided by Hunton & Williams & CH2MHill (CH2MHill's comments were one of the attachments to Hunton & Williams' comments). You will see several shaded blue. I had questions about these and will be sending them to the appropriate R3 personnel (you'll see that email shortly). ** Note these sometimes refer to the technical appendices and assume that the Appendix numbers don't change.

Spruce responses 61-95.doc Spruce responses 1-60.doc

ATTACHMENTS REDACTED - DELIBERATIVE

Next steps:

(1) Since Hunton & Williams are lawyers, as you might imagine, they had plenty of legal comments. I will try to get those to you by Monday am, if I can put in enough time over the weekend. Otherwise, it will be Wednesday. (Unfortunately, I also have to get out the comment response document for the Accotink flow TMDL by Tuesday and there are only so many hours between now and then). I have informed management that I am not responding to anything other than the Accotink and Spruce for at least a week to get these done.

(3) Remaining comments. Turns out comments 96-150 are the "general" comments from commenters other than H&W. I will get these to you by Friday. (I know Chris and I spoke about maybe HQ doing some of these. Since we appear to have drafts of some of these answers, I think this might be the most efficient way to proceed. That way you guys can devote yourselves to comparing with the H&W post-RD submission).

Stefania Shamet/R3/USEPA/US

12/10/2010 03:22 PM

To Margaret Passmore, Greg Pond, Louis Reynolds, David Rider

cc Christopher Hunter, Palmer Hough, John Forren

bcc

Subject Spruce response to comments follow up

Gang -- I just sent the first batch of draft responses to OW. First -- THANK YOU. You guys did a magnificent job (why am I not surprised). Between Regina and I we had a few questions and/or areas that need clarification or confirmation. Rather than send all the comments back to you, I'm attaching a file that contains only the responses that we had questions about. There are twelve. No. 7 (retaining numbering from the comment response document -- it's not the 7th question) needs an answer, if somebody can help out. The rest should be self-explanatory. I believe No. 19 is Dave's and the remainder can be addressed by Wheeling.

Sorry to loop back to you guys, but I couldn't figure these out myself. As you may or may not know, Hunton & Williams dropped another huge set of comments on the RD on OW. OW is trying to figure out what's new and what's not, so it would help to finish these up sooner rather than later.

Thanks again so much.

ATTACHMENT REDACTED - DELIBERATIVE

Wheeling questions.doc

Christopher Hunter/DC/USEPA/US
12/10/2010 04:52 PM

To Palmer Hough
cc
bcc
Subject Fw: FD HQ Comments on Selenium by Frank Borsuk, Region 3

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454
hunter.christopher@epa.gov

----- Forwarded by Christopher Hunter/DC/USEPA/US on 12/10/2010 04:52 PM -----

From: Brian Topping/DC/USEPA/US
To: Christopher Hunter/DC/USEPA/US@EPA, Ross Geredien/DC/USEPA/US@EPA, Palmer Hough/DC/USEPA/US@EPA
Date: 12/08/2010 05:10 PM
Subject: Fw: FD HQ Comments on Selenium by Frank Borsuk, Region 3

FYI

----- Forwarded by Brian Topping/DC/USEPA/US on 12/08/2010 05:09 PM -----

From: Frank Borsuk/R3/USEPA/US
To: Brian Topping/DC/USEPA/US@EPA
Cc: borsuk.frank@epa.gov, Margaret Passmore/R3/USEPA/US@EPA
Date: 12/08/2010 04:30 PM
Subject: Fw: FD HQ Comments on Selenium by Frank Borsuk, Region 3

I am sending this a second time because my computer has issues with email.

Frank

Frank Borsuk, Ph.D.
Aquatic/Fisheries Biologist
Freshwater Biology Team
USEPA-Region 3 (Wheeling Office)
Office of Monitoring & Assessment (3EA50)
Environmental Assessment & Innovation Division
1060 Chapline Street, Suite 303
Wheeling, WV 26003-2995
304-234-0241 Phone
304-234-0260 Fax
borsuk.frank@epa.gov

Please visit our website at http://epa.gov/reg3esd1/3ea50.htm

----- Forwarded by Frank Borsuk/R3/USEPA/US on 12/08/2010 04:29 PM -----

From: Frank Borsuk/R3/USEPA/US
To: Brian Topping/DC/USEPA/US@EPA
Date: 12/08/2010 04:24 PM
Subject: FD HQ Comments on Selenium by Frank Borsuk, Region 3

Brian:

Attached are my comments.

Frank

Frank Borsuk, Ph.D.
Aquatic/Fisheries Biologist
Freshwater Biology Team
USEPA-Region 3 (Wheeling Office)
Office of Monitoring & Assessment (3EA50)
Environmental Assessment & Innovation Division
1060 Chapline Street, Suite 303
Wheeling, WV 26003-2995
304-234-0241 Phone
304-234-0260 Fax
borsuk.frank@epa.gov

Please visit our website at http://epa.gov/reg3esd1/3ea50.htm

Spruce FD draft 120110_LR and FB 12-08-2010.doc

ATTACHMENT REDACTED - DELIBERATIVE

Christopher Hunter/DC/USEPA/US
12/10/2010 04:52 PM

To Palmer Hough
cc
bcc
Subject Fw: FOR YOUR REVIEW: Draft Spruce 404(c) Final Determination

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454
hunter.christopher@epa.gov

----- Forwarded by Christopher Hunter/DC/USEPA/US on 12/10/2010 04:53 PM -----

From: Stefania Shamet/R3/USEPA/US
To: Christopher Hunter/DC/USEPA/US@EPA
Cc: Palmer Hough/DC/USEPA/US@EPA, Kevin Minoli/DC/USEPA/US@EPA, Karyn Wendelowski/DC/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Greg Pond/R3/USEPA/US@EPA, Mazzarella.Christine@epamail.epa.gov, Regina Poeske/R3/USEPA/US@EPA, Stephen Field/R3/USEPA/US@EPA
Date: 12/09/2010 10:36 AM
Subject: Re: FOR YOUR REVIEW: Draft Spruce 404(c) Final Determination

(b) (5) [redacted]

[redacted]

[redacted]

[redacted]

ATTACHMENT REDACTED - DELIBERATIVE

Spruce FD draft 120110sds.doc

Christopher Hunter Hello all, Attached for your review, please find... 12/01/2010 11:02:10 AM

From: Christopher Hunter/DC/USEPA/US
To: Denise Keehner/DC/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA, Cliff Rader/DC/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA, Charles Lee/DC/USEPA/US@EPA, Suzi Ruhl/DC/USEPA/US@EPA, Kevin Minoli/DC/USEPA/US@EPA, Karyn Wendelowski/DC/USEPA/US@EPA, Michael Slimak/DC/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA, John Pomponio/R3/USEPA/US@EPA, Regina Poeske/R3/USEPA/US@EPA, Greg Pond/R3/USEPA/US@EPA, Margaret

	Passmore/R3/USEPA/US@EPA, Jim Giattina/R4/USEPA/US@EPA, Tom Welborn/R4/USEPA/US@EPA, Tinka Hyde/R5/USEPA/US@EPA, Peter Swenson/R5/USEPA/US@EPA, Christine Mazzarella/R3/USEPA/US, Heather Case/DC/USEPA/US@EPA, Tom Laverty/DC/USEPA/US@EPA, Marcus Zobrist/DC/USEPA/US@EPA
Cc:	Palmer Hough/DC/USEPA/US@EPA, Julia McCarthy/R8/USEPA/US@EPA, Marcel Tchaou/DC/USEPA/US@EPA, Ross Geredien/DC/USEPA/US@EPA, Brian Frazer/DC/USEPA/US@EPA, Brian Topping/DC/USEPA/US@EPA, David Evans/DC/USEPA/US@EPA, Jim Pendergast/DC/USEPA/US@EPA, Tanya Code/DC/USEPA/US@EPA
Date:	12/01/2010 11:02 AM
Subject:	FOR YOUR REVIEW: Draft Spruce 404(c) Final Determination

Hello all,
Attached for your review, please find our draft Final Determination for the Spruce No. 1 Surface Mine 404(c) action. Now that the consultation period with the permittee has ended, we will need to move quickly toward finalizing this document, so I am requesting **all comments on this draft (in redline/strikeout) back to me by COB December 8**. At the end of next week, I will be sending the draft technical appendices for your review as well. Following comment review, we will be preparing a revised draft of the main body text and start the briefings for upper management. At the moment, we are planning for a publication and communications rollout for the Final Determination just after the New Year, possibly January 7, 2011.

I will be out of the office until December 9, but if you have any questions on the draft during the next week, please contact Palmer Hough.

Thank you,
Chris

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454
hunter.christopher@epa.gov [attachment "Spruce FD draft 120110.doc" deleted by Stefania Shamet/R3/USEPA/US]

Christopher Hunter/DC/USEPA/US

12/10/2010 04:53 PM

To Palmer Hough

cc

bcc

Subject Fw: FOR YOUR REVIEW: Draft Spruce 404(c) Final Determination

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454
hunter.christopher@epa.gov

----- Forwarded by Christopher Hunter/DC/USEPA/US on 12/10/2010 04:53 PM -----

From: Greg Pond/R3/USEPA/US
To: Stefania Shamet/R3/USEPA/US@EPA
Cc: Christopher Hunter/DC/USEPA/US@EPA, Karyn Wendelowski/DC/USEPA/US@EPA, Kevin Minoli/DC/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Mazzarella.Christine@epamail.epa.gov, Palmer Hough/DC/USEPA/US@EPA, Regina Poeske/R3/USEPA/US@EPA, Stephen Field/R3/USEPA/US@EPA
Date: 12/09/2010 12:25 PM
Subject: Re: FOR YOUR REVIEW: Draft Spruce 404(c) Final Determination

(b) (5) [redacted]

Greg Pond
Office of Monitoring and Assessment
U.S. EPA Region 3
1060 Chapline Street, Suite 303
Wheeling, WV 26003-2995
(p) 304-234-0243
(f) 304-234-0260
pond.greg@epa.gov

Visit our website at http://epa.gov/reg3esd1/3ea50.htm

Stefania Shamet	Chris -- I know I'm a few hours late. Attached ar...	12/09/2010 10:36:05 AM

From: Stefania Shamet/R3/USEPA/US
To: Christopher Hunter/DC/USEPA/US@EPA
Cc: Palmer Hough/DC/USEPA/US@EPA, Kevin Minoli/DC/USEPA/US@EPA, Karyn Wendelowski/DC/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Greg Pond/R3/USEPA/US@EPA, Mazzarella.Christine@epamail.epa.gov, Regina Poeske/R3/USEPA/US@EPA, Stephen Field/R3/USEPA/US@EPA
Date: 12/09/2010 10:36 AM
Subject: Re: FOR YOUR REVIEW: Draft Spruce 404(c) Final Determination

Chris -- I know I'm a few hours late. Attached are some comments. Mostly, proposed additions or comments in the margins. Main issues:

(b) (5)

[redacted]

[redacted]

[redacted]

[attachment "Spruce FD draft 120110sds.doc" deleted by Greg Pond/R3/USEPA/US]

Christopher Hunter	Hello all, Attached for your review, please find...	12/01/2010 11:02:10 AM

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Cc: Palmer Hough/DC/USEPA/US@EPA, Julia McCarthy/R8/USEPA/US@EPA, Marcel Tchaou/DC/USEPA/US@EPA, Ross Geredien/DC/USEPA/US@EPA, Brian Frazer/DC/USEPA/US@EPA, Brian Topping/DC/USEPA/US@EPA, David Evans/DC/USEPA/US@EPA, Jim Pendergast/DC/USEPA/US@EPA, Tanya Code/DC/USEPA/US@EPA
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Subject: FOR YOUR REVIEW: Draft Spruce 404(c) Final Determination

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Thank you,
Chris

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454
hunter.christopher@epa.gov [attachment "Spruce FD draft 120110.doc" deleted by Stefania Shamet/R3/USEPA/US]

Matthew Klasen/DC/USEPA/US
12/10/2010 04:58 PM

To MichaelG Lee
cc
bcc
Subject Fw: revised draft final letter for Leeco/Stacy Branch (LRL-2007-0217 897-0480)

Here's the most recent draft.

mk

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229
----- Forwarded by Matthew Klasen/DC/USEPA/US on 12/10/2010 04:58 PM -----

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Cc: Duncan Powell/R4/USEPA/US@EPA, Jim Giattina/R4/USEPA/US@EPA, KevinH Miller/R4/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA, Philip Mancusi-Ungaro/R4/USEPA/US@EPA, Tom Welborn/R4/USEPA/US@EPA
Date: 12/10/2010 01:58 PM
Subject: Re: revised draft final letter for Leeco/Stacy Branch (LRL-2007-0217 897-0480)

Stan - (b) (5) [redacted] There were three minor edits that is needed for clarity, Here is the last version is entitled 12-10 from me. Thanks

ATTACHMENT REDACTED - DELIBERATIVE

2010-12-10 Leeco Draft Closeout Letter khm edits clean.docx

****
Brian M. Frazer, Chief
Wetlands & Aquatic Resources Regulatory Branch
Office of Wetlands, Oceans and Watersheds
U.S. EPA
1200 Pennsylvania Avenue, NW (MC 4502T)
Washington, DC 20460
202-566-1652

Stan Meiburg | Brian, I read your version you sent this morning... | 12/10/2010 01:06:38 PM

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To: KevinH Miller/R4/USEPA/US@EPA, Brian Frazer/DC/USEPA/US@EPA
Cc: Duncan Powell/R4/USEPA/US@EPA, Jim Giattina/R4/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA, Philip Mancusi-Ungaro/R4/USEPA/US@EPA, Tom Welborn/R4/USEPA/US@EPA
Date: 12/10/2010 01:06 PM

Subject: Re: revised draft final letter for Leeco/Stacy Branch (LRL-2007-0217 897-0480)

Brian, I read your version you sent this morning against this one. (b) (5) [redacted]

Stan

A. Stanley Meiburg
Deputy Regional Administrator
EPA Region 4
Sam Nunn Atlanta Federal Center
61 Forsyth Street, SW
Atlanta, GA 30303

Office: (404) 562-8357
Fax: (404) 562-9961
Cell: (404) 435-4234
Email: meiburg.stan@epa.gov

Healthier Families, Cleaner Communities, A Stronger America
http://www.epa.gov/40th

KevinH Miller	Gentlemen, I have revised the version of the lett...	12/10/2010 11:00:40 AM

From: KevinH Miller/R4/USEPA/US
To: Stan Meiburg/R4/USEPA/US@EPA, Jim Giattina/R4/USEPA/US@EPA, Philip Mancusi-Ungaro/R4/USEPA/US@EPA, Tom Welborn/R4/USEPA/US@EPA
Cc: Duncan Powell/R4/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA
Date: 12/10/2010 11:00 AM
Subject: revised draft final letter for Leeco/Stacy Branch (LRL-2007-0217 897-0480)

Gentlemen,

I have revised the version of the letter Matt sent yesterday, as we have discussed. Track changes and clean versions attached.

Please feel free to call me if you have any questions. I will be driving back to Atlanta this afternoon, and working on the special conditions over the weekend.

Thanks, Kevin

Matt, after we spoke, all the things I came across seemed pretty clear, so I went ahead and made changes without the discussion we had planned for noon. But call me if you have any questions, or if you think I have misrepresented anything.

[attachment "2010-12-09 Leeco Draft Closeout Letter khm edits.docx" deleted by Brian Frazer/DC/USEPA/US]
[attachment "2010-12-09 Leeco Draft Closeout Letter khm edits clean.docx" deleted by Brian Frazer/DC/USEPA/US]

Kevin H. Miller
Physical Scientist/Landscape Ecologist

Mining Section/Wetlands, Coastal and Oceans Branch
Water Protection Division/EPA Region 4
Sam Nunn Atlanta Federal Center
Mail Code 9T25/61 Forsyth Street, SW
Atlanta, GA 30303-8960

404.562.9435/404.562.9343 (fax)
miller.kevinh@epa.gov
www.epa.gov/region4/water/wetlands

Matthew Klasen/DC/USEPA/US
12/10/2010 05:48 PM

To Christopher Hunter
cc Gregory Peck
bcc
Subject Re: FOR YOUR REVIEW: Draft Spruce 404(c) Final Determination

Hey Chris,

See attached for my comments on the FD. (b) (5) [redacted]

Let me know if you have any questions. I'm copying Greg on this, too, who may take a look over the weekend.

Thanks,
Matt

ATTACHMENT REDACTED - DELIBERATIVE

Spruce FD draft 120110 - mk.doc

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

Christopher Hunter | Hello all, Attached for your review, please find... | 12/01/2010 11:02:06 AM

From: Christopher Hunter/DC/USEPA/US
To: Denise Keehner/DC/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA, Cliff Rader/DC/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA, Charles Lee/DC/USEPA/US@EPA, Suzi Ruhl/DC/USEPA/US@EPA, Kevin Minoli/DC/USEPA/US@EPA, Karyn Wendelowski/DC/USEPA/US@EPA, Michael Slimak/DC/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA, John Pomponio/R3/USEPA/US@EPA, Regina Poeske/R3/USEPA/US@EPA, Greg Pond/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Jim Giattina/R4/USEPA/US@EPA, Tom Welborn/R4/USEPA/US@EPA, Tinka Hyde/R5/USEPA/US@EPA, Peter Swenson/R5/USEPA/US@EPA, Christine Mazzarella/R3/USEPA/US, Heather Case/DC/USEPA/US@EPA, Tom Laverty/DC/USEPA/US@EPA, Marcus Zobrist/DC/USEPA/US@EPA
Cc: Palmer Hough/DC/USEPA/US@EPA, Julia McCarthy/R8/USEPA/US@EPA, Marcel Tchaou/DC/USEPA/US@EPA, Ross Geredien/DC/USEPA/US@EPA, Brian Frazer/DC/USEPA/US@EPA, Brian Topping/DC/USEPA/US@EPA, David Evans/DC/USEPA/US@EPA, Jim Pendergast/DC/USEPA/US@EPA, Tanya Code/DC/USEPA/US@EPA
Date: 12/01/2010 11:02 AM
Subject: FOR YOUR REVIEW: Draft Spruce 404(c) Final Determination

Hello all,
Attached for your review, please find our draft Final Determination for the Spruce No. 1 Surface Mine 404(c) action. Now that the consultation period with the permittee has ended, we will need to move quickly toward finalizing this document, so I am requesting **all comments on this draft (in redline/strikeout)**

back to me by COB December 8. At the end of next week, I will be sending the draft technical appendices for your review as well. Following comment review, we will be preparing a revised draft of the main body text and start the briefings for upper management. At the moment, we are planning for a publication and communications rollout for the Final Determination just after the New Year, possibly January 7, 2011.

I will be out of the office until December 9, but if you have any questions on the draft during the next week, please contact Palmer Hough.

Thank you,
Chris

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454
hunter.christopher@epa.gov [attachment "Spruce FD draft 120110.doc" deleted by Matthew Klasen/DC/USEPA/US]

Matthew Klasen/DC/USEPA/US
12/11/2010 01:27 PM

To Heather Case
cc
bcc
Subject Fw: FOR YOUR REVIEW: Draft Spruce 404(c) Final Determination

Hi Heather,

Hope all's well -- and feliz once de diciembre to you!

We in OW are working to finish up the Final Determination for the Spruce #1 mine in WV, and we're on an extremely quick timeline. I heard from OWOW that they've asked for OEJ comments on the two EJ pages within the draft document but haven't yet gotten a substantive response -- so folks were prepared to quickly elevate to the Nancy Stoner-Lisa G. level.

Can you let me know if you guys are working on this, and whether we could get comments by Wednesday this week? I've attached both the full document and the EJ excerpt, which in most cases is similar to the content of Region 3's Recommended Determination (the prior step of the CWA Section 404(c) process).

Thanks for your help!

Best,
Matt

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

-----Forwarded by Matthew Klasen/DC/USEPA/US on 12/11/2010 01:20PM -----

To: Denise Keehner/DC/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA, Cliff Rader/DC/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA, Charles Lee/DC/USEPA/US@EPA, Suzi Ruhl/DC/USEPA/US@EPA, Kevin Minoli/DC/USEPA/US@EPA, Karyn Wendelowski/DC/USEPA/US@EPA, Michael Slimak/DC/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA, John Pomponio/R3/USEPA/US@EPA, Regina Poeske/R3/USEPA/US@EPA, Greg Pond/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Jim Giattina/R4/USEPA/US@EPA, Tom Welborn/R4/USEPA/US@EPA, Tinka Hyde/R5/USEPA/US@EPA, Peter Swenson/R5/USEPA/US@EPA, Christine Mazzarella/R3/USEPA/US, Heather Case/DC/USEPA/US@EPA, Tom Laverty/DC/USEPA/US@EPA, Marcus Zobrist/DC/USEPA/US@EPA
From: Christopher Hunter/DC/USEPA/US
Date: 12/01/2010 11:01AM
Cc: Palmer Hough/DC/USEPA/US@EPA, Julia McCarthy/R8/USEPA/US@EPA, Marcel Tchaou/DC/USEPA/US@EPA, Ross Geredien/DC/USEPA/US@EPA, Brian Frazer/DC/USEPA/US@EPA, Brian Topping/DC/USEPA/US@EPA, David

Evans/DC/USEPA/US@EPA, Jim Pendergast/DC/USEPA/US@EPA, Tanya Code/DC/USEPA/US@EPA
Subject: FOR YOUR REVIEW: Draft Spruce 404(c) Final Determination

(See attached file: Spruce FD draft 120110.doc)

Hello all,
Attached for your review, please find our draft Final Determination for the Spruce No. 1 Surface Mine 404(c) action. Now that the consultation period with the permittee has ended, we will need to move quickly toward finalizing this document, so I am requesting all comments on this draft (in redline/strikeout) back to me by COB December 8. At the end of next week, I will be sending the draft technical appendices for your review as well. Following comment review, we will be preparing a revised draft of the main body text and start the briefings for upper management. At the moment, we are planning for a publication and communications rollout for the Final Determination just after the New Year, possibly January 7, 2011.

I will be out of the office until December 9, but if you have any questions on the draft during the next week, please contact Palmer Hough.

Thank you,
Chris

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454

hunter.christopher@epa.gov - Spruce FD draft 120110.doc - Spruce FD draft - EJ - 120110.docx

ATTACHMENTS REDACTED - DELIBERATIVE

Christopher Hunter/DC/USEPA/US
12/11/2010 05:19 PM

To Palmer Hough, Julia McCarthy
cc
bcc
Subject Fw: Re: FOR YOUR REVIEW: Draft Spruce 404(c) Final Determination

I've incorporated Matt's redline changes, but he includes about 50 comments that I haven't gotten to. I don't want to ignore them because he has some good questions. Please review and see if any require action.

Thanks

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454
hunter.christopher@epa.gov

-----Forwarded by Christopher Hunter/DC/USEPA/US on 12/11/2010 05:17PM -----

To: Christopher Hunter/DC/USEPA/US@EPA
From: Matthew Klasen/DC/USEPA/US
Date: 12/10/2010 05:48PM
Cc: Gregory Peck/DC/USEPA/US@EPA
Subject: Re: FOR YOUR REVIEW: Draft Spruce 404(c) Final Determination

Hey Chris,

See attached for my comments on the FD. (b) (5) [redacted]

Let me know if you have any questions. I'm copying Greg on this, too, who may take a look over the weekend.

Thanks,
Matt

(See attached file: Spruce FD draft 120110 - mk.doc)

Matt Klasen
U.S. Environmental Protection Agency
Office of Water (IO)
202-566-0780
cell (202) 380-7229

Christopher Hunter---12/01/2010 11:02:06 AM---Hello all, Attached for your review, please

find our draft Final Determination for the Spruce No. 1

From: Christopher Hunter/DC/USEPA/US

To: Denise Keehner/DC/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA, Cliff Rader/DC/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA, Charles Lee/DC/USEPA/US@EPA, Suzi Ruhl/DC/USEPA/US@EPA, Kevin Minoli/DC/USEPA/US@EPA, Karyn Wendelowski/DC/USEPA/US@EPA, Michael Slimak/DC/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA, John Pomponio/R3/USEPA/US@EPA, Regina Poeske/R3/USEPA/US@EPA, Greg Pond/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Jim Giattina/R4/USEPA/US@EPA, Tom Welborn/R4/USEPA/US@EPA, Tinka Hyde/R5/USEPA/US@EPA, Peter Swenson/R5/USEPA/US@EPA, Christine Mazzarella/R3/USEPA/US, Heather Case/DC/USEPA/US@EPA, Tom Laverty/DC/USEPA/US@EPA, Marcus Zobrist/DC/USEPA/US@EPA

Cc: Palmer Hough/DC/USEPA/US@EPA, Julia McCarthy/R8/USEPA/US@EPA, Marcel Tchaou/DC/USEPA/US@EPA, Ross Geredien/DC/USEPA/US@EPA, Brian Frazer/DC/USEPA/US@EPA, Brian Topping/DC/USEPA/US@EPA, David Evans/DC/USEPA/US@EPA, Jim Pendergast/DC/USEPA/US@EPA, Tanya Code/DC/USEPA/US@EPA

Date: 12/01/2010 11:02 AM

Subject: FOR YOUR REVIEW: Draft Spruce 404(c) Final Determination

---

Hello all,
Attached for your review, please find our draft Final Determination for the Spruce No. 1 Surface Mine 404(c) action. Now that the consultation period with the permittee has ended, we will need to move quickly toward finalizing this document, so I am requesting **all comments on this draft (in redline/strikeout) back to me by COB December 8** . At the end of next week, I will be sending the draft technical appendices for your review as well. Following comment review, we will be preparing a revised draft of the main body text and start the briefings for upper management. At the moment, we are planning for a publication and communications rollout for the Final Determination just after the New Year, possibly January 7, 2011.

I will be out of the office until December 9, but if you have any questions on the draft during the next week, please contact Palmer Hough.

Thank you,
Chris

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454
hunter.christopher@epa.gov [attachment "Spruce FD draft 120110.doc" deleted by

Matthew Klasen/DC/USEPA/US] - Spruce FD draft 120110 - mk.doc

ATTACHMENT REDACTED - DELIBERATIVE

Christopher Hunter/DC/USEPA/US
12/11/2010 06:43 PM

To Palmer Hough, Julia McCarthy
cc
bcc
Subject

Hi Palmer and Julia,
I didn't get as much done as I wanted (naturally), but I got the majority of the reorg and line edits incorporated. I sent Palmer Matt K's comments to screen for any gems, and I'm going to give Julia my hard copies of Dave and Denise's comments to double check them if necessary. (b) (5) [redacted] It's yours to do with what you will, but my recommendation is clean it up as best you can, then talk to Brian and Dave about next steps, probably being giving it to Denise to discuss with Nancy. Thanks a million!

Here are some tips on the areas still in need of work:

- (b) (5) [redacted]

Chris

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454

hunter.christopher@epa.gov - Spruce FD draft 121110.doc

ATTACHMENT REDACTED - DELIBERATIVE

Matthew Klasen/DC/USEPA/US
12/13/2010 10:20 AM

To "Gregory Peck"
cc
bcc
Subject Fw: revised draft final letter for Leeco/Stacy Branch (LRL-2007-0217 897-0480)

Matt Klasen
U.S. Environmental Protection Agency
Office of Water
(202) 566-0780
Cell (202) 380-7229
Brian Frazer

----- Original Message -----
From: Brian Frazer
Sent: 12/10/2010 02:00 PM EST
To: Brian Frazer
Cc: Duncan Powell; Jim Giattina; KevinH Miller; Matthew Klasen; Philip Mancusi-Ungaro; Stan Meiburg; Tom Welborn
Subject: Re: revised draft final letter for Leeco/Stacy Branch (LRL-2007-0217 897-0480)

Here is the version I edited.

ATTACHMENT REDACTED - DELIBERATIVE

2010-12-10 Leeco Draft Closeout Letter khm edits clean.docx

****

Brian M. Frazer, Chief
Wetlands & Aquatic Resources Regulatory Branch
Office of Wetlands, Oceans and Watersheds
U.S. EPA
1200 Pennsylvania Avenue, NW (MC 4502T)
Washington, DC 20460
202-566-1652

Brian Frazer | Stan - Overall I think Kevin's is clearer and more... | 12/10/2010 01:58:17 PM

From: Brian Frazer/DC/USEPA/US
To: Stan Meiburg/R4/USEPA/US@EPA
Cc: Duncan Powell/R4/USEPA/US@EPA, Jim Giattina/R4/USEPA/US@EPA, KevinH Miller/R4/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA, Philip Mancusi-Ungaro/R4/USEPA/US@EPA, Tom Welborn/R4/USEPA/US@EPA
Date: 12/10/2010 01:58 PM
Subject: Re: revised draft final letter for Leeco/Stacy Branch (LRL-2007-0217 897-0480)

Stan - (b) (5) [redacted] There were three minor edits

that is needed for clarity, Here is the last version is entitled 12-10 from me. Thanks

[attachment "2010-12-10 Leeco Draft Closeout Letter khm edits clean.docx" deleted by Brian Frazer/DC/USEPA/US]

****

Brian M. Frazer, Chief
Wetlands & Aquatic Resources Regulatory Branch
Office of Wetlands, Oceans and Watersheds
U.S. EPA
1200 Pennsylvania Avenue, NW (MC 4502T)
Washington, DC 20460
202-566-1652

Stan Meiburg	Brian, I read your version you sent this morning...	12/10/2010 01:06:38 PM

From: Stan Meiburg/R4/USEPA/US
To: KevinH Miller/R4/USEPA/US@EPA, Brian Frazer/DC/USEPA/US@EPA
Cc: Duncan Powell/R4/USEPA/US@EPA, Jim Giattina/R4/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA, Philip Mancusi-Ungaro/R4/USEPA/US@EPA, Tom Welborn/R4/USEPA/US@EPA
Date: 12/10/2010 01:06 PM
Subject: Re: revised draft final letter for Leeco/Stacy Branch (LRL-2007-0217 897-0480)

Brian, I read your version you sent this morning against this one. (b) (5) [redacted]

Stan

_____
A. Stanley Meiburg
Deputy Regional Administrator
EPA Region 4
Sam Nunn Atlanta Federal Center
61 Forsyth Street, SW
Atlanta, GA 30303

Office: (404) 562-8357
Fax: (404) 562-9961
Cell: (404) 435-4234
Email: meiburg.stan@epa.gov

Healthier Families, Cleaner Communities, A Stronger America
http://www.epa.gov/40th

KevinH Miller	Gentlemen, I have revised the version of the lett...	12/10/2010 11:00:40 AM

From: KevinH Miller/R4/USEPA/US

To:	Stan Meiburg/R4/USEPA/US@EPA, Jim Giattina/R4/USEPA/US@EPA, Philip Mancusi-Ungaro/R4/USEPA/US@EPA, Tom Welborn/R4/USEPA/US@EPA
Cc:	Duncan Powell/R4/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA
Date:	12/10/2010 11:00 AM
Subject:	revised draft final letter for Leeco/Stacy Branch (LRL-2007-0217 897-0480)

Gentlemen,

I have revised the version of the letter Matt sent yesterday, as we have discussed. Track changes and clean versions attached.

Please feel free to call me if you have any questions. I will be driving back to Atlanta this afternoon, and working on the special conditions over the weekend.

Thanks, Kevin

Matt, after we spoke, all the things I came across seemed pretty clear, so I went ahead and made changes without the discussion we had planned for noon. But call me if you have any questions, or if you think I have misrepresented anything.

[attachment "2010-12-09 Leeco Draft Closeout Letter khm edits.docx" deleted by Brian Frazer/DC/USEPA/US]
[attachment "2010-12-09 Leeco Draft Closeout Letter khm edits clean.docx" deleted by Brian Frazer/DC/USEPA/US]

Kevin H. Miller
Physical Scientist/Landscape Ecologist
Mining Section/Wetlands, Coastal and Oceans Branch
Water Protection Division/EPA Region 4
Sam Nunn Atlanta Federal Center
Mail Code 9T25/61 Forsyth Street, SW
Atlanta, GA 30303-8960

404.562.9435/404.562.9343 (fax)
miller.kevinh@epa.gov
www.epa.gov/region4/water/wetlands

Frank Borsuk/R3/USEPA/US
12/13/2010 10:42 AM

To Palmer Hough, Christopher Hunter
cc Greg Pond, Stefania Shamet, John Forren, Margaret Passmore, borsuk.frank
bcc
Subject Comments on Appendix 4 by Frank Borsuk - Re: Fw: FOR YOUR REVIEW: Draft Spruce 404(c) Appendices 1-5

Palmer/Chris:

I have reviewed Appendix 4 Selenium and have the following comments:

I have attached the document with my redline and corrections which were limited. Only one typo on Table A4.1 (croos versus cross section).

(b) (5) [redacted]

Other then these, it is good.

Frank

ATTACHMENT REDACTED - DELIBERATIVE

Appendix 4 Selenium 121010 - comments by Borsuk 12-13-2010.doc

Frank Borsuk, Ph.D.
Aquatic/Fisheries Biologist
Freshwater Biology Team
USEPA-Region 3 (Wheeling Office)
Office of Monitoring & Assessment (3EA50)
Environmental Assessment & Innovation Division
1060 Chapline Street, Suite 303
Wheeling, WV 26003-2995
304-234-0241 Phone
304-234-0260 Fax
borsuk.frank@epa.gov

Please visit our website at http://epa.gov/reg3esd1/3ea50.htm

Margaret Passmore | Lou and Frank, Please find the time to review y... | 12/13/2010 06:44:29 AM

From: Margaret Passmore/R3/USEPA/US
To: Louis Reynolds/R3/USEPA/US@EPA, Frank Borsuk/R3/USEPA/US@EPA
Date: 12/13/2010 06:44 AM
Subject: Fw: FOR YOUR REVIEW: Draft Spruce 404(c) Appendices 1-5

Lou and Frank,

Please find the time to review your sections. Get back directly to Palmer Hough and Chris Hunter and cc me, Greg, John, and Stef.

Thanks

M

Margaret Passmore
Freshwater Biology Team
Office of Monitoring and Assessment (3EA50)
Environmental Assessment and Innovation Division
USEPA Region 3
1060 Chapline Street, Suite 303
Wheeling, WV 26003-2995
(p) 304-234-0245
(f) 304-234-0260
passmore.margaret@epa.gov

Visit our website at http://epa.gov/reg3esd1/3ea50.htm

----- Forwarded by Margaret Passmore/R3/USEPA/US on 12/13/2010 06:39 AM -----

From:	Christopher Hunter/DC/USEPA/US
To:	Denise Keehner/DC/USEPA/US@EPA, Gregory Peck/DC/USEPA/US@EPA, Cliff Rader/DC/USEPA/US@EPA, Matthew Klasen/DC/USEPA/US@EPA, Kevin Minoli/DC/USEPA/US@EPA, Karyn Wendelowski/DC/USEPA/US@EPA, Michael Slimak/DC/USEPA/US@EPA, Stefania Shamet/R3/USEPA/US@EPA, John Pomponio/R3/USEPA/US@EPA, Regina Poeske/R3/USEPA/US@EPA, Greg Pond/R3/USEPA/US@EPA, Margaret Passmore/R3/USEPA/US@EPA, Christine Mazzarella/R3/USEPA/US, Heather Case/DC/USEPA/US@EPA, Tom Laverty/DC/USEPA/US@EPA, Marcus Zobrist/DC/USEPA/US@EPA
Cc:	Palmer Hough/DC/USEPA/US@EPA, Julia McCarthy/R8/USEPA/US@EPA, Marcel Tchaou/DC/USEPA/US@EPA, Ross Geredien/DC/USEPA/US@EPA, Brian Frazer/DC/USEPA/US@EPA, Brian Topping/DC/USEPA/US@EPA, David Evans/DC/USEPA/US@EPA, Jim Pendergast/DC/USEPA/US@EPA, Tanya Code/DC/USEPA/US@EP
Date:	12/10/2010 06:15 PM
Subject:	FOR YOUR REVIEW: Draft Spruce 404(c) Appendices 1-5

Hello all,
As promised, attached for your review, please find the draft Appendices for the Spruce No. 1 Surface Mine 404(c) action. These are fairly technical, and I'm not expecting everyone to give me comments, but if you plan to review them, I am requesting **all comments (in redline/strikeout) back to me by COB December 20**. We are still finalizing the other 2 Appendices (Response to Comments and References). These will be reviewed by a smaller group within the next couple of weeks.

I will be out of the office until December 21, but if you have any questions on the draft during the next week, please contact Palmer Hough.

Thanks for your comments on the FD main text,
Chris

[attachment "Appendix 1 Macroinvertebrates 121010.doc" deleted by Frank Borsuk/R3/USEPA/US] [attachment "Appendix 2 Water Quality & Widlife 121010.doc" deleted by Frank Borsuk/R3/USEPA/US] [attachment "Appendix 3 Mitigation 121010.doc" deleted by Frank Borsuk/R3/USEPA/US] [attachment "Appendix 4 Selenium 121010.doc" deleted by Frank Borsuk/R3/USEPA/US] [attachment "Appendix 5 Cumulative Impacts 121010.doc" deleted by Frank Borsuk/R3/USEPA/US]

Chris Hunter
U.S. Environmental Protection Agency
Office of Wetlands, Oceans, & Watershed
(202) 566-1454

hunter.christopher@epa.gov

Cynthia Giles-AA/DC/USEPA/US
Sent by: Linda Huffman

12/13/2010 11:09 AM

To chip.smith, Christy_JohnsonHughes, Cliff Rader, Dave_Stout, John Pomponio, Lauren_D._Leuck, Matt Bogoshian, Matthew Klasen, mboots, mccabe.catherine, rock.salt, Susan Bromm

cc barbara.cassady, Beers.Samantha, Bill Jenkins, Brian Frazer, bwinters, Christopher Hunter, david.b.olson, dhartos, Doreen Cantor, Gregory Peck, Heather Case, Heinz Mueller, Kenneth Westlake, Kyndall Barry, Lisa Garcia, mthompson, pmcilwain, srideout, Suzi Ruhl, Tammy.R.Fudge, Tinka Hyde, Tom Marshall, Yong.J.Chung

bcc

Subject Information Update - Description has changed: MTM Cumulative Impacts Meeting

AGENDA ATTACHED:

venn diagram-2.docx agenda - Cumulative Impact Assessment for Surface Coal Mining in Appalachia.docx

ATTACHMENTS REDACTED - DELIBERATIVE

MTMCumulative Effects Proposal_description12_8_10 final.docx

As agreed to on the Principals conference call last week, we are expanding the schedule for our upcoming December 13 meeting to allow time for more detailed discussions about our work on cumulative impact assessment (new time: 12:30 pm – 3:00 pm).

We also agreed that each agency (EPA, COE, OSM) will circulate a short outline by December 8 of what methodology/approach they are working on (5 pages or less would be best), a schedule for what is proposed to be accomplished, and how the methodology/approach will be used.

At the December 13 meeting, both Principals and staff will attend; the meeting will start with 15 minute summaries from each of the three agencies, followed by clarifying questions.

(b) (5) [redacted]

Please confirm your attendance for the meeting with Linda Huffman at Huffman.Linda@epa.gov or 202-564-2440.

Cynthia Giles-AA/DC/USEPA/US
Sent by: Linda Huffman

12/13/2010 11:11 AM

To chip.smith, Christy_JohnsonHughes, Cliff Rader, Dave_Stout, John Pomponio, Lauren_D._Leuck, Matt Bogoshian, Matthew Klasen, mboots, mccabe.catherine, rock.salt, Susan Bromm

cc barbara.cassady, Beers.Samantha, Bill Jenkins, Brian Frazer, bwinters, Christopher Hunter, david.b.olson, dhartos, Doreen Cantor, Gregory Peck, Heather Case, Heinz Mueller, Kenneth Westlake, Kyndall Barry, Lisa Garcia, mthompson, pmcilwain, srideout, Suzi Ruhl, Tammy.R.Fudge, Tinka Hyde, Tom Marshall, Yong.J.Chung

bcc

Subject Information Update - Description has changed: MTM Cumulative Impacts Meeting

AGENDA ATTACHED:

ATTACHMENT REDACTED - DELIBERATIVE

venn diagram-2.docx

ATTACHMENT REDACTED - DELIBERATIVE

agenda - Cumulative Impact Assessment for Surface Coal Mining in Appalachia.docx

ATTACHMENT REDACTED - DELIBERATIVE

MTMCumulative Effects Proposal_description12_8_10 final.docx

As agreed to on the Principals conference call last week, we are expanding the schedule for our upcoming December 13 meeting to allow time for more detailed discussions about our work on cumulative impact assessment (new time: 12:30 pm – 3:00 pm).

We also agreed that each agency (EPA, COE, OSM) will circulate a short outline by December 8 of what methodology/approach they are working on (5 pages or less would be best), a schedule for what is proposed to be accomplished, and how the methodology/approach will be used.

At the December 13 meeting, both Principals and staff will attend; the meeting will start with 15 minute summaries from each of the three agencies, followed by clarifying questions.

(b) (5) [redacted]

Please confirm your attendance for the meeting with Linda Huffman at Huffman.Linda@epa.gov or 202-564-2440.