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To: Kevin Coyne < Kevin.R.Coyne@wv.gov >

Mr. Coyne:

Please accept the following public comments regarding solicitation for potential revisions to West Virginia's water quality standards, which will be under review as part of the 2014 Triennial Review process.

The U.S. Environmental Protection Agency (EPA) concluded that, "Based on the science, as a general matter, EPA expects that in-stream conductivity levels maintained at or below 300 µS/cm will meet water quality standards and that in-stream conductivity levels above 500 µS/cm are likely to be associated with adverse impacts that may rise to the level of exceedances of narrative state water quality standards. If water quality modeling suggests that in-stream levels will exceed 500 µS/cm, EPA believes that reasonable potential likely exists to cause or contribute to an excursion above applicable water quality standards; unless, based on site-specific data, the state has an alternative interpretation of their water quality standards that is supported by relevant science. Similarly, if water quality monitoring suggests that in-stream levels will exceed 300 µS/cm but will be below 500 µS/cm, EPA should work with the permitting authority to ensure that the permit includes conditions that protect against conductivity levels exceeding 500 µS/cm."[1]

The EPA Science Advisory Board, which conducted a comprehensive review of two of the Agency's draft reports, *The Effects of Mountaintop Mines and Valley Fills on Aquatic Ecosystems of the Central Appalachian Coalfields* and *A Field-based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams*, stated that "The extensive data set from West Virginia used to derive the benchmark provides broad spatial coverage and includes a large number of streams with and without mountaintop mining and valley fills. The similarity of the benchmark developed using an independent data set from Kentucky was an important validation of the approach and the quality of the data." [2]

The West Virginia Environmental Quality Board (EQB) has ruled twice on an NPDES appeal regarding the adverse environmental effects of elevated concentrations of conductivity, sulfates, and TDS on water quality and aquatic life, concluding that scientific evidence clearly shows mining pollution is damaging water quality downstream from surface mining operations. In the original ruling, the EQB said the WVDEP's own data backs up such conclusions and faulted DEP for not taking action on its own, and said that, "Despite longstanding and abundant

[1] < http://www.epa.gov/owow/wetlands/guidance/pdf/appalachian_mtntop_mining_summary.pdf >
[2] < http://yosemite.epa.gov/sab/sabproduct.nsf/0/EEDF20B88AD4C6388525785E007331F3/$File/EPA-SAB-11-006-unsigned.pdf >

evidence within the WVDEP's watershed database for biological damage ... in streams draining surface mines in West Virginia's coalfields, the WVDEP has made little attempt either to determine the cause of such damage or to limit it." Among other things, the Board ordered WVDEP to impose numerical permit limits on conductivity and sulfate.[3] The supplemental ruling reiterated that "The Board finds that a growing body of science has demonstrated that discharges from surface coal mines in Appalachia are strongly correlated with and cause increased levels of conductivity, sulfate and [Total Dissolved Solids, or TDS] in water bodies downstream from mines. The science also demonstrates that these discharges cause harm to aquatic life and significant adverse impacts to aquatic ecosystems in these streams… Direct impacts from coal mining associated with elevated levels of conductivity are not restricted to macro invertebrates. An analysis of a data set from Kentucky that includes information on fish taxa, and that was analyzed in the same manner as the West Virginia macro invertebrate data, demonstrates a community level response for the fish taxa at conductivity levels of approximately 200 µS/cm. Appellants' Ex. 38; Tr. 12/15/2010, 167:4- 168:24 (King Direct)… The consistency of the correlations identified in the research on the relationship between elevated conductivity from mine discharges and impacts to aquatic organisms has been so strong that it has led scientists to conclude that "collectively, there's a considerable amount of evidence that strongly suggests that conductivity associated with mine drainage is causing impairment – biological impairment in streams." Tr. 12/17/2010, 156:3-6 (King Rebuttal)."

Recent scientific studies have found a statistically significant correlation between high concentrations of conductivity, sulfates, and total dissolved solids (TDS) with degradation of aquatic stream life.[4] Declines in stream macroinvertebrate biodiversity have been linked to the amount of mining activity in a watershed[5] and to increased levels of sulfate[6] and specific conductance[7]. In another recent study, the authors stated that "The extent of surface mining within catchments is highly correlated with the ionic strength and sulfate concentrations of receiving streams. Generalized additive models were used to estimate the amount of watershed mining, stream ionic strength, or sulfate concentrations beyond which biological impairment (based on state biocriteria) is likely. We find this threshold is reached once surface coal mines occupy >5.4% of their contributing watershed area, ionic strength exceeds 308 µS cm−1, or sulfate concentrations exceed 50 mg L−1. Significant losses of many intolerant macroinvertebrate taxa occur when as little as 2.2% of contributing catchments are mined. As of 2005, 5% of the land area of southern WV was converted to surface mines, 6% of regional streams were buried in valley fills, and 22% of the regional stream network length drained watersheds with >5.4% of their surface area converted to mines."[8]

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[3] < http://www.wveqb.org/finalorders/10-34-eqb%20-%20supplemental%20final%20order.pdf
[4] < http://www.sciencemag.org/content/327/5962/148.summary >
< http://palmerlab.umd.edu/Bernhard_and_Palmer_2011.pdf >
< http://www.pnas.org/content/108/52/20929.full.pdf >
< https://gsa.confex.com/gsa/2012AM/webprogram/Paper211477.html >
[5] < http://www.bioone.org/doi/abs/10.1899/08-015.1 >
< http://www.bioone.org/doi/abs/10.1899/10-079.1 >
[6] < http://www.sciencemag.org/content/327/5962/148.summary >
[7] < http://www.bioone.org/doi/abs/10.1899/08-015.1 >
[8] < http://pubs.acs.org/doi/pdfplus/10.1021/es301144q >

Where we live in northern West Virginia, 2172 acres of 9420 acres or 23% of the Scotts Run watershed has already been surface mined and/or permitted for surface mining operations. The WVDEP discharge monitoring report data typically show conductivity and sulfate concentrations well in excess of 500 µS/cm and 50 mg/l, respectively, downstream of the active and reclaimed permits, while the few remaining, relatively unaffected tributaries in Scotts Run upstream of mining impacts tend to have relatively low conductivity and sulfate concentrations, greater numbers of sensitive and total genera (Figure1) and greater WV Stream Condition Index (WVSCI) scores (Table 1).

Figure 1. Relationship between conductivity (µS/cm), sulfate (mg/l) and numbers of macro-invertebrate genera, Scotts Run mile points 5.4 (sampled on 6/10/2003), 5.5(sampled on 7/22/2009), and 0.6 (sampled on 7/22/2009 and 9/15/1999, left to right). Data source: WVDEP.

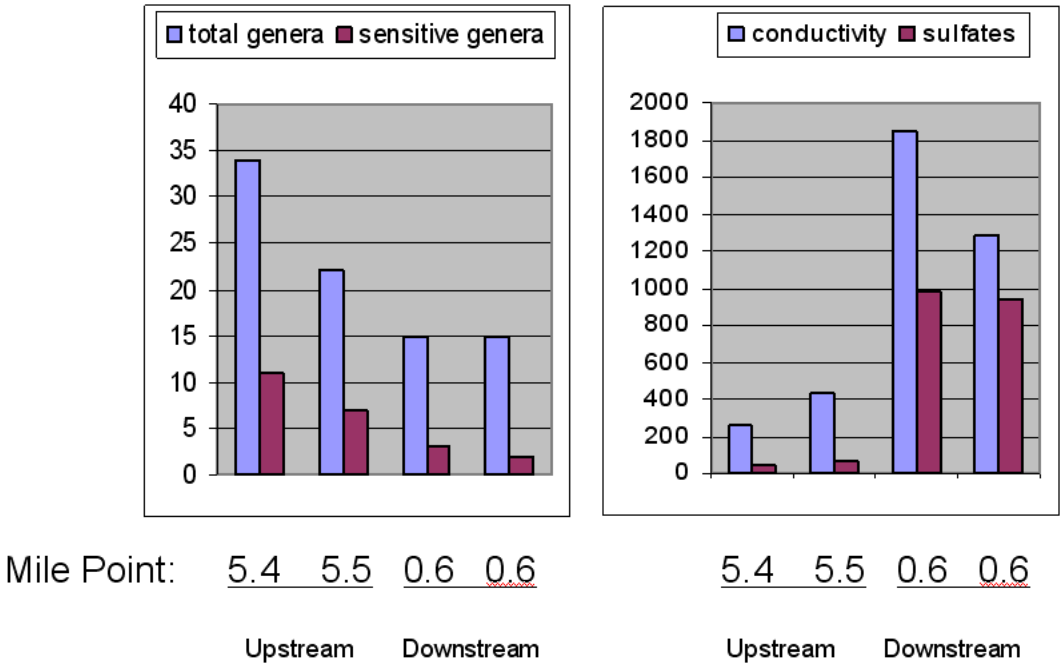

Table 1. WV Stream Condition Index (WVSCI) scores for Scotts Run. Data source: WVDEP.

SAMPLE_ID	SAMPLE_DATE	STREAM_NAME	latitude	longitude	ANCODE	MILE_POINT	FINAL_BENTHIC_IE	WVSCI	NARRATIVE_SCORE_WVSCI
2700	9/8/1999	UNT/Monongahela River RM 99.49	39.6501	-79.9764	WVM-6.2	1.2	No	17.22	Severely Impaired
2699	9/15/1999	Scotts Run	39.6607	-80.0009	WVM-6	0.6	WVSCI/GLIMPSS	31.8	Moderately Impaired
47280	7/22/2009	Scotts Run	39.6607	-80.0009	WVM-6	0.6	WVSCI/GLIMPSS	51.36	Slightly Impaired
16894	6/10/2003	Scotts Run	39.6745	-80.0673	WVM-6	5.4	WVSCI/GLIMPSS	54.23	Slightly Impaired
47281	7/22/2009	Scotts Run	39.6748	-80.0683	WVM-6	5.5	WVSCI/GLIMPSS	74.27	Unimpaired-Good
47283	7/22/2009	Wades Run	39.6684	-80.0182	WVM-6-A	0.1	WVSCI/GLIMPSS	64	Gray Zone
2683	9/16/1999	Wades Run	39.6703	-80.0181	WVM-6-A	0.2	WVSCI/GLIMPSS	52.92	Slightly Impaired
20535	5/18/2004	Guston Run	39.6731	-80.0321	WVM-6-B	0.4	WVSCI/GLIMPSS	53.07	Slightly Impaired
47284	7/22/2009	Guston Run	39.6731	-80.0321	WVM-6-B	0.4	WVSCI/GLIMPSS	45.35	Slightly Impaired
2684	9/15/1999	Guston Run	39.6751	-80.0362	WVM-6-B	0.6	WVSCI/GLIMPSS	49.29	Slightly Impaired

For all of these sound scientific reasons, we propose a modification to West Virginia's water quality standards which includes numerical effluent limits for NPDES permits that will be protective of the biological diversity of aquatic life in West Virginia's streams and rivers. Based on the scientific evidence, numerical effluent limits for surface mining (SCMRA) permits should be approximately 300 µS/cm for conductivity, 500 mg/l for TDS, and 50 mg/l for sulfate.

Sincerely,

John M. and Petra B. Wood