



west virginia department of environmental protection

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MEMORANDUM

To: Jeff Bailey, John Wirts, & Pat Campbell
From: Doug Wood, Environmental Resources Specialist III
Date: June 30, 2009
Subject: Evidence for Secretary Randy Huffman

Recently I read the statement which Secretary Huffman provided to members of Congress on June 25, 2009 in a hearing regarding mountaintop coal quarrying (often called “mining”) practices. The following quote was of particular interest to me since it deals with the agency’s effort to understand the impact of mountaintop coal quarrying on the designated uses of the state’s water resources, an effort I have been involved in as a regular part of my work assignments since I first suspected that ionic toxicity was a potential significant biological stressor in the Tug Fork watershed in 2002. Secretary Huffman’s statement reads, “Without evidence of any significant impact on the rest of the ecosystem beyond the diminished numbers of certain genus[sic] of mayflies, the State cannot say that there has been a violation of its narrative standard.” I presume the narrative standard that Secretary Huffman is referring to is the following one:

“§47-2-3. Conditions Not Allowable In State Waters.

- 3.1. Certain characteristics of sewage, industrial wastes and other wastes cause pollution and are objectionable in all waters of the state. Therefore, the Secretary does hereby proclaim that the following general conditions are not to be allowed in any of the waters of the state.
- 3.2. No sewage, industrial wastes or other wastes present in any of the waters of the state shall cause therein or materially contribute to any of the following conditions thereof: [...]
- 3.2.e. Materials in concentrations which are harmful, hazardous or toxic to man, animal or aquatic life; [...]
- 3.2.i. Any other condition, including radiological exposure, which adversely alters the integrity of the waters of the State including wetlands; no significant adverse impact to the chemical, physical, hydrologic, or biological components of aquatic ecosystems shall be allowed.”

Despite the findings of the Watershed Assessment Section that I have presented in numerous memoranda and reports since 2002, it appears that Secretary Huffman is unaware of the findings of our efforts to understand the effects of mountaintop coal extraction to aquatic ecosystems in West Virginia. I hope you will make the Secretary aware of the following points so he will be better informed the next time he represents our agency’s current state of knowledge to federal authorities and elected representatives:

- (1) We now have clear evidence that in some streams that drain mountaintop coal quarry valley

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fills, the entire order *Ephemeroptera* (mayflies) has been extirpated, not just certain genera of this order. We also have evidence that some streams no longer support the order *Plecoptera* (stoneflies). Some genera of stoneflies are particularly sensitive to high total dissolved solids just as some mayfly genera are. So, in streams below valley fills where stoneflies have survived, that order's diversity has been diminished. There are other genera and species of other orders of benthic macroinvertebrates that have been negatively impacted by streams draining mountaintop coal quarries, not just a few "genus[sic] of mayflies." The loss of an order of insects from a stream is taxonomically equivalent to the loss of all primates (including humans) from a given area. The loss of two insect orders is taxonomically equivalent to killing all primates and all rodents through toxic chemicals. Such adverse ecological impacts are most certainly significant, and they prevent affected streams from meeting their designated aquatic life uses. The discharges from valley fills are industrial waste discharges regulated through the National Pollutant Discharge Elimination System. Many such discharges contain materials (e.g., total dissolved solids) that are toxic to some species, some genera, or even some taxonomic orders of organisms. This is clearly in violation of §47-2-3.2.e., the narrative standard of the state's water quality standards.

Salamanders, the top predators of headwater stream ecosystems have also been significantly negatively impacted by mountaintop coal quarries. Our searches consistently show no salamanders or only one species out of four or five expected stream salamander species immediately below valley fills until stream stretches below un-quarried tributaries are reached. Such un-disturbed tributaries act as refugia for source populations of salamanders in these downstream stretches. The one salamander species complex most frequently encountered nearest to valley fills is the two-lined salamander (*Eurycea bislineata/cirrigera*), well-known for its ability to survive in disturbed aquatic environments.

Also, plant life, both in-stream and near-stream has been significantly negatively impacted by coal quarrying activities. The most visually obvious type of plant life degradation is the replacement of native vegetation structured in a multi-layered canopy with non-native invasive species primarily in a simple ground layer. Often, the periphyton community is also significantly negatively impacted. The photo (taken June 2, 2009) of a dense precipitate of manganese tannate on the bottom of a rock from Big Branch, which drains Fola Coal Company's mine in Nicholas County, illustrates how diatoms and other periphyton are severely limited by such abnormal precipitation of metal salts from valley fill discharges containing high metals concentrations. The diminished periphyton community produces smaller numbers of grazing organisms and therefore fewer organisms in other trophic levels up the food chain.



(2) As you are fully aware, an ecosystem consists of biological, geological/pedological, hydrological, and climatological components, not just biological components. The American Heritage Science Dictionary (Houghton Mifflin, 2002) defines the word as “A community of organisms together with their physical environment, viewed as a system of interacting and interdependent relationships and including such processes as the flow of energy through trophic levels and the cycling of chemical elements and compounds through living and nonliving components of the system.” When we read §47-2-3.2.i, it is obvious that the West Virginia legislature had this definition in mind when it promulgated the rule.

Despite Secretary Huffman’s statement “Without evidence of any significant impact on the rest of the ecosystem beyond the diminished numbers of certain genus[sic] of mayflies [...],” there is ample evidence that mountaintop quarrying in general has had significant adverse impacts on many geological/pedological and hydrological components of both lentic (still water bodies) and lotic (flowing water bodies) aquatic ecosystems. Habitat parameters, such as embeddedness and sediment deposition, usually score marginal or poor in our rapid habitat assessments of sites we visit below valley fills. Stream temperature regimes have been changed dramatically. All such negative impacts to “the chemical, physical, hydrologic [...] components of aquatic ecosystems” contribute to the significant adverse impact on the biological components that we consistently find below valley fills.

(3) The developmental abnormalities found in fish in the Mud River reservoir have been attributed in part to Selenium toxicity. As you know, we are finding high selenium concentrations in more streams below valley fills with each new field season. Selenium toxicity, like ionic toxicity, is a clear violation of §47-2-3.2.e., the narrative standard of the state’s water quality standards.

(4) Another measure of the significance of a negative impact is its persistence. If the impact lasts only a few hours, then that is less significant than an impact that lasts for several months. With valley fill discharges, especially those from very large fills, we can expect the negative impacts to last for centuries, just as deep mine discharges have remained toxic for centuries. Such long-lasting adverse impacts are indeed significant.

I hope this information helps Secretary Huffman explain to federal authorities that our data are consistent with data generated by Environmental Protection Agency researchers and several other well-respected researchers in the field of aquatic ecology. I also hope it will help him make well-informed policy decisions in the coming months. I stand ready to assist him and other policy makers to understand ecological impacts of various permitted activities in West Virginia, including mountaintop coal quarrying. We now have an excellent opportunity to improve intra-agency and inter-agency communications so that all our efforts more effectively protect stream uses for future generations, and more efficiently restore streams degraded by short-sighted abuses in the past. I hope our agency is moving in that direction.