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Stream Conductivity: It's Not Just a Mining Issue

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Coal mining, and related industries that consume coal, have attracted quite a bit of attention from the federal government as of late. Most of that attention has focused on how to further, or "better," regulate the industry. Whether it concerns safety regulations governing mines, carbon dioxide emissions from coal-burning facilities, or the permits needed to extract coal from the earth, the Obama administration at every turn has endeavored to create a more stringent regulatory environment for most things coal.

One aspect of the government's regulatory efforts is the federal Environmental Protection Agency's (EPA's) implementation of "Detailed Guidance," developed without any advance notice or opportunity for public comment, applicable to the review of applications for Clean Water Act "dredge and fill" permits, commonly known as Section 404 permits, which are necessary to construct valley fills associated with surface coal mines.

Released on April 1, 2010, this Guidance, which by its own terms applies only to surface coal mining activities in the Appalachian region, sets forth the EPA's position that mining activity resulting in downstream conductivity levels as low as 300 microsiemens per centimeter (µS/cm) can potentially cause or contribute to an adverse impact on certain species of aquatic life in violation of so-called "narrative" water quality standards (a subjective description of the condition of a water body, such as biological health, as opposed to a numeric water quality standard).

The EPA further concludes that conductivity exceeding 500 µS/cm will presumptively cause violations of the narrative water quality standards unless a permit applicant can demonstrate otherwise. Conductivity is simply a measure of how well water conducts electricity, and it is used as a surrogate to measure the amount of minerals and other solids that are dissolved in the water—known as total dissolved solids (TDS). Conductivity itself is not a pollutant; rather, it is an indirect measurement of TDS concentration. To put this in perspective, seawater, with its high salinity, has a conductivity of approximately 54,000 µS/cm. Sports drinks like Gatorade have reportedly been measured at 2,580 µS/cm, and the conductivity of some bottled drinking water has been measured between 558 and 712 µS/cm—a level at which the EPA presumes aquatic life will be harmed.

The EPA based this 500 µS/cm conductivity threshold largely on the results of a study conducted by its Office of Research and Development entitled "A Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams." Based on data gathered from streams in both mined and unmined watersheds, the EPA's study concludes that surface mining activities in the areas studied, primarily the construction of valley fills, have caused increased levels of conductivity in downstream waters, and that increased conductivity adversely affects aquatic life. The EPA's own Science Advisory Board released a draft report in late December 2010 largely praising the study and noting that the agency's efforts to develop a conductivity benchmark based on field study results "holds tremendous promise for other regions[.]"

Even though the EPA's Detailed Guidance is purportedly only guidance, and interim guidance at that, and the conductivity studies are still undergoing the public review and comment process, the agency has seized on this new information as grounds for increased scrutiny of the coal industry. In this case, a near moratorium on the issuance of "dredge and fill" permits associated with surface coal mining activities has occurred. In addition to preventing the issuance of new permits, on January 13, 2011, the EPA rescinded a previously issued Section 404 permit for Arch Coal's Spruce No. 1 Mine in West Virginia—a permit that the EPA itself had approved several years ago-based in part on the EPA's conclusion that mining activities would likely cause downstream waters to exceed the 500 µS/cm benchmark.

The mining industry has fought back. Arch has sued the EPA over the permit revocation. The National Mining Association and the governors of West Virginia and Kentucky have each filed separate suits against the EPA alleging that its Guidance is actually a rulemaking that requires the agency to follow the procedures prescribed for promulgating, and amending, regulations. A federal judge recently ruled that the EPA has likely engaged in "illegal rulemaking" but declined to issue an injunction prohibiting the agency from continuing to apply the Guidance pending a final decision in the case.

For those not directly involved in the mining industry, the natural question is: "Why does this matter to me?" The EPA's Guidance expressly applies only to surface coal mining activities, so why should anyone outside of the coal industry be concerned? The answer is that conductivity is not just a mining issue. Although the EPA's studies focus on conductivity measurements in areas where mining has occurred, elevated conductivity is not unique to the mining industry. Any earth disturbance in the vicinity of a stream, or the discharge of wastewater, can cause elevated conductivity by adding TDS to the water. Especially in places like central Appalachia, where flat land is hard to come by, most large construction projects generally involve some amount of valley filling to create flat land to build on, which requires a Section 404 permit. A valley fill to build a section of highway or a shopping center in southern West Virginia is generally no different than a valley fill associated with a surface coal mine in southern West Virginia.

Other human activity not associated with the creation of valley fills can also cause increased conductivity. Agricultural activities like plowing the earth, fertilizing crops, and raising livestock can all cause elevated TDS levels in downstream waters. Sewage treatment plants contribute a fair amount of TDS to receiving waters as a byproduct of the treatment process. Even general urban storm water runoff can lead to increased conductivity. So can construction of access roads associated with logging or oil and natural gas development, not to mention the disposal of wastewater generated by drilling in natural gas formations such as the Marcellus Shale.

In addition to conductivity being a widespread issue, water treatment to lower TDS concentration is very problematic. Reverse osmosis and evaporation/crystallization are the most widely recognized methods for TDS treatment. Both systems are very expensive to build and operate, plus they require a fairly large amount of space for installation.

Why the EPA has decided to target only the coal mining industry in its efforts to regulate conductivity and TDS can certainly be debated. There is no debate, however, that the EPA is doing everything it can to severely curtail new surface coal mining developments through the implementation of its conductivity "guidance." Everyone in the business world should be concerned with the efforts of a federal agency as powerful as the EPA to circumvent the required rulemaking process and unilaterally change the "rules of game" without soliciting any input from the regulated community. If the EPA is permitted to change the regulatory environment in such a dramatic way through guidance documents like the one applicable to the Appalachian coal industry, there would seem to be no impediment to the agency taking a similar approach to other industries whose activities can be identified as a source of TDS, and therefore increased conductivity.

As the EPA's Science Advisory Board commented, the agency's conductivity benchmark "holds tremendous promise for other regions," and potentially other industries as well, because surface coal mining is certainly not the only potential source of TDS. Who knows, your industry could be next.