THE SCOPES MONKEY TRIAL REVISITED: HOW THE COAL INDUSTRY AND THE SURFACE MINING STATES IGNORE SCIENCE TO THE DETRIMENT OF THE APPALACHIAN ENVIRONMENT

SARAH J. SURBER*

I. INTRODUCTION

Over the past decade, scientists and environmental advocacy groups have challenged the proliferation of surface mining and especially mountaintop removal ("MTR") in Appalachia. However, MTR has been viable simply because the industry has not been required to meet the basic requirements of the Clean Water Act ("CWA")—a costly endeavor for any industry, but particularly the surface coal mining industry. The West Virginia Division of Mining and Reclamation in the Department of Environmental Protection ("WVDEP") has failed to include permit limits for surface coal mining operations for pollutants that these operations had a reasonable potential to exceed water quality-based standards. This is a violation of both the CWA and the Surface Mining Control and Reclamation Act ("SMCRA"), as well as the state laws and regulations implementing the state programs.

For example, when the Environmental Protection Agency ("EPA") imposed selenium limits on MTR operations, the WVDEP allowed unlimited stays on those limits, rendering the limits essentially meaningless.[1] When permit limits were imposed on other pollutants, such as iron, aluminum, and total suspended solids ("TSS"), the WVDEP never enforced these violations unless citizen groups issued notices of intent to

---

* A twist on an old corny lawyer joke: What is the difference between a scientist and a lawyer? A scientist doesn't think she's a lawyer. Sarah J. Surber is a doctoral student studying occupational and environmental health science in the School of Public Health at West Virginia University. She earned her law degree from the West Virginia University College of Law and later her Master of Science degree in environmental science from Marshall University. She previously practiced environmental law in law firms and law offices, representing industries, corporations, state agencies. Beginning in 2013, along with being a full-time doctoral student, she serves as part-time in-house counsel for Coal River Mountain Watch ("CRMW"), a non-profit group opposed mountaintop removal and illegal surface mining activities. She was not involved in any cases in this article (except for one case briefly representing WVDEP, as noted) and has no pending cases on the issues raised in this article. CRMW was involved in the cases as noted. She credits all of the pseudo-scientists and lawyers who manufacture doubt for profit as the fuel for her desire to set aside short-term pecuniary interests to study and produce accurate and helpful scientific knowledge. Her goal is to be a scientist who also happens to be a lawyer.

[1] *See* Ohio Valley Envtl. Coal. v. Coal-Mac, Inc., 775 F. Supp. 2d 900 (S.D.W. Va. 2011) (CRMW was one of several environmental group plaintiffs, but the author was not involved in the case).

sue. So WVDEP was not including proper limits, indefinitely staying required limits, not enforcing those limits, or using a combination of all of these acts, in direct contravention of the CWA, SMCRA, and state law. This charade has continued for decades over various pollutants and legal requirements of the CWA and SMCRA.

Recently, aquatic life scientists have shown that conductivity, the ions that cause salinity in fresh water, has destroyed parts of the aquatic community, particularly the building blocks of the entire aquatic life chain. The mining industry, WVDEP, and politicians have denied this science without any credible evidence of their own. Instead, they have fought this science with claims of a 'War on Coal,' decrying that 'Coal Keeps the Lights On,' and asking that Appalachians join together as 'Friends of Coal.' The fact that complex scientific research by experts in their field is routinely denied, ignored or questioned by industry, politicians, and agencies (all of which have little to no scientific knowledge on these subjects—sometimes purposefully) is similar to the Scopes Monkey Trial. Except this time, instead of religion as the motivation, pure profits motivate this denial of science.

Years of surface mining have caused real and measurable impacts to Appalachian water bodies. Mining companies, governmental agencies, and courts have allowed the bastardization of science by requiring citizens' groups to prove that specific harm would occur, rather than by forcing the regulators and the mining industry to produce credible scientific evidence showing that proposed projects would not destroy the environment—the requirements under SMCRA and CWA. Once peer-reviewed science showed harm to the environment, these mining powers then manufactured uncertainty[2] on the peer-reviewed academics by producing either their own hired guns (who never produced scientific peer-reviewed studies) or begging for sympathy by decrying a loss of jobs and profits. They attack "environmentalists," by minimizing the role of aquatic "bugs" or through mass advertising of the 'War on Coal.'

As it stands, the mining industry simply passes the cost of its pollution to citizens and the next generation of Appalachians. Instead of propping up an industry that is destroying the Appalachian environment, all parties should use facts and science to make the important decisions that face Appalachians for decades to come. This article explains the science and law behind these decisions and urges policy that reflects sound science and follows the law.

---

[2] The author uses this phrase encapsulated by the work of David Michaels to describe the assault by the cigarette, pharmaceutical, and chemical industries for years on human health science. The author draws a parallel between these assaults on human health and the mining industry and state agencies' assault on the science of aquatic resources (and human health as well). DAVID MICHAELS, DOUBT IS THEIR PRODUCT (Oxford Univ. Press 2008).

II. SCOPES AND MTR SIMILARITIES

The Scopes Monkey Trial is generally known for the courts' role in the conflict between science and religion. In 1925, the Tennessee Legislature passed The Tennessee Anti-Evolution Act.[3] The Act made it a crime for any teacher in public schools, including public universities, "to teach any theory that denies the story of the Divine Creation of man as taught in the Bible, and to teach instead that man has descended from a lower order of animals."[4]

Mr. Scopes was a high school teacher who taught evolution from his school-issued textbook after the enactment of the Act.[5] Clarence Darrow represented Mr. Scopes and called Dr. Metcalf to testify on Scope's behalf. Dr. Metcalf was a zoologist, a professor at several colleges, and an author published in numerous academic works on zoology. Dr. Metcalf testified that he was "absolutely convinced" that evolution was a fact.[6] He also testified that he was "acquainted with practically all of the zoologists, botanists, and geologists of this country," and that "there [wa]s not a single one among them who ha[d] the least doubt of the act of evolution."[7] He was familiar with the scientific literature supporting the theory of evolution.[8] The State did not produce any scientific evidence to dispute this statement.

Despite the overwhelming agreement within the scientific community, Scopes was convicted of violating the Act.[9] The real issue was neither scientific in nature nor did it regard teaching children the scientific method; the real issue was dogma. Similarly, despite ample scientific, peer-reviewed evidence that MTR degrades the environment in violation of the CWA and SMCRA, the issue here is dogma of a different sort: the dogma of money, power, politics, and manufactured uncertainty.

III. OVERVIEW OF MOUNTAINTOP REMOVAL

The MTR method of mining coal in Appalachia, pioneered in West Virginia, involves the blasting of the soil and rock on top of a mountain to expose coal deposits in the mountain's upper strata. Mining companies

---

[3] MONKEY TRIAL: THE STATE OF TENNESSEE VS. JOHN THOMAS SCOPES 3 (Sheldon Norman Grebstein ed., Houghton Mifflin Co. 1960).

[4] *Id.*

[5] *Id.* at 100-02.

[6] *Id.* at 112.

[7] *Id.*

[8] *Id*.

[9] *Id.* at 176, 189. The Court fined Scopes $100 for his crime. On appeal, the Tennessee Supreme Court upheld the conviction, but would have remanded the judgment, finding that only the jury could impose a fine of more than $50. However, at this point, Scopes no longer worked in Tennessee, so the Supreme Court entered *nolle prosequi*, dismissing the case. The Appalachian Mountains have not received such a reprieve.

acquire the property rights to the mountain and then use explosives and large-scale demolition equipment to remove the top portion of the mountain to access seams of coal. With this demolition, springs, streams, vegetation, forest, wildlife, and soil on the mountain's surface are also permanently removed. The contour of the mountain is left permanently altered.

When the top of the mountain is removed, not all of the material is coal. Some of the material contains rock and other minerals, which are called mining spoils or "overburden." As much as 1,000 feet of overburden is removed from the mountain.[10] The overburden is placed in another area because, even if the mountain is returned to its original state, the crushed mountain expands, resulting in excess overburden. Overburden in Appalachian MTR sites is placed in valleys, which are areas that are naturally lower than the mountain, resulting in a valley fill. A valley fill looks like a large dam but with mining spoil filled inside. The mine dumps large rocks and other minerals that contain pollutants into the valley fill, burying streams and destroying the natural environment. Headwater streams exist in the valley and the mountain and must move natural snowmelt, rainwater, and spring water, even though the mountain contour has changed. Water then naturally flows into the valley fill, moving pollutants out of the valley fill into waterbodies.

The Central Appalachian coalfields cover approximately twelve million acres in West Virginia, Kentucky, Virginia, and Tennessee.[11] Surface mining has been identified as the dominant driver of land cover and land-use change through significant changes in the region's topography, hydrology (including an increased risk of flooding), vegetation, groundwater, and wildlife.[12] While in some areas, surface mining has decreased due to the reduction in minable coal, in other areas, such as Southern West Virginia, "the area of active surface mining and coal production has actually increased (as much as threefold in some counties) due to the emergence of MTR."[13] As a result of this increased surface mining and MTR in Central Appalachia, coal mining was identified as the greatest contributor to earth-moving activity in the entire United States.[14]

Permits approved between 1992 and 2002 are projected to result in the loss of 1,944 km (over 1,200 miles) of headwater streams.[15] This

---

[10] U.S. ENVTL. PROT. AGENCY, THE EFFECTS OF MOUNTAINTOP MINES AND VALLEY FILLS ON AQUATIC ECOSYSTEMS OF THE CENTRAL APPALACHIAN COALFIELDS 7 (2011) [hereinafter EFFECTS OF MOUNTAINTOP MINES], *available at* http://ofmpub.epa.gov/eims/eimscomm.getfile?p_download_id=501593.

[11] *Id.* at ii.

[12] *Id.* at 10.

[13] Roger L. Hooke, *Spatial Distribution of Human Geomorphic Activity in the United States: Comparison with Rivers*, 24 EARTH SURFACE PROCESSES & LANDFORMS 687 (1999).

[14] EFFECTS OF MOUNTAINTOP MINES, *supra* note 11, at 10.

[15] *Id.* at 2.

represents a loss of almost 2% of the stream miles in the MTR states.[16] The loss during this ten-year period is more than triple the length of the Potomac River.[17] By 2012, mine footprint and stream losses were projected to double from 2002 levels.[18]

IV. HOW THE CWA AND SMCRA ARE SUPPOSED TO WORK TO REGULATE SURFACE MINING

Congress passed SMCRA in 1977 to "establish a nationwide program to protect society and the environment from the adverse effects of surface coal mining operations."[19] Congress recognized the need to "strike a balance between protection of the environment and agricultural productivity and the Nation's need for coal as an essential source of energy."[20] As part of the environmental protection performance standards, SMCRA requires that overburden from surface mining be disposed of "in a controlled manner . . . and in such a way to assure mass stability and to prevent mass movement."[21]

SMCRA requires that where the disposal area contains "springs, natural water courses, or wet weather seeps . . . lateral drains must be constructed from the wet areas to the main under-drains in such a manner that filtration of the water into the spoil pile will be prevented."[22] Water should not flow into the spoil pile/overburden, which is a valley fill in Appalachia. Water that seeps or runs from the valley fill also runs into streams or rivers. Thus, water from valley fills are discharges into waters of the United States and must meet all CWA requirements through a permitting regime separate from the SMCRA permitting requirements.[23] However, any CWA violations are also SMCRA violations because SMCRA permitted sites must meet CWA requirements.[24] The two permitting regimes are similar in many ways—prevent or control discharges of pollutants from valley fills.

MTR sites typically require a CWA § 404 permit because of the valley fill and other types of fill material disposals into waters of the United States. Under that regime, a MTR site must first comply with the CWA § 401 by obtaining certification from the state that any discharge from the mine site will comply with all applicable water quality standards (the state

---

[16] *Id.*
[17] *Id.*
[18] *Id.*
[19] 30 U.S.C. § 1202(a) (2013).
[20] *Id.* § 1202(f).
[21] *Id.* § 1265(b)(22)(A).
[22] *Id.* § 1265(b)(22)(D).
[23] 33 U.S.C. § 1362(6), (12) (2013).
[24] 30 U.S.C. § 1292(a)(3).

may also waive issuing such a certification).[25] Second, the mine operator must obtain a National Pollutant Discharge Elimination System ("NPDES") permit if the site discharges pollutants from a point source into waters of the United States.[26] If the water streams through the valley fill or the MTR site is treated by a sediment pond or other methods, and this water is released into a stream carrying or potentially carrying pollutants, then the mine site must receive an NPDES permit and meet those requirements.

Finally, MTR sites that intend to dispose fill or overburden into jurisdictional waters (waters of the United States) must obtain a CWA § 404 permit from the Army Corps. The Corps must issue this § 404 permit before any fill activity can occur. This section allows "the discharge of dredged or fill material into the navigable waters at specified disposal sites."[27] The EPA retains veto authority over § 404 permits.[28] The Army Corps uses § 404 permits to authorize the fill activity itself, as well as the construction of downstream sediment ponds.

In issuing § 404 permits, the Army Corps relies upon CWA Guidelines issued through EPA rulemaking.[29] The EPA prohibits discharges that "will cause or contribute to significant degradation of waters of the United States."[30] A discharge contributes to significant degradation if it has "[s]ignificant adverse effects" on: (1) human health or welfare[31]; (2) life stages of aquatic life and other wildlife dependent on aquatic ecosystems[32]; (3) aquatic ecosystem diversity, productivity, and stability[33]; or (4) recreational, aesthetic, and economic values.[34]

The CWA Guidelines also require that the Army Corps "[d]etermine the nature and degree of effect that the proposed discharge will have, both individually and cumulatively, on the structure and function of the aquatic ecosystem and organisms."[35] The Army Corps should consider "potential changes in substrate characteristics and elevation, water

---

[25] 33 U.S.C. § 1341(a)(1). This article does not address the states' aptitude (which is dubious at best) in issuing State Certifications, but the author is currently addressing such matters in a paper in progress.

[26] *Id.* § 1342.

[27] *Id.* § 1344(a).

[28] *Id.* § 1344(c).

[29] 40 C.F.R. § 230.10 (2013).

[30] *Id.* § 230.10(c).

[31] *See, e.g.*, Michael Hendryx, *Personal and Family Health in Rural Areas of Kentucky with and without Mountaintop Coal Mining*, 29 J. RURAL HEALTH 79 (2013).

[32] *See, e.g.*, Emily S. Bernhardt & Margaret A. Palmer, *The Environmental Costs of Mountaintop Mining Valley Fill Operations for Aquatic Ecosystems of the Central Appalachians*, 1223 ANNALS N.Y. ACAD. SCI. 39 (2011).

[33] *See, e.g.*, James Wickham et al., *The Overlooked Terrestrial Impacts of Mountaintop Mining*, 65 BIOSCIENCE 335 (2013).

[34] *See, e.g.*, Joseph R. Ferrari et al., *Surface Mining and Reclamation Effects on Flood Response of Watersheds in the Central Appalachian Plateau Region*, 45 WATER RESOURCES RES. W04407 (2009).

[35] 40 C.F.R. § 230.11(e).

or substrate chemistry, nutrient, currents, circulation, fluctuation, and salinity, on the re-colonization and existence of indigenous aquatic organisms or communities."[36]

In addition to the CWA Guidelines, the Army Corps and the EPA developed a Memorandum of Agreement ("MOA") in February 1990 concerning the Determination of Mitigation under the Clean Water Act § 404(b)(1) Guidelines.[37] The MOA set out an approach for evaluating stream function, assessed "by applying aquatic site assessment techniques generally recognized by experts in the field and/or the best professional judgment of Federal and State agency representatives, provided such assessments fully consider ecological functions included in the Guidelines."[38] At the time, the Army Corps did not have a functional assessment protocol in place for West Virginia. Instead, the Army Corps relied upon the best professional judgment of its staff, using information almost wholly from the mining companies, to assess aquatic impacts and potential mitigation efforts, which meant assessing stream structure as a surrogate for stream function.[39]

V. IS COMPENSATORY MITIGATION A LEGAL FICTION?

In 2005, Ohio Valley Environmental Coalition, CRMW, and Highlands Conservancy (collectively, "OVEC") challenged four MTR mining permits issued by the United States Army Corps of Engineers through its § 404 authority under the CWA for valley fills associated with coal removal activities in federal district court.[40] In its case, OVEC challenged the four permits for Camp Branch (owned by Aracoma Coal Company), Black Castle Mine (owned by Elk Run Coal Company), Republic No. 1, and Republic No. 2 mines (both owned by Alex Energy, Inc.) – all in West Virginia. Together, the four challenged permits authorized the creation of twenty-three valley fills and twenty-three sediment ponds, impacting 68,841 linear feet (just over thirteen miles) of intermittent and ephemeral streams.[41] The Army Corps concluded that the permitted activity would not result in significant environmental impacts because of the planned mitigation measures, and it approved the challenged permits.

---

[36] *Id.*

[37] *Memorandum of Understanding*, U.S. ENVTL. PROTECTION AGENCY, http://water.epa.gov/lawsregs/guidance/wetlands/mitigate.cfm (last visited Aug. 4, 2013).

[38] Corrected Notice, 55 Fed. Reg. 9210, 9212 (Mar. 12, 1990).

[39] Ohio Valley Envtl. Coal. v. Aracoma Coal Co., 556 F.3d 177, 199 (4th Cir. 2009).

[40] Ohio Valley Envtl. Coal. v. U.S. Army Corps of Eng'rs, 479 F. Supp. 2d 607 (S.D.W. Va. 2007). As stated above, CRMW was a Plaintiff in the case, but the author was not involved in the matter.

[41] *Aracoma Coal Co.*, 556 F.3d at 187.

OVEC challenged the Army Corps' finding that stream structure equated to stream function, and also challenged the lack of effective protocols for determining stream function for proposed mitigation efforts.[42] OVEC argued that the Guidelines' plain language required both stream structure and function to be assessed.[43] OVEC also argued that the "best professional judgment" determination by the Army Corps was arbitrary and capricious because it lacked any objective standards.[44]

The United States District Court for the Southern District of West Virginia, presided over by Judge Robert C. Chambers, found in favor of OVEC, determining that the mining companies' mitigation plans were not sufficient to compensate for the adverse impacts associated with valley fills and that the Army Corps inadequately evaluated the cumulative impacts of the projects.[45] The court rescinded all four permits.

On appeal, the Fourth Circuit reversed the district court's decision, finding that based upon the available science, the Army Corps had acted reasonably in issuing the permits.[46] Despite the evidence provided that the Corps did not properly evaluate the cumulative impacts and the mitigation plans, the court found that the Army Corps did, in fact, use its best professional judgment in determining that stream structure was a surrogate for stream function.[47] Essentially, the court found the Army Corps was justified in using structural measurements to provide adequate indications of stream function. Thus, the Corps was allowed to ignore stream function since structural elements were met.[48] The court allowed the Corps to equate a natural spring's function in a natural forest to that of a ditch common to many suburban residential subdivisions or shopping centers—rocks thrown together as a conduit to move water.

The court also found that the Army Corps was justified in relying upon the mining companies' measurements of benthic macroinvertebrate population to determine stream function because the measure is an appropriate indicator of ecological quality, integrity of the soil and water chemistry, geological processes, and land use changes.[49] The benthic population is composed of "nonvertebrate, aquatic organisms that are large enough to be seen with the naked eye."[50] Benthic life includes mayflies, stoneflies, and caddisflies, which "function trophically as detritivores, algivores, and predators, serving to fulfill important intermediate pathways

---

[42] *U.S. Army Corps of Eng'rs*, 479 F. Supp. 2d at 616.
[43] *Id*.
[44] *Id*.
[45] *Id*. at 662.
[46] *Aracoma Coal Co.*, 556 F.3d at 216.
[47] *Id.* at 199.
[48] *Id.* at 199-200.
[49] *Id*. at 200.
[50] *Id.* at 199-200 n.17.

of nutrient cycling and foodweb support."[51] The benthic community is part of the beginning of the life cycle chain for the total aquatic community—from macroinvertrebrates to invertebrates—in any freshwater system.

Further, the court found the Army Corps was justified in not evaluating nutrient cycling because "the effects of filling ephemeral streams on nutrient cycling are difficult to measure and that there is a lack of consensus among the relevant agencies about how best to collect quantitative evidence regarding these functions."[52] The court stated, "[t]he precise role of headwater streams in overall watershed ecology is a matter of some debate in the litigation . . . but all parties agree that these streams perform important ecological functions."[53]

The court ultimately deferred to the Army Corps' judgment, which was based upon findings made by the permit applicants, stating that it was not the court's "place to dictate how the Corps should go about assessing stream function and losses."[54] The court determined that its proper action was to be "most deferential" to the Army Corps.[55] Basically, the court allowed the Army Corps to defer to the mine permit applicant's findings because science is hard and neither the Army Corps nor the courts wanted to play a role in deciding what the law dictated.

But was that deference warranted? As to the issue of stream mitigation for valley fills destroying headwater streams, the Army Corps cannot issue a § 404 permit, "unless appropriate and practicable steps have been taken which will minimize potential adverse impacts of the discharge on the aquatic ecosystem."[56] The Army Corps and the EPA make "no net loss" the goal of the § 404 permit program,[57] and this is accomplished through mitigation. Mitigation has three components: (1) avoidance, (2) minimization, and (3) compensatory mitigation.[58] At issue in this case was the proposed compensatory mitigation for more than thirteen miles of affected streams in the four permit areas. Compensatory mitigation may include restoring existing wetlands or creating new wetlands with on-site mitigation.[59] Off-site mitigation may occur in the same geographic area.[60] The MOA directs that the functional values lost should be carefully considered when determining compensatory mitigation, because in-kind

---

[51] Gregory J. Pond, *Biodiversity Loss in Appalachian Headwater Streams (Kentucky, USA): Plecoptera and Trichoptera Communities*, 679 HYDROBIOLOGIA 97, 98 (2012).
[52] *Aracoma Coal Co.*, 556 F.3d at 200.
[53] *Id*. at 187.
[54] *Id*. at 201.
[55] *Id*. at 192.
[56] 40 C.F.R. § 230.10(d) (2013).
[57] Corrected Notice, 55 Fed. Reg. 9210, 9210 (Mar. 12, 1990).
[58] *Id*. at 9211.
[59] *Id*. at 9212.
[60] *Id*.

mitigation should be used.[61] Basically, compensatory mitigation must be more than ditch creation. Mining companies must be able to recreate the functional uses of the streams destroyed in the mining process, including the ability to support aquatic life.

The mitigation efforts proposed by the four challenged permits included stream enhancement, stream restoration, and stream creation.[62] The Army Corps determined that no net loss of habitat resulted from the impacts to more than thirteen miles of streams.[63] The court relied upon the mining companies' experts' conclusions that "downstream waters could still maintain a healthy benthic community even when headwater streams were filled, as long as the water quality below the fill remained good."[64]

The court placed emphasis on the fact that a full, functional assessment was not yet available to the Army Corps.[65] The court held that the Corps' support for its claim that the proposed stream creation measures have good potential for success is admittedly limited . . . . However, the novelty of a mitigation measure alone cannot be the basis of our decision to discredit it."[66] The court stated that "whatever the role of headwater streams in overall watershed ecology, the Corps is not required to differentiate between headwater and other stream types in the determination of mitigation measures."[67] Even though the CWA requires that appropriate and practicable steps be taken to minimize potential adverse impacts of the discharge on the aquatic ecosystem, the court concluded the Corps could issue permits without knowing the proposed discharges did just that, simply because the Corps didn't know. A simple reading of the regulations would find that the Corps could not issue the permits without that knowledge, regardless of the Corps' lack of science.[68]

A lengthy dissent by Judge Michael disagreed with the court's determination, focusing on the U.S. Fish and Wildlife Service's comment "expressing a continued belief that it is not possible to fully replicate the critical aquatic and terrestrial ecosystem functions of healthy headwater streams."[69] Instead, his dissent would uphold the district court's decision in its entirety and rescind the four permits. Judge Michael was the only judge from West Virginia participating on the Fourth Circuit panel.[70]

---

[61] *Id*.
[62] Ohio Valley Envtl. Coal. v. Aracoma Coal Co., 556 F.3d 177, 202 (4th Cir. 2009).
[63] *Id*.
[64] *Id*. at 203.
[65] *Id*. at 204.
[66] *Id*. at 205.
[67] *Id*. at 203.
[68] *See* 40 C.F.R. § 230.10(d) (2013).
[69] *Aracoma Coal Co.*, 556 F.3d at 225 (Michael, J., dissenting).
[70] Lawrence Hurley, *Federal Judge is Remembered for Vigorous Dissent in Mountaintop Case*, N.Y. TIMES (Mar. 29, 2011), http://www.nytimes.com/gwire/2011/03/29/29greenwire-federal-judge-is-remembered-for-vigorous-disse-14219.html.

The court ultimately reversed the district court in full, upholding the Army Corps' decision to issue all four permits.[71] The court allowed twenty-three valley fills to be created in West Virginia because the Army Corps had failed to scientifically establish whether mining companies could mimic the effects of nature in creating ditches to discharge pollutants from valley fills.[72] The mining industry was allowed to continue MTR without proving that it was not harming the environment, and the law was not stopping them. This Fourth Circuit decision proved to be costly and likely irreparable to the Appalachian environment and its residents.[73]

VI. SCIENTIFIC ANALYSIS AFTER THE OVEC DECISION

After the Fourth Circuit decision in 2009, the EPA issued a publication on the existing scientific research into MTR in Appalachia entitled "The Effects of Mountaintop Mines and Valley Fills on Aquatic Ecosystems of the Central Appalachian Coalfields."[74] The publication documented years of measurable, scientific inquiry into the effects of MTR and valley fills on the Appalachian coalfields. The evidence was grim: MTR was causing significant degradation to the Appalachian environment.[75] The Fourth Circuit's reliance on the mining companies' assurances that "downstream waters could still maintain a healthy benthic community even when headwater streams were filled, as long as the water quality below the fill remained good" turned out to be utterly wrong—with measurable and lasting damage.[76] The water quality below the fill did not remain "good."

The EPA found six potential consequences of MTR: (1) loss of headwater streams, (2) impacts on water quality, (3) impacts from aquatic toxicity, (4) impacts on aquatic ecosystems, (5) cumulative impacts of multiple mining operations, and (6) effectiveness of on-site reclamation and mitigation activities.[77] The EPA did not evaluate the impacts of MTR on cultural or aesthetic resources or human health.[78]

A. Functions of Headwater Streams

"Most of the world's great rivers are born in vast networks of tiny headwater mountain streams."[79] Headwater streams dominate surface flows

---

[71] *Aracoma Coal Co.*, 556 F.3d at 217.
[72] *Id*. at 187.
[73] *See* Hendryx, *supra* note 32; Bernhardt & Palmer, *supra* note 33; Wickham et al., *supra* note 34; Ferrari et al., *supra* note 35.
[74] EFFECTS OF MOUNTAINTOP MINES, *supra* note 11.
[75] *Id*. at ii.
[76] *Aracoma Coal Co.*, 556 F.3d at 203.
[77] *Id*. at 188.
[78] *Id*.
[79] Bernhardt & Palmer, *supra* note 33.

in the United States and include 70-80% of the total stream miles in the eastern coal mining states.[80] Mining impacts on headwater streams include the loss of streams on the removed mountains, burial of streams in valley fills, and the potential fragmentation of remaining stream and riparian habitats.[81] When surface mining impacts headwaters, the impact influences the headwater's function, especially in the transformation and transport of water, organic matter, sediment, and other materials downstream.[82]

In Central Appalachia, natural headwaters are forested, high-gradient streams that occur on hilltops and valleys. They are typically dendritic in structure (which is a branched pattern similar to tree roots) with channels of underlying rocks.[83] In their natural environment, undisturbed by mining, hilltop streams receive water from rain, land flow, and hilltop aquifers.[84] Aquifers are formed by shallow groundwater on rock layers above coal seams.[85] Hilltop stream channels slow the runoff into valleys, reduce erosion, and contribute to flood control.[86] The existing stream structure and function have evolved since the Appalachian Mountains were created, continuously making natural and gradual changes that balance nature with water flow. Destruction or alteration of these headwater streams, where rivers are born, bears great significance.

The EPA estimates that in the seventeen-year period from 1985 to 2001, approximately 724 miles of headwater streams were permanently buried under valley fills in the Central Appalachian states.[87] The EPA further estimates that a total of 1,208 miles were lost due to mountaintop removal, valley fills, and associated activity between 1992 and 2002.[88] This is more than 2% of the total stream miles (and 4% of first and second-order stream miles) in Central Appalachia in a ten-year period.[89]

The EPA's estimates do not include unmapped streams, springs, seeps, and wet areas that may occur in watersheds less than 0.12 km in size or headwaters disconnected from the stream network by valley fills.[90] The loss does not include loss of headwater wetlands and forested vernal pools, which provide refuge and a habitat for breeding, hunting, and foraging by amphibians, reptiles, and aquatic invertebrates.[91] It also does not include the

---

[80] EFFECTS OF MOUNTAINTOP MINES, *supra* note 11, at 15.
[81] *Id.*
[82] *Id.*
[83] *Id.* at 16.
[84] *Id.*
[85] *Id.*
[86] *Id.* at 15.
[87] *Id.* at 16.
[88] *Id.*
[89] *Id.*
[90] *Id.* at 19.
[91] *Id.*

potential long-term effects of landscape-scale changes in land cover, such as topsoil, trees, and brush, from MTR.

Effects of land cover changes on regional biodiversity can persist for decades.[92] Bernhardt and Palmer concluded that "the environmental impacts of MTR [with valley fills] in the Central Appalachians are severe, large scale, and long lasting."[93] Mountain ecosystems that survived glaciation, resulting in the most biologically diverse freshwater systems in North America, have been subjected to destruction and alteration of the functions of pristine headwater streams.[94] The downstream effects of the pollution of headwater streams continue to be investigated. The true loss resulting from stream fill is underestimated.

The loss of headwater streams results in losing headwater biota. The Appalachian Mountains were a refuge for species during glaciation over 10,000 years ago.[95] Fish species found refuge in the rivers of West Virginia, including the Kanawha River.[96] Central Appalachia includes new stream species that are continually discovered, and is home to nearly 10% of global salamander species.[97] Samples from thirty-six intermittent and perennial headwater streams in West Virginia and Kentucky scheduled for burial by MTR collected approximately seventy-three genera and forty-one families of aquatic invertebrates.[98]

Benthic invertebrates from headwater streams provide a crucial function necessary to downstream aquatic life.[99] When leaf litter (leaves, twigs, and bark) from forest canopies falls into small streams, invertebrates in the streams then consume either the whole, decomposing leaves ("shredders") or the organic materials that are created when these leaves break apart ("collectors").[100] In turn, predators feed on the shredders and collectors.[101] The large fish that most people think of when discussing aquatic life depend upon the small benthic communities for survival. Diverse algal and fungal communities, which provide key roles for the entire aquatic community, also exist in headwater streams.

The EPA assumes that most of the organisms inhabiting a headwater stream and riparian area are eliminated when that headwater is

---

[92] *Id.* at 20.

[93] Bernhardt & Palmer, *supra* note 33, at 52.

[94] *See id.* at 40-42.

[95] EFFECTS OF MOUNTAINTOP MINES, *supra* note 11, at 20.

[96] *Id*.

[97] *Id.* (citing N. BAYNARD GREEN & THOMAS K. PAULEY, AMPHIBIANS AND REPTILES IN WEST VIRGINIA (Univ. of Pittsburg Press 1987)).

[98] EFFECTS OF MOUNTAINTOP MINES, *supra* note 11, at 21 (citing F. Kirchner et al., *A Survey of Eight Major Aquatic Insect Orders Associated with Small Headwater Streams Subject to Valley Fills from Mountaintop Mining*, *in* U.S. ENVTL. PROT. AGENCY, PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT ON MOUNTAINTOP MINING/VALLEY FILLS IN APPALACHIA APPENDIX D (2005)).

[99] *See id.*

[100] *Id.*

[101] *Id.*

buried or blasted.[102] Loss or burial of headwater streams can also result in fragmenting the remaining habitats by increasing the geographical distance between populations, which can result in local extinction.[103]

The EPA also assumes that most ecosystem functions performed by a high-gradient, forested headwater stream are lost when it is buried or removed.[104] Some functions, such as water conveyance and export of dissolved solids, may continue under fills in an altered state, but no research has been conducted on buried streams.[105] However, extensive data regarding pollutants that are discharged from the valley fills are available in discharge monitoring reports in the NPDES program.

Headwater streams perform the essential function of nutrient transformation. Nutrients are taken up and transformed more rapidly in headwaters because water is slowed by woody debris has longer contact times with benthic substrates and hyporheic zones.[106] The benthic substrates and hyporheic zones allow sediment bacteria and plants to absorb and consume nitrogen.[107] The EPA estimates that 50-60% of inorganic nitrogen entering a stream is retained or transformed in the headwaters.[108] However, the actual number may be higher because denitrification also removes nitrogen from the stream in the form of gases.[109]

Natural headwaters also remove metals, including copper, zinc, manganese, and iron—all of which can be produced in mining activities.[110] Outflows from filled headwaters from valley fills discharge pollutants downstream, which increases the risk to water quality below MTR sites.[111] Therefore, the loss of stream structures and functions can naturally increase pollutant loads in addition to the pollutant loads that the mining activities themselves add. By destroying natural headwaters, the mining companies also destroy the natural processes that would aid in absorbing the mine's polluted effluent.

---

[102] *Id.* at 20.
[103] *Id.* at 23-24.
[104] *Id.* at 24.
[105] *Id.*
[106] *Id.* at 24-25 (citing Richard B. Alexander et al., *Effect of Stream Channel Size on the Delivery of Nitrogen to the Gulf of Mexico*, 403 NATURE 758 (2000); Emily S. Bernhardt et al., *Can't See the Forest for the Stream? In-stream Processing and Terrestrial Nitrogen Exports*, 55 BIOSCIENCE 219 (2005)).
[107] Emily S. Bernhardt et al., *Can't See the Forest for the Stream? In-stream Processing and Terrestrial Nitrogen Exports*, 55 BIOSCIENCE 219, 226 (2005).
[108] EFFECTS OF MOUNTAINTOP MINES, *supra* note 11, at 25 (citing B.J. Peterson et al., *Control of Nitrogen Export from Watersheds by Headwater Streams*, 292 SCIENCE 86 (2001)).
[109] *Id.* (citing W.J. PAYNE, DENITRIFICATION (Wiley 1981); B.J. Peterson et al., *Control of Nitrogen Export from Watersheds by Headwater Streams*, 292 SCIENCE 86 (2001)).
[110] *Id.* (citing M. Schorer & W. Symader, *Biofilms as Dynamic Components for the Sorption of Inorganic and Organic Pollutants in Fluvial Systems*, *in* HEADWATERS: WATER RESOURCES AND SOIL CONSERVATION, 187 (M.J. Haigh et al. eds., 1998)).
[111] *Id.*

Natural headwaters export very little sediment or woody debris—the resulting water is what most people would look at and consider "clean."[112] Phosphorus and ammonium can travel further downstream when wood is removed from headwater streams.[113] Forested headwaters also receive and process large volumes of organic matter from litter fall, surface runoff, and dissolved material and subsurface movement.[114] The litter fall feeds aquatic life from the smallest to the largest fish in the chain. By altering this natural process, even an untrained observer can observe big changes in aquatic life.

Mountaintop headwaters are not only where rivers are born, but also where aquatic communities begin. It is hubris to think that humans can destroy headwater streams for profit, without downstream effects. Without understanding the effects that blowing up, burying, and polluting pristine mountain headwaters can have, as of 2001, the EPA, state agencies, and the courts have allowed 724 miles of headwater streams to be impacted.

The EPA's March 2011 finalization of the effects of mountaintop removal came nearly three decades after severe surface mining proliferated in Central Appalachia. The science the EPA relied upon in that document was not created simply to attack the coal mining industry. The science embodies the collection of hundreds of peer-reviewed journal articles, written over decades, by experts in their field. However, the EPA, the Army Corps, and the state agencies did not consult these experts prior to permitting MTR. These permitting agencies should have understood these effects before headwater streams were permanently destroyed or altered. SMCRA and the CWA were created for precisely this reason.

B. On-Site Reclamation and Stream Mitigation

In light of the plethora of critical roles that headwater streams play on watersheds, on-site reclamation and stream mitigation must be able to adequately compensate for the loss of headwater streams under the legal requirements of compensatory mitigation. The EPA notes that SMCRA reclamation techniques developed prior to 2000 focused on soil compaction, fast-growing herbaceous vegetation, and stabilization, rather

---

[112] *Id.* (citing Lee Benda et al., *Geomorphology of Steepland Headwaters: The Transition from Hillslopes to Channels*, 41 J. AM. WATER RES. ASS'N 835 (2005)).

[113] *Id.* (citing J.R. Webster et al., *Effects of Litter Exclusion and Wood Removal on Phosphorus and Nitrogen Retention in a Forest Stream*, 27 VERHANDLUNGEN DES INT'L VEREIN LIMNOLOGIE 1337 (2000)).

[114] *Id.* (citing Mark S. Wipfli et al., *Ecological Linkages Between Headwaters and Downstream Ecosystems: Transport of Organic Matter, Invertebrates, and Wood Down Headwater Channels*, 43 J. AM. WATER RES. ASS'N 72 (2007); J. Bruce Wallace et al., *Effects of Resource Limitation on a Detrital-Based Ecosystem*, 69 ECOLOGICAL MONOGRAPHS 409 (1999); Kenneth W. Cummins et al., *Shredders and Riparian Vegetation: Leaf Litter that Falls into Streams Influences Communities of Stream Invertebrates*, 39 BIOSCIENCE 24 (1989)).

than reforestation or stream restoration.[115] Reclamation is often simply the use of fast growing plants to create prairies on a mountaintop. Re-contouring does not produce the same quality of natural topsoil to support the plants and forests that existed prior to blasting. Evidence suggests that the reclamation approach of heavy soil compaction and planting with grasses "largely fails to ameliorate either the hydrologic or water quality impacts of MTR."[116]

Grasses cannot replace the functions that forested vegetation provided to headwater streams. For example, grasses decrease shade and reduce the amount of organic inputs into the stream.[117] A study in North Carolina found that artificially excluding leaf litter changed the food web structure of the headwater stream.[118] Grasses also fail to restore the flood response of the mined area to pre-mining levels.[119] Runoff from reclaimed mine sites mimic those of urban parking lots and other impervious surfaces, which are known to negatively impact water quality.[120] Surface mining reclamation is more similar to the large parking lot structures at shopping malls in Northern Virginia than the natural mountain streams of Appalachia.

Constructed channels have become a favored compensatory mitigation mechanism for valley fills in Appalachia. Palmer and Filoso have found no evidence that historic ecological conditions can actually be restored.[121] Their research has found that "final ecosystem services are supported by a complex network of biophysical processes and ecosystem features . . . many of which are not restored because restoration designs are typically not process-based."[122] Just like the valley fill stream function design that the Fourth Circuit case approved, "most designs are based on structural features of ecosystems or, at best, hydrological processes that may be necessary, but not sufficient, to recover desired ecosystem services."[123] Structural designs alone do not recover lost natural stream processes that are essential to the ecosystem, no matter what the mining companies and the Army Corps claim.

---

[115] *Id.* at 80.

[116] *Id.* at 82.

[117] *Id.* at 83 (citing Robin L. Vannote et al., *River Continuum Concept*, 37 CAN. J. FISHERIES & AQUATIC SCI. 130 (1980)).

[118] *Id.* (citing J. Bruce Wallace et al., *Multiple Trophic Levels of a Forest Stream Linked to Terrestrial Litter Inputs*, 277 SCIENCE 102 (1997)).

[119] *Id.* at 82 (citing Joseph R. Ferrari et al., *Surface Mining and Reclamation Effects on Flood Response of Watersheds in the Central Appalachian Plateau Region*, 45 WATER RES. RESEARCH W04407 (2009)).

[120] *Id.* at 82-83.

[121] Margaret A. Palmer & Solange Filoso, *Restoration of Ecosystem Services for Environmental Markets*, 325 SCI. 575, 575 (2009), *available at* http://palmerlab.umd.edu/Palmer_and_Filoso_2009.pdf.

[122] *Id.*

[123] *Id.*

Bernhardt and Palmer expand on this concept by stating that "while a constructed channel may occupy the same map coordinates as a previously filled stream, virtually every aspect of this new channel and its watershed will be dramatically altered by surface mining operations."[124] Moreover, "[e]ven well-constructed channels are thus highly unlikely to provide a habitat that mimics or matches unmined streams in the region."[125] In layman's terms, placing rocks or wood in a channel does not recreate a natural channel. As stated previously, if that were true, every subdivision and parking lot in the United States would have headwater streams.

Even the EPA recognized that stream restoration techniques were not designed to completely recreate stream channels. Instead, these techniques "were developed to restore one or more features of an existing stream with its basic structure intact*, not to create streams starting from scratch*."[126] The EPA concludes that there is "no evidence that these [newly constructed] channels improve the water quality impacts of MTR or provide habitat invertebrate communities in intermittent or perennial reaches."[127] After MTR has occurred, the pre-MTR quality of a stream can never be restored. According to the EPA, "[w]hen a mountain is leveled and a valley filled, the hill slopes, subsurface flows, and groundwater exchanges that supported its small streams are permanently dismantled."[128] The structure, function, and whatever roles that headwater played downstream have forever been negatively impacted. Expressly contrary to the Fourth Circuit's holding, the EPA states, "the hydrology of that stream cannot be replaced."[129] In violation of the CWA and SMCRA, constructed channels simply do not support the aquatic life or stream function that the buried headwater streams once did.

C. Impacts on Water Quality

In the Fourth Circuit decision in *OVEC*, the court relied upon testimony of experts from the mining companies that "downstream waters could still maintain a healthy benthic community even when headwater streams were filled, as long as the water quality below the fill remained good."[130] The court even bought into the manufactured uncertainty that "the role of headwater streams in downstream ecology is a matter of some

---

[124] Bernhardt & Palmer, *supra* note 33, at 39, 50.

[125] *Id.*

[126] EFFECTS OF MOUNTAINTOP MINES, *supra* note 11, at 85-86 (citing Margaret A. Palmer, *Reforming Watershed Restoration: Science in Need of Application and Applications in Need of Science*, 32 ESTUARIES & COASTS 1 (2009)) (emphasis added).

[127] *Id.* at 86.

[128] *Id.*

[129] *Id.*

[130] Ohio Valley Envtl. Coal. v. Aracoma Coal Co., 556 F.3d 177, 203 (4th Cir. 2009).

debate in the scientific community."[131] As the EPA document set forth, there is *no debate* in the published scientific community about the role of headwater streams. At the time *OVEC* was decided, no respected aquatic ecologist would suggest in a peer-reviewed paper that blowing up a mountaintop and its headwater streams and then shoving the overburden into the valley would not have negative downstream effects, much less that the benthic community and water quality would be maintained.

Even if the assertion that headwater streams are not necessary to support benthic communities is accurate, ample evidence exists to show that water quality is poor below MTR sites. The EPA has found the following water quality effects: (1) concentrations of major chemical ions (conductivity) are persistently elevated downstream; (2) degraded water quality levels are acutely lethal to standard laboratory test organisms; (3) selenium concentrations are elevated, reaching levels with toxic effects in fish and birds; and (4) macro invertebrate and fish communities are consistently degraded.[132]

Coal mining exposes pyrite, a ferric sulfide mineral.[133] In the presence of water and oxygen, pyrite is oxidized in a reaction catalyzed by autotrophic bacteria to form acids, which is characteristic of acid mine drainage, which has been a long-term problem with abandoned mines in Appalachia.[134] Although valley fill effluents are generally not acidic and can be alkaline[135] other pollutants leach from valley fills. Manganese, nickel, aluminum, sulfate, calcium, magnesium, and bicarbonate can be elevated in the effluent waters below valley fills.[136] Selenium, potassium, sodium, and chloride ions occur at elevated levels as well.[137] These ions are components of elevated specific conductivity. Elevated specific conductivity has been observed at valley fill watersheds at levels ten times greater than un-mined watersheds.[138] Studies have shown greater toxicity to *Ceriodaphnia Dubia* (a type of water flea that is used universally for toxicity testing) from mined watersheds with high conductivity.[139]

---

[131] *Id.*

[132] EFFECTS OF MOUNTAINTOP MINES, *supra* note 11, at ii.

[133] *Id*. at 30 (citing FRANK T. CARUCCIO ET AL., U.S. ENVTL. PROT. AGENCY, PALEOENVIRONMENT OF COAL AND ITS RELATION TO DRAINAGE QUALITY (1977); Z.S. Altschuler et al., *Sulfur Diagenesis in Everglades Peat and Origin of Pyrite in Coal*, 221 SCI. 221 (1983); D.J. Casagrande, *Sulphur in Peat and Coal*, 32 GEOLOGICAL SOC'Y SPECIAL PUBLICATIONS, 87 (1987); Paul L. Younger, *Environmental Impacts of Coal Mining and Associated Wastes: A Geochemical Perspective*, 236 GEOLOGICAL SOC'Y SPECIAL PUBLICATIONS 169 (2004)).

[134] *Id.* (citing WERNER STUMM & JAMES J. MORGAN, AQUATIC CHEMISTRY: CHEMICAL EQUILIBRIA AND RATES IN NATURAL WATERS (John Wiley & Sons, Inc. 3d ed. 1996)).

[135] *Id.* (citing T.C. Merricks et al., *Coal-Mine Hollow Fill and Settling Pond Influences on Headwater Streams in Southern West Virginia, USA*, 129 ENVTL. MONITORING & ASSESSMENT 359 (2007)).

[136] *Id.* at 30, 35.

[137] *Id.* at 35.

[138] *Id.*

[139] *Id.* at 45-46.

Selenium from coal ash and coal mine wastes has resulted in elevated concentrations in surface waters and toxicity to aquatic organisms.[140] Selenium is bioaccumulative, analogous to mercury exposure.[141] Research has shown that microbes, algae, and plants ingest selenium ions and convert it to organic forms with several detrimental effects.[142] The mayfly (a short-lived insect that serves as food for fish) bioaccumulates dietary selenium, which has been shown to affect its reproductive system.[143] This bioaccumulation moves up the food chain. Trout embryos from a pond near a coal mine in British Columbia have shown effects ranging from deformities to mortality.[144] Selenium has also caused reproductive failure and gross deformities in birds.[145] Academic researchers have documented severe deformities in West Virginia fish in the Mud River reservoir.[146] These deformities are manifest in fish larvae, resulting in cranial structure deformities and severe vertebrae curvature in adults.[147] The body deformations can be seen by an untrained, naked eye.[148] The deformities are associated with MTR.

Violations of water quality-based effluent limitations established in NPDES permits are well established in West Virginia. Patriot Coal Corporation, Alpha Natural Resources, and CONSOL Energy have all settled CWA lawsuits with citizen groups.[149] The EPA settled a CWA enforcement action with Massey Energy Co. for $20 million for more than

---

[140] *Id.* at 52 (citing Patricia L. Orr et al., *Food Chain Transfer of Selenium in Lentic and Lotic Habitats of a Western Canadian Watershed*, 63 ECOTOXICOLOGY & ENVTL. SAFETY 175 (2005)).

[141] *Id.*

[142] *Id.* at 53.

[143] *Id.* at 54 (citing Justin M. Conley et al., *Selenium Bioaccumulation and Maternal Transfer in the Mayfly* Centroptilum Triangulifer *in a Life-Cycle, Periphyton-Biofilm Trophic Assay*, 43 ENVTL. SCI. & TECH. 7952 (2009)).

[144] *Id.* (citing Barri-Lynn Rudolph et al., *Reproductive Success, Early Life Stage Development, and Survival of Westslope Cutthroat Trout (Oncorhynchus Clarki Lewisi) Exposed to Elevated Selenium in an Area of Active Coal Mining*, 42 ENVTL. SCI. & TECH. 3109 (2008)).

[145] *Id*. (citing Harry M. Ohlendorf, *Ecotoxicology of Selenium, in* HANDBOOK OF ECOTOXICOLOGY 490-91 (David J. Hoffmann et al. eds., 2d ed. 2003); Lee E. Harding et al., *Accumulation of Selenium and Lack of Severe Effects on Productivity of American Dippers (Cinclus Mexicanus) and Spotted Sandpipers (Actitis Macularia)*, 48 ARCHIVES ENVTL. CONTAMINATION & TOXICOLOGY 414, 414 (2005).

[146] T. Ty Lindberg et al., *Cumulative Impacts of Mountaintop Mining on an Appalachian Watershed*, 108 PROCEEDINGS NAT'L ACAD. SCI. 20932, 20929 (2011).

[147] *Id.* at 20933 fig. 4.

[148] *See id*.

[149] Order Specifying Relief at 1, Ohio Valley Envtl. Coal., Inc. v. Apogee Coal Co., 531 F. Supp. 2d 747 (S.D.W. Va. 2010) (No. 3:07-0413), 2010 WL 3951964 (requiring Patriot to spend $46 million on selenium treatment facilities); Dan Lowrey, *Patriot Reaches Potentially Costly Agreement to Treat Selenium from Coal Mines,* SNL ENERGY DAILY COAL REPORT, Jan. 20, 2012 (reporting Patriot settlement awarding $6.75 million to the West Virginia University West Virginia Land Trust); Virginia Galax, *U.S. Coal Producer Settles Selenium Dispute for $7.5 Million*, PLATTS COAL OUTLOOK (Jan. 18, 2012, 8:00 PM), http://www.platts.com/latest-news/coal/galaxvirginia/us-coal-producer-settles-selenium-dispute-for-6869108 (explaining that Alpha Natural Resources settlement includes $50 million to build selenium treatment facilities); Dan Lowrey, *Arch Coal Agrees to Settle Selenium Pollution Suit for $2M*, SNL COAL REPORT, Oct. 4, 2011.

60,000 days of violations for underground and surface mining operations.[150] This was the largest CWA civil penalty in EPA's history.[151] The EPA, West Virginia, and the Commonwealth of Kentucky have also entered into a consent decree against Arch Coal in 2011 for $4 million in civil penalties for water quality violations at MTR sites.[152] Lawsuits and water quality data establish an airtight case that mining companies have violated both the CWA and SMCRA by failing to meet water quality standards.

VII. EPA ATTEMPTS TO MAKE SOUND SCIENTIFIC DECISIONS INVOLVING MTR

As a result of the problems found in MTR, the EPA also issued a Memorandum Final Guidance entitled, "Improving EPA Review of Appalachian Surface Coal Mining Operations Under the Clean Water Act, National Environmental Policy Act, and the Environmental Justice Executive Order" in July 2011.[153] This Guidance addressed enhanced coordination procedures, such that the EPA would become more involved in coordinating the CWA aspects during SMCRA permitting to ensure that aquatic resources would not be impaired in the Appalachian coalfields.[154] Basically, this Guidance mandates more stringent reviews by the EPA.[155] Several entities challenged the enhanced coordination guidance including the National Mining Association and the State of West Virginia.[156] The appeal of the legality of enhanced coordination is on-going.

VIII. THE NUMERIC CRITERIA AND THE BATTLE OVER SELENIUM

Under the CWA, states must implement water-quality based standards through numeric and narrative criteria.[157] The standards are first

---

[150] *U.S. v. Massey Energy Co. (S.D. W.VA.)*, U.S. DEPT. JUST., http://www.justice.gov/enrd/4425.htm (last updated Nov. 2010).

[151] *Id*.

[152] *Arch Coal to Pay $4 Million to Settle Clean Water Act Violations in Appalachian Mining Operations*, U.S. ENVTL. PROTECTION AGENCY (Mar. 1, 2011), http://yosemite.epa.gov/opa/admpress.nsf/d0cf6618525a9efb85257359003fb69d/79408bbed97535f0852578460059fb97!OpenDocument. The author notes that she represented West Virginia as counsel at the final stages of the Arch Coal Consent Decree, but did not participate in any negotiation or settlement of the case.

[153] U.S. ENVTL. PROT. AGENCY, MEMORANDUM: IMPROVING EPA REVIEW OF APPALACHIAN SURFACE COAL MINING OPERATIONS UNDER THE CLEAN WATER ACT, NATIONAL ENVIRONMENTAL POLICY ACT, AND THE ENVIRONMENTAL JUSTICE EXECUTIVE ORDER 1 (2011).

[154] *Id.* at 6-7.

[155] U.S. ENVTL. PROT. AGENCY, MEMORANDUM OF UNDERSTANDING AMONG THE U.S. DEPARTMENT OF THE ARMY, U.S. DEPARTMENT. OF THE INTERIOR, AND U.S. ENVIRONMENTAL PROTECTION AGENCY IMPLEMENTING THE INTERAGENCY ACTION PLAN ON APPALACHIAN SURFACE COAL MINING 3 (2009).

[156] *See* Nat'l Mining Ass'n v. Jackson, 880 F. Supp. 2d 119 (D.D.C. 2012) (overturning the EPA's Guidance document).

[157] 33 U.S.C. § 1313(c)(2)(b) (2013); 40 C.F.R. § 122.44(d)(1)(ii) (2013).

set by the states and then approved by the EPA.[158] In regards to mining, the standards are pollutant-based and focus on concentrations of elements such as aluminum, selenium, iron and manganese.[159] In general, the numeric standards are established through a statistical analysis[160] that establishes at what concentration the water body can receive the pollutant without violating one of the designated uses of the stream—such as aquatic life, human health, recreation, and other such designations.[161]

The numeric criterion is established for water bodies, and then each discharge is calculated for a pollutant load to prevent the water body from receiving too high of a concentration.[162] The individual discharge first takes into account whether a reasonable potential exists that the discharge will exceed water quality standards, by characterizing the effluent and using statistical analysis for the variability of the effluent.[163] If a reasonable potential exists, then the state calculates the outfall's limit by assessing the existing water quality, discharge rate from the outfall, concentration of the pollutant in the discharge, background loads, and other pollutant-related issues.[164]

In 2013, the West Virginia Legislature and the coal industry attempted to ameliorate the coal industry's liabilities due to the extreme costs of meeting selenium limits.[165] W.Va. Code § 22-11-6 was amended to state:

> Legislature finds that there are concerns within West Virginia regarding the applicability of the research underlying the federal selenium criteria to a state such as West Virginia which has high precipitation rates and free-flowing streams and that the alleged environmental impacts that were documented in applicable federal research have not been observed in West Virginia and, further, that considerable research is required to determine if selenium is having an impact on West Virginia streams, to validate or determine the proper testing methods for selenium and

---

[158] 33 U.S.C. § 1313(c)(2)(a).

[159] *See* 40 C.F.R. § 122 app. D (2013).

[160] *See generally* U.S. Envtl. Prot. Agency, *Water Quality Criteria (40 CFR 131.11)*, *in* WATER QUALITY STANDARDS HANDBOOK (2012).

[161] 33 U.S.C. § 1313(c)(2)(a).

[162] *See generally* U.S. Envtl. Prot. Agency, *Water Quality Criteria (40 CFR 131.11)*, *in* WATER QUALITY STANDARDS HANDBOOK (2012).

[163] Technical Support Document for Water Quality-Based Toxins Control, 57 Fed. Reg. 93, 98-99 (June 5, 1992) (document filed by Envtl. Prot. Agency Mar. 1991).

[164] *Id*. at 49-50.

[165] 2013 W. Va. Acts.

> to better understand the chemical reactions related to selenium mobilization in water.[166]

The amendment gave the WVDEP twenty-four months to research the effects of selenium in West Virginia waters.[167] This call for water quality research comes after more than thirty years of MTR in West Virginia. Environmental groups have recently had stunning success at forcing the industry to pay tens of millions of dollars to treat for selenium.[168] Thus, the Legislature's true concern is the protection of the coal industry from selenium lawsuits, not in improving water quality, or else it would have requested research long before the state was riddled with MTR.

Academic articles have already researched the effect of selenium in Appalachia, particularly with respect to West Virginia. The EPA based its decision to regulate selenium in surface mining operations after researching 1,200 stream segments in Southern Appalachia, including those located in West Virginia.[169] The EPA found that the increases in pollutants, including selenium, negatively impacted fish and macroinvertebrates, "leading to less diverse and more pollutant-tolerant species," in direct contravention of the CWA.[170] The EPA specifically found that, "technical studies demonstrate that water quality standards for selenium were being violated in West Virginia below valley fills."[171] The EPA studied areas in West Virginia, and there is no scientific support to find that federal research was not conducted in West Virginia, contrary to the Legislature's (or more likely, the West Virginia Coal Association's) concern that "the alleged environmental impacts that were documented in applicable federal research have not been observed in West Virginia."[172]

Research by other academics supports the EPA's decision in peer-reviewed literature. Lindbergh et al., found fish deformities in the form of

---

[166] *See* W. VA. CODE § 22-11-6(3) (2013).

[167] *Id*. § 22-11-6(6).

[168] Order Specifying Relief at 1, Ohio Valley Envtl. Coal., Inc. v. Apogee Coal Co., 531 F. Supp. 2d 747 (S.D.W. Va. 2010) (No. 3:07-0413), 2010 WL 3951964 (requiring Patriot to spend $46 million on selenium treatment facilities); Dan Lowrey, *Patriot Reaches Potentially Costly Agreement to Treat Selenium from Coal Mines,* SNL ENERGY DAILY COAL REPORT, Jan. 20, 2012 (reporting Patriot settlement awarding $6.75 million to the West Virginia University West Virginia Land Trust); Virginia Galax, *U.S. Coal Producer Settles Selenium Dispute for $7.5 Million*, PLATTS COAL OUTLOOK (Jan. 18, 2012, 8:00 PM), http://www.platts.com/latest-news/coal/galaxvirginia/us-coal-producer-settles-selenium-dispute-for-6869108 (explaining that Alpha Natural Resources settlement includes $50 million to build selenium treatment facilities); Dan Lowrey, *Arch Coal Agrees to Settle Selenium Pollution Suit for $2M,* SNL COAL REPORT, Oct. 4, 2011.

[169] *Mid-Atlantic Mountaintop Mining*, U.S. ENVTL. PROTECTION AGENCY, http://www.epa.gov/region3/mtntop/ (last visited Sept. 22, 2013).

[170] *Id*.

[171] U.S. ENVTL. PROT. AGENCY, MOUNTAINTOP MINING/VALLEY FILLS IN APPALACHIA FINAL PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT 37 (2005).

[172] W. VA. CODE § 22-11-6(3) (2013).

facial cranial and curved spines present in two fish species in the Mud River reservoir in southern West Virginia.[173] The deformities can be seen with the bare eye.[174] The Mud River reservoir is downstream of one of the largest mountaintop removal sites in Appalachia—the Hobet mine in West Virginia.[175] The research also found larvae deformities in two fish species in the reservoir.[176] Wood and Williams found that water quality chemistry, including high concentrations of selenium and conductivity, were associated with decreased numbers of salamanders below MTR with valley fill sites in West Virginia.[177]

IX. THE SCIENCE AND BATTLE OVER CONDUCTIVITY AND STATE NARRATIVE STANDARDS

While selenium implicates the numeric criterion, conductivity concerns the narrative criterion because no numeric standard exists. The narrative criterion has become a recent battleground between science, the law, environmental groups, and supporters of the coal industry. Some pollutants that affect water quality are not covered by the numeric standard. As 40 C.F.R. § 122.44(d)(1)(iv) states, "[w]here a State has not established a water quality criterion for a specific chemical pollutant that is present in an effluent at a concentration that causes, has the reasonable potential to cause, or contributes to an excursion above a narrative criterion within an applicable State water quality standard, the permitting authority must establish effluent limits." Those effluent limits are established under the narrative standard.

A discharger does not get a free pass to degrade water quality just because it happens to discharge a pollutant that is not contemplated in the state water quality standards. For example, the Cuyahoga River, the landmark problem that helped create the CWA, does not necessarily have a numeric or narrative criterion for the number of times that it may catch on fire, but setting a river on fire through various pollutants surely violates the narrative standard. In West Virginia, sediment is one narrative criterion that the Division of Water and Waste Management of the WVDEP relies on when setting Best Management Practices and issuing violations, especially at construction sites.

Conductivity is one such pollutant discharged by the mining community that falls under the narrative criterion because no numeric standard exists. Conductivity is salinity created by ions in water from a

---

[173] Lindberg et al., *supra* note 147, at 20932-33 fig. 4.
[174] *Id.*
[175] *Id.* at 20932.
[176] *Id.*
[177] Petra Bohall Wood & Jennifer M. Williams, *Impact of Valley Fills on Streamside Salamanders in Southern West Virginia*, 47 J. HERPETOLOGY 119, 123-24 (2013).

number of pollutants.[178] Those ions in the water have been associated with MTR with valley fill operations and with surface mines in Appalachia, specifically southern and northern West Virginia.[179] Conductivity affects aquatic life; "[f]ish, amphibians, mussels, and aquatic macroinvertebrates are especially exposed on their gills or other respiratory surfaces that are in direct contact with dissolved ions in water."[180] The EPA has also linked elevated levels of conductivity to MTR with valley fill operations in Appalachia and in West Virginia specifically.[181]

This link prompted the EPA to draft "A Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams," which was finalized in March 2011. The final conductivity guidance evaluated data from Central Appalachia, including northern and southern West Virginia, to determine whether conductivity impaired water quality and aquatic life. Based on its scientific review, it recommended that the "chronic aquatic life benchmark value for conductivity derived from all-year data from West Virginia is 300 μS/cm."[182] The cation and anion salts found creating the conductivity in those regions prompted this recommendation. The EPA found:

> The prominent sources of salts in Ecoregions 69 and 70 [northern and southern West Virginia] are mine overburden and valley fills from large-scale surface mining, but they may also come from slurry impoundments, coal refuse fills, or deep mines. Other sources include effluent from waste water treatment facilities and brines from natural gas drilling and coalbed methane production.[183]

For years, West Virginia defined the narrative water quality standards through two legislative rules. First, 47 C.S.R. 2-3.2.e forbids materials "in concentrations which are harmful, hazardous or toxic to man, animal or aquatic life."[184] Second, 47 C.S.R. 2-3.2.i forbids any condition "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

---

[178] U.S. ENVTL. PROT. AGENCY, A FIELD-BASED AQUATIC LIFE BENCHMARK FOR CONDUCTIVITY IN CENTRAL APPALACHIAN STREAMS (FINAL REPORT) 1 (2011) [hereinafter FIELD-BASED AQUATIC LIFE BENCHMARK], *available at* http://cfpub.epa.gov/si/si_public_record_Report.cfm?dirEntryId=233809.

[179] *Id*. at 4.

[180] *Id*. at 2.

[181] *See id*.

[182] *Id*. at xv.

[183] *Id*. at 4.

[184] W. VA. CODE R. § 47-2-3.2.e. (2013).

allowed."[185] This coincides with what the D.C. Circuit described and is commonly referred to as "no toxic pollutants in toxic amounts."[186]

Recently, the mining industry has attacked the regulation of benthic communities by arguing that they are less important than fish or that they play a less important role on water quality. As the legislative rules correctly recognize, aquatic life must be protected. Benthic communities are vital to fish communities; they are the building blocks of the aquatic community, performing essential functions for a healthy aquatic ecosystem.

It would seem that the WVDEP would embrace a conductivity narrative standard because of the declining water quality in the West Virginia watersheds documented by academic researchers. WVDEP has recognized this declining water quality through the ever increasing list of streams on the CWA 303(d) list of impaired waters in mined watersheds.[187] However, the WVDEP, alongside the mining industry, has fought against a standard for conductivity in the D.C. Circuit and now the Supreme Court of Appeals of West Virginia.[188] The Legislature has also charged the WVDEP to create its "own" measure of stream health. In 2012, the West Virginia Legislature amended a portion of the Water Pollution Control Act to combat attacks on the mining industry through the narrative standard by adding:

> The secretary shall propose rules measuring compliance with the biologic component of West Virginia's narrative water quality standard requires evaluation of the holistic health of the aquatic ecosystem and a determination that the stream: (i) Supports a balanced aquatic community that is diverse in species composition; (ii) contains appropriate trophic levels of fish, in streams that have flows sufficient to support fish populations; and (iii) the aquatic community is composed of benthic invertebrate assemblages sufficient to perform the biological functions necessary to support fish communities within the assessed reach, or, if the assessed reach has insufficient flows to support a fish community, in those downstream reaches where fish are present. The secretary shall propose rules for legislative approval in accordance with the provisions of article three, chapter twenty-nine-a of this code that implement the

---

[185] *Id.* § 47-2-3.2.i.

[186] Am. Paper Inst. v. U.S. EPA, 996 F.2d 346, 349 (D.C. Cir. 1993).

[187] *See* WEST VIRGINIA DEPT. OF ENVTL. PROT., INTEGRATED WATER QUALITY AND ASSESSMENT REPORT (2012), *available at* http://www.dep.wv.gov/WWE/WATERSHED/IR/Pages/303d_305b.aspx.

[188] Nat'l Mining Ass'n v. Jackson, 880 F. Supp. 2d 119, 130 (D.D.C. 2012); Sierra Club v. Patriot Mining Co., No. 13-0256 (W. Va. filed July 29, 2013).

> provisions of this subsection. Rules promulgated pursuant to this subsection may not establish measurements for biologic components of West Virginia's narrative water quality standards that would establish standards less protective than requirements that exist at the time of enactment of the amendments to this subsection by the Legislature during the 2012 regular session.[189]

This was a way for WVDEP to establish its own narrative water quality standard, rather than rely upon EPA and academic peer-reviewed science. The author suggests that WVDEP carefully reviews the science in the EPA Guidance and peer-reviewed science on ionic conductivity research conducted in Appalachia and particularly West Virginia. One such study found that the EPA recommendation is too low using 2,210 stream samples in West Virginia.[190]

West Virginia and the mining industry challenged the conductivity guidance document as unlawful rulemaking.[191] In July 2012, the U.S. District Court for the District of D.C. invalidated that guidance based on the administrative process the EPA used to implement the guidance. The court never evaluated the science behind the EPA's guidance. The issue is currently pending on appeal to the D.C. Circuit.

It is important to note that at the same time West Virginia argued that the EPA's Guidance was actual rulemaking instead of guidance, WVDEP *repeatedly* argued in state proceedings that the Guidance was "*explicitly not binding on the states*" and "*not legally binding on the states*."[192] In the U.S. Federal District Court of D.C., the state maintained the opposite position, claiming that the EPA's Guidance document was an attempt to institute a *legally binding* water quality standard without rulemaking.[193] The parties in that case, including West Virginia, argued that the guidance had caused state permitting authorities to believe that permits should and will be denied if its "suggestions" and "recommendations" are not satisfied."[194]

However, this legally-binding understanding is wholly untrue in West Virginia. In *Sierra Club v. Clarke*, before the West Virginia

---

[189] W. VA. CODE § 22-11-7b(f) (2012).

[190] Susan M. Cormier et al., *Derivation of a Benchmark for Freshwater Ionic Strength*, 32 ENVTL. TOXICOLOGY & CHEMISTRY 263, 263 (2013).

[191] Nat'l Mining Ass'n v. Jackson, 880 F. Supp. 2d 119, 130 (D.D.C. 2012).

[192] Transcript of Evidentiary Hearing at 21, 93, 147-49, Sierra Club v. Clarke, No. 10-34-EQB (W. Va. Envtl. Quality Bd. Dec. 14, 2010).

[193] *Nat'l Mining Ass'n*, 880 F. Supp. 2d at 130 ("Review of the Final Guidance itself and of the post-implementation evidence before the Court makes clear that the Final Guidance, whether intentionally or not, has caused EPA field offices and the state permitting authorities to believe that permits should and will be denied if its "suggestions" and "recommendations" are not satisfied.").

[194] *Id*.

Environmental Quality Board ("EQB"),[195] WVDEP admitted that the EPA unsuccessfully suggested that the WVDEP impose conductivity limits in an NPDES permit. The *Clarke* case also listed at least five other surface mining permits, two of which came out after the EPA Guidance document.[196] In those permits, the EPA discussed conductivity and how the WVDEP handled conductivity. The EPA had the right to object to each of those permits, but did not. The WVDEP testified that the EPA had specifically not objected to the permits, even though the WVDEP had not followed the EPA guidance.[197] Other such permits also exist in West Virginia, so West Virginia's genuine concern expressed to the federal court that the EPA would impose limits is questionable at best.[198]

At the state level, WVDEP and the mining industry's arguments at the appeal hearing reveal the true concern about conductivity, as well as WVDEP's lack of concern about water quality standards in general. In 2010, the Sierra Club challenged the WVDEP on its failure to include conductivity and other limits at Patriot Mining Company, Inc.'s New Hill West surface mine, a mine that would disturb an additional area of 225 acres, but was "pretty small potatoes by West Virginia standards," according to the mine's counsel.[199] If surface mining has destroyed so much of the state, why worry about 225 additional acres?

The Sierra Club appealed a WVDEP-issued permit to the EQB because the permit did not include conductivity limitations to protect the narrative criterion in northern West Virginia. The EQB is a statutorily-created administrative board that operates independently of the WVDEP and reviews appeals of NPDES permitting and enforcement decisions by the WVDEP.[200] Each Board member is appointed by the Governor and must have knowledge and experience regarding the state's water

---

[195] Sierra Club v. Clarke, No. 10-34-EQB (W. Va. Envtl. Quality Bd. 2010). The author notes that she was counsel for WVDEP from February 2010 through May 2011, while the initial appeal to the Circuit Court was pending. However, she was not an employee when the appeal was briefed and was not involved in the case at all. She was only an employee during the waiting period between the appeal and a decision by the Circuit Court. She was not an employee of WVDEP when the case was argued before the EQB or when the final EQB decision was issued. Her information on the case comes from the cited transcripts. The transcripts were obtained through a request with the EQB staff in summer 2013 during the research and writing of this article. All information cited is publicly available and is on file with the author.

[196] *See, e.g.*, Transcript of Evidentiary Hearing at 228-246, Sierra Club v. Clarke, No. 10-34-EQB (W. Va. Envtl. Quality Bd. Dec. 15, 2010).

[197] *Id*.

[198] Of course, counsel in the state case and the federal court case differed. In the federal case, attorneys from Bailey and Glasser, LLC, represented West Virginia under a no-bid special contract (and were paid nearly half a million dollars for their representation in 2012—the year of the Guidance decision). In the state case, an attorney from the WVDEP Office of Legal Services represented WVDEP (and was paid just over $50,000 as an annual salary for a full-time employee). W. VA. AUDITOR'S DATABASE, https://www.wvsao.gov/Login.aspx (last visited Aug. 3, 2013).

[199] Transcript of Evidentiary Hearing at 29, Sierra Club v. Clarke, 10-34-EQB (W. Va. Envtl. Quality Bd. Dec. 14, 2010).

[200] *See generally* W. VA. CODE § 22B-1-1 to -12 (2013).

resources.[201] The Board that issued the final conductivity decision consisted of five members, all of whom had experience with the water quality regulation and four of whom had doctoral degrees in science.[202]

Essentially, the Sierra Club's argument was that a reasonable potential existed for the mining site to violate the narrative standard through conductivity by allowing toxics in toxic amounts. The conductivity would come from: (1) coal fly ash waste disposed of at the mine site from a coal-fired power plant in West Virginia, (2) the disturbance of forest through MTR activities exposing conductivity ions, and (3) disturbance at the surface mine site containing conductivity ions.

The Sierra Club presented five witnesses, four of whom held doctoral degrees and had published in peer-reviewed journals in the areas of environmental impairment due to MTR.[203] Dr. Margaret Palmer testified on behalf of the Sierra Club. She is a stream and coastal ecologist. After reviewing information of water quality in West Virginia, she testified that when mining exists in a watershed, sulfates and conductivity levels increase in the watershed.[204] When sulfate concentrations increase, the aquatic health declines significantly, as measured by West Virginia standards (known as the West Virginia Stream Condition Index or "WVSCI").[205] The intolerant species, such as invertebrates, insects, and mayfly, statistically decline.[206] When sulfates increase, conductivity increases as well.[207] Based upon actual measurements within West Virginia streams and using the WVDEP measurements and metrics, a relationship exists between mining, high sulfates, high conductivity, and decreased aquatic life.[208]

Palmer found that based on measurements that she and Dr. Margaret Passmore analyzed, "there's a very clear relationship between the amount of mining and the number of genera and the number of family of

---

[201] *Id.* § 22B-3-1(b).

[202] *Board Members*, W. VA. ENVTL. QUALITY BOARD, http://www.wveqb.org/board.asp (last visited Jan. 29, 2014).

[203] In contrast, WVDEP presented four witnesses, with only one holding a doctoral degree. He testified about the use of Fluidized Bed Combustion (FBC) ash to treat pH levels and the cost of conductivity treatment. Transcript of Evidentiary Hearing at 71-72, Sierra Club v. Clarke, 10-34-EQB (W. Va. Envtl. Quality Bd. Dec. 14, 2010). Patriot presented four witnesses, with only one holding a doctoral degree. *Id.* at 157. That witness, Dr. Gensemer, criticized the published work of King and Palmer but had no peer-reviewed published work on the topic or the critique. His testimony contribution was that the previous experts failed to consider other potential confounders, without analyzing himself whether those potential confounders actually were confounders. *Id.* at 222-23. That critique was later rebutted by Dr. King, who stated that the authors had reviewed the confounders that Gensemer discussed. Transcript of Evidentiary Hearing at 149-50, Sierra Club v. Clarke, 10-34-EQB (W. Va. Envtl. Quality Bd. Dec. 17, 2010).

[204] Transcript of Evidentiary Hearing at 212, Sierra Club v. Clarke, 10-34-EQB (W. Va. Envtl. Quality Bd. Dec. 14, 2010).

[205] *See id.*

[206] *Id.* at 210-11.

[207] *Id.* at 212.

[208] *Id.*

insects that you see in the streams."[209] This results in a less diverse biological stream condition in both the genus and family levels. This loss in diversity would violate the legislature's newly adopted narrative quality standard that the biological component "supports a balanced aquatic community that is diverse in species composition."[210]

Palmer testified that published peer-reviewed data establishes that increasing mining, sulfates, and conductivity, all degrade water quality.[211] Based upon this information and peer-reviewed literature, Palmer testified that there is a strong correlation between high conductivity, sulfates, and harm to aquatic life.[212] Correlation establishes a relationship between variables, where variability in one explains the change in the other.[213]

Palmer also explained the concern for the loss of biodiversity in streams from degraded water quality.[214] For example, loss of algae creates a loss of food for fish.[215] Bacteria, fungi, and insects break down leaf litter to increase photosynthesis and improve oxygen levels in streams.[216] Mayflies and caddisflies remove organic matter from water pollen. As those insects decrease, so does the food available to larger aquatic life.[217] Consequently, populations of insects that fish do not want to consume flourish.[218] Even if the initial concern is not focused on mayflies, mayflies impact larger aquatic life through the natural water life cycle.

Dr. Emily Bernhardt is an ecosystem ecologist who testified to the structure and function of streams and the impacts on these from surface mining.[219] She explained that sulfate was a good indicator for surface mining activity because surface mining exposes pyrite to water and air, creating oxidized iron and sulfuric acid, which is the base of sulfate.[220] She agreed that sulfate and conductivity were "incredibly well correlated" and that they are further associated with significant declines in the diversity of taxa in the streams below surface mining.[221] Where high conductivity and sulfates exist, the aquatic health of the stream naturally declines.[222]

The mining counsel essentially argued that this watershed was

---

[209] *Id.* at 214.
[210] W. VA. CODE § 22-11-7b(f) (2012).
[211] Transcript of Evidentiary Hearing at 219, Sierra Club v. Clarke, 10-34-EQB (W. Va. Envtl. Quality Bd. Dec. 14, 2010).
[212] *Id.* at 223.
[213] GEOFFREY R. NORMAN & DAVID L. STREINER, BIOSTATISTICS: THE BARE ESSENTIALS (People's Medical Publishing House 2008).
[214] Transcript of Evidentiary Hearing at 228, Sierra Club v. Clarke, 10-34-EQB (W. Va. Envtl. Quality Bd. Dec. 14, 2010).
[215] *See id.* at 228-29.
[216] *Id.* at 229.
[217] *See id.* at 229-30.
[218] *See id.* at 231.
[219] *Id.* at 269.
[220] *Id.* at 276.
[221] *Id.* at 277-78.
[222] *Id.* at 278.

already impaired, so what further harm could be done? Bernhardt testified that even where a stream is already impaired, adding additional pollutants can cause the impairment to travel further downstream—essentially, impairing even more of the watershed.[223] The purpose of the CWA is to improve water quality, not to write-off a stream that is already impaired. With the mine's reasoning, water quality would never improve.

Dr. Ryan King testified as an aquatic ecologist and stream ecologist. Similarly to the EPA's conductivity guidance, his work found that 277 µS of conductivity is the threshold where "the community [of aquatic ecology] is really changing dramatically."[224] He also used a Kentucky dataset that was comparable to the results in West Virginia and found a sharp decline in fish between 200 and 400 µS.[225] He used different methods and data than the EPA did, yet he reached a similar conclusion regarding the threshold for significant impairment.

Dr. King's testimony put the damage done to the Appalachian mountains in perspective. He was not surprised by the results that he found with conductivity because of the ecology of the Appalachians. He stated, "Appalachia is very old, and these organisms have adapted to this environment for a very long period of time, and have never been subjected naturally to these levels of conductivity, and so we would expect that they would be sensitive to that."[226]

The CWA was designed to protect aquatic life from the potential stresses of man's modern life. When an industry enters a naturally pristine area, especially one that has withstood a glaciation that wiped out most of North America, the CWA also acts to protect that area, regardless of the industry or politics involved.

In sum, the Sierra Club's case was built entirely upon peer-reviewed research by experts who work and publish in the field of aquatic water quality. All of the experts established that water quality declined downstream of surface mining in West Virginia. The experts testified that conductivity and sulfates increased downstream of surface mining in West Virginia. Based on the available science, high conductivity and sulfates caused significant impairment to the entire aquatic ecosystem.

WVDEP's position, much like the Scopes Trial,[227] was that

---

[223] *Id.* at 347.

[224] Transcript of Evidentiary Hearing at 162, Sierra Club v. Clarke, 10-34-EQB (W. Va. Envtl. Quality Bd. Dec. 15, 2010).

[225] *Id.* at 168.

[226] *Id.* at 176.

[227] MONKEY TRIAL: THE STATE OF TENNESSEE VS. JOHN THOMAS SCOPES 34 (Sheldon Norman Grebstein ed., Houghton Mifflin Co. 1960) (The Court charged the jury: "You will bear in mind that in this investigation you are not interested to inquire into the policy or wisdom of this legislation.").

"science informs policy judgments; it doesn't dictate them."[228] WVDEP's position is patently incorrect. As the CWA and the West Virginia law states, the narrative standard must be followed and water quality cannot decline. *Science* dictates the limits. This aspect is *not* policy; this is about whether aquatic life is impaired to the extent that conductivity creates conditions not allowable in state waters. The WVDEP does not get to make policy decisions as to what level of harm it will tolerate in state waters; Congress has already decided that policy in the CWA. The West Virginia Legislature also determined this policy when implementing rules for the West Virginia Water Pollution Control Act: No harmful conditions or significant adverse impacts shall be tolerated under 47 C.S.R. 2-3.2.e and i. Even at a more basic level: discharges must protect all uses of a water body. An exception cannot be made simply because it will harshly impact one industry, especially one that has shown callous disregard for the *existing numeric* criteria in each of their own NPDES permits through a pattern of significant violations for numerous other pollutants.[229]

The WVDEP attempted to beat actual science and the EPA's conductivity guidance with its own. Bear in mind that the WVDEP did not develop its own conductivity guidance until five months *after* the EPA's draft guidance, despite more than three decades of large-scale surface mining in the state.[230] The WVDEP justified its guidance by stating that it had "determined that 'significant adverse impact' is more than a change in the numbers or makeup of the benthic macroinvertebrate community in a segment of a water body downstream from a point source discharge. It is, instead, a material decline in the overall health of an aquatic ecosystem.[231] Even Dr. Gensemer, the expert for the mining company,[232] testified that he agreed that "something is killing the aquatic life below coalmines in West Virginia."[233] However, he had not used his expertise to identify what that "something" was; his role was to merely critique scientific research that he had not performed himself on conductivity.

---

[228] Transcript of Evidentiary Hearing at 27, Sierra Club v. Clarke, No. 10-34-EQB (W. Va. Envtl. Quality Bd. Dec. 14, 2010).

[229] Dan Lowrey, *Patriot Reaches Potentially Costly Agreement to Treat Selenium from Coal Mines,* SNL ENERGY DAILY COAL REPORT, Jan. 20, 2012 (reporting Patriot settlement awarding $6.75 million to the West Virginia University West Virginia Land Trust); Steve Hooks, *Patriot Settlement Means 8.5 Million St. Mine Nixed: Environmental Groups*, PLATTS COAL OUTLOOK, Jan. 23, 2012 (reporting that Alpha Natural Resources settlement includes $50 million to build selenium treatment facilities); Dan Lowrey, *Arch Coal Agrees to Settle Selenium Pollution Suit for $2M*, SNL COAL REPORT, Oct. 4, 2011 (discussing settlement of $2 million to the West Virginia Land Trust).

[230] W. VA. DEPT. ENVTL. PROT., PERMITTING GUIDANCE FOR SURFACE COAL MINING OPERATIONS TO PROTECT WEST VIRGINIA'S NARRATIVE WATER QUALITY STANDARDS, 47 C.S.R. 2 §§ 3.2E AND 3.2I (2012), *available at* http://www.dep.wv.gov/pio/Documents/2011-05-11%20%20Narrative%20Standards%20Permitting%20Guidance%20(Rev%20%202).pdf.

[231] *Id.*

[232] Transcript of Evidentiary Hearing at 163, Sierra Club v. Clarke, 10-34-EQB (W. Va. Envtl. Quality Bd. Dec. 16, 2010).

[233] *Id.* at 205.

The WVDEP's Permitting Guidance for the Narrative Standards is a total of eight pages, with no data included.[234] It refers to no research on conductivity, but focuses solely on lengthy steps that must occur in order for WVDEP to consider a narrative limit. Over three years since its issuance, WVDEP has not amended the Guidance with any additional research conducted by it or other researchers. In contrast, the EPA Guidance is 276 pages long with a plethora of actual data included and was also approved by the Science Advisory Board as a peer-reviewed document.[235] During the hearing, the WVDEP's counsel stated that the WVDEP "went through a lengthy and rigorous process" to develop an eight-page document.[236] The WVDEP called no witnesses who had actually developed the document. None of the witnesses could even identify *who* developed the document, other than to say numerous employees worked on it. The WVDEP did not even apply this Guidance to the mine at issue in the Sierra Club appeal because the permit was issued three days before the WVDEP Guidance was published.[237]

In the document, the WVDEP does not set any guidance for limitations on conductivity, but rather focuses on Whole Effluent Toxicity ("WET") testing to see if a problem exists and then allows for a reopener clause once a problem is shown to exist.[238] The mine would have to report WET testing on a quarterly basis. A problem with a WET test is that it will not show the exact pollutant causing the problem,[239] so this issue would have to be resolved prior to reopening.

Of course, a reopener of an NPDES permit is a modification of a permit, which requires several months of negotiation with the permit holder, a public notice and comment period, and the opportunity to appeal to the EQB. During this process, the pollutant continues to be discharged.

WVDEP also relied upon using "report only" values to monitor data. These "report only" values would not be enforceable as violations, because they are not limitations. It is unclear what the WVDEP does with the "report only" values or whether the WVDEP even reviews the data prior to permit reissuance, which occurs five years after issuance.[240] The WVDEP designee testified that he was not aware of any employee was actually reviewing the "report only" values and that the computer program did not alert WVDEP when "report only" values reached a certain point, as

---

[234] WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION, *supra* note 230.

[235] FIELD-BASED AQUATIC LIFE BENCHMARK, *supra* note 180.

[236] Transcript of Evidentiary Hearing at 22, Sierra Club v. Clarke, 10-34-EQB (W. Va. Envtl. Quality Bd. Dec. 16, 2010).

[237] *Id.* at 298.

[238] WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION, *supra* note 230, at 6.

[239] Transcript of Evidentiary Hearing at 311-12, Sierra Club v. Clarke, 10-34-EQB (W. Va. Envtl. Quality Bd. Dec. 16, 2010).

[240] W. VA. CODE R. § 47-10-3.5.a. (2013).

it would with actual limits.[241] Ronald Hamric, manager of environmental and engineering services for the mine, testified that WVDEP had never contacted his mining company regarding a "report only" value and that he would not expect an issue with a "report only" value until permit reissuance.[242] So the mine could discharge a pollutant at high levels for five years (the life of the permit) before anyone at WVDEP recognized a problem.

WVDEP also argued that conductivity could not be a pollutant because it did not fall under the narrative standard.[243] The mine also maintained the position that conductivity was not a pollutant because it consisted of ions which do not constitute a pollutant.[244] The mining company cited no authority to support this position. Significantly, it did not oppose the WVDEP's requirement of monitoring of conductivity. The WVDEP required monitoring of conductivity in the NPDES permit with a reopener available at a later date. If conductivity was not a pollutant, how could the WVDEP require monitoring? Obviously, the WVDEP and the mine recognized a concern for conductivity for harm to aquatic life as a pollutant, but chose not to impose those costs on the industry until a much later date.

The West Virginia Water Pollution Control Act in W. Va. Code § 22-11-3(16) states, "'[p]ollutant' means industrial wastes, sewage or other wastes as defined in this section; and (17) states "'[p]ollution' means the man-made or man-induced alteration of the chemical, physical, biological and radiological integrity of the waters of the state." Surface mining waste containing conductivity ions are not excluded from the definitions because the ions are: (1) a waste (as evidenced by the mine's need for an NPDES permit) and (2) a man-induced alteration of the chemical, physical, and biological integrity of waters of the State. The mine's argument clearly ignored or misstated state law.

Counsel for the mine further tried to box-in the Sierra Club's science as relying solely on the mayfly, which is apparently not an aquatic life species worthy of protection as a baseline predictor of water quality in the mine's opinion.[245] However, the actual standard is not whether a mayfly is worthy of protection, but whether conductivity exists "in concentrations which are harmful, hazardous or toxic to man, animal or aquatic life;"[246] or "which adversely alters the integrity of the waters of the State including wetlands" and that no significant adverse impact to the chemical, physical,

---

[241] Transcript of Evidentiary Hearing at 298, Sierra Club v. Clarke, 10-34-EQB (W. Va. Envtl. Quality Bd. Dec. 16, 2010).

[242] *Id.* at 32-33.

[243] *Id.* at 313-14.

[244] *Id.* at 32.

[245] *Id.* at 34-35.

[246] W. VA. CODE R. § 47-2-3.2.e. (2013).

hydrologic, or biological components of aquatic ecosystems shall be allowed."[247]

Moreover, other pollutants are not specific causes of harm. For example, fecal coliform are strains of bacteria that indicate feces. Turbidity is not a specific substance; it is a measurement of cloudiness. Fecal coliform and turbidity are pollutants listed in West Virginia under the numeric criterion.[248] Under 47 CSR 2-3, "[c]onditions not allowable in state waters," scum, settleable solids, odors, taste, and color are all listed under the narrative criterion. All of those are subjective standards not subject to testing. These are all similar to conductivity in that perhaps the precise chemical make-up is unknown, but it causes harm to aquatic ecosystems. Therefore, elevated levels of conductivity that are harmful to aquatic life are not allowed under the narrative criterion.

Also, if the WVDEP chose to set conductivity limits *after* a MTR site began mining, the mine site would have the same issues as existing mines have with selenium: they would have to build facilities to meet conductivity limits. According to the WVDEP's expert on pollution remediation in West Virginia, the only type of facility able to meet conductivity limits is reverse osmosis, which is a process more expensive than selenium treatment.[249] The president and general manager testified that Patriot would not mine the site if it had to comply with the Sierra Club's suggested limits to protect the narrative criterion.[250] Thus, the political and mining industry's true motive in opposing conductivity limits is to keep expenses low.

Patriot's president and general manager also opined that if coal mining companies had to install technologies to comply with a conductivity narrative standard, then the costs "could bankrupt a lot of companies."[251] Yet Patriot Coal Company filed for bankruptcy in July 2012 without ever having to install any equipment to meet conductivity standards (although it had significant selenium liabilities). So the financial healthiness of the coal industry might be similar to Dr. Gensemer's analysis of aquatic life below mine sites—we *know* that the mining industry is financially declining, but we don't know *exactly* what the cause is.

In ruling on *Sierra Club v. Clarke*, the EQB found that WVDEP should have conducted a reasonable potential analysis. It found that the WVDEP "overlooked or discounted information that, had it been

---

[247] *Id.* § 47-2-3.2.i.

[248] *Id.* § 47-2 app. E, tbl. 2.

[249] Transcript of Evidentiary Hearing at 99-101, 126, Sierra Club v. Clarke, 10-34-EQB (W. Va. Envtl. Quality Bd. Dec. 16, 2010) ("[T]he twenty-year life of the reverse osmosis unit, plus its operating costs, which puts you in the range of $34 million.").

[250] Transcript of Evidentiary Hearing at 11-12, 126, Sierra Club v. Clarke, 10-34-EQB (W. Va. Envtl. Quality Bd. Dec. 17, 2010).

[251] *Id.* at 114.

considered, would have compelled WVDEP to include effluent limits in the permit for conductivity, sulfate, and TDS in order to prevent violations of West Virginia's narrative water quality standards."[252] The WVDEP's actions in the permit were not protective of the narrative criteria based upon the evidence that the Board received. The Board stated:

> 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 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.[253]

Moreover, the Board found "elevated levels of conductivity, sulfate, and TDS associated with mine discharges cause direct impacts to aquatic organisms by acting as a stressor, and by disrupting water and ion balance."[254] The Supplemental Order cited extensively to the expert witness testimony, making sixty-nine findings of fact.[255] Most critically, the Board stated that the Sierra Club's "evidence for biological damage due to surface mine drainage was unrefuted."[256]

The Board essentially admonished the WVDEP for its water quality work where surface mining occurs. Significantly, the Board found:

> Despite long-standing and abundant evidence within the DEP's watershed database for biological damage (evidenced by low WVSCI scores) in circumneutral to mildly alkaline streams draining surface mines in the West Virginia coalfields, the DEP has made little attempt either to determine the cause of such damage, or to limit it."[257]

The Board rejected the WVDEP's notion that WET testing would fully protect water quality because WET testing was unable to determine whether impairment actually existed, so a more robust and accurate limitation was necessary. The Board used the watershed in this case as demonstrative because the WET testing showed the stream was non-toxic, yet that same

---

[252] Supplemental Final Order at 5, Sierra Club v. Clarke, 10-34-EQB (W. Va. Envtl. Quality Bd. July 30, 2012).

[253] *Id.* at 6.

[254] *Id.* at 9.

[255] *See id.* at 7-20.

[256] *Id.* at 14.

[257] *Id.* at 12-13.

area showed the WVSCI score as biologically impaired.[258] Therefore, WET testing alone was not protective of the narrative criterion.[259]

Since WET testing alone was an inappropriate form of protection of the narrative criterion, the Board found that the WVDEP must implement a conductivity narrative limitation to protect water quality. As stated previously, the WVDEP limited other pollutants, even though they contain a mixture, contrary to claims by the WVDEP and the mine. The EQB noted that "hardness, alkalinity, TDS, total suspended solids ("TSS"), biochemical oxygen demand ("BOD"), and chemical oxygen demand ("COD") that measure a mixture of dissimilar substances rather than a single substance."[260]

Thus, the Board concluded that elevated levels of conductivity are pollutants under state law. Under 40 C.F.R. § 122.44(d)(1)(I), "for pollutants or pollutant parameters for which the state has not promulgated a numeric standard, WVDEP must conduct a reasonable potential analysis to determine whether that pollutant or pollutant parameter will cause, have the reasonable potential to cause, or contribute to an excursion above a narrative standard."[261] Moreover, WVDEP should have found a reasonable potential existed at the site because mining facilities similar to the one permitted are "known to contain high conductivity levels, and because of scientific data establishing that discharges such as those proposed" at the site would have high conductivity levels.[262] The Board remanded the permit and urged WVDEP to use the analysis conducted by its own expert, Dr. Ziemkiewicz, along with EPA's science-based conductivity guidance, as a roadmap to set limits for sulfates and conductivity.[263] Significantly, the Board did not set a numeric limit, encouraged a site-by-site analysis, and did not use the EPA's conductivity guidance of 300 μS as the limit.[264]

Both WVDEP and Patriot appealed the decision. EQB decisions are appealed to the Circuit Court of Kanawha County, a state trial court of general jurisdiction, presided by judges who are elected through partisan county elections. The Circuit Court of Kanawha County reversed the EQB's decision on February 10, 2013.[265] Significantly, the court applied an incorrect standard of review to reverse the EQB's decision. The circuit court found that the Board must defer to the WVDEP's factual decisions under *Muscatell v. Cline*,[266] but that standard applies to *administrative*

---

[258] *Id.* at 13.
[259] *Id.*
[260] *Id.* at 16.
[261] *Id.* at 23.
[262] *Id.* at 23-24.
[263] *Id.* at 25.
[264] *Id*.
[265] Final Order at 2, Patriot Mining. Co. v. Sierra Club, Nos. 11-AA-102, 11-AA-104 (W. Va. Cir. Ct. 2013).
[266] Muscatell v. Cline, 474 S.E.2d 518, 524-25 (W. Va. 1996).

orders, not orders from the EQB.[267] Administrative orders differ from Board orders because the Board is a separate entity reviewing the agency's action. Therefore, the EQB's standard of review was based on a later decision involving appeals of the Surface Mining Board, which states that "appeals of a final agency decision issued by the director of the division of environmental protection shall be heard *de novo* . . . . The board is not required to afford any deference to the WVDEP decision but shall act independently on the evidence before it."[268] This syllabus point has been cited by the Supreme Court of Appeals of West Virginia as recently as 2004 for Board decisions.[269] The court also ignored W.Va. Code § 22B-1-7 that states that appeals to the Board are to be heard *de novo*. WVDEP is afforded no deference to the evidence before it.

The court relied upon WVDEP's conductivity guidance, even though it was not used in the permit, which is another error in judgment.[270] It also found ambiguity in the narrative standards: no materials "in concentrations which are harmful, hazardous or toxic to man, animal or aquatic life"[271] or no condition "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."[272] Finding ambiguity in no toxics in toxic amounts for an agency that regularly reviews applications for discharges of toxins is another error of the circuit court. If the WVDEP cannot determine what aquatic toxicity means, then how can it protect the waterbodies in the state? Are other NPDES permit provisions and enforcement actions based upon the narrative standard invalid because the legislative rules are ambiguous?

The circuit court ignored all of the expert testimony received by the EQB over the four-day period. The circuit court also ignored the findings of the EQB of actual impairment in mining watersheds and the correlation to conductivity. The court cited the D.C. Circuit decision administratively invalidating the EPA Conductivity Guidance as a reason the Board's decision should be overturned, even though the Board only cited to the EPA Guidance for scientific analysis and as a roadmap to be used with other available science.[273] The circuit court failed to distinguish the difference.

Instead, the circuit court deferred to WVDEP's "interpretation of water quality standards" and did not address the fact that the WVDEP

---

[267] *Id*.

[268] W. Va. Div. of Envtl. Prot. v. Kingwood Coal Co., 490 S.E.2d 823, 834 (W. Va. 1997).

[269] Marfork Coal Co. v. Callaghan, 601 S.E.2d 55, 57 (W. Va. 2004).

[270] Final Order at 7, Patriot Mining Co. v. Sierra Club, Nos. 11-AA-102, 11-AA-104 (W. Va. Cir. Ct. 2013).

[271] W. VA. CODE R. § 47-2-3.2.e (2013).

[272] *Id.* § 47-2-3.2.i.

[273] Final Order at 7, Patriot Mining Co. v. Sierra Club, Nos. 11-AA-102, 11-AA-104 (W. Va. Cir. Ct. 2013).

actually failed to interpret the narrative standard.[274] The court also failed to identify how the EQB's finding was contrary to the evidence on the record—that the WVDEP failed to recognize documented and consistent evidence of actual biological impairments in streams where high levels of conductivity from surface mining occur. Instead, the circuit court erroneously relied upon case law regarding the EPA's role in state permitting, even though the EPA did not impose conductivity requirements in this case. EPA approved the permit without conductivity limits and was not a party to the case before the EQB or court.

The court never found any grounds to exclude or ignore expert testimony on conductivity and its effects. It did not even discuss the expert testimony. The court also did not cite to the Sierra Club's brief, deferring only to the WVDEP and Patriot's briefs. The court needed to find that WVDEP's expertise contradicted the expert testimony in order to defer to WVDEP, but the court wholly neglected to address this issue.

The court also found that the EQB tried to establish *de facto* effluent limitations when the EQB did not impose any numeric limits at all.[275] The EQB deferred to WVDEP to make this determination. In its actual order, the EQB directed WVDEP to use the available scientific evidence on conductivity to establish a limit necessary to protect the narrative standard, which WVDEP is statutorily required to do.

This decision has been appealed in light of the extensive expert testimony adduced in the four days and the fact that the court used the wrong standard of review by solely attacking the EPA's Guidance.[276] Based upon the evidence, science, and the circuit court's use of the wrong standard of review, the West Virginia Supreme Court should reverse the circuit court's ruling.

X. CONCLUSIONS

Regardless of the outcome of the challenges to the EPA's scrutiny of MTR permits or guidance to improve water quality, the EPA should move forward in learning as much as possible about the long-term effects of MTR and surface mining because Central Appalachia is severely impacted by MTR and surface mining in general. Any mitigation or restoration of the impacted watersheds should be explored in order to reduce the impact from past surface mining on the water quality of those watersheds.

As West Virginia and Kentucky have realized, the costs of not implementing rigorous NPDES and SMCRA programs are unbelievably expensive. It is a far better policy to be ahead of the problem with the

---

[274] *Id.* at 8.
[275] *Id.* at 7.
[276] Sierra Club v. Patriot Mining Co., No. 13-0256 (W. Va. filed July 29, 2013).

science, rather than to ignore the problem until it is out of control. Selenium is a prime example. Despite reliable science, the legislature follows the complaints of the West Virginia Coal Association and continues to question whether selenium is even a problem in West Virginia.[277] In the 2013 legislative session, the legislature went back to beat the selenium issue again. It implemented new language to the water quality standards:

> The Legislature finds that there are concerns within West Virginia regarding the applicability of the research underlying the federal selenium criteria to a state such as West Virginia which has high precipitation rates and free-flowing streams and that the alleged environmental impacts that were documented in applicable federal research have not been observed in West Virginia and, further, that considerable research is required to determine if selenium is having an impact on West Virginia streams, to validate or determine the proper testing methods for selenium and to better understand the chemical reactions related to selenium mobilization in water.[278]

This section was revised in the 2013 Legislative Session and directed WVDEP to develop a site-specific selenium criteria. Because photographs and descriptions of fish in West Virginia waters with visible cranial deformities and curved spines by research scientists are just "alleged" problems. Moreover, the top surface and MTR mine companies in the state have consented in settlements to construct $50 million or more in selenium treatment facilities because there are no problems with selenium in the state. It seems more likely that the price-tag is the true "alleged" problem, not the science.

West Virginia seems to repeat history in regards to conductivity issues. If the WVDEP's eight-page guidance document on how to implement the narrative standard, with no science at all, is the product of "lengthy and rigorous hard-work," then the state is doomed. Instead, a conductivity narrative standard furthers the meaning and intent of the CWA, as EPA did through its rigorous scientific-based guidance document. A state permit must ensure that "*all* state water quality standards be enforced through meaningful limitations in individual NPDES permits."[279] If a pollutant like conductivity exists, affecting certain areas of a state

---

[277] *See* W. VA. CODE § 22-11-6(3) (2013).

[278] *Id*.

[279] Am. Paper Inst. v. U.S. Envtl. Prot. Agency, 996 F.2d 346, 351 (D.C. Cir. 1993) (emphasis added).

differently than others, then the narrative standard is an appropriate standard to use.

As peer-reviewed conductivity articles and West Virginia's own 303(d) list shows, *some* pollutant is causing significant and adverse impacts to West Virginia waters. Based upon the science, that pollutant is conductivity. Therefore, the WVDEP must regulate conductivity by either adopting statewide numeric criteria or through a case-by-case narrative standard within each NPDES permit where a reasonable potential exists for conductivity impairment. It should not issue permits and wait until signs of problems exist at the end of the five-year permit period to address the problem. Once the conductivity pollution exists, fixing the problem will be expensive and lengthy.

The CWA and the West Virginia Water Pollution Control Act decided many decades ago the policy that no one shall impair aquatic life.[280] The purpose of the CWA states "[t]he objective of this Act is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters."[281] In order to achieve this objective, "it is the national policy that the discharge of toxic pollutants in toxic amounts be prohibited."[282] Surface mining and MTR are notably not excluded from that objective.

What Leopold, Wolman, and Miller stated in their pioneering handbook of landform changes by water over long periods of time is especially true in Appalachia: "streams are the gutters down which flow the ruins of the continents."[283] The concept is that fluvial geomorphology—water changes in watersheds through surface water, groundwater, the natural water cycle, and human changes—affects landmasses over long periods of time. Water washes landmasses downstream, one trickle of water at a time moving small sediment matter over an extremely long period of time to change the shape of rivers and land—much like the continuing processes in the Grand Canyon. Water flow changes the landscape, and landscape changes water flow.

Leopold, Wolman, and Miller's book is centered on gradual, natural weathering processes through time, beginning the book by stating, "[w]hen a man makes a pilgrimage to the fields and woods of his boyhood, he does not expect to find the hills and mountains dissolved, or the valleys moved."[284] These words are haunting in Appalachia because MTR and surface mining have violently and unnaturally dissolved hills and mountains and filled valleys, exposing pollutants that would have taken

---

[280] 33 U.S.C. § 1251 (2013); W. VA. CODE § 22-11-2 (2013).
[281] 33 U.S.C. § 1251(a).
[282] *Id.* § 1251(a)(3).
[283] LUNA B. LEOPOLD ET AL., FLUVIAL PROCESSES IN GEOMORPHOLOGY 97 (W.H. Freeman & Co. 1964).
[284] *Id*. at 3.

millennia perhaps to naturally weather in the Appalachian mountains, quickly impacting aquatic life as well. As Dr. King testified in the *Sierra* case, "Appalachia is very old, and these organisms have adapted to this environment for a very long period of time, and have never been subjected naturally to these levels of conductivity, and so we would expect that they would be sensitive to that."[285]

West Virginia's legal promise to protect water quality standards is the only reason the EPA has delegated authority to the State.[286] Now it is time for the WVDEP to stand behind that policy and implement it. But the WVDEP's response is to drag its feet and implement "report only" or WET testing requirements to buy the coal industry more time. Rather than rely upon the work of the scientific community, the courts, the Army Corps, the states, and the mining companies place profits ahead of science. There is little difference between relying upon religious doctrine to ban the teaching of evolution as in *Scopes* and worshipping at the altar of profits to ignore the scientific fact that surface mining is illegally destroying Appalachia by blasting it down the gutter.

---

[285] Transcript of Evidentiary Hearing at 176, Sierra Club v. Clarke, 10-34-EQB (W. Va. Envtl. Quality Bd. Dec. 15, 2010).

[286] If the Division of Mining and Reclamation at WVDEP continues to refuse to correctly implement and run its NPDES program, EPA is authorized to withdraw West Virginia's authority to run the mining aspects of the NPDES program under 40 C.F.R. § 123.64(b). Citizen groups (including CRMW) requested to withdraw WV's authority on June 17, 2009, and the request remains pending before EPA as of publication of this article. The author has no involvement in that matter.