IN THE UNITED STATES DISTRICT COURT FOR THE SOUTHERN DISTRICT OF WEST VIRGINIA

HUNTINGTON DIVISION

OHIO VALLEY ENVIRONMENTAL COALITION,
WEST VIRGINIA HIGHLANDS CONSERVANCY and
SIERRA CLUB,

Plaintiffs,

v. CIVIL ACTION NO. 3:12-0785

ELK RUN COAL COMPANY, INC. and
ALEX ENERGY, INC.,

Defendants.

MEMORANDUM OPINION AND ORDER

On December 3-4, 2013, the Court held a trial in this case regarding jurisdiction and liability,[1] and the parties timely conducted post-trial briefing. As explained below, the Court **FINDS** that Plaintiffs have established statutory jurisdiction under both the Clean Water Act and the Surface Mining Control and Reclamation Act. The Court further **FINDS** that Plaintiffs have established, by a preponderance of the evidence, that each Defendant has committed at least one violation of its permits by discharging into Laurel Creek or Robinson Fork high levels of ionic pollution, which have caused or materially contributed to a significant adverse impact to the chemical and biological components of the applicable stream's aquatic ecosystem, in violation of the narrative water quality standards that are incorporated into those permits.

I. BACKGROUND

Plaintiffs bring this action pursuant to the citizen suit provisions of the Federal Water

[1] Pursuant to this Court's July 13, 2012, Scheduling Order, ECF No. 16, this case is proceeding in two phases: Phase I will resolve issues of jurisdiction and liability, and Phase II, if necessary, will resolve issues of appropriate injunctive relief and civil penalties.

Pollution Control Act ("Clean Water Act" or "CWA") and the Surface Mining Control and Reclamation Act ("SMCRA"). Plaintiffs allege that Defendants Elk Run Coal Company, Inc., ("Elk Run") and Alex Energy, Inc., ("Alex Energy") violated these statutes by discharging excessive amounts of ionic pollution, measured as conductivity and sulfates, into the waters of West Virginia in violation of their National Pollutant Discharge Elimination System ("NPDES") permits and their West Virginia Surface Mining Permits. Before proceeding to the parties' arguments, the Court will first discuss the relevant regulatory framework.

The primary goal of the CWA is "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters." 33 U.S.C. § 1251(a). To further this goal, the Act prohibits the "discharge of any pollutant by any person" unless a statutory exception applies; the primary exception is the procurement of an NPDES permit. 33 U.S.C. §§ 1311(a), 1342. Under the NPDES, the U.S. Environmental Protection Agency ("EPA") or an authorized state agency can issue a permit for the discharge of any pollutant, provided that the discharge complies with the conditions of the CWA. 33 U.S.C. § 1342. A state may receive approval to administer a state-run NPDES program under the authority of 33 U.S.C. § 1342(b). West Virginia received such approval, and its NPDES program is administered through the West Virginia Department of Environmental Protection ("WVDEP"). 47 Fed. Reg. 22363-01 (May 24, 1982). All West Virginia NPDES permits incorporate by reference West Virginia Code of State Rules § 47-30-5.1.f, which states that "discharges covered by a WV/NPDES permit are to be of such quality so as not to cause violation of applicable water quality standards promulgated by [West Virginia Code of State Rules § 47-2]." This is an enforceable permit condition. *Ohio Valley Envtl. Coal. v. Elk Run Coal Co., Inc.*, No. CIV.A. 3:12-0785, 2014 WL 29562, at *3, 6 (S.D. W. Va. Jan. 3, 2014).

Coal mines are also subject to regulation under the SMCRA, which prohibits any person

from engaging in or carrying out surface coal mining operations without first obtaining a permit from the Office of Surface Mining Reclamation and Enforcement ("OSMRE") or an authorized state agency. 30 U.S.C. §§ 1211, 1256, 1257. A state may receive approval to administer a state-run surface mining permit program under the authority of 30 U.S.C. § 1253. In 1981, West Virginia received conditional approval of its state-run program, which is administered through the WVDEP pursuant to the West Virginia Surface Coal Mining and Reclamation Act ("WVSCMRA"). W. Va. Code §§ 22-3-1 to -33; 46 Fed. Reg. 5915-01 (Jan. 21, 1981). Regulations passed pursuant to the WVSCMRA require permittees to comply with the terms and conditions of their permits and all applicable performance standards. W. Va. Code R. § 38-2-3.33.c. One of these performance standards requires that mining discharges "shall not violate effluent limitations or cause a violation of applicable water quality standards." *Id.* § 38-2-14.5.b. Another performance standard mandates that "[a]dequate facilities shall be installed, operated and maintained using the best technology currently available . . . to treat any water discharged from the permit area so that it complies with the requirements of subdivision 14.5.b of this subsection." *Id.* § 38-2-14.5.c.

West Virginia's water quality standards are violated if wastes discharged from a surface mining operation "cause . . . or materially contribute to" 1) "[m]aterials in concentrations which are harmful, hazardous or toxic to man, animal or aquatic life" or 2) "[a]ny other condition . . . which adversely alters the integrity of the waters of the State." *Id.* § 47-2-3.2.e, -3.2.i. Additionally, "no significant adverse impact to the chemical, physical, hydrologic, or biological components of aquatic ecosystems shall be allowed." *Id.* § 47-2-3.2.i.

II. CWA AND SMCRA CITIZEN SUIT REQUIREMENTS

As the Court ruled in its November 26, 2013, Memorandum Opinion and Order, ECF No. 87, Plaintiffs have established constitutional standing. However, that Order did not address the three statutory requirements which must be established in order to properly bring a citizen's suit under the CWA and the SMCRA. Thus, the Court must address these requirements now.

Under the CWA and the SMCRA, no citizen suit may be commenced prior to the provision of sixty days' notice to the alleged violator, to the Administrator of the EPA (for CWA citizen suits) or the Secretary of the Department of the Interior (for SMCRA citizen suits), and to the state in which the alleged violation occurs. 30 U.S.C. § 1270(b)(1)(A); 33 U.S.C. § 1365(b)(1)(A). Additionally, no such suit may be commenced if the state, the Administrator, or the Secretary has commenced and is diligently prosecuting its own civil action against the alleged violator to require the same compliance which is the aim of the citizen suit. *See* 30 U.S.C. § 1270(b)(1)(B); 33 U.S.C. § 1365(b)(1)(B); *OVEC v. Maple Coal Co.*, 808 F. Supp. 2d 868, 883 (S.D. W. Va. 2011).

Plaintiffs sent a letter to the appropriate recipients which provided the necessary details for valid notice of suit on January 11, 2012. *See* Joint Exs.[2] 1-3. This lawsuit was commenced over sixty days later, on March 20, 2012. *See* Compl., ECF No. 1. Plaintiffs represented at trial that they have received no information that any regulators—state or federal—have filed an action regarding these violations. *See* Tr. at 16. Defendants do not challenge Plaintiffs' contention that they have met the sixty days' notice and lack of diligent prosecution requirements. The Court thus finds that the CWA's and the SMCRA's notice and lack of diligent prosecution requirements have been met by Plaintiffs in this case.

[2] All exhibits cited throughout this Memorandum Opinion and Order are exhibits admitted at trial.

The CWA's citizen suit provision also states,

> [A]ny citizen may commence a civil action on his own behalf . . . against any person . . . *who is alleged to be in violation* of (A) an effluent standard or limitation under this chapter or (B) an order issued by the Administrator or a State with respect to such a standard or limitation . . . .

33 U.S.C. § 1365(a)(1) (emphasis added). The SMCRA's citizen suit provision states,

> [A]ny person having an interest which is or may be adversely affected may commence a civil action on his own behalf to compel compliance with this chapter . . . against any . . . person *who is alleged to be in violation* of any rule, regulation, order or permit issued pursuant to this subchapter . . . .

30 U.S.C. § 1270(a)(1) (emphasis added). The Supreme Court has interpreted the phrase "to be in violation" in this context to require "that citizen-plaintiffs allege a state of either continuous or intermittent violation—that is, a reasonable likelihood that a past polluter will continue to pollute in the future." *Gwaltney of Smithfield, Ltd. v. Chesapeake Bay Found., Inc.* ("*Gwaltney III*"), 484 U.S. 49, 57 (1987).[3] "[A] good-faith allegation [of continuous or intermittent violation] . . . suffice[s] for jurisdictional purposes . . . ." *Id.* at 65.

The issue of what evidence must be shown for jurisdictional purposes is distinct from what evidence must be shown for a defendant to ultimately be held liable for violations of the CWA and the SMCRA. *See Chesapeake Bay Found., Inc. v. Gwaltney of Smithfield, Ltd.* ("*Gwaltney IV*"), 844 F.2d 170, 171 (4th Cir. 1988) (drawing a distinction between making "a good faith allegation of ongoing violation sufficient to maintain jurisdiction" and "prov[ing] [an] allegation of continuous or intermittent violation[], as required in order to prevail"). The Supreme Court specifically rejected the proposition that "citizen-plaintiffs must prove their allegations of ongoing noncompliance before jurisdiction attaches." *Gwaltney III*, 484 U.S. at 64. Good-faith allegations,

[3] The *Gwaltney* line of cases is highly instructive for the Court's deliberations here. For the purposes of this case, it is useful for the Court to refer to several of the cases in this line: 1) the district court's original decision, 611 F. Supp. 1542 (E.D. Va. 1985) ("*Gwaltney I*"); 2) the Fourth Circuit's affirmance, 791 F.2d 304 (4th Cir. 1986) ("*Gwaltney II*"); 3) the Supreme Court's decision on appeal from the Fourth Circuit, 484 U.S. 49 (1987) ("*Gwaltney III* "); and 4) the Fourth Circuit's decision on remand from the Supreme Court, 844 F.2d 170 (4th Cir. 1988) ("*Gwaltney IV*").

not definitive proof, suffice for jurisdictional purposes. *Id.* at 65. To meet the jurisdictional requirements, Plaintiffs must merely show that, at the time they filed suit, they had a good-faith belief that Defendants were in continuous or intermittent violation of the CWA and the SMCRA. In a jurisdictional sense, then, this good-faith belief is an element of each of Plaintiffs' claims.

Accordingly, the Court must consider what constitutes a sufficient good-faith belief for jurisdictional purposes. In the district court case which eventually gave rise to the Supreme Court's *Gwaltney III* decision, the Eastern District of Virginia considered this question:

> A useful analogy [for understanding good-faith belief] is the manner in which the federal courts treat the jurisdictional amount requirement in diversity cases. . . .
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> In diversity cases, the question whether the jurisdictional amount is satisfied—and whether the court, ultimately, has jurisdiction—is not answered by whether the plaintiff ultimately recovers in excess of $10,000. Rather, the issue is whether the amount plaintiff *stated in the original claim* satisfies the amount, and is made in good faith. . . . [T]he test of good faith is whether it appears to be a legal certainty that the jurisdictional fact is not satisfied.

Chesapeake Bay Found. v. Gwaltney of Smithfield, Ltd. ("*Gwaltney I*"), 611 F. Supp. 1542, 1549 n.8 (E.D. Va. 1985) (citations omitted) (internal quotation marks omitted), *aff'd*, 791 F.2d 304 (4th Cir. 1986) ("*Gwaltney II*"), *vacated on different grounds in Gwaltney III*, 484 U.S. 49. In *Gwaltney I*, the district court found that "there was no certainty . . . —legal, factual, or otherwise—that [the defendant's] system would correct one of the two major violation problems for which this suit was brought—until nearly one year after the suit was filed." *Id*. In view of that finding, that district court ruled that the *Gwaltney I* plaintiffs had sufficiently pled a violation in good faith.

In the Complaint, Plaintiffs allege that, since mining began and through to the present day, Elk Run's discharges into Laurel Creek from the East of Stollings Surface Mine and the White Castle No. 1 Surface Mine have resulted in extremely high conductivity levels in the creek, usually

exceeding 1,000 µS/cm and frequently exceeding 3,000 µS/cm, when substantial and increasing aquatic life impacts occur as conductivity increases beyond 300 µS/cm. *See* Compl. ¶¶ 32-43. They also allege that the EPA measured a West Virginia Stream Condition Index ("WVSCI")[4] score of 58.76—below the biological impairment threshold of 68—in Laurel Creek in 2007. *See id.* ¶ 41.

Additionally, Plaintiffs allege that, since mining began and through the present day, Alex Energy's discharges into Robinson Fork from the Robinson North Surface Mine and the Wildcat Surface Mine have also resulted in extremely high conductivity levels in the stream, usually exceeding 1,000 µS/cm and frequently exceeding 3,000 µS/cm. *See id.* ¶¶ 44-55. They further allege that the WVDEP classified Robinson Fork as biologically impaired due to ionic stress in 2008 and that, from 1998 to 2008, the WVDEP and the EPA measured the following WVSCI scores below the biological impairment threshold in Robinson Fork: 59.95 (1998), 50.95 (2003), 24.75 (2007), 61.78 (2007), and 61.53 (2008). *See id.* ¶ 52.

Defendants do not challenge Plaintiffs' contention that they have sufficiently alleged, in good faith, that Defendants are in continuous or intermittent violation of the CWA and the

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[4] WVSCI is a bioassessment tool which was used by the WVDEP from 2002 through 2010 to determine whether West Virginia streams were biologically "impaired"—meaning that they were waters for which numeric effluent limitations were not stringent enough to maintain the biological narrative water quality standards embodied in West Virginia Code of State Rules § 47-2-3.2.e and -3.2.i—under Section 303(d) of the CWA. *See* 33 U.S.C. § 1313(d)(1)(A); Letter from Shawn M. Garvin, Regional Administrator, EPA, to Randy C. Huffman, Secretary, WVDEP, at 1 (Mar. 25, 2013) ("Mar. 25, 2013, Letter from EPA to WVDEP"), Joint Ex. 118 at JE 293; WVDEP Division of Water and Waste Management, 2012 Draft West Virginia Integrated Water Quality Monitoring and Assessment Report 15-16 (2012), Joint Ex. 119 at JE 316-317. The WVDEP explained how it used WVSCI to find a stream biologically impaired in its 2010 Section 303(d) list of impaired waters:

> Streams are listed as biologically impaired based on a survey of their benthic macroinvertebrate community. Benthic macroinvertebrate communities are rated using a multimetric index developed for use in wadeable streams of West Virginia. [WVSCI] is composed of six metrics that were selected to maximize discrimination between streams with known impairments and reference streams. . . . In general terms, all metric values were converted to a standard 0 (worst) to 100 (best) point scale. The six standardized metric scores were then averaged for each benthic sample site to come up with a final index score ranging from 0.0 to 100.0. Using the distribution of scores from all sites that are considered reference sites, an impairment threshold of 68.0 was established. If a stream site received a WVSCI score greater than 68.0, it was considered to be unimpaired.

WVDEP Division of Water and Waste Management, 2010 West Virginia Integrated Water Quality Monitoring and Assessment Report 14 (2010), Joint Ex. 120 at JE 362.

SMCRA. The Court thus finds that both the CWA's and the SMCRA's requirement that the Complaint contain a good-faith allegation of continuous or intermittent violation against each Defendant has been met by Plaintiffs in this case.

III. LIABILITY

A. Legal Issues

Before making any findings regarding liability, the Court must address arguments made by Defendants which, according to Defendants, bar this Court from ruling in favor of Plaintiffs or, in the alternative, limit and direct this Court's analysis.

1. Effectively creating a conductivity water quality effluent limit

Defendants argue that this Court cannot rule in Plaintiffs' favor because doing so would effectively create a conductivity water quality effluent limit—precisely the action which a federal district court, in *National Mining Association v. Jackson*, 880 F. Supp. 2d 119, 137-38 (D.D.C. 2012), ruled to be beyond the authority of the EPA, despite the EPA's otherwise broad powers under the CWA.

First, the Court notes that the operative document in *Jackson* was the EPA's July 21, 2011, Final Guidance document, entitled "Final 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." *See id.* at 127. In contrast, the document which Plaintiffs referenced at trial and to which Defendants here object is an entirely different document, released by the EPA in March 2011 and entitled "A Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams" ("EPA's Benchmark"). Pls.' Ex. 9. In *Jackson*, through its Final Guidance, the EPA exceeded its authority under the CWA and the SMCRA by effectively establishing a region-wide water quality standard. *See Jackson*, 880 F. Supp. 2d at 127,

138. However, here, in its Benchmark, the EPA is acting within the core of its authority by publishing a scientific study, within its area of expertise, regarding the causal relationship between conductivity levels and biological impairment. *Cf. Envtl. Def. Ctr., Inc. v. U.S. E.P.A.*, 344 F.3d 832, 869 (9th Cir. 2003) ("We treat [the] EPA's decision with great deference because we are reviewing the agency's technical analysis and judgments, based on an evaluation of complex scientific data within the agency's technical expertise.")

Importantly, unlike *Jackson*, this case does not result from a direct assertion of regulatory authority by the EPA. Instead, this case is a citizen suit, brought under 33 U.S.C. § 1365, which alleges that Defendants violated a term in their permits by discharging materials which have caused or materially contributed to a significant adverse impact to the chemical or biological components of aquatic ecosystems, in violation of West Virginia's narrative water quality standards. The EPA's Benchmark is not relied upon by Plaintiffs to demonstrate that the EPA set a particular effluent limit which, if exceeded, automatically results in a violation of water quality standards, and the Court will not treat it as such. Instead, it is used by Plaintiffs as a scientific study, among others, which supports Plaintiffs' general causation argument that high conductivity levels in streams, caused by surface mining, lead to the extirpation of some types of benthic macroinvertebrates. Thus, Defendants' comparison of this case to *Jackson* is inapposite. The holdings in *Jackson* simply do not apply to this case.

2. Deference to the WVDEP's or the West Virginia Legislature's interpretations

In the alternative, Defendants argue that this Court must follow the WVDEP's and/or the West Virginia legislature's interpretations and guidance regarding West Virginia's water quality standards when analyzing Plaintiffs' evidence and arguments. Specifically, Defendants argue that the Court must follow: 1) the WVDEP's assessment that high conductivity levels do not cause low

WVSCI scores, as explained in its August 12, 2010, "Justification and Background for Permitting Guidance for Surface Coal Mining Operations to Protect West Virginia's Narrative Water Quality Standards, 47 C.S.R. 2 §§ 3.2.e and 3.2.i" ("WVDEP's Guidance"), Joint Ex. 55; 2) the WVDEP's instruction, also in its Guidance, that a stand-alone WVSCI score cannot be the sole determinant of compliance with West Virginia's narrative water quality standards and that, instead, analysis of the phrase "significant adverse impact" in the water quality standards requires a holistic approach, through which the investigator must determine whether a material decline in the overall health of an aquatic system has occurred; 3) the West Virginia legislature's instruction, through its passage of House Concurrent Resolution 111 ("H.C.R. 111") and of Senate Bill 562 ("S.B. 562"), and the WVDEP's instruction, in its Guidance, that this holistic approach requires proof of effects on fish, not just invertebrates, in order to find a violation; and 4) the WVDEP's instruction, in its Guidance, that the proper WVSCI score at which to list a stream as "impaired" under Section 303(d) of the CWA is 60.6, not 68. The Court will address each of these arguments in turn.

a. The WVDEP's assessment that high conductivity levels do not cause low WVSCI scores

Regarding its finding that there is no causative effect between high conductivity and low WVSCI scores, the WVDEP, in its Guidance, states:

> [The] EPA has recently set a numeric limit on conductivity at 500 µS/cm, finding that conductivity levels below 300 µS/cm generally will not cause a water quality standard violation and that in-stream conductivity levels above 500 µS/cm are likely to be associated with adverse impacts that may rise to the level of exceedances of narrative state water quality standards. However, [the WV]DEP's data shows that more than a simple conductivity measurement is necessary to determine the health of a stream. . . . [A] stream can have a low level of specific conductance and a WVSCI score firmly within the range for impairment; conversely, a stream can have a high level of specific conductance and a WVSCI score that indicates the stream is above the threshold for impairment. WVSCI scores are affected by many factors: habitat, other uses of the stream and the surrounding land, other pollutants unrelated to conductivity (e.g. fecal coliform), *inter alia*. Certain stream reaches simply cannot attain a "good" WVSCI score because of those factors.

> . . .
> [The WV]DEP has performed a correlative evaluation of benthic condition and specific conductance. This evaluation suggests that native aquatic life is protected at various values and ranges of specific conductance. This finding supports the basic scientific principle that correlation is not cause and effect.

WVDEP's Guidance at 5-6 (footnote omitted). At this point in the Guidance, the WVDEP is explaining its choice to not require a specific numeric limit on conductivity in order to meet the state's water quality standards, despite the EPA's apparent insistence that it do so. Importantly, here, the WVDEP is not directly interpreting its own regulations or any of the state statutes which it administers.

The Court can find no basis for substituting the WVDEP's general judgment that there is no causative effect between high conductivity and low WVSCI scores for the extensive scientific evidence in this case which reveals precisely this causative effect.[5] The Court's role in this citizen suit is to determine whether, despite inaction by the WVDEP, Defendants have been violating their permits by violating West Virginia's water quality standards, the nonviolation of which is clearly required by their permits. *See Elk Run Coal Co., Inc.*, 2014 WL 29562, at *3, 6. Just as the Court must find a violation if a defendant is exceeding a specific numeric effluent limit in its permit, the Court must find a violation here if Defendants' discharges cause or materially contribute to a significant adverse impact to the chemical or biological components of aquatic ecosystems. W. Va. Code R. § 47-2-3.2.i. Notably, the U.S. Supreme Court has recognized that the central purpose of a citizen suit under the CWA is to "permit[] citizens to abate pollution when the government cannot or will not command compliance." *Gwaltney III*, 484 U.S. at 62. The Court will not adopt

[5] The strength of this scientific evidence is discussed in more detail in the "General Causation" section of this Memorandum Opinion and Order. Also discussed in that section is the important fact that the detailed, substantiated, and rational scientific determinations made by the EPA in its nearly three-hundred page Benchmark fall within that agency's special area of expertise; thus, the Court owes deference to those determinations. In contrast, the WVDEP's determination in its eight-page Guidance that there is no causative effect between high conductivity and low WVSCI scores is in direct contradiction with the only scientific evidence—in the form of a graph and a chart—included in the Guidance. *See* WVDEP's Guidance at 6-7. This contradiction is also discussed in more detail in the "General Causation" section of this Memorandum Opinion and Order.

the WVDEP's conclusion—contrary to the finding of the EPA and the weight of the scientific evidence in this case—that there can be no causative effect between high conductivity and low WVSCI scores. Instead, the Court will weigh all of the evidence, including the WVDEP's Guidance—given that this document was admitted into evidence—, in determining if Defendants have violated their permits. According any special weight in this process to the WVDEP's unsubstantiated finding would be improper.

b. The WVDEP's instruction that a stand-alone WVSCI score cannot be the sole determinant of compliance with the narrative water quality standards and that proper analysis requires a holistic approach

Regarding the need for a "holistic approach"—and not solely a stand-alone WVSCI score—in determining whether the state's narrative water quality standards have been violated, the WVDEP, in its Guidance, states:

> [The] narrative water quality standards . . . state[], in pertinent part, "No significant adverse impact to the chemical, physical, hydrologic, or biological components of aquatic ecosystems shall be allowed."
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> . . .
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> [The WV]DEP has 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[, a dynamic complex of plant, animal, and microorganism communities and their non-living environment interacting as a functional unit within water]. A goal of the CWA and the [West Virginia Water Pollution Control Act ("WVWPCA")] is to protect the aquatic ecosystem as a whole; it is a holistic standard that requires a holistic approach to ecosystem assessment. In contrast to numeric water quality criteria, which can be applied by analysis of samples of water taken at any discharge or monitoring point in a stream, compliance with a standard that protects the aquatic ecosystem must be assessed in the broader area comprising the ecosystem. An ecosystem does not exist at a single point and, accordingly, its health cannot be assessed at a single point.
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> . . .
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> [WVSCI is] not [a] stand-alone determinant[] of compliance with the narrative standard.
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> . . .
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> [The WV]DEP continues its existing practice of using WVSCI in addition to consideration of other factors affecting the aquatic ecosystem to enforce its

> narrative water quality standards. . . . [WVSCI] was specifically designed for assessment of the biological component of the 47 C.S.R. 2 § 3.2.i narrative criteria and [is] used as a tool in developing the Impaired Streams List ("303(d) List") . . . .
> . . .
> WVSCI scores are affected by many factors: habitat, other uses of the stream and the surrounding land, other pollutants unrelated to conductivity (e.g. fecal coliform), *inter alia*. Certain stream reaches simply cannot attain a "good" WVSCI score because of those factors.
> . . .
> Where the only impacts to this component of the ecosystem [i.e., the benthic macroinvertebrate community] are diminished numbers of certain genera of mayflies, without evidence that this has had any adverse impact of any significance on the rest of the ecosystem, the State cannot say that there has been a violation of its narrative standard.

WVDEP's Guidance at 2, 3 & n.7, 4-6.

It is apparent to the Court that, through its Guidance, the WVDEP intends to interpret the biologically-based subset of the state's narrative water quality standards under West Virginia Code of State Rules § 47-2-3.2. Section 47-2-3.2 is part of a legislative rule originally proposed by the WVDEP and necessarily affirmed through a legislative authorization process, as required by West Virginia Code Chapter 29A. *See* W. Va. Code § 29A-1-2(d) ("Unless lawfully promulgated as an emergency rule, a legislative rule is only a proposal by the agency and has no legal force or effect *until promulgated by specific authorization of the legislature*." (emphasis added)); W. Va. Code R. § 47-2-1.2, -1.4.

A reviewing court is only required to afford deference, if any, to an agency's interpretation of its own legislative rule if the regulation contains an ambiguity. *Cookman Realty Grp., Inc. v. Taylor*, 566 S.E.2d 294, 298 (W. Va. 2002). "In the absence of any definition of the intended meaning of words or terms used in a regulation, they will be given their common, ordinary and accepted meaning in the connection in which they are used." *Lawyer Disciplinary Bd. v. Smoot*, 716 S.E.2d 491, 502 n.23 (W. Va. 2010) (brackets omitted) (internal quotation marks omitted). A court interpreting a statute has a "duty to avoid whenever possible an application of a statute which

leads to absurd, inconsistent, unjust or unreasonable results." *Davies v. W. Va. Office of Ins. Comm'r*, 708 S.E.2d 524, 530 (W. Va. 2011) (brackets omitted) (internal quotation marks omitted). "Where a particular construction of a statute would result in an absurdity, some other reasonable construction, which will not produce such absurdity, will be made." *Id.* (internal quotation marks omitted). "In giving effect to a word employed in a legislative enactment, it is a fundamental principle of statutory construction that the meaning of a word cannot be determined in isolation, but it must be drawn from the context in which it is used." *Osborne v. United States*, 567 S.E.2d 677, 684 (W. Va. 2002) (brackets omitted) (internal quotation marks omitted). "Additionally, in the interpretation of statutes, words and phrases therein are often limited in meaning and effect, by necessary implications arising from other words or clauses thereof." *Id.* (brackets omitted) (internal quotation marks omitted).

Section 47-2-3.2—the rule which the WVDEP intends to partially interpret in the Guidance passages quoted above—states, in pertinent part:

> No . . . wastes present in any of the waters of the state shall cause therein or materially contribute to any of the following conditions thereof:
> . . .
> 3.2.e. Materials in concentrations which are harmful, hazardous or toxic to man, animal or aquatic life; [and]
> . . .
> 3.2.i. Any other condition . . . which adversely alters the integrity of the waters of the State . . . ; no significant adverse impact to the chemical, physical, hydrologic, or biological components of aquatic ecosystems shall be allowed.

W. Va. Code R. § 47-2-3.2, -3.2.e, -3.2.i.

Plaintiffs bring this case under subsections 3.2.e and 3.2.i. None of the operative wording in either subsection appears in the definitions sections which apply to § 47-2-3.2. *See* W. Va. Code § 22-11-3; W. Va. Code R. § 47-2-2. The Court finds that subsection 3.2.e, when read alone, is unreasonable and creates an absurdity. Giving the operative words in subsection 3.2.e their

common, ordinary and accepted meaning in the context in which they are used, a literal reading of subsection 3.2.e leads to the conclusion that any wastes which materially contribute to even the most miniscule harm to a single aquatic creature result in a violation of West Virginia's narrative water quality standards. On the other hand, the final directive in the narrative water quality standards—"no significant adverse impact to the chemical, physical, hydrologic, or biological components of aquatic ecosystems shall be allowed"—appears after a semicolon in subsection 3.2.i. The placement of this directive at the end of all of the narrative water quality standards—and the fact that it is clearly grammatically unmoored from the introductory wording of § 47-2-3.2, which states, "No . . . wastes present in any of the waters of the state shall cause therein or materially contribute to any of the following conditions thereof . . ."—indicates to this Court that the directive informs each of the specific subsections listed before it. In order to avoid an absurdity and based upon the grammatically distinct structure of this final directive, it appears to this Court that the directive "no significant adverse impact to the chemical, physical, hydrologic, or biological components of aquatic ecosystems shall be allowed" modifies subsection 3.2.e, such that "harm" to "aquatic life" requires a showing of a "significant adverse impact to the . . . biological components of aquatic ecosystems."[6]

[6] To the extent that the absurdity created by reading subsection 3.2.e alone creates an ambiguity—or that the tandem reading of subsections 3.2.e and 3.2.i is ambiguous—and to the extent that the Court would be required to defer on any level to an agency interpretation regarding such ambiguity, both the WVDEP—the state agency which promulgated this rule—and the EPA—the federal agency which, as explained below, has authority under certain circumstances to determine when West Virginia's narrative water quality standards are being violated—appear to have come to the same reasonable interpretation as the Court: subsection 3.2.i modifies subsection 3.2.e. For example, in its Guidance, the WVDEP includes both subsections 3.2.e and 3.2.i in the title—"Justification and Background for Permitting Guidance for Surface Coal Mining Operations to Protect West Virginia's Narrative Water Quality Standards, 47 C.S.R. 2 §§ 3.2.e and 3.2.i."—; however, the remainder of the document does not mention subsection 3.2.e, identifies subsection 3.2.i three times, and purports throughout to define the proper way to measure a "significant adverse impact" to the "biological components of aquatic ecosystems"—both of which phrases appear solely in subsection 3.2.i. WVDEP's Guidance at 1, 2 & n.4, 3-7. Also by way of example, the EPA, in its March 2013 letter to the WVDEP, repeatedly discussed "whether certain waters [were] achieving *West Virginia's narrative water quality criteria as applied to the aquatic life uses (W.Va. CSR § 47-2-3.2(e) & (i))*," never once analyzing one subsection separately from the other, thus signaling that the EPA viewed subsections 3.2.e and 3.2.i as applying in tandem to any analysis. *See* Mar. 25, 2013, Letter from EPA to WVDEP at JE 276, 280, 285-86, 289, 292-93, 295 (emphasis added).

However, the operative phrases in subsection 3.2.i—"significant adverse impact" and the "biological components of aquatic ecosystems"—are ambiguous. The U.S. Supreme Court has ruled that "[w]hen a[] [federal] agency interprets its own regulation, [a federal court], as a general rule, [must] defer[] to it unless that interpretation is plainly erroneous or inconsistent with the regulation." *Decker v. Nw. Envtl. Def. Ctr.*, 133 S. Ct. 1326, 1337 (2013) (internal quotation marks omitted). On the other hand, in this case, the Court is dealing with a state agency's interpretation of a state legislative rule, which was necessarily promulgated through *both* the agency's and the state legislature's action.

The West Virginia Supreme Court of Appeals has not ruled as to what level of deference, if any, a state agency's interpretation of a state legislative rule should receive. *See Cookman Realty Grp.*, 566 S.E.2d at 298. Nevertheless, this Court finds that West Virginia law regarding interpretive and legislative rules resolves the issue. West Virginia Code § 29A-1-2(i) defines the word "rule" as follows:

> "Rule" includes every regulation, standard or *statement of policy or interpretation of general application and future effect*, including the amendment or repeal thereof, affecting private rights, privileges or interests, or the procedures available to the public, adopted by an agency to implement, extend, apply, interpret or make specific the law enforced or administered by it or to govern its organization or procedure, but does not include regulations relating solely to the internal management of the agency, nor regulations of which notice is customarily given to the public by markers or signs, nor mere instructions. Every rule shall be classified as "legislative rule," "interpretive rule" or "procedural rule,"[7] all as defined in this section, and shall be effective only as provided in this chapter.

W. Va. Code § 29A-1-2(i) (emphasis added). West Virginia Code § 29A-1-2(d) deals with legislative rules:

> "Legislative rule" means every rule . . . proposed or promulgated by an agency pursuant to this chapter. Legislative rule includes every rule which, when promulgated after or pursuant to authorization of the legislature, has (1) the force of

[7] Section 29A-1-2(h) defines "procedural rule" as "every rule . . . which fixes rules of procedure, practice or evidence for dealings with or proceedings before an agency, including forms prescribed by the agency."

> law, or (2) supplies a basis for the imposition of civil or criminal liability, or (3) grants or denies a specific benefit. *Every rule which, when effective, is determinative on any issue affecting private rights, privileges or interests is a legislative rule. Unless lawfully promulgated as an emergency rule, a legislative rule is only a proposal by the agency and has no legal force or effect until promulgated by specific authorization of the legislature.* Except where otherwise specifically provided in this code, legislative rule does not include (A) findings or determinations of fact made or reported by an agency, including any such findings and determinations as are required to be made by any agency as a condition precedent to proposal of a rule to the legislature; (B) declaratory rulings issued by an agency pursuant to the provisions of section one, article four of this chapter; (C) orders, as defined in subdivision (e) of this section; or (D) executive orders or proclamations by the governor issued solely in the exercise of executive power, including executive orders issued in the event of a public disaster or emergency . . . .

W. Va. Code § 29A-1-2(d) (emphasis added). West Virginia Code § 29A-1-2(c) deals with interpretive rules:

> "Interpretive rule" means every rule . . . adopted by an agency independently of any delegation of legislative power which is *intended by the agency to provide information or guidance to the public regarding the agency's interpretations, policy or opinions upon the law enforced or administered by it* and which is not intended by the agency to be determinative of any issue affecting private rights, privileges or interests. An interpretive rule may not be relied upon to impose a civil or criminal sanction nor to regulate private conduct or the exercise of private rights or privileges nor to confer any right or privilege provided by law and is not admissible in any administrative or judicial proceeding for such purpose, except where the interpretive rule established the conditions for the exercise of discretionary power as herein provided. . . . Where any provision of this code lawfully commits any decision or determination of fact or judgment to the sole discretion of any agency or any executive officer or employee, the conditions for the exercise of that discretion, to the extent that such conditions are not prescribed by statute or by legislative rule, may be established by an interpretive rule and such rule is admissible in any administrative or judicial proceeding to prove such conditions . . . .

W. Va. Code § 29A-1-2(c) (emphasis added).

It is apparent to this Court that the WVDEP's Guidance is an interpretive rule. The West Virginia Supreme Court of Appeals has clarified that, "'[a]lthough [interpretive rules] are entitled to some deference from the courts, [they] do not have the force of law nor are they irrevocably

binding on the agency or the court. They are entitled on judicial review only to the weight that their inherent persuasiveness commands.'" *Hornbeck v. Caplinger*, 712 S.E.2d 779, 785 (W. Va. 2011) (quoting *Appalachian Power Co. v. State Tax Dep't of W. Va.*, 466 S.E.2d 424, 444 (W. Va. 1995)); *see also Cookman Realty Grp.*, 566 S.E.2d at 304-05 (Starcher, J., concurring) ("I discern no basis for affording *Chevron* deference to an agency's informal interpretation of its own regulations, where we have otherwise refused to do so in the case of formal interpretive rules promulgated pursuant to the notice-and-comment provisions of *W. Va. Code,* 29A–3–8. Indeed, to do so would run afoul of the spirit, if not the letter, of the Legislature's admonition that such interpretive rules should not be given controlling weight unless they are issued pursuant to a legislative grant of discretion . . . ." (citation omitted)). Thus, the WVDEP's Guidance is only due deference from this Court to the extent of its inherent persuasiveness.

"[T]he rulings, interpretations and opinions of [an agency], while not controlling upon the courts by reason of their authority, do constitute a body of experience and informed judgment to which courts and litigants may properly resort for guidance." *Hornbeck*, 712 S.E.2d at 785 (internal quotation marks omitted). "The weight of such a judgment in a particular case will depend upon the thoroughness evident in its consideration, the validity of its reasoning, its consistency with earlier and later pronouncements, and all those factors which give it power to persuade, if lacking power to control." *Id.* (internal quotation marks omitted).

The WVDEP, through its Guidance, appears to interpret subsection 3.2.i—and, thus, also subsection 3.2.e—in two ways. First, it purports to further define the biological standard in subsection 3.2.i—"significant adverse impact to the . . . biological components of aquatic ecosystems"—to mean "a material decline in the overall health of an aquatic ecosystem."

WVDEP's Guidance at 3. Before coming to this conclusion, the WVDEP "recognizes"[8]—but does not adopt through legislative rule-making—the West Virginia legislature's resolution, through H.C.R. 111, "[t]hat the requirements of the narrative criteria are met when a stream (a) supports a balanced aquatic community that is diverse in species composition; and (b) contains appropriate trophic levels of fish (in streams with sufficient flows to support fish populations); and (c) [sic] the aquatic community is not composed only of pollution tolerant species or 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)." *Id.* at 1. Second, the WVDEP purports to redefine the methodology used to find a violation of the biological standard in subsection 3.2.i to include a "holistic approach to ecosystem

[8] In addition to the portions quoted above, the Guidance states:

> [This] Guidance was developed in accordance with the [WVWPCA], which states that "the public policy of the State of West Virginia [is] to maintain reasonable standards of purity and quality of the water of the State consistent with (1) public health and public enjoyment thereof; (2) the propagation and protection of animal, bird, fish, aquatic and plant life; and (3) the expansion of employment opportunities, maintenance and expansion of agriculture and the provision of a permanent foundation for healthy industrial development."
>
> . . . [This] Guidance also *recognizes* the intent of the West Virginia Legislature, which has formally resolved [in H.C.R. 111] as follows:
>
> - That any interpretation and implementation of West Virginia's narrative water quality standards is the responsibility of the [WVDEP];
> - That the requirements of the narrative criteria are met when a stream (a) supports a balanced aquatic community that is diverse in species composition; and (b) contains appropriate trophic levels of fish (in streams with sufficient flows to support fish populations); and (c) [sic] the aquatic community is not composed only of pollution tolerant species or 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); and
> - That interpretation of West Virginia's narrative water quality standards must faithfully balance the protection of the environment with the need to maintain and expand opportunities for employment, agriculture, and industry as set forth in the Legislature's statement of public policy as contained in the West Virginia Water Pollution Control Act.
>
> . . .
>
> Through adoption of H.C.R. 111, the West Virginia Legislature has given [the WV]DEP direction as to how it *should* implement its narrative water quality standards.

WVDEP's Guidance at 1-2, 7 (emphasis added) (footnotes omitted).

assessment," which is wholly undefined except that it requires something more than solely obtaining a WVSCI score. *Id.* at 3-4.

To the extent that the WVDEP further defines the biological standard in subsection 3.2.i to mean "a material decline in the overall health of an aquatic ecosystem"—with no further definition of "material," "overall health" or "aquatic ecosystem"—, the Court sees no reason to defer to such an interpretation. This phrase merely restates the applicable standard—a "significant adverse impact to the . . . biological components of aquatic ecosystems"—, such that it is not really an interpretation as much as a rewording. To the extent that Defendants argue that the WVDEP is interpreting subsection 3.2.i to incorporate the three-part test from H.C.R. 111, the Court disagrees that the WVDEP has done so.[9]

To the extent that the WVDEP purports to redefine the methodology used to find a violation of the biological standard in subsection 3.2.i to include a "holistic approach to ecosystem assessment," which is wholly undefined except that it requires something more than solely obtaining a WVSCI score, the Court does not find such a redefinition persuasive or, indeed, even permissible. The profound issue with the WVDEP's new-found "methodology" is that it is actually an *absence* of methodology. The WVDEP states that an undefined "holistic approach" is needed and that a low WVSCI score alone is not enough to find a violation, thus negating the

[9] The fact that the West Virginia legislature felt the need to pass Senate Bill 562, which directs the WVDEP to promulgate new rules incorporating the three-part test from H.C.R. 111,—two years *after* the passage of H.C.R. 111 and the subsequent publishing of the WVDEP's Guidance—is further proof that the WVDEP did not interpret subsection 3.2.i to incorporate that three-part test. Apparently, the legislature agreed with this Court that, if the WVDEP believed H.C.R. 111 to be binding, it should have stated such in its Guidance and/or begun the process of promulgating a new rule based upon the three-part test in H.C.R. 111. The WVDEP did neither. Further, even were the WVDEP to have somehow adopted the three-part test from H.C.R. 111 by "recogniz[ing] the intent" of the legislature—a far stretch—, such an interpretation of subsection 3.2.i would be unpersuasive to this Court, given that the WVDEP would merely be rubber-stamping the legislature's interpretation without giving any reasoning through which this Court could assess the interpretation. The entire point of this type of persuasive authority "deference" to agency interpretations is the recognition of an agency's superior expertise in the area. No such expertise was used to create the three-part test, and the Guidance reveals no assessment of the test by the WVDEP. Importantly, an "administrative rule[] may not, under the guise of 'interpretation,' be modified, revised, amended or rewritten." *Cookman Realty Grp.*, 566 S.E.2d at 298 (internal quotation marks omitted). This Court will not do so.

WVDEP's own previous practice of using WVSCI scores to define whether a violation of the biological standard in subsection 3.2.i was occurring, such that a stream needed to be listed as "impaired" under Section 303(d) of the CWA. *See* WVDEP Division of Water and Waste Management, 2012 Draft West Virginia Integrated Water Quality Monitoring and Assessment Report 15-16 (2012) ("WVDEP 2012 Draft Report"), Joint Ex. 119 at JE 316-317.

The void created by the WVDEP in rejecting its prior practice of relying upon WVSCI scores is not filled by any other methodology. Instead, as indicated by the WVDEP's more recent statements in West Virginia's draft 2012 Section 303(d) list of impaired waters, the WVDEP's enforcement of the biological narrative water quality standards embodied in § 47-2-3.2.e and -3.2.i has come to nearly a stand-still as a result of its current lack of a methodology for assessing violations of those standards. *Id.* at JE 316 ("In response to [S.B. 562, which requires that the WVDEP promulgate new rules incorporating the three-part test originally outlined in H.C.R. 111], [the WV]DEP is not adding new biological impairments to the 2012 Section 303(d) list."). As explained below, it is this very abdication of responsibility by the WVDEP which required the EPA to step in and conduct its own assessment of West Virginia's biological narrative water quality standards—embodied in § 47-2-3.2.e and -3.2.i—for the purposes of completing West Virginia's 2012 Section 303(d) list of impaired waters. Letter from Shawn M. Garvin, Regional Administrator, EPA, to Randy C. Huffman, Secretary, WVDEP, at 1 (Mar. 25, 2013) ("Mar. 25, 2013, Letter from EPA to WVDEP"), Joint Ex. 118 at JE 276; *see also* 33 U.S.C. § 1313(d)(1)(A), (d)(2). As explained earlier, the central purpose of a citizen suit under the CWA is to allow citizens to stop pollution when the government cannot or will not command compliance. To credit the WVDEP's current position that there is no methodology for assessing West Virginia's biological narrative water quality standards in § 47-2-3.2.e and -3.2.i—leading to no enforcement

whatsoever—would be to contravene the very purpose of this citizen suit and to fail to enforce the CWA. This Court will not do so.[10]

Instead, this Court will continue to follow the WVSCI methodology for determining compliance with the biological narrative water quality standards in § 47-2-3.2.e and -3.2.i. There are multiple reasons which require this decision. First, WVSCI was the last methodology used by the WVDEP to define whether a violation of the biological standard in subsection 3.2.i was occurring, such that a stream needed to be listed as "impaired" under Section 303(d) of the CWA.[11] Even in its 2012 Draft Report, despite adding no new biologically-impaired streams to West Virginia's 303(d) list, the WVDEP retained previously-listed biologically-impaired streams, which had been included in the list in the past based upon WVSCI scoring. WVDEP 2012 Draft Report at JE 316; *see* Mar. 25, 2013, Letter from EPA to WVDEP at JE 276. Second, WVSCI is the methodology most recently used by the EPA to complete West Virginia's 2012 Section 303(d) list of impaired waters.[12] Further, the EPA—the final authority regarding whether a state's narrative water quality criteria are being violated for the purposes of Section 303(d)

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[10] Regardless, Plaintiffs present more than simply stand-alone WVSCI scores in this case.

[11] Ironically, in the WVDEP's 2012 Draft Report—in which the agency refused to use *any* methodology to assess West Virginia's streams under the biological narrative water quality standards for the purpose of the 2012 Section 303(d) listing—, the WVDEP lauded the use of benthic macroinvertebrates to assess overall ecological health:

> The [WV]DEP uses benthic macroinvertebrates to assess the biological condition of streams in the state. These organisms provide reliable information on water and habitat quality in streams and have been used as indicators all over the world for nearly 100 years. They are extremely diverse and exhibit a wide range of tolerances to pollutants. Further, they serve as an excellent tool for measuring overall ecological health, especially when summarized into a single index of biological integrity[, like WVSCI].

WVDEP 2012 Draft Report at JE 327.

[12] *See* Mar. 25, 2013, Letter from EPA to WVDEP at JE 299 ("Given . . . [the] WVDEP's representation that WVSCI was a 'valid' assessment methodology at the time that prior impairments were identified, [the] EPA has elected for purposes of the 2012 Section 303(d) list to apply WVSCI, [the] WVDEP's past methodology . . . . [The] EPA's partial disapproval [of the 2012 list submitted by the WVDEP] is based not upon [the] WVDEP's selection of an assessment methodology, but rather upon [the] WVDEP's failure to evaluate certain existing and readily available biological data using any assessment methodology. [The] EPA's decision to utilize WVSCI, a methodology that [the] WVDEP acknowledges was valid in the past, is consistent with the basis of its partial disapproval while avoiding introduction of a new methodology while [the] WVDEP undertakes methodology development pursuant to SB562.").

listing—recently made the *specific finding* that WVSCI scores below 68[13] "indicate that [the] waters [at and in which such scores were assessed] do not achieve the West Virginia narrative criteria as applied to the aquatic life uses"—defined by the EPA to mean the biological standards embodied in § 47-2-3.2.e and -3.2.i. *See* Mar. 25, 2013, Letter from EPA to WVDEP at JE 295-96, 299; *see also* 33 U.S.C. § 1313(d)(2).

c. The West Virginia legislature's instruction, through its passage of H.C.R. 111 and of S.B. 562, and the WVDEP's instruction, in its Guidance, that this holistic approach requires proof of effects on fish, not just invertebrates, in order to find a violation

In 2010, the West Virginia legislature passed H.C.R. 111, which states, in pertinent part:

> [West Virginia's] narrative water quality standards codified at 47 CSR 2-3 . . . must be implemented and interpreted in a manner that is protective of aquatic communities consistent with the Legislature's statement of public policy and applicable laws . . . . The State of West Virginia has not adopted subcategories of special use to protect a certain species of mayfly but protects the aquatic community consistent with the Legislature's statement of public policy . . . . [A]ny interpretation and implementation of West Virginia's narrative water quality standards is the responsibility of the [WVDEP] . . . . [T]he requirements of the narrative criteria are met, when a stream (a) supports a balanced aquatic community that is diverse in species composition; and (b) contains appropriate trophic levels of fish (in streams with sufficient flows to support fish populations); and (c) [sic] the aquatic community is not composed only of pollution tolerant species, or 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) . . . .

H. Con. Res. 111, 2010 Legis., Reg. Sess. (W. Va. 2010).

First, it is important to note that H.C.R. 111 is not a properly promulgated statute. Instead, it is a concurrent resolution; thus, according to the West Virginia Supreme Court of Appeals, it has no force of law, in and of itself. *State ex rel. Barker v. Manchin*, 279 S.E.2d 622, 633 (W. Va. 1981) ("Joint or concurrent resolutions, while they may bind the members of the legislative body, are not statutes and do not have the force and effect of law."). Further, in H.C.R. 111, the

[13] The issue of whether the proper threshold for impairment under WVSCI is 68 or 60.6 is dealt with below.

legislature explicitly states its intention to affect the interpretation of West Virginia's narrative water quality standards, as embodied in West Virginia Code of State Rules § 47-2-3, which, as explained earlier, is part of a legislative rule originally proposed by the WVDEP—an administrative agency—and affirmed by the legislature. The West Virginia Supreme Court of Appeals has stated that, though "the Legislature has the power to void or to amend administrative rules and regulations, when it exercises that power it must act as a legislature . . . within the confines of the enactment procedures mandated by [the West Virginia] [C]onstitution.[14] It cannot invest itself with the power to act as an administrative agency in order to avoid those requirements." *Id.*; *see also id.* at 634 n.8 ("Regardless of its inherent efficiency, informal coercive review of executive rule making is not permissible in the presence of a constitutional mandate that the powers of government be maintained in separate and distinct branches.").

Here, it is apparent to the Court that the West Virginia legislature, through H.C.R. 111, attempted to modify West Virginia's narrative water quality standards. The specific modification detailed by the resolution is that a violation of West Virginia's narrative water quality standards

[14] As explained by the West Virginia Supreme Court of Appeals, the West Virginia Constitution places rigorous limits—which are not followed when a mere resolution is passed—upon the proper enactment of state statutes:

> Article VI, section 1 vests the Senate and the House of Delegates with the legislative power and requires enactments to be styled, "Be it enacted by the Legislature of West Virginia." "Bills and resolutions may originate in either house, but may be passed, amended or rejected by the other." W. Va. Const. art. VI, s 28. Section 29 of article VI prohibits a bill from becoming law "until it has been fully and distinctly read, on three different days, in each house . . . ", except in cases of urgency. No act of the Legislature may embrace more than one object, which must be expressed in the title of the act, nor may any law be revived or amended by reference only to its title. W. Va. Const. art. VI, s 30. Article VI, s 31 provides for the passage of amended bills or resolutions upon the affirmative vote of a majority of the house in which the bill or resolution was originally passed. Additional procedures for the passage of budgetary items and appropriations bills are set out at length in article VI, s 51 and its subsections. Before any bill passed by the Legislature can become law, it must be submitted to the Governor for his approval. If the Governor disapproves the bill, it is returned first to the house in which it originated and then to the other house. The Governor's veto may be overriden [sic] by a majority vote of the members of both houses. W. Va. Const. art. 7, s 14. Detailed procedures for the Governor's veto or approval of appropriations bills are set forth in article VI, section 7 and article VII, section 15.

Manchin, 279 S.E.2d at 632.

does not occur—although a violation of one of the subsections of § 47-2-3[15] would otherwise be found—"when a stream (a) supports a balanced aquatic community that is diverse in species composition; and (b) contains appropriate trophic levels of fish (in streams with sufficient flows to support fish populations); and (c) [sic] the aquatic community is not composed only of pollution tolerant species, or 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)." W. Va. H. Con. Res. 111. Though it is unclear whether the legislature intended to modify all of the subsections under § 47-2-3.2 by adding a biological component which is clearly missing from the majority of the subsections as written or solely to modify subsections 3.2.e and/or 3.2.i, such attempted modification outside of constitutionally-mandated procedures has been declared null and void by the West Virginia Supreme Court of Appeals. Thus, this Court will give no weight to the legislature's attempted modifications, in H.C.R. 111, to West Virginia's water quality standards.

In 2012—two years after H.C.R. 111 was passed and the WVDEP published its Guidance—, the West Virginia legislature passed S.B. 562. S.B. 562 states, in pertinent part:

> Be it enacted by the Legislature of West Virginia: That §22-11-7b of the Code of West Virginia, 1931, as amended, be amended and reenacted to read as follows:
> . . .
> (f) The secretary shall propose rules measuring compliance with the biologic component of West Virginia's narrative water quality standard [sic] 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) [sic] 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

[15] No subsection under § 47-2-3 is specified at any point in the entire resolution.

> 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 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.

S.B. 562, 80th Leg., Reg. Sess. (W. Va. 2012) (emphasis omitted).

The Court first notes that S.B. 562, unlike H.C.R. 111, is a duly-enacted statute.[16] However, S.B. 562 does not attempt to directly amend § 47-2-3.2.i. Instead, the statute directs the WVDEP to promulgate legislative rules which will address how to measure compliance with the biological component of West Virginia's narrative water quality standards and which will include 1) a requirement that the holistic health of the aquatic ecosystem be evaluated and 2) the specific three-part test regarding the composition of the aquatic community outlined in S.B. 562. The WVDEP will promulgate legislative rules pursuant to S.B. 562 in due time. In the interim, the Court may not, under the guise of "interpretation," modify § 47-2-3.2.i based upon S.B. 562. *See Cookman Realty Grp.*, 566 S.E.2d at 298.

To summarize, this Court has found that 1) H.C.R. 111 lacks the force of law to directly modify § 47-2-3.2, 2) the WVDEP did not adopt the three-part test from H.C.R. 111 through its Guidance, and 3) S.B. 562 does not directly modify § 47-2-3.2. Thus, the Court need not defer to this test even to the extent of its persuasiveness.

Further, the test, itself, does *not* require proof of effects on fish in order to find a violation. The direct inverse of the test shows that a violation of West Virginia's narrative water quality

[16] Also unlike H.C.R. 111, the first sentence of the subsection of S.B. 562 in which wording very similar to that in H.C.R. 111 appears clearly focuses solely upon "the *biologic component* of West Virginia's narrative water quality standard[s]." S.B. 562(f) (emphasis added). Subsection 3.2.i is the only subsection within all of the water quality standards embodied in § 47-2-3.2 which refers to "biological components." Further, after specifying its focus upon "biologic components," S.B. 562 then goes on to use another phrase which appears only in subsection 3.2.i: "aquatic ecosystem." Based upon this wording, it appears to the Court that S.B. 562 is intended specifically to affect subsection 3.2.i.

standards can occur "when a stream (a) [does not] support[] a balanced aquatic community that is diverse in species composition; [*or*] (b) [does not] contain[] appropriate trophic levels of fish (in streams with sufficient flows to support fish populations); [*or*] (c) [sic] the aquatic community is [] composed only of pollution tolerant species [and] the aquatic community is [not] 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)." WVDEP's Guidance at 1-2 (emphasis added). Thus, a violation of the narrative water quality standards occurs when any one of the three conditions above is met, including when a stream does not support a balanced aquatic community that is diverse in species composition. Fish are not mentioned at all in this first condition.

d. The WVDEP's instruction, in its Guidance, that the proper WVSCI score at which to list a stream as "impaired" under Section 303(d) of the CWA is 60.6, not 68

Defendants argue that Plaintiffs cannot prove a violation of West Virginia's narrative water quality standards at a particular location by merely showing that a WVSCI score at that location falls below 68, particularly because the WVDEP historically did not list a stream as "impaired" under Section 303(d) of the CWA unless scores at the stream fell below 60.6; thus, according to Defendants, to the extent this Court relies on WVSCI scores in determining liability, it should only rely on scores below 60.6. Plaintiffs argue that the EPA 1) found the WVDEP's use of 60.6 as the cutoff for impairment of streams to be "statistically unsupportable" and 2) declared that all scores within the "gray zone" between 60.6 and 68 indicate that the waters from which such scores were obtained "do not achieve the West Virginia narrative criteria as applied to aquatic life uses," since 68 is the proper cutoff score. Pls.' Post-Trial Brief at 21, ECF No. 106. Plaintiffs

further argue that such findings by the EPA overrule any contrary findings by the WVDEP because the EPA declared that West Virginia's narrative water quality standards are federal, not state, requirements.

As explained earlier, WVSCI scoring was the most recent methodology used by the WVDEP—and is still used by the EPA—to determine whether West Virginia streams are biologically "impaired"—meaning that they are waters for which numeric effluent limitations are not stringent enough to maintain the biological narrative water quality standards embodied in § 47-2-3.2.e and -3.2.i—under Section 303(d) of the CWA. *See* 33 U.S.C. § 1313(d)(1)(A); Mar. 25, 2013, Letter from EPA to WVDEP at JE 293; WVDEP 2012 Draft Report at JE 316-317.

Regarding the proper WVSCI score cutoff at which the WVDEP historically listed a stream as "impaired" under Section 303(d) of the CWA, the WVDEP's Guidance states:

> Based on the 5th percentile of reference values, the current WVSCI score that indicates the integrity of a benthic macroinvertebrate community in West Virginia's wadeable streams is 68.0. The threshold for inclusion on the 303(d) List has historically been 60.6. That value subtracts a precision estimate from the 5th percentile of reference values, and its historical use was intended to take into account sampling error and to aid [the WV]DEP in allocating its resources so as to avoid misclassifying non-impaired waters as impaired. WVSCI and its application in the 303(d) listing process are consistent with methodologies implemented to assess protection of aquatic ecosystems by all of West Virginia's neighboring states.

WVDEP's Guidance at 5.

The statute which requires the compilation of Section 303(d) lists of "impaired" waters by the states specifies: "Each State shall identify those waters within its boundaries for which the effluent limitations . . . are not stringent enough to implement any water quality standard applicable to such waters." 33 U.S.C. § 1313(d)(1)(A). That same statute then states:

> Each State shall submit to the Administrator [of the EPA] from time to time . . . for his approval the waters identified and the loads established under paragraph[] (1)(A) . . . of this subsection. The Administrator shall either approve or disapprove

> such identification and load . . . . If the Administrator approves such identification and load, such State shall incorporate them into its current plan . . . . If the Administrator disapproves such identification and load, *he shall . . . identify such waters in such State* and establish such loads for such waters *as he determines necessary to implement the water quality standards applicable to such waters* and upon such identification and establishment the State shall incorporate them into its current plan . . . .

Id. § 1313(d)(2) (emphasis added). EPA regulations delegate the authority of the Administrator of the EPA in § 1313(d)(2) to regional EPA administrators. 40 C.F.R. § 130.7(d). Thus, under federal law, an EPA regional administrator has the final authority to determine which waters within his region are "impaired" according to the water quality standards applicable to those waters.[17]

In March 2013, the EPA Regional Administrator for Region III partially approved and partially disapproved West Virginia's 2012 Section 303(d) list of impaired waters, which had been submitted by the WVDEP. Mar. 25, 2013, Letter from EPA to WVDEP at JE 276-77. The partial disapproval of the list, according to the Regional Administrator, was the result of the "WVDEP's decision not to evaluate . . . data regarding whether certain waters [were] achieving West Virginia's narrative water quality criteria (W. Va. CSR § 47-2-3.2(e) & (i)) as applied to the aquatic life uses." *Id.* at JE 276. As explained earlier, it was then—and is now—the WVDEP's position that "pending completion and adoption by rulemaking of a new methodology, [the WVDEP] is precluded by [S.B. 562] from evaluating waters for [the] purposes of determining compliance with the narrative water quality criteria as applied to the aquatic life uses." *Id.*; *see also* WVDEP 2012 Draft Report at JE 316.

Thus, pursuant to its authority under § 1313(d)(2), the EPA conducted the evaluation of whether West Virginia's waters were achieving the state's biological narrative water quality

[17] "For the purposes of listing waters under § 130.7(b), the term[s] 'water quality standard applicable to such waters' and 'applicable water quality standards' refer to those water quality standards established under section 303 of the [CWA], including numeric criteria, narrative criteria, waterbody uses, and antidegradation requirements." 40 C.F.R. § 130.7.

standards using WVSCI—which had been used by the WVDEP for the development of West Virginia's Section 303(d) lists since 2002—, given that the WVDEP had "acknowledged in the past [that] WVSCI was a valid means of assessing compliance with West Virginia's currently applicable narrative water quality criteria as applied to the aquatic life uses."[18] Mar. 25, 2013, Letter from EPA to WVDEP at JE 276.

The EPA did note, however, that it did not incorporate into its evaluation the "statistically unsupported" "gray zone" of WVSCI scores ranging from 60.6 to 68, in which waters would be listed by the WVDEP as neither impaired nor unimpaired. *Id.* at JE 277, 296. According to the Regional Administrator, by creating the "gray zone," the WVDEP "double-count[ed]" what statistically should be only one adjustment for sampling variability. *Id.* at JE 298 ("[T]he potential variability for which the gray zone is purported to account *already is accounted for* by variability in the reference sites."[19]). The EPA thus determined that all streams with WVSCI scores below 68 were "impaired," meaning that such "waters do not achieve the West Virginia narrative criteria as applied to the aquatic life uses," embodied in § 47-2-3.2.e and -3.2.i. *See id.* at JE 299.

As explained earlier, the WVDEP currently has *no* methodology for assessing whether violations of the biological narrative water quality standards embodied in § 47-2-3.2.e and -3.2.i are occurring, and in 2012, the WVDEP flatly *refused* to use WVSCI scores to make such determinations. Given that the EPA has final authority under Section 303(d) to determine whether

[18] Since 1998, the WVDEP "has considered the health of the macroinvertebrate community as the primary means of directly measuring whether the narrative water quality criteria as applied to the aquatic life uses are being satisfied." Mar. 25, 2013, Letter from EPA to WVDEP at JE 296.

[19] "Using the distribution scores from all sites that are considered reference sites, a threshold score of 68.0, representing the 5th percentile of reference sites, was identified by [the] WVDEP as the lowest WVSCI score that was considered as fully supportive of the narrative criteria as applied to the aquatic life uses. This means that 95% of all reference sites had a higher score." Mar. 25, 2013, Letter from EPA to WVDEP at JE 296. "As a general matter, the reference sites will have experienced some alteration and thus represent some degree of departure from truly natural conditions. To account for this, many states (Virginia for example) use 10th percentile of reference, or even the 25th percentile of reference. EPA agreed with [the] WVDEP's use of the 5th percentile of reference because of the high quality and general confidence in West Virginia's reference samples as representative of something closer to natural conditions." *Id.* at n.2.

a stream is biologically impaired, such that the narrative water quality standards embodied in § 47-2-3.2.e and -3.2.i are being violated, given the EPA's detailed and persuasive discussion of the statistical support for using 68—and not 60.6—as the cutoff,[20] and given that the EPA's determination appears to be the only presently espoused agency view on the issue, this Court will credit the EPA's WVSCI score impairment threshold of 68 and not the WVDEP's historical threshold of 60.6.

B. Fact-Finding

1. General Causation

As explained earlier, the Court is crediting the EPA's specific finding—under its Section 303(d) authority—that a WVSCI score below the impairment threshold of 68 indicates a violation of West Virginia's biological narrative water quality standards, as embodied in § 47-2-3.2.e and -3.2.i, in the stream where the score was assessed. However, that finding does not specify the *cause* of such low scores, as there are many possibilities.

Plaintiffs' general causation theory in this case is that 1) surface mining causes—or at least materially contributes to—high conductivity in adjacent streams and, 2) controlling for other potential confounding factors, high conductivity in streams is scientifically proven to cause or materially contribute to a significant adverse impact to the chemical or biological components of aquatic ecosystems—proof of which can be shown through low WVSCI scores. The Court will now assess the evidence presented at trial to determine whether Plaintiffs have proven this aspect of their case by a preponderance of the evidence.

First, it is important to note that the EPA has spoken to both general causation theories 1) through its October 2005 "Mountaintop Mining/Valley Fills in Appalachia Final Programmatic

[20] *See id.* at JE 297-99; *see also* Letter from Shawn M. Garvin, Regional Administrator, EPA, to Randy C. Huffman, Secretary, WVDEP, Enclosure 2 at 22-24 (Sept. 30, 2013), Joint Ex. 121 at JE 398-400.

Environmental Impact Statement" ("EIS") and, most importantly, 2) through its March 2011 Benchmark, entitled "A Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams." Pls.' Ex. 9; *see* Tr. at 61-62. In its EIS, the EPA identified two downstream impacts from mountaintop mining valley fills: 1) increases in conductivity and 2) decreases in the number of invertebrate taxa. *See* Tr. at 62.

In its nearly three-hundred page scientific Benchmark—after considering and then ruling out the potential confounding effects of habitat, organic enrichment, nutrients, deposited sediments, pH, selenium, temperature, lack of headwaters, catchment areas, settling ponds, dissolved oxygen, and metals—the EPA found that "salts, as measured by conductivity, are a common cause of impairment of aquatic macroinvertebrates" in Central Appalachian streams. EPA's Benchmark at A-1, B-1; *see also id.* at A-40 ("This causal assessment presents clear evidence that the deleterious effects to benthic invertebrates are *caused by, not just associated with*, the ionic strength[, i.e., conductivity,] of the water. . . . When [other potential] causes are absent or removed, a relationship between conductivity and ephemeropteran[, i.e. mayfly,] richness is still evident." (emphasis added)); *id.* at A-37 ("As conductivity increases, the occurrence and capture probability decreases for many genera in West Virginia . . . at the conductivity levels predicted to cause effects. The loss of these genera is a severe and clear effect."). The Benchmark also found that "of the [nine] land uses . . . analyzed, only mining especially associated with valley fills[, i.e., mountaintop mining with valley fills,] is a substantial source of the salts that are measured as conductivity." *Id.* at A-18.

The Benchmark ultimately concluded that the "chronic aquatic life benchmark value for conductivity" in West Virginia streams is 300 µS/cm. *Id.* at xv. To derive this recommended high-end threshold value, the EPA used the 5th percentile of a species sensitivity distribution,

based on the standard methodology for deriving water-quality criteria, meaning that this 300 µS/cm benchmark value for conductivity is "expected to avoid the local extirpation [due to the salts measured as conductivity] of 95% of native species." *Id.* at xiv. In support of both the specific 300 µS/cm benchmark value and the general causal linkage between conductivity and impairment to aquatic macroinvertebrates, the Benchmark contains a graph which charts, for 163 genera, the level of salt exposure above which a genus is effectively absent from water bodies in a region, with conductivity readings on the x axis and proportion of genera extirpated on the y axis. *Id.* at xiv, 18 fig. 8. A fairly consistent line is formed as conductivity and extirpation both increase, illustrating the causal connection between conductivity and significant biological impairment which Plaintiffs seek to prove. *See id.* at 18 fig. 8.

Plaintiffs' expert Dr. Margaret Palmer testified that the Benchmark was authored by scientists who had published important papers in the area of mountaintop mining, conductivity, and macroinvertebrate effects and that, before publication, the Benchmark was reviewed by a scientific advisory board, which itself was composed of top scientists who possessed expertise in the area. *See* Tr. at 69-71. Plaintiffs' expert Dr. Ryan King described the peer review process which the Benchmark underwent before publishing as "very rigorous, very intense, probably at [the] highest level of review that most documents can receive." *Id.* at 248. Additionally, he expressed his opinion that the Benchmark is "good science." *Id.* The Benchmark, itself, lists four authors, eight contributors, and twenty-five reviewers—including Defendants' expert Dr. Charles Menzie—, sixteen of whom were members of the Science Advisory Board. EPA's Benchmark at ix-xii.

"Particularly with environmental statutes such as the Clean Water Act, the regulatory framework . . . requires sophisticated evaluation of complicated data. . . . [A court] therefore do[es]

not sit as a scientific body in such cases, meticulously reviewing all data under a laboratory microscope." *Crutchfield v. Cnty. of Hanover, Virginia*, 325 F.3d 211, 218 (4th Cir. 2003) (citation omitted) (internal quotation marks omitted). Instead, "[a] reviewing court must generally be at its most deferential when reviewing factual determinations within an agency's area of special expertise. . . . It is not the role of a reviewing court to second-guess the scientific judgments of the EPA." *Sw. Pennsylvania Growth Alliance v. Browner*, 121 F.3d 106, 117 (3d Cir. 1997) (citation omitted) (internal quotation marks omitted); *see also Baltimore Gas & Elec. Co. v. Natural Res. Def. Council, Inc.*, 462 U.S. 87, 103 (1983) ("[A] reviewing court must remember that the [agency] is making predictions, within its area of special expertise, at the frontiers of science. When examining this kind of scientific determination, as opposed to simple findings of fact, a reviewing court must generally be at its most deferential."); *Envtl. Def. Ctr.*, 344 F.3d at 869 ("We treat EPA's decision with great deference because we are reviewing the agency's technical analysis and judgments, based on an evaluation of complex scientific data within the agency's technical expertise."); *Chem. Mfrs. Ass'n v. U.S. E.P.A.*, 919 F.2d 158, 167 (D.C. Cir. 1990) ("[W]e give considerable latitude to the EPA in drawing conclusions from scientific and technological research, even where it is imperfect or preliminary." (internal quotation marks omitted)).

"[T]echnological and scientific issues . . . are by their very nature difficult to resolve by traditional principles of judicial decisionmaking. For this reason, we must look at the decision not as the chemist, biologist or statistician that we are qualified neither by training nor experience to be, but as a reviewing court exercising our narrowly defined duty of holding agencies to certain minimal standards of rationality." *Reynolds Metals Co. v. U.S. E.P.A.*, 760 F.2d 549, 558-59 (4th Cir. 1985) (internal quotation marks omitted). "[A]n agency's data selection and choice of

statistical methods are entitled to great deference, . . . and its conclusions with respect to data and analysis need only fall within a zone of reasonableness." *Id.* at 559 (citations omitted) (internal quotation marks omitted). In the context of agency action, "if the agency fully and ably explains its course of inquiry, its analysis, and its reasoning sufficiently enough for us to discern a rational connection between its decision-making process and its ultimate decision, [a court] will let its decision stand." *Crutchfield*, 325 F.3d at 218 (brackets omitted) (internal quotation marks omitted).

There is no question in this case that the content of the EPA's Benchmark falls within the agency's special area of expertise; thus, the Court owes deference to the EPA's scientific determinations as long as the agency's reasoning and conclusions are rational. The Benchmark easily clears this hurdle. The document methodically defines its inquiry, its reasonable analysis, and its ultimate, rational conclusions. Additionally, the Benchmark underwent extensive scientific review, and it is respected as good science within the relevant scientific community. The Court will thus properly defer to the EPA's determination that 1) mountaintop mining with valley fills is a substantial—if not the primary—source of conductivity in adjacent streams and 2) high conductivity in streams causes significant biological impairment to—including the localized extinction of—aquatic macroinvertebrates.

Even if the Court had not deferred to the EPA's conclusions in its Benchmark, it would still find that Plaintiffs have proven by a preponderance of the evidence that 1) surface mining causes—or at least materially contributes to—high conductivity in adjacent streams and, 2) controlling for other potential confounding factors, high conductivity in streams is scientifically proven to cause or materially contribute to a significant adverse impact to the chemical and biological components of aquatic ecosystems. First, the science in the EPA's Benchmark

regarding these two causation theories is independently compelling. Second, two of the authors of the Benchmark, Dr. Susan Cormier and Dr. Glenn Suter, subsequently published four different peer-reviewed journal-article versions of several sections of the EPA's Benchmark—including the section regarding the causal link between conductivity and biological impairment and the section ruling out potential confounding factors—in the scientific journal *Environmental Toxicology and Chemistry*.[21] *See* Tr. at 84. Plaintiffs' expert Dr. Palmer testified that this is a quality journal which focuses specifically on topics such as biological response to pollutants. *Id.* at 84-86. Plaintiffs' expert Dr. King testified that "the list of the number of people who commented on [these journal articles] in the acknowledgments [section and] the peer reviews . . . [is] impressive." *Id.* at 258. He also testified that, in his own professional opinion, he found the articles "rigorous and very defensible." *Id.*

Third, numerous other scientific articles published in peer-reviewed journals—both before and after publication of the Benchmark—lead to the same conclusions. In 2008, Dr. Gregory Pond—who would later be one of the contributors to the EPA's Benchmark—published a peer-reviewed scientific article in the *Journal of the North American Benthological Society*, based upon a field study he conducted which found that, as surface coal mining with valley fills—and its associated conductivity—increased, benthic macroinvertebrate taxa decreased. *See* Gregory J. Pond et al., *Downstream Effects of Mountaintop Coal Mining: Comparing Biological Conditions Using Family- and Genus-Level Macroinvertebrate Bioassessment Tools*, 27 J. N. Am. Benthological Soc'y 717 (2008), Pls.' Ex. 15; Tr. at 64-65; Pls.' Ex. 9. Dr. Palmer testified that the

[21] *See* Susan M. Cormier, Glenn W. Suter II & Lei Zheng, *Derivation of a Benchmark for Freshwater Ionic Strength*, 32 Envtl. Toxicology & Chemistry 263 (2013), Pls.' Ex. 3; Susan M. Cormier & Glenn W. Suter II, *A Method for Assessing Causation of Field Exposure-Response Relationships*, 32 Envtl. Toxicology & Chemistry 272 (2013), Pls.' Ex. 4; Susan M. Cormier et al., *Assessing Causation of the Extirpation of Stream Macroinvertebrates by a Mixture of Ions*, 32 Envtl. Toxicology & Chemistry 277 (2013), Pls.' Ex. 5; Glenn W. Suter II & Susan M. Cormier, *A Method for Assessing the Potential for Confounding Applied to Ionic Strength in Central Appalachian Streams*, 32 Envtl. Toxicology & Chemistry 288 (2013), Pls.' Ex. 6.

Journal of the North American Benthological Society is the highest impact freshwater journal in existence. Tr. at 65.

In 2010, Dr. Palmer and a colleague, Dr. Emily Bernhardt, published a peer-reviewed scientific article in *Science* magazine—one of the premier scientific journals worldwide, according to Dr. Palmer—, which found that as mining increased, conductivity and sulfate—one of the constituent ions measured by conductivity—increased and there was a coincident decline in a number of biological metrics, including WVSCI scores. M. A. Palmer et al., *Mountaintop Mining Consequences*, 327 Sci. 148 (2010), Pls.' Ex. 13; Tr. at 63, 65-67. Also in 2010, Dr. Pond published another peer-reviewed article, this time in the journal *Hydrobiologia*, which found that mayflies—which are normally common inhabitants of Appalachian streams—often reduced in number in or were eliminated from mined areas and that relative mayfly abundance was most strongly correlated with conductivity, not habitat. Gregory J. Pond, *Patterns of Ephemeroptera Taxa Loss in Appalachian Headwater Streams*, Hydrobiologia, Mar. 2010, at 185, Pls.' Ex. 16 (draft version); Tr. at 67.

In 2011, Dr. Palmer and Dr. Bernhardt published another peer-reviewed article, this time in the *Annals of the New York Academy of Sciences*, which found that conductivity, which is associated with coal mining, leads to the loss of sensitive macroinvertebrate taxa in Central Appalachian streams. Emily S. Bernhardt & Margaret A. Palmer, *The Environmental Costs of Mountaintop Mining Valley Fill Operations for Aquatic Ecosystems of the Central Appalachians*, Annals N.Y. Acad. Sci., Mar. 2011, at 39, Pls.' Ex. 1; Tr. at 79. Also in 2011, Ty Lindberg and Dr. Bernhardt published a peer-reviewed article, entitled "Cumulative Impacts of Mountaintop Mining on an Appalachian Watershed," in the *Proceedings of the National Academy of Sciences of the United States of America*—a very prestigious journal, according to Dr. Palmer—, which found

that conductivity increased in direct proportion to the extent of mining upstream. Tr. at 80-82.

In 2012, Dr. Pond published another peer-reviewed article in *Hydrobiologia*, which found that conductivity was an excellent indicator of how many individuals of certain types of macroinvertebrate taxa normally abundant in Appalachian streams would be found at a disturbed site. Gregory J. Pond, *Biodiversity Loss in Appalachian Headwater Streams (Kentucky, USA): Plecoptera and Trichoptera Communities*, Hydrobiologia, Jan. 2012, at 97, Pls.' Ex. 17. Also in 2012, Dr. Bernhardt and Dr. King published a peer-reviewed article in *Environmental Science and Technology*, which, according to Dr. King, is the number one journal in the field of environmental science. Emily S. Bernhardt et al., *How Many Mountains Can We Mine? Assessing the Regional Degradation of Central Appalachian Rivers by Surface Coal Mining*, 46 Envtl. Sci. & Tech. 8115 (2012), Pls.' Ex. 2 (draft version); Tr. at 267. The article found that streams receiving water from mining catchments had significantly higher conductivity than streams in unmined areas. Pls.' Ex. 2. It also found that, after screening out potential confounding factors, high conductivity was highly correlated with lower numbers of intolerant taxa and declining WVSCI scores.[22] Pls.' Ex. 2; Tr. at 268-74. Additionally, using a different methodology than the EPA did in its Benchmark, the paper found that about five percent of taxa were lost at about 300 µS/cm—the same conclusion that the EPA came to in its Benchmark. Pls.' Ex. 2; Tr. at 83, 272.

Fourth, multiple different scientific methods were used at different times by different

[22] In their cross-examination of Dr. King, Defendants attempted to undermine the causal relationship between conductivity and low WVSCI scores shown in Dr. King's 2012 *How Many Mountains Can We Mine?* article by pointing out that the article's reported r-squared number of .36—a measure of total variability in data that is explained by the fitted line between two variables—shows that conductivity only accounts for 36% of the variability among WVSCI scores; thus, 64% of the variability is due to causes other than conductivity levels. *See* Tr. at 278-79, 282-83. Dr. King explained that at least half of the total variance in WVSCI scores relative to conductivity is attributed to variability in conductivity over time at a particular site, which can jump up and down a lot. *Id.* at 314, 336-37. He further explained that, for snapshot environmental conditions related to biology like this, an r-squared number of .36 reveals a strong relationship between variables. *Id.* at 316. For instance, the r-squared number for the correlation between cigarettes smoked and lung cancer is only about .08 to .15, but it is seen as highly significant and very predictive. *See id.* at 316. The Court credits Dr. King's explanation of the meaning of the r-squared number found in his 2012 article.

scientists to come to the same conclusions regarding the causal link between surface mining, conductivity, and biological impairment, which, Dr. Palmer testified, is the "strongest form of evidence" possible. Tr. at 83, 89-90, 248-52, 272, 274. For example, in its Benchmark, the EPA created a species sensitivity distribution—modeling the conductivity level at which each of 163 different genera are extirpated—which revealed that about five percent of taxa are lost at about 300 µS/cm. *See* EPA's Benchmark at 18-19. The Benchmark also used another method: modeling conductivity against WVSCI scores. *Id.* at A-35, -36. That modeled relationship revealed that the benchmark threshold of 300 µS/cm corresponded with a failing WVSCI score of 64. *Id.* at A-36. Using logistic regression, the probability of impairment—as measured by WVSCI—at 300 µS/cm was calculated to be 59%. *Id.* At 500 µS/cm, the probability of impairment was 72%. *Id.*; Tr. at 324. In the 2012 Bernhardt and King paper, two different methods were used to determine the biological impairment effects of conductivity: generalized additive regression models for three different biological response variables—including the number of intolerant taxa and WVSCI scores—and the Threshold Indicator Taxa Analysis ("TITAN") method, which Dr. King developed. *How Many Mountains* at C-D, P022-23; Tr. at 272, 274. Each of these different methods, conducted by different scientists at different times and subjected to the rigorous peer-review process required by scientific journals, resulted in the same conclusion: conductivity associated with surface mining causes biological impairment, such that about five percent of taxa are lost at about 300 µS/cm. EPA's Benchmark at 18, A-36; *How Many Mountains* at F; Tr. at 274.

Fifth, the Court finds the expert testimony of Dr. Palmer and Dr. King to be very persuasive. Among her many accomplishments, Dr. Palmer is a professor in the Department of Entomology at the University of Maryland, and she is the Director of the National Socio-Environmental Synthesis Center. Tr. at 52-53; Joint Ex. 28. Dr. Palmer has also published

almost 150 articles in scientific journals. Tr. at 55-56; Joint Ex. 28. Further, she has specifically published and given talks in the area of conductivity, surface mining, and effects upon macroinvertebrates; she teaches classes in stream ecology; and she has been working on insects in streams and rivers, including those in the Appalachian region, for over twenty years. Tr. at 53-55; Joint Ex. 28. Based upon these qualifications, Dr. Palmer was qualified as an expert in entomology, aquatic ecology, and conductivity as it relates to mountaintop mining and stream ecology. Tr. at 56. Dr. Palmer stated that, in her professional opinion, the science described above regarding the causal linkage between surface mining, conductivity, and biological impairment simply "[d]oesn't get any better." *Id.* at 90. She stated that she keeps up with the science in the area, yet she has not encountered a single scientific paper which contradicts these conclusions. *Id.* at 88.

Dr. King is a tenured professor in the Department of Biology at Baylor University, and in the past, among other positions, he worked as an ecologist at the Smithsonian Environmental Research Center in Edgewater, Maryland. *Id.* at 213; Joint Ex. 44. Dr. King has published approximately fifty academic papers, about half of which focus upon aquatic entomology, and he even wrote a chapter in a book regarding North American aquatic insects. Tr. at 214; Joint Ex. 44. Dr. King also has experience in the field regarding surface mining, entomology, and Appalachian streams, and he teaches an advanced ecological data analysis course to graduate students at Baylor. Tr. at 214-15, 217; Joint Ex. 44. Based upon these qualifications, Dr. King was qualified as an aquatic ecologist, aquatic entomologist, ecological data analyst, and expert on conductivity related to surface mining in Appalachian headwater streams.[23] Tr. at 218-20. Dr. King stated that, in his professional opinion, the science described above regarding the link between surface mining,

[23] The Court notes that, other than to quibble over whether Dr. King was an expert "statistician" or merely an expert "ecological data analyst," Defendants did not challenge the qualifications or areas of expertise of either Dr. Palmer or Dr. King. Tr. at 56, 219-20.

conductivity, and biological impairment is a "very mature science." *Id.* at 258-59. Dr. King also specifically opined that, based upon the scientific evidence presented, it "is clear . . . that conductivity associated with surface mining . . . unequivocally leads to the extirpation of a vast majority of [the] native taxa [which are] found in reference sites in Appalachian streams." *Id.* at 343-44.

Finally, even though the WVDEP's Guidance purports to find that there is no causative effect between conductivity and low WVSCI scores, two portions of the Guidance seriously undermine this assertion and, ironically, support Plaintiffs' case. First, the Guidance includes a scatterplot graph of conductivity and associated WVSCI scores which reveals a clear reduction in WVSCI scores as conductivity increases; in fact, above 1500 µS/cm, only 2 scores out of approximately 100 fall above the passing WVSCI score threshold of 68 and the vast majority fall under 60.6. WVDEP's Guidance at 6. This strong association supports, rather than contradicts, a causal connection. Second, Figure 2 in the Guidance concludes that conductivity measurements that fall within the range of 1075-1532.9 µS/cm are "likely stressor[s]" and that measurements above 1533 µS/cm are "definite stressor[s]." *Id.* at 7. Almost all of the recent conductivity measurements at the sites at issue in this case fall within these two categories; many are firmly within the "definite stressor" category. Thus, the WVDEP's Guidance is additional evidence that high levels of conductivity cause biological impairment.

In the face of such overwhelming scientific evidence,[24] this Court **FINDS** that Plaintiffs have proven, by a preponderance of the evidence, that, 1) controlling for other potential confounding factors, high conductivity in streams causes or at least materially contributes to a significant adverse impact to the chemical and biological components of aquatic ecosystems—proof of which can be shown through low WVSCI scores—and 2) surface mining

[24] Defendants presented no contrary scientific literature, even in their cross examinations of Plaintiffs' experts.

causes—or at least materially contributes to—high conductivity in adjacent streams.

2. Specific Causation

a. Elk Run: Laurel Creek Area Sampling

Elk Run owns and operates the White Castle No. 1 Surface Mine and the East of Stollings Surface Mine, both in Boone County, West Virginia. Stip. ¶¶ 1, 12, Joint Ex. 57. Each mine is regulated both by WV/NPDES permits and by West Virginia Surface Mining Permits issued by the WVDEP under the CWA and the SMCRA. *Id.* ¶¶ 3, 14. The East of Stollings Surface Mine has seven valley fills that discharge from Outfalls 001 through 007 and 019 into Mudlick Fork and Stolling Fork, tributaries of Laurel Creek. *Id.* ¶ 13. The White Castle No. 1 Surface Mine has seven valley fills that discharge from Outlets 001, 002, 003, 004, and 017 directly into Laurel Creek. *Id.* ¶ 2.

On May 1, 2013, Plaintiffs' sampler, Evan Hansen of Downstream Solutions, collected water samples 1) directly from East of Stollings Surface Mine Outfalls 019, 002, and 003—respectively, from upstream to downstream—, which empty into Mudlick Fork, 2) directly from East of Stollings Surface Mine Outfalls 007, 006, 005, and 004—respectively, from upstream to downstream—, which empty into Stolling Fork, 3) from an instream sample site in upper Laurel Creek ("ULC")—after Mudlick Fork and Stolling Fork converge into Laurel Creek—, and 4) from an instream sample site in downstream Laurel Creek ("DLC")—after the outfalls from the White Castle No. 1 Surface Mine have also emptied into Laurel Creek. Joint Exs. 60, 91; Tr. at 30-36. While on site, Mr. Hansen documented the temperature, conductivity, dissolved oxygen, and pH of the water from which he collected the samples. Tr. at 41; Joint Exs. 5-6.

On September 20, 2012, and on May 1, 2013, Dr. Christopher Swan, also hired by Plaintiffs, collected biological samples from ULC and DLC and calculated WVSCI scores from

those samples. Tr. at 8, 18-19, 43; Joint Exs. 24-27; Pls.' Ex. 18a; Defs.' Ex. 128 at 7. On September 20, 2012, Dr. Swan also collected water samples from those sites and documented the temperature, conductivity, dissolved oxygen, and pH of the water from which he collected the samples.[25] Tr. at 36, 43-44; Joint Ex. 6.

On July 12, 2013, Defendants' expert, Dr. Charles Menzie of the engineering and scientific consulting firm Exponent, visited ULC, DLC, and three reference sites, two of which—Neal Branch and 17332—were chosen from the WVDEP's database of reference sites. Tr. at 347, 364-66, 371; Joint Ex. 122. The third site, Ash Fork, was chosen by Dr. Menzie as a reference site because it is known to be "unaffected by mining." Tr. at 365-66. All three reference sites drain into Twentymile Creek—which is near Alex Energy's mines—at different points. *Id.* at 365; Joint Ex. 128. At each of the five sites, Dr. Menzie took photographs, assessed habitat—including embeddedness, epifaunal substrate, substrate (sedimentation), and canopy cover—using the EPA's rapid bioassessment protocol ("RBP"),[26] and gathered temperature, conductivity, total

[25] At trial, Defendants objected to the entirety of Dr. Swan's benthic sampling based upon his failure to obtain a collection permit from the State of West Virginia pursuant to West Virginia Code § 20-2-50. Tr. at 21; *see* W. Va. Code § 20-2-50 ("Any person desiring to collect or procure any wildlife, including any body tissue, organ or other portion thereof, eggs, nesting materials or other materials from the habitat of such wildlife shall be required to make application to the director for a scientific collecting permit."); *see also* W. Va. Code § 20-7-9 ("Any person violating any of the provisions of this chapter or rules promulgated under the provisions of this chapter, the punishment for which is not prescribed, shall be guilty of a misdemeanor . . . ."). The Court took the objection under advisement. Tr. at 25. Although Plaintiffs addressed this objection in their post-trial briefing, Defendants did not do so. At trial, Defendants stated—without citation—that the West Virginia Supreme Court of Appeals has held that evidence obtained through the violation of a criminal statute can be excluded. *Id.* at 22-23. However, this is not a West Virginia state court. In the context of federal criminal cases, the Fourth Circuit has repeatedly clarified that "evidence admissible under federal law cannot be excluded [merely] because it would be inadmissible under state law." *United States v. Van Metre*, 150 F.3d 339, 347 (4th Cir. 1998). The Court sees no reason that this principle of federal courts abiding by federal—not state—evidentiary rules should be any different in civil cases brought in federal court under federal question jurisdiction, as is the situation here. Defendants provide no federal evidentiary argument for excluding from presentation in a federal civil case evidence obtained in violation of state law. The Court thus **DENIES** this objection. *See also Capitol Records Inc. v. Thomas-Rasset*, 680 F. Supp. 2d 1045, 1058 (D. Minn. 2010) (evidence gathered by a private detective in violation of a state licensing and wiretap statute was admissible in federal court, where the detective did not intercept or use the communication for the purpose of committing a crime or tort).

[26] As described by Dr. Menzie, RBP is "a qualitative/semi-quantitative . . . [multi-metric] methodology for scoring habitats" which aggregates scores gathered across ten different categories. Tr. at 366, 369; *see also* Tr. at 234. The scoring for each category ranges from 0 (poor) to 20 (optimal) or 0 (poor) to 10 (optimal), with four decreasing categories which can be assigned based upon those scores: optimal, suboptimal, marginal, and poor. *See* Joint Ex. 133;

dissolved solids, pH, turbidity, and dissolved oxygen data directly from the stream. Tr. at 364-65, 367, 369, 381; Joint Exs. 123, 132, 135.

The following table compiles the data collected at ULC, DLC, Neal Branch, 17332, and Ash Fork by each of the three samplers:[27]

	ULC	DLC	Neal Branch	17332	Ash Fork
WVSCI:					
Swan (9/20/12)	51.70	55.81	-	-	-
Swan (5/1/13)	44.05	37.96	-	-	-
Conductivity (µS/cm):					
Swan (9/20/12)	2,360	1,917	-	-	-
Hansen (5/1/13)	2,425	1,678	-	-	-
Menzie (7/12/13)	2,280	1,906	40	39	29
pH:					
Swan (9/20/12)	7.7	7.6	-	-	-
Hansen (5/1/13)	8.0	6.4	-	-	-
Menzie (7/12/13)	8.18	8.13	6.98	6.96	6.63
Temperature (°C):					
Swan (9/20/12)	12.2	14.0	-	-	-
Hansen (5/1/13)	14.3	13.9	-	-	-
Menzie (7/12/13)	23.79	26.67	18.85	20.09	18.53

The following table compiles the key extra data collected on July 12, 2013, by only Dr. Menzie at ULC, DLC, Neal Branch, 17332, and Ash Fork:[28]

Tr. at 234.

[27] *See* Joint Exs. 6, 24, 25, 132.

[28] *See* Joint Ex. 133; *see* also Joint Ex. 135.

	ULC	DLC	Neal Branch	17332	Ash Fork
Total Dissolved Solids (g/L)	1.517	1.201	0.029	0.028	0.022
Turbidity (NTU+)	-12.2	-50.1	-38.5	-43.5	-39.4
Embeddedness[29]	7 (Marginal)[30]	8 (Marginal)[31]	18 (Optimal)	15 (Suboptimal)[32]	20 (Optimal)
Epifaunal Substrate[33]	8 (Marginal)	10 (Marginal)	17 (Optimal)	16 (Optimal)	18 (Optimal)
Sediment Deposition[34]	13 (Suboptimal)	11 (Suboptimal)	17 (Optimal)	12 (Suboptimal)	18 (Optimal)
Total RBP Score	116.5 (Suboptimal)	122 (Suboptimal)	161 (Optimal)	147 (Suboptimal)	173 (Optimal)

In order to prove that Elk Run has committed at least one violation of its permits, Plaintiffs must demonstrate, by a preponderance of the evidence, that 1) high conductivity in upper and/or downstream Laurel Creek is causing or materially contributing to a significant adverse impact to the chemical or biological components of the creek's aquatic ecosystems and 2) Elk Run's White Castle No. 1 Surface Mine and/or East of Stollings Surface Mine are the cause of—or at least materially contributing to—this high conductivity.

First, reviewing the conductivity and WVSCI data collected—by the WVDEP, the EPA, Mr. Hansen, Dr. Swan, Dr. Menzie, Elk Run, and a previous mining company—from the specific

[29] 0 = poor, 20 = optimal.

[30] Two exhibits prepared by Dr. Menzie conflict regarding the embeddedness rating for ULC. Joint Exhibit 135, the higher level summary, shows that ULC's embeddedness rating is "75-100% (Poor)"; however, Joint Exhibit 133 gives a detailed average score of 7/20 and the higher rating of "Marginal," which appears to properly correspond with a score of 7/20. The Court assumes that Dr. Menzie made a mistake when he transferred the detailed score from the chart in Exhibit 133 to the more generalized chart in Exhibit 135. Thus, the Court credits only the more detailed score and rating from Exhibit 133.

[31] Like with ULC, Joint Exhibits 133 and 135 conflict regarding the embeddedness rating for DLC. Exhibit 135 shows DLC's embeddedness rating as "1-25% (Optimal)"; however, Exhibit 133 gives a detailed average score of 8/20 and the lower rating of "Marginal," which appears to properly correspond with a score of 8/20. Like with ULC, the Court credits only the more detailed score and rating from Exhibit 133.

[32] Like with ULC and DLC, Joint Exhibits 133 and 135 conflict regarding the embeddedness rating for 17332. Exhibit 135 shows 17332's embeddedness rating as "1-25% (Optimal)"; however, Exhibit 133 gives a detailed average score of 15/20 and the lower rating of "Suboptimal," which appears to properly correspond with a score of 15/20. Like with both ULC and DLC, the Court credits only the more detailed score and rating from Exhibit 133.

[33] 0 = poor, 20 = optimal. Scores shown here are taken from Joint Exhibit 133. The epifaunal substrate scores for ULC and DLC in Joint Exhibit 135 vary slightly from those in Exhibit 133. Like with the embeddedness rating conflicts between these two exhibits, the Court credits only the score and rating from Exhibit 133.

[34] 0 = poor, 20 = optimal.

sites nearby White Castle No. 1 Surface Mine and the East of Stollings Surface Mine which are at issue in this case, there is a pattern over time whereby conductivity increases and WVSCI scores decrease. Conductivity in Mudlick Fork, Stolling Fork, and Laurel Creek was historically low, but since Elk Run's mines have been operating in the area, conductivity has shot upward dramatically, to the point where most recent measurements range[35] from approximately 1500 µS/cm to approximately 3000 µS/cm—and all the way up to approximately 4180 µS/cm—, with only sporadic exceptions dropping below 1000 µS/cm.[36] *See* Joint Exs. 6, 29, 132; Stip. ¶¶ 6, 17, 19, 22; *see also* Stip. ¶ 7. Additionally, monitoring data from these two mines' outfalls since 2007 predominantly show similarly extremely high conductivity levels; thus, the outfalls are contributing large amounts of the ions which cause high conductivity into Laurel Creek. *See* Joint Exs. 5, 30, 31; Stip. ¶¶ 8-9, 20-21; *cf.* Stip. ¶ 7 (showing historically low conductivity levels for White Castle No. 1 Surface Mine outfalls). At the same time, WVSCI scores from the area have decreased, with all scores since 2007 revealing impairment (68 or below). Stip. ¶¶ 10-11; Joint Exs. 24, 25; *see also* Stip. ¶ 17-18; *cf.* Joint Ex. 61 at 3 (A 1992 study conducted in Mudlick Fork, Stolling Fork, and upper Laurel Creek found that "benthic macroinvertebrate communities were well-balanced and dominated by pollution-sensitive families.").

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[35] As explained by Dr. King, conductivity measurements will vary greatly from moment to moment for a number of reasons, including precipitation and the amount of water coming out of a nearby outfall at any given time. *See* Tr. at 231. Thus, the most accurate portrayal of conductivity levels at a particular site is created by taking repeated readings of conductivity at that site over an extended period of time. *See id.*

[36] In 1982—prior to the creation of both the East of Stollings Surface Mine and the White Castle No. 1 Surface Mine—sampling in Laurel Creek, into which both mines now ultimately discharge, revealed conductivity levels in the range of 46 to 807 µS/cm. *See* Stip. ¶ 6; Joint Ex. 89. In 1991, sampling by Elk Run from three of its White Castle No. 1 Surface Mine outlets revealed conductivity levels in the range of 70.9 to 196 µS/cm; sampling from those same outlets in 2007 revealed conductivity levels in the range of 1177 to 4460 µS/cm. Stip. ¶¶ 7-8. Sampling through the present day reveals that these outlets continue to discharge very high levels of conductivity. *See id.* ¶ 9 & tbl. A (compiling 2008 to 2013 sampling data from White Castle No. 1 Surface Mine outlets). Also, in 1992, prior to the creation of the East of Stollings Surface Mine, conductivity measurements in Mudlick Fork, Stolling Fork, and upper Laurel Creek were all below 100 µS/cm. *See* Stip. ¶ 17. In 1994, sampling on Mudlick Fork and Stolling Fork continued to show conductivity levels below 100 µS/cm. *See id.* ¶ 19. In contrast, conductivity measurements in Mudlick Fork, Stolling Fork, ULC, and DLC from 2009 to present day are all extremely high, as are 2007 and 2009 conductivity measurements from the East of Stollings Surface Mine outlets. *See id.* ¶¶ 20-22 & tbl. B; Joint Exs. 6, 29, 132.

In addition, taxonomic changes to the benthic macroinvertebrate community in upper and downstream Laurel Creek reveal that conductivity—and not other potentially confounding factors, such as habitat—is the primary cause of biological impairment. First, key taxa in unimpacted Appalachian streams ("reference streams") which are known to be sensitive to high conductivity yet not very sensitive to habitat degradation, particularly mayflies (Ephemeroptera)—which were historically present at Laurel Creek—, are now entirely absent from the creek. Tr. at 255-56, 261-64, 299; *see* Joint Exs. 26, 27, 61; Pls.' Ex. 18a; Stip. ¶ 18. Second, taxa known to proliferate in high conductivity environments—because of reduced predation by and competition for resources from struggling and/or extirpated conductivity-sensitive taxa—, chiefly Hydropsychidae,[37] are present in relatively large numbers in Laurel Creek, to the point of dominating the benthic macroinvertebrate community there. Tr. at 260-65; *see* Joint Exs. 27, 45; Pls.' Ex. 18a. In his 2012 *How Many Mountains Can We Mine?* article, Dr. King found ten taxa to be reliable threshold indicators of high conductivity, meaning that they increased in frequency and abundance in response to elevated conductivity. Tr. at 265-66. Of those ten taxa, six were found at DLC, some in relatively large numbers. *See* Joint Ex. 45. Third, taxa known to be comparatively tolerant of high conductivity yet very sensitive to habitat degradation, particularly Elmidae, are also present in Laurel Creek. Tr. at 260-65, 298, 328; *see* Joint Ex. 27; Pls.' Ex. 18a. Fourth, consistent with high conductivity, there is an overall reduction in the abundance of benthic

[37] At trial, Defendants insinuated that the testimony of Dr. King—qualified as an expert in aquatic entomology—regarding the causal link between high conductivity and Hydropsychidae prevalence was not credible because a summary of field data for Robinson Fork prepared by Plaintiffs' counsel showed extremely low pre-mining conductivity—40 µS/cm—from 1977 coupled with Hydropsychidae as the "dominant taxa." Tr. at 299-303; Defs.' Ex. 128; *see also* Tr. at 127-28. Later, upon closer examination of the underlying data, Dr. King pointed out that 1) the collecting method used in 1977 was not that which is required for WVSCI, so comparison is inapposite and 2) the data, itself, is very coarse—with the collector marking merely "X" for present and "A" for abundant and notating no further quantitative data—, so the information collected then is of limited value today. *See* Tr. at 322-23; *see also* Joint Ex. 117. Given the imprecise collection methodology used for this 1977 survey, the Court gives it little weight. The Court instead credits Dr. King's scientific judgment regarding the causal link between high conductivity and the increased prevalence of Hydropsychidae, based upon his expertise in the area.

macroinvertebrates collected at Laurel Creek, such that Dr. King described the Fall 2012 collection numbers for both ULC and DLC as "depauperate" and the Spring 2013 collection numbers for these sites as still very low. Tr. at 228-30; *see* Joint Exs. 24, 25, 27; Pls.' Ex. 18a.

Dr. Menzie—whom Defendants hired only to "critique the technical basis for [P]laintiffs' experts arriving at the conclusions they did" regarding conductivity causing biological impairment at Laurel Creek and Robinson Fork and not to conduct any causal analysis himself—presented several potential "confounding factors" which, in his opinion, had not been adequately ruled out by Dr. Palmer and Dr. King before they concluded that conductivity was causing biological impairment at these sites. Tr. at 354-55, 382-83. Using photographs and videos he took at ULC and DLC, Dr. Menzie testified that, unlike the reference streams, 1) ULC had an open canopy, contained lots of silt from the adjacent haul road, and had periphyton all over the rocks and 2) DLC had a partly open canopy, was one of the warmest sites overall, and contained lots of silt, which had gathered on rocks and on the bottom of the creek. *Id.* at 371-77; *see* Joint Exs. 123e-f, l-o, t-u. Dr. Menzie opined that, based upon his preliminary work, temperature, pH, and siltation—particularly siltation which has built up between the rocks on the bottom of the creek, called embeddedness—are all potential causes, along with conductivity, for the biological impairment at these sites. Tr. at 256, 379-81, 411; *see also* Joint Exs. 132, 133, 135.

Regarding the temperatures and canopy cover observations collected by Dr. Menzie at ULC and DLC, Dr. King testified that, unequivocally, neither are sufficient to cause the level of biological impairment seen at these sites. Tr. at 238-39, 247-48, 445. Additionally, he noted that snapshot temperatures taken at different times from different streams are quite useless since water temperature changes from minute-to-minute and day-to-day and that suggesting, based upon these temperature readings, that the level of impairment seen at ULC and DLC could be caused by high

water temperature is simply not good science. *Id.* at 238-39, 247, 444-45; *see also id.* at 407-08. Dr. Palmer noted that the temperature data for these sites is "well within the temperature tolerance range of organisms in this system," so no scientist familiar with this ecosystem would consider those temperatures to be noteworthy. *See id.* at 405, 426-28. Additionally, the EPA's Benchmark found that, in Appalachian streams with high temperatures (over 22ºC) but also low conductivity levels (less than 200 µS/cm), mayflies would be present 100% of the time. Additionally, mayflies would be found 99% of the time at such streams with low temperatures (under 17ºC) but also low conductivity. EPA's Benchmark at B-21. However, despite that ULC and DLC displayed low temperatures during Dr. Swan's sampling trips and despite Dr. Menzie's opining that high temperatures could be the cause of impairment based upon the high temperatures he took in July 2013, absolutely no mayflies were found at ULC and DLC on either of Dr. Swan's collecting trips. *See* Tr. at 257, 440-41, 448-49; Joint Exs. 6, 26, 27, 132; Pls.' Ex. 18a.

Regarding the pH and total dissolved solids data collected by Dr. Menzie, Dr. King testified that neither metric can be viewed in isolation from the conductivity data as potential "confounding" factors because 1) conductivity measures the electrical current created by dissolved ions, 2) total dissolved solids measures the mass of those *same* ions, and 3) pH is a functional component of conductivity, such that it should increase when water contains extra bicarbonate—one of the component ions which is measured by conductivity. Tr. at 241-42, 443-44. Additionally, Dr. Palmer testified that the pH data for ULC and DLC are well within the tolerance range of the organisms in these streams. *See id.* at 405.

Regarding the sedimentation RBP scores given to ULC and DLC by Dr. Menzie, Dr. Palmer noted that they are, overall, "not that bad," given that both scores merit a rating of "suboptimal," which is ranked just below the best rating ("optimal") and above the remaining

ratings of "marginal" and "poor." *See id.* at 409; *see also* Joint Ex. 133. In fact, one of the *reference* streams, 17332, was given a sedimentation score of 12 by Dr. Menzie, while ULC and DLC's sedimentation scores are 13 and 11, respectively. Joint Ex. 133. Additionally, the EPA's Benchmark found that, in Appalachian streams with low embeddedness scores (less than 7—lower than the scores of 7 and 8 from ULC and DLC) but also low conductivity levels (less than 200 µS/cm), mayflies would be present 95% of the time; however, no mayflies were found at either site during both of Dr. Swan's collecting trips. *See* EPA's Benchmark at B-15; Joint Exs. 26, 27, 133; Tr. at 256-57, 439-40; Pls.' Ex. 18a.

While reviewing the same photos of ULC and DLC about which Dr. Menzie testified, Dr. King stated that he did not see any real sedimentation problem in these streams; instead, what he saw was calcium carbonate precipitate—with which he is very familiar based upon his studies of streams in Texas where such precipitate is common—, which is caused by the ions measured by conductivity coming out of solution and solidifying onto the rocks. *See* Tr. at 243-46, 292-93. Dr. King further testified that what Dr. Menzie had testified was siltation could not be, since fine sediment gathers in the interstitial spaces between rocks but the areas between the rocks in these pictures were clear; instead, the photos revealed calcium carbonate precipitate on *top* of the rocks, where fine sediment does not normally attach. *See id.* at 244-46. Dr. King further noted that periphyton, which is a community of algae, bacteria and fungi that attaches to rocks, is normal in streams. *Id.* at 242. Dr. Palmer agreed with Dr. King on all of these points, also noting the chalkiness of the water at these sites, which is characteristic of high conductivity, and stating that a certain amount of siltation is entirely normal. *See id.* at 134, 145-46, 190, 412-16, 418-23.

Regarding the overall RBP scores gathered by Dr. Menzie for ULC and DLC—which fell within the suboptimal category—, Dr. King testified that Appalachian streams commonly fall

within the suboptimal category and noted that even one of Dr. Menzie's reference sites, 17332, received a score of suboptimal. *Id.* at 235-36; *see* Joint Ex. 133. Dr. King also stated that the purpose of RBP is to determine, when there is biological impairment at a site, whether habitat could be the reason for such impairment; however, in his professional experience, he has never seen scores in this range resulting in the level of biological impairment seen at these sites. Tr. at 237, *see also* Tr. at 446. Dr. Palmer stated that a suboptimal habitat score is not something that would worry her and that, to give context, in some of the impaired streams in which she works which are slated for restoration, the total habitat scores are 25 or 30, not 116.5 and 122, like ULC and DLC. *See id.* at 409-10; Joint Ex. 133. Additionally, the EPA's Benchmark found that, in Appalachian streams with low total habitat scores (less than 115—lower than the scores at these sites) but also low conductivity levels (less than 200 μS/cm), mayflies would be present 99% of the time; however, no mayflies were found at either ULC or DLC during both of Dr. Swan's sampling trips. *See* EPA's Benchmark at B-11; Tr. at 438-39; Joint Exs. 26, 27, 133; Pls.' Ex. 18a.

Despite reviewing all of the information gathered by Dr. Menzie, both Dr. King and Dr. Palmer continued to conclude that habitat—including temperature, pH, and siltation—simply was not the cause of biological impairment at these sites.[38] Tr. at 246-47, 255-56, 290, 410, 424, 428-29, 432-33, 436-37, 446. Dr. Palmer also testified that, unlike the habitat data, the differences in conductivity between the reference sites and ULC and DLC are huge, "on the order of magnitude that far exceed what [she] kn[ows] from the literature to impact biota in [such]

[38] At trial, Defendants repeatedly stressed that neither Dr. Palmer nor Dr. King personally visited any of the sites at issue in this case. *See, e.g.*, Tr. at 144-46, 149, 429-32. However, when Dr. Menzie testified regarding his site visits, he came to conclusions based upon the data he gathered, using the photographs and videos he took on site. Dr. Palmer and Dr. King merely did the same. Given Dr. Palmer and Dr. King's prior experiences conducting fieldwork in Appalachian streambeds—unlike Dr. Menzie—, the Court is unconvinced by Defendants' insinuation that the testimony of these experts should not be credited simply because they did not visit the sites in person. *Id.* at 384-85.

streams." *See id.* at 405. Given their extensive experience in this area, the Court credits Dr. Palmer and Dr. King's expert testimony.

At trial, Defendants attempted to rebut the specific causation element of Plaintiffs' case regarding both sites by claiming that, contrary to the EPA's CADDIS method for determining the cause of biological impairment, Dr. Palmer and Dr. King improperly converted general causation literature regarding conductivity and impairment into specific causation findings at each site without adequately assessing and ruling out other potential causative factors, such as habitat. *See, e.g.*, *id.* at 129-132, 157-159. Defendants specifically point to step two of the multi-step causal analysis which requires that, after defining the case, the assessing scientist should "list the candidate causes" of impairment. *Id.* at 131; *see* Defs.' Ex. 18 at CADDIS000015. Defendants argue that both Dr. Palmer and Dr. King failed to list any candidate cause except for conductivity, and later, when Dr. Menzie's report listed other candidate causes, Dr. Palmer and Dr. King continued to fail to adequately assess those other potential causes since they had already decided upon conductivity as the cause, based solely upon their knowledge of the general causation literature related to this case. *See* Defs.' Post-Trial Brief at 14-15, ECF No. 107. Defendants further point to Step 4 of the CADDIS method—"Evaluate Data from Elsewhere"—which states:

> Data from elsewhere may include information from other sites within the region; stressor-response relationships derived from field or laboratory studies; studies of similar situations in other streams, and numerous other kinds of information. . . . You cannot use evidence developed using data from elsewhere to eliminate a particular candidate cause; this evidence is used only to compare the strength of evidence associated with each cause.

See Defs.' Ex. 18 at CADDIS000047.

Plaintiffs point to the EPA's "Stressor Identification Guidance Document," which further explains how to apply the CADDIS method. *See* Tr. at 188. In its section regarding how to develop a list of candidate causes, the Document states:

> Where multiple stressors contribute to cause an effect, the stressor that makes the largest contribution is the principal cause. Usually a principal cause is so dominant that removing the other causes has no effect on the condition of the resource. For example, if the benthic habitat is both physically altered and chemically contaminated, restoring the physical habitat may have no effect until the chemical contamination is removed. In this situation chemical contamination is the principal cause. The habitat alteration is still a cause of impairment, but it is ancillary and masked by the toxic impact.

See id. Dr. King stated that this was precisely his reasoning regarding the specific causation of impairment at the sites in this case. *Id.* at 442. Based upon the scientific literature and his experience, he believes that, if the habitat at the sites was perfect, conductivity would still cause impairment and that, if conductivity at the sites were reduced to below 300 µS/cm, over time these streams would come to be unimpaired; thus, conductivity is the principal cause of biological impairment at these sites. *See id.*

Dr. Palmer also stressed that, though CADDIS is a reasonable approach to a causation problem which is based upon the scientific method, it is not the sole method used by scientists when assessing the specific causation of impairment. *Id.* at 129-132. To the contrary, CADDIS is most appropriate when evaluating a problem in an unexplored area of research, where the evaluator has no baseline research off of which to work. *See id.* at 402. In the instant situation, a large amount of preliminary research in this area had already been done, so the baseline pointed to one factor—conductivity—which was likely to trump all of the others. *Id.* at 402-403. In this way, science builds upon prior science; a scientist need not re-create the wheel during every project. Given their extensive expertise in this area, the Court continues to credit Dr. Palmer and Dr. King's testimony about the specific causation of impairment at these sites, regardless of the fact that they did not explicitly use the nonexclusive CADDIS method for their analysis.

Defendants also attempt to discredit Dr. Palmer and Dr. King's expert testimony by labeling them "advocates." First, they note that Dr. Palmer has testified for the Sierra Club a

number of times, that she recommended in her 2010 *Science* paper that no new surface mining permits be granted, and that she appeared on the television show *The Colbert Report*. *Id.* at 132. Second, Defendants note that, in 2012, Dr. King submitted a comment to the WVDEP during an open comment period on West Virginia's 2012 303(d) list which expressed concerns with the use of 60.6 as the WVSCI threshold—concerns which were clearly shared by the EPA. *Id.* at 308-10; *see* Defs.' Ex. 123. The Court is not persuaded by these attempts at impeachment. Throughout their testimony, Dr. Palmer and Dr. King spoke in terms of scientific literature and findings, and Defendants failed to even minimally rebut the science supporting their testimony. The Court thus credits Dr. Palmer and Dr. King's expert testimony as based upon scientific research, not bias.

Given the large body of evidence presented by Plaintiffs and the lack of any meaningful counter-evidence, the Court **FINDS** that Plaintiffs have demonstrated, by a preponderance of the evidence, that 1) high conductivity in upper and downstream Laurel Creek is causing—or, at the very least, materially contributing to—a significant adverse impact to the chemical and biological components of the creek's aquatic ecosystems and 2) Elk Run's White Castle No. 1 Surface Mine and/or East of Stollings Surface Mine are the cause of—or, at the very least, materially contributing to—this high conductivity. The Court thus **FINDS** that Plaintiffs have proven that Elk Run has committed at least one violation of its permits.

b. Alex Energy: Robinson Fork Area Sampling

Alex Energy operates the Robinson North Surface Mine and the Wildcat Surface Mine, both in Nicholas County, West Virginia. Stip. ¶¶ 23, 45. Each mine is regulated both by WV/NPDES permits and by West Virginia Surface Mining Permits issued by the WVDEP under the CWA and the SMCRA. *Id.* ¶¶ 27, 47. The Robinson North Surface Mine has four valley fills that discharge from Outlets 001, 002, and 003 into Robinson Fork. *Id.* ¶ 26. The Wildcat Surface

Mine has a large valley fill which discharges from Outlet 004 into an unnamed tributary of Robinson Fork and from Outlet 007 into Wildcat Hollow, also a tributary of Robinson Fork. *Id.* ¶ 46.

On May 1, 2013, Mr. Hansen collected water samples 1) directly from Robinson North Surface Mine Outfalls 001 and 003, which empty into Robinson Fork, and 2) from an instream sample site on downstream Robinson Fork ("DSRF"), very close to where Robinson Fork drains into Twentymile Creek and downstream from the outfalls of both the Robinson North Surface Mine and the Wildcat Surface Mine. Tr. at 36-40. While on site, he documented the temperature, conductivity, dissolved oxygen, and pH of the water from which he collected the samples. Tr. at 41; Joint Exs. 7-8.

On September 20, 2012, and on May 1, 2013, Dr. Swan collected biological samples from DSRF and calculated WVSCI scores from those samples. Tr. at 8, 18-19, 43; Joint Exs. 24-27; Pls.' Ex. 18a; Defs.' Ex. 128 at 7. On September 20, 2012, he also collected water samples at that site and documented the temperature, conductivity, dissolved oxygen, and pH of the water from which he collected the samples. Tr. at 39, 45; Joint Ex. 8.

On July 12, 2013, Dr. Menzie visited DSRF and, as explained earlier, three reference sites—Neal Branch, 17332 and Ash Fork—all of which drain into Twentymile Creek at different points. Tr. at 364-66, 371; Joint Ex. 128. Dr. Menzie also gathered data from Twentymile Creek just upstream from the mouth of Robinson Fork. Tr. at 366; Joint Ex. 132. At each of the four key sites, Dr. Menzie took photographs, assessed habitat—including embeddedness, epifaunal substrate, substrate (sedimentation), and canopy cover—using RBP, and gathered temperature, conductivity, total dissolved solids, pH, turbidity, and dissolved oxygen data directly from the stream. Tr. at 364-65, 367, 369, 381; Joint Exs. 123, 132, 135.

The following table compiles the key data collected at DSRF, Twentymile Creek, Neal Branch, 17332, and Ash Fork by each of the three samplers:[39]

	DSRF	Twentymile Creek	Neal Branch	17332	Ash Fork
WVSCI:					
Swan (9/20/12)	52.44	-	-	-	-
Swan (5/1/13)	48.65	-	-	-	-
Conductivity (µS/cm):					
Swan (9/20/12)	2,025	-	-	-	-
Hansen (5/1/13)	1,892	-	-	-	-
Menzie (7/12/13)	1,638	1,227	40	39	29
pH:					
Swan (9/20/12)	7.6	-	-	-	-
Hansen (5/1/13)	7.9	-	-	-	-
Menzie (7/12/13)	8.12	7.84	6.98	6.96	6.63
Temperature (°C):					
Swan (9/20/12)	18.8	-	-	-	-
Hansen (5/1/13)	19.1	-	-	-	-
Menzie (7/12/13)	23.34	22.05	18.85	20.09	18.53

The following table compiles the key extra data collected on July 12, 2013, by only Dr. Menzie at ULC, DLC, Neal Branch, 17332, and Ash Fork:[40]

[39] *See* Joint Exs. 8, 24, 25, 132.
[40] *See* Joint Ex. 133; *see* also Joint Ex. 135.

	DSRF	Twentymile Creek	Neal Branch	17332	Ash Fork
Total Dissolved Solids (g/L)	1.1	0.845	0.029	0.028	0.022
Turbidity (NTU+)	-49	-48.8	-38.5	-43.5	-39.4
Embeddedness[41]	16 (Optimal)[42]	-	18 (Optimal)	15 (Suboptimal)	20 (Optimal)
Epifaunal Substrate[43]	11 (Suboptimal)	-	17 (Optimal)	16 (Optimal)	18 (Optimal)
Sediment Deposition[44]	13 (Suboptimal)	-	17 (Optimal)	12 (Suboptimal)	18 (Optimal)
Total RBP Score	125.5 (Suboptimal)	-	161 (Optimal)	147 (Suboptimal)	173 (Optimal)

In order to prove that Alex Energy has committed at least one violation of its permits, Plaintiffs must demonstrate, by a preponderance of the evidence, that 1) high conductivity in downstream Robinson Fork is causing or materially contributing to a significant adverse impact to the chemical or biological components of the stream's aquatic ecosystems and 2) Alex Energy's Robinson North Surface Mine and/or Wildcat Surface Mine are the cause of—or at least materially contributing to—this high conductivity.

Reviewing the conductivity and WVSCI data collected—by Alex Energy, the WVDEP, Mr. Hansen, Dr. Swan, and Dr. Menzie—from the specific sites nearby the Robinson North Surface Mine and the Wildcat Surface Mine which are at issue in this case, there is a clear pattern over time whereby conductivity increased and WVSCI scores decreased. Conductivity in Robinson Fork was historically very low,[45] but since Alex Energy's mines have been operating in the area, conductivity has shot upward dramatically, to the point where most recent measurements

[41] 0 = poor, 20 = optimal.
[42] Like with ULC, DLC, and 17332, Joint Exhibits 133 and 135 conflict regarding the embeddedness rating for DSRF. Exhibit 135 shows DSRF's embeddedness rating as "25-50% (Suboptimal)"; however, Exhibit 133 gives a detailed average score of 16/20 and the higher rating of "Optimal," which appears to properly correspond with a score of 16/20. Like with ULC, DLC, and 17332, the Court credits only the more detailed score and rating from Exhibit 133.
[43] 0 = poor, 20 = optimal.
[44] 0 = poor, 20 = optimal.
[45] A 1977-78 survey, which Defendants represented at trial to have been conducted pre-mining in the area, reported the conductivity in Robinson Fork on November 2, 1977, December 1, 1977, and March 9, 1978, to be 40 µS/cm, 42 µS/cm, and 35 µS/cm, respectively. Tr. at 299, 302; Joint Ex. 117 at 51, 62.

range from approximately 1500 µS/cm to approximately 3000 µS/cm—and all the way up to approximately 4240 µS/cm. Joint Exs. 8, 37, 117, 132; Stip. ¶¶ 32, 39, 42-44; Defs.' Ex. 128; Tr. at 91, 299, 302; *see also* Stip. ¶¶ 30-31. Additionally, recent monitoring data from these two mines' outfalls show similarly extremely high conductivity levels; thus, the outfalls are contributing large amounts of the ions which cause high conductivity into Robinson Fork. *See* Joint Exs. 7, 38, 39; Stip. ¶¶ 35-38, 41, 50-54. At the same time, WVSCI scores from the downstream Robinson Fork area have clearly decreased over time, with no passing score (above 68) since 2003 and recent scores in the 50 to 60 range. Joint Exs. 24, 25; Stip. ¶¶ 40, 42, 44.

At trial, Defendants attempted to rebut both the general causal relationship between conductivity and low WVSCI scores and the specific causal relationship between those two variables at Robinson Fork by pointing, first, to a prediction made in Dr. King's initial expert report and, second, to several specific measurements over time at Robinson Fork which did not fit this prediction. *See* Tr. at 284-88. Dr. King's expert report states:

> Streams and outfalls influenced by mining in the Mudlick/Laurel Creek and Robinson Fork drainages have measured conductivity levels that far exceed the US EPA conductivity benchmark of 300 µS/cm and the WVSCI-conductivity threshold as reported in Bernhardt et al. (2012) of 308 µS/cm (245-385 µS/cm, 95% confidence interval of threshold). *Most observations exceed 1000 µS/cm, with some >2000 µS/cm. WVSCI scores based on these conductivities* and the empirical relationships reported by Bernhardt et al. (2012) *are predicted to be approximately 50-60*, well below the biological impairment threshold of 68. Indeed, 2012 benthic macroinvertebrate samples collected by Dr. Chris Swan resulted in WVSCI scores of 53.45 (Mudlick), 57.83 (DLC), and 57.32 (Robinson), all well below the biological impairment threshold and *within the range predicted by the conductivity-WVSCI model* in Bernhardt et al. (2012).

Defs.' Ex. 4 (emphasis added). Thus, the report predicts that conductivity levels primarily ranging from 1000 µS/cm to 2000 µS/cm will likely correspond with WVSCI scores which fall within the range of 50-60.

While cross-examining Dr. King regarding this prediction, Defendants drew attention to a table of Robinson Fork sampling data which was compiled by Plaintiffs' counsel. *See* Defs.' Ex. 128 at 8-9. Defendants highlighted multiple WVSCI scores above 60 in the table, which, Defendants argued, undermined Dr. King's prediction that conductivity readings of 1000 µS/cm and above would correspond with WVSCI scores which fall within the range of 50-60. *See* Tr. at 285-90; *see also* Defs.' Ex. 128 at 8-9 (highlighting all WVSCI scores above 60 in green and yellow).[46] Importantly, Dr. King repeatedly explained that the report's prediction means only that, *on average*, conductivity readings of 1000-2000 µS/cm will correspond with WVSCI scores which fall within the range of 50-60. Tr. at 286-89, 317, 337-38. Using the specific table of conductivity and WVSCI scores upon which Defendants focused at trial, the average of all 29 WVSCI scores which corresponded with a conductivity reading above 1000 µS/cm—the cutoff Defendants purported to use at trial—is 54.07, almost precisely in the middle of the 50-60 range predicted by Dr. King.[47] *See* Defs.' Ex. 128 at 8-9. Contrary to Defendants' argument, this verification of Dr. King's scientific prediction—derived from his 2012 *How Many Mountains Can We Mine?* article—by independent data specific to this case strengthens 1) the general evidence that high conductivity causes low WVSCI scores, 2) the specific evidence that high conductivity is causing low WVSCI scores at Robinson Fork, and 3) Dr. King's credibility as an expert in this area.

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[46] Oddly, Defendants drew attention to several WVSCI scores above 60 which should have been excluded from the data set in order to conform with the parameters of Dr. King's prediction; this included a score which correlated with a conductivity level *below* 1000 µS/cm and four WVSCI scores for which there was *no* corresponding conductivity data whatsoever. Tr. at 286-88; *see* Defs.' Ex. 128 at 8. Defendants also neglected to mention eight WVSCI scores which fell below the 50-60 range. *See* Defs.' Ex. 128 at 8.

[47] Additionally, the Court notes that the overwhelming majority of the WVSCI scores included in the Robinson Fork table are failing scores. *See* Defs.' Ex. 128 at 8-9. Out of the 39 WVSCI scores included in the table—measured from Fall 1999 through Fall 2012—only 6 of those scores are passing scores, with the most recent passing score occurring in Fall 2003. *See id.* At PMC 10—the sampling site with the most data points in the table and at which sampling was the most regularly conducted—, this pattern of consistently failing WVSCI scores is most pronounced: from 1999 through 2012, with conductivity scores consistently in the approximately 1000 µS/cm to approximately 2300 µS/cm range, only 2 out of 20 recorded WVSCI scores were passing scores. *See id.*

In another attempt to rebut both the general causal relationship between conductivity and low WVSCI scores and the specific causal relationship between those two variables at Robinson Fork, Defendants drew attention to the fact that, despite consistently high conductivity scores—mostly between 1000 µS/cm and 2000 µS/cm—, some of the WVSCI scores recorded at Robinson Fork in the early 2000s were passing scores (above 68). Tr. at 112-13; *see* Defs.' Ex. 128 at 8; *see also* Tr. at 159-60, 162-63. Next, Defendants drew attention to a particular sampling site, PMC 16, located in Robinson Fork about 1.5 miles upstream from the confluence of Robinson Fork and Twentymile Creek—well upstream of DSRF—which, despite consistently high conductivity scores of mostly between 1000 µS/cm and 2000 µS/cm, periodically receives passing WVSCI scores, about every 1 to 4 years, with only one barely passing score since 2006. Tr. at 118-120; *see* Defs.' Ex. 52 at Alex008218, Alex008237; Defs.' Ex. 53 at Alex008109; *see also* Tr. at 174. Third, Defendants drew attention to another sampling site, PMC 7, located in Twentymile Creek, about 200 feet downstream of its confluence with Robinson Fork, which, despite high conductivity levels over 13 years—with a dip in levels below 1000 µS/cm from 2002 to 2006—, received many passing WVSCI scores, until its last passing score in 2007. Tr. at 121-22; *see* Defs.' Ex. 52 at Alex008218, Alex008238; Defs.' Ex. 53 at Alex008109. Fourth, Defendants drew attention to two other sampling sites, PMC 5 and 6, located in Twentymile Creek, substantially downstream from the creek's confluence with Robinson Fork, which, despite high conductivity levels, received many initially passing WVSCI scores for 4 to 5 years, but which have not garnered a passing WVSCI score since 2004. Tr. at 123-24; *see* Defs.' Ex. 52 at Alex008217, Alex008219, Alex008236; Defs.' Ex. 53 at Alex008109; *see also* Tr. at 172-74. Finally, Defendants drew attention to two other sampling sites, HWB-2 and HWB-8, located, respectively, 1) even farther downstream in Twentymile Creek than PMC 5 and 6 and 2) up a different tributary to the creek,

which, despite high conductivity, have shown sporadic passing WVSCI scores. Tr. at 125-26; *see* Defs.' Ex. 52 at Alex008217, Alex008233-34; Defs.' Ex. 53 at Alex008106.

Dr. King provided sound explanations, consistent with the science on the subject, for variation in WVSCI scores despite consistently high conductivity measurements. First, he noted that almost all of the recent, sporadically-passing WVSCI scores at these seven sites are barely passing scores[48] and that many of the passing scores occurred in the fall.[49] *See* Tr. at 325, 327. Importantly, according to Dr. King, a score in the low 70s is not much better than a score of 68, and Tetra Tech—the company which developed WVSCI—recommended sampling in the spring because impairment was much more reliably detected during spring than during fall. *See id.* at 325, 327, 329, 338-39. Second, Dr. King described an important phenomena studied by Dr. Pond whereby neighboring tributaries with no mining or minimal mining feed the stream at which a WVSCI score is calculated with drifting organisms; because conductivity is not acutely toxic but is, instead, a chronic stressor which gradually extirpates entire populations, these drift organisms can survive long enough—though only temporarily—to be collected at the degraded site, deceptively boosting the WVSCI score. *See id.* at 325-26, 344. Third, because of the chronic nature of conductivity as a stressor, the complete extirpation of benthic macroinvertebrates in a stream with high conductivity may take years; thus, there is a gradual decrease in WVSCI scores

[48] The Court notes that this pattern is apparent from the data. The Robinson Fork data aggregated in Defendants' Exhibit 128 shows no passing score since 2003, despite the fact that 19 WVSCI scores were recorded over the course of the 9 years since this passing score was recorded. *See* Defs.' Ex. 128. At PMC 16, the only passing score out of the 5 scores recorded since 2006 is a 68.4. *See* Defs.' Ex. 52 at Alex008237. At PMC 7, despite high early WVSCI scores, only one passing WVSCI score, a 75, was garnered in the final seven years of data, which was comprised of 8 scores. *See id.* at Alex008238. PMC 5 has received no passing WVSCI score since 2004, despite the fact that 5 scores were calculated there since that time. *See id.* at Alex008236. PMC 6 has received no passing score since 2003, despite the fact that 10 scores were calculated there since that time. *See id.* At HWB-2, only 2 scores—68.7 and 68.8—out of the 9 scores collected since 2004 have been passing scores. *See id.* at Alex008233. At HWB-8, only one score—a 69.7—out of the 5 collected since 2006 was a passing score. *See id.* at Alex008234.

[49] The Court notes that this is most clearly illustrated by PMC 16—the site with the most sporadically fluctuating WVSCI scores of all of the sites targeted by Defendants. Out of the 19 total scores collected from 1999 to 2012, 6 were passing scores; 4 such scores were collected in the fall and 2 were collected in the spring. *See* Defs.' Ex. 52 at Alex008237. On the whole, the fall scores are also higher than the spring scores. *See id.*

over time—reflected in the data at all of these sites—, whereby scores begin high and gradually reduce down to chronically failing scores. *Id.* at 326, 339-42; *see* Defs.' Ex. 52 at Alex008233-34, -36-38; Defs.' Ex. 128 at 8-9. Additionally, Dr. Palmer noted that, since there is always variation in data, the pattern of conductivity causing impairment has been scientifically proven *on the whole* and not necessarily for every specific data point. *See* Tr. at 180-81. According to the EPA's Benchmark, at 500 µS/cm, the probability of impairment is 72%; thus, 28% of WVSCI scores collected from streams with conductivity readings at 500 µS/cm will still be passing scores. *See* EPA's Benchmark at A-36; Tr. at 181. Accordingly, even at high conductivity readings like those collected in this case, there will still be some passing WVSCI scores. *See* Tr. at 181-82, 252. Based upon the compelling nature of the patterns in the evidence, the science involved, and the theories presented—along with Dr. King and Dr. Palmer's extensive experience in the area—, the Court credits Dr. King and Dr. Palmer's explanation for such sporadic, primarily older variation in the data.

Taxonomic changes to the benthic macroinvertebrate community in downstream Robinson Fork reveal that conductivity—and not other potentially confounding factors, such as habitat—is the primary cause of biological impairment. Key taxa in unimpacted Appalachian streams which are known to be sensitive to high conductivity yet not very sensitive to habitat degradation, particularly mayflies—which were historically present at Robinson Fork—, are now almost entirely absent from the creek.[50] Tr. at 255-56, 262-65, 299, 323; Joint Exs. 26, 27, 117; Pls.' Ex. 18a; *see also* Stip. ¶ 33. Additionally, taxa known to proliferate in high conductivity environments,

[50] At trial, Defendants pointed out that two individual mayflies were collected at DSRF in spring 2013, one using the WVSCI collection protocol and one using a multi-habitat collection protocol. *See* Tr. at 297; Joint Ex. 27. Dr. King noted that one of the two mayflies found was from the genus *Acentrella*, which is one of the most conductivity-tolerant genera of mayflies. *See* Tr. at 297, 333. Given the extremely low number of mayflies found—just two individuals—and given that no mayflies were found at this site in the fall, the Court, like Dr. King, does not find this evidence to be particularly significant.

chiefly Hydropsychidae, are present in relatively large numbers in Robinson Fork, to the point of dominating the benthic macroinvertebrate community there. Tr. at 260, 263, 265; Joint Exs. 27, 45; Pls.' Ex. 18a. Of the ten taxa found by Dr. King to be reliable threshold indicators of high conductivity, nine were found at DSRF, some in large numbers. *See* Tr. at 265-66; Joint Ex. 45. Also, taxa known to be relatively tolerant of high conductivity yet very sensitive to habitat degradation, particularly Elmidae, are abundant in Robinson Fork.[51] Tr. at 261-64, 298, 328; *see* Joint Ex. 27; Pls.' Ex. 18a.

Dr. Menzie again presented the same three potential "confounding factors" which, in his opinion, had not been adequately ruled out by Dr. Palmer and Dr. King before they concluded that conductivity was causing biological impairment at Robinson Fork: temperature, pH, and siltation—particularly embeddedness caused by siltation. Tr. at 354-55, 379-83; *see also* Joint Exs. 132, 133, 135. Using photographs and videos he took at DSRF, Dr. Menzie testified that, unlike the reference streams, DSRF had an open canopy and all of the rocks were covered in plant growth which was collecting particulate matter that was getting into the stream through haul roads and bare, tree-free areas. Tr. at 371, 375-78; *see* Joint Exs. 123d, p-q, v-w.

Regarding the temperature and canopy cover observations collected by Dr. Menzie at DSRF, like with that at ULC and DLC, Dr. Palmer and Dr. King both testified that neither is sufficient to cause the level of biological impairment seen at this site. *Id.* at 238-39, 247-48, 405, 445. Also like with ULC and DLC, Dr. King testified that pH and total dissolved solids cannot be considered "confounding" factors because they are directly linked to conductivity levels, such that an increase in conductivity will result in an increase in both pH and total dissolved solids. *See id.* at 241-42, 443-44. Dr. Palmer also testified that the pH collected at DSRF is well within the tolerance

[51] Dr. King noted that an extremely large number of Elmidae were found at DSRF. Tr. at 262. Of the 682 organisms collected at DSRF using the WVSCI collection protocol in fall 2012, 346—more than half—were of the family Elmidae. *See* Pls.' Ex. 18a.

range of the organisms in the stream. *See id.* at 405. Just as with ULC and DLC, Dr. Palmer testified that the sedimentation RBP score of 13 given to DSRF by Dr. Menzie could not result in the biological impairment seen at this site. *Id.* at 409-10; *see also* Joint Ex. 133. One of the reference streams, 17332, was given the lower sedimentation score of 12 by Dr. Menzie. Joint Ex. 133. Also, the embeddedness score of 16 at Robinson Fork is rated *optimal* and is higher than the suboptimal score of 15 at 17332. *See id.*

As with ULC and DLC, while reviewing the same photos of DSRF about which Dr. Menzie testified, Dr. King stated that he did not see any real sedimentation problem in the stream; instead, what he saw was periphyton—normal in streams—and calcium carbonate precipitate caused by high conductivity. *See* Tr. at 242-43. Dr. Palmer agreed with Dr. King on all of these points, also noting the chalkiness of the water at these sites, which is characteristic of high conductivity, and stating that a certain amount of siltation is entirely normal. *See id.* at 134, 145-46, 190, 412-16, 418-23. Regarding the overall RBP score gathered by Dr. Menzie for DSRF—125.5, which fell within the suboptimal category—, Dr. King testified that Appalachian streams commonly fall within the suboptimal category and noted that even one of the reference sites, 17332, received a suboptimal rating. Tr. at 235-36. Dr. King also stated that he has never seen scores in this range resulting in the level of biological impairment seen at this site.[52] *Id.* at 237, *see also id.* at 446. Dr. Palmer, in essence, agreed. *See id.* at 409-10.

As with ULC and DLC, despite reviewing all of the information gathered by Dr. Menzie, Dr. King and Dr. Palmer both continued to conclude that habitat—including temperature, pH,

[52] Specifically, in September 2012 and in May 2013, DSRF received the extremely poor, failing WVSCI scores of 52.44 and 48.65, respectively. *See* Joint Exs. 24, 25. However, very recently thereafter, in July 2013, DSRF received the relatively high "suboptimal" overall RBP score. *See* Joint Ex. 133. Given the expert testimony in this case, the Court finds it very unlikely that habitat scoring in the "suboptimal" range could be the cause of these extremely low WVSCI scores. In fact, all of the individual RBP scores for DSRF—other than those for "riparian zone width," which was never suggested by Dr. Menzie to be a possible confounding factor in this case—were either "optimal" or "suboptimal," with 5 out of the 12 scores assessed at DSRF falling in the "optimal" range. *See id.*

siltation, and embeddedness—simply was not the cause of biological impairment at these sites. Tr. at 246-47, 255-56, 290, 410, 424, 428-29, 432-33, 436-37, 446. Given their extensive experience in this area, the Court credits Dr. Palmer and Dr. King's expert testimony.

Given the large body of evidence presented by Plaintiffs and the lack of any meaningful counter-evidence, the Court **FINDS** that Plaintiffs have demonstrated, by a preponderance of the evidence, that 1) high conductivity in downstream Robinson Fork is causing—or, at the very least, materially contributing to—a significant adverse impact to the chemical and biological components of the stream's aquatic ecosystems[53] and 2) Alex Energy's Robinson North Surface Mine and/or Wildcat Surface Mine are the cause of—or, at the very least, materially contributing to—this high conductivity. The Court thus **FINDS** that Plaintiffs have proven that Alex Energy has committed at least one violation of its permits.

IV. CONCLUSION

In multiple ways, the chemical and the biological components of the aquatic ecosystems found in Laurel Creek and Robinson Fork have been significantly adversely affected by Defendants' discharges. The water chemistry of these streams has been dramatically altered, containing levels of ionic salts—measured as conductivity—, which are scientifically proven to be

[53] Though this Court has already rejected the notion that the WVDEP in any way adopted the three-part test from H.C.R. 111 or that the Court should defer directly in any manner to H.C.R. 111 or the prospective instruction to the WVDEP regarding the test which was given by the legislature in S.B. 562, the Court notes that the extreme extirpative effects of conductivity upon benthic macroinvertebrates, as demonstrated by the evidence at all of the sites involved, would be sufficient to find a violation of West Virginia's narrative water quality standards even under the three-part test since such a violation can occur 1) "when a stream . . . [does not] support[] a balanced aquatic community that is diverse in species composition" or 2) when "the aquatic community is [] composed only of pollution tolerant species [and] the aquatic community is [not] 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)." *See* W. Va. H. Con. Res. 111. Dr. Palmer testified that "levels of [stream] functioning such as rates of primary production or decomposition [and] whole-stream metabolism . . . change when [] species diversity or species composition changes. Different species perform different functions in . . . stream ecosystems." Tr. at 61. Dr. King testified that a WVSCI score below 68 indicates "a tremendous loss of biodiversity in the stream and [the] commensurate loss of ecological function . . . related to those organisms," and all of the experts, including Dr. Menzie, agree that the streams at issue are impaired. *See Id.* at 93-94, 224, 227-28, 395. Thus, the sites involved in this case, with their hugely failing WVSCI scores, simply do not support balanced aquatic communities that are diverse in species composition.

seriously detrimental to aquatic life. The biological characteristics of these streams have also been significantly injured, in that species diversity—and, in some areas, overall aquatic life abundance—is profoundly reduced. These receiving streams are unquestionably biologically impaired, in violation of West Virginia's narrative water quality standards, with current WVSCI scores falling well below the threshold score of 68.

Losing diversity in aquatic life, as sensitive species are extirpated and only pollution-tolerant species survive, is akin to the canary in a coal mine. These West Virginia streams, like the reference streams used to formulate WVSCI and even like those used by Defendants' expert for comparison in this trial, were once thriving aquatic ecosystems. As key ingredients to West Virginia's once abundant clean water, the upper reaches of West Virginia's complex network of flowing streams provide critical attributes—"functions," in ecological science—that support the downstream water quality relied upon by West Virginians for drinking water, fishing and recreation, and important economic uses. Protecting these uses is the overriding purpose of West Virginia's water quality standards and the goal of the state's permit requirements.

The Court thus **FINDS** that Plaintiffs have established, by a preponderance of the evidence, that each Defendant has committed at least one violation of its permits by discharging into Laurel Creek or Robinson Fork high levels of ionic pollution, which have caused or materially contributed to a significant adverse impact to the chemical and biological components of the applicable stream's aquatic ecosystem, in violation of the narrative water quality standards that are incorporated into those permits. The Court also **FINDS** that Plaintiffs have established statutory jurisdiction under both the CWA and the SMCRA.

The Court **DIRECTS** the Clerk to send a copy of this written Opinion and Order to counsel of record and any unrepresented parties.

ENTER: June 4, 2014

ROBERT C. CHAMBERS, CHIEF JUDGE