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west virginia department of environmental protection

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

PURPOSE

The West Virginia Department of Environmental Protection ("DEP") adopts this Justification and Background for its "Permitting Guidance for Surface Coal Mining Operations to Protect West Virginia's Narrative Water Quality Standards" (the "Guidance"). The Guidance is intended to facilitate compliance with applicable statutory and regulatory requirements and to provide reasonable means of effectuating the intent of the narrative criteria, as well as to enforce the mandate of the Clean Water Act ("CWA") that every permit contain effluent limitations that reflect the practicable pollution reduction a state can achieve.[1]

The Guidance was developed in accordance with the West Virginia Water Pollution Control Act ("WVWPCA"), which states that "the public policy of the State of West Virginia 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."[2]

As it must, the Guidance also recognizes the intent of the West Virginia Legislature, which has formally resolved as follows:

- That any interpretation and implementation of West Virginia's narrative water quality standards is the responsibility of the West Virginia Department of Environmental Protection;
- 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) the aquatic community is not composed only of pollution tolerant species or

[1] *American Paper Institute, Inc. v. United States Environmental Protection Agency*, 996 F.2d 346, 349 (D.C. Cir., 1993)
[2] W. Va. Code § 22-11-2(a).

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.[3]

BACKGROUND

West Virginia has had primacy of the NPDES program since 1982 and has narrative water quality standards that predate its NPDES primacy. These criteria are found in West Virginia's *Code of State Rules*, which states, in pertinent part, "No significant adverse impact to the chemical, physical, hydrologic, or biological components of aquatic ecosystems shall be allowed."[4]

In light of its goals to advance, wherever attainable, water quality that provides for recreation and the protection and propagation of fish, shellfish, and wildlife,[5] and to assure that surface mining operations are conducted so as to protect the environment,[6] DEP reviewed its NPDES permitting and compliance assessment protocols vis-à-vis West Virginia's narrative water quality standards and solicited public comment regarding these issues. As a result, DEP adopts the Guidance, which describes the procedures DEP will implement in the development of NPDES permits for the coal mining industry. These new procedures shall take effect immediately. In light of the changing nature of the policy concerns addressed herein, this document is intended to be dynamic and will likely be modified in the future as technology and best management practices develop and improve.

While DEP appreciates EPA's recent effort to assist the states in interpreting their various narrative water quality standards, DEP finds that the Guidance is the more appropriate approach for West Virginia for several reasons. First, it involves subject matter uniquely within DEP's expertise and special knowledge. Further, while this document specifically addresses concerns related to the mining industry, it is designed to be adapted in the future to address all discharges to water bodies that will cause, or that have the reasonable potential to cause or contribute to, excursions from water quality standards. Finally, it does not use an overbroad, generic criterion (i.e. conductivity) to set unattainable limits, but instead identifies specific pollutants that can be managed through the inclusion of appropriate whole effluent toxicity ("WET") monitoring and/or limits and best management practices ("BMPs") in NPDES permits, where there is reasonable potential to cause or contribute to excursions from water quality criteria. If the

[3] H.C.R. 111 (2010 Regular Session).
[4] 47 C.S.R. 2 § 3.2.i
[5] *See* 33 U.S.C. § 1251(a)(2)
[6] *See* 30 U.S.C. § 1202(d)

applicant cannot demonstrate, by means of its chemical and biological monitoring and the control measures outlined in the plans it will submit with its application, that it does not have reasonable potential ("RP") to cause or contribute to an excursion above the narrative criteria, the permit writer should treat new or expanded discharges as if they have RP and include WET limits in the permit, in accordance with 40 C.F.R. § 122.44(d)(1)(v). Alternatively, if the operator identifies toxic pollutants that can be regulated through the use of numeric limits, DEP will put a regulatory control number for those pollutants in the operator's permit.

PROTECTION OF THE AQUATIC ECOSYSTEM

As stated above, the narrative water quality criteria set out in 47 C.S.R. 2 § 3.2.i prohibits the introduction of wastes that cause significant adverse impact to the chemical, physical, hydrologic or biological components of aquatic ecosystems. These criteria are valid components of West Virginia water quality standards that have been properly promulgated by the West Virginia Legislature and approved by the EPA. The phrase "significant adverse impact" is not defined in the CWA or the WVWPCA, the regulations promulgated thereunder or in any literature or guidance published by the EPA. 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.[7] A goal of the CWA and the 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.

The Pond-Passmore Study, upon which EPA relied in the development of its guidance on this subject, concludes that West Virginia's narrative standard is violated by surface coal mining operations based on the Study's application of two biologic assessment tools, the West Virginia Stream Condition Index ("WVSCI") and the draft Genus Level Index of Most Probable Stream Status ("GLIMPSS"), to samples of benthic macroinvertibrate life taken from these streams. This conclusion is flawed for two reasons. First, West Virginia does not use the draft GLIMPSS in its assessment of the biologic health of State streams. Second, these tools are just that – tools. They are not stand-alone determinants of compliance with the narrative standard. Any application of these assessment tools in determining compliance with the narrative standard must faithfully apply the language of the standard itself, which prohibits significant adverse impacts on the chemical, physical, hydrologic or biological components of the aquatic ecosystem. Thus, DEP's Guidance follows long-standing EPA guidance, which indicates that biosurveys cannot fully characterize an entire aquatic community and its many attributes, and accordingly suggests that "State standards should contain biological criteria that consider various components (e.g.

[7] An aquatic ecosystem is a dynamic complex of plant, animal, and microorganism communities and their non-living environment interacting as a functional unit within water. *See*, Coweeta Long Term Ecological Research "Glossary of Terms."

algae, invertebrates, fish) and attributes (measures of structure and/or function) of the larger aquatic community."[8]

Through implementation of the Guidance, 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. By way of background, WVSCI was developed for EPA by national experts to assess biological integrity in West Virginia's waterways through "careful measurement of the natural aquatic ecosystem and its constituent biological communities,"[9] including the evaluation of benthic macroinvertebrate communities. It was specifically designed for assessment of the biological component of the 47 C.S.R. 2 § 3.2.i narrative criteria and has been used as a tool in developing the Impaired Streams List ("303(d) List") and the TMDLs resulting therefrom for almost a decade.[10] WVSCI acknowledges that "[i]t is the responsibility of West Virginia's [Department] of Environmental Protection to maintain and protect the ecosystem health of the state's waters[,]" and "[i]n keeping with the Clean Water Act and technical guidance from USEPA, DEP developed water quality standards for the protection of ecosystem health."[11]

DEP's Guidance is the appropriate methodology for implementing West Virginia's narrative water quality standards, because it is consistent with the Federal Regulations regarding establishing limitations, standards, and other permit conditions for NPDES programs, and it incorporates a holistic approach to ecosystem assessment and protection. The CWA's implementing regulations require WET testing and limits when the State finds that a discharge has RP to cause or contribute to excursions from water quality standards.

> [W]hen the permitting authority determines . . . that a discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above a narrative criterion within an applicable State water quality standard, the permit must contain effluent limits for whole effluent toxicity. Limits on whole effluent toxicity are not necessary where the permitting authority demonstrates in the fact sheet or statement of basis of the NPDES permit . . . that chemical-specific limits for the effluent are sufficient to attain and maintain applicable numeric and narrative State water quality standards.[12]

WET testing allows flexibility where appropriate (e.g. allowing time to collect additional data for RP determination to supplement limited data sets) and is consistent with DEP's policy that

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[8] EPA's *Policy on the Use of Biological Assessments and Criteria in the Water Quality Program* (May 1991) ("1991 Policy")

[9] A Stream Condition Index for West Virginia Wadeable Streams, March 28, 2000 (Rev. July 21, 2000) ("Stream Condition Index").

[10] However, a stand-alone WVSCI score has never been the sole determinant of compliance or non-compliance with the narrative standard. This is because WVSCI scores are influenced by many factors (e.g. habitat, geology, and pH).

[11] Stream Condition Index

[12] 40 C.F.R. § 122.44(d)(1)(v)

permittees develop robust monitoring plans with the intention of identifying any causative pollutants and adjusting their methods of operation so that those problems may be remedied before the aquatic community suffers a significant breakdown.

WVSCI considers various components (e.g. algae, invertebrates, fish) and attributes (measures of structure and/or function) of the larger aquatic community. "Because biological integrity is a strong indicator of overall ecological integrity, it can serve as both a meaningful goal and a useful measure of environmental status. . . ."[13] 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 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.

CAUSATIVE POLLUTANTS / PROTECTIVE THRESHOLDS

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.[14] However, DEP's data shows that more than a simple conductivity measurement is necessary to determine the health of a stream. As proof that a number for specific conductance is an inappropriate gauge, FIGURE 1 below illustrates that 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.

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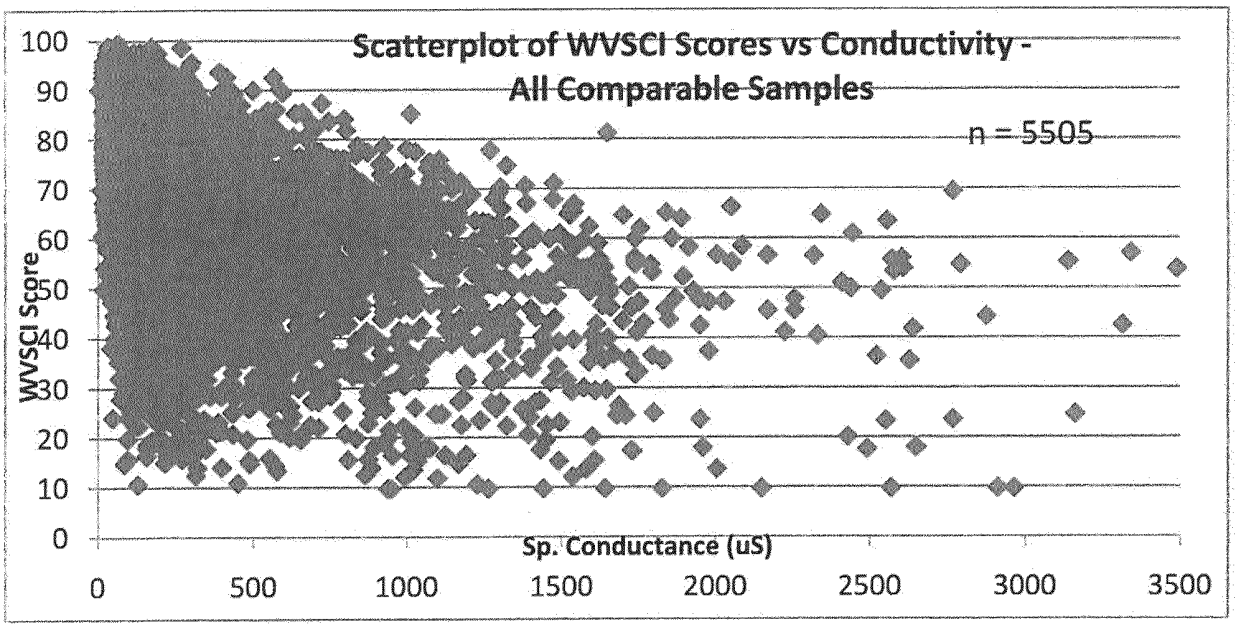
[13] 1991 Policy

[14] EPA's *Detailed Guidance: Improving EPA's Review of Appalachian Surface Coal Mining Operations under the Clean Water Act, National Environmental Policy Act, and the Environmental Justice Executive Order* (April 1, 2010) ("April 1 Memo")



The Pond-Passmore Study found a shift in the benthic macroinvertibrate community downstream from mining activity, but did not otherwise correlate this finding with any significant or adverse impairment of the ecosystem. Where the only impacts to this component of the ecosystem 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. Various scientific studies and evaluations performed by DEP indicate that lowered biological condition is associated with increased ionic strength, but scientists remain less than certain about the specific causative pollutant(s) and the concentration(s) responsible for impairment. Additional uncertainty is present in correlative studies, because the effects of increased ionic strength cannot be completely distinguished from the effects of other stressors that often co-occur (e.g. organic enrichment, sedimentation). In fact, most available information attempts to relate biological condition to a surrogate parameter, such as specific conductance.

Because conductivity represents the combined concentrations of all different dissolved ions, each with potential varying toxic effects, regulation solely via an indicator such as specific conductance is not the best way to protect against excursions from narrative standards. For example, the elevated dissolved pollutants most commonly associated with mining discharges are sulfate and bicarbonate alkalinity. EPA has not published national recommended aquatic life protection criteria for those pollutants. Similarly, chloride, for which West Virginia has adopted EPA's recommended numeric aquatic life protection water quality criteria, may also be present in some cases. But because chloride seldom exists in the absence of sulfates or alkalinity, singular control of chloride cannot be expected to resolve all ionic stress.

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. Even though the DEP evaluation applied various filters to the

evaluated dataset to address complicating factors listed above, the biological condition of a stream may be different from the condition predicted by specific conductance. In situations such as these, where DEP has determined that it is infeasible to calculate a numeric effluent limit to implement a narrative water quality standard, DEP will include in the permit appropriate WET limits and BMPs to control or abate the discharge of pollutants, in accordance with 40 C.F.R. § 122.44(k)(3).

DEP routinely identifies biological stressors when developing TMDLs for biologically impaired waters. Stressor identification employs a strength-of-evidence approach that considers multiple information sources. Researchers evaluate water quality monitoring data, physical habitat data, field notes, and the composition of the biological assemblage concurrently to identify significant stressors. DEP's most recent stressor identification protocols, as used in the EPA-approved TMDL process, include the guidelines shown in FIGURE 2 below for evaluating water chemistry to determine if ionic strength is a significant stressor:

Candidate Cause	**Parameter**	**Elimination (Rule out stressors at these thresholds)** **Elimination Threshold**	**Strength of Evidence (Evidence for each Candidate Cause as stressor)** **Candidate Stressor Thresholds**
4. Ionic strength	Conductivity	< 326.9 umhos	Consider as independent stressor in non-acidic, non-AMD streams, when conductivity values met threshold ranges and sulfates and chloride violate conditions listed as follows. >1533 Definite Stressor 1075-1532.9 Likely stressor 767-1074.9 Possible stressor 517-766.9 Weak stressor 327-516.9 Equivocal or No Trend
	Sulfates	< 56.9 mg/l	>417 Definite Stressor 290-416.9 Likely stressor 202-289.9 Possible stressor 120-201.9 Weak stressor 57-119.9 Equivocal or No Trend
	Chloride	< 60 mg/l	>230.0 Definite Stressor 160.1-229.9 Likely stressor 125.1-160 Possible stressor 80.1-125.0 Weak stressor 60.1-80.0 Equivocal or No Trend

Based on FIGURE 2, it is clear the EPA limits of 300 – 500 µS/cm established in the April 1 Memo are far more stringent than what it has long approved for West Virginia's TMDL process. As shown above, conductivity in the 300 – 500µS/cm range is "Equivocal or No Trend" as a stressor. Conductivity does not even become a "Likely Stressor" of a stream under this EPA-approved approach until it reaches three to five times these limits: 1075-1532.9 µS/cm. This is additional support for the State's conclusion that reliance on the single surrogate of specific conductance to implement and/or enforce the State's narrative water quality standards is improper. It also demonstrates that EPA's proposed limits are too narrowly focused on a single parameter and single aquatic species to determine the health of the impacted watershed.

Only the West Virginia Legislature can adopt a numeric water quality standard for conductivity (or any other pollutant); DEP has no authority to immediately or unilaterally

implement numeric standards. Through adoption of H.C.R. 111, the West Virginia Legislature has given DEP direction as to how it should implement its narrative water quality standards. Even if the Legislature does adopt a numeric standard for conductivity, DEP cannot implement it until after it is approved by the EPA. Based on the loose and questionable causal relationship between conductivity and stream impairment, it remains unclear whether EPA would approve such a numeric limit. EPA's duly promulgated regulation endorses establishment of WET limits where, as here, a state is unable to use a limit for a surrogate parameter. DEP can implement new permitting controls based on the agency's best professional judgment of actions necessary to protect the State's waters using its narrative criteria, with follow-up monitoring and contingencies for unsatisfactory outcomes. Thus, DEP is protecting against excursions from its narrative water quality standards by establishing WET limits and verifying impacts to a stream (or lack thereof) by requiring an extensive, comprehensive monitoring plan for the entire watershed.