RELEASE DATE: AUGUST 12, 2010
REVISED: AUGUST 18, 2010

west virginia department of environmental protection

# 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

## INTRODUCTION

The purpose of this Permitting Guidance ("Guidance") is to assist West Virginia Department of Environmental Protection ("DEP") permit writers in developing site-specific National Pollutant Discharge Elimination System ("NPDES") permit conditions for surface coal mining operations using a holistic watershed management approach through the use of biological and chemical monitoring, whole effluent toxicity ("WET") testing, and the development of Aquatic Ecosystem Protection Plans ("AEPP") and, where necessary, Adaptive Management Plans ("AMP") to protect the State's narrative water quality standards. These standards 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."[1] These new procedures shall take effect immediately.[2]

This Guidance does not apply to outlets that are primarily precipitation induced, or for which the activities associated with those outlets have been substantially completed.[3]

## REASONABLE POTENTIAL ANALYSIS

In deciding which permit conditions to include in a permit, the first thing a permit writer must do is perform a reasonable potential analysis and document the same in the Statement of Basis for the permit. If the applicant cannot demonstrate, by means of its chemical and biological monitoring and the control measures outlined in its AEPP, 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).

At permit reissuance, DEP will use all valid and representative data to determine, on a case-by-case basis, whether an existing discharge causes, has the reasonable potential to cause, or contributes to an excursion from the narrative water quality criteria. Where DEP concludes that an existing outlet has RP, the permit will include WET limits. In cases where insufficient data is available to make a determination of RP upon permit reissuance, the permit writer will place WET monitoring requirements and triggers in the permit in order to determine RP (or lack of

[1] 47 C.S.R. 2 § 3.2.i
[2] 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.
[3] The term "substantially complete" shall mean that the operation is past the point when measures that could be undertaken under either an AEPP or an AMP could be effective in reducing the operation's impact on the aquatic ecosystem.

RP). If the monitoring shows RP, the permit writer will reopen the permit to include WET limits.

## PERMIT CONDITIONS

If the applicant has RP, the permit writer should use best professional judgment to establish permit terms and conditions and determine whether the proposed control measures are sufficient to protect the narrative water quality standards. The permit writer should, depending on the type of permit being issued, establish the following conditions in the permit, each of which is discussed more completely below:

**New and Expanded Discharge Permits**

- WET Limits
- Chemical Monitoring
- In-Stream Biological Monitoring
- Aquatic Ecosystem Protection Plan (AEPP)
- Adaptive Management Plan (AMP), if necessary
- Reopener Clause

**Permits at Reissuance**

- WET Monitoring
- Chemical Monitoring
- In-Stream Biological Monitoring
- Aquatic Ecosystem Protection Plann (AEPP)
- Adaptive Management Plan (AMP), if necessary
- Reopener Clause

## NEW AND EXPANDED DISCHARGE PERMITS

This Guidance does not apply to outlets that are primarily precipitation induced.

### WET Limits

If the applicant cannot demonstrate, by means of its chemical and biological monitoring and the control measures outlined in its AEPP, that it does not have RP, the permit writer should treat new and expanded mining discharges as if they have RP and include WET limits in the permit, as prescribed by 40 C.S.R. § 122.44(d)(1)(v).

The permit writer shall establish WET limits using all applicable rules and guidance, including the EPA's 1991 *Technical Support Document for Water Quality-based Toxics Control* ("TSD").[4] To develop the WET limits, the permit writer shall consider the in-stream waste concentration of the effluent in the immediate receiving stream and calculate it so as to result in no greater than 1.0 chronic toxicity unit ($TU_c$) and 0.3 acute toxicity unit ($TU_a$) at the edge of the appropriate mixing zones, where applicable.

[4] EPA/505/2-90-001 PB91-127415

The permittee is required to perform WET testing quarterly. The TSD requires use of the most sensitive available surrogate organism (ceriodaphnia dubia) for chronic toxicity testing of effluents. DEP requires TDS, conductivity, sulfate, and bicarbonate analyses for each aliquot used in WET testing.

If WET testing shows noncompliance with the specified limitations prescribed in the permit, the permittee shall resample and test the effluent within 30 days. If the second test shows compliance, the permittee shall continue WET testing in accordance with the permit requirements. However, if the second test shows noncompliance, the permittee must, within 60 days, submit an AMP (as more fully described below) identifying actions it will take to achieve compliance with the WET discharge limitations. If WET testing shows noncompliance with the specified limitations prescribed in the permit, but the aquatic ecosystem remains healthy (as evidenced by acceptable data retrieved at the biological monitoring stations), the DEP shall reevaluate the WET limits placed in the permit to assure that such limits take into consideration the appropriate dilution factors, mixing, and the effects of the discharge on the downstream monitoring stations.

**Chemical Monitoring**

In addition to what is required for monitoring associated with the protection of numeric standards, the permit will require twice-per-month effluent monitoring for TDS, specific conductance, sulfate, alkalinity, pH, calcium, magnesium, sodium, and potassium upon commencing the permitted activity. The same sampling suite is required for all established biological assessment stations ("BAS"), as described below. The results of concurrent monitoring of WET, dissolved ions, and biological conditions will provide a wealth of information to guide future decisions and possible refinements to this Guidance.

**In-Stream Biological Monitoring**

The permit will require the maintenance of acceptable ecosystem health in waters of the State. Biological monitoring will be required prior to, and then regularly over the life of, the permitted activity. An applicant must submit a monitoring plan for agency approval that proposes in-stream BAS that allow a holistic assessment of the aquatic ecosystem and a determination of the impacts of the permitted activity.

The applicant should work with the permit writer and the DEP biologist to establish a monitoring strategy with the most appropriate monitoring locations for a holistic evaluation of the aquatic ecosystem. All biologic sampling shall be done in accordance with the West Virginia Division of Natural Resources' scientific collection permit and DEP's West Virginia Stream Condition Index ("WVSCI") protocol. The applicant shall submit to DEP for approval a monitoring plan that is consistent with WVDEP's Watershed Assessment Branch 2009 Standard Operating Procedures, Chapter 4,[5] which must include the following:

[5] http://www.dep.wv.gov/WWE/watershed/wqmonitoring/Documents/SOP%20Doc/WAB%20SOP.pdf

- An in-stream BAS shall be located at the first appropriate riffle/run habitat downstream of each new outlet in a perennial stream segment. Ideally, the BAS will be located such that future impacts to the stream are attributable solely to the permitted activity.
- Additional stations should be situated on a site-specific basis, but generally should be located upstream and downstream of the confluence of the immediate receiving stream and the stream into which it drains, which allows the aquatic ecosystem's health to be assessed in its entirety.
- If the first available location for a BAS is potentially influenced by other watershed activities and stressors, then a clear link between the permit controls and biological conditions at the station may not be possible. Those scenarios will require baseline documentation of the other potential stressors and tracking of watershed activities over time. The applicant will also have to submit a monitoring plan in accordance with the provisions set forth in "Chemical Monitoring" above.
- Additional monitoring stations may be designated further upstream or downstream at points that are useful in determining the entire aquatic ecosystem's health. Such stations may be beneficial in identifying actions the applicant can take to improve the overall health of the aquatic ecosystem.
- The plan should include chemical and biological monitoring at the BAS prior to the start of the permitted activity.

If the agency finds the condition of the aquatic ecosystem at the assessment stations prior to initiation of the permitted activity to be satisfactory, taking into account all potentially applicable criteria, then the acceptable future biological condition is a WVSCI score greater than or equal to the WVSCI value representing the 5th percentile of reference (currently 68.0). If the agency finds the condition of the aquatic ecosystem at the assessment stations is less than satisfactory, taking into account all potentially applicable criteria, then the applicant shall identify existing conditions within the watershed that may be contributing to the problem. If a TMDL addressing biological impairment for ionic stress is not in effect, a WVSCI score greater than or equal to the baseline value would represent an acceptable future condition.

However, permit writers should be aware that a single point in a stream may not represent the overall health of the aquatic ecosystem. WVSCI is a tool to be used as a primary indicator of stream health, but not the sole criteria; if the WVSCI score suggests a potential problem, DEP shall conduct an assessment of the health of the aquatic ecosystem as a whole. In determining whether a lower WVSCI score represents an unacceptable condition, the DEP will utilize best professional judgment in a manner comparable to the discretion it exercises in listing streams as biologically impaired pursuant to § 303(d) of the Clean Water Act, including a holistic examination of the health of the aquatic ecosystem.

**Aquatic Ecosystem Protection Plan (AEPP)**

New and expanded discharge permit applications shall include an AEPP for agency review and approval, and the permit writer shall use the control measures outlined therein as part of his or her RP analysis, as outlined more fully above. The permittee shall use

the measures outlined in its AEPP as a means of maintaining the health of the aquatic ecosystem and complying with the State's narrative water quality standards.

An AEPP describes control measures the applicant will implement to achieve WET limitations and minimize adverse biological impacts to the aquatic ecosystem surrounding the permitted activity. The plan should also include controls designed to lower the magnitude of pollutant loading associated with mining activities. If the agency cannot conclude that the proposed measures are reasonably expected to result in compliance, then the permit will not be issued. The applicant should consider all appropriate options when selecting and implementing control measures. Where an initial AEPP fails to achieve WET compliance and acceptable ecosystem conditions, the applicant must amend its AEPP to include additional measures that enable it to comply with WET limits.

The applicant can implement any of a number of controls in an attempt to protect the aquatic ecosystem and to reduce or minimize the ionic strength in the stream. Some examples of control measures that may be included in the AEPP include, but are not limited to, the following:

- Test overburden to determine the material that contains sulfur or other ionic strength-bearing material, so it can be isolated through material handling;
- Minimize the amount of area disturbed at one time;
- Minimize stormwater contact with pulverized material;
- Increase stream buffer zones;
- Minimize fill areas;
- Mine down-dip instead of up-dip;
- Cap fills and spoil so as to minimize pass-through of rain water;
- Revegetate any disturbed areas to minimize runoff;
- Develop a plan to reduce or prevent ionic stress;
- If necessary, conduct TRE/TRI pursuant to EPA's TSD;
- Segregate weathered rock and return to surface;
- Expedite reclamation;
- Enhance riparian plantings;
- Limit the number of active fills;
- Restore natural streams.

Because many of the controls outlined in the AEPP are related to best management practices, they will need to be addressed in the mining permit issued pursuant to the *West Virginia Surface Coal Mining & Reclamation Act* ("Article 3 permit"). The AEPP must be included as an attachment to the NPDES permit application to allow for agency review and evaluation.

**Adaptive Management Plan (AMP)**

A "new and expanded discharge" permittee shall submit an AMP to DEP within 60 days of failing two WET tests in a 30-day period. An AMP is more than merely monitoring activities and occasionally changing them; it involves exploring alternative ways to meet environmental objectives, predicting the outcomes of alternatives based on the current

state of knowledge, implementing one or more of these alternatives, monitoring to learn about the impacts of management actions, and then using the results to update knowledge and adjust management actions.[6] For purposes of this Guidance, the AMP outlines the measures the permittee will take to achieve the chronic toxicity permit limitations (1.0 $TU_c$). This plan shall include, at a minimum, a thorough review of the AEPP to determine what, if any, changes can be made to the control measures outlined therein that will bring the permittee back into compliance with its WET limits.

The permittee may also implement a Toxicity Reduction Evaluation (TRE)/Toxicity Identification Evaluation (TIE)[7] plan to obtain compliance with final effluent limits or triggers for chronic toxicity. The purpose of a TRE is to investigate the causes and to identify corrective actions for difficult effluent toxicity problems.[8] A TRE is a site-specific study conducted in a stepwise process to narrow the search for effective control measures for effluent toxicity. TREs are designed to identify the causative agents of effluent toxicity, isolate the sources of the toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in effluent toxicity. The ultimate objective of a TRE is for the permittee to achieve the limits or requirements for effluent toxicity contained in the permit and thereby attain the water quality standards for the receiving waters.[9]

A TIE is a set of procedures to identify the specific chemicals responsible for effluent toxicity, and TIE methods are an integral part of the protocols for TREs. TIE procedures are performed in three phases: characterization, identification, and confirmation. In each phase, the permittee shall use aquatic organism toxicity tests to track toxicity at each step of the procedure. In most cases, these are abbreviated or shortened toxicity tests.

If the TRE/TIE identifies toxic pollutants that can be regulated through the use of numeric limits, the permit writer shall put a numeric limit for those pollutants in the permit, in accordance with 47 C.S.R. 2 § 9 and 40 C.F.R. § 122.44(d)(1)(vi)(A). If the TRE/TIE does not identify toxic pollutants that can be regulated through the use of numeric limits, the WET limits shall remain in the permit.

**Reopener Clause**

The permit will contain an explicit reopener clause allowing DEP to modify or revoke the permit if prescribed controls do not attain and maintain applicable water quality standards. The permittee may also request that the permit be reopened if, after a sufficient amount of data has been collected, the agency determines that RP does not exist, and the permittee can request an adjustment to its monitoring activities through a modification of the permit.

---

[6] *See*, U.S. Department of the Interior's *Technical Guide: Adaptive Management*

[7] Although TRE/TIE is briefly outlined in this document, permit writers and permittees shall refer to EPA's TSD and the guidance documents listed therein for specific direction on how to conduct these evaluations.

[8] EPA's TSD, p. 114

[9] Id.

**PERMITS AT REISSUANCE**

These permit conditions ~~are only to be established for~~ do not apply to outlets that are primarily precipitation induced or for which the activities associated with the outlets are substantially complete at the time of reissuance. If the agency determines at the time of reissuance that permitted outlets have not been constructed, the requirements outlined in "New and Expanded Discharge Permits" above will apply. Otherwise, DEP will establish the following permit conditions:

**Wet Monitoring and Limits**

Where there is not sufficient WET, chemical, and/or biological assessment data to perform a reasonable potential analysis at permit reissuance, the permit writer will assign WET monitoring to determine reasonable potential to cause or contribute to an excursion above the narrative criteria, as prescribed by 40 C.F.R. § 122.44(d)(1)(ii).

The permit writer will establish WET monitoring triggers using all applicable rules and guidance, including EPA's TSD. In developing the WET trigger, the permit writer will consider the in-stream waste concentration of the effluent in the immediate receiving stream and calculate it so as to result in no greater than 1.0 chronic toxicity unit ($TU_c$) and 0.3 acute toxicity unit ($TU_a$) at the edge of the appropriate mixing zones, where applicable.

The permittee is required to perform WET monitoring quarterly. The TSD requires use of the most sensitive available surrogate organism (ceriodaphnia dubia) for chronic toxicity testing of effluents. DEP requires TDS, conductivity, sulfate, and bicarbonate analyses for each aliquot used in WET testing.

If WET monitoring shows an exceedance of the specified triggers prescribed in the permit, the permittee shall resample and test the effluent within 30 days. If the second test shows compliance, the permittee shall continue WET monitoring in accordance with the permit requirements. However, if the second test shows an exceedance, the permittee must, within 60 days, submit an AMP identifying actions it will take to achieve compliance with the WET triggers. The permittee must also submit a permit modification to place WET limits in the permit.

**Chemical Monitoring**

The permit will require enhanced effluent and receiving water monitoring of dissolved ions for permits upon reissuance.

The permit will require twice-per-month effluent monitoring for TDS, specific conductance, sulfate, alkalinity, pH, calcium, magnesium, sodium, and potassium. The same sampling suite is required for all established stream monitoring stations. The results of concurrent monitoring of WET and dissolved ions testing at the discharge and in-stream monitoring locations will provide a wealth of information to guide future decisions and possible refinements to this protocol.

**In-Stream Biological Monitoring**

The permit will require the maintenance of acceptable ecosystem health in waters of the State. DEP will require in-stream biological monitoring regularly over the remaining life of the permitted activity. The permittee must submit a monitoring plan for agency approval that proposes in-stream BAS that allow a holistic assessment of the aquatic ecosystem and a determination of the impacts of the permitted activity. To that end, biological monitoring as discussed above may be applied as appropriate.

**Adaptive Management Plan (AMP)**

A permittee with a reissued permit shall submit an AMP to DEP within 60 days of exceeding two WET triggers in a 30-day period. The AMP shall include appropriate control measures as outlined in "Aquatic Ecosystem Protection Plan" above that are designed to obtain compliance with WET triggers, maintain the health of the aquatic ecosystem, and comply with the State's narrative water quality standards. If the WET testing results continue to exceed the established permit trigger(s), then the permittee has exhibited a reasonable potential to cause or contribute to an excursion above West Virginia's narrative water quality standards (specifically, 47 C.S.R. 2 §§ 3.2.e and 3.2.i), and the permit writer will reopen the permit to impose WET limits. Alternatively, the AMP may allow the permittee to conduct TRE/TIE (as outlined above), in an effort to identify toxic pollutants that can be regulated through the imposition of numeric limits in the permit.

**Reopener Clause**

The permit will contain an explicit reopener clause allowing DEP to modify or revoke the permit if prescribed controls do not attain and maintain applicable water quality standards. The permittee may also request that t he permit be reopened if, after a sufficient amount of data has been collected, the agency determines that RP does not exist, and the permittee can request an adjustment to its monitoring activities through a modification of the permit.

**REFERENCES**

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

EPA's *Technical Support Document for Water Quality-based Toxics Control*, EPA/505/2-90-001 (March 1991)

EPA's *NPDES Permit Writers' Manual*, EPA-833-B-96-003