



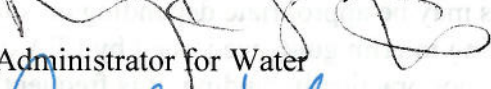
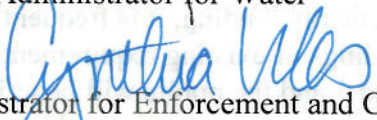
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

WASHINGTON, D.C. 20460

JUL 21 2011

MEMORANDUM

SUBJECT: Improving EPA Review of Appalachian Surface Coal Mining Operations Under the Clean Water Act, National Environmental Policy Act, and the Environmental Justice Executive Order

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I. Purpose

The purpose of this memorandum is to clarify the roles and expectations of the U.S. Environmental Protection Agency (EPA), in coordinating with our Federal and State partners, to assure more consistent, effective, and timely EPA review of Appalachian surface coal mining operations with respect to provisions of the Clean Water Act (CWA), the National Environmental Policy Act (NEPA), and the Environmental Justice Executive Order (E.O. 12898).^{1,2} This memorandum does not impose legally binding requirements and will not be implemented as binding in practice. It does not impose any obligations on private parties. Its goal is to clarify existing understandings and to improve and strengthen permit decision-making consistent with existing law, thereby improving compliance with Federal environmental statutes, implementing regulations, and policies. EPA's goal is to work with our Federal and State partners, and the public, to protect public health and the environment and promote the Nation's economic and energy security.

¹ This memorandum replaces EPA's interim final guidance issued on April 1, 2010, and the Regions should begin consulting it immediately. Unless otherwise noted, the discussion of the provisions of the CWA, NEPA, and E.O. 12898 in this memorandum focuses on their applicability to Appalachian surface coal mining operations in Kentucky, West Virginia, Virginia, Ohio, Tennessee, and Pennsylvania.

² A summary of relevant CWA, NEPA, and E.O. 12898 provisions is included as Appendix 2 of this memorandum.

This guidance document is intended to describe for EPA Regions 3, 4, and 5 the Agency's current understanding of existing legal requirements and best-available science; it is not a rule, and hence it is not binding and lacks the force of law. This guidance is not intended to direct the activities of any other Federal, State or local agency or to limit the exercise of their legal authority. EPA's goal is to support the environmentally sound permitting of Appalachian surface coal mining projects by explaining various permitting approaches that are consistent with existing CWA and regulatory requirements and current science. This document is intended to guide EPA staff in reviewing and commenting on permitting activities related to Appalachian surface coal mining. Consistent with the Agency's experience in reviewing CWA permits, this guidance does not represent the only acceptable permitting approaches, and different permitting approaches and conditions may be appropriate depending on site-specific circumstances. This guidance supersedes existing interim guidance issued by EPA on April 1, 2010. Although guidance is neither legally nor practically binding, it is frequently used by Federal agencies to explain and clarify their understandings of existing requirements. In this case, the Agency believes that EPA Regions 3, 4, and 5 and the public will benefit from new guidance that is informed by available peer-reviewed science, extensive public comment, and lessons learned since April 1, 2010, and that explains the Agency's understanding with respect to existing CWA requirements. Each Regional review of a draft or proposed permit or permit application for discharges associated with Appalachian surface coal mining operations, however, will be made on a case-by-case basis considering the facts and circumstances of the case and consistent with applicable statutes, regulations, and case law.

EPA recognizes the important role that the CWA provides to States in administering NPDES programs in order to reduce duplication and promote timely permit decision-making. The carefully constructed legislative scheme provides States the responsibility for implementing clean water protections while entrusting CWA oversight authority of State programs to EPA. EPA has significant discretion in exercising this authority and works collaboratively with States to further the purposes of the CWA. This nonbinding guidance clarifies EPA's use of its CWA oversight responsibilities in cooperation with States in the review of permits for Appalachian surface coal mining discharges to streams, wetlands, and other waters. The Agency will exercise its CWA permit review responsibilities in accordance with the statute and regulations and with careful judgment and discretion on a case-by-case basis to assure effective protection of human health and water quality, and to reduce unnecessary duplication and delay in the permitting process.

While this memorandum is intended to provide guidance to EPA's Regions as they review proposed permits and permit applications, we expect this memorandum will also be helpful to EPA's Federal and State partners, the regulated community, and the public in clarifying existing legal requirements designed to prevent harmful impacts to public health, water quality, and the environment associated with Appalachian surface coal mining and to more effectively include the voices of affected communities in the Appalachian coalfields, including low-income and minority populations. We expect EPA Regions 3, 4, and 5 to give appropriate consideration to this guidance when reviewing proposed permits or permit applications associated with Appalachian surface coal mining activities.

It is important to note that the CWA provisions and supporting regulations described in this document contain the legally binding requirements. As noted, this guidance does not substitute for those provisions or regulations and is not itself a regulation. It does not impose legally or practically binding requirements on EPA, the Corps, or the regulated community, and may not apply to a particular situation depending on the circumstances. Any decisions made regarding a particular permit will be based on the applicable statutes, regulations, and case law.

This guidance does, however, provide relevant information to EPA Regions, the public, the regulated community and our Federal and State partners about existing statutory and regulatory requirements and available peer-reviewed scientific data and information that may be useful for developing CWA permit conditions. This guidance does not establish new, mandatory requirements that must be incorporated into a particular permit. Rather, it provides information about practices and approaches that can help ensure that a permit is consistent with existing legal requirements. Other practices and approaches may also comply with those existing regulatory requirements, and each permit will be evaluated on a case-by-case basis to ensure it complies with existing statutory and regulatory requirements. By describing best-available science; identifying the most relevant statutory and regulatory requirements; and outlining possible permit conditions, practices, and approaches that are consistent with those legal requirements, EPA's goal is to provide all interested parties with insights into the Agency's decision-making process as it fulfills its statutorily mandated oversight role, and to support permitting of Appalachian surface coal mining projects that are consistent with existing CWA and regulatory requirements. This guidance does not represent the only acceptable approaches, and permits with different approaches and conditions may comply with existing legal requirements. Such permits will be carefully reviewed on a case-by-case basis to determine whether they are consistent not with this guidance, but with the statute and implementing regulations.

II. Introduction

The CWA entrusts EPA with overall responsibility to administer its provisions, including protection of human health, water quality, and the environment. CWA protections, including water quality requirements, extend to all waters of the United States (U.S.), from headwater streams to the larger downstream systems that they feed. In particular, EPA's CWA responsibility includes preserving the long-term chemical, physical, and biological integrity of Appalachian watersheds, and maintaining safe, clean, and abundant water for Appalachian communities. Achieving these goals is fully consistent with promoting the economic and energy benefits that coal mining provides to the Appalachian region and the nation.

EPA's development of this guidance memorandum has been motivated by three primary considerations:

- First, EPA has evaluated the growing body of scientific information documenting the scope and significance of adverse environmental and water quality effects associated with surface coal mining practices, including peer-reviewed research published by independent scientists and by EPA. This includes independent scientific review by EPA's Science Advisory Board (SAB) of two draft EPA scientific reports and finalization of these reports.

- Second, EPA’s work with other Federal agencies, and its reviews of permitting actions under CWA Sections 402 and 404 for Appalachian surface coal mining, have provided information about how current permitting practices can be more effective in addressing adverse water quality effects. The results of these reviews are summarized in Sections III and IV below.
- Third, EPA has gained significant experience since releasing its April 1, 2010 interim final guidance. EPA has benefited from reviewing more than 60,000 public comments and has deliberated over various issues addressed in the 2010 guidance. While developing this guidance, EPA has also recognized, and responded to, key concerns raised by Appalachian States and the mining industry in litigation associated with EPA’s April 1, 2010 interim final guidance.

A. Scientific Evidence

The environmental legacy of mining operations in the Appalachian region is far-reaching. Recent studies, as well as the experiences of Appalachian coalfield communities, point to new environmental and health challenges that were largely unknown even ten years ago. Since 1992, more than 1,200 miles of Appalachian streams have been filled by Appalachian surface coal mining practices, at an estimated ongoing rate of 120 miles per year.³ Further, while precise estimates are limited, the estimated scale of deforestation from existing Appalachian surface mining operations is greater in size than the State of Delaware, or 5,700 square kilometers predicted to be affected by 2012.⁴ The full cumulative effects of surface coal mining operations at this scope and scale are still largely unknown.⁵ Appalachian deforestation has been linked to significant changes in aquatic communities as well as to modified storm runoff regimes, accelerated sediment and nutrient transport, reduced organic matter inputs, increased algal production, and altered stream thermal regimes.⁶ Such impacts have placed further stresses on water quality and the ecological viability of watersheds. Possible human health impacts from coal mining activities have also been documented, including peer-reviewed public health literature that has preliminarily identified associations between increases in surface coal mining activities and increasing rates of cancer, birth defects, and other health problems in Appalachian communities.⁷

³ *Final Programmatic Environmental Impact Statement on Mountaintop Mining/Valley Fills in Appalachia*. 2005. Available at <http://www.epa.gov/region03/mtntop/eis2005.htm>.

⁴ *Ibid.* These estimates do not reflect recent efforts to promote reforestation of previously mined sites.

⁵ *The Effects of Mountaintop Mines and Valley Fills on Aquatic Ecosystems of the Central Appalachian Coalfields* (Final Report), EPA-600-R-09-138A. This report and the SAB’s final review report are available at <http://www.epa.gov/owow/wetlands/guidance/mining.html>.

⁶ Webster, J.R., S.W. Golladay, E.F. Benfield, J.L. Meyer, W.T. Swank, and J.B. Wallace. 1992. *Catchment disturbance and stream response: an overview of stream research at Coweeta Hydrologic Laboratory*. In P.J. Boon, P. Calow, and G.E. Petts (eds.). *River Conservation and Management*. John Wiley and Sons, New York, N.Y.

⁷ See, e.g., Hitt, N.P. and M. Hendryx. 2010. *Ecological Integrity of Streams Related to Human Cancer Mortality Rates*. *EcoHealth* 7, 91–104; Hendryx, M. and M.M. Ahern. 2008. *Relations Between Health Indicators and Residential Proximity to Coal Mining in West Virginia*. *Am. Jnl. of Public Health* 10.2105; and M.M. Ahern, M. Hendryx, J. Conley, E. Fedorko, A. Ducatman, and K.J. Zullig. 2011. *The Association Between Mountaintop Mining and Birth Defects Among Live Births in Central Appalachia, 1996-2003*.

EPA's development of this guidance has been informed by the development, review, and finalization of two EPA reports that document the effects of Appalachian surface coal mining on the aquatic environment. These two final reports are *The Effects of Mountaintop Mines and Valley Fills on Aquatic Ecosystems of the Central Appalachian Coalfields* and *A Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams*.⁸ EPA released these reports in draft form on April 1, 2010 for public comment and independent peer review by the SAB. The SAB considered the public comments received, held a three-day public meeting and several public teleconferences, and completed its review in March. The SAB's final reports supported the methodologies and conclusions outlined in both EPA reports, reinforcing the significant aquatic effects of Appalachian surface coal mining and the appropriateness of EPA's conductivity benchmark for protecting aquatic life. The SAB made several recommendations for how EPA could improve these draft reports, and EPA has incorporated these recommendations into its final reports. Completion of this independent scientific review has significantly strengthened the scientific support for EPA's water quality concerns and forms the basis for the recommendations described in this guidance.

Of particular relevance to this document, EPA has paid careful attention to the SAB's peer-review recommendations regarding the scientific relevance of EPA's field-based aquatic life benchmark (i.e., reference point) for conductivity within this guidance. As recommended within the final SAB report and described in Appendix 1, use of the benchmark for assessing effects on aquatic ecosystems should be limited to ecoregions 68, 69, and 70 in the States of West Virginia and Kentucky (the study region in which it was derived or validated) until validation can be performed. Even within the study region, site-specific factors may affect the appropriateness of the benchmark in a particular case. The SAB indicated that the use of the benchmark outside the study region should be dependent upon additional validation, including consideration of the ionic mixture, background conductivity levels, and macroinvertebrate assemblages. Where subsequent field-based validation or studies by EPA, State agencies, or the scientific literature confirm the appropriateness of the benchmark outside the study area, Regions should incorporate that evidence when determining whether to consider the benchmark more broadly within their reviews under the CWA, NEPA, and E.O. 12898. EPA anticipates undertaking further scientific and technical validation of the benchmark outside West Virginia and Kentucky to ensure that the field-based benchmark may be considered, where appropriate on a case-by-case basis, in the Regions' permit reviews.

Moreover, the SAB also concluded that the 300 $\mu\text{S}/\text{cm}$ conductivity benchmark is not appropriate for ephemeral streams (which flow only in response to rainfall/runoff) without validation. For the time being, EPA Regions should not use this benchmark in connection with ephemeral streams, consistent with the SAB's recommendation, until additional validation can be performed. Regions are encouraged to review available data carefully to verify the flow characteristics and species assemblages in streams. In general, EPA believes that species assemblages that include species associated with relatively permanent flowing water are unlikely to be capable of living in ephemeral streams. Where such taxa are present, EPA believes that the flow classification of that stream is most likely intermittent or perennial, and therefore the

⁸ EPA's final reports and the SAB's final review reports are available at <http://www.epa.gov/owow/wetlands/guidance/mining.html>.

benchmark may provide a valid reference point. Relevant determinations should be made on a case-by-case basis.

Consistent with Executive Order 13563, section 5, EPA is committed to assuring that our decision-making reflects best-available science. This strong body of science has emphasized the significant impacts of Appalachian surface coal mining operations on the Appalachian aquatic environment and the communities that depend on healthy streams for swimming, drinking, fishing, and other uses. To further inform this memorandum, EPA has included a summary of available peer-reviewed science, including EPA's two final scientific reports, in Appendix 1. EPA has applied this science in developing recommendations for ensuring that permits issued under Sections 402 and 404 of the CWA comply with the law and protect water quality. EPA anticipates that as additional peer-reviewed scientific literature is developed, EPA will update this summary to reflect best-available science to guide implementation of the CWA, NEPA, and E.O. 12898. New peer-reviewed scientific literature should be considered by the Regions where appropriate when reviewing permits, and EPA will revisit the recommendations in this guidance if prompted by any such new studies.

B. Recent Federal Actions and Clean Water Act Program Reviews

It has been a high priority of EPA and other Federal agencies to reduce the substantial environmental and human health consequences of surface coal mining in Appalachia.⁹ Over the past two years, EPA has worked to evaluate permitting practices under CWA Sections 402 and 404 for surface coal mining projects in Appalachia. These efforts were initiated as part of EPA's role in coordinating with and overseeing State programs in accordance with the CWA, and consistent with the June 11, 2009 interagency Memorandum of Understanding (MOU) on Appalachian surface coal mining.¹⁰ Beginning in mid-2009, EPA conducted Permit Quality

⁹ As noted in the title of this memorandum, the discussion of legal requirements and scientific information in this memorandum focuses on how they apply in the context of Appalachian surface coal mining. Appalachian States and public comments on EPA's interim final guidance have noted concerns with EPA's discussion of the relevance of conductivity science to Appalachian surface coal mining and its potential relevance to other types of activities. This memorandum focuses specifically on surface coal mining, but we believe that the scientific information on which this guidance relies may be useful to inform CWA decision-making for other activities or in other regions depending on the circumstances. However, this document does not discuss the appropriateness of doing so. With respect to other types of projects or activities in Appalachia, EPA believes that circumstances unique to surface coal mining are principally responsible for the increase in conductivity levels and other water quality parameters of concern observed in surface waters downstream of mining practices, as reiterated by the SAB. Surface coal mining involves disturbing and exposure to weathering of large volumes of rock and dirt, land clearing, and spoil disposal activities at a scale not typically associated with activities such as development practices or forestry. When evaluating other activities under the CWA, or similar activities in other States, Regions should be guided by the CWA and EPA's implementing regulations as well as relevant best-available scientific information.

¹⁰ In June 2009, the Department of the Army, EPA, and the Department of the Interior (DOI) signed an MOU designed to minimize the harmful consequences of Appalachian surface coal mining practices. The MOU reflects an agreement among the agencies to strengthen the environmental reviews of Appalachian surface coal mining projects under the CWA, NEPA, and the Surface Mining Control and Reclamation Act (SMCRA). In the MOU, EPA committed to improve its review of permits under Section 404 and to bolster coordination with States on both Section 402 permits for pollutant discharges from Appalachian surface coal mining operations and State water quality certifications (CWA Section 401) for these operations. The Corps committed to reassess Nationwide Permit 21, a general permit used to authorize some surface coal mining activities, and to work with EPA to clarify Section 404 policies for environmental review and mitigation. DOI committed to evaluate how the Office of Surface

Reviews (PQRs) of Section 402 permits in Appalachian States to assess how effectively States are implementing provisions of the CWA through their permitting actions. EPA released a final PQR report in July 2010 summarizing the results of reviews of CWA Section 402 permitting in the States of West Virginia, Kentucky, Tennessee and Ohio. The findings of the PQR are summarized in Section III of this memorandum.

Meanwhile, over the past two years, EPA and other Federal agencies have worked to ensure timely review of Section 404 permit applications for surface coal mining, many of which have faced delays for many years. It is our hope that our efforts to promote responsible permit decisions will reduce the likelihood of judicial challenges and thus will be seen as a demonstration of our commitment to helping promote an environmentally sustainable Appalachian coal industry that meets existing environmental standards established under the law. EPA's recent experience in reviewing and commenting on permit applications, and our work with the Corps and permit applicants, have identified opportunities for further avoiding and minimizing the potential environmental effects of many, if not most, projects. EPA's ongoing work with the Corps has reinforced the benefit of identifying a set of best practices for mine design and recommendations for designing projects in a way that helps to avoid and minimize impacts, including the potential for significant negative impacts to downstream water quality.

EPA and its regulatory partners in the States and at the Corps increasingly recognize the importance of improving consistency among CWA programs (Sections 404, 402, 401, and water quality standards), and between the CWA and the Surface Mining Control and Reclamation Act (SMCRA), in the agencies' review of proposed mining projects. Our experience over the last year has emphasized the importance of working together under these authorities to assure predictable, consistent, and environmentally effective evaluation of mining operations. Through the exercise of its existing CWA authorities, EPA can help to improve and strengthen coordination between Federal and State CWA programs; provide greater certainty for the mining industry; and promote more effective environmental, water quality, and public health protection.

C. Implementation Experience and Public Comment

EPA published interim final guidance on April 1, 2010, motivated by the extensive scientific evidence described in Appendix 1 and by EPA's CWA program reviews, which suggested additional opportunities to improve compliance with the requirements of existing law. EPA also developed this guidance to support EPA's priority in promoting a greater focus on environmental justice. Since April 1, 2010, EPA has continued its ongoing dialogue with other Federal agencies, Appalachian States, the mining industry, environmental groups, and the public. This ongoing dialogue and collaboration (including consideration of public comments on the April 2010 interim guidance) has significantly informed EPA's development of this final guidance, and further input and new information will continue to inform EPA's decisions in the future.

Mining Reclamation and Enforcement (OSM) can more effectively oversee State permitting and enforcement activities under SMCRA. OSM is also engaged in a rulemaking effort to improve the protection of streams under SMCRA.

1. Implementation Experience

EPA has increased its understanding of the effectiveness of CWA programs as informed by its implementation of the interim final guidance over the last year. In Section 402 permitting, EPA has worked with Appalachian States to communicate the scientific and legal basis for its interim final guidance, consider alternative approaches presented by States, and to improve State permitting practices to ensure consistency with CWA requirements. The States of Virginia and West Virginia, in response to EPA's concerns regarding compliance with narrative water quality standards, released State guidance on how they intend to interpret their narrative standards. EPA looks forward to working with these States to assure that their permitting approaches effectively protect public health, water quality and aquatic communities. At the same time, EPA has engaged in an ongoing dialogue with Kentucky, Virginia, and West Virginia regarding their administrative records for Section 402 permits and inclusion of an appropriate reasonable potential analysis for numeric and narrative water quality standards. We are also working with States to develop permits that include limits that are stringent enough under the CWA to protect water quality standards consistent with best-available science. EPA believes these discussions with Appalachian States are yielding improved permitting outcomes that are more consistent with the CWA and best-available science. Within this final guidance, EPA has refined its discussion of appropriate Section 402 permitting approaches to reflect its ongoing dialogue with Appalachian States.

With respect to Section 404 permitting, EPA is working closely with the Corps to evaluate proposed discharges of fill material associated with mining projects. In these discussions, EPA has recommended the incorporation of emerging and practicable Best Management Practices (BMPs) for valley fill design and construction into permits issued by the Corps under CWA Section 404. These BMPs are designed to minimize the impacts of mining operations on streams while limiting the potential for long-term water quality effects. For example, some permits recently issued by the Corps, after effective dialogue among EPA, the Corps, and the permit applicant, have incorporated BMPs such as sequenced valley fill construction, fill compaction, biological monitoring, conductivity triggers, adaptive management, and more robust mitigation plans. These discussions have prompted EPA to refine the list of BMPs included as Appendix 4 in this final guidance, which identifies promising practices for ensuring compliance with the Section 404(b)(1) Guidelines. EPA anticipates updating this list of BMPs as mine design innovations continue. EPA looks forward to continuing to work with the Corps and individual mining companies to promote protection of water quality, public health and compliance with applicable requirements throughout Appalachia.

With respect to NEPA and environmental justice concerns, EPA is working with the Corps to evaluate proposed projects and to ensure that NEPA and EJ concerns are more effectively articulated in EPA's comments. While appropriate NEPA documentation for 404 permit reviews is determined by the Corps on a case-by-case basis, EPA has recommended that serious consideration be given to the preparation of an Environmental Impact Statement (EIS) for proposed mining projects with multiple valley fills or large stream impacts. In order to foster the early and meaningful public involvement important to the NEPA process as well as effective environmental justice analysis, EPA continues to recommend circulation of draft Environmental

Assessments (EAs) for public review and comment. Finally, EPA continues to work with OSM and the Corps to promote improved analysis of impacts to environmental justice communities, and these discussions have prompted EPA to offer more specific examples in this final guidance of the types of impacts to these communities that EPA believes should be considered.

2. Public Comment

EPA provided an opportunity for public comment on its interim final guidance between April 9 and December 1, 2010. During this public comment period, EPA received more than 60,000 public comments, including approximately 300 unique comments. Most comments from private citizens, mass mailing campaigns, and environmental groups were in general agreement with the interim guidance, and commended EPA for issuing it. Environmental groups supported EPA's work to ensure clearer and stricter CWA enforcement and to recognize environmental justice concerns, but criticized EPA for not further restricting mountaintop removal coal mining. Several State agencies, local officials, and industry commenters expressed general opposition to the interim guidance, while one State agency expressed general support. Some private citizens opposed the interim guidance based on concerns regarding potential impacts to the economic benefits provided by coal and coal mining. Many industry commenters contended that the interim guidance is legally flawed, was instituted without due process, will have negative economic impacts, and relies on insufficient scientific data and peer review. Several Members of Congress commented that the interim guidance was issued prematurely and will negatively impact coal mining jobs, and that it undermines the authority, roles, and responsibilities of State agencies in reviewing and issuing permits.

Through litigation and related public comments, concerns have been expressed by industry and some Appalachian States that the interim guidance represented a legislative rule that should have been promulgated through notice-and-comment rulemaking procedures required by the Administrative Procedure Act. These groups are particularly concerned that EPA's interim guidance imposed a numeric water quality standard on Appalachian States independent of the formal process established under Sections 303(c) or 304(a) of the CWA.

EPA reiterates that this guidance is guidance and not a rule. The CWA provisions and supporting regulations described in this document contain the legally and practically binding requirements. This guidance does not substitute for those provisions or regulations and is not itself a regulation. It does not impose legally or practically binding requirements on EPA, the Corps, or the regulated community, and may not apply to a particular situation depending on the circumstances. Any decisions regarding a particular permit will be based on the facts relevant to that permit and will be evaluated in accordance with the applicable statutes, regulations, and case law. Interested persons are always free to raise questions regarding the recommendations in this guidance in a particular situation. EPA will consider whether or not the recommendations or interpretations in this guidance are appropriate in each situation based on the statutes, regulations, and case law. The use of language such as "recommend," "may," "should," and "can" is intended to describe agency policies and recommendations, while the use of mandatory terminology such as "must" and "required" refers to existing requirements under the CWA, its implementing regulations, and relevant case law.

EPA is not the CWA permitting authority for permits associated with Appalachian surface coal mining operations. Section 402 permits for discharges of pollutants other than dredged or fill material to waters of the United States are issued by Appalachian states, and Section 404 permits are issued by the Corps. EPA's primary role is to comment on these permit applications, and this guidance is primarily directed at informing the comments provided by EPA Regions to Appalachian States and the Corps. EPA has discretion to exercise its formal backstop authority where it determines, on a case-by-case basis, that a particular permit does not comply with the CWA and applicable regulations. EPA will consider the recommendations in this guidance, along with other relevant factors, when reviewing CWA permits. Any objection would be based on applicable requirements of the CWA and implementing regulations. EPA recognizes that approaches other than those discussed in the guidance may be appropriate and fully consistent with applicable legal requirements in specific situations.

EPA has refined this final guidance by clarifying discussions of legal and scientific provisions to emphasize the relevant existing legal requirements. Additionally, EPA has clarified the discussion of numeric conductivity to reinforce that EPA is not establishing a water quality standard. Rather, EPA is providing recommendations to its Regions on case-by-case permitting approaches that comply with long-standing regulations. Under EPA's regulations, Regions and Appalachian States should use best-available scientific information to inform their comments and permitting decisions including – where appropriate – the development of numeric permit limits. The benchmarks are derived from best-available science and represent one possible approach; however, alternative approaches may be appropriate based on site-specific information, other best-available science, and the Clean Water Act. Section III of this guidance provides examples of potential such alternative approaches.

EPA has carefully evaluated the public comments it received on the interim final guidance. EPA has prepared a summary of those public comments and developed responses to the key issues raised in those comments. Both documents are available to the public on EPA's website.¹¹ This final guidance specifically incorporates several of the recommendations provided in these public comments, and EPA appreciates the strong public interest in EPA's actions and the public's engagement with EPA as the Agency carries out its responsibilities under the CWA, NEPA, and E.O. 12898.

Taking into consideration existing legal requirements, the significant body of scientific information, public comments, implementation experience, and related pending litigation, EPA provides the following guidance to its Appalachian Regional offices in order to improve EPA review of Appalachian surface coal mining operations under the CWA, NEPA, and E.O. 12898.

¹¹ Both documents are publicly available on EPA's website at <http://www.epa.gov/owow/wetlands/guidance/mining.html>.

III. EPA Coordination with Appalachian States on NPDES Permitting for Surface Coal Mining Operations

A. Background

All of the States in the Appalachian coal mining region are currently authorized by EPA to administer the NPDES program under Section 402(b) of the Clean Water Act, 33 U.S.C. § 1342(b). The CWA and EPA's implementing regulations require that NPDES permits contain (1) technology-based effluent limitations, which represent the degree of control that can be achieved by point sources using various specified levels of pollution control technology; and (2) more stringent limitations, commonly known as water quality-based effluent limits (or "WQBELs"), when necessary to ensure that the receiving waters meet applicable water quality standards. CWA § 301(b)(1)(C); 40 C.F.R. § 122.44(d)(1). EPA regulations further describe the process for determining the need for such water quality-based effluent limitations (WQBELs) and, if needed, for deriving them, at 40 C.F.R. § 122.44(d).

Extensive scientific evidence described in Appendix 1 supports EPA's belief that discharges from surface mining activities in many if not most cases will have a reasonable potential to cause nonattainment of applicable water quality standards downstream from valley fills, impoundments, and sediment ponds in Appalachia, which in those cases would then require establishment of a WQBEL pursuant to 40 C.F.R. § 122.44(d)(1)(vi). Discharges from Appalachian surface coal mining activities have been found to have a high potential to impact aquatic life uses, as measured using indices of stream biological integrity that Appalachian States typically employ in assessing their waters pursuant to CWA Section 303(d).¹² This section of the guidance addresses Section 402 permits and how they may be written to protect water quality, comply with the CWA, and prevent future degradation of Appalachian watersheds. EPA recognizes that the recommendations in this guidance are not the only acceptable approach for writing such permits. EPA's goal as it reviews proposed discharges associated with surface coal mining projects under CWA Section 402 is to support state efforts to ensure that projects proposed in healthy watersheds protect water quality, and that projects proposed in already-degraded watersheds are permitted in ways that help to restore water quality and aquatic life.

B. EPA's Oversight Role in CWA Section 402 Permitting and State Program Reviews

EPA Regions are given oversight authority under the CWA to help ensure that authorized State program implementation is consistent with the CWA and implementing regulations. 40 C.F.R. Part 123. In their oversight capacity, Regions review draft or proposed permits and supporting documentation on a routine basis, and conduct periodic programmatic assessments through discussions with State staff and onsite visits to assess State program health. In an effort to ensure that NPDES permitting for surface coal mining operations is conducted consistent with the practices for other categories of dischargers and with CWA requirements, EPA's Office of Water has been working closely with Regions 3, 4, and 5 to assess the quality of State-issued

¹² e.g., Pond, G.J., M.E. Passmore, F.A. Borsuk, L. Reynolds, and C.J. Rose. 2008. *Downstream Effects of Mountaintop Coal Mining: Comparing Biological Conditions Using Family- and Genus-Level Macroinvertebrate Bioassessment Tools*. J. N. Am. Benthol. Soc. 27(3):717-737.

CWA Section 402 (NPDES) permits for surface coal mining operations with respect to the requirements of each State's permitting program. EPA has also been assessing permits for their compliance with applicable Federal requirements.

As noted above, EPA conducted Permit Quality Reviews (PQRs) of Section 402 permits in Appalachian States to assess how effectively States are implementing provisions of the CWA through their permitting actions. EPA released a final PQR report in July 2010 summarizing the results of reviews conducted in the States of West Virginia, Kentucky, Tennessee and Ohio.¹³ In that report, EPA identified concerns related to how effectively States were achieving protection of downstream water quality consistent with CWA requirements, focusing on the implementation of each State's narrative and numeric criteria in permits for surface coal mining projects. The report concludes that Appalachian States could be more effective in gathering water quality data and documenting their permit decision-making processes. EPA also found that the NPDES permit records reviewed did not show evidence of a parameter-specific reasonable potential analysis addressing parameters of concern for discharges to cause or contribute to in-stream excursions of water quality standards. In addition, EPA conducted PQR site visits and file reviews in fall 2010 in Pennsylvania and Virginia, which identified similar areas for improvement in State implementation of CWA provisions.

During EPA's PQRs, all permits reviewed by EPA included appropriate technology-based limits for pollutant parameters listed in the effluent limitation guidelines for coal mining (40 C.F.R. Part 434). However, based on observations from both ongoing program oversight and the PQRs, including detailed discussions with State permit writers, EPA has identified certain concerns common to many of the reviewed permits that warrant attention to ensure that water quality is protected.

We encourage Regions to evaluate several key elements of State NPDES permits to help ensure CWA compliance, as outlined below and consistent with issues identified during EPA's PQRs for Appalachian surface coal mining. Should Regions identify similar concerns when reviewing draft or proposed permits, we encourage you to work with your authorized States to resolve these concerns. We encourage the Water Division Directors of the three Regions to work together to ensure a comparable level of review and response across Appalachia. We also encourage Regions to continue reviewing State programs, via the Permit Quality Review and State Review Framework processes, and ensure that appropriate follow-up actions to improve State program performance are incorporated into State performance and workplan agreements. We recommend that the Regions make the results of these reviews public through Web posting or other means, where appropriate, to help promote transparency and public involvement.

C. Effluent and Receiving Water Characterization

Section 308 of the CWA provides broad authority to require information from point sources in order to characterize the nature of their discharges. Pursuant to CWA Section 308, NPDES regulations at 40 C.F.R. § 122.21 provide specific requirements for the submission of

¹³ *Review of Clean Water Act §402 Permitting for Surface Coal Mines by Appalachian States: Findings and Recommendations*. EPA Office of Wastewater Management, Water Permits Division. July 13, 2010. Available at http://www.epa.gov/owow/wetlands/guidance/pdf/Final_Appalachian_Mining_PQR_07-13-10.pdf.

information for owners or operators seeking an individual NPDES permit. In accordance with these regulations, it is the responsibility of the applicant to characterize the wastewater to be discharged from the permitted facility and to provide the information necessary for the permitting authority to make informed decisions. In the context of surface coal mining operations, such data may come from mining facilities located adjacent to or having similar geologic characteristics as the mine under review, or from ambient data collected as part of the Section 404 or SMCRA permit applications. Permitting authorities should seek to obtain such data independently if they are not submitted by the applicant; permitting authorities also have the ability to reject an application as incomplete. 40 C.F.R. § 122.21(e).

In order to submit a complete NPDES permit application for an individual permit, the applicant must present data to properly characterize its discharge to enable a reasonable potential analysis to be completed by the permit writer at the time of permit issuance. 40 C.F.R. § 122.44(g)(7). In addition to data specifically required by permit applications, 40 C.F.R. § 122.21 allows permitting authorities to request any additional data as necessary to support an assessment of potential water quality impacts. As a result of the scientific evidence described in Appendix 1, EPA recommends that applications for surface coal mining facilities in Appalachia generally include discharger- or watershed-specific data on conductivity, TDS, and selenium, and that States request these data if not provided. Where possible, States should request information in digital format to facilitate the efficiency of their permitting processes and any submittal to EPA for subsequent review. Additional information to characterize the ionic matrix in the effluent (bicarbonate, sulfate, chloride, etc.) is also recommended, consistent with the discussion in Section IV.C below.

Existing Discharges: To characterize their effluent, existing dischargers applying or reapplying for an NPDES individual permit must provide the permitting authority with screening information for a suite of pollutants and pollutant parameters listed in the applicable NPDES permit application form, consistent with 40 C.F.R. § 122.21(g). During EPA's PQRs, not all required application data for existing discharges were found to be provided by applicants or available in the administrative record.

New Discharges: For new (proposed) discharges, the application form for an individual permit requires an estimate of the effluent characteristics. During EPA's PQRs, the anticipated pollutant characterization was generally not found to be provided by applicants or available in the administrative record. Even though valley fills, impoundments, and sediment ponds would be constructed before data from actual discharges would be available, other data, such as data from similar activities at nearby mines, are most likely available to characterize these discharges. Additionally, the applicant must also report the existence of any technical evaluation concerning its wastewater treatment, along with the name and location of similar mines of which it has knowledge. 40 C.F.R. § 122.21(k)(6). The permitting authority should require the applicant to characterize the anticipated pollutant concentrations and loads using data from similar discharges and/or based on characteristics of local soils and geology, consistent with 40 C.F.R. § 122.21(k)(5).

EPA recommends that the permitting authority determine that a permit application is incomplete when it lacks effluent data that properly characterizes the discharge.¹⁴ Regions should determine whether they believe the permit application to be complete when reviewing a draft or proposed permit and the associated application. Additionally, the Regions should ensure that permits for new dischargers require follow-up with actual effluent data within 24 months of commencement of discharge as required by 40 C.F.R. § 122.21(k)(5)(vi).

Ambient Data: Ambient water quality and biological data collected as part of the SMCRA and Section 404 permitting processes should be included in the NPDES permit development process and, where appropriate, should be incorporated as “background” conditions for receiving water characterization in reasonable potential analyses and limit development.

D. Determining the Need for a Water Quality-Based Effluent Limit: Reasonable Potential Analysis

The procedure for determining the need for WQBELs is called a “reasonable potential” analysis. Under EPA’s regulations at 40 C.F.R. § 122.44(d)(1)(i), WQBELs are required for all pollutants that the permitting authority determines “are or may be discharged at a level [that] will cause, have the reasonable potential to cause, or contribute to an excursion above any [applicable] water quality standard, including State narrative criteria for water quality.” Thus, if a pollutant discharge has the reasonable potential to cause or contribute to an excursion above any applicable water quality standard – including narrative criteria – the discharger’s NPDES permit must contain a WQBEL for that pollutant. 40 C.F.R. § 122.44(d)(1)(iii)-(vi).

In conducting a reasonable potential analysis, all valid representative qualitative and quantitative information regarding the effluent and receiving water should be used, as described above. To ensure that limitations are as stringent as necessary to meet water quality standards, consistent with 40 C.F.R. § 122.44(d)(1), permitting authorities should not defer reasonable potential analyses until after permit issuance. Under the CWA and its implementing regulations, an NPDES permit must contain limits as stringent as necessary to meet applicable water quality standards. CWA § 301(b)(1)(C); 40 C.F.R. § 122.44(d)(1). EPA recommends that the administrative record for a permit include evidence of a parameter-specific reasonable potential analysis in order to ensure compliance with these provisions. With respect to surface coal mining discharges, the following paragraphs discuss how this assessment should be conducted for both numeric and narrative water quality criteria.

Procedures for conducting a reasonable potential analysis where a State has adopted a numeric criterion are well established and can be found in EPA’s Technical Support Document (TSD) for Water Quality-based Toxics Control.¹⁵ These procedures should also be used to conduct analyses for surface coal mining discharges.

¹⁴ See 40 C.F.R. § 122.21(e) (a permit application is determined to be complete at the discretion of the permitting authority) and 40 C.F.R. § 122.21(g)(13) (the applicant shall provide to the Director, upon request, such other information as the Director may reasonably require to assess the discharge).

¹⁵ *Technical Support Document for Water Quality-based Toxics Control* (EPA/505/2-90-001 PB91-127415). 1991. Available at <http://www.epa.gov/npdes/pubs/owm0264.pdf>.

For existing discharges, permitting authorities should use all valid and representative facility-specific data as well as ambient data and any associated Total Maximum Daily Loads (TMDLs) to determine whether the discharge causes, has the reasonable potential to cause, or contributes to an excursion above numeric and/or narrative water quality standards. For new (proposed) discharges, permitting authorities should use all valid and representative data. Section 3.2 of the TSD provides guidance to permit writers regarding how to conduct a reasonable potential analysis without effluent data. For surface coal mining operations, pre-issuance reasonable potential analysis should be conducted using data secured through evaluation of similarly situated facilities in adjacent watersheds or similar mining practices in the same ecological or geological setting.

Numeric Criteria

As one example, all Appalachian States have adopted chronic numeric criteria for selenium for the protection of aquatic life. Should a reasonable potential analysis indicate that the discharge of selenium (or another parameter) has the potential to cause or contribute to an excursion above the applicable State criterion for selenium, the State must include a limit protective of water quality in the permit to be consistent with the CWA. 40 C.F.R. § 122.44(d)(1).

Narrative Criteria

In addition to those parameters for which there are numeric water quality standards, all Appalachian States have adopted narrative water quality standards. “Narrative water quality criteria have the same force of law as other water quality criteria, and NPDES permits must contain effluent limits necessary to attain and maintain all applicable water quality criteria, including narrative criteria.” 54 Fed. Reg. 23868, 23875 (June 2, 1989).

There are numerous tools that the permitting authority may use to determine whether a discharge will cause or has a reasonable potential to cause or contribute to an in-stream excursion above an applicable narrative water quality criterion, consistent with 40 C.F.R. § 122.44(d)(1)(ii) and EPA’s TSD. These include State bioassessment methodologies; whole effluent toxicity testing; consideration of the effect on in-stream conditions from nearby, similar discharges; and consideration of best-available science related to the effects of similar discharges.¹⁶

Of particular relevance here, no Appalachian States (with the exception of Ohio¹⁷ and Pennsylvania¹⁸) currently have applicable numeric water quality criteria that account for the effects associated with high levels of conductivity, TDS, and sulfates. In lieu of such numeric

¹⁶ See EPA’s 1991 TSD.

¹⁷ Ohio has a numeric standard for Total Dissolved Solids (TDS) that is equivalent at 25°C to a conductivity level of 2,400 µS/cm. In light of the recent scientific information described in Appendix 1 as well as recent analyses conducted by EPA, we encourage Region 5 to work with Ohio to ensure that it interprets its narrative criteria consistent with relevant science and, where appropriate, to consider revisions to its numeric criteria.

¹⁸ Pennsylvania’s criteria for TDS are designed to protect drinking water at the plant’s intake pipe and are not designed to protect aquatic life. Likewise, the Pennsylvania osmotic pressure criteria may not be protective of water quality in the context of surface coal mining activities.

criteria, however, all Appalachian States have applicable narrative water quality standards that include provisions for the protection of aquatic life. These criteria are summarized in Appendix 3 of this memorandum.

Where a State implements narrative criteria to protect designated uses, the State should provide information identifying the method by which the State intends to assess reasonable potential and regulate point source discharges, consistent with the narrative criteria. Such information may be included as part of the standards or as part of State implementation policies and procedures and should be documented in the permit fact sheet or statement of basis. In establishing a numeric interpretation of a narrative criterion, States may establish numeric values based on EPA's 304(a) guidance, EPA's 304(a) guidance modified to reflect site-specific conditions, or any other scientifically defensible methods, such as EPA's *A Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams* (Final Report). See 40 C.F.R. § 122.44(d)(1)(vi).

As noted in Appendix 1, EPA recently completed an independent SAB peer review of this report, and has issued a final report that addresses the SAB's recommendations. This final peer-reviewed study concludes that 5% of native macroinvertebrate genera are extirpated where the conductivity level reaches 300 $\mu\text{S}/\text{cm}$, which is consistent with the endpoint typically selected by EPA when deriving numeric aquatic life criteria under section 304(a). Pond et al. (2008) demonstrates that substantial aquatic life effects have already occurred when conductivity levels reach 500 $\mu\text{S}/\text{cm}$, which suggests impairment of the aquatic life use as measured using genus- and family-level macroinvertebrate bioassessment indices. A State's assessment of whether discharges from a proposed project have a reasonable potential to exceed narrative criteria should reflect the best-available science. Where a State does not have an established methodology for implementing a numeric interpretation of the applicable narrative criterion, EPA recommends that States give serious consideration to the science contained in its two peer-reviewed reports, which indicates that substantial and increasing aquatic life impacts occur as conductivity increases beyond 300 $\mu\text{S}/\text{cm}$. EPA believes that use of these conductivity levels (where the use is appropriate) as a numeric interpretation of the narrative standard for reasonable potential determinations is one option that would generally be an appropriately protective and scientifically defensible approach consistent with the CWA.¹⁹ However, application of narrative water quality criteria in the context of a specific permit is a case-by-case determination taking into account the specific circumstances of the permit. The appropriate specific level of conductivity or other parameter relevant to a reasonable potential analysis may differ based on site-specific conditions, which would justify higher or lower triggers, or different parameters, for assessing reasonable potential for a given discharge to cause or contribute to an excursion above applicable water quality standards.

Based on available literature, EPA expects that in many cases, the available science will indicate that there is a reasonable potential for these discharges to cause or contribute to an excursion above numeric or narrative water quality standards, thus making water quality-based

¹⁹ The SAB's comments on EPA's draft conductivity benchmark report also raised concerns that a conductivity level of 300 $\mu\text{S}/\text{cm}$ in some circumstances may not be protective of ecologically important, rare, or sensitive taxa. Where relevant, states should also consider the SAB's advice on this point.

effluent limits necessary. Appalachian States have made great progress in recognizing their obligation to perform such analyses.

Another possible approach for assessing reasonable potential to exceed the State's narrative water quality criterion could include bioassessment tools. A July 21, 1997, EPA memo²⁰ clarifies that if available, the permitting authority should consider biological assessments and any other relevant data in characterizing the effluent to determine whether the discharge will cause, have reasonable potential to cause, or contribute to an excursion above a State water quality standard, including State narrative criteria.

E. Developing and Incorporating Protective Water Quality-Based Effluent Limits and Other Conditions

When developing WQBELs, the permitting authority must ensure that the limits are as stringent as "necessary to ... achieve water quality standards," and that the level of water quality achieved by such limits is "derived from and complies with all applicable water quality standards." 40 C.F.R. § 122.44(d)(1); CWA § 301(b)(1)(C).

Where there is reasonable potential for a pollutant to exceed a narrative criterion, and the state has not adopted chemical-specific criteria for such pollutant, then the permitting authority must establish a WQBEL based on one of the methods specified in the regulation. 40 C.F.R. § 122.44(d)(1)(vi). WQBELs are generally expressed as chemical-specific numeric limitations on the quantity or concentration of the pollutant or pollutant parameter that may be discharged. Additionally, WQBELs may be numerically expressed in terms of Whole Effluent Toxicity (WET). WQBELs may also be expressed in narrative form, such as BMPs or pollutant minimization measures, when it is infeasible to derive a numeric limit. 40 C.F.R. § 122.44(k)(3).^{21,22} Any such WQBEL must be set at a level that is as stringent as necessary to meet water quality standards. CWA § 301(b)(1)(C); 40 C.F.R § 122.44(d)(1).

Where there is no applicable TMDL, the determination of a limit that is as stringent as necessary is made on a case-by-case basis. In practice, such limits have included limits set at or below either the numeric water quality criteria or a quantification of narrative water quality criteria, or limits based on offsets or trades with other pollutant sources to meet such criteria. Where there is an applicable TMDL for the waterbody, the WQBEL must be consistent with the assumptions and requirements of any available wasteload allocation in the TMDL. 40 C.F.R. § 122.44(d)(1)(vii)(B).

²⁰ Memorandum from Tutor T. Davies and Michael B. Cook to Water Management Division Directors, Regions I-X, and Environmental Services Division Directors, Regions I-X. *Clarifications Regarding Whole Effluent Toxicity Test Methods Recently Published at 40 C.F.R. Part 136 and Guidance on Implementation of Whole Effluent Toxicity in Permits* July 21, 1997. Available at <http://www.epa.gov/npdes/pubs/owm0127.pdf>. Also see the discussion on p. 22 of EPA's TSD.

²¹ EPA believes that in many cases, calculation of numeric effluent limits for conductivity is feasible, in light of the extensive scientific evidence documenting the relationship between elevated conductivity levels and aquatic life effects.

²² So that permit decisions are consistent with the Statement of Basis or Fact Sheet requirements at 40 C.F.R. § 124.56, 124.7, or 124.8 and are transparent to the public and the regulated community, the State should document the basis for any determination that a numeric effluent limit for the narrative standard was infeasible to calculate.

EPA's recent PQR in Appalachian States, and the Agency's ongoing oversight of State permitting programs, identified concerns regarding the consistent application of state water quality standards relating to discharges that increase the levels of conductivity, TDS, and sulfates. A permit that fails to include limits where necessary to meet applicable water quality standards is not consistent with the requirements of the CWA. 40 C.F.R. § 122.44(d)(1). EPA Regions should evaluate permits to determine, on a case-by-case basis, if numeric limits are required to ensure that the draft or proposed permit is consistent with the CWA, and recommend to permitting authorities specific parameters and limits based on the best available science where they are needed.

1. Chemical- or Parameter-Specific Numeric Effluent Limits

Numeric Water Quality Standards: Where a surface coal mining discharge is found to have reasonable potential to cause or contribute to an excursion above a numeric criterion within a State's water quality standards, EPA's regulations generally require that NPDES permits include water quality-based effluent limits (WQBELs) based on the approved numeric water quality criteria (40 C.F.R. § 122.44(d)(1)(iii)), as described in Chapter 5 of the TSD.

Narrative Water Quality Standards: To implement a State narrative water quality criterion, the State must determine if it is necessary and possible to derive a numeric interpretation of the narrative criterion in order to ensure that the criterion is met. Once a numeric interpretation is developed, it can be applied in a manner identical to a numeric criterion to derive the WQBEL, consistent with procedures in the TSD.

As to interpretation of narrative standards with respect to conductivity, EPA believes NPDES permit provisions that include numeric effluent limits for conductivity consistent with best-available science would generally reflect a scientifically defensible, transparent, and protective approach for preventing impacts to aquatic life that may rise to the level of excursions above applicable narrative water quality standards. EPA recommends that States consider a conductivity level of 300 $\mu\text{S}/\text{cm}$, as outlined in Appendix 1, calculated in EPA's final report, *A Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams*. EPA anticipates that this chronic level of conductivity would generally be an appropriate numeric interpretation used to derive a WQBEL, consistent with TSD procedures. In light of this report and Pond et al. (2008),²³ EPA recommends that states work to assure that discharges from surface coal mining operations are generally not above 300-500 $\mu\text{S}/\text{cm}$. However, because application of narrative water quality criteria in a permit is a case-specific determination, it may be the case that conductivity levels outside the range of 300-500 $\mu\text{S}/\text{cm}$ are consistent with meeting applicable water quality standards in some waters, depending on their characteristics. Different levels might well be appropriate for waters that are different from those on which the EPA reports were based, such as those with dissimilar ionic mixtures or aquatic life communities. And as noted previously, alternate scientifically defensible approaches for implementing narrative water quality standards are also acceptable. Whatever approach is used, however, site-specific data and high-quality scientific information should be used to develop

²³ Pond et al. (2008) identified substantial aquatic life effects to have already occurred at a level of 500 $\mu\text{S}/\text{cm}$.

permit limits, including any limits for conductivity that are set at different numeric values from those discussed here, in order to ensure that they fully protect applicable aquatic life uses.

Alternatively, States may choose to implement their narrative standards consistent with the CWA and EPA's regulations through a numeric effluent limitation for parameters other than conductivity. For example, a State may also choose to employ numeric limitations for a suite of ions that are dominant in the conductivity mixture and are common constituents of Appalachian surface coal mining discharges, such as sulfate and bicarbonate. EPA Region 3 recently concluded that, based on information specific to the particular permit and receiving stream, a permittee's proposal to include adaptive management procedures and a numeric performance measure for sulfate control would be an acceptable approach to satisfying potential water quality concerns. As a general matter, Regions should review such limitations to ensure they are scientifically defensible, account for the interactive effects of multiple ions, and protect water quality.²⁴

2. Numeric Whole Effluent Toxicity (WET) Limits

If there is a reasonable potential to cause or contribute to an excursion above a narrative water quality criterion, even where the permit includes a chemical-specific limit to meet a narrative criterion, the permit must include a limit for WET if toxicity testing data or other information indicates a reasonable potential for toxicity of the discharge to exceed a narrative criterion. 40 C.F.R. § 122.44(d)(1)(v); 54 Fed. Reg. 23868, 23879 (June 2, 1989). Where there is reasonable potential for toxicity, a WET limit is necessary unless the permitting authority “demonstrates... that chemical-specific limits for the effluent are sufficient” to meet standards. *Ibid.* One method for making this demonstration would be to use toxicity testing to show that, after application of chemical-specific limits, the effluent has no acute or chronic toxic effects on aquatic life in the receiving water. 54 Fed. Reg. 36868, 36874 (June 2, 1989).

Consistent with these requirements, even if a Section 402 permit for a surface coal mining operation includes numeric limits for conductivity (or other indicator parameters), there may be other pollutants in the effluent that, alone or through a synergistic effect, could result in a reasonable potential to exceed the narrative criterion. Based on the available science and current data from surface coal mining discharges, EPA in many cases anticipates that permitting authorities would find that discharges from surface coal mining operations will have the reasonable potential to exceed State narrative water quality criteria, as described in Section III.D above, unless site-specific information leads to a determination to the contrary. Thus, EPA generally expects that NPDES permits for these discharges will include WET limits. An alternative permitting approach would be to include chemical-specific limits for all pollutants necessary to meet the narrative criteria.

Generally, WET limits alone have not been shown to protect water quality from the effects of conductivity. Available scientific information, including the SAB review of EPA's conductivity benchmark report, has highlighted that the current WET testing organisms are not

²⁴ The final review report from the SAB, available at <http://www.epa.gov/owow/wetlands/guidance/mining.html>, describes how individual ions can interact to cause ionic stress, and recommends additional research to better clarify this interactive effect.

good surrogates for the native aquatic organisms with respect to the effects of conductivity.²⁵ EPA believes this evidence makes clear that the macroinvertebrate assemblage in central Appalachian streams is more sensitive to the effects of elevated TDS or conductivity than the standard WET testing organisms. For example, some waters with conductivity levels as high as 2,700 uS/cm, nine times the protective level identified in recent scientific reports, did not elicit greater than 50% mortality in standard short-term toxicity tests using *C. dubia*.²⁶ This suggests that in many cases WET limits alone are not a good approach for ensuring that narrative water quality criteria are met in Appalachian streams.

3. Bioassessment Permitting Approaches

Some States have proposed to use endpoints based upon established bioassessment indices in permits to protect aquatic life from the effects of mining-related discharges in healthy or impaired waters. For effluent-dominated streams downstream of valley fill sediment ponds, such an approach would typically include permit conditions requiring periodic assessment of the aquatic community using a scientifically valid bioassessment method. We recommend that Regions carefully review such a proposed permit to ensure that its limits are as stringent as necessary to achieve applicable water quality standards in accordance with 40 C.F.R. § 122.4(d) and CWA § 301(b)(1)(C).

Regions should work with States that propose such an approach to ensure that it is protective, implementable, and enforceable. Consistent with 40 C.F.R. § 122.44(d)(1)(i-vi) and EPA's TSD, Regions should consider several issues, including whether:

- The proposed bioassessment index and numeric thresholds represent a scientifically valid tool for assessing aquatic life uses, are sufficiently sensitive to reflect trends and impacts from changes in conductivity or other appropriate chemical parameters, and provide for an adequate baseline and monitoring frequency;
- Pre-mining baseline stream conditions and the permit's monitoring requirements are sufficient to ensure that effects from existing sources can be quantified and distinguished from effects from the permitted discharge;
- For discharges into waters that do not meet applicable water quality standards, the effluent limit(s) are as stringent as necessary to meet applicable water quality standards. (A limit that simply maintains an impaired stream at its existing level of impairment without any improvement over time would not constitute a limit as stringent as necessary to meet applicable standards.);

²⁵ In particular, the SAB noted that traditional laboratory surrogates are not suitable for testing the effect of changing major ion concentrations and that such organisms employ a different approach to osmoregulation that makes them much less vulnerable to high concentrations of major ions. Therefore, WET testing based on *C. dubia* or other currently employed laboratory surrogates would be underprotective. See SAB report at 15.

²⁶ Merricks, TC et al., 2007. *Coal-mine hollow fill and settling pond influences on headwater streams in southern West Virginia, USA*. Environmental Monitoring and Assessment 129(1-3):359-378.

- Bioassessment is effectively coupled with permit triggers and adaptive management plans to assure that remedial action is taken before changes in conductivity or other appropriate chemical parameters result in nonattainment of the aquatic life use; and
- The permit includes measurable and enforceable thresholds representing a violation of the permit, and places responsibility on the permittee to take action to remedy violations and avoid long-term noncompliance with the limit.

4. Best Management Practices (BMPs)

BMPs may be imposed in the form of NPDES permit conditions in lieu of a numeric WQBEL when the permitting authority determines that numeric effluent limits are infeasible to calculate, 40 C.F.R. § 122.44(k)(3), or to supplement a numeric WQBEL, or where the permitting authority determines that such requirements are necessary to achieve effluent limitations and standards or to carry out the purposes and intent of the CWA. 40 C.F.R. § 122.44(k)(4). Any BMPs that the permittee implements for surface coal mining discharges (including discharges from valley fills and stormwater) should be consistent with emerging best practices as implemented by States, the Corps, and the mining industry. A list of some potential BMPs that could be considered is included in Appendix 4. The responsibility for initially identifying appropriate BMPs to meet effluent limits ultimately rests with the permittee, in consultation with the permitting authority.

EPA recommends that BMPs be implemented as a supplement to the numeric effluent limitations described above.²⁷ EPA recommends that implementation of BMPs include detailed monitoring to assure that BMPs are performing as expected and quantifiable action levels (“triggers”) set at levels sufficient to identify problems and before water quality criteria are exceeded. When such levels are exceeded, the permit should require implementation of an adaptive management plan designed to ensure action is taken before water quality standards are violated or permit limitations are exceeded. Such quantifiable triggers can be established for parameters such as conductivity levels or other water quality metrics. The permitting authority should document how these triggers are sufficient to ensure that water quality criteria are not exceeded within the permit’s Statement of Basis or fact sheet.

5. Other Applicable Permit Conditions

In addition to BMPs, EPA recommends that State NPDES permitting authorities consider the following permit conditions to help ensure that permits are protective of water quality standards. Many of these conditions are consistent with those outlined in Section IV of this memorandum with respect to CWA Section 404. The determination of whether a combination of limitations and permit conditions is appropriately protective, scientifically defensible, and consistent with the CWA will be unique to each operation and should be made on a case-by-case basis. This determination should be documented in the fact sheet and the administrative record.

²⁷ EPA believes that it will generally be feasible to calculate a numeric effluent limit for conductivity, consistent with the scientific information described in Appendix 1. See Footnote 21.

Use of Offsets

Permitting authorities may include conditions in CWA Section 402 permits that allow for the discharger to meet a water quality-based effluent limitation that has been determined to be as stringent as necessary by utilizing offsets from another source that is contributing the pollutant or pollutant parameter of concern to the segment. For example, such offsets could be acquired by remediating and thus reducing contributions of pollutants or pollutant parameters from pre-SMCRA mining activity that might otherwise not be specifically addressed under Federal or State regulations.

Any offsets utilized should be protective of water quality standards and should take into account guidance in EPA's *Water Quality Trading Toolkit for Permit Writers*.²⁸ For example, the Toolkit recommends the following to ensure that offsets are protective of water quality standards:

- NPDES permits should include the water quality-based effluent limitation that determines the level of discharge that the permittee would have to meet were offsets not to occur. Permitting authorities should also consider including monitoring and reporting conditions as well as conditions for how offsets may be generated.
- Use of offsets should not create localized impacts. In order to avoid localized effects in the mining context, EPA expects that offsets for conductivity would generally be available only in circumstances in which the reducing source is upstream of the segment exceeding applicable in-stream conductivity or other benchmarks.
- Offsets should be calculated at a ratio that accounts, at a minimum, for differences in location between sources, differences in pollutant type (if any), and any uncertainty related to the type of credit generator (e.g., nonpoint sources). Addressing this uncertainty factor will be especially important when considering what value to place on reductions from mine remediation.

Use of Sequencing

For new mining projects proposing to construct multiple valley fills, EPA recommends that discharges from outfalls associated with valley fills be authorized in Section 402 permits in "sequence." As outlined in Section IV, "sequencing" means:

- Discharges from valley fills associated with a project should generally be authorized one at a time; and
- The permittee should demonstrate that aquatic life uses and the water quality necessary to support those uses have been protected at each valley fill before the permittee may discharge from subsequent valley fills.

This practice is intended to minimize the likelihood that more than one valley fill outfall or group of outfalls from a single project will be in violation of effluent limitations. Including

²⁸ EPA's *Water Quality Trading Toolkit for Permit Writers* (EPA-833-R-07-004) is available at <http://water.epa.gov/type/watersheds/trading/WQTToolkit.cfm>.

such a provision is consistent with EPA's recommendations to the Corps for surface coal mining projects that require authorization under CWA Section 404. This could be implemented in Section 402 permits by providing authorization of only one valley fill-associated sediment pond discharge at a time and allowing the permittee to commence additional discharges only after a permit modification is effective that authorizes additional fill-related discharge(s). Alternatively, similar to the approach outlined in Section IV, the Section 402 permit could include effluent and ambient monitoring, enable commencement of one initial fill-related discharge, and authorize additional fill-related discharges only if conductivity (or other indicators) from the first discharge remain below a specific level of concern. Such data may also be valuable to permitting authorities in evaluating subsequent permit applications and proposed permit amendments for mining operations proposing to expand.

The Regions should encourage State permits to sequence fills where monitoring and watershed-specific factors (such as known impacts from nearby similar facilities or other facilities operated by the permittee) suggest water quality impacts may occur. On a case-by-case basis, concurrent construction of valley fills may be appropriate, for example, if available site-specific data suggest that concurrently constructing more than one fill would not be likely to lead to violation of water quality standards, or that sequencing would not reduce impacts. Factors to consider in making this evaluation can include whether sequencing is practicable (considering costs, logistics, and technology), the size and scope of impacts proposed to waters, the length of time needed to construct each fill and to complete the entire mining operation, and the available data documenting the past success of proposed BMPs at protecting and maintaining water quality.

6. Completing Appropriate Antidegradation Analyses

Regions should also focus on ensuring that permits are issued consistent with water quality standards, regulations, policies, and procedures, including antidegradation. States are required to develop and adopt an antidegradation policy and identify methods for implementing such policy, which must be consistent with elements set forth in EPA's regulations. 40 C.F.R. § 131.12(a). States should ensure that adequate antidegradation reviews have been conducted for the receiving water consistent with applicable State water quality standards.

Federal antidegradation regulations require that existing uses and the level of water quality necessary to protect existing uses shall be maintained and protected (e.g., Tier 1). 40 C.F.R. § 131.12(a)(1). Where the quality of the waters exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water (e.g., "high-quality" waters), that quality shall be maintained and protected unless the State finds, after satisfying all intergovernmental coordination and public participation provisions, that allowing lower water quality is "necessary to accommodate important economic or social development in the area in which the waters are located" (e.g., Tier 2). 40 C.F.R. § 131.12(a)(2). Finally, for waters that constitute an outstanding national resource, that water quality shall be maintained and protected (e.g., a lowering of water quality is prohibited) (e.g., Tier 3). 40 C.F.R. § 131.12(a)(3).

Among the most important and useful elements of an antidegradation policy is the requirement that, before allowing lower water quality in high-quality waters, the State must

make a finding that lower water quality is “necessary to accommodate important economic or social development in the area in which the waters are located.” 40 C.F.R. § 131.12(a)(2). Before a lowering of water quality is allowed, an alternatives analysis should be undertaken to evaluate whether the proposed discharge is “necessary.” This analysis should include consideration of a range of less-degrading or non-degrading alternatives to the direct discharge or to the manner of discharge (e.g., non-discharging options, relocation of discharge, alternative processes, and innovative treatments). With respect to the finding that allowing lower water quality will accommodate important economic or social development, we recommend that Regions encourage States to take into account environmental justice considerations, for example, by incorporating in the economic or social analysis both an assessment of the benefits of mining (such as jobs or financial inputs to the community) and considerations of the economic and/or social impacts associated with the lowering of water quality, including those that affect low-income and minority populations. For example, when considering the social and economic benefits compared to environmental costs, the potential effects that should be considered include, in addition to job creation and other economic benefits, potential loss of assimilative capacity; negative impacts to fishing, recreation and tourism; health impacts; and impacts to the societal value of environmental quality. The permit record should contain documentation to support the State’s antidegradation analysis and to ensure that public participation procedures have been followed.

Where the State has made an appropriate antidegradation finding, the State may allow a discharge to lower the quality of a high-quality water. For example, in the case of a new Appalachian surface coal mining discharge, an antidegradation finding that allowing lower water quality is necessary to accommodate important economic or social development could support authorization of a discharge that results in an increase in in-stream conductivity levels. However, such a finding would generally not support a lowering of water quality that would increase in-stream conductivity levels beyond levels associated with impairment of the aquatic life use (e.g., consistent with the best-available science in Appendix 1). See 40 C.F.R. § 131.12(a)(2). For permits for new discharges that propose to discharge to impaired waters (or to unimpaired waters), permits must include permit limits and conditions that ensure that the discharge will not cause or contribute to a violation of applicable water quality standards, which include antidegradation. 40 C.F.R. § 122.4(i). Such permits could include the use of upstream offsets as described above, as a means of attaining the limit. If a TMDL has been developed for the impaired waters involved, the permits should be consistent with the allocations in the TMDL. 40 C.F.R. § 122.44(d)(1)(vii)(B).

F. Other Permitting Considerations

1. Specific Guidance Regarding Oversight of General Permits

Some discharges associated with surface coal mining operations are authorized through State-issued general NPDES permits. In light of the site-specific analysis that may be necessary to ensure that surface coal mining discharges are controlled as necessary to meet applicable water quality standards, and in light of the significant water quality impacts discussed previously, general permits may be inadequate to protect water quality if they lack numeric effluent limitations for parameters of concern. EPA looks forward to working with Appalachian

States that utilize general permits for surface coal mining to ensure that these permits reflect current science and protect water quality.

Facilities seeking coverage under an NPDES general permit are generally required to submit information specifically identified in the Notice of Intent provisions of the general permit. 40 C.F.R. § 122.28(b)(2)(ii). EPA's PQRs have found that States generally did not adequately document or explain how information submitted by applicants was used to characterize the nature of their actual or proposed discharges. In particular, where facilities had proposed to discharge, but had not yet begun construction or operation, the files evaluated in the PQRs contained little discussion of how the permitting authority projected or anticipated the types and concentrations of pollutants expected in the effluent.

When a permitting authority elects to issue a general permit for discharges from a surface coal mining operation, EPA believes that the permit should include effluent limitations as necessary for discharges to meet water quality standards applicable to each waterbody for which discharge authorization can be provided under the permit. EPA further recommends that the permitting authority create a mechanism, such as eligibility criteria for coverage under the permit, to ensure that new or increased discharges that may be authorized under the permit are permissible under 40 C.F.R. § 122.4(i) and the State's antidegradation policy. Consistent with 40 C.F.R. § 122.28(b)(3)(i), EPA recommends that the permit (1) identify circumstances in which the permitting authority may require a source that is authorized under a general permit to apply for and obtain an individual permit, and (2) provide that any interested person may petition the permitting authority to require an individual permit.

2. Addressing Downstream and Watershed-Level Water Quality Impacts

In its recent reviews of proposed surface coal mining projects under CWA Sections 402 and 404, and as a result of interagency Federal efforts to improve assessment of the cumulative effects of surface coal mining operations, EPA has noted that many surface coal mining operations are proposed in watersheds already significantly impacted by previous mining activities.²⁹ In many cases, these watersheds include streams that have significantly elevated levels of conductivity and degraded biological communities. These streams are typically either listed under CWA Section 303(d), or they demonstrate levels of degradation commensurate with impaired streams but have not been formally assessed for impairment.

Where the receiving stream or an affected downstream waterbody has been listed on the State's CWA Section 303(d) list, and there is an approved TMDL for any of the affected waterbodies, the permit must be consistent with the assumptions and requirement of any wasteload allocation for the discharge identified in the TMDL. 40 C.F.R. § 122.44(d)(1)(vii)(B).

Where the receiving stream or an affected downstream waterbody has been listed on the State's CWA Section 303(d) list and there is no approved TMDL, or where the waterbody is degraded and has not been listed on the CWA Section 303(d) list, it will be important that the

²⁹ e.g., Merriam, E. R., J. T. Petty, G. T. Merovich, Jr, J. B. Fulton, and M. P. 2011. *Additive effects of mining and residential development on stream conditions in a central Appalachian watershed*. J. N. Am. Benthol. Soc., 2011, 30(2):399–418.

reasonable potential analysis and limit development process include pollutants for which the waterbody is impaired or degraded. This is especially significant if immediate receiving streams are of high quality but downstream waters affected by the discharge are impaired for parameters that will be present in the effluent.

High-quality Appalachian headwater streams typically have low levels of TDS or conductivity,³⁰ and generally have a dilutive effect on higher conductivity downstream waters before mining-related disturbances occur. Following mining-related disturbances, elevated levels of conductivity in formerly high-quality headwaters can further exacerbate downstream water quality effects. EPA's regulations state that permit limitations must be established at a level as stringent as necessary to protect numeric and narrative water quality standards (CWA § 301(b)(1)(C) and 40 C.F.R. § 122.44(d)(1)(i-vi)), which includes protection of any downstream segment that would be affected by the new mining-related discharge. Permits that do not address the protection of water quality standards in both immediate receiving waters and downstream waters that may be affected by loss of dilution may not be consistent with the CWA.

G. Environmental Justice Considerations

Important provisions under CWA Section 402 may be relevant to environmental justice issues stemming from surface coal mining and its impact on human health and the environment. EPA encourages States to evaluate whether an activity to be covered by a proposed NPDES permit would result in a disproportionate human health or environmental effect on low-income and minority populations. EPA encourages States to include in such an evaluation an analysis of technical and scientific aspects of the draft permit (including avoidance and mitigation of adverse impacts) and documentation of its analysis of impacts to affected populations. The opportunity for public participation by low-income and minority communities in the permitting process is also a critical environmental justice consideration.

As Regions review NPDES draft permits, they should address the adequacy of the technical and scientific aspects of the draft permit. Where adverse human health or environmental effects are likely, EPA Regions should suggest ways and measures to avoid and/or mitigate such impacts through appropriate comments to States.

With respect to public participation, Regions should make efforts to ensure there is sufficient public information and outreach to ensure a meaningful opportunity for public participation, including by low-income and minority communities, consistent with 40 C.F.R. Part 124. To ensure opportunities for meaningful engagement in the permitting process by nearby communities, including low-income and minority populations, Regions are encouraged to ensure broad dissemination of permitting documents, EPA analyses and comment letters, and other materials. Regions should also make available appropriate contact information for affected communities to provide relevant data and information that can be considered during the permitting process.

³⁰ *A Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams* (Final Report). As noted in the report and the SAB's final report, background in-stream conductivity in the region is naturally low. The final report found that background for ecoregions 69 and 70 was 72 and 153 $\mu\text{S}/\text{cm}$, respectively.

IV. Strengthening EPA’s Environmental Review Under CWA Section 404 in Coordination with the Corps of Engineers

The CWA establishes an important role for EPA in assessing environmental and water quality impacts of proposed CWA Section 404 permits, including authorizing the Agency to prohibit, restrict, or withdraw an area as a disposal site where activities will result in unacceptable adverse environmental effects. EPA’s goal is to work closely with the Corps of Engineers, States, and permit applicants in the context of the public notice and comment process, to assure that Section 404 permits issued for new mining projects comply with the CWA. While States are responsible, in coordination with EPA, for establishing State water quality standards, the CWA Section 404(b)(1) Guidelines³¹ include an independent requirement that permits address possible threats to water quality, and the potential for significant degradation of waters of the U.S. Among other environmental impacts associated with surface coal mining, EPA is particularly concerned about the growing body of scientific literature (summarized in Appendix 1) demonstrating that discharges associated with Appalachian surface coal mining operations may cause high conductivity or selenium levels in streams that can lead to significant adverse impacts to the aquatic ecosystem. Section 404(b) requires permits for the discharge of dredged or fill material to be issued in compliance with the Guidelines, and therefore, as described below, consideration of these environmental and water quality concerns is appropriate in the evaluation of applications for permits under CWA Section 404.

It is EPA’s goal to coordinate with and provide comments to the Corps with the goal of ensuring that permits comply with the Guidelines. Corps regulations provide that the Corps alone is responsible for reaching a decision on the merits of any application (33 C.F.R. § 325.2(a)(3)). Corps regulations also provide that “[i]f comments relate to matters within the special expertise of another Federal agency, the district engineer may seek the advice of that agency.” 33 C.F.R. § 325.2(a)(3). Regions should be prepared and willing to assist the Corps by discussing EPA comments regarding water quality and the potential for significant degradation from proposed activities, as well as regarding the adequacy of proposed compensatory mitigation for unavoidable impacts associated with the discharge of dredged or fill material into waters of the U.S., and where appropriate, exercising EPA’s authorities under Sections 404(c) and 404(q) of the CWA. As noted previously, this guidance provides examples of approaches and practices that could be recommended to the Corps to help ensure that permits for Appalachian surface coal mining projects are consistent with the Guidelines. Other practices and approaches may also be consistent with the Guidelines, and EPA Regions 3, 4, and 5 should carefully review permits for new mining projects on a case-by-case basis to determine if they are consistent with the regulations.

A. Key Provisions of the Guidelines

The fundamental premise of the Guidelines is that no discharge of dredged or fill material may be permitted: if a practicable alternative exists that is less damaging to the aquatic environment, i.e., if it is not the Least Environmentally Damaging Practicable Alternative

³¹ Unless otherwise noted, all references to “the Guidelines” in this section refer to the 404(b)(1) Guidelines, 40 C.F.R. Part 230.

(LEDPA); if it causes or contributes, after consideration of disposal site dilution and dispersion, to violations of any applicable State water quality standard; or if the nation's waters would be significantly degraded. 40 C.F.R. § 230.10.³² In addition, if the proposed discharge is associated with a non-water-dependent activity such as surface coal mining, and the discharge involves a special aquatic site, then upland alternatives are presumed to be available, unless clearly demonstrated otherwise. 40 C.F.R. § 230.10(a)(3). A demonstration must first be made that there is no practicable alternative to the proposed discharge to the waters of the U.S. that would have less adverse impact on the aquatic ecosystem. 40 C.F.R. § 230.10(a). If there is no less damaging practicable alternative, then all appropriate and practicable steps to minimize potential adverse impacts of the discharge must be taken. 40 C.F.R. § 230.10(d). Determination of direct, secondary, and cumulative adverse environmental effects on streams, wetlands, and other aquatic resources is required by the Guidelines. 40 C.F.R. § 230.11. Finally, compensatory mitigation may be required to compensate for any remaining aquatic impacts. 40 C.F.R. § 230.91-98.

To better assist the Corps in assuring that surface mining proposals meet these requirements, Regions should focus their review and comments on the following provisions of the regulations:

- Applicants have evaluated a full range of potential alternatives to discharging into waters of the U.S., including off-site and/or other disposal alternatives, with clear documentation regarding practicability for each alternative. 40 C.F.R. § 230.10(a).
- Permitted discharges will not cause or contribute to violations of water quality standards, contaminate drinking water supplies, or add toxic pollutants that kill or impair stream life. 40 C.F.R. § 230.10(b).
- Permitted discharges will not result in significant degradation of the aquatic environment in consideration of all direct, indirect, and cumulative impacts of proposed discharges. 40 C.F.R. § 230.10(c). This should include consideration of the effect at the proposed discharge site of potential direct, indirect, and cumulative adverse impacts on the existence and biological integrity of indigenous aquatic organisms or communities. 40 C.F.R. § 230.11(e).
- Impacts to waters of the U.S. have been fully minimized. 40 C.F.R. § 230.10(d). This should include evaluating alternative mining methods that reduce generation of excess spoil and assure that the maximum volume of rock and soil is returned to the mined area. Modern engineering and materials handling practices should be used to the extent practicable and consistent with SMCRA to reduce the number and size of mining-related fills in aquatic resources and the extent of streams impacted as a result of mine-through operations, and to ensure segregation and encapsulation of fill material likely to contribute to downstream water quality concerns.
- Unavoidable impacts to aquatic resources have been effectively mitigated by establishing, restoring, enhancing, or preserving waters of the U.S., consistent with the 2008 Compensatory Mitigation Regulations. 40 C.F.R. § 230.91-98.

³² This section generally includes citations only to EPA's CWA regulations for Section 404 permitting. We note that in most cases, the Corps has identical regulations to implement its CWA Section 404 responsibilities.

As Regions review proposed permits under Section 404 consistent with the regulatory requirements described above and other provisions of law, Regions should coordinate the results of their reviews with the Corps, the permit applicant, and the State. As Regions review permit applications under Section 404, Regions should also keep in the mind the flexibility that is available when making recommendations to the Corps. For example, over the last year EPA has used a variety of approaches in considering the conductivity benchmarks discussed in the interim final guidance. Some Section 404 permits have conditions establishing conductivity triggers at a level within the range of the conductivity benchmarks and if the level is exceeded require that the permittee undertake adaptive management actions (e.g., accelerated reforestation) to reduce conductivity in water draining from the fill. Some Section 404 permits have conditions establishing conductivity triggers at background levels and if the level is exceeded additional best management practices are required. Some Section 404 permits have special conditions requiring the permittee to implement restoration projects in the watershed aimed at reducing background levels of conductivity to protect against further increases in conductivity in the already impacted watershed. Some Section 404 permits require water quality and biological monitoring for conductivity levels. Several permits have also included conductivity triggers linked to valley fill construction. In these circumstances, valley fill construction is sequenced to protect against increased conductivity in streams below new valley fills. See Appendix 6 for additional examples of flexible approaches to addressing water quality concerns in Section 404 permits.

B. Applying the 404(b)(1) Guidelines to Surface Coal Mining Activities

The Section 404(b)(1) Guidelines establish the environmental criteria and standards applicable to the review of proposed activities involving the discharge of dredged or fill material into waters of the U.S. 40 C.F.R. § 230.10. The Corps is responsible for making 404(b)(1) Guidelines compliance determinations. 40 CFR § 230.11. The following discussion clarifies EPA's CWA roles and responsibilities in the review of proposed mining projects under Section 404, in coordination with the Corps, States, and permit applicants, to help to achieve compliance with the Section 404(b)(1) Guidelines. The following guidance provides recommendations to EPA Regions on how to interpret these provisions in the context of Appalachian surface coal mining. They are not legally or practically binding on the Corps' determinations of whether a particular project complies with the Guidelines.

1. Analyzing Less Environmentally Damaging Practicable Alternatives: 40 C.F.R. § 230.10(a)

Peer-reviewed science outlined in Appendix 1 demonstrates that construction of larger and more numerous mine waste fills (e.g., valley fills, mine-through operations, slurry ponds, etc.) in waters of the U.S. is associated with greater direct, indirect, and cumulative adverse environmental and water quality impacts to streams receiving such discharges. The Corps evaluates discharges of dredged or fill material under the Guidelines to identify cost-effective and technologically feasible practices for minimizing the volume of excess spoil and other pollutants produced as part of conducting a robust alternatives analysis. Increased use of modern, cost-effective, and efficient mining practices, such as those that reduce the volume of

mine waste in valley fills, are likely to be more generally consistent with the Guidelines by reducing impacts to streams and their watersheds.

Regions should work closely with the Corps, OSM, State SMCRA agencies, and mine operators to promote the incorporation of such improved practices at the initial stages of mine design to increase consistency between SMCRA and CWA permits. More effective coordination among regulatory agencies and mining operators will help to assure permit decisions are more consistent, timely, and effective in reducing mining-related environmental and water quality impacts. Options for maximizing placement of spoil within the mined area, in uplands, or in adjacent, previously mined areas should be fully evaluated. For mine-through operations, stream impacts should be avoided to the maximum extent practicable and spoil placement should be controlled to reduce drainage through overburden into streams. Direct impacts from slurry impoundments can be reduced by raising the height of embankments, consistent with safety and engineering requirements. “Piece-mealing” of multiple small mines to replace fewer large mines should also be carefully evaluated to ensure that substitution of smaller mines is not resulting in greater direct, secondary, and cumulative adverse environmental impacts, which is not consistent with the Guidelines. 40 C.F.R. § 230.11(g) and (h). Other practices to avoid impacts may be proposed or developed by mine operators or academia, and Regions should evaluate whether those practices may also be consistent with the Guidelines and provide such comments to the Corps.

2. Protecting Against Violations of Water Quality Standards: 40 C.F.R. § 230.10(b)

While potential mining-related water quality impacts from NPDES permitted discharges are addressed under CWA Section 402, the 404(b)(1) Guidelines include an independent requirement that Section 404 permits address possible threats to water quality from permitted discharges of dredged or fill material. 40 C.F.R. § 230.10(b)(1). In addition, States must certify that permits issued by the Corps under Section 404 do not violate water quality standards or other provisions of State law. As discussed below, there may be water quality impacts associated with Section 404 discharges that are not addressed by Section 402 permits. Coordinated efforts to reduce water quality impacts under each of these programs are necessary to restore and maintain the chemical, physical, and biological integrity of the Nation’s waters.

As explained more fully above in Section III and in Appendix 3, all Appalachian States have established narrative water quality standards intended to protect the biological integrity of streams, including protection from adverse effects associated with elevated levels of conductivity. Few Appalachian States, however, have established numeric water quality criteria for conductivity or TDS and historically these States have not included numeric effluent limitations to address conductivity or TDS in State-issued NPDES permits. As described in Section III, EPA is working closely with Appalachian States to ensure effective implementation of narrative water quality standards in Section 402 permits issued for Appalachian surface coal mining operations. This collaboration has begun to result in improved permitting outcomes under Section 402. Scientific information cited in Appendix 1 of this memorandum is relevant to assessments of water quality effects under Section 404, as well as Section 402, consistent with Section 230.10(b) of the Guidelines.

Surface coal mining operations required to obtain permits under Section 404 must also receive a permit from States under CWA Section 402 to control discharges of pollutants into waters of the U.S. However, NPDES permits address only the impacts from the discharge of effluent and therefore may not consistently address the full range of impacts associated with activities permitted under Section 404 (discharges of dredged or fill material). For example, discharges of fill material permitted under Section 404 frequently result in physical modification and loss of portions of headwater streams. Elimination of all or part of a headwater stream may often remove from the watershed an important source of freshwater dilution that contributes to overall water quality.³³ Depending on the location of the Section 402 discharge, the effect on the ecological integrity of the downstream watershed of eliminating all or part of a headwater stream may not be an impact typically evaluated under CWA Section 402. In these cases, and consistent with 40 C.F.R. § 230.10(b), even where a NPDES permit has been issued, it is important that the Section 404 review assess potential water quality impacts attributable to mining-related discharges of dredged or fill material to waters of the U.S.

Pursuant to Corps regulations, for activities in waters of the U.S. that may adversely affect the quality of waters, the Corps evaluates applications for compliance with applicable effluent limitations and water quality standards during the construction and subsequent operation of the proposed activity. 33 C.F.R. § 320.4(d). Corps regulations provide that certification of compliance with applicable effluent limitations and water quality standards required under provisions of Section 401 of the CWA will be considered by the Corps as conclusive with respect to water quality considerations unless EPA advises of other water quality aspects to be taken into consideration. In order to ensure that EPA has evaluated potential impacts to water quality and communicated its concerns to the Corps, Regions should review each Section 404 permit application carefully and provide comments on whether the discharge of dredged or fill material into waters of the U.S. will cause or contribute to a violation of water quality standards. If EPA believes that a project will cause or contribute to a violation of water quality standards, the Region should provide the rationale for this assessment to the Corps. Where EPA has information supporting a determination that issuance of a Section 404 permit is not consistent with Section 230.10(b) of the Guidelines, including in circumstances where a State Section 401 certification of proposed discharges has been issued or waived, the Regions should recommend to the Corps conditions for the Section 404 permit to protect water quality. In providing comments to the Corps regarding water quality under Section 230.10(b) of the Guidelines, EPA should consider the extent to which the Section 402 permit has adequately addressed water quality impacts. Where Section 402 permits have adequately addressed water quality impacts, Regions should not assert that separate or more stringent water quality requirements are needed in the Section 404 permit to protect water quality standards under Section 230.10(b). EPA should work with State permitting authorities, as discussed in Section III of this guidance, to ensure that appropriate limits are included in Section 402 permits.

³³ *The Effects of Mountaintop Mines and Valley Fills on Aquatic Ecosystems of the Central Appalachian Coalfields* (Final Report).

3. Preventing Significant Degradation: 40 C.F.R. § 230.10(c)

The Guidelines prohibit permitting a discharge of dredged or fill material that will cause or contribute to significant degradation of the waters of the U.S. 40 C.F.R. § 230.10(c). A key focus of EPA's review of new mining permits, therefore, is assessing whether or not permits for discharges of dredged or fill material into waters of the United States associated with mining projects effectively protect the chemical, physical, and biological integrity of waters from direct, indirect, and cumulative adverse effects of proposed discharges. Regions should provide the Corps with substantive comments that will assist the Corps in making its 404(b)(1) Guidelines determination related to significant degradation. The principal effects of discharges of dredged or fill material into waters of the United States are associated with the direct and cumulative impacts of burying streams under mining-related discharges of dredged or fill material (e.g., valley fills, mine-through operations, slurry impoundments) and the indirect and cumulative effects of such discharges on downstream water quality. EPA has emphasized coordination with the Corps, States, and mining operators to take practicable steps to avoid, minimize, and compensate for impacts by, for example, reducing the size and number of valley fills and incorporating BMPs to address water quality impacts.

As outlined in Appendix 1, an increasing volume of scientific research, including studies conducted by EPA, point to a strong relationship between elevated conductivity levels in headwater streams and larger streams and significant degradation of benthic communities in Appalachian streams as a result of mining activity. The Corps has more frequently included conditions in recent Section 404 permits that require modern BMPs for controlling conductivity-generating materials, and that trigger adaptive management actions when in-stream conductivity levels are elevated by mining-related discharges. These conditions have helped to minimize the potential for the downstream water quality effects discussed in Appendix 1.

EPA's final report, *A Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams*, identifies a conductivity level in Appalachian headwater streams associated with significant biological degradation from loss of stream life. Specifically, this peer-reviewed study concludes that 5% of native macroinvertebrate genera are extirpated where the conductivity level reaches 300 $\mu\text{S}/\text{cm}$. The findings of Pond et al. (2008), which indicate that substantial aquatic life effects have already occurred when conductivity levels reach 500 $\mu\text{S}/\text{cm}$, also represent relevant scientific information for evaluating whether an effect may rise to the level of significant degradation of the aquatic ecosystem. In conjunction with the conductivity benchmark report, *The Effects of Mountaintop Mines and Valley Fills on Aquatic Ecosystems of the Central Appalachian Coalfields* (Final Report) also describes impacts that are relevant to a determination of significant degradation. These impacts are similar to those described in other scientific literature, such as Palmer et al. (2010) and Merriam et al. (2011), which detail the effects of surface coal mining on aquatic habitat loss, water quality degradation, and extirpation of stream life.³⁴ These scientific findings are directly relevant to portions of the Guidelines that require assessment of the effects of proposed discharges on the existence and recolonization of

³⁴ M. A. Palmer, E. S. Bernhardt, W. H. Schlesinger, K. N. Eshleman, E. Foufoula-Georgiou, M. S. Hendryx, A. D. Lemly, G. E. Likens, O. L. Loucks, M. E. Power, P. S. White, P. R. Wilcock. *Mountaintop Mining Consequences*. Science. Vol. 327. 1/8/10. P148-9. Also see Merriam et al. 2011, Pond 2010, and Appendix C of *A Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams* (Final Report).

indigenous aquatic organisms or communities. 40 C.F.R. § 230.11(e). EPA recognizes, however, that there may be other scientifically appropriate approaches for determining whether or not discharges are likely to cause significant degradation and should coordinate with the Corps if such approaches are proposed.

The Guidelines identify effects potentially contributing to significant degradation, similar to those identified in the scientific literature highlighted above. These specifically include: adverse effects on life stages of aquatic life and other wildlife dependent on aquatic ecosystems, and adverse effects on aquatic ecosystem diversity, productivity, and stability. 40 C.F.R. § 230.10(c)(2) and (3). Consistent with the Guidelines, such effects should be considered in assessing the potential for significant degradation.

Where the results of prior evaluations, chemical and biological tests, scientific research, and experience can provide information helpful in making a determination of compliance with the Guidelines, these sources of data should be used. 40 C.F.R. § 230.60. Specifically, when ensuring compliance with Section 230.10(c) of the Guidelines, Regions should consider current science when examining whether a project is likely to result in significant degradation of waters of the U.S. The administrative record for the permit should demonstrate, based on site- and receiving water-specific information, how the permit is consistent with the CWA and the Guidelines, and Regions are encouraged to review this record carefully. EPA, the Corps, and individual mining operators should coordinate to ensure that discharges proposed to be authorized under the Section 404 permit will not result in effects downstream of the mining operation (which may include increases in conductivity, as determined on a site-specific basis) that are likely to cause or contribute to significant degradation.

Based on the latest science as detailed in EPA's final reports, Regions should be guided by the following principles, when reviewing mining proposals for compliance with Section 230.10(c) of the Guidelines. Many of these principles are consistent with those included in Section III of this memorandum:

- Regions should consider on a site-specific basis recommending permit conditions requiring adaptive management actions to protect against elevated conductivity that would be triggered when conductivity in the effluent from the sediment pond reaches or trends toward levels that may cause downstream reaches to exceed appropriate science-based conductivity benchmarks (such as 300 $\mu\text{S}/\text{cm}$ contained in EPA's final conductivity benchmark report or 500 $\mu\text{S}/\text{cm}$ as outlined in Pond et al. (2008), or other appropriate levels as determined appropriate for specific streams in accordance with best available scientific information).³⁵ As noted above, Regions should consider the extent to which the Section 402 permit has adequately addressed water quality impacts in providing comments to the Corps regarding water quality concerns.
- Where in-stream conductivity levels in downstream waters already exceed such benchmarks, Regions should consider recommending that agencies coordinate with the mine operator to incorporate permit requirements that protect against increases in

³⁵ Regions may also (or alternately) recommend the inclusion of other protective permit conditions to control the effects of conductivity using limits for a suite of ions, TDS, or other parameters.

conductivity from new mining and, where appropriate, reduce conductivity sources in the watershed from previous mining.

- For permitted discharges that would otherwise result in significant degradation due to increased conductivity, EPA should recommend to the Corps that it include conditions in permits that mitigate this impact, which may include reductions in existing sources of conductivity in the watershed from previous mining or other causes. For example, such mitigation could include remediating and thus reducing pollutant loadings from pre-SMCRA mining activity that might otherwise not be specifically addressed under Federal or State regulation. Where such mitigation is proposed, we believe that careful consideration should be given to its location relative to the authorized discharge to ensure that it does not lead to localized impacts. EPA recommends that mitigation for increased conductivity generally be located within the same watershed and upstream of the point where the stream segment impacted by a valley fill enters a new stream.

The Guidelines characterize the evaluation of significant degradation to include assessment of the potential cumulative adverse effects of discharges of dredged or fill material into waters of the U.S. Regions should work to ensure that watershed-scale (e.g., Hydrologic Unit Code 12 (HUC-12)) cumulative impact analyses are conducted as an element of the factual determinations required by the 404(b)(1) Guidelines. 40 C.F.R. § 230.11(g). These analyses should assess the consequences of past, present, and reasonably foreseeable future discharges of dredged or fill material in the affected watershed on water quality and the aquatic environment. To the extent the cumulative impacts to water quality and the aquatic environment also affect human use characteristics, such as water supplies, recreation, or fisheries, those impacts also should be addressed. Regions are encouraged to ensure that cumulative impact assessments conducted pursuant to the Guidelines are coordinated with required NEPA evaluations described in Section VI below.

4. Minimizing Impacts: 40 C.F.R. § 230.10(d)

Following a robust alternatives analysis and identification of the LEDPA, all appropriate and practicable steps to minimize potential adverse impacts of the discharge should be taken. In the context of Appalachian surface coal mining activities, these minimization steps typically take the form of BMPs designed to reduce dissolved solids, selenium, or other parameters of concern in mining runoff; limit the infiltration of water into spoil material; limit the amount and duration of exposed area during mining; and minimize increases to existing levels of conductivity downstream of the mine site. Many of the newer BMPs associated with the design and operation of surface coal mining operations remain unproven in their effectiveness to protect water quality and to prevent significant degradation. However, there are a number of measures that can be taken to help minimize likely impacts, including identification, separation, isolation, and treatment of strata that are most likely to lead to high levels of specific conductance, selenium, or other parameters of concern, as outlined below.

In addition to these BMPs, as a general matter, an effective approach for managing this uncertainty is to sequence multiple fills on a project. The sequencing approach, or other comparably effective measure, should be recommended to the Corps to account for uncertainty

regarding the ability of current BMPs to address the potential adverse impacts of multiple fills. In this context, the term "sequencing" means:

- Valley fills associated with a project should generally be constructed one at a time; and
- The permittee should demonstrate to the satisfaction of the permitting authority that water quality has been protected and that significant degradation has not occurred as a result of each valley fill before the permittee may begin construction of subsequent valley fills.

The Regions should recommend to the Corps that applicants be encouraged to sequence fills to minimize water quality impacts caused by discharges of dredged or fill material into waters of the United States. On a case-by-case basis, concurrent construction of valley fills may be appropriate if available site-specific data suggest that concurrently constructing more than one fill would not be likely to lead to violations of water quality standards or sequencing would not reduce impacts. Factors to consider in making this evaluation can include whether sequencing is practicable (considering costs, logistics, and technology), the size and scope of impacts proposed to waters, the length of time needed to construct each fill and to complete the entire mining operation, and the available data documenting the past success of proposed BMPs at protecting and maintaining water quality.

As part of valley fill sequencing, EPA recommends that a trends analysis be performed utilizing project-area conductivity monitoring data that may be tied to water quality-based thresholds. For example, under this approach, the trends analysis could be evaluated against two threshold conductivity values established within the permit. The first value would establish a threshold at which a trend toward causing or contributing to significant degradation is identified, and the operator would be required to implement an adaptive remedial action plan to prevent further degradation. The second value would establish a threshold at which significant degradation is likely, and the permittee would not be authorized to construct additional valley fills until such time as the degradation has been remediated and the permittee has demonstrated that no significant degradation will occur. Where applicable, Regions are encouraged to utilize the scientific literature described in Appendix 1 and Section III of this document in recommending appropriate thresholds for trends analysis that are protective of downstream water quality for valley fill sequencing. EPA recognizes, however, that there may be other scientifically appropriate approaches that will provide comparable protection against significant degradation.

It is EPA's experience that mine plans do not always reflect the "on-the-ground" construction and operation of a mine project. For many reasons, as construction and operation of the mine is underway, it is possible that the mine plan may change and that an operation may not fully utilize authorized capacity in valley fills. To prevent under-utilization of fills and to encourage additional avoidance and minimization of impacts to waters of the U.S. during operation, Regions should recommend that an issued permit be conditioned to require the operator to notify the Corps and EPA at appropriate intervals of any changes to the mine plan, e.g., prior to construction of each valley fill, so that the Corps may, if it deems necessary, verify that the conditions of the permit are being met. As a general matter, it is also good practice for

operators to provide post-mining “as-built” plans for all waters of the U.S. that will be affected by a discharge of fill material.

Projects should fully evaluate and, where appropriate and practicable, incorporate the following general aspects of effective impact minimization. Additional specific BMPs that should be considered during application review can be found in Appendix 4. Regions are encouraged to work with OSM or the State SMCRA agency to encourage them to incorporate appropriate BMPs into the applicable SMCRA permit.

- a. Materials handling plans – Ensure that soils and rock on the mine site have been tested for concentrations of acid-, selenium-, sulfate-, carbonate-, or heavy metals-bearing or soluble strata that are likely to lead to environmental concerns. Overburden with high concentrations of these parameters should be handled to minimize exposure to rainwater and groundwater and subsequent drainage into surface waters. Regions should review materials handling plans carefully to ensure that they provide sufficient sampling to characterize geological formations and identify strata of water quality concern.
- b. Fill construction – Where valley fills are necessary to accommodate disposal of excess spoil, overburden should be configured to maximize disposal as far up the valley as is feasible from an engineering perspective. To prevent infiltration of surface runoff into the fill mass whenever possible, overburden should be compacted, leaving the top six feet unconsolidated; cover vegetation required as soon as the face of each lift is finished; and tree seedling planting consistent with Appalachian reforestation efforts. The use of end dumps (durable rock fills) should be discouraged. Valley fills should not be constructed with a flat deck, whenever possible and consistent with the authorized post-mining land use, to minimize infiltration.
- c. Reducing drainage area flowing through mine spoil – Projects should reduce the drainage area flowing through mine spoil and especially valley fills to the maximum practicable extent consistent with sound engineering and safety considerations. Recent studies identified in Appendix 1 have suggested that water (e.g., precipitation and groundwater) flowing through valley fills contributes significantly to downstream water quality concerns as infiltrating water accumulates metals, dissolved solids, and sulfates. Minimizing drainage through mining spoil can contribute significantly to protecting downstream water quality. In addition, runoff and other discharges of pollutants from activities conducted on the fill should be controlled. 40 C.F.R. § 230.77(a).
- d. Sedimentation ponds – While achieving adequate sediment control, projects should minimize the number and size of sediment ponds placed in waters of the U.S. and ensure that post-mining reclamation plans remove such ponds and restore affected streams.

5. Compensatory Mitigation: 40 C.F.R. § 230.91-98

The 404(b)(1) Guidelines require the permitting authority to make certain factual determinations addressing the potential short- or long-term effects of a proposed discharge of dredged or fill material on the physical, chemical, and biological components of the aquatic environment. 40 C.F.R. § 230.11. As reiterated in the July 30, 2010, joint EPA-Army memorandum, “*Assessment of Stream Ecosystem Structure and Function under Clean Water Act Section 404 Associated with Review of Permits for Appalachian Surface Coal Mining*,”

*In conducting future determinations under the Guidelines associated with high-gradient streams in Appalachia, the permitting authority should initiate an evaluation of ecosystem functions and structure using available, scientifically-valid direct indicia, including an effects-based assessment of the short- and long-term functions of the stream. The permitting authority may also use scientifically-valid indirect indicia of structure and function in the watershed, but will not rely exclusively on an evaluation of structure in place of function when making a determination under this provision of the Guidelines.*³⁶

Regions are encouraged to work with and provide technical assistance to the Corps and States on the development and implementation of effective assessment methods. These assessments should be used to ensure that compensatory mitigation adequately replaces lost stream functions. Regions should review proposed compensatory mitigation plans to ensure that they adequately address the 12 required components of a mitigation plan as laid out in the 2008 Mitigation Rule (40 C.F.R. § 230.94(c)). If the Region has concerns about the proposed mitigation plan, they should communicate such concerns to the Corps. Some specific recommendations for compensatory mitigation consistent with the agencies’ mitigation regulations include:

- a. Timeframe – An expected timeframe for achievement of performance standards should be identified and the mitigation should be monitored for that length of time in order to ensure success.
- b. Mitigation monitoring – A detailed monitoring plan outlining the observable and measureable physical, chemical and biological criteria, and performance standards to be achieved, should be incorporated into permit conditions. Where available, measures of stream function and condition should be used in addition to measures of stream structure to track and assess mitigation success. We recommend that Regions request that as-built plans be provided to the agencies for all compensatory mitigation projects.
- c. Adaptive remedial action – The compensatory mitigation plan should include an adaptive remedial action plan that identifies additional actions and/or supplemental

³⁶ This document is available at http://www.epa.gov/owow/wetlands/guidance/pdf/Stream_Guidance_final_073010.pdf.

mitigation that will be required in the event performance standards are not achieved within an appropriate timeframe.

- d. Stream establishment – Streams are difficult-to-replace resources and when further avoidance is not practicable, Regions should recommend that the required compensation should be provided through in-kind rehabilitation, enhancement, or preservation when practicable because there is a greater certainty that these methods will successfully offset permitted impacts (40 C.F.R. § 230.93(e)(3)). Where stream establishment is proposed, channels should be designed to develop good water quality, healthy and diverse biological communities, and similar hydrologic regimes as streams to be impacted by mining activities.

The goal of these compensation projects is to replace the lost stream functions impacted by the discharge of fill material associated with the mining activities; therefore, they should be designed and assessed for establishment of stream physical, chemical, and biological processes and compliance with performance standards for achieving the aquatic life use or other designated uses.

- e. Ditches – In reviewing available information on sediment, groin, and other water control ditches required for mining projects under SMCRA and CWA Section 402, including available peer-reviewed scientific literature, EPA believes it is unlikely that these structures, by themselves, can adequately replace the chemical and biological functions provided by headwater streams.³⁷ Based on this information, Regions should recommend to the Corps that such structures not receive Section 404 compensation credit without a sound, science-based showing that they will successfully mitigate for lost stream structure and function. Where a mitigation plan proposes to attempt to convert such structures into streams after mining is complete, Regions should carefully review such proposals to ensure that watershed benefits in fact would occur, that monitoring is sufficient to document the achievement of these functions, and that additional mitigation is required if they are not successful.

C. Water Quality and Biological Monitoring

Section 404 permits should generally include provisions for conducting necessary water quality and biological monitoring and in-stream habitat assessments in streams below surface coal mining operations to ensure consistency with the Guidelines. 40 C.F.R. Part 260. These monitoring data should complement and not duplicate monitoring required by Section 402 permits to the extent possible. Such monitoring will help to ensure permit conditions are being met and to provide important data to inform continued operations at the mine site. Monitoring should be conducted before construction, during construction, and post-construction. We recommend that the permittee be required to submit baseline monitoring data consistent with the parameters outlined in Appendix 5. The permittee should generally use the methodology

³⁷ *The Effects of Mountaintop Mines and Valley Fills on Aquatic Ecosystems of the Central Appalachian Coalfields* (Final Report), Section 7.2.2.1 (pp. 85-87). Also see Bernhardt, E.S. and M.A. Palmer. 2011. *The Environmental Costs of Mountaintop Mining Valley Fill Operations for Aquatic Ecosystems of the Central Appalachians*. *Annals of the New York Academy of Sciences* 1223:39-57.

employed by the State for assessing its waters pursuant to CWA Section 303(d) or other methodology utilized by the State. With respect to biological data, the permittee should identify taxa to the genus level for invertebrates and species level for vertebrates even where the State methodology does not do so. We recommend that permittees implement a monitoring plan for the parameters outlined in Appendix 5 at appropriate locations upstream and downstream of the project, where applicable. The permittee should take photographs of each monitored site that are sufficient to establish a photographic record of the physical habitat and to support the visual habitat assessments. The permit should include clear requirements for remedial actions to protect water quality in the event monitoring reveals a trend toward significant degradation.

D. Environmental Justice Considerations

While the Guidelines evaluation process addresses impacts to the aquatic environment and the consequences of those impacts, we recognize that issuance of Section 404 permits can have other important environmental and human health impacts that are considered by the Corps as part of the “public interest review” process. 33 C.F.R. § 320.4(a). The public interest review process explicitly requires a “careful weighing” of up to 21 relevant public interest factors, including economics, aesthetics, energy needs, safety, and the general “needs and welfare of the people.” In that light, we recommend that Regions provide comments to the Corps that address relevant public interest factors associated with the discharge of fill material into waters of the U.S., with a particular emphasis on ways or measures to mitigate potential adverse impacts to low-income and minority populations. When the issuance of a permit may result in adverse human health or environmental effects, Regions should suggest ways and measures to avoid and/or mitigate impacts through comments to the Corps.

In addition, consistent with E.O. 12898 (“Federal Actions to Address Environmental Justice In Minority Populations and Low-income Populations”) and the accompanying Presidential Memorandum, we recommend that Regions work collaboratively with the Corps to analyze the potential for disproportionately high and adverse human health or environmental effects on low-income and minority populations, including impacts to water supplies and fisheries, from issuance of a permit for surface coal mining activities in waters of the U.S., and to ensure that the public interest review analysis for permit applications is comprehensive. In this context, we recommend that Regions identify whether issuing a permit would result in disproportionate adverse human health or environmental effects on low-income and minority populations and provide comments to the Corps that address relevant public interest factors associated with the discharge of fill material into waters of the U.S. Where such effects are likely, Regions should suggest ways and measures to avoid and/or mitigate such disproportionate impacts to low-income and minority populations. Regions should also work with the Corps to provide for meaningful engagement by potentially affected communities.

In response to specific factors related to water quality, water supply, and needs and welfare, we recommend that Regions work with the Corps to ensure the permit evaluations effectively consider impacts to drinking water supplies (including municipal water supplies and private sources of drinking water, including streams or wells) for local communities and individuals in the affected areas. Further, in response to specific factors related to fish and wildlife values, recreation, and aesthetics, we recommend that permit evaluations explore the relationship between habitat loss as a result of valley fills and impacts to subsistence fishing,

hunting, and foraging activities, recognizing that these unique exposure pathways are often associated with communities and individuals in surface coal mining areas.

In addition to conducting the analyses described above, and consistent with the recommendations described in Section VI below, Regions should work with the Corps to ensure effective participation of nearby communities, including low-income and minority populations, in the permitting process. Regions are encouraged to work with the Corps to promote broad dissemination of permitting documents, including alternatives considered; EPA analyses and comment letters; and other materials. Regions should also make available appropriate contact information for affected communities to provide relevant data and information that can be considered during the permitting process.

E. Conclusion

We encourage the Regions to discuss these general strategies with Corps Districts and States. Consistent with long-standing practice, we encourage Regional staff to work with the Corps to offer specific recommendations to permit applicants who are willing to work with EPA to resolve EPA's concerns. Experience has shown that discussions with permit applicants can provide an efficient and effective path to agreement on permit conditions that meet the requirements of the law while allowing mining companies to proceed on a cost-effective and environmentally responsible basis. We continue to encourage interaction between EPA, other Federal and State regulatory partners, and industry to resolve permit issues through dialogue and technical cooperation.

V. CWA Section 401 Certification by States

Section 401 conveys to States directly and eligible Tribes the authority to approve (certify), condition, or deny all Federal permits or licenses authorizing a discharge to waters of the U.S., including wetlands, including CWA Section 404 permits and Federally issued SMCRA permits. 33 U.S.C. § 1341. States and Tribes may choose to waive their Section 401 certification authority and, if they fail to respond to a request for certification within the proscribed time (generally one year), their Section 401 authority is waived by default.

States and Tribes most commonly make their decisions to deny, certify, or condition permits or licenses primarily in consideration of whether the activity will comply with State water quality standards. However, they may also look at whether the activity will violate effluent limitations, new source performance standards, toxic pollutant controls, or other appropriate requirements of State or Tribal law or regulation. EPA has developed an updated handbook on the basics of State Section 401 certification actions, which is intended to help clarify how States and tribes can most effectively employ this statutory water quality management tool for applicable projects, including surface coal mining projects permitted under Section 404.³⁸

³⁸ This handbook is available at http://water.epa.gov/lawsregs/guidance/cwa/upload/CWA_401_Handbook_2010_Interim.pdf.

Although Section 401 certification authority rests with the jurisdiction(s) in which the discharge originates, neighboring States and tribes downstream or otherwise potentially affected by the discharge have an opportunity to raise objections to, and comment on, the Federal permit or license. Upon receipt of notice of an application for Section 401 certification from the Federal licensing or permitting agency, EPA should determine if a discharge subject to Section 401 certification may affect the water quality of other States or tribes and, if there may be such an effect, EPA Regions should notify other jurisdictions whose water quality may be affected. 33 U.S.C. § 1341(a)(2). The other jurisdictions should then be provided an opportunity to submit their views and objections, including opportunities for public hearings, consistent with CWA Section 401(a)(2). Although the nature of recommendations from neighboring jurisdictions do not have the same force as conditions from a Section 401 certifying State, the Federal agency must develop measures to address the downstream jurisdiction(s)' concerns. 33 U.S.C. § 1341(a)(2).

CWA Section 401(a)(1) requires that a State "establish procedures for public notice in the case of all applications for certification by it and, to the extent it deems appropriate, procedures for public hearings in connection with specific applications." 33 U.S.C. § 401(a)(1). To enable meaningful engagement by affected communities, we recommend that Regions work with States to ensure that these public participation procedures are in place, and encourage States to provide appropriate opportunities for public hearings on specific certifications.

VI. National Environmental Policy Act Considerations

NEPA plays an important role in the review of proposed surface coal mining activities in Appalachia. NEPA provides a framework for a comprehensive consideration of the environmental impacts associated with Federal permit decisions, and provides opportunities for public involvement. Regional review and comment under NEPA and Section 309 of the Clean Air Act foster the goals of NEPA by ensuring that EPA's environmental expertise is considered by agency decision-makers. In addition to reviewing and commenting on NEPA analyses, we recommend that Regions work collaboratively with the Corps and OSM early in the NEPA process to provide technical assistance and recommendations.

Consistent with the goals of NEPA, and to further the goal of ensuring transparency and open government, we recommend that Regions encourage Corps Districts and OSM to make the full range of NEPA notices and documents, including draft Environmental Assessments (EAs), readily available to the public using a variety of methods, including online and print media, as appropriate and as early in the permitting process as possible. In addition, EPA encourages all agencies to work with local communities, including low-income and minority populations, to identify potential adverse human health and environmental impacts and mitigation measures and to improve the accessibility of public meetings, relevant documents, and notices.

As discussed earlier, the NEPA process is also an effective vehicle for considering the potential cumulative effects of Corps and OSM permit decisions. Using a watershed-scale analysis (e.g., HUC-12 analyses) would be an effective way to examine the incremental environmental and human health impacts of a proposed discharge when added to past, present,

and reasonably foreseeable actions in the watershed, including Federal and non-Federal actions. When working with the Corps and OSM to help define the proper scope of a NEPA cumulative impact assessment, Regions should be clear that while Cumulative Hydrologic Impact Assessments (CHIAs) prepared as part of the SMCRA process can provide useful information regarding impacts to the hydrologic balance of an area, a NEPA cumulative impact assessment should consider the full suite of relevant environmental and human health impacts. See 40 C.F.R. § 1508.7-8.

As clarified in recent CEQ guidance concerning the use of mitigation in the NEPA process, when an agency develops and makes a commitment to require enforceable mitigation measures to avoid, minimize, rectify, reduce, or compensate for significant environmental impacts, NEPA compliance can be accomplished with an EA, coupled with a Finding of No Significant Impact (FONSI).³⁹ In cases where the FONSI relies on proposed mitigation measures for its conclusion that no significant impacts will occur, Regions should carefully evaluate those measures not only to ensure that they will be effective at avoiding or compensating for significant impacts, but also to ensure that they are clearly stated, include binding commitments and monitoring plans, and include provisions for public access to implementation information, monitoring results, and related documents.

Recent scientific evidence referenced earlier in this memorandum, as well as field experience with surface coal mining mitigation projects, has raised technical concerns about the capacity of some forms of mitigation to reduce on-site and downstream impacts associated with Appalachian surface coal mining to below levels of significance. For example, as noted in Section IV above, available information suggests lack of demonstrated success in utilizing sediment, groin, or other water control ditches as effective mitigation for impacts to headwater streams. As you provide comments to the Corps on such mitigation proposals, therefore, you should recommend that these ditches not be relied upon as the sole basis for supporting a FONSI. Moreover, mitigation measures that rely on establishing or re-establishing streams, rather than rehabilitating or enhancing existing streams, have less certainty of successfully offsetting impacts, as outlined in Section IV, and should be carefully assessed before being used to support a FONSI. Accordingly, Regions should also encourage the development of adaptive management approaches to mitigation monitoring, where appropriate. See CEQ guidance at p. 9.

While no specific regulatory thresholds exist for determining whether a potential impact is significant under NEPA, CEQ's regulations are explicit that "considerations of both context and intensity" are required. In reviewing the state of the science on the environmental impacts of mountaintop mines and valley fills on streams in Appalachia, EPA's Office of Research and Development (ORD) found that these activities lead to five principal alterations of stream ecosystems, as outlined in Appendix 1.⁴⁰ In light of these findings, and other findings outlined in Appendix 1, determinations regarding the need to prepare an EIS must carefully consider the ability of any proposed mitigation measures to lower the level of impacts so that they are not

³⁹ *Appropriate Use of Mitigation and Monitoring and Clarifying the Appropriate Use of Mitigated Findings of No Significant Impact*. 76 FR 3843 (January 21, 2011). Available at <http://69.175.53.6/register/2011/jan/21/2011-1188.pdf>.

⁴⁰ *The Effects of Mountaintop Mines and Valley Fills on Aquatic Ecosystems of the Central Appalachian Coalfields* (Final Report).

significant. While smaller projects should be reviewed to determine whether potential impacts warrant preparation of an EIS, we recommend that the Regions take a hard look at the potential for significant impacts for those proposed projects that involve more than one mile of stream loss or more than one valley fill. In those cases, Regions should make appropriate recommendations, on a case-by-case basis, to Corps Districts and OSM, requesting that the Corps and OSM: 1) make draft NEPA documents, including EAs and FONSI, available to EPA and the public; 2) incorporate appropriate mitigation measures to reduce impacts to levels below significance; and 3) prepare an EIS if impacts are not reduced to levels below significance.⁴¹

Finally, following completion of permitting actions, Regions should regularly coordinate with the Corps and OSM to provide their views on whether mitigation commitments are being implemented.

VII. Conclusions

EPA will continue to work with our Federal regulatory partners, State agencies, the mining industry, and the public to fulfill our common goals of reducing adverse impacts to water quality, aquatic ecosystems, and human health. We will also continue to communicate effectively with local communities and mining companies to provide the transparency, consistency, and efficiency expected of government agencies in dealing with issues of such importance to health, the environment, and the economy. EPA's Regional offices will continue to be the Agency's primary field representatives to other Clean Water Act agencies, mining companies, affected communities, and interested members of the public as we work to respond to CWA, NEPA, and environmental justice issues associated with Appalachian surface coal mining operations. We look forward to your leadership as we coordinate to develop environmentally effective, scientifically sound, and economically responsible approaches for meeting the requirements of the law, promoting the Nation's economic and energy security, and protecting human health and the environment.

cc: Regional Water and Enforcement Division Directors, Regions 3, 4, and 5
Regional Counsels, Regions 3, 4, and 5
Robert Sussman, Senior Policy Counsel to the Administrator
Scott Fulton, General Counsel

⁴¹ Consistent with EPA's *Policy and Procedures for the Review of Federal Actions Impacting the Environment*, Regions should consult with the Office of Federal Activities (OFA) when recommending to the Corps or OSM that an EIS be prepared. See http://www.epa.gov/compliance/resources/policies/nepa/nepa_policies_procedures.pdf. OFA can also provide assistance when Regions are unable to reach agreement with Corps Districts or OSM on whether an EIS should be prepared in a particular case. Further, although the decision to prepare an EIS rests with the Corps and OSM, under EPA's Clean Air Act Section 309 authority, EPA must "refer" to CEQ matters that the Administrator finds are "unsatisfactory from the standpoint of public health or welfare or environmental quality." OFA will work with Regions to determine an appropriate course for resolving disputes, including the potential for a referral to CEQ, if appropriate.

Appendix 1

Summary of Best-Available Science on the Aquatic Effects of Appalachian Surface Coal Mining

Note: This Appendix summarizes available peer-reviewed scientific literature as of July 2011. EPA anticipates providing updates to this Appendix as additional scientific information is developed that is relevant to decision-making under the Clean Water Act, National Environmental Policy Act, and Executive Order 12898 on environmental justice.

Aquatic Effects of Appalachian Surface Coal Mining

Peer-reviewed science has increasingly documented the effects of surface coal mining operations on downstream water quality and aquatic life. A Federal study conducted in 2002 in support of an interagency Programmatic Environmental Impact Statement (PEIS) on Mountaintop Mining/Valley Fills in Appalachia⁴² found elevated levels of highly toxic and bioaccumulative selenium in streams downstream of valley fills.⁴³ An analysis of peer-reviewed studies published in early 2010 in the journal *Science* shows that ecological losses downstream of coal mining valley fills are associated with increased levels of total dissolved solids, sulfates, and selenium.⁴⁴ More recent studies by the West Virginia Department of Environmental Protection have emphasized the role of high selenium levels in causing developmental effects in fish.⁴⁵

EPA's Office of Research and Development (ORD) recently completed a final report reviewing available scientific literature related to the environmental impacts of surface coal mining and found effects that included resource loss, water quality impairment, and degradation of aquatic ecosystems.⁴⁶ The report evaluated relevant peer-reviewed literature and the 2005 interagency PEIS. This EPA report has been independently peer reviewed by EPA's Science Advisory Board (SAB), and the SAB's review endorsed the findings of EPA's draft report, emphasized the strength of the field observational studies it describes, and recommended additional discussion and analysis that is reflected in the final report. Based on the available literature, the report concludes that mountaintop mining and valley fills leads directly to five principal alterations of stream ecosystems:

⁴² *Final Programmatic Environmental Impact Statement on Mountaintop Mining/Valley Fills in Appalachia*. 2005. Available at <http://www.epa.gov/region03/mtntop/eis2005.htm>.

⁴³ Bryant, G., S. McPhillamy, and H. Childers. 2002. *A Survey of the Water Quality of Streams in the Primary Region of Mountaintop / Valley Fill Coal Mining*. Mountaintop Mining Valley Fill Programmatic Environmental Impact Statement. USEPA Region 3. Wheeling, WV. Available at <http://www.epa.gov/region03/mtntop/eis2003appendices.htm#appd>.

⁴⁴ Palmer, M.A., E.S. Bernhardt, W.H. Schlesinger, K.N. Eshleman, E. Foufoula-Georgiou, M.S. Hendryx, A.D. Lemly, G.E. Likens, O.L. Loucks, M.E. Power, P.S. White, P.R. Wilcock. 2010. *Mountaintop Mining Consequences*. *Science* 327(5962):148-149.

⁴⁵ e.g., West Virginia Department of Environmental Protection. 2010. *Selenium-induced developmental deformities among fishes in West Virginia*. Watershed Assessment Program, Division of Water Resources, West Virginia Department of Environmental Protection, Charleston WV. Available at <http://www.dep.wv.gov/WWE/watershed/wqmonitoring/Documents/Selenium/Se%20Larvae%202010%20final.pdf>.

⁴⁶ *The Effects of Mountaintop Mines and Valley Fills on Aquatic Ecosystems of the Central Appalachian Coalfields* (Final Report), EPA-600-R-09-138A. This report and the SAB's final review report are available at <http://www.epa.gov/owow/wetlands/guidance/mining.html>.

- Springs, and ephemeral, intermittent, and small perennial streams are permanently lost with the removal of the mountain and from burial under fill;
- Concentrations of major chemical ions are persistently elevated downstream;
- Degraded water quality reaches levels that are acutely lethal to standard laboratory test organisms;
- Selenium concentrations are elevated, reaching concentrations that have caused toxic effects in fish and birds; and
- Macroinvertebrate and fish communities are consistently degraded.

Effects of Conductivity on Aquatic Life

EPA and independent scientists have increasingly focused on identifying and assessing the impacts of elevated levels of salts (especially salts of sulfate and bicarbonate) on aquatic life. Salt levels are commonly measured by evaporating the water and weighing the residue as total dissolved solids (TDS) or by measuring the dissolved salts in water as specific conductance – also known as conductivity. Increasing salt concentrations increase water’s ability to conduct an electrical charge. Scientific studies have documented the causal link between surface coal mining activities and elevated levels of TDS and conductivity.⁴⁷ These studies have also provided significant scientific support for the relationship between elevated levels of salts and extirpation of entire genera of macroinvertebrates and potentially other aquatic life in central Appalachian streams.

Numerous studies, data submitted to permitting authorities for proposed mining activities, and some State impaired waters lists published pursuant to CWA Section 303(d) have reinforced the conclusion that high levels of salts, measured as TDS or conductivity, are a primary cause of water quality impairments downstream from mine discharges. These studies build upon existing research from other regions that demonstrate the toxicity of specific ions, such as sulfate, as well as the complex interplay of mixtures of ionic constituents associated with coal mining operations.⁴⁸ Elevated concentrations of salts in waters draining from surface coal mining operations or valley fills are a primary cause of biological impairment resulting from changes in benthic species richness and diversity. A 2003 study by Kennedy et al. linked elevated conductivity levels in coal effluent to impaired, sensitive aquatic fauna.⁴⁹ A 2005 study by Kennedy et al. linked impairment of aquatic life to elevated levels of TDS.⁵⁰ A 2004 Kentucky

⁴⁷ e.g., Pond, G.J., M.E. Passmore, F.A. Borsuk, L. Reynolds, and C.J. Rose. 2008. *Downstream Effects of Mountaintop Coal Mining: Comparing Biological Conditions Using Family- and Genus-Level Macroinvertebrate Bioassessment Tools*. J. N. Am. Benthol. Soc. 27(3):717-737; *A Field-Based Aquatic Life Benchmark for Central Appalachian Streams* (Final Report), Appendix C; *The Effects of Mountaintop Mines and Valley Fills on Aquatic Ecosystems of the Central Appalachian Coalfields* (Final Report); Palmer et al. 2010; Pond, G.J. 2010. *Patterns of Ephemeroptera taxa loss in Appalachian headwater streams (Kentucky, USA)*. Hydrobiologia 641(1):185-201.

⁴⁸ Soucek, D.J. and A.J. Kennedy. 2005. *Effects of hardness, chloride, and acclimation on the acute toxicity of sulfate to freshwater invertebrates*. Environmental Toxicology and Chemistry 24:1204-1210; Lasier, P.J., and Hardin, I.R. 2010. *Observed and predicted reproduction of Ceriodaphnia dubia exposed to chloride, sulfate and bicarbonate*. Environmental Toxicology and Chemistry 29:347-358.

⁴⁹ Kennedy, A.J., D.S. Cherry, and R.J. Currie. *Field and laboratory assessment of a coal processing effluent in the Leading Creek Watershed, Meigs County, Ohio*. Archives of Environmental Contamination and Toxicology 44:324-331.

⁵⁰ Kennedy A. J., D.S. Cherry and C.E. Zipper. *Evaluation of Ionic Contribution to the Toxicity of a Coal-Mine Effluent Using Ceriodaphnia dubia*. Archives of environmental contamination and toxicology 49.2:155-162.

Department for Environmental Protection study found that the loss of mayflies in streams below mined sites indicates that these organisms are especially sensitive to coal mine drainage.⁵¹ A 2008 study by Pond et al. found evidence that mining activities have subtle to severe impacts on downstream aquatic life and the biological conditions of a stream, and concluded that nine out of every 10 streams downstream from surface coal mining operations were impaired based on a genus-level assessment of aquatic life.⁵² In that study and additional work published in 2010, specific conductance was the factor most strongly correlated with a reduction of *Ephemeroptera* in streams impacted by mining and residential development.⁵³

EPA's ORD has released a final report entitled *A Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams*.⁵⁴ This final report applies EPA's standard method for deriving water quality criteria⁵⁵ to field measurements and concludes that genus-level extirpation of 5% of aquatic organisms occurs at conductivity levels of 300 $\mu\text{S}/\text{cm}$. This report was finalized after independent peer review by the SAB. In its peer-review comments, the SAB affirmed the appropriateness of EPA's conductivity benchmark and expressed strong support for EPA's field-based methods and the quality of EPA's analyses of causation and confounding factors. The SAB also supported EPA's choice of an ecological endpoint (the protection of 95% of macroinvertebrate genera from extirpation), while noting that the 300 $\mu\text{S}/\text{cm}$ benchmark may not be sufficiently protective of ecologically valuable rare or sensitive taxa. The SAB encouraged EPA to strengthen the report by expanding the discussion of mechanisms of action, increasing the number of potential confounders analyzed, and clarifying various issues. They also suggested that the Agency clarify some policy issues such as the range of geographic and hydrologic applicability. As a result of the SAB's review, EPA's final conductivity benchmark report includes the same benchmark value as outlined in the draft report. This final report, along with EPA's final report on the aquatic ecosystem effects of mountaintop mining and valley fills, further demonstrate the significant environmental effects of high levels of salts, measured by TDS and conductivity, on Appalachian aquatic resources.

The SAB's peer review comments indicated that the 300 $\mu\text{S}/\text{cm}$ conductivity benchmark should not be utilized, without additional validation, outside ecoregions 68, 69, and 70 of the States of West Virginia and Kentucky. The SAB reached this conclusion because data to derive and validate the benchmark were gathered from these States. The SAB indicated that its conclusions regarding the applicability of the benchmark outside the study area should be dependent upon additional validation that considers the similarity of the ionic mixture, background conductivity levels, and macroinvertebrate assemblages.

In addition, the SAB review also concluded that the 300 $\mu\text{S}/\text{cm}$ conductivity benchmark should not be used in connection with ephemeral streams (which flow only in response to

⁵¹ Kentucky Department for Environmental Protection, Division of Water, Water Quality Branch. *Effects of Surface Mining and Residential Land Use on Headwater Stream Biotic Integrity in the Eastern Kentucky Coalfield Region*.

⁵² Pond et al. 2008.

⁵³ Pond 2010.

⁵⁴ *A Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams* (Final Report).

⁵⁵ Stephan, C.E.; Mount, D.I.; Hanson, D.J.; et al. 1985. *Guidelines for deriving numeric National Water Quality Criteria for the protection of aquatic organisms and their uses*. U.S. Environmental Protection Agency, Office of Research and Development, Washington, D.C. PB85-227049. Available at <http://www.epa.gov/waterscience/criteria/library/85guidelines.pdf>.

rainfall/runoff) without validation. Data used to derive the conductivity benchmark were collected exclusively from perennial streams, and the SAB concluded that there are sufficient similarities between perennial and intermittent streams to make the benchmark applicable to intermittent streams, but that differences in stream biology between perennial and ephemeral streams make it likely that the benchmark would not be applicable to ephemeral streams.

Pond et al. (2008),⁵⁶ based on field measurements comparing unmined and mined watersheds in Central Appalachia, found that aquatic life at sites with specific conductance greater than 500 $\mu\text{S}/\text{cm}$ had adverse impacts based on both genus and family-level multi-metric biological indices. Unlike EPA's final conductivity benchmark report, which derives a protective level of conductivity using a field-based application of EPA's standard method for deriving water quality criteria, Pond et al. (2008) identified that substantial aquatic life effects had already occurred at this level of conductivity. This evidence suggests that 500 $\mu\text{S}/\text{cm}$ may not be a protective level and, if exceeded, is likely to result in substantial aquatic life effects.

As noted above, EPA scientists and the broader scientific community have made substantial progress in recent years in developing high-quality, peer-reviewed scientific information supporting the causal relationships between surface coal mining activities, downstream water quality degradation, and significant harm to aquatic communities in central Appalachian streams. EPA believes that this extensive scientific information provides important information to CWA permitting authorities to help ensure that their decisions reflect best-available science and existing law.

⁵⁶ Pond et al. 2008.

Appendix 2

Legal Background: CWA, NEPA, and E.O. 12898

Clean Water Act Background

The CWA, 33 U.S.C. § 1251 *et seq.*, establishes a comprehensive program designed “to restore and maintain the chemical, physical, and biological integrity of the Nation’s waters.” 33 U.S.C. § 1251(a). To achieve that objective, CWA Section 301(a) prohibits the “discharge of any pollutant” – defined as the addition of any pollutant to the waters of the U.S. from any point source – except “as in compliance with” specified provisions of the CWA. 33 U.S.C. §§ 1311(a), 1362(7), 1362(12). In most cases, regulated entities achieve compliance with the relevant CWA provisions by obeying the terms of a permit issued under one of the CWA’s two complementary permitting programs: (1) a permit program for discharges of dredged or fill material, which is administered primarily by the Corps pursuant to Section 404 of the CWA, 33 U.S.C. § 1344; or (2) the National Pollutant Discharge Elimination System (NPDES), which is administered by EPA and authorized States pursuant to Section 402 of the CWA, 33 U.S.C. § 1342. Section 401 of the CWA also applies where Federal permits are issued, enabling States to certify (or waive) that discharges from permitted operations are in compliance with State environmental regulations. Typically, surface coal mining operations in the steep slopes of central Appalachia require Section 404 permits for the discharge of mining overburden into waters of the U.S. (e.g., valley fills, mine-through operations), mine faceups, stream diversions, road crossings, coal process waste impoundments, and for discharges to create sediment ponds. Discharges from the sediment ponds and any other stormwater discharges require Section 402 permits. Because the Corps issues Section 404 permits in Appalachia, States have authority to condition those permits under Section 401.

Legal Framework for Water Quality-Based Permitting Under CWA Section 402

The CWA and EPA’s implementing regulations require that NPDES permits contain (1) technology-based effluent limitations, which represent the degree of control that can be achieved by point sources using various specified levels of pollution control technology; and (2) more stringent limitations, commonly known as water quality-based effluent limits (or “WQBELs”), when necessary to ensure that the receiving waters meet applicable water quality standards. CWA § 301(b)(1)(C); 40 C.F.R. § 122.44(d)(1).

The procedure for determining the need for WQBELs is called a “reasonable potential” determination. Under EPA’s regulations at 40 C.F.R. § 122.44(d)(1)(i), WQBELs are required for all pollutants that the permitting authority determines “are or may be discharged at a level [that] will cause, have the reasonable potential to cause, or contribute to an excursion above any [applicable] water quality standard, including State narrative criteria for water quality.” Thus, if a pollutant discharge has the reasonable potential to cause or contribute to an excursion above any applicable water quality standard – including narrative criteria – the discharger’s NPDES permit must contain a WQBEL for that pollutant. See 40 C.F.R. § 122.44(d)(1)(iii)–(vi).

WQBELs necessary to meet narrative criteria can be a combination of chemical-specific limitations, controls on whole effluent toxicity (WET), and best management practices (BMPs).

Where there is reasonable potential for a pollutant to exceed a narrative criterion, and the state has not adopted chemical-specific criteria for such pollutant, then the permitting authority must establish a chemical-specific WQBEL based on one of the methods specified in the regulation. See 40 C.F.R. § 122.44(d)(1)(vi). In addition, even where the permit includes a chemical-specific limit to meet a narrative criterion, the permit must include a limit for WET if toxicity testing data or other information indicates a reasonable potential for toxicity of the discharge to exceed a narrative criterion that is not adequately controlled by the chemical specific limits. See 40 C.F.R. § 122.44(d)(1)(v); 54 Fed. Reg. 23868, 23879 (June 2, 1989). Where there is reasonable potential for toxicity, a WET limit is necessary unless the permitting authority “demonstrates... that chemical-specific limits for the effluent are sufficient” to meet standards. *Ibid.* One method for making this demonstration would be to use toxicity testing to show that, after application of the chemical-specific limits, the effluent has no acute or chronic toxic effects on aquatic life in the receiving water. See 54 Fed. Reg. 36868, 36874 (June 2, 1989).

When developing WQBELs, the permitting authority must ensure that the limits are as stringent as “necessary to ... achieve water quality standards” (CWA § 301(b)(1)(C); 40 C.F.R. § 122.44(d)(1)), and that the level of water quality achieved by such limits is “derived from and complies with all applicable water quality standards.” 40 C.F.R. § 122.44(d)(1)(vii)(A). Where there is no applicable TMDL, the determination of a limit that is as stringent as necessary is made on a case-by-case basis. In practice, such permits have included limits set at or below either the numeric water quality criteria or a quantification of the narrative water quality criteria, or limits based on offsets or trades with other pollutant sources to meet such criteria. Where there is an applicable TMDL for the waterbody, the WQBEL must be consistent with the assumptions and requirements of any available wasteload allocation in the TMDL. 40 C.F.R. § 122.44(d)(1)(vii)(B).

Most WQBELs are expressed as numeric limits on the amounts of specified pollutants that may be discharged. However, WQBELs may also be expressed in narrative form, such as BMPs or pollutant minimization measures, when it is infeasible to derive a numeric limit (see 40 C.F.R. § 122.44(k)(3)). In addition, BMPs may be imposed in the form of NPDES permit conditions to supplement numeric effluent limits when the permitting authority determines that such requirements are necessary to achieve effluent limitations and standards or to carry out the intent and purposes of the Act. See CWA § 402(a)(1)(B); 40 C.F.R. § 122.44(k)(4).

CWA Section 404 Permitting

Under Section 404(a) of the CWA, the Corps is authorized to issue permits, after notice and opportunity for public hearings, for the discharge of dredged or fill material into waters of the U.S., including wetlands. Under Section 404(b)(1), EPA is responsible for promulgating, in conjunction with the Corps, the environmental criteria and standards applied in the review of proposed activities to ensure that the goals of the CWA are met. See 40 C.F.R. Part 230. The Section 404(b)(1) Guidelines (Guidelines) are applicable to all discharges of dredged or fill material to waters of the U.S., and the Corps issues Section 404 permits after evaluating proposed discharges for consistency with the Guidelines and its own implementing regulations. 40 C.F.R. § 230.2. EPA also reviews public notices and general permit pre-construction notifications for Section 404 permits for consistency with the Guidelines.

In addition, under Section 404(q) of the CWA, the agencies have entered into a Memorandum of Agreement (“404(q) MOA”) governing the sharing of information and elevating of decisions when there is a dispute between Regional and District offices over implementation of the Guidelines.⁵⁷ Finally, under Section 404(c) of the CWA, the Administrator is authorized to “veto” a discharge of dredged or fill material if the Administrator determines that a discharge will have an unacceptable adverse effect.⁵⁸

National Environmental Policy Act

Section 102(2)(C) of the National Environmental Policy Act (NEPA) and the CEQ implementing regulations at 40 C.F.R. Parts 1500-08 require an assessment of the environmental impacts of Federal actions. For example, the Section 404 review by the Corps of a proposed mining operation with discharges into waters of the U.S. triggers review under NEPA.

For Federal actions significantly affecting the quality of the human environment, NEPA requires preparation of an environmental impact statement (EIS). The CEQ regulations – as well as individual Federal agency NEPA regulations – provide for a public “scoping” process prior to preparation of a draft EIS; public comment on the draft EIS; preparation of a final EIS; and preparation of a public “record of decision.” See 40 C.F.R. Parts 1501 (scoping), 1502 (draft and final EISs), and 1505 (record of decision). Under the regulations, an EIS must present a comprehensive and transparent evaluation of the full range of potential environmental and human health impacts associated with a Federal action, as well as project alternatives and mitigation that may avoid and minimize significant adverse impacts. See 40 C.F.R. §§ 1508.7 (cumulative impact), 1508.8 (effects), and 1502.14 (alternatives and mitigation).

In order to determine whether preparation of an EIS is necessary, CEQ regulations provide for preparation of an environmental assessment (EA). 40 C.F.R. § 1508.9. Agencies are to involve environmental agencies in preparing EAs, to the extent practicable. 40 C.F.R. § 1501.4(b). If an EA determines that an action will not have a significant impact, a finding of no significant impact (FONSI) is prepared. 40 C.F.R. § 1508.13.

Under the authority of NEPA, and as required under Section 309 of the Clean Air Act, EPA reviews and comments on Federal actions with potentially significant impacts, including actions for which an EA is prepared. Further, in the event the Administrator determines that

⁵⁷ *Clean Water Act Section 404(q) Memorandum of Agreement Between the Environmental Protection Agency and the Department of the Army*. 1992. Available at http://www.usace.army.mil/CECW/Documents/cecwo/reg/mou/moa_epa404q.pdf.

⁵⁸ “The Administrator is authorized to prohibit the specification (including the withdrawal of specification) of any defined area as a disposal site, and he is authorized to deny or restrict the use of any defined area for specification (including the withdrawal of specification) as a disposal site, whenever he determines, after notice and opportunity for public hearings, that the discharge of such materials into such area will have an unacceptable adverse effect on municipal water supplies, shellfish beds and fishery areas (including spawning and breeding areas), wildlife, or recreational areas. Before making such determination, the Administrator shall consult with the Secretary. The Administrator shall set forth in writing and make public his findings and his reasons for making any determination under this subsection.” CWA § 404(c).

such an action is “unsatisfactory from the standpoint of public health or welfare or environmental quality,” the matter must be referred to CEQ. CAA § 309(b); 40 C.F.R. Part 1504.

Executive Order 12898 on Environmental Justice

E.O. 12898 and the Presidential Memorandum that accompanies it also need to be addressed appropriately in the context of any Federal action – such as Federal permitting under the CWA and SMCRA – including Federal actions that are subject to NEPA. E.O. 12898 provides that “[t]o the greatest extent practicable and permitted by law...each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.”

Consideration of environmental justice concerns is vital to understanding the potential human health and environmental impacts of surface coal mining during the CWA and SMCRA permitting and NEPA review processes. The Presidential Memorandum articulates the role of Federal environmental statutes in securing human health and environmental protection of vulnerable populations and assuring their participation in the process.

E.O. 12898 calls for actions that can address several key environmental justice issues associated with surface coal mining. These include conducting research, data collection, and analysis on direct, indirect and cumulative impacts; identifying patterns of subsistence consumption of fish and wildlife; and providing effective public participation and access to information. Identifying and addressing adverse effects of proposed Federal activities on low-income and minority populations, including measures to mitigate any adverse effects, is consistent with requirements of E.O. 12898.

Appendix 3
Applicable Narrative Water Quality Standards of Appalachian States

As outlined in Sections III and IV, a critical element of permitting under Sections 402 and 404 of the Clean Water Act is the protection of State narrative water quality standards. In five of the six Appalachian States identified within this memorandum, States do not have numeric water quality standards for conductivity. Ohio’s water quality standards do include a numeric value for conductivity.

	State	Text of Narrative Standard	State Regulatory Citation
EPA Region 3	Pennsylvania ⁵⁹	<i>(a) Water may not contain substances attributable to point or nonpoint source discharges in concentration or amounts sufficient to be inimical or harmful to the water uses to be protected or to human, animal, plant or aquatic life.</i>	25 Pa. Code 93.6(a)
		<i>(b) In addition to other substances listed within or addressed by this chapter, specific substances to be controlled include, but are not limited to, floating materials, oil, grease, scum, and substances that produce color, tastes, odors, turbidity or settle to form deposits.</i>	
	Virginia	<i>A. All state waters, including wetlands, are designated for the following uses: recreational uses, e.g., swimming and boating; the propagation and growth of a balanced, indigenous population of aquatic life, including game fish, which might reasonably be expected to inhabit them; wildlife; and the production of edible and marketable natural resources, e.g., fish and shellfish.</i>	9 VAC 25-260-10
		<i>A. State waters, including wetlands, shall be free from substances attributable to sewage, industrial waste, or other waste in concentrations, amounts, or combinations which contravene established standards or interfere directly or indirectly with designated uses of such water or which are inimical or harmful to human, animal, plant, or aquatic life.</i>	9 VAC 25-260-20
	West Virginia	<p><u>Conditions not allowable in State waters</u></p> <p>1. <i>Certain characteristics of sewage, industrial wastes and other wastes cause pollution and are objectionable in all waters of the state. Therefore, the Secretary does hereby proclaim that the following general conditions are not to be allowed in any of the waters of the state.</i></p> <p>2. <i>No sewage, industrial wastes or other wastes present in any of the waters of the state shall cause therein or materially contribute to any of the following conditions thereof:</i></p> <p style="padding-left: 40px;"><i>a. Distinctly visible floating or settleable solids, suspended solids, scum, foam or oily slicks; [...]</i></p>	CSR 47-02-3, 6

⁵⁹ Pennsylvania also has a numeric water quality standard for osmotic pressure of 50 milliosmoles per kilogram, which applies to the statewide list (includes warm water fisheries, among other uses), cold water fish, and trout stocking. 25 Pa. Code 93.7(a)

		<p>e. Materials in concentrations which are harmful, hazardous or toxic to man, animal or aquatic life; [...]</p> <p>i. Any other condition, including radiological exposure, which adversely alters the integrity of the waters of the State including wetlands; no significant adverse impact to the chemical, physical, hydrologic, or biological components of aquatic ecosystems shall be allowed.</p> <p>6.3. Category B -- Propagation and maintenance of fish and other aquatic life-This category includes:</p> <p>a. Category B1 -- Warm water fishery streams. -- Streams or stream segments which contain populations composed of all warm water aquatic life.</p>	
		<p>Therefore, the Secretary does hereby proclaim that the following general conditions are not to be allowed in any of the waters of the state.</p> <p>e. Materials in concentrations which are harmful, hazardous or toxic to man, animal or aquatic life; [...]</p> <p>i. Any other condition, including radiological exposure, which adversely alters the integrity of the waters of the State including wetlands; no significant adverse impact to the chemical, physical, hydrologic, or biological components of aquatic ecosystems shall be allowed.</p>	
EPA Region 4	Kentucky	<p>Total dissolved solids or specific conductance shall not be changed to the extent that the indigenous aquatic community is adversely affected.</p>	401 KAR 10:031, Section 4(1)(f)
		<p>Surface waters shall not be aesthetically or otherwise degraded by substances that ... injure, are chronically or acutely toxic to or produce adverse physiological or behavioral responses in humans, animals, fish and other aquatic life.</p>	401 KAR 10:031, Section 2
		<p><u>Definitions</u></p> <p>(5) "Adversely affect" or "adversely change" means to alter or change the community structure or function, to reduce the number or proportion of sensitive species, or to increase the number or proportion of pollution tolerant aquatic species so that aquatic life use support or aquatic habitat is impaired.</p> <p>(38) "Impact" means a change in the chemical, physical, or biological quality or condition of surface water.</p> <p>(39) "Impairment" means, a detrimental impact to surface water that prevents attainment of a designated use.</p>	401 KAR, Chapter 10
		<p><u>Minimum Criteria Applicable to All Surface Waters</u></p> <p>(1) The following minimum water quality criteria shall be applicable to all surface waters including mixing zones, with the exception that toxicity to aquatic life in mixing zones shall be subject to the provisions of 401 KAR 10:029, Section 4. Surface waters</p>	401 KAR 10:031, Section 2

		<p><i>shall not be aesthetically or otherwise degraded by substances that [...]</i></p> <p><i>(d) Injure, are chronically or acutely toxic to or produce adverse physiological or behavioral responses in humans, animals, fish and other aquatic life;</i></p> <p><i>(e) Produce undesirable aquatic life or result in the dominance of nuisance species;</i></p>	
	Tennessee	<p><i>Waters identified as wet weather conveyances according to the definition found in 1200-4-3-.04 (4), shall be protective of humans and wildlife that may come in contact with them and shall not adversely affect the quality of downstream waters. Applicable water quality standards will be maintained downstream of wet weather conveyances.</i></p>	<p><i>Rules of the TDEC, Chapter 1200-4-3-.02(6)</i></p>
		<p><i>The waters shall not contain substances or a combination of substances including disease-causing agents which, by way of either direct exposure or indirect exposure through food chains, may cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions (including malfunctions in reproduction), physical deformations, or restrict or impair growth in fish or aquatic life or their offspring.</i></p>	<p><i>Rules of the TDEC, Chapter 1200-4-3-.03(g)</i></p>
		<p><i>m. The waters shall not be modified through the addition of pollutants or through physical alteration to the extent that the diversity and/or productivity of aquatic biota within the receiving waters are substantially decreased or adversely affected, except as allowed under 1200-4-3-.06.</i></p> <p><i>n. The quality of stream habitat shall provide for the development of a diverse aquatic community that meets regionally-based biological integrity goals.</i></p>	<p><i>Rules of the TDEC, Chapter 1200-4-3-.03</i></p>
EPA Region 5	Ohio	<p><i>Total Dissolved Solids: 1500 mg/L (Outside Mixing Zone Average).</i></p> <p><i>Footnote (d): Equivalent 25°C specific conductance value is 2400 micromhos/cm [ug/L]</i></p>	<p><i>Ohio Administrative Code, 3745-1-07, Table 7-1</i></p>
		<p><i>The following general water quality criteria shall apply to all surface waters of the state including mixing zones. To every extent practical and possible as determined by the director, these waters shall be: [...]</i></p> <p><i>(D) Free from substances entering the waters as a result of human activity in concentrations that are toxic or harmful to human, animal or aquatic life and/or are rapidly lethal in the mixing zone;</i></p>	<p><i>Ohio Administrative Code, 3745-1-04</i></p>

Appendix 4

Best Management Practices for Mining Project Design under CWA Section 404

Note: This Appendix summarizes EPA's current understanding of Best Management Practices (BMPs) for the design of mining projects that require Clean Water Act permits as of July 2011. EPA anticipates providing updates to this Appendix as additional BMPs are implemented and as monitoring data regarding their effectiveness are gathered and evaluated.

The following list provides examples of avoidance and minimization measures that EPA believes should be considered, and employed where appropriate, to reduce impacts associated with Appalachian surface coal mining activities. It is not intended to be an exhaustive list, and any particular BMP may not be applicable or appropriate to a specific project. As other BMPs and "best available technology" are developed and tested in the field, they should be utilized where practicable.

1. Extended Depth Contour Mining – Evaluate leaving high ratio (overburden to coal extraction) areas along the center of ridges, thus preserving the original watershed boundaries and allowing natural propagation of revegetation from both above and below the disturbed area.
2. Alternative Mining Methods – Evaluate the use of mining methods that generate less excess spoil including deep mining, highwall miner, or auger. Use of alternate mining approaches could allow the recovery of additional coal resources and minimize the production of spoil.
3. Offsite Disposal – In order to reduce the quantity of excess spoil placed in aquatic resources, evaluate all possible disposal locations including adjacent mining locations.
4. AOC+ Model – Use the Kentucky or West Virginia protocols to help select the valleys that are the optimum for the disposal of excess spoil; the objective should be to select the best locations in order to minimize stream impacts. Implementation of these protocols provides additional helpful technical analysis, but by themselves is not determinative of a finding of compliance with the Section 404(b)(1) Guidelines.
5. Fill Location – When selecting fill sites select fills that complement each other, such as being "back to back" in order to maximize the quantity of additional backfill, as well as evaluate the relative condition of streams proposed to be filled.
6. "Canted" Fills – Evaluate the use of canted (or side-hill) fills where the existing stream is relocated prior to any mining or fill activity, thus minimizing temporal losses. The valley can then be filled using a canted fill approach with the toe of the fill buttressed against the opposing valley wall. This type of fill increases stability and can also reduce water quality impacts if placed on the up-dip side of valley, thus minimizing groundwater flow into the fill. In addition, the other side of the valley is still providing natural flow and

clean freshwater. The relocated stream should have a buffer on the fill side as well to also aid in water quality protection. This methodology also incorporates concurrent mitigation techniques.

7. Drainage Through Fills – Reduce the number of fills and locate remaining fills as far up in the watershed as possible, thereby reducing the percentage of the drainage area that flows through a fill. Where possible, locate remaining fills in smaller streams with less flow to reduce the amount of water coming through the fill. Liner material placed under valley fills or underdrains should be composed of the most durable, and least reactive, material to minimize opportunity for water draining through fills to pick up dissolved solids.
8. Direction of Mining – Whenever possible mine down dip so that any infiltration of water into the backfill is contained in the pit and not discharged through the pond.
9. Materials Handling Plans – First, the strata that are most likely to have high total dissolved solids (i.e., high specific conductance) should be identified before the overburden is disturbed. Then, identified strata should be separated from other material during the removal of the overburden. Next, these strata should be permanently stored in isolation from contact with surface and ground water. Lastly, dissolved solids should be treated prior to the effluent being discharged into waters of the U.S.
10. Post-Mining Land Use – When proposed permits incorporate a variance from AOC requirements based on a post-mine land use that requires such a variance, an alternatives analysis should be provided for both the mining and post-mining land use proposal to assure that the LEDPA is achieved. Also, evaluate the impacts to waters that would occur as a result of this post-mine land use that are beyond those impacts that would result if the area were returned to AOC.
11. Sequential Filling – Build and monitor one valley fill at a time in order to assure that water quality is protected and significant degradation does not occur.
12. Sedimentation Ponds – Consider design, construction and/or operation alternatives that minimize the size and number of ponds placed in waters of the U.S. and ensure post-mining reclamation plans restore affected streams. Liners may be appropriate for sediment ponds to prevent infiltration of water into the ponds or the recharge of ground water with pond water pollutants. The closure of the sediment pond may require a hazardous waste profile to determine the quality of the sediment. In addition, when the ponds are breached, there exists an opportunity for the sediments that were stored behind the dam to be released downstream. This secondary impact should be addressed during the initial permit review.

Appendix 5

Information Needs for Evaluating Section 404 Permit Applications for Appalachian Surface Coal Mining

Surface coal mining projects are typically complex and large in scale, and Regions should also keep in mind that the environmental review of new mining projects is conducted under a variety of State and Federal programs. Evaluating these projects consistent with Section 404 of the CWA requires sufficient information to make informed judgments about compliance with the Guidelines. In particular, adequate information describing the extraction site, materials to be extracted, and the candidate disposal site is essential to assess whether surface coal mining projects comply with the Guidelines. 40 C.F.R. § 230.6(a). EPA Regions should evaluate project-specific data including, but not limited to, the information listed below. Where such data are also required by other Federal and State regulatory partners, the agencies are encouraged to collaborate in sharing this information among one another to increase efficiency, reduce costs, and better ensure regulatory decisions are being made using the same base of technical information.

- Geospatial information – Digital geospatial boundaries for the proposed project and individual valley fills. Location of nearby, reference, or unmined tributaries in the same catchment.
- Surface area disturbed – Total acreage of surface disturbance area (mineral extraction area).
- Spoil material – Volume of overburden excavated and volume of excess spoil (in cubic yards).
- Disposal location – Detailed as on site, off site, or a combination or percentage.
- Spoil for each valley fill – In cubic yards, where applicable, for both the total fill and the fraction placed in waters of the U.S.
- Drainage area – Above each toe of fill or each sediment pond, whichever is further downstream (in acres).
- Impacts – Aquatic resource impacts resulting from, but not limited to, valley fills, sediment corridors, sediment ponds, slurry ponds, in-stream mining, or other mining operation features, in linear feet by type of stream (perennial, intermittent, ephemeral) or acres for other resource types, and by type of impact (permanent or temporary).
- Baseline monitoring – Where appropriate, pre-mine (land disturbance) sampling data and sampling location for total suspended solids, total dissolved solids, conductivity, sulfates, bicarbonate, chloride, magnesium, potassium, calcium, sodium, metals, pH, selenium, dissolved oxygen, temperature, instream bioassessments (list of the presence and abundance of aquatic organisms identified to the lowest practicable taxonomic level, usually genus-level for invertebrates and species-level for vertebrates), and habitat assessments. Baseline monitoring should include photographs of all sampled sites and reaches. Such data should be evaluated in the context of data gathered to support CWA Section 402 or SMCRA permitting.
- Hydrology – Cumulative Hydrologic Impact Assessments (CHIAs), Probable Hydrologic Consequences (PHC), and any flow duration assessments conducted.

- Watershed condition – Any sampling data for total suspended solids, total dissolved solids, conductivity, sulfates, bicarbonate, chloride, magnesium, potassium, calcium, sodium, metals, pH, selenium, and macroinvertebrate presence and abundance for adjacent mines included with the CHIA or other sources.
- Geology – To determine the possibility of chemical contamination, information on the material to be discharged should be made available. 40 C.F.R. § 230.5(h). This should include geologic strata information from core samples, including analysis of selenium, pyrite, calcium carbonate, acid-producing strata, and any strata that may cause or contribute to conductivity.
- Drinking water supplies – Location of drinking water supplies that could be affected, including private wells and community drinking water intakes. 40 C.F.R. § 230.50. Such data are likely available in the applicable SMCRA permit application.

Appendix 6
Clean Water Act Permitting Experience Regarding Conductivity
Following EPA's April 1, 2010 Interim Guidance on Appalachian Surface Coal Mining

Clean Water Act Section 404

Section 404 of the Clean Water Act requires EPA to develop environmental standards in conjunction with the U.S. Army Corps of Engineers (Corps) to guide the Corps' review of permit applications to discharge dredged or fill material in waters of the U.S. EPA reviews Section 404 permit applications for consistency with the Agency's regulations and the CWA and, if appropriate, can elevate individual permits for additional review or can "veto" authorization of discharges that would have unacceptable adverse effects under CWA Section 404(c). The Corps issues CWA Section 404 permits.

EPA comments and Corps-issued Section 404 permits demonstrate that EPA is not applying the April 1, 2010 guidance as a rule. Depending upon the circumstances of each project, EPA has employed a mixture of tools to articulate its concerns, such as individual comment letters, permit elevations, and closeout letters for Enhanced Coordination Procedure (ECP) projects. Recent EPA recommendations and permitting decisions demonstrate that the conductivity benchmarks in the guidance (300-500 $\mu\text{S}/\text{cm}$) are not being applied rigidly. Instead, based on best-available science and applicable regulations, the agencies are evaluating projects on a case-by-case basis to address conductivity concerns and to prevent conductivity from increasing further in already degraded watersheds. Experience shows that Section 404 permits do not conform to a single model. Some are being issued without conductivity limits, some with conductivity monitoring provisions, some with monitoring provisions to inform sequencing of valley fills, and some with monitoring conditions and numeric triggers that, if exceeded, trigger adaptive management actions designed to reduce conductivity. Where included in permits, conductivity levels vary and in some cases are above the 300-500 $\mu\text{S}/\text{cm}$ range in the interim guidance.

The environmental concerns outlined in EPA comment letters to the Corps on proposed mining projects were in many cases being expressed before release of the April 1, 2010 interim-final guidance. This demonstrates that EPA permit reviews are based on the regulations and relevant science, not the guidance *per se*. For example:

- Comment letters on the Georges Creek permit in West Virginia public noticed before the guidance (August 2009) raise the same environmental concerns as a comment letter on the same project, re-public noticed in April 2011.
- Comment letters on Highland Mining's Reylas mine (March and April 2009) recommended a conductivity trigger based on best-available science.

How Conductivity is Being Addressed in Enhanced Coordination Procedure (ECP) Permits (Issued or Pending)⁶⁰

Since April 1, 2010			
Project (Applicant)	State	EPA Recommendation	Permitting Action ⁶¹
Scaffold Lich Branch (Czar Coal)	KY	500 $\mu\text{S}/\text{cm}$ trigger tied to adaptive management; BMPs	Final Permit: Conductivity trigger based on background levels (1,560 $\mu\text{S}/\text{cm}$), tied to adaptive management plan; ⁶² BMPs
Premier Elkhorn (Premier Elkhorn)	KY	300-500 $\mu\text{S}/\text{cm}$ conductivity trigger tied to valley fill sequencing and adaptive management; BMPs	Proffered Permit: Conductivity trigger of 500-703 $\mu\text{S}/\text{cm}$ to reflect background conditions, tied to adaptive management; BMPs (Final permit decision not made.)
Stacy Branch (Leeco)	KY	Conductivity trigger tied to adaptive management and restoration projects	Revised Proposal: 400 $\mu\text{S}/\text{cm}$ trigger, tied to adaptive management and restoration projects; BMPs (Final permit decision not made.)
Hall's Knob (Oxford Mining)	OH	2,400 $\mu\text{S}/\text{cm}$ trigger for adaptive management (state numeric standard) and additional mitigation	Final Permit: 2,400 $\mu\text{S}/\text{cm}$ trigger for additional mitigation and adaptive management
Area 19 (Premium Coal)	TN	Conductivity monitoring but no trigger for future actions	Final Permit: Conductivity monitoring but no trigger for further actions
Pine Creek (Coal-Mac)	WV	300-500 $\mu\text{S}/\text{cm}$ trigger tied to valley fill sequencing	Final Permit: 300-500 $\mu\text{S}/\text{cm}$ trigger tied to sequencing, adaptive management, and additional mitigation
Spring Branch Deep Mine (Consol of KY)	WV	Water quality monitoring for conductivity	Final Permit: Water quality monitoring for conductivity

⁶⁰ This chart represents EPA's understanding of how conductivity was addressed for each project and is current as of July 20, 2011. Applicants' original mining proposals did not typically anticipate including specific conductivity triggers or conductivity-specific best management practices.

⁶¹ As of July 13, 2011, all permits on this table have been issued, with the exception of Premier Elkhorn (proffered) and Stacy Branch (under review). Section 404 permits are issued by the Corps.

⁶² Adaptive management typically includes development of a plan that requires the permittee to take further steps to reduce conductivity if triggers are exceeded. These steps may include additional best management practices such as isolating conductivity-producing strata, redirecting water away from valley fills, or other measures.

Prior to April 1, 2010			
Surface Mine No. 45 (Hobet Mining)	WV	Conductivity trigger of 300 and 500 μ S/cm for adaptive management and additional mitigation (depending on stream reach)	Final Permit: Conductivity trigger of 300 and 500 μ S/cm for adaptive management and additional mitigation (depending on stream reach)
Kaiser Mathias (Oxford Mining)	OH	Water quality monitoring for conductivity	Final Permit: Water quality monitoring for conductivity
Buckingham Wash Plant (Buckingham Coal)	OH	Water quality monitoring for conductivity	Final Permit: Water quality monitoring for conductivity

Clean Water Act Section 402

Permitting experience under Section 402 of the CWA is difficult to describe quantitatively due to the multi-step nature of the permit process and the lack of finality for many pending permits. Appalachian states have issued some permits for discharges from surface coal mining projects without EPA objections. EPA has objected to other NPDES permits in Appalachian States for various reasons. These include inappropriate use of compliance schedules for selenium, inadequate implementation of Total Maximum Daily Loads (TMDLs) and in some cases the lack of a reasonable potential analysis for narrative water quality standards. This latter objection involves in part the failure of the state permitting authority to examine whether elevated conductivity levels could create a reasonable potential for violation of the narrative standard. Because the permitting process is still ongoing, how the EPA objections will be resolved, and whether the final permits will include conductivity limits, is not certain, although in a few instances dialogue between EPA and the State has resulted in agreement on permit terms protective of water quality. However, based on experience to date, EPA can confidently state that in the 402 context as well, the Interim Guidance is not being implemented as a rule. State permits that have been issued, as well as EPA comments on permits under review, have considered and adopted a variety of approaches for implementing narrative water quality criteria. In reviewing Section 402 permits, EPA has consistently applied the Clean Water Act and implementing regulations, rather than the Interim Guidance.