**APPENDIX 6**
**Response to Comments Received by EPA Regarding the Spruce No. 1 Mine 404(c) Determination**

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## I. Response to Comments Received on the Spruce No. 1 Mine 404(c) Recommended Determination

**Comments submitted by Hunton and Williams, counsel for Mingo Logan, on November 29, 2010, regarding EPA's Recommended Determination.[1]**

Comment #1A – Because the Recommended Determination finds no support in law or fact, Mingo Logan strongly urges the Administrator to rescind the Recommended Determination.

Response #1A – Comment noted. EPA respectfully disagrees with the commenter's assessment, based on the analyses included in the Final Determination and the following responses to comments.

Comment #2A – Congress provided EPA with only a limited authority under Section 404(c). In particular, the statute requires EPA to show that the "discharge of fill material" into "waters of the United States" will have unacceptable adverse effects on very specific resources. Both the text and legislative history of 404(c) make clear that Congress intended 404(c) to be a limited and constrained authority. Indeed, Congress characterized the resources identified in 404(c) as "critical areas." The statute also requires EPA to establish that the discharge of fill material into waters of the United States "*will* have an unacceptable adverse effect" on at least one of these critical resources. 33 U.S.C. § 1344(c) (emphasis added). EPA cannot meet this burden based on speculation or possibility, but must establish a strong degree of certainty that the effects "will" occur.

Response #2A – See Responses #8, 9, 21, and 167.

Comment #3A – EPA may not base its 404(c) action on impacts from 402 discharges; nor may it base its action on impacts caused by non-fill related mining activity occurring outside "waters of the United States." *See Coeur Alaska, Inc. v. Southeast Alaska Conservation Council*, 129 S.Ct. 2458, 2467-68 (2009); Cmt. at 4, 41-43, 105-06. It is clear that the text of Section 404(c) is limited to the resources listed in Section 404(c). *See* 40 C.F.R. § 231.2(e). As Mingo Logan explained in its initial comment, the 404(c) resources are therefore included *to the exclusion* of other resources, areas and concerns. Cmt. at 66-67

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[1] When evaluating Hunton & Williams' comments on the Recommended Determination, EPA noted complete or significant overlap between several comments and Hunton and Williams' comments on the Proposed Determination. Where overlap exists, this document references the relevant responses to Hunton and Williams' comments on the Proposed Determination rather than duplicating responses.

As noted elsewhere, Hunton and Williams also submitted a Technical Evaluation Document developed by CH2M HILL.

Response #3A – See Responses #28 and 155.

Comment #4A: Mingo Logan does not believe that EPA's regulations adequately account for what Congress intended "unacceptable" to mean within the context of 404(c). "Unacceptable," like "significant," is a relative term that must be weighed against the endangerment of the species, the size of the project, and any economic benefit from the project. The word "unacceptable" is either so broad as to not provide EPA with a meaningful standard to apply, or is a relative term that is not adequately accounted for in EPA's regulations. EPA construes "unacceptable" to mean unacceptable to EPA, which if true would be an improper delegation of legislative authority.

Response #4A – EPA's regulations implementing CWA Section 404(c) have, for more than 30 years, provided the following definition of "unacceptable adverse effects":

> *Unacceptable adverse effects* means an impact on an aquatic or wetland ecosystem which is likely to result in significant degradation of municipal water supplies (including surface or ground water) or significant loss of or damage to fisheries, shellfishing, or wildlife habitat or recreation areas. In evaluating the unacceptability of such impacts, consideration should be given to the relevant portions of the section 404(b)(1) guidelines (40 CFR part 230).

40 CFR 231.2. While EPA acknowledges that both the regulatory definition and the statutory provision provide the Agency with broad authority under 404(c), the breadth of the authority does not constitute the limitless type of authority that could constitute an improper delegation of authority from Congress. Congress did define the scope of EPA's authority by both the use of "unacceptable adverse effects" and limiting the type of effects that could be considered "unacceptable adverse effects" to effects on "municipal water supplies, shellfish beds and fishery areas (including spawning and breeding areas), wildlife, or recreational areas."

The commenter's contention that the word "unacceptable" "must be weighed against the endangerment of the species, the size of the project, and any economic benefit from the project" is without merit. EPA's authority to veto a project based on solely on the environmental impacts has been upheld in court:

> We are presented then with the chore of determining whether the EPA has the authority to justify its Sec. 404(c) veto in this case solely on the basis that it would cause unacceptable adverse effects on the environment. Although we find no precedent and little legislative history, we are persuaded by the structure and language of the Act that it has that authority.

James City County Virginia v. EPA, 12 F.3d 1330 (4th Cir. 1993). EPA, therefore, is under no obligation to consider the factors suggested by the commenter.

Comment # 5A – Despite reference to the 404(b)(1) guidelines, EPA recognized that Section 404(c) does not incorporate the full range of those guidelines. In fact, EPA originally proposed, but rejected, 404(c) regulations providing that the "404(b)(1) guidelines provide the substantive criteria by which the acceptability of a proposed discharge is to be judged." 44 Fed. Reg. at 14,579. EPA rejected such a broad incorporation because such a standard was "misleading, since the guidelines are concerned with a greater range of resources than 404(c) is. To avoid any misunderstanding [regarding the scope of EPA's definition], the reference now reads, 'the relevant portions of the section 404(b)(1) guidelines.'" 44 Fed. Reg. at 58,078. Accordingly, EPA cannot point to the Guidelines *writ large* to inform its findings under 404(c). Finally, EPA's final definition acknowledges that EPA must demonstrate a "significant" adverse effect on one of these critical areas.

Response #5A – See Response #169.

Comment #6A – When EPA published its final 404(c) regulations, its preamble to those regulations wrongly claimed the authority to act after the Corps had issued a Section 404 permit. But in making that claim, EPA recognized that "an important distinction should be drawn" between the agency's 404(c) authority before a permit has been issued and after. Mingo Logan disputes this authority.

Response #6A – See Responses #168 and 9A.

Comment #7A – EPA stated that: it would be inappropriate to use 404(c) after issuance of a permit where the matters at issue were reviewed by EPA without objections during the permit proceeding, or where the matters at issue were resolved to EPA's satisfaction during the permit proceeding, unless substantial new information is first brought to the Agency's attention after issuance.

Response #7A – See Response #168.

Comment #8A – EPA must demonstrate that the authorized discharges will result in an unusual loss or damage to a 404(c) critical area, such that it has serious consequences for the species community or the surrounding ecosystem. Impacts that are routine in the 404 context, or impacts that do not have a significant impact on the species community or surrounding aquatic ecosystem are not "significant."

Response #8A – See Responses #8, 9, and 21.

Comment #9A – EPA expressly acknowledged that it would be wrong to exercise its 404(c) authority where issues were raised and addressed during the permit proceeding. Instead, EPA promised to undertake 404(c) only in situations where there was substantial new information indicating significant impacts to critical 404(c) resources. Accordingly, even under EPA's own view of its regulations, the 404(c) standard pre-permit is high; the standard postpermit is even higher.

Response #9A – See Responses #152 and 168. To the extent the comment asserts that language in the preamble creates a "higher" legal standard for EPA in the context of an issued permit, EPA disagrees. The preamble represents a statement of EPA's intention as to how its authority would be exercised; it does not create a legal standard. Nevertheless, EPA acknowledges that the preamble to the regulations implementing 404(c) did explain that the Agency generally thought initiating a veto after a permit was issued would be disfavored "unless substantial new information is first brought to the Agency's attention after issuance." 44 Fed. Reg. 58,077. The record before the Agency shows that this is such an instance. Therefore, even if the commenter was correct that the preamble created some "higher" standard for action, the record here more than adequately demonstrates that such a standard would be satisfied.

Comment #10A – As demonstrated below, the Recommended Determination violates EPA's commitment to exercise Section 404(c) sparingly. EPA reviewed all of the matters raised in the Recommended Determination over the course of the extensive permitting process, either in SMCRA, National Environmental Policy Act ("NEPA"), CWA Section 404, 402, and 401 processes, and consented to the issuance of the 404 permit. *See Coeur Alaska, Inc.*, 129 S. Ct. at 2465. The Recommended Decision has not raised any "substantial" new information, but relies entirely on issues that were raised and addressed in the permit proceedings. *See* Letter from Scott Mandirola, Acting Dir., WVDEP, to Col. Robert Peterson, Dist. Eng'r, Corps, Huntington Dist. at 3 (Sep. 25, 2009), Cmt. Ex. 26 (hereinafter "Mandirola Letter") ("This is the most heavily studied and scrutinized surface mining coal operation in the history of [West Virginia]").

Response #10A – See Responses #24, 28, 125, 152, and 156.

Comment #11A – The Corps recognized EPA's failure to raise new information. In response to EPA's request that the Corps suspend Mingo Logan's 404 permit, pending EPA's 404(c) action, the Corps evaluated the issues raised and stated that "USEPA neither points to any new facts or circumstances nor identifies any significant permit objections which were not earlier considered." Robert D. Peterson, Corps, Memorandum for Record at 22 (Sep. 30, 2009) (refusing to suspend the permit because the Corp's regulations, 33 C.F.R. § 325.7, require that new circumstances or objections be raised), Cmt. Ex. 5. Indeed, even the district court in the pending litigation acknowledged that the issues raised by EPA are not new. *See Ohio Valley Envtl. Coal. v. U.S. Army Corps of Eng'rs*, Nos. 3:05-0784 and 3:06-0438 slip op. at 3 (S.D. W. Va. Sep. 15, 2009) ("…the EPA letter [of September 3, 2009] does not provide substantial new information regarding the Spruce No. 1 permit.").

Response #11A – While EPA respects the position expressed by Col. Peterson in his September 30, 2009, letter, EPA disagrees. Throughout the history of the Spruce No. 1 Surface Mine, EPA has raised concerns regarding adverse impacts to the environment. Additional data and information, including peer-reviewed scientific studies of the ecoregion, have become available since permit issuance. The peer-reviewed literature now reflect a growing consensus of the importance of headwater streams; a growing concern about the adverse ecological effects of mountaintop mining, specifically with regard to the effects of elevated levels of total dissolved solids and selenium discharged by mining operations on downstream aquatic ecosystems; and concern that impacted streams cannot be easily recreated or replaced. These scientific advances support EPA's long-standing concerns about the Spruce No. 1 project regarding the potential for unacceptable adverse effects on wildlife, including adverse effects on wildlife from water quality impacts; significant cumulative effects; as well as the shortcomings in avoidance, minimization, and compensatory mitigation measures designed to reduce environmental impacts from the project. EPA's Final Determination relies upon a body of science that was not fully developed in

2006. Since 2006, the scientific understanding of the types of effects that will occur as a result of construction of the Spruce No. 1 Mine as authorized has significantly increased and informs EPA's action. Notably, Appendix 7 of the Final Determination includes more than 100 references that were not available at the time of permit issuance. Also see Responses #152, 153, and 163.

Col. Peterson's September 30, 2009, letter pre-dates the commencement of EPA's Section 404(c) action. Nevertheless, EPA believes that a response to the conclusions outlined in Col. Peterson's letter is appropriate, especially given that the commenter cites this letter to support its claims. While EPA respects the position of Col. Peterson, it is clear that substantial new information does exist, and that available evidence supports EPA's Final Determination that the Spruce No. 1 Mine will have unacceptable adverse effects on wildlife.

The major conclusions from Col. Peterson's letter, and EPA's response, are provided below:

*(i) The permitted mine design utilized the AOC-plus and bottom-up construction techniques. These techniques, along with an approved toxic material handling plan, should ameliorate water quality impacts.*

> While valuable in reducing the permitted footprint of the Spruce No. 1 Mine to a smaller magnitude than originally proposed, even with AOC-plus techniques, the Spruce No. 1 Mine will bury more than six miles of Pigeonroost Branch and Oldhouse Branch. As outlined in Section V.C of the Final Determination, burial of these high-quality streams and their wildlife represents an unacceptable adverse effect on wildlife.
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> As outlined in Responses #14A and 188A, available evidence – including monitoring results downstream of recently constructed valley fills in West Virginia (WVDEP unpublished data 2010a) – makes clear that bottom-up fill construction and materials handling have not reduced levels of selenium or total dissolved solids below levels known to be harmful to wildlife. Also see Sections V.D.1.(a) and (b) of the Final Determination with respect to the likely water quality and wildlife effects of the Spruce No. 1 mine as authorized (including bottom-up fill construction and materials handling) with respect to selenium and total dissolved solids/conductivity, respectively.

*(ii) The USACE in its NEPA and Section 404(b)(1) Guidelines evaluation for the Spruce No.1 Mine permit application independently evaluated potential water quality impacts based upon an extensive review of various parts of the Surface Mine Application, including Section J (Probable Hydrologic Consequences, Surface Baseline Water Quality data), surface and ground water monitoring plans, Surface Water Runoff Analysis, Material Handling Plan, drainage control plan, the Cumulative Hydrologic Impact Assessment, baseline benthic and water quality data, water quality data from adjacent sites, minimization and construction techniques and concluded the Spruce No. 1 Mine will not cause or contribute to significant degradation.*

> Following EPA's review under Section 404(c), the Final Determination concludes that the Spruce No. 1 Mine will result in unacceptable adverse effects on wildlife. EPA's approximately 15-month review has included an evaluation of more than 100 new

scientific studies that were not available to support the Corps' evaluation in 2007, and which point to a conclusion that the Spruce No. 1 Mine will contribute to significant adverse effects on wildlife. To further reinforce the unacceptability of these effects, EPA has independently concluded, based on EPA's analyses and available scientific evidence, that the project will cause significant degradation of the aquatic environment, as defined at 40 C.F.R 230.10(c). See Final Determination, Section V.E.2.

*(iii) I have no expectation the disposal of fill material in waters of the U.S. at the Spruce No.1 Mine will violate any applicable State water quality standards.*

EPA's Final Determination does not allege current or future violations of West Virginia water quality standards.

*(iv) There is no compelling information that indicates the authorized mining would contribute to significant degradation of the aquatic environment [cumulative effects].*

EPA disagrees, as outlined in (ii) above. With respect to cumulative effects, Appendix 4 of the Final Determination evaluates the Spruce No. 1 Mine in the context of past, present, and reasonably foreseeable future mining projects in the Little Coal River watershed and describes the significant cumulative water quality and wildlife impacts that will occur as a result of construction of the Spruce No. 1 Mine.

*(v) The overall mitigation plan will provide a ratio of approximately 2: 1, including additional components addressing restoration and enhancement of streams and riparian zones, and use of restrictive covenants.*

With respect to mitigation ratios, see Responses #37, 39, and 251A. Also see Final Determination, Section V.E.3.; Appendix 3; and Responses #243A-304A, for a description and analyses of how the Spruce No. 1 Compensatory Mitigation Plan will not fully replace the functions of impacted resources.

*(vi) The proposed mitigation work plan was developed in accordance with the USACE mitigation guidelines, incorporates a watershed approach, and is based on ecological lift.*

EPA disagrees. As outlined in Final Determination Section V.E.3 and Appendix 3, EPA has concluded that the Compensatory Mitigation Plan for the Spruce No. 1 Mine will not replace the structure and function of impacted resources consistent with the 404(b)(1) Guidelines.

*(viii) Based on the information provided during the review of the subject project and development of the EIS, and evaluating compliance with 40 CFR 230.10, I have determined there were no other practicable alternatives that would have less impacts on the aquatic environment, the proposed discharge would not be expected to cause or contribute to violations of applicable state water quality standards or significant degradation of the environment, and all appropriate steps were taken to minimize potential adverse impacts.*

EPA disagrees. See Section V.E of the Final Determination, which concludes that the DA permit for the Spruce No. 1 Mine is inconsistent with the 404(b)(1) Guidelines in the area of alternatives analysis (230.10(a)), significant degradation (230.10(c)), and mitigation (230.10(d)). As noted in the Final Determination and in Responses to Comments, a violation of West Virginia's water quality standards is not a basis for the Final Determination.

*(viii) Further, the WVDEP has advised the District that Spruce No.1 Mine is currently in compliance with their existing authorizations for the mine.*

EPA's Section 404(c) review of the Spruce No. 1 Mine focuses exclusively upon the DA Permit issued pursuant to Section 404 of the Clean Water Act. EPA's Section 404(c) review does not extend to authorizations received by Mingo Logan for the Spruce No. 1 Mine pursuant to the Surface Mining Control and Reclamation Act, or pursuant to Sections 401 or 402 of the Clean Water Act. EPA notes that the majority of the Spruce No. 1 Mine has not yet been constructed, so the project's compliance or non-compliance with "existing authorizations" is not particularly instructive.

With respect to Col. Peterson's November 29, 2010, letter to Assistant Administrator Peter S. Silva, see Response #1C.

Comment #12A – EPA Fails To Establish That the Permitted Discharges Will Raise Selenium Levels To Cause an Unacceptable Adverse Effect on 404(c) Resources

Response #12A – See Responses #13A, 47A, and 53A.

Comment #13A – To base any action under Section 404(c) on concerns about selenium, EPA must demonstrate that the permitted discharges into Pigeonroost and Oldhouse will cause selenium levels that will have unacceptable adverse effect on a 404(c) resource. EPA has not met its burden. EPA provides no information to suggest that selenium levels in Spruce Fork will rise, that existing or likely selenium levels will cause an unacceptable adverse effect on a 404(c) resource, or that EPA's projected rise in selenium levels would be caused by the 404 discharges instead of upland areas of the Spruce No. 1 Mine.

Response #13A – As set forth in the Final Determination and in Response #29, EPA has established that construction of the Spruce No. 1 Mine as authorized will contribute additional loads of selenium to downstream receiving waters. To the extent the commenter asserts that EPA may not consider effects outside the footprint of the fill, the commenter disregards that, but for the discharge of fill material creating the valley fill, most of the effluent discharges (including those from on bench) would not exist. Accordingly, the contribution of pollutants to downstream waters through the discharge of effluent is a secondary effect of the discharge of fill material. *See* 40 C.F.R. § 230.11(h). It is appropriate for EPA to consider whether the placement of fill will have an unacceptable effect even though the mechanism may involve secondary effects of the fill.

The courts have upheld EPA determinations of unacceptable adverse effects where the adverse effects are the result of secondary effects of the fill. This occurs, for example, in the cases where the courts have upheld EPA's Section 404(c) determinations based on the flooding effects of impoundments. *See, e.g., James City County Virginia v. EPA*, 12 F.3d 1330 (4th Cir. 1993); *Alameda Water & Sanitation District v. Reilly*, 930 F. Supp. 486 (D. Colo. 1996). In those matters, the unacceptable adverse effects found by EPA were not necessarily within the footprint of the fills creating the impoundments but as a result of secondary flooding effects. Similarly, it is appropriate for EPA to consider effects to downstream waters that will be caused by discharges associated with the project. The fact that WVDEP may have authorized those discharges through the NPDES permit does not preclude EPA from considering the secondary effects.

It is also important to note that the secondary downstream effects from construction of the valley fills will arise not only from export of pollutants, but also from removal of Pigeonroost Branch and Oldhouse Branch as sources of freshwater dilution to downstream waters. The Final Determination also demonstrates that Pigeonroost Branch and Oldhouse Branch are providing freshwater dilution that moderates levels of selenium and conductivity within Spruce Fork. The loss of this dilution function also is a secondary effect of placement of the fill and is not authorized through the NPDES program. See Response #29.

Comment #14A – Selenium was carefully examined and addressed during the permitting process. Consequently, the SMCRA permit and the 402 permit impose measures to ensure compliance with the State of West Virginia's selenium criteria, and protect water uses and the aquatic ecosystem. EPA consented to these permit conditions, does not suggest that Mingo Logan has failed to comply with them, and does not demonstrate that the measures will be ineffective. Most importantly, selenium levels are appropriately low in the areas of concern to EPA, and EPA provides no information to suggest that this will change. Instead, EPA bases its entire discussion of selenium on unsupportable comparisons that ignore the measures that Mingo Logan must take to minimize selenium loading downstream.

Response #14A – With respect to EPA's actions during the permitting process, see Response #156. With respect to commenter's compliance with the permit, see Response #29. With respect to commenter's assertion that selenium levels are low in "areas of concern to EPA," current water quality data from monitoring stations identified in the NPDES permit represent baseline conditions with respect to specification of Pigeonroost Branch and Oldhouse Branch and their tributaries for discharge of fill material associated with the Spruce No. 1 Mine because the fill has not yet been discharged.

As set forth in the Final Determination and in Response #29, EPA has established that construction of the Spruce No. 1 Mine as authorized will contribute additional loads of selenium to downstream receiving waters. With respect to the commenter's assertion that comparisons to discharges from Dal-Tex are inapplicable, EPA disagrees. A comparison of the geology at the Dal-Tex complex with Spruce No. 1 demonstrates that essentially all the formations in the Dal-Tex complex that had in the past shown high Se levels and have led to environmental releases are present in the Spruce No. 1 complex. See Appendix 4 and Response #30. Consideration of discharges and water quality associated with the Dal-Tex complex also is consistent with

WVDEP guidance. See Response #22A. Moreover, EPA's consideration of discharges and water quality associated with the Dal-Tex complex is consistent with the Corps' consideration of the Dal-Tex complex as part of the Draft and Final EIS for this project. See Response #29A.

Accordingly, to the extent the commenter asserts that EPA should not consider the nearby Dal-Tex complex to predict increased selenium loads from Spruce No. 1, commenter's assertion is based solely upon the presence of a materials handling plan at Spruce No. 1 that was not implemented at Dal-Tex.

Given the scale of the project and the evidence that it will clearly expose selenium-bearing strata, it is appropriate for EPA to consider the potential for increased selenium loadings. While EPA acknowledges that the materials handling plan is intended to keep selenium bearing strata "high and dry," EPA may consider as part of its determination the likely efficacy of the materials handling plan in light of the strata that will be disturbed. The materials handling plan is not likely to prevent the project from causing increased loadings of selenium to downstream waters for the following reasons:

- The materials handling plan (MHP) does not account for potential contribution during mining from the coal itself. Coal that is mined, blasted, stored, or otherwise exposed contains the highest Se levels, as justified by available data, including data provided by the commenter's consultant. Once exposed, this coal may release Se into the receiving streams. While the mined coal ultimately will be removed from the site, the MHP does not account for the coal as a potential source of selenium discharge while present on the site and exposed.

- The MHP calls for alkaline encapsulation of materials that are acidic and/or with high concentrations of selenium. This is counterproductive given that alkaline environments increase the mobility of selenium and cause it to be more likely to leach and reach surface and ground water. Selenium naturally exists in different oxidation states including oxyanions [selenate ($SeO_4^{2-}$) and selenite ($SeO_3^{2-}$)], reduced selenium [selenide ($Se^{2-}$)] and elemental selenium [Se]. The concentration and form of selenium in soils is governed by pH, redox, and soil composition. Selenite, the most mobile of the selenium species, is the predominant form of selenium in calcareous soils such as the mine materials to be potentially exposed in valley fill areas resulting from the Spruce No. 1 Mine. Selenite, the reduced form of selenate, is highly water soluble and is known to be the most toxic to biological systems at relatively low concentrations. Research by Seby, et al, 1998 has shown that alkaline addition to spoils containing selenium can actually solubilize both humic substances and selenium. Selenate seems to be adsorbed by weak exchange mechanisms similar to sulfate (Neal & Sposito 1989). Given the depositional history and nature of formation of the rocks above and below the coal layers in West Virginia coal formations, significant concentrations of sulfates are expected in these valley-filled materials. Since sulfates are known to compete with Se oxyanions for mineral adsorption sites, this will make the Se oxyanions more available for leaching to surface and ground water ecosystems. The presence of aluminum and/or iron oxides in the solid phase may result in substantially higher selenium sorption as selenide ($Se^{2-}$) oxidizes to selenite ($Se^{4+}$) with the selenite sorbing to compounds such as FeO(OH). However, given the alkaline nature of the mine materials from the proposed Spruce No. 1 Mine, and the materials that would not be subject to MHP, specific adsorption of selenium species onto geologic (or valley-filled materials) materials is not likely to play an important role in reducing Se mobility.

- The MHP is based on three core samples for selenium that are used to identify high selenium strata from the proposed new mine. Three samples is greatly insufficient to obtain an accurate picture of selenium strata across the project site. Acid-base accounting (ABA) test data by CH2M HILL were collected from cores that are said to be representative of the entire site; however, no justification is given for the adequacy of the sample number. Standard procedures to determine the minimum number of data points (based on inherent variability) to generate statistically valid data were not followed. The variability of Se within the soil cores from DT0417, DT0727, and DT0739 shows that Se distribution demonstrates variability that undermines the adequacy of the three rock cores as sufficiently representative. This inadequacy is of further concern because there is a potential that the entire MTM interval may be enriched with selenium. Neuzil et al (2005) evaluated the argument that if a specific rock stratum in the mountaintop mining sequence is enriched in Se, then the release of Se to the environment probably could be controlled by materials handling protocols. The authors cited preliminary geochemical analyses of core sections that were collected through a joint program by the USGS, the WVGES, and WVU that indicate that the entire mountaintop mining geologic interval is enriched with Se and that coarser-grained siltstone has the highest concentrations. The authors therefore concluded that that controlling the release of Se by materials-handling protocols would be problematic. Because only few (and non-statistically significant) cores were drilled, the MHP does not account for this potential.

- The MHP does not account for selenium concentrations located further away from the coal seam. Vesper and Roy (2006) reported measurements of Se concentrations and mode of occurrence from a WV coal mine that spanned the Coalburg and Winifrede coal zones in the Kanawha Formation. The rock types with the highest total Se were carboliths, coal, and shale. The shale layers located proximate to the coal were generally higher in Se than those located further from the coals. However, while Se in the coals was primarily found in the sulfide-fraction, Se in shale that is usually removed and disposed of was primarily in the organically-bound fraction ('carbolith' or 'coal and shale'). This carbolith is not always close to the mined coal layer. The Se distribution in layers above and below the Winifrede coal is highest in the Carbolith layer that is separated from the coal by about a 5' mudstone layer. Consequently, the focus on coal seams and associated "pit cleanings" (including the carbonaceous roof, floor and parting materials) in the MHP (because these materials are expected to contain the highest concentrations of selenium in the overburden) does not account for this. To the extent the MHP calls for ripping up six inches to one foot of the floor of the bottom coal seam so that no selenium material is left to contaminate the water/rock interface, this may be insufficient in many instances to account for selenium located away from the seam. Similarly, segregating the visually dark material above and below the coal seam will not necessarily segregate all material that is > 1mg/kg or that will leach concentrations above 5 μg/L.

- There is variability horizontally as well as vertically. The MHP does not account for microscale spatial differences in Se occurrence and concentrations make it difficult (if not impossible) to predict *a priori* which drilled locations will have high Se concentrations above and below the coal beds.

- The potential for leaching of Se is not accounted for in the materials handling plan. The WVDEP suggests several leachate tests but only "….if the applicant does not want to do the materials handling plan based on the total selenium analyses…." For the MHP to properly account for leaching potential, several leaching tests should be performed to determine the upper limit of Se soil concentration with a Se leaching concentration of < 5ppb and used as the basis for which layers of rock material should be segregated. In addition, site-specific Se distribution coefficients ($K_d$) for layers above and below the coal seam as well as layers that appear to have a noticeable high organic content ("carbolith") should be determined.

Moreover, the materials handling plan to keep potential selenium-bearing material "high and dry" apparently is not being implemented with respect to all outfalls. See Response #49A.

In addition, as referenced in Response #74A, WVDEP's Valley Fill Study (WVDEP unpublished data 2010a) includes selenium concentrations from the toe of two recent valley fills (construction beginning in 2006 and 2008). These ranged from 6 to 61 µg/L Se. While WVDEP's Valley Fill Study does not indicate whether materials handling plans were implemented at these sites, these fills represent "modern" (i.e., post-2005) valley fill construction techniques, and these data are evidence that modern techniques alone will not necessarily prevent increased selenium loadings. The valley fill that discharged water measuring 61 µg/L Se was described by the inspector during construction as having "top notch fill construction."

Comment #15A – Selenium Was Addressed During the Permitting Process, and EPA Provides No New Information To Justify its Recommended Determination

Response #15A – See Responses #29, 92, 152, 156, and 168.

Comment #16A – EPA objected to the initial issuance of the Section 402 permit in 1998, but withdrew its objection upon the addition of several conditions. *See* Cmt. at 28-29. EPA objected to the modification in 2002, but again withdrew its objection after the West Virginia Department of Environmental Protection ("WVDEP") agreed to add selenium monitoring to all of the outlets (including internal outlets, referred to as "on bench structures"), and add the selenium materials handling plan as a condition of the Section 402 permit. *Id.* at 31-32; Letter from Allyn Turner, Dir., Div. of Water Resources, WVDEP, to Jon Capacasa, Acting Dir., Water Prot. Div., EPA Region III (Oct. 28, 2002), Cmt. Ex. 23. As a result, Condition 16 of the Section 402 Permit (from the modification approved June 24, 2003) specifies that a feasibility study will be conducted to identify selenium bearing strata and the locations of the drill holes for testing. EPA did not object to the modification in 2005 that created the current, smaller mine configuration, but instead consented to the existing configuration and surface water control plan. Cmt. at 32-33. WVDEP nonetheless imposed selenium limits on all outfalls from 404 discharges in Pigeonroost and Oldhouse. Cmt. § II.D. EPA had the authority under CWA Section 402(d) to halt the permitting process, but instead consented to the issuance of the permit. Cmt. at 33.

Response #16A – See Response #156.

Comment #17A – The Section 402 permit was renewed in 2004 and 2007, also without objection from EPA. Cmt. at 33

Response #17A – See Response #156.

Comment #18A – The Corps also thoroughly studied selenium in the 404 permitting process, and EPA raised concerns about selenium levels in the NEPA process, via letter of June 16, 2006. Letter from Donald Welsh, Reg'l Adm'r, EPA Region III, to Ginger Mullins, Chief, Regulatory Branch, Corps, Huntington Dist. (June 16, 2006), Cmt. Ex. 6 at 3. The Corps responded to each of EPA's concerns in the Final EIS ("FEIS"), in supplement to the Corps' own comprehensive consideration of selenium. *See* Draft EIS ("DEIS") (Mar. 2006), page v; Chapter 2, pages 2-42, 2-51, 2-63, 2-68; Chapter 3, pages 3-40, 3-50, 3-52, 3-93 through 3-94, and 3-101

Response #18A – Based on a review of the DEIS and FEIS, the comment appears to cite any page that references selenium, regardless whether the page includes analysis. For example, DEIS p. 2-42 mentions selenium only as one of a number of parameters that must be monitored pursuant to the NPDES permit. DEIS p. 3-50 references selenium as one of the impairments identified as part of WVDEP's preparation of a draft TMDL for the Coal River sub-basin, and DEIS p. 3-52 references selenium as part of an overall statement that regional water sampling indicates that water quality is within water quality standards *with the exception of* iron, aluminum and selenium. Where the Corps discusses selenium on a project-specific basis, the Corps relies upon a general description of the materials handling plan as requiring testing and placement in isolation zones of overburden having a concentration of selenium greater than 1mg/kg (e.g., DEIS p. 2-51 & 2-63, 2-68). The Corps does not analyze the potential efficacy of the materials handling plan. See Response #14A.

Comment #19A – On December 19, 2005, West Virginia issued a water quality certification to Mingo Logan pursuant to CWA § 401. Ltr. from Randy Huffman, Dir., WVDEP, to Ginger Mullins, Chief, Operations & Readiness Div., Corps, Huntington Dist. (Dec. 19, 2005), Cmt. Ex. 9. To do so, West Virginia necessarily determined that the project would not cause or contribute to a violation of the State's water quality standards, including the water quality criteria for selenium. Cmt. Ex. 9 at 2; W. VA. CODE R. §§ 47-2-8; 47-2 App. E. This 401 certification conclusively determined that the project would not violate water quality standards or the state's antidegradation policy. *See Ohio Valley Envtl. Coal v. Aracoma Coal Co.*, 556 F.3d 177, 208 (4th Cir. 2009), *cert. dismissed*, 2010 WL 3260662 (U.S. Aug. 19, 2010) (No. 09-247, R46-024) (hereinafter "*OVEC*") ("[a] § 401 certification is considered conclusive, and no independent analysis of the certification [by federal agencies] is required"). West Virginia does not expect that the 404 discharges will violate the applicable water quality criteria for selenium and EPA provides no reason to think otherwise. *See* Memorandum for Record at 7, Cmt. Ex. 5

Response #19A – See Responses #29, 33, 154, and 14A. As noted elsewhere, EPA's conclusion that the Spruce 1 mine as authorized would cause unreasonable adverse effects on wildlife is not dependent on a conclusion that West Virginia's water quality standards will be violated at or downstream of the site.

Comment #20A – The Section 402 and SMCRA Permits Require Material Handling Techniques Designed To Minimize Selenium Discharges and Set Appropriate Selenium Discharge Limits**.** Thus, unlike past practices, no materials with significant selenium content will be placed either in a water of the United States or anywhere in an excess spoil valley fill. Rather, the materials will be placed above the mine bench is areas isolated from water flows. Yet the Recommended Decision either ignores these requirements or unjustifiably assumes that Mingo Logan will not comply with them.

Response #20A – See Response #14A for a discussion of the materials handling plan. To the extent the comment states that no materials with significant selenium content will be placed in waters of the United States, EPA notes that the commenter concedes that materials with selenium content were placed in close proximity to waters of the U.S. in connection with reconfiguration of existing Pond No. 2 and construction of Ponds 1 and 1AB. See Comment & Response #49A. It is also important to note that the secondary downstream effects from placement of the valley fills will arise not only from export of pollutants, but also from removal of Pigeonroost Branch and Oldhouse Branch as sources of freshwater dilution to downstream waters. The loss of this dilution function also is a secondary effect of placement of the fill and is not authorized through the NPDES program. See also Response #29.

Comment #21A – The surface water control plan for the Spruce No. 1 Mine, to which EPA consented, also sets permit limits for Outlets 001, 002, 003, and 004, and mandates selenium monitoring at all other outlets. All of the authorized discharges from the permitted fills in Pigeonroost and Oldhouse discharge into Outlets 001, 002, and 003. EPA complains that the Section 402 permit only establishes selenium limits at some outfalls, but does not note that those permit limited outfalls are the ones that will ultimately discharge downstream of the 404 permitted fills.

Response #21A – There are 28 numbered outfalls identified by the NPDES permit for the Spruce No. 1 Mine. As the commenter notes, Outfalls 001, 002, and 003 have selenium limits and represent discharges from sediment ponds into which valley fills to be constructed in Pigeonroost Branch and Oldhouse Branch will discharge. (EPA notes that Outfall 004 also has selenium limits). The remaining outfalls, including Outfall 028 which handles discharges from Valley Fill 1A, lack selenium discharge limits. As described in Responses #30 and #14A and Appendix 4, an analysis of the geology at the project site indicates that the project site includes high selenium-bearing materials. Outfall 028, which handles discharges from Valley Fill 1A and has only monitoring and no effluent limit for selenium, has had monthly average discharges of selenium at concentrations greater than 5 μg/L. See Responses #29 and 47A.

To the extent the commenter asserts that the NPDES effluent limitations on Outfalls 001,002, and 003 foreclose EPA's consideration of increased selenium loadings from those outfalls, EPA disagrees. First, given the very low in-stream selenium concentrations of Pigenroost Branch and Oldhouse Branch currently (see Response #29), even if discharges were to remain below the effluent limitations, such discharges would represent increased loadings of selenium to downstream waters. In addition to these increased loadings, construction of the project in Pigeonroost Branch and Oldhouse Branch would remove both streams as sources of dilution that moderate already elevated concentrations of selenium in downstream waters (see Response #29). Moreover, the fact that there are effluent limitations does not mean those limitations will be achieved. To achieve the effluent limitations, the permittee relies almost exclusively on its materials handling plan. As noted in Response #14A, it is unlikely that the materials handling plan will succeed in completely isolating selenium-bearing strata or preventing elevated selenium concentrations.

Moreover, it is apparently from other comments (See Comment and Response #44A & #49A) that the materials handling plan and/or other efforts to prevent selenium from reaching receiving streams are not implemented throughout the Site. To the extent the commenter asserts that, as part of this section 404(c) action, EPA may consider only the discharges from the fills and may not consider discharges from on-bench, the commenter disregards the fact that, as currently authorized, but for the construction of the fills the on-bench discharges would not occur. Accordingly, it is appropriate for EPA to consider these discharges when considering the effects of the specification of Pigeonroost Branch and Oldhouse Branch as disposal sites for the construction of valley fills. See Response #13A.

In addition, the commenter disregards the fact that the permittee is seeking mitigation credit for some on-bench discharges as connectivity channels. For that reason, it is also appropriate for EPA to consider the concentrations in and effect of those discharges.

Comment #22A – EPA also seems to misunderstand the creation and function of surface water control plans. For a number of reasons, it is the dominant practice for some outfalls to have limits, and some to have only monitoring.

Response #22A – See Responses #14A and 21A. EPA notes that the commenter does not describe the basis perceived by the commenter for distinguishing outfalls that should have limits from those that require only monitoring, beyond the fact that the permit-limited outfalls address discharges from the 404-permitted fills. NPDES regulations state clearly that effluent limitations must be established for discharges that have a reasonable potential to cause or contribute to any excursion from an applicable water quality standard. 40 C.F.R. § 122.44(d)(1). According to WVDEP's Selenium Implementation Guidance (WVDEP 2007) – which was issued in November 2007 and therefore was issued after the most recent NPDES permit and after IBR 2 – reasonable potential is established if any of the four following conditions is present:

- The proposed mining is in the Winifrede to Upper No.5 Block coal seam interval. (Seam nomenclature as defined by the West Virginia Geologic and Economic Survey), or;
- Site-specific or adjacent water quality data (associated with mining in the same geologic strata) shows concentrations equal to or more than 5 μg/L. This water data may include, but is not limited to, application water quality data (e.g. PHC, anti-degradation BWQ sampling), effluent data from adjacent mining operations (e.g. NPDES Table 2 IV C analysis) and instream monitoring data from DEP Trend Stations, DMRs, and DEP Stream Assessments, or;

- This provision is met if the receiving stream for a proposed discharge is listed on the operable Section 303(d) List for use impairment related to selenium, or;
- There is an approved selenium Total Maximum Daily Load for the receiving stream or downstream waters that mandates regulation of selenium in the discharges from the activity.

The first two bullets are satisfied with respect to the Spruce No. 1 Mine.

Comment #23A – All Available Data Suggests That the Fish Assemblage in Spruce Fork Is Healthy, and Selenium Levels Are Low

Response #23A – See Responses #94, 24A, and 204A.

Comment #24A – EPA's primary concern related to selenium is the fish population downstream of Spruce No. 1 Mine in Spruce Fork. But EPA acknowledges that the fish population in downstream Spruce Fork is "in relatively good condition" and has remained virtually unchanged for the past 60 years despite decades of surface and underground mining upstream and downstream of the Spruce No. 1 Mine. RD at 31, 32, 60. EPA does not present any data for selenium bioaccumulation in fish from Spruce Fork. As a result, the only relevant data points are the selenium levels in Spruce Fork, and the selenium levels in the discharges from the Spruce No. 1 Mine into Spruce Fork. Neither of these supports any concern about selenium.

Response #24A – See Responses #5, 92, 94, and 204A. While EPA acknowledges the relatively good condition of the Spruce Fork fish assemblage, EPA notes that commenters have selectively quoted from this section of the Recommended Determination. The Recommended Determination notes shortly after the quoted statement on page 32 that Spruce Fork fish assemblages "are not representative of pristine conditions and it is likely that some of the more sensitive species have been historically extirpated from past anthropogenic activities, including mining."

EPA disagrees that "the *only* relevant data points" are selenium levels in Spruce Fork and discharges from Spruce No. 1 into Spruce Fork. However EPA believes that even these two "data points" support EPA's conclusion when characterized properly. EPA also believes additional available information on the effects of selenium on fish in West Virginia is also relevant.

First, with respect to "selenium levels in the discharges from the Spruce No. 1 Mine," as noted in Response #47A, Discharge Monitoring Reports (DMRs) generated from at least one outfall downstream of the Spruce No. 1 mine in Seng Camp Creek have demonstrated repeated monthly average selenium levels that exceed 5 μg/L. According to a submission from the commenter, selenium levels downstream of the Spruce No. 1 have been measured as high as 14.8 μg/L in August 2010, or nearly three times the level recognized by EPA and West Virginia to be harmful to aquatic life. As laid out in Response #29A below, EPA believes that the similarity among rock strata between these activities and other permitted activities at the Spruce No. 1 mine demonstrates a likelihood that mining activities in or near Pigeonroost Branch and Oldhouse Branch are likely to result in correspondingly elevated downstream concentrations of selenium.

Loss of dilution from Pigeonroost Branch and Oldhouse Branch will further increase downstream concentrations of selenium.  See Response #29.

Second, with respect to "selenium levels in Spruce Fork," EPA notes that the proper point of comparison for assessing future impacts is the predicted downstream selenium levels *after* construction of the Spruce No. 1 mine, not baseline levels *before* the majority of the project is constructed.  (See related Response #224A with respect to a similar commenter confusion regarding conductivity.)  As noted above, EPA believes that strong evidence exists to suggest that selenium will rise directly downstream of discharges of fill material into Pigeonroost Branch and Oldhouse Branch, producing elevated levels of selenium comparable to those measured downstream of the adjacent Dal-Tex mining operation and downstream of Spruce No. 1 mining activities in Seng Camp Creek.  These elevated selenium levels in these tributaries combined with loss of dilution will result in increased levels of selenium in Spruce Fork.

In the absence of direct water column-fish tissue correlations measured in Spruce Fork, EPA's concerns with bioaccumulation are justified by WVDEP studies documenting fish health problems as a result of high selenium levels in West Virginia streams and lakes.  As recently as January 2010, WVDEP concluded:  "Larval deformity rates were variable throughout the study duration but were nonetheless associated with waterborne selenium exposure." (WVDEP 2010a).  A second WVDEP study (February 2009) documents that numerous streams and lakes in West Virginia have elevated selenium in receiving streams and that fish are accumulating the selenium in their tissues (WVDEP 2009a).  While samples were not collected from the mainstem of Spruce Fork, this study did sample in adjacent watersheds, such as Beech Creek, which drains part of the Dal-Tex complex. Levels of selenium are sufficiently high that a TMDL for selenium was developed for Beech Creek.  In the WVDEP study on selenium bioconcentration factors, selenium was also found in fish tissue in Beech Creek (average 7.55 mg/kg).

See Response #67A.

Comment #25A – The selenium permit limitations for Outlets 001, 002, 003, and 004 is 4.7 chronic, and 8.2 acute. *See* CH2M HILL, "Technical Evaluation Document Spruce No. 1 Mine, West Virginia" (June 2010), Cmt. App. at 27, Table 1 (hereinafter "TED"); Section 402 Permit No. WV1017021, Cmt. Ex. 12

Response #25A – The comment summarizes effluent limitations in the NPDES permit.  The comment is noted.

Comment #26A – Outlet 004 is a vestige of the previous mine plan, to which EPA also consented, which had authorized discharges into White Oak Branch.

Response #26A – The comment is noted.  To the extent the comment refers to EPA's "consent," see Response #152.

Comment #27A – Spruce No. 1 Mine's combined impact on Spruce Fork, along with the Spruce Fork watershed upgradient of the mine, can be measured at the point on Spruce Fork just downstream of the three receiving waters. Selenium levels at this point have varied between 0.3

μg/L and 2.45 μg/L, and none of the values exceeded 2.9 μg/L.18 *Id*. Moreover, not only do the most relevant sampling points demonstrate no cause for concern, the selenium levels related to the Spruce No. 1 Mine have been going down (instead of rising, as EPA contends). RD at 39 n.10, 40, 45. From January 2007 to December 2008, levels have averaged 1.99 μg/L, but since December 2008, the average has been 1.36 μg/L.

Response #27A – The data provided by the commenter does not represent the "Spruce No. 1 Mine's combined impact on Spruce Fork" because the discharges of fill material to Pigeonroost Branch and Oldhouse Branch, additional discharges to Seng Camp Creek, and the other associated discharges have not occurred. The data provided in the comment represents a baseline. EPA notes that construction of valley fills in Pigeonroost Branch and Oldhouse Branch as authorized by the DA permit will increase the baseline load in two ways, both by exporting selenium and by removing Pigeonroost Branch and Oldhouse Branch as sources of dilution. See Responses #29 and 30.

Comment #28A – EPA's Comparison to Dal-Tex and Other Older Mining Sites Is Unjustifiable. EPA relies on comparisons between the Spruce No. 1 Mine and the Dal-Tex Complex to show that selenium levels in Spruce Fork will rise. But differences in mining practices, the extent and manner of coal seam mining, and material handling techniques at the two mine sites render such comparison technically inappropriate.19 *See* Cmt. at 113-14; TED2 § 3.1.2. Inexplicably, EPA dismisses Mingo Logan's materials handling plan out of hand, with no supporting data, and does not consider that the comparison sites were all mined without materials handling techniques (or any attempt to control selenium).

Response #28A – See Responses #29, 30, and 14A.

Comment #29A – At the outset of its section on adverse impacts, EPA erroneously argues that "impacts from the Mingo Logan Dal-Tex operation are likely to be a good predictor of impacts [to water quality and aquatic life health] from the Spruce No. 1 Mine." RD at 37. To support this statement, EPA wrongly claims that the Corps agrees, and quotes from the Corps' DEIS section on "Mineral Resources": "[t]he past and present impacts to **topography**, **geology**, and **mineral resources** of the previous mining along the western side of Spruce Fork are similar to the anticipated impacts of the Spruce No. 1 Mine, as mining is to occur in the same strata." *Id.* (emphasis added). EPA misrepresents that the Corps' statement about the rock and coal to be extracted is an "acknowledge[ment] by the Huntington District Corps of Engineers" that the Corps agrees with EPA's claims regarding comparative impacts to water quality, aquatic life health, and the ecosystem generally. *Id*. Obviously, the Corps said nothing of the sort. *See* DEIS at 3-15. In fact, the Corps wrote in the DEIS that "[o]verall, it would be anticipated that the Spruce No. 1 Mine would only contribute minimally to cumulative impacts on surface water quality." DEIS at v. That EPA begins its presentation of adverse impacts with such a blatant misrepresentation foreshadows the lack of technical rigor in the remainder of the Recommended Determination. EPA actually repeats its reference to this misleading statement at the beginning of its section on macroinvertebrates. *See* RD at 51. Without any analysis or supporting data, EPA uses this deliberate misstatement as the sole basis for its comparison to the Dal-Tex Complex.

Response #29A – The Corps' Final EIS repeatedly looks to the Dal-Tex Complex to predict impacts from the Spruce No. 1 Mine. Accordingly, EPA's approach is consistent with that taken by the Corps. The following are examples, but not the universe, of references to the Dal-Tex Complex in the DEIS and FEIS:

- "The mining techniques for the Spruce No. 1 Mine would be similar to those previously used at the Dal-Tex Complex. The Dal-Tex Complex, located on the west side of Spruce Fork, and the Spruce No. 1 Mine site have similar geologic and hydrologic conditions. In addition, the available groundwater data for the existing Dal-Tex complex provides insight into the existing conditions and the potential groundwater impacts that may occur as a result of development of the Spruce No. 1 Mine." (DEIS p. 3-23)
- "Due to the proximity of the Dal-Tex Complex and the proposed Spruce No. 1 Mine project (on either side of Spruce Fork), the groundwater levels in the Spruce Fork aquifer within the Dal-Tex Complex are assumed to be the same for the Spruce No. 1 Mine project area." (DEIS p. 3-29)
- In describing the basic construction, operation, and reclamation activities, the Corps noted: "This is the same process that has occurred at the adjacent Dal-Tex Complex for over twenty (20) years. The primary operational difference between the proposed Spruce No. 1 Mine and the Dal-Tex Complex, aside from the location, is that the proposed project would conduct mountaintop mining via shovel, loaders, and trucks as opposed to the dragline operations at the Dal-Tex Complex." (FEIS p. ii)

EPA's comparisons are valid because both mines will be extracting materials from similar geologic formations. Again, in the absence of the extracted materials in question, comparisons can only be made using information from existing formations next to the formations in question. The permit proponent has not convinced EPA that the natural background concentrations at Spruce No. 1 will be different from those at the adjacent Dal-Tex formation (especially subsurface layers), particularly in light of the significant geographic similarity as presented in Appendix 4. The data indicate that for the most part, the formations are repeated from the Dal-Tex mine complex to the proposed Spruce No. 1 Mine location. Indeed, as stated by the permittee, the same coal beds are proposed to be developed for the Spruce No. 1 mine as for the Dal-Tex complex. Also, these coal bed sequences are similar to those described in the literature for southern WV coal bed sequences (Appendix 4, Figure A.4.1) and the geologic column for the proposed Spruce No. 1 mine (Appendix 4, Figure A.4.2). Essentially, all the formations in the Dal-Tex complex that had in the past showed high Se levels and have led to environmental releases are present at the Spruce No. 1 Mine. EPA is therefore on sound technical footing to use existing data from the Dal-Tex complex as a basis to predict what may happen when mining occurs at Spruce No. 1. With respect to the commenter's claims regarding materials handling, see Response #14A.

Comment #30A – The data from Outlet 15 (shown in Figure 10, RD at 43) are not relevant for comparison to potential discharges from the Spruce No. 1 Mine. Outlet 15 at the Dal-Tex Complex is the discharge from an abandoned underground mine in the Coalburg seam that is discharged to an entirely different watershed (Pine Fork, a tributary in the Guyandotte River system). The discharge is not the result of a surface mine or valley fill and does not represent anything similar to what may result from valley fill from the Spruce No. 1 Mine. TED2 § 3.1.2.

Response #30A – EPA disagrees. Outlet 15 is associated with NPDES Permit # WV1004956, which has two SMCRA Permit Numbers associated with it: U-508886 and S-505286. The footprint of S-505286, which is a surface mine, is large compared to the small footprint of U-508886, which is an underground mine. Outlet 15 may discharge into a different watershed (i.e. Pine fork, a tributary in the Guyandotte River system); however, it still documents that the proposed coal seams (e.g. Coalburg) that are proposed to be mined at the Spruce No. 1 Mine Complex, and are also mined at the adjacent underground mine, produce elevated selenium water quality problems in the receiving streams (i.e. Pine Fork). A review of the mine maps support the statement that a valley fill is not associated with Outfall 15; however, bench drainage structures appear to be associated with Outfall 15 and contribute to the flow from Outfall 15.

Comment #31A – The Dal-Tex Complex and the Spruce No. 1 Mine Are Not Geographically Comparable. EPA misleadingly suggests that the Spruce No. 1 Mine is geographically comparable to the Dal-Tex Complex. *See* RD at 10.21 In fact, the Dal-Tex Complex is nearly three times larger than the Spruce No. 1 Mine. The Dal-Tex Complex encompasses approximately 6,630 acres and includes 11 surface mining permits, 9 underground mining permits, and 11 surface ancillary facilities permits. DEIS § 1.1.2. In contrast, the permit area for Spruce No. 1 Mine consists of 2,278 acres, or 34 percent of the area of the Dal-Tex Complex. The significantly larger watershed of the Dal-Tex Complex renders inappropriate EPA's reliance on Dal-Tex data to predict water quality impacts from the Spruce No. 1 Mine. Moreover, the coal seams at the Spruce No. 1 mine will be mined in a significantly different manner, rendering the comparison to Dal-Tex even less justifiable. TED2 § 3.1.2.

Response 31A – As noted in Responses #29 and 14A and Appendix 4, a comparison of the geology at the Dal-Tex complex with Spruce No. 1 demonstrates that essentially all the formations in the Dal-Tex complex that have been shown to have high levels of selenium and have led to environmental releases also present on the Spruce No. 1 project site. Moreover, EPA notes that a significant factor is the percent of the watershed that is impacted by mining activity. The Spruce No. 1 project is of sufficient scale to adversely impact the remainder of Pigeonroost Branch and Oldhouse Branch. Moreover, as noted in Response #29A, the Corps looked to the Dal-Tex Complex to predict impacts from the Spruce No. 1 Mine, including water quality impacts (apparently without objection from the permittee). Accordingly, it is appropriate for EPA to do the same.

Comment #32A – To sensationalize this overstatement, EPA includes an absurd overlay of the project boundaries on downtown Pittsburgh, Pennsylvania. *See* RD at 11. As can be seen in Exhibit 3, which portrays the project boundaries over the actual city limits, EPA has grossly misrepresented the size of Pittsburgh to the benefit of its inflammatory superimposition.

Response #32A – The figure was provided to give a sense of scale. Nevertheless, while the text both above and below the figure make it clear that the figure depicts the downtown portion of Pittsburgh, the caption did not do so. The Final Determination has removed the caption.

Comment #33A – A simple back of the envelope calculation suggests that if the Spruce No. 1 Mine is 1/3 the size of the Dal-Tex Complex, it should be expected to have 1/3 of the water quality impacts. And that does not account for the materials handling plan, the site management plan, and the fact that selenium levels from Dal-Tex are coming from the entire mine, not just the authorized discharges. Yet, EPA proposes to compare the Dal-Tex Complex to the Spruce No. 1 Mine on a 1:1 ratio, ignoring important materials handling differences, and assuming, without any support, that all selenium comes from the authorized fills.

Response #33A – See Response #31A. EPA's analysis does not use a 1:1 ratio. EPA considers the effects from the Dal-Tex complex as predictive of the types of effects that the Spruce No. 1 Mine will have. This consideration is appropriate given the close proximity, similarity of geology, and similarity of technique between the Dal-Tex complex and the Spruce No.1 Mine as authorized. It is also consistent with WVDEP guidance that effluent data from adjacent mines may be considered (see Response #22A) and with consideration of the Dal-Tex complex by the Corps in the DEIS and FEIS for the Spruce No. 1 Mine (see Response #29A). To the extent the comment asserts that the materials handling plan undermines this comparison, see Response #14A. The "back of the envelope" calculation posited by the commenter has no relevance. Whether a discharge has the potential to increase downstream levels of pollution to levels associated with water quality concerns or wildlife impacts depends on several factors including concentration and flow. The commenter's "back of the envelope" calculation includes an implicit assumption that the contribution, in terms of volume of flow, may be greater from the Dal-Tex Complex. Volume and rate of flow depend upon a variety of factors. The commenter has not provided data (other area) to support its implicit assumption. Taking the commenter's assumption as correct, solely for the purposes of this response, as noted by the Corps in its DEIS and FEIS, the Dal-Tex Complex and Spruce No. 1 Mine share similarity of mining technique, geology, and hydrology. Accordingly, it is appropriate to consider the impacts from the Dal-Tex Complex.

Comment #34A – Additionally, as Mingo Logan noted in its earlier comments, while the boundaries of its surface mining permit represent one of the larger individual surface mining permits issued by WVDEP, the boundaries of the mining complex are nowhere near as large as many others in the State. At those other operations, smaller individual and adjacent surface mining and Corps' permits reveal much larger overall mining operations. Cmt. at 161.

Response #34A – EPA agrees that permits have authorized mining operations to expand or to be constructed adjacent to other operations under separate names and/or permit numbers. EPA agrees this has resulted in some instances of contiguous land areas subject to surface mining operations that would be larger than the Spruce No. 1 Mine individually. To the extent the commenter suggests that regulatory authorities, including EPA, need to do a better job considering the cumulative impacts from the incremental expansion of operations or from contiguous mining operations, EPA agrees. With respect to Spruce No. 1, the Final Determination (as well as the Proposed Determination and the Recommended Determination) refers to the project as "one of" the largest mountaintop mining operations ever authorized in West Virginia.

Comment #35A – Historical Mining at Dal-Tex, Lacking the Benefits of Modern Mining Techniques, Greatly Influences Downstream Impacts. As such, the Dal-Tex Mine site has multiple and significantly different source areas that provide selenium loading to the watershed than those of the Spruce No. 1 Mine.

Response #35A – See Responses #14A and 29A.

Comment #36A – In addition to its erroneous comparison to the Dal-Tex Complex, EPA attempts to compare the Spruce No. 1 Mine to other (frequently unspecified) "similar projects." *See, e.g.*, RD at 36. As with the comparisons to the Dal-Tex Complex, these comparisons are nullified by geological differences, historical mining practices, and material handling practices. Thus, EPA's comparison of rock cores to Gut Fork Mine ignores the fact that selenium mobilization is expected to be different because of differences in waste handling procedures between the two mines. RD at 37. A marked difference in selenium handling also sharply distinguishes EPA's attempted comparisons to other Mingo Logan mines. RD at 45 n.13. EPA also argues that selenium criterion exceedances at other creeks in the Coal River Sub-basin with similar geology "support a prediction that construction of the Spruce No. 1 Mine as currently authorized will result in elevated levels of selenium in downstream waters." *Id.* at 39 n.10. As with the other comparisons, this is not relevant to the Spruce No. 1 Mine unless EPA can provide evidence that material handling practices used at source areas in those watersheds were similar to those used for the Spruce No. 1 Mine. The Recommended Determination provides no such information.

Response #36A – See Responses #14A and 21A.

Comment #37A – EPA Ignores Information Provided by Mingo Logan and Provides No Information To Suggest That the Authorized Fills Will Cause Selenium Levels To Rise

Response #37A – See Responses #29, 31, and 92.

Comment #38A – EPA vainly attempts to discount the extensive consideration that was given to selenium in the permitting process, discredit the comprehensive surface management plan, and postulate selenium concerns where none exist. Each of EPA's arguments ignores crucial information. Importantly, EPA provides no reason to doubt that the comprehensive surface management plan will work to effectively limit selenium discharges downstream. Even if EPA were not bound by West Virginia's conclusive Section 401 certification, EPA presents no reason to doubt West Virginia's conclusions.

Response #38A – See Responses #29, 31, 92, 154, and 14A.

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**Introductory Response to Comments 39A-44A:**

Comments 39A-44A raise very specific questions regarding West Virginia's Water Quality Standard for Selenium. In particular, the comments raise questions about how to properly evaluate compliance with the Selenium Water Quality Standard. While EPA has chosen to provide explanations in response to these comments below, EPA's action does not rely on a conclusion that the proposed discharges will violate Water Quality Standards. Rather, EPA has evaluated the expected impact of the proposed discharges on water quality. Discussions of the specific Standards provide information and context, but do not form the basis of the Final Determination. As EPA has stated clearly in other Responses:

> While the Final Determination refers to some of West Virginia's numeric and narrative water quality criteria, the Final Determination is based upon a finding of unacceptable adverse effects to wildlife. This determination is qualitatively different than and is not dependent upon a measure of compliance with water quality standards. To be clear, EPA's conclusion that the Spruce 1 mine as authorized would cause unreasonable adverse effects on wildlife is not dependent on a conclusion that West Virginia's water quality standards will be violated at or downstream of the site.

Response #33. EPA has not repeated this discussion in each of the responses below, but hereby incorporates it into those responses.

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Comment #39A – EPA Has Not Shown a Violation of the Applicable Selenium Criteria at the Spruce No. 1 Mine. The Recommended Determination claims that certain outlets at the Spruce No. 1 Mine have violated chronic water quality standards for selenium, and that therefore future violations are expected. RD at 46-47. But the data EPA supplies do not support this assertion. Instead, EPA's argument manifests a fundamental misunderstanding of water quality standards.

Response #39A – The comment appears to refer to the sentence in the Recommended Determination summarizing Region III's discussion of selenium:

> *"In summary, water quality from streams and discharges draining both the Dal-Tex Mine Complex and the current operational portions of the Spruce No. 1 Mine confirm EPA's concern that the Spruce No. 1 project would be likely to discharge levels of selenium exceeding the WV chronic water quality criterion for selenium (greater than 5 µg/l) downstream of the filled streams and in Spruce Fork."*

To the extent the commenter points out that this sentence refers to water quality standards as something other than an instream condition, EPA agrees. The language in the Final Determination has been revised as follows:

> *"In summary, water quality from streams and discharges draining both the Dal-Tex Mine Complex and the current operational portions of the Spruce No. 1 Mine confirm EPA's concern that the Spruce No. 1 Mine, if constructed as authorized, would contribute additional loads of selenium to downstream waters at concentrations that, as a monthly average, will exceed 5 µg/L."*

See also Response #33.

Comment #40A – As with the Proposed Determination, it appears that EPA is claiming authority over water quality through the Corps' exclusive authority to apply the 404(b)(1) guidelines. EPA begins its section on water chemistry by stating, in part, that "[t]he Section 404(b)(1) Guidelines direct that no permit should issue if the discharge will cause or contribute to violations of applicable water quality standards . . ." RD at 38. However, Section 404 of the CWA dictates that it is the Corps, and not EPA, that has the authority to enforce the 404(b)(1) guidelines. 33 U.S.C. § 1344(b)(1); *see* Cmt. at 69.

Response #40A – See Responses #33, 154, 158, and 163.

Comment #41A – EPA's argument misrepresents and conflates acute and chronic water quality criteria. EPA states that "[a] technical review of the submitted 16 monthly [Discharge Monitoring Report ("DMR")] records for the Spruce No. 1 Outlet 028 document the maximum values exceeded the chronic selenium water quality criteria of 5 µg/L on six occasions . . ." *Id.* at 44.26 Yet EPA relies on just one or two measurements of selenium levels each month. *See* RD Table 4 at 46; RD Fig. 12 at 45 [The column in Table 4 that EPA labels as the "Sample Date" is actually the "report date." RD at 46. The samples were taken on different days, and this error explains why the chart reflects more than one sample per month, but only one sample day each month. It also explains why every sample date conveniently fell on the last day of each month]. The West Virginia chronic criterion, however, is not intended to measure individual samples. To measure a single instance, the appropriate metric is the acute criterion of 20 µg/L, which is a "[o]ne hour average concentration not to be exceeded more than once every three years on the average, unless otherwise noted." W.VA. CODE R. 47-2-8 (App. E, Table 1 Parameter 8-27). EPA points to not even a single instance of a violation of the acute criterion at either Outfall 028 or Outfall 017. Moreover, even if EPA could show selenium above 20 µg/L at either of these outlets, data from neither outlet is useful to predict any selenium exceedance from the permitted discharges, as explained below.28 TED2 § 3.1.3.

Response #41A – The column labeled "Sample Date" in Table 9 of the Final Determination has been revised to "Report Date." The remainder of the comment misinterprets Table 4 and the related discussion. Table 4 and Figure 12 (Figure 13 in the Final Determination) both reflect a maximum value, a minimum value, and an average value for each month. Accordingly, both Table 4 and Figure 12 reflect two samples per month. The average of those two samples reflects the monthly average and is considered to reflect the entire month. Accordingly, it is reasonable to compare the average monthly value to both the acute and chronic criteria. Additionally, per EPA's Technical Support Document for Water Quality-based Toxics Control (EPA/505/2-90-001) (March 1991), it is appropriate to translate the numeric water quality criteria to include a permit limit of 5 µg/L expressed as a monthly average, in addition to a daily maximum limit, particularly where the receiving stream at the toe of the sediment pond would become effluent dominated and have no assimilative capacity. For Outfall 028, the average monthly limit exceeded 5 µg/L multiple times (See Response #47A), and thus would be likely to contribute to 4-day average exceedances. See also Response #33.

Comment #42A – The West Virginia chronic criterion, which EPA misleadingly represents as 5 µg/L per sampling event, is actually a "[f]our-day average concentration not to be exceeded more than once every three years on the average, unless otherwise noted." W.VA. CODE R. 47-2-8 (App. E, Table 1, Parameter 8.27). As a result, EPA presents no data in the Recommended Determination or appendices that shows or suggests that outlet 028 has ever exceeded the chronic selenium water quality criterion.29 TED2 § 3.1.3.

Response #42A – See Response # 41A. EPA's conclusion that the Spruce 1 mine as authorized would cause unreasonable adverse effects on wildlife is not dependent on a conclusion that West Virginia's water quality standards will be violated at or downstream of the site.

The description in the Recommended Determination assumed that the reader understands that a chronic numeric criterion means a four-day average concentration not to be exceeded more than once every three years. The text of the Final Determination has been revised to incorporate the full definition of a chronic numeric criterion.

EPA disagrees with the commenter's suggestion that available data are not consistent with the four-day average concentration aspect of the chronic criterion. See Responses #33 and 41A.

Comment #43A – EPA published guidance in 1987 that suggested states should adopt the 5 parts per billion ("ppb") (chronic) and 20 ppb (acute) standards. *See* "Ambient Water Quality Criteria for Selenium-1987" (EPA 440/5-87-008) (cited at 65 Fed. Reg. 35,283, 35,284 (June 2, 2000)). EPA did not itself issue a rule requiring use of these standards until 1995, when it issued them as part of its "Revocation of the Selenium Criterion Maximum Concentration for the Final Water Quality Guidance for the Great Lakes System." *See* 65 Fed. Reg. at 35,283. EPA was sued over that rulemaking. One part of that lawsuit involved a challenge to EPA's acute selenium criterion to protect aquatic life. *See Am. Inst. of Iron & Steel v. EPA*, 115 F.3d 979 ("AISI"), 1003 n.7 (D.C. Cir. 1997); 65 Fed. Reg. at 35,283. The challenge included claims that: " inorganic selenium has two oxidation states, selenite and selenate, that have different toxicities to aquatic life, and that EPA erred by promulgating a single acute criterion that failed to properly account for the two oxidation states." 65 Fed. Reg. at 35,284. Faced with this challenge, EPA agreed that it should propose a new approach after soliciting public comments. *Id.* Accordingly, EPA moved to remand the acute criterion to allow EPA to propose additions. *Id.* The Circuit Court then issued an order vacating the acute selenium standard after noting that "[t]he regulations are seriously deficient." *AISI v. EPA*, No. 95-1348 (D.C. Cir. Sep. 19, 1996 Order).

Response #43A – Responses #29 and 92 and Appendix 4 describe how EPA considered the two oxidation states for purposes of the Final Determination. The remainder of the comment discusses the history of EPA's acute water quality criterion for selenium. EPA notes that, to the extent an acute water quality criterion is applicable, it would be West Virginia's approved water quality criterion. EPA notes that its discussion of the water quality criteria in the Final Determination refers primarily to the chronic, not acute, water quality criterion and therefore this comment has little relevance to the Final Determination. For informational purposes, EPA's current national recommended water quality criteria are presented online at http://www.epa.gov/waterscience/criteria/wqctable/ such that the acute criterion takes into account the fractions of total selenium that are treated as selenite and selenate, respectively, with corresponding acute criteria of 185.9 mg/l and 12.82 mg/l, respectively. See also Response #33.

Comment #44A – EPA also contends that "[s]elenium concentration in excess of the chronic criterion were also reported from Outlet 017." RD at 45. On September 3, 2009, Outlet 017 recorded a discharge with a selenium concentration of 19.20 μg/L. But this reading is below the acute selenium criterion of 20 μg/L, which is the only criterion that is appropriate in this context (017 does not have a separate permit limit). Moreover, the selenium levels at Outlet 017 could not come from discharges authorized under the 404 permit that EPA is seeking to revoke. Outlet 017 does not discharge from a valley fill, but from an active mine site into Pigeonroost Branch. EPA has no authority under Section 404(c) to review upland impacts. Upon investigation, it appears that the source of this discharge was impounded water that had been pumped out of a previously mined pit of Upper Stockton coal. TED2 § 3.1.3. This pit was left unreclaimed to provide temporary sediment control, but ultimately had to be dewatered to continue active mining. A water pump was setup in late August 2009 and the pit water was pumped into a sediment ditch that contributed to Outlet 017. The impounded water in these pits is a temporary condition that is being eliminated as mining proceeds.

Response #44A – The concentration of selenium from Outfall 017 is relevant because it confirms that mining activity on the Spruce No. 1 Mine involves selenium-bearing strata and that, uncontrolled, discharges will contain high concentrations of selenium. Further, in numerous comments, the commenter asserts that EPA must assume that the materials handling plan as implemented by the permittee will prevent the Spruce No. 1 Mine from contributing increased loads of selenium to receiving waters. The comment demonstrates that, even if implemented effectively (see Response #14A), the materials handling plan does not represent an effort to control selenium across the entire project and will not effectively control selenium at all outfalls. The representation by the commenter that the permittee is pumping (or allowing the pumping of) water with high concentrations of selenium through NPDES-permitted outfalls and apparently is prepared to continue to do so is evidence that the permittee will not address discharges with elevated concentrations of selenium outside its materials handling plan and in the absence of permit limits applicable to the outfall.

Comment #45A – EPA Fails To Demonstrate That the Discharges Authorized in the 404 Permit Caused the Above-Background Selenium Levels

Response #45A – See Responses #29, 30, 31, and 92.

Comment #46A – EPA's reliance on selenium discharges from Outlet 028 is misplaced. Outlet 028 is a vestige of a previous mining operation and was included on a previous Section 402 permit. As such, it does not reflect modern mining and material handling techniques. Moreover, the selenium levels noted by EPA do not appear to have originated in the existing 404 fill in Seng Camp Creek. Thus, Outlet 028 does not reflect likely selenium discharges from the authorized fills in Pigeonroost and Oldhouse.

Response #46A – See Responses #47A and 49A.

Comment #47A – Available Data Shows That the Elevated Selenium Loading Does Not Originate in the Existing Fill in Seng Camp Creek. In August 2010, Mingo Logan initiated an investigation to determine the source of elevated selenium concentrations at Outlet 028. Mingo Logan retained Sturm Environmental Services to collect and analyze water samples from designated locations within the Right Fork of Seng Camp Creek in order to isolate the potential sources of selenium found in the discharge from Outlet 028. Sturm collected samples on August 20, 2010, September 24, 2010, and October 8, 2010. TED2 § 3.1.3. On none of these occasions did Sturm find measurable flow from Valley Fill 1A, the lone discharge in Seng Camp that is authorized by the 404 permit at issue. Instead, the flow originated in the material placed in the 1990s, as well as sections of the treatment system that are beyond the scope of the CWA. Thus, the 404 discharges that Mingo Logan has undertaken in Seng Camp do not appear to have contributed any selenium whatsoever to Outlet 028.

Response #47A – The commenter's conclusion that discharges from Valley Fill 1A did not contribute to the elevated concentrations of selenium from Outfall 028 as outlined in the Recommended Determination is apparently based upon the permittee's contractor finding no measurable flow from Valley Fill 1A on the three dates identified in the comment.  EPA disagrees that lack of flow from Valley Fill 1A on those dates establishes that discharges from Valley Fill 1A did not contribute to the concentration of selenium from Outfall 028 on entirely different dates.  Moreover, this part of West Virginia was categorized as "Abnormally Dry" by the U.S. Drought Monitor from late September through November 2010 (http://www.drought.unl.edu/dm/), which means that for two of the three sampling events, low or no flow would be expected.  EPA also notes that the contractor apparently did not determine or account for any interstitial flow that commonly occurs with the use of sediment control structures at the locations identified on the map for Valley Fill 1A. The commenter has not provided any sample from the outfall of the pond on August 20, 2010, September 24, 2010, and October 8, 2010; accordingly, EPA is unable to determine whether the concentration at the outfall was consistent with the concentration from flow originating in the material placed in the 1990s and other sections of the treatment system that the commenter describes as beyond the scope of the CWA.

Regardless, even accepting solely for purposes of this response the commenter's premise, concentration of selenium from Outfall 028 is relevant because it confirms that mining activity on the Spruce No. 1 Mine involves selenium-bearing strata and that, uncontrolled, discharges will contain high concentrations of selenium.  In addition, this comment undermines the commenter's insistence that EPA must assume the materials handling plan will prevent the Spruce No. 1 Mine from contributing increased loads of selenium to receiving waters.  According to the comment, the permittee, despite multiple monthly average concentrations greater than 5 µg/L, did not investigate Outfall 028 until after EPA noted these concentrations as part of the Proposed Determination, and the permittee apparently has taken no action to ensure that future discharges from Outfall 028 will not contain elevated concentrations of selenium.  The comment indicates that the permittee's sole method for controlling selenium concentration is the materials handling plan, that plan does not apply to all discharges, and the permittee will not address discharges with elevated concentrations of selenium in the absence of permit limits applicable to the outfall.

EPA also notes that DMRs reporting discharges since March 2010 also reflect discharges of elevated monthly average concentrations of selenium from Outfall 028 for May 2010, June 2010, July 2010, August 2010, and September 2010:

**Table A1.12.   Total Recoverable Selenium (µg/L) for Outfalls 015, 017 and 028 for NPDES Permit WV1017021, Mingo Logan Coal Company Spruce No. 1 Mine. Note:  Shaded areas indicate exceedances of 5 µg/L.**

| Site Code | Site Location | Report Date | Min Value | Avg. value | Max value |
|---|---|---|---|---|---|
| 015 | Outlet 015 | 12/31/2008 | 0.00 | 0.00 | 0.00 |
| | | | | | |
| 017 | Outlet 017 | 12/31/2008 | 0.00 | 0.00 | 0.00 |
| 017 | Outlet 017 | 9/30/2009 | 19.20 | 19.20 | 19.20 |
| | | | | | |
| 028 | Outlet 028 | 12/31/2008 | 5.70 | 5.70 | 5.70 |
| 028 | Outlet 028 | 1/31/2009 | 9.80 | 9.80 | 9.80 |
| 028 | Outlet 028 | 2/28/2009 | 3.90 | 3.90 | 3.90 |
| 028 | Outlet 028 | 3/31/2009 | 0.60 | 1.00 | 1.40 |
| 028 | Outlet 028 | 4/30/2009 | 1.70 | 1.70 | 1.70 |
| 028 | Outlet 028 | 5/31/2009 | 2.50 | 2.50 | 2.50 |
| 028 | Outlet 028 | 6/30/2009 | 3.20 | 3.30 | 3.40 |
| 028 | Outlet 028 | 8/31/2009 | 1.25 | 3.48 | 5.70 |
| 028 | Outlet 028 | 9/30/2009 | 4.60 | 6.05 | 7.50 |
| 028 | Outlet 028 | 10/31/2009 | 3.00 | 3.00 | 3.00 |
| 028 | Outlet 028 | 11/30/2009 | 1.40 | 1.85 | 2.30 |
| 028 | Outlet 028 | 12/31/2009 | 1.80 | 1.85 | 1.90 |
| 028 | Outlet 028 | 1/31/2010 | 3.40 | 3.80 | 4.20 |
| 028 | Outlet 028 | 2/28/2010 | 3.80 | 4.50 | 5.20 |
| 028 | Outlet 028 | 3/31/2010 | 4.70 | 6.10 | 7.50 |
| 028 | Outlet 028 | 4/30/2010 | 3.8 | 4.40 | 5.00 |
| 028 | Outlet 028 | 5/31/2010 | 4.70 | 7.60 | 10.50 |
| 028 | Outlet 028 | 6/30/2010 | 11.40 | 11.50 | 11.60 |
| 028 | Outlet 028 | 7/31/2010 | 6.40 | 8.50 | 10.40 |
| 028 | Outlet 028 | 8/31/2010 | 4.80 | 10.65 | 14.80 |
| 028 | Outlet 028 | 9/30/2010 | 4.80 | 9.40 | 11.00 |

Comment #48A – Outlet 028 Is Not Indicative of the Discharges Authorized by the Section 404 Permit. EPA refers to the information from Outlet 028 as "data from the portion of the Spruce No. 1 Mine that is already constructed in Seng Camp Creek." RD at 44. This misleading statement implies that Outlet 028 is part of the new construction at Spruce No. 1 Mine, and that the selenium levels there will predict selenium levels from the remainder of Spruce No. 1 Mine. In fact, Outlet 028 is not original to the Spruce No. 1 Mine, and does not benefit from the new mining techniques and materials handling plan that will accrue to the remainder of the outfalls.

Response #48A – The text of the Final Determination has been revised to reflect the comment. Data from Outfall 028 remains relevant to the Final Determination as set forth in Responses #47A and 49A.

Comment #49A – Outlet 028 is the discharge from an erosion and sediment control pond – now "existing Pond No. 2" – that was originally constructed in the Right Fork of Seng Camp Creek in the mid- 1990s pursuant to Surface Mine Permit S-5070-91 and NPDES (Section 402) Permit No. WV1013289. During the reissuance of the Spruce No. 1 Mine Section 402 permit on August 7, 2007 (Permit No. WV1017021), Outlet 02830 was transferred to the Spruce permit. Cmt. Ex. 12. The WVDEP added selenium as a "report only" parameter as a function of the transfer. The outlet, the pond, and much of the upstream area in the Right Fork of Seng Camp Creek was disturbed and filled as part of operations in the 1990s.

To re-configure existing Pond No. 2 and construct Pond Nos. 1 and 1AB in anticipation of active mining at Spruce No. 1, Mingo Logan used excess overburden originally placed in the hollow during the 1990s-era mining. Some of the excess spoil from the site development was then placed atop fill material that had previously been placed in the lower portions of the Right Fork of Seng Camp Creek as part of the mid-1990s mining. The Corps determined this activity to be outside the scope of the CWA because all of the construction would occur in areas filled in the 1990s. Thus, current Outlet 028, the ponds, and the related sediment control structures in the Right Fork of Seng Camp Creek were constructed in or of excess spoil material deposited in the watershed in the 1990s. TED2 § 3.1.3.

Response #49A – EPA's consideration of Outfall 028 is relevant for several reasons. The fact that Outfall 028 discharges elevated concentrations of selenium is evidence that the Spruce No. 1 mine will expose selenium-bearing strata that will contribute to downstream selenium loads. While Outfall 028 receives discharges from other portions of the site, it also handles the discharges from Valley Fill 1A. Apart from Comment # 47A, the commenter provides no data to demonstrate that discharges other than from Valley Fill 1A are the source of elevated concentrations of selenium from Outfall 028. To the extent the commenter asserts that the concentrations of selenium in Seng Camp Creek come from discharges associated with activities that pre-date construction of the Spruce No. 1 Mine, EPA notes that WVDEP sampling for the 2002-2003 time period (prior to construction of Spruce No. 1 in Seng Camp Creek) found selenium levels in Seng Camp Creek to be below detection levels. See Appendix 1, Table A1.10. The fact that levels increased after the valley fill was created is evidence that the selenium in the discharge from Outfall 028 is a result of the valley fill. To the extent the source of elevated concentrations of selenium through Outfall 028 is not Valley Fill 1A, the elevated concentrations of selenium through Outfall 028 still demonstrate that sources of selenium from the project will include on-bench exposure of selenium bearing strata. Accordingly, commenter's assurance that selenium-bearing strata would not be used to construct valley fills – even if that effort is successful (see Response #14A) – will not prevent discharges of elevated selenium concentrations from other areas of the project (see Responses #155, 21A, and 52A).

The comment also undermines the commenter's repeated assertions that the materials handling plan will be sufficient to control discharges of elevated levels of selenium from the project (See Response #14A). According to the comment, the commenter suspects that the materials used to re-configure existing Pond No. 2 and construct Pond Nos. 1 and 1AB are a source of selenium being discharged through Outfall 028. According to the commenter, these materials were not tested for selenium leachability. Moreover, while the materials handling plan states that overburden or strata defined as potentially acid-toxic or selenium-toxic will not be placed in close proximity to drainage courses, these materials apparently were placed near drainage courses in connection with reconfiguration of existing Pond No. 2 and construction of Pond Nos. 1 and 1AB. To the extent the comment asserts that the activities associated with reconfiguring existing Pond No. 2 did not require a permit pursuant to section 404, EPA notes those activities, as described by the commenter, were closely associated with construction of Pond Nos. 1 and 1AB in anticipation of active mining at Spruce No. 1 as currently authorized and may be considered. See Responses #155, 21A, and 52A.

Comment #50A – This is important because at the time of the mining in the mid-1990s, the relevant permits did not impose selenium limits or selective handling processes. As a result, the 1990's disturbance, which accounts for the ponds and the related sediment structures, did not reflect any attempts to locate or selectively handle selenium-bearing rock to prevent the formation of selenium-containing leachate. Thus, it is likely that selenium concentrations at Outlet 028 are the product of the 1990s-era spoil placement in the hollow and its redisturbance in 2006, rather than from a failure of the selenium handling procedures subsequently used at the Spruce No. 1 Mine. *Id.*

Response #50A – See Responses #49A and 52A.

Comment #51A – EPA Does Not Provide Any Data To Support its Claims Regarding Dilutive Capacity. EPA erroneously claims that Pigeonroost and Oldhouse have a significant dilutive capacity that is important to maintain low selenium levels in the mainstem of Spruce Fork. EPA wrongly concludes that increased selenium concentrations in Pigeonroost Branch, Oldhouse Branch, and Seng Camp Creek will therefore likely cause selenium concentrations in Spruce Fork to increase. RD at 46-47.

Response #51A – See Response #29. As noted in Response #212A with respect to conductivity, modeling makes clear that Pigeonroost Branch and Oldhouse Branch do, and will continue to be capable of, providing dilution to the mainstem. As outlined in Response #53A, EPA has concerns with commenters' dilution calculations and believes they underestimate dilution provided by streams on the Spruce No. 1 site.

Comment #52A – EPA has withdrawn its attempt to revoke Mingo Logan's permit with respect to Seng Camp Creek. As a result, the impacts relevant to this 404(c) action are those of Pigeonroost and Oldhouse alone. It is therefore inappropriate to include Seng Camp Creek in an assessment of potential impacts downstream.

Response #52A – See Responses #22 and 167.

EPA has not determined that discharges from Seng Camp Creek will have unacceptable adverse effects on wildlife, and, therefore, today's action is not based directly on impacts from discharges of fill to Seng Camp Creek. Notwithstanding that, however, *information about* the discharges of fill to Seng Camp Creek and *information about* the downstream effects of those discharges are relevant pieces of information that support EPA's conclusion that discharges of fill to Pigeonroost Branch and Oldhouse Branch will have unacceptable adverse effects on wildlife.

For example, EPA's analyses utilize existing discharge monitoring reports from Mingo Logan's ongoing mining activities in Seng Camp Creek on the Spruce No. 1 project site (as well as from the neighboring Dal-Tex mining complex) when determining the expected effects of the discharge of fill to Pigeonroost Branch and Oldhouse Branch. Additionally, some of EPA's analyses in the Final Determination, consider upon modeled or observed data from Seng Camp Creek to support EPA's conclusion that the construction of valley fills in Pigeonroost Branch and Oldhouse Branch will have unacceptable adverse effects on wildlife.

Such consideration is reasonable for at least two reasons. First, because the discharges of fill to Seng Camp Creek happen on the Spruce No. 1 Mine site, discharges of fill to Pigeonroost Branch and Oldhouse Branch can be expected to have similar effects. Second, because EPA has not determined that discharges from Seng Camp Creek will have unacceptable adverse effects on wildlife and is not withdrawing specification of Seng Camp Creek as a disposal site, on can assume that the effects associated with existing fill at the Spruce No. 1 Mine have occurred or will continue to occur consistent with the DA Permit.

Comment #53A – EPA provides no data indicating that selenium levels in Spruce Fork will rise, nor does it cite to any. To the contrary, a model of the impact of these two watersheds on Spruce Fork shows that Pigeonroost and Oldhouse have a negligible dilutive effect on the downstream waters. The two streams combined represent only 9.92 percent of the watershed downstream of the Spruce No. 1 Mine. TED2 § 3.1.3. Seng Camp Creek represents only another 2.46 percent, and the watershed only grows as it passes the mine area.

Response #53A – As set forth by the data presented in Response #29, while EPA did not model the effect on selenium concentrations that would be caused by construction of the Spruce No. 1 Mine in Pigeonroost Branch and Oldhouse Branch, EPA has demonstrated that selenium concentrations downstream will rise both as a result of increased loadings from Pigeonroost Branch and Oldhouse Branch and as a result of loss of dilution from those waters. EPA did model conductivity, and that model demonstrates that Pigeonroost Branch and Oldhouse Branch are providing dilution water to Spruce Fork. See Response #212A.

With respect to the model provided by the commenter, EPA notes that the commenter did not use the Se data from the USF site (the upstream Spruce Fork site, located upstream of White Oak Branch), asserting Spruce Fork is too small at that location. However, flow from the upstream Spruce Fork has elevated levels of selenium and its contribution of selenium loading downstream is being moderated by Pigeonroost Branch and Oldhouse Branch, along with other intervening tributaries. Response #29.

The commenter models the Se concentrations at the Downstream Spruce Fork (DSF) site based on adding or subtracting flow-weighted Se concentrations from Pigeonroost Branch, Oldhouse Branch, and the Right Fork of Seng Camp Creek to/from the DSF concentrations. Because the model focuses on concentration, it does not take into account that construction of the valley fills likely will increase base flow in Pigeonroost Branch and Oldhouse Branch that will add selenium loads. See Response #212A. In addition, the model considers only inputs from Pigeonroost Branch and Oldhouse Branch and fails to account for the loss of dilution from Pigeonroost Branch and Oldhouse Branch. EPA also notes that commenter's model of concentrations at DSF does not include the full contribution from Seng Camp Creek and is limited only to the Right Fork. Accordingly, the model does not accurately predict selenium concentrations at that point in Spruce Fork that is being modeled.

Comment #54A – In order for Pigeonroost, Oldhouse and Seng Camp to raise the selenium level of downstream Spruce Fork above the chronic selenium criterion, the average selenium concentration at the three watersheds would have to average 46.85 μg/L. RED2 § 3.1.3. That represents an almost unfathomable selenium level that in many cases is over ten times larger than any observed selenium level in those three streams. Thus, EPA's own data proves that selenium concentrations will not likely exceed the applicable water quality criteria, let alone lead to an unacceptable adverse effect.

Response #54A – See Response #53A regarding inappropriate site and data selection for the commenter's dilution calculations, which lead to an elevated and "almost unfathomable" resulting concentration. EPA also notes that while commenters suggest that a concentration of 46.85 μg/L is "almost unfathomable," see Response #188A describing unpublished WVDEP data that include a concentration of 61 μg/L downstream of a valley fill (WVDEP unpublished data 2010a).

Comment #55A – EPA's Attempt To Discredit the Materials Handling Plan Is Baseless. Without any legitimate support, EPA contends that the materials handling plan "being implemented by Mingo Logan in the Seng Camp Creek watershed has not fully succeeded in preventing exceedance of the numeric water quality criterion for selenium at Outfalls 17 and 28." RD at 45, n.13. There have been no exceedances of the relevant selenium criteria, and neither of the outlets identified reflect the results of discharges from the permitted fills in Seng Camp Creek. TED2 § 3.1.3. The selenium levels at 028 are caused by old unsegregated mine spoils rather than the construction of Valley Fill No. 1A, with its modern selenium handling techniques. Outfall 017 is equally unrelated to the discharges authorized by the 404 permit, as it is not anywhere close to an existing fill.

Response #55A – See Responses #14A, 44A, 47A, and 49A.

Comment #56A – EPA Compares the Spruce No. 1 Mine to Sites That Were Mined Without Materials Handling Plans.

Response #56A – See Response #14A.

Comment #57A – EPA also disingenuously claims that Mingo Logan has been unable to control selenium with such techniques at other sites. RD at 45 n.13. EPA implies that if Mingo Logan has been unable to control selenium at its other surface mines, despite the use of the same materials handling plan, Mingo Logan cannot be expected to control selenium at Spruce No. 1

Mine. EPA relegates this contention to the bottom of a footnote because EPA must be aware that it is just plain wrong.

Response #57A – See Responses #29 and 30.

Comment #58A – All but one of the unnamed facilities for which the extension requests have been made are historical mining operations where active mining and reclamation activities were completed before 2000, and selenium was added as a monitored parameter of concern on a Section 402 permit reissuance after the facility was constructed.32 *See* RD at 45 n.13. Because these facilities were completed before 2000, there were no mining or material handling techniques in use to address selenium, and selenium limits had not been added to Section 402 permits.

Response #58A – Reference to Mingo Logan's efforts to seek extensions of compliance schedules at other permitted facilities is relevant. These efforts demonstrate that Mingo Logan has not developed a method that consistently treats elevated concentrations of selenium in its discharges if a materials handling plan either is not implemented or fails to prevent increased concentrations of selenium. As set forth elsewhere, the Spruce No. 1 Mine will disturb known selenium-bearing strata. While the commenter has asserted that EPA must assume the efficacy of Mingo Logan's materials handling plan to prevent increased selenium loads from the project (in the absence of any study or data to support the efficacy of that plan), questions remain regarding the efficacy of the materials handling plan to control discharges of selenium from the project. (See Responses #14A, 44A, 47A, and 49A). In addition, Mingo Logan's efforts demonstrate that, despite good faith efforts, Mingo Logan's past representations regarding efficacy of its efforts to control selenium at other sites have proved overly optimistic.

Comment #59A – The only Arch facility that receives drainage from currently active mining and has sought an extension of its NPDES (Section 402) compliance schedule is one of the facilities on the Left Fork of Beech Creek on the Dal-Tex property. This facility experienced extensive mining predating the passage of SMCRA and was again mined in the 1990s with final reclamation to occur in the 2000s. Mining was restarted in July 2008 on this facility using structures and outfalls constructed in the 1990s. Selenium concentrations at Beech Creek are elevated because mining occurred before selenium had been identified as a parameter of concern, so special material handling practices to address selenium were neither required nor implemented during the 1990s. Historical mining explains both the selenium in the discharge waters and selenium in fish tissue samples. *See* RD at 41 n.11.

Response #59A – See Response #58A.

Comment #60A – EPA's Estimate of Selenium Loading Relies on Unsupportable Assumptions. In further postulating potentially adverse selenium levels, EPA inexplicably assumes the material to be placed in fills will have a selenium concentration of 2.0 mg/kg. RD App. 4 at 4. Again, this assumption is baseless. The materials handling plan, a condition of the Mingo Logan permit, *requires* that all rock with selenium concentrations over 1 mg/kg will be "back-stacked" in a dry location rather than being placed in the valley fill. Not only does the assumed value of 2.0 mg/kg ignore the materials handling plan, which is specifically designed to limit the amount of selenium bearing rock, it assumes that Mingo Logan will place the coal it intends to extract into the authorized fills. *Id*. This is not consistent with WVDEP regulations, SMCRA permit conditions, and maximizing yield. TED2§ 3.1.2. EPA also assumes a Kd value of 0.78, which is unrealistically low.33 Applicable science suggests that Kd values for selenium ranging from 3.8 to 6.7 ± 1.9 are more appropriate. TED2 § 3.1.2.

Response #60A – To the extent the comment asserts that the materials handling plan will prevent the project from discharging additional loads of selenium to Spruce Fork, see Responses #14A, 44A, 47A, and 49A. Moreover, it appears the permittee has not implemented or implemented effectively a "high and dry" methodology for all selenium-bearing materials, particularly where the outfall does not have a selenium limit. See Responses #44A and 47A.

With respect to EPA's assumed concentration of 2.0 mg/kg, the 2 mg/kg concentration is appropriate. That value represents half the mean Se concentration reported for West Virginia coals. Some horizons above and below the coal beds have also been reported to have more than 2 mg/kg. Microscale spatial differences in Se occurrence and concentrations make it difficult (if not impossible) to predict *a priori* which drilled locations will have high Se concentrations above and below the coal beds. In addition, while Se is highest in coals and rocks that are adjacent to the coals, not all units close to the coal beds are high in Se and not all units away from the coal are low in Se. Even correlations with sulfur (S) and total organic carbon (TOC) are not always strong. Also, extraction data indicates that both organic and sulfide principal component analysis (PCA) show no single trend for Se (Vesper & Rhoads, 2008). Hence, these parameters are unreliable as indicators for Se occurrence. The practice of mountaintop coal mining disturbs large volumes of rock with huge quantities of overburden removed. Given the nature of Se distribution in these overburden materials, an assumed concentration of 2.0 mg/kg is appropriate.

With respect to Kd values for Se, it is not uncommon to have Kd values with orders of magnitude differences. The Kd value of 0.78 L/Kg is based on work by various researchers in the field. First, Kaplan and Serne (1995) provided data for Se-Kd values under neutral-to-high pH, low organic material concentrations, and oxic and low-ionic strength conditions using Hanford sediments. There is a strong consensus amongst geochemists, including Kaplan and Serne, that Se can be redox sensitive and selectively adsorbed by ferric oxides. The authors also noted that groundwater Se is expected to sorb to Hanford sediments very weakly because Se will likely exist as an anion in waste and that specific adsorption onto geologic materials is not likely to play an important role in controlling Se mobility because the near-field plume (pH =11) and natural groundwater (pH = 8) will have a sufficiently high pH to greatly reduce the number of anion exchange sites. In addition, the potentially high concentrations of sulfates that are known to compete with Se for mineral adsorption sites may mean even further decreased Se sorption onto mineral phases. While the soils and sediments from the proposed Spruce mining activities may be different, the potentially high pH waters from the proposed fill material combined with high levels of sulfates justifies the reasonableness of the reported Kd value range of 0.78 to 2.17 for the proposed fill material from the Spruce mine. Second, Serne (2007) provided a comparison of recommended Kd values from his research to past tabulations for non-groundwater scenarios. Serne's research focused on Kd values for agricultural and surface soils for use in Hanford site farm, residential, and river shoreline scenarios. Serne's report showed that the Kd values for Se can range from 3-30 L/Kg. The author compared this data to previous work by Napier and Snyder (2002) that reported Se Kd range of -3.4 to 0.78.

Even using the permittee's suggested numbers (maximum concentration in the fill of 1 mg/Kg and a Se Kd value of 7.8), at equilibrium, we would expect 0.887 mg/kg (or 887 µg/kg) to remain adsorbed on the solid phase and 0.113 mg/L (or 113 µg/L) to be present in the soil solution. If we assume 1µg = 1 mL (which is reasonable for dilute systems), then 113 µg/mL in solution is equivalent to 113 parts per million (ppm). This is still about 23 times the 5 ppm criterion for Se in receiving streams. While this estimate lacks specific selenium transport modeling, it demonstrates the potential for high downstream conductivity levels in spite of the unproven materials handling plan based on 1 mg/kg.

Comment #61A – The Kd value is technically the sorbed metals concentration divided by dissolved metal concentration. This means it is a representation of the metal that is likely to dissolve in water and pass downstream, relative to the quantity that remains in rock or soil. A Kd value over 1 means that more selenium will remain in the rock than pass downstream, and a Kd value under 1 means that more selenium will pass downstream than will remain the rock. TED2 § 3.1.2.

Response #61A – To the extent the comment is a generic statement regarding the nature of the Kd value and does not specifically address EPA's analysis, the comment is noted. To the extent the comment purports to address the Kd value used in EPA's analysis, see Response #60A.

Comment #62A – The record created by EPA does not establish that any posited problemative levels of selenium will result from the actual "fill material" to be placed in waters of the United States by Mingo Logan. Concerns about selenium leaching from upland areas of the mine into waters of the United States are outside the scope of EPA's 404(c) authority. In a case involving this very permit, the Fourth Circuit affirmed the United States' position that the scope of its authority under Section 404 is limited to "nothing more than the filling of jurisdictional waters for the purpose of creating an underdrain system for the larger valley fill." *OVEC*, 556 F.3d at 194.

Response #62A – See Responses #155, 157, and 13A. EPA notes that the 4th Circuit recognized the centrality of the Section 404 discharge to the overall project. While the 4th Circuit held that the Corps is not *required* to consider impacts from the entire valley fill or the entire project enabled by the valley fill, nothing in the 4th Circuit's opinion precludes the Corps from doing so. Moreover, in light of the different question posed by Section 404(c) (See Response #157), it is appropriate for EPA to consider increased contributions of selenium loading from aspects of the project made possible by the specification of Pigeonroost Branch and Oldhouse Branch.

Comment #63A – EPA Provides No Relevant Information To Support its Fish Bioaccumulation Projections. The Recommended Determination contends that the discharges authorized by Mingo Logan's 404 permit "are likely to increase selenium loading to the immediate receiving streams and downstream waters," such that the increased selenium levels will have an unacceptable adverse effect on "downstream wildlife populations, including fish population [sic]." RD at 38, 40. EPA provides no support for this conclusion.

Response #63A – EPA has established that construction of valley fills in Pigeonroost Branch and Oldhouse Branch will increase selenium loadings to the remainders of those streams and to Spruce Fork and will further impact selenium concentrations in downstream Spruce Fork by removing the dilution effect of Pigeonroost Branch and Oldhouse Branch. See Responses #47A and 53A. WVDEP recently published two reports on the effects of selenium on fishes in West Virginia. One of the main findings of these reports is that '*Larval deformity rates were variable throughout the study duration but were nonetheless associated with waterborne selenium exposure.'* Other findings included the selenium problem in the Upper Mud River Reservoir and selected waters of the State of West Virginia.

The first report released in February 2009 was entitled: <u>Selenium Bioaccumulation Among Select Stream and Lake Fishes in West Virginia</u>. This report provided a study designed to elucidate the factors and impacts of selenium bioaccumulation among selected fish species, including bluegill sunfishes, found in the surface waters of West Virginia (including in Spruce Fork downstream of Seng Camp Creek). This research emphasized the correlation of observed whole-body tissue concentrations of selenium in fishes to in-stream selenium quantities in both lotic and lentic environments, and comparison of those tissue concentrations to EPA's proposed whole-body chronic exposure tissue criterion of 7.91 µg/g (dry weight selenium). Particular attention was given to the more susceptible sunfishes (family Centrarchidae) in regard to bioaccumulation; however, the bioaccumulation rates of many other species found in potentially impacted and reference aquatic systems were also researched. Site-specific water quality information, whole fish tissue concentrations, and bioaccumulation factors for selenium among select species of stream and lake fishes were derived from 18 locations (Fig. 1), beginning November 1, 2005, and continuing to July 20, 2007.'

The second report released in January 2010 was entitled: <u>Selenium-Induced Developmental Effects Among Fishes in Selected West Virginia Waters</u>. WVDEP provided a summary of this document as follows:

> *"In respect to the USEPA's draft whole fish tissue body burden criterion for selenium - 7.91 mg/kg dry weight (USEPA, 2004, potentially revised to 11.1 mg/kg dry weight (USEPA, 2008) - the West Virginia Department of Environmental Protection (WVDEP) has studied selenium bioaccumulation among fishes residing in the State's lakes and streams since 2005. Additionally, due to concern regarding fish population health at locations subjected to elevated selenium inputs, particularly during the more sensitive developmental life stages of fishes (e.g. yolk-sac larvae), the WVDEP has collected and examined bluegill sunfish, Lepomis macrochirus, larvae (ichthyoplankton) from selected waterbodies since 2007. Also, in 2009, WVDEP began acquiring data about selenium concentrations in fish eggs, which is often used as a predictor of larval deformity rates (Lemly, 1997; Holm et al., 2005; Muscatello et al., 2006). Certain developmental deformities may also be observed among individuals surviving to later life stages (Nagano et al., 2007); consequently, WVDEP has conducted deformity surveys of adult fishes in selenium enriched waters as well as at reference locations since 2008.*
>
> *"Larval deformity rates were variable throughout the study duration but were nonetheless associated with waterborne selenium exposure. Reference locations*

*produced age-based larval bluegill subsamples (24 - 168 hours) with deformity rates between 0% and 1.27%; whereas, locations with elevated seleniferous inputs exhibited bluegill ichthyoplankton deformity rates ranging from 0% to 47.56% in certain developmental stages (10 - 312 hours). However, these evaluations were not indicative of overall reproductive success or population sustainability, which must be determined via more detailed studies. Independent confirmation of selenium-induced larval deformities among bluegill populations sampled in 2008 was sought via collaboration with Dr. Diana Papoulias, Fish Research Biologist, United States Geological Survey (USGS), Columbia, MO, who verified the presence of developmental deformities. Maximum deformity rates among certain aged bluegill subsamples as determined through these evaluations were 19.28%, representing specimens collected from selenium-enriched waters. Concentrations of selenium within fish eggs also varied according to study location and ranged from <0.8 mg/kg dry weight among bluegill eggs at the control site to 64.62 mg/kg dry weight among largemouth bass, Microptrus salmoides, eggs collected from selenium-enriched waters. Searches for more mature, yet developmentally-deformed fishes revealed increased deformity rates (14%) among largemouth bass residing in the Upper Mud River Reservoir (UMMR), Lincoln County, West Virginia, as compared to deformity rates among largemouth bass found in the reference location (0%), Plum Orchard lake (POL), Fayette County, West Virginia."*

Comment #64A – EPA seems primarily concerned about the fish population downstream of Spruce No. 1 Mine in Spruce Fork, where there are fish populations that EPA considers to be "in relatively good condition" despite decades of surface and underground mining upstream and downstream of the Spruce No. 1 Mine. *Id*. at 36, 60. There are no data for selenium in fish from Spruce Fork, however, and no data that can be attributable to the Spruce No. 1 Mine. TED2 § 3.1.5. In a misguided attempt to support its Recommended Determination with bioaccumulation data, EPA incredibly confuses Seng Camp Creek with Seng Creek. RD at 47 n.14. These are two different streams in two entirely different watersheds. Fish have been analyzed from Seng Creek, as reported by WVDEP, but no data are available from Seng Camp Creek. TED2 § 3.1.3. This is at least the second time in this proceeding that EPA has confused Seng Camp Creek with Seng Creek, despite earlier comments from WVDEP, the Corps, and Mingo Logan. *See, e.g.*, Memorandum for Record, at 13, Cmt. Ex. 5; Mandirola Letter at 2, Cmt. Ex. 26.

Response #64A – This footnote and associated text have been revised in response to this comment.

Comment #65A – In a further important omission, EPA does not recognize that historical selenium data from discharges similar to those expected at Spruce No. 1 Mine indicate that most, if not all, of the selenium is selenate, which is the most oxidized form and least likely to bioaccumulate in fish. This is based on selenium speciation data collected by CH2M HILL from the discharge of 7 different valley fill ponds at three surface coal mine sites in southwest West Virginia during 2009 and 2010. EPA twice wrongly states that selenate is the most toxic. TED2 § 3.1.3.

Response #65A – See Responses #29, 92, and 43A. The commenter does not appear to fully comprehend the Se fate discussion in Appendix 4. Oxidation of the selenite to the highly mobile selenate may take place. However, it is well known that significant concentrations of sulfates are expected and frequently measured in valley-filled materials. These sulfates are known to compete with Se oxyanions for mineral adsorption sites making the Se oxyanions more available for leaching to surface waters and other environments. However, even if this potential is minimized, a reducing environment that may be induced in streams could reduce the oxyanions to forms that could easily bioaccumulate in aquatic species. EPA further notes that QAPP and QA/QC information were not provided for the CH2M HILL report.

Comment #66A – While the discharge limits are based on total recoverable selenium, selenate is the least likely form to bioaccumulate in aquatic organisms in these environments.

Response #66A – See Responses #29, 92, and 65A. While selenite is the least likely selenium species to bioaccumulate, it can still result in bioaccumulation.

Comment #67A – EPA cites to "Lemly (1997)" to support its assertion of 4 μg/g in whole-body fish as an effect level for teratogenic development and reproductive failure. RD at 47 n.14. It is unclear which "Lemly" reference is being used because there is no reference in Appendix 5 with that spelling or the correct spelling of the assumed author, "Lemly." However, EPA's support for this 4 μg/g effect level is weak. In the 1997 study to which EPA is presumably referring, Lemly wrote that visual indicators and symptoms were necessary to confirm an adverse effect from tissue concentrations. TED2 § 3.1.5. Thus, by the standards of the Lemly study, this recently reported concentration is not enough to corroborate or draw conclusions of selenium-induced teratogenesis. Moreover, recent reviews report an effect level of about 8 μg/g, which is double EPA's proposed level. *Id.* EPA has also published a draft water quality criterion of 7.91 μg/g, which has not been finalized and has itself drawn considerable criticism. *Id.* Finally, there are no data for selenium in fish from Spruce Fork that can be attributed to Spruce No. 1 Mine in either of the recent reports by WVDEP. TED2 § 3.1.3.

Response #67A – EPA's Final Determination has removed the reference to Lemly (1997) to support a whole-body effect level of 4 μg/g, but does cite Lemly (2002a) generally. However, EPA notes that the use of 4 μg/g as a screening level is supported by available literature (Peterson et al. 2009). With respect to EPA's 2004 draft water quality criterion, commenter is correct that EPA has not yet finalized this criterion.

Commenter is correct that the WVDEP report (WVDEP 2009) does not include data from Spruce Fork. However, EPA believes that the WVDEP data, which include both water column and fish tissue selenium concentrations collected from nearby streams affected by mining operations (including similar geologic strata to the Spruce No. 1 Mine), serve as a valid point of comparison with the likely selenium effects of the Spruce No. 1 Mine.

Two nearby waters with similar characteristics, Seng Creek and Mud River, have available data that indicate that construction of the Spruce mine and associated discharges can result in impacts to wildlife. In Seng Creek, creek chub egg/ovary tissue (mean = 19.9 ppm; range = 16.4 - 23.7 ppm; n= 4) and water measurements (mean = 15.8 μg/L; range = 8-45 μg/L; n = 11) indicate that both fish tissue and water numbers would exceed 5 μg/L and this has resulted in unacceptable tissue concentrations in the reproductive tissue (Note: the translated whole body numbers would exceed the 2004 proposed draft whole body tissue value of 8 ppm). Similarly, water and fish tissue samples from Mud River show similar unacceptable impacts to fish. Creek chub egg ovary (composite measurement of 17.6 in egg/ovary tissue) and water measurements (mean = 9.5 μg/L; range = 4-22 μg/L; n = 21) in Mud River show that selenium concentrations exceed 5 μg/L and has resulted in unacceptably high tissue concentrations in fish. This concentration when translated to whole body would exceed the 2004 EPA proposed whole body tissue value of 8 ppm, which EPA believes remains consistent with available science.

As EPA has noted in other responses, only a small portion of the Spruce No. 1 Mine has been constructed to date. Therefore, any fish tissue concentrations collected in Spruce Fork would not currently serve as a valid predictor of selenium concentrations that would result following full construction of the Spruce No. 1 Mine. This fact makes EPA's use of data in WVDEP (2009) more appropriate as a predictor because these data include water column and fish tissue concentrations from streams already impacted by existing mines.

Comment #68A – EPA Fails To Establish That a Rise in Conductivity or a Change in EPT Composition Will Cause an Unacceptable Adverse Effect on 404(c) Resource

Response #68A – See Responses #6 and 7.

Comment #69A – The RD relies on supposed impacts from conductivity and speculative changes in the composition of a subset of macroinvertebrates. Both issues were fully considered during the permit proceeding.

Response #69A – EPA disagrees. To the extent the comment suggests that impacts to the naturally occurring macroinvertebrate community discussed in the Recommended and Final Determination are "speculative," the commenter is incorrect. While the valley fills have not yet been constructed in Pigeonroost Branch and Oldhouse Branch and thus there is necessarily a predictive aspect to EPA's analysis, it is not speculative. The predicted impacts to the naturally occurring macroinvertebrate community are based upon a dose-response threshold identified in the published, peer-reviewed literature and confirmed in other studies. Many of these studies were not available during the permit proceeding and are considered new information. To the extent the comment asserts that impacts from conductivity and impacts to the naturally occurring macroinvertebrate community were fully considered, see Responses #152 and 156. See also Response #24.

Comment #70A – EPA ignores important ecological factors, like macroinvertebrate abundance and habitat quality, and provides no information to suggest that the authorized fills will cause conductivity levels or macroinvertebrate composition changes similar to those at the Dal-Tex Complex.

Response #70A – See Responses #33, 138A-139A, and 178A.

Comment #71A – EPA fails to establish an unacceptable adverse effect on 404(c) resources, fails to establish that a change in the makeup of a subset of macroinvertebrates would be a "significant" loss of macroinvertebrates, and fails to establish that either this change in macroinvertebrates or EPA's predicted rise in conductivity will have any impact on aquatic ecosystem health.

Response #71A – See Responses # 6, 7, 167, 154A, and 156A.

Comment #72A – Conductivity Was Evaluated During the Permit Proceedings, And EPA Presents Nothing New

Response #72A – See Responses #152 and 73A-86A.

Comment #73A – Concerns were appropriately addressed [during permit proceedings, with respect to conductivity], with EPA's concurrence.

Response #73A – See Responses #152 and 156.

Comment #74A – The SMCRA, 402, and 404 permits, as well as the fill design and construction process, address EPA's conductivity concerns through a number of protective measures designed to minimize conductivity, and other water quality and aquatic impacts. (e.g., Fill material is tested for durability and acid-producing material is segregated; the West Virginia surface mining regulations require baseline monitoring for total dissolved solids and conductivity, as well as quarterly monitoring; overburden handling practices and sediment control structures manage drainage and minimize sediment loads to the stream.)

Response #74A – EPA disagrees. Except for monitoring, the SMCRA, 402 and 404 permits do not specifically address conductivity. To the extent the commenter asserts that other aspects of the SMCRA permit, including the Special Handling Plan for Potentially Acid Toxic Material (SHP) will also control total dissolved solids or conductivity, EPA disagrees. The SHP, as outlined in Mingo Logan's comments, includes several measures that the company claims will protect against harmful levels of total dissolved solids or conductivity. These include testing and segregation of material, monitoring, and overburden handling and control. These are standard techniques included in most post-2005 fill construction to address potentially toxic or acid materials. As outlined below and in Responses #79A-81A, the available evidence does not demonstrate that these techniques will protect against harmful levels of conductivity downstream of the Spruce No. 1 Mine.

Commenter's claims that these approaches will be protective of downstream water quality at Spruce No. 1 are not supported by available evidence. As outlined in Response #94A, EPA utilized a dose-response threshold justified by available peer-reviewed literature to evaluate potential adverse impacts to downstream wildlife. As outlined in Response #124A, EPA utilized a weight-of-evidence approach using multiple methods to reach its conclusion that adverse effects to wildlife will occur as a result of the Spruce No. 1 project. Mingo Logan does not provide quantitative evidence to suggest that the SHP will prevent elevated levels of downstream conductivity that will affect wildlife, and does not predict what the levels of downstream conductivity will be as a result of implementing these practices.
In contrast, EPA's review of available quantitative evidence suggests that surface coal mining projects with valley fills in the vicinity of Spruce No. 1 have not succeeded at reducing

conductivity to non-harmful levels even after employing these practices. For illustration, the WVDEP initiated a Valley Fill Study to examine the water quality downstream of 51 valley fills (WVDEP unpublished data 2010). WVDEP shared the preliminary dataset of this study with EPA. As outlined in Response #188A, this study included 7 valley fills that were constructed post-2005 with modern mining techniques. Conductivity measurements are available for all 7 recently constructed valley fills with a mean of 1193 μS/cm and a range of 264 to 2259 μS/cm. Regarding the newer fill with the 2259 μS/cm conductivity, WVDEP noted that it was "top notch fill construction" in the following in the spreadsheet comments: "Almost finished; insp.- "top notch fill construction"; fill comprised entirely of Coalburg to Stockton materials - 5-Block overburden disposed in back of Fill G; fill is "overstacked"."

The WVDEP Valley Fill Study (WVDEP unpublished data 2010a) provides evidence that mining techniques employed in post-2005 fill construction and as laid out in the Spruce No. 1 permit will not control conductivity.

Comment #75A – EPA first raised the issue of conductivity in 2002, in response to the proposed modification of the Section 402 permit. EPA withdrew its objections and consented to the modification when WVDEP agreed to adopt conductivity monitoring and spoil handling measures to reduce conductivity.

Response #75A – See Responses #28, 155, and 156.

Comment #76A – The Corps also considered conductivity during the extensive NEPA review of the 404 permit. EPA raised the issue of conductivity in its comments on the DEIS, and the Corps addressed EPA's conductivity concerns in the FEIS. At that point, EPA could have objected to the issuance of the permit under CWA Sections 404(q) or 404(c), but declined to do so, leaving the Corps' permitting action as the final federal response on conductivity.

Response #76A – To the extent the comment asserts that the Corps considered conductivity during its NEPA review, the Corps, like EPA, lacked the benefit of much of the emerging science surrounding the effects of elevated conductivity on naturally occurring organisms in Appalachian streams. This is evident from the Corps' responses to EPA's comments. (FEIS, Response to EPA Comments). For example, the Corps identified iron, manganese, and aluminum as "the main contributors to conductivity," where it is now understood that elevated levels of conductivity are a function of total dissolved solids, and that the dominant ions are sulfate and bicarbonate. The Corps also pointed to Rockhouse Creek as an example of a good quality stream with a valley fill, whereas Rockhouse Creek was subsequently identified in WVDEP's Coal River TMDL as impaired by ionic toxicity (Coal River TMDL Main Report, page 35) and Rockhouse Creek remains on West Virginia's CWA Section 303(d) List of Impaired Waters as biologically impaired. To the extent the comment asserts that EPA may not take action under Section 404(c) now because EPA did not avail itself of elevation procedures under Section 404(q) or initiate action under Section 404(c) earlier, See Responses #153 and 84A.

Comment #77A – Mingo Logan does not agree or concede that EPA has the authority under CWA Section 404(c) to base its action on an issue that is properly addressed under CWA Section 402.

Response #77A – See Responses #155 and 156.

Comment #78A – The SMCRA, 402, and 404 permits, as well as the fill design and construction process, address EPA's conductivity concerns through a number of protective measures designed to minimize conductivity, and other water quality and aquatic impacts.

Response #78A – See Responses #158, 14A, and 74A.

Comment #79A – Fill material is tested for durability, and acid-producing material is segregated.

Response #79A – The SHP is not specific to conductivity, and in fact does not reference conductivity or TDS. The commenter has not provided any evidence to support a conclusion that these techniques will protect against elevated levels of total dissolved solids or conductivity that have been associated with degradation of water quality and wildlife. In particular, the lack of references to conductivity within the SHP does not reassure EPA that the Plan will be effective in controlling conductivity, especially when available data from recently constructed fills in West Virginia continue to show elevated levels of conductivity. See Responses #14A, 74A, and 188A.

Comment #80A – The West Virginia surface mining regulations require baseline monitoring for total dissolved solids ("TDS") and conductivity, as well as quarterly monitoring.

Response #80A – The comment describes 38 C.S.R. 147.7.a; 38 C.S.R. 3.22.c.2, and 38 C.S.R. 3.22.g and is noted. The commenter does not explain how baseline and quarterly monitoring for TDS will control or minimize levels of TDS or conductivity caused by the discharges.

Comment #81A – Overburden handling practice and sediment control structures are designed to manage drainage with minimum disruption down stream. Mingo Logan must construct the authorized fills in a manner to minimize sediment loads in the stream and maximize sediment control sites.

Response #81A – EPA is not making the determination on the basis of sediment loading. The comment reflects a misunderstanding of the difference between total suspended solids (i.e., sediment loads) and total dissolved solids. EPA is unaware of any evidence that techniques, such as settling ponds, that will address total suspended solids by allowing the suspended particles to settle out before discharge, will also treat total dissolved solids, which are salts dissolved in solution, rather than sediment particulates. With respect to conductivity and total dissolved solids, see Response #74A.

Comment #82A – Mingo Logan has agreed to comprehensive monitoring for total suspended solids, TDS (conductivity), pH, and a series of water-soluble metals. *Id.* As a result, West

Virginia issued a 401 certification, which conclusively determines compliance with the State's water quality standards.

Response #82A – The commenter does not explain how monitoring will minimize or prevent adverse effects in the absence of a corresponding set of actions to address elevated levels. To the extent the commenter asserts that EPA's action under Section 404(c) is foreclosed by WVDEP's issuance of a Section 401 water quality certification, see Response #154.

Comment #83A – The Recommended Determination repackages those same previously addressed concerns, but does not raise any new issues or information.

Response #83A – See Responses #4, 11, 24, 28, 125, 152, and 156.

Comment #84A – When EPA asked the Corps to suspend Mingo Logan's 404 permit in this proceeding on conductivity grounds, the Corps stated that EPA had failed to raise any new information, but "rather a new method for evaluating previously considered information."

Response #84A – EPA respectfully disagrees with the Corps. EPA agrees that the Corps considered concerns raised regarding impact to the macroinvertebrate community and conductivity in response to comments by EPA on the DEIS and that these concerns are not entirely new. Numerous scientific studies, however, including several conducted by EPA, are very recent and provide an emerging and consistent technical basis supporting the need to assure more effective protection of the ecological integrity of streams from the water quality and environmental impacts of surface coal mining. See Response #152.

For example, in its response to EPA's comments on the FEIS, the Corps noted that then-available studies did not demonstrate a statistical relationship between water quality and biological condition (FEIS, Response to Comment EPA-10). See also Response #76A. More recent studies subsequently have established this relationship and thus provided a basis for determining unacceptable adverse effects. EPA's Section 404(c) review of the Spruce No.1 mine relies extensively on this new information.

Comment #85A – Of the six sites referenced in the 2008 Pond study on which EPA relies, five were evaluated by the Corps in the NEPA review. The Corps noted that by eliminating more tolerant species and all other measures of aquatic system quality in its analysis, EPA is asserting an increased likelihood of impairment based on a narrow metric that fails to consider the wide range of factors affecting wildlife.

Response #85A – See Responses #33, 64-67, 75, 80, 116A, 124A, and 125A. EPA considered several measures of "aquatic system quality" in the Proposed Determination, Recommended Determination, and Final Determination, including water quality degradation (presenting data on conductivity, sulfate and Se), macroinvertebrate health (genus level data including richness measures, an O/E model, and the family-level WVSCI), fish health effects (Se, golden algae), and fish assemblage data. EPA also reviewed the peer reviewed literature and data analyses presented in public comments. We disagree that EPA based the determination on a "narrow metric." See Response #86A.

Comment #86A – It is only through an exclusive focus of an extremely narrow metric and a failure to consider more tolerant Ephemeroptera, Plecoptera, and Trichoptera ("EPT") species, other measures of macroinvertebrate health, and the wide range of factors affecting aquatic wildlife that EPA is able to claim an increased likelihood of some form of impairment. The Corps found this neither new nor persuasive. Indeed, the Corp's response is a comprehensive refutation of EPA's scientific claims surrounding conductivity. *See* Memorandum for Record, Cmt. Ex. 5.

Response #86A – This comment is incorrect. EPA based its determination on a detailed review of the macroinvertebrate data for the tributaries affected by the project, nearby tributaries, Spruce Fork, and other data in ecoregion 69d generated by WVDEP, EPA, and others. See Responses #64, 66, 75, 85, 86, 114A, 116A, 117A, 120A, and 124A-127A. EPA concluded that the project is likely to degrade water quality to the point that the naturally occurring macroinvertebrate assemblage will be adversely impacted in the immediate receiving streams and further degraded in Spruce Fork. The bioassessment techniques are defensible and represent the current state of the science. This prediction of degradation was based on several data analyses using WVDEP's monitoring data. Other scientists have independently conducted similar studies that support our finding that increased conductivity is strongly associated with mining and the degradation of the macroinvertebrate community. These studies (USEPA 2010a) and Bernhardt et al. 2010 in review), point to significant loss of taxa (extirpation of genera) at low conductivity levels (277-300 µS/cm). Our analyses of WVDEP data indicate a high rate (62%) of impairment (score of 68 or lower) for sites with good habitat quality and conductivity > 500 µS/cm, even when using WVDEP's family-level WVSCI. We are not aware of any data analyses by the USACE that refute these findings.

Moreover, the commenter seriously misrepresents EPA's use of detailed genus-level macroinvertebrate assessments from hundreds of Appalachian streams, including project-specific data and suites of universally accepted benthic metrics (E, P, and T). EPA's analysis was not based an "exclusive focus on an extremely narrow metric." See Responses referenced above.

The Corps' Memorandum for Record (Ex.5) is not a "comprehensive refutation." The Corps' Memorandum for Record relied upon three industry reports and conclusions that had large statistical errors, inappropriate sample representativeness, and known taxonomic quality control problems. See Responses #33, 64-67, 75, and 80. The Corps analysis also failed to fully understand the data in Hartman et al., 2005 (the only peer-reviewed information the Corps reviewed). Hartman analyzed four sets of paired streams (each pair having one reference stream and one stream with a valley fill). Hartman found significant alteration to benthic communities below valley fills, but the Corps either did not understand or disregarded that finding. See Response #118A.

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**Overall Response to Comments #87A-110A:** The majority of comments #87A-110A raise very specific questions regarding West Virginia's Water Quality Standards. In particular, the comments raise questions about how to properly evaluate compliance with those Water Quality Standards. While EPA has chosen to provide explanations in response to these comments below, EPA's action does not rely on a conclusion that the proposed discharges will violate Water Quality Standards. Rather, EPA has evaluated the expected impact of the proposed discharges on water quality. Discussions of the specific Standards provides information and context, but does not form the basis of the Final Determination. As EPA has stated clearly in other Responses:

> While the Final Determination refers to some of West Virginia's numeric and narrative water quality criteria, the Final Determination is based upon a finding of unacceptable adverse effects to wildlife. This determination is qualitatively different than and is not dependent upon a measure of compliance with water quality standards. To be clear, EPA's conclusion that the Spruce 1 mine as authorized would cause unreasonable adverse effects on wildlife is not dependent on a conclusion that West Virginia's water quality standards will be violated at or downstream of the site.

Response #33.

Furthermore, several of the responses argue that other EPA documents should have been developed under notice and comment rulemaking under the Administrative Procedure Act or some other process (e.g., the Agency's process for adopting a Water Quality Criterion). Allegations that other documents mentioned or discussed in the record for the Final Determination should have been adopted after an alternate process are beyond the scope of today's action. As stated above, EPA does not believe those documents create a Water Quality Standard or Criterion, nor has the Agency used the documents in that manner in today's action.

EPA has not repeated this discussion in each of the responses below, but hereby incorporates it into those responses.

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Comment #87A – There Is No Enforceable Conductivity Standard for EPA To Apply. The source of EPA's conductivity arguments appears to be an *ad hoc* conductivity limit of 500 µS/cm. EPA first proposed its *ad hoc* conductivity limit in April 2010 through the publication of a series of documents (titled *Improving EPA Review of Appalachian Surface Coal Mining Operations Under the Clean Water Act, National Environmental Policy Act, and the Environmental Justice Executive Order* (Apr. 1, 2010), *A Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams* (April 12, 2010)). These documents presumptively apply EPA's *ad hoc* conductivity limit to Section 402 and Section 404 permits.

Response #87A – See Responses #32, 33, 154, and 170.

Comment #88A – The proposed *ad hoc c*onductivity limit has not been subjected to notice and comment.

Response #88A – See Responses #32, 33, and 87A.

Comment #89A – Its scientific bases have not been fully vetted.

Response #89A – See Response #87A.

Comment #90A – It is neither a Section 303 water quality standard nor a Section 304(a) water quality criterion.

Response #90A – See Responses #33, 170, and 87A.

Comment #91A – Mingo Logan agrees with NMA (National Mining Association, *NMA v. Jackson*, No. 1:10-cv-01220) that the series of documents that EPA published in April 2010 must comply with the Administrative Procedure Act ("APA") and go through notice and comment rulemaking procedures. Despite the failure to comply with the APA, EPA is nonetheless applying the *ad hoc* conductivity limit to NMA members. This 404(c) action is an excellent example of the unlawful application of EPA's proposed limit.

Response #91A – See Responses #33, 164, 87A, and 94A.

Comment #92A – There is no legally enforceable conductivity standard for EPA to apply

Response #92A – See Responses #33, 154, and 170.

Comment #93A – The 404(b)(1) Guidelines, on which EPA bases its authority to review water quality, only permit consideration of the State's water quality standards. EPA appears to rest its claimed authority to enforce the 404(b)(1) Guidelines on the phrase "applicable water quality standards," which appears therein. However, EPA has defined the phrase "applicable water quality standards" to mean the water quality standards adopted by a state pursuant to the statutorily prescribed process under Section 303; in this case, West Virginia. *See* 40 C.F.R. § 131.21(d); *Alaska Clean Water Alliance v. Clarke*, No. C96-1762R, 1997 WL 446499 (W.D. Wash. July 8, 1997).

Response #93A – See Responses #33, 154 and 170.

Comment #94A – The proposed conductivity limit is not a water quality standard, as that term is defined under CWA Section 303. As Mingo Logan has explained, the State has primary authority over its own water quality standard program, and in this case West Virginia has not adopted a numeric water quality standard for conductivity. Instead, West Virginia has adopted a narrative standard designed to protect the State's designated aquatic life use, and has soundly rejected the use of conductivity as a stand-alone metric for determining compliance with the narrative standard. *See* WVDEP, "Justification and Background for Permitting Guidance for Surface Coal Mining Operations to Protect West Virginia's Narrative Water Quality Standards, 47 C.S.R. 2 §§ 3.2.e and 3.2.i" at 5-8 (Aug. 12, 2010) (hereinafter "Justification") (attached as Exhibit 4).

Response #94A – To the extent the comment repeats the point that there is no applicable numeric water quality criterion for conductivity and that the WVDEP has sole authority to interpret and apply water quality standards, see Responses #33, 154, and 170.

EPA does not believe that the Proposed, Recommended, or Final Determinations contain a proposed or final water quality standard. The commenter is correct that the Proposed

Determination extensively discusses the adverse effects of the Spruce No. 1 Mine as authorized on downstream water chemistry. EPA's consideration of changes in water chemistry and water quality is based upon the fact that adverse changes in water chemistry frequently have a corresponding adverse effect on native aquatic wildlife and water-dependent communities and the record for today's action supports EPA's conclusion regarding the potential for those impacts here. Accordingly, it is appropriate for EPA to consider as part of its Section 404(c) action changes in water chemistry as those changes affect wildlife.

EPA's consideration of increased levels of conductivity and total dissolved solids predicted to emanate from construction of the valley fills in Pigeonroost Branch and Oldhouse Branch as currently authorized and the corresponding effect on the native benthic macroinvertebrate community is not tantamount to a proposed water quality standard. In the Final Determination, EPA uses 500 µS/cm as a dose-response threshold that corresponds to adverse effects on the integrity of the benthic macroinvertebrate community and has been observed in numerous studies, including those conducted by researchers in other states. See Response #34 and Appendix 2.

EPA's Section 404(c) review of the Spruce No. 1 mine is independent of the process for interpreting the State's narrative water quality standard. As stated in more detail elsewhere, a determination that a discharge will cause or contribute to a violation of an applicable water quality standard is not dispositive of whether or not such discharge will result in an unacceptable adverse environmental effect under CWA Section 404(c). EPA has conducted an extensive review of the scientific literature regarding water quality impacts associated with surface coal mining operations, and assessed the likelihood that the Spruce mine, as permitted, would result in direct and indirect environmental effects constituting a significant and unacceptable degradation of aquatic resources, including wildlife resources.

EPA notes that when it discusses interpretations of West Virginia's narrative criterion in documents relating to EPA's Final Determination, EPA does so by relying on the West Virginia Stream Condition Index (WVSCI), which is the same metric used by WVDEP to interpret its narrative criterion for purposes of its bi-annual list of impaired waters pursuant to Section 303(d) of the CWA.

Comment #95A – The only "applicable water quality standard" is the State's narrative standard, as interpreted by the state. The State's interpretation is controlling over any competing interpretation by EPA. *Am. Paper Inst., Inc. v. USEPA*, 996 F.2d 346 (D.C. Cir. 1993); Cmt. III.C.)

Response #95A – See Responses #33, 170, and 94A.

Comment #96A – If EPA disagrees with the State on some aspect of its water quality standards, then EPA must make a specific determination that the State's standards are inadequate and thereafter follow a process for promulgating replacement standards. EPA has not done so.

Response #96A – See Responses #33, 170 and 94A.

Comment #97A – The proposed conductivity limit is also not a "criteri[on] for water quality," which EPA is authorized to promulgate pursuant to Section 304(a) of the CWA.

Response #97A – EPA does not believe that the Proposed or Final Determinations contain a "criteri[on] for water quality pursuant to Section 304(a). See Responses #33 and 94A.

Comment #98A – EPA has not followed the statutorily-prescribed process for creating a formal criterion, but has instead simply created the proposed conductivity limit for its own purposes, outside of any statutory or regulatory regime. EPA convened a panel of the Science Advisory Board ("SAB") to review the proposed *ad hoc* conductivity limit, and acknowledged in its charge to the SAB panel that it may consider pursuing such 304(a) criteria for conductivity in the future but that the Agency had not yet decided whether or how to do so.

Response #98A – See Responses #33, 154, 170, and 97A.

Comment #99A – The method used to derive the proposed conductivity limit deviates from EPA's standard methodology for establishing 304(a) criteria in a manner that would need to be vetted and reconciled through the statutorily prescribed process for adopting 304(a) criteria.

Response #99A – To the extent the comment characterizes this Section 404(c) action as a "proposed conductivity limit," EPA does not believe the Section 404(c) action represents or incorporates a proposed conductivity limit or water quality standard. See Responses #33, 154, 94A, and 97A. To the extent the commenter's reference to a "proposed conductivity limit" refers to the draft EPA Office of Research and Development's report titled "*A Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams*" USEPA 2010a), EPA does not believe that document represents a "proposed conductivity limit" or water quality standard. With respect to the commenter's reference to "EPA's standard methodology for establishing 304(a) criteria," the "standard method" for deriving water quality criteria for aquatic life published by the Agency in 1985 (Stephan et al. 1985) is guidelines and not a method required by statute or regulations. The draft Conductivity Benchmark Report USEPA 2010a) is in the process of peer review by the Science Advisory Board, as was the "standard method," the 1985 Guidelines. Water Quality Criteria may be and have been developed using methods other than the 1985 Guidelines.

Comment #100A – By way of example, the report only considers the effects of conductivity on certain invertebrate species and then limits its consideration of possible confounding factors to only one genera of mayfly, Ephemeroptera. The report fails to consider other taxa and does not include the minimum of eight different families of aquatic organisms as required by EPA's standard methodology (such as fish, mussels or aquatic plants).

Response #100A – EPA assumes the reference to "the report" refers to the draft Conductivity Benchmark Report (USEPA 2010a). As noted elsewhere, EPA's Final Determination does not rely upon the draft conductivity benchmark value. Rather, the Final Determination's discussion of conductivity and its impacts on wildlife are based on a dose-response threshold of 500 µS/cm that corresponds to adverse effects on the integrity of the benthic macroinvertebrate wildlife community. EPA relied upon site-specific data and WVDEP data sets to make this determination, and predicts adverse effects based upon a dose-response threshold identified in the published, peer-reviewed literature and confirmed in other studies.

EPA disagrees with the comment's substantive claim that EPA's draft report assesses the impacts of conductivity upon an overly narrow range of species. The draft Conductivity Benchmark Report is based on analysis of all macroinvertebrate taxa identified by the State of West Virginia, not just the Order Ephemeroptera. It includes 151 genera from 49 families, so it greatly exceeds eight families. The "standard methodology" (Stephan et al. 1985) does not require that the eight families include aquatic plants or mussels, but do contemplate the use of fish data. However, as noted in Response #99A above, the Stephan et al. (1985) method represents non-binding guidelines.

In any case, the stated purpose of the eight-family element of the guidelines is to increase the likelihood that sensitive taxa are considered. It is not a mechanism for "averaging" the levels at which each family responds to a particular stressor. In this case, field data and subject knowledge have already identified macroinvertebrates as sensitive to elevated levels of conductivity, so impacts on these organisms were evaluated.

Comment #101A – EPA's charge to the SAB was more limited than necessary for peer review of the proposed conductivity limit *as a recommended water quality criterion*. Although outside their charge, the SAB panel made a point of noting the limitations in the data used to derive the conductivity limit and expressed concern that only macroinvertebrate genera were used to develop the limit. "Although the WV database did not include fish, amphibians, or mollusks, it would be instructive to compare the differential response to conductivity among organisms groups when possible." EPA SAB, *Review of Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams* at 10 (Sep. 28, 2010 Draft.

Response #101A – See Responses #32, 97A, and 100A. As noted elsewhere, EPA's Final Determination does not rely upon the draft conductivity benchmark value. Rather, the Final Determination's discussion of conductivity and its impacts on wildlife are based on a dose-response threshold of 500 µS/cm that corresponds to adverse effects on the integrity of the benthic macroinvertebrate wildlife community. EPA relied upon site-specific data and WVDEP data sets to make this determination, and predicts adverse effects based upon a dose-response threshold identified in the published, peer-reviewed literature and confirmed in other studies.

EPA also disagrees with the substance of the comment. The quotation from the SAB panel's draft comments does not indicate a requirement or expectation that other taxa be included in the derivation of the benchmark. They merely state that the response of other taxa would be *instructive* to consider. The SAB's December 28, 2010 draft report (SAB 2010) reiterates this statement.

Comment #102A – Based on the panel's draft report, the method will require considerable additional work, data and information before being used for regulatory or permitting purposes.

Response #102A – See Responses # 32, 97A, and 101A.

As noted elsewhere, EPA's Final Determination does not rely upon the draft conductivity benchmark value. Rather, the Final Determination's discussion of conductivity and its impacts on wildlife are based on a dose-response threshold of 500 µS/cm that corresponds to adverse effects on the integrity of the benthic macroinvertebrate wildlife community. EPA relied upon site-specific data and WVDEP data sets to make this determination, and predicts adverse effects based upon a dose-response threshold identified in the published, peer-reviewed literature and confirmed in other studies.

EPA disagrees with the substance of the comment. EPA has committed to revise its draft conductivity benchmark report in response to the SAB's final comments, which have not been finalized. However, EPA notes that the Panel's draft comments have indicated strong support for EPA's field-based benchmark derivation methodology, including the Panel's December 28, 2010 recommendations to the full Science Advisory Board (SAB 2010)

Comment #103A – Because the proposed conductivity limit is neither a Section 303 water quality standard nor a Section 304(a) criterion, EPA is left with the argument that the proposed conductivity limit can be applied through the 404(b)(1) Guidelines. Mingo Logan disputes EPAs authority to review water quality under the 404(b)(1) Guidelines.

Response #103A – See Responses #154, 169, 170, and 110A. As noted in Response #110A, the 404(b)(1) Guidelines do not exclude consideration of changes in water chemistry or limit such consideration to final water quality standards or criteria. Neither the 404(b)(1) Guidelines nor their preamble limit EPA to sole consideration of water quality standards when determining whether a discharge will cause unacceptable adverse effects. EPA may use "factual determinations, evaluations, and tests" to measure or consider the extent to which a discharge will "cause or contribute to significant degradation of waters of the United States." *See* 40 C.F.R. pts. 230.10(c), 230.60, and 230.61.

EPA's consideration of the effect of elevated levels of in-stream conductivity and selenium that will result from discharges of fill material on the naturally occurring aquatic community is the product of EPA's consideration under CWA § 404(c) of "unacceptable adverse effects on… wildlife." *See* 33 U.S.C. § 1344(c). "[R]ecognizing the EPA's expertise and concentrated concern with environmental matters, Congress gave the final decision whether to permit a project to that agency. Its authority to veto to protect the environment is practically unadorned. … This broad grant of power to the EPA focuses only on the agency's assigned function of assuring pure water and is consistent with the missions assigned to it throughout the Clean Water Act." *James City County, Virginia v. EPA*, 12 F.3d 1330, 1336 ($4^{th}$ Cir. 1993).

Comment #104A – Only the Corps has the authority to apply the guidelines.

Response #104A – EPA has broad discretion under Section 404(c) in evaluating and determining whether a discharge will result in "unacceptable adverse effects." In addition, EPA's Section 404(c) regulations provide that in evaluating the "unacceptability" of impacts, consideration should be given to the "relevant portions of the section 404(b)(1) Guidelines." 40 CFR 231.2(e). See Responses #163 and 169.

Comment #105A – The 404(b)(1) Guidelines specifically exclude consideration of *ad hoc* water quality standards like the proposed conductivity limit.

Response #105A – EPA disagrees that the Final Determination represents or includes an "*ad hoc* water quality standard" for conductivity. See Responses #33, 170, and 94A. With respect to consistency with the Section 404(b)(1) Guidelines, see Response #110A.

Comment #106A – Even assuming that the proposed conductivity limit was an applicable 303 water quality standard (adopted by the State and approved by EPA) or a 304(a) criterion, it would not be independently applicable. Instead, it would need to be assessed and implemented through the State's Section 402 NPDES permit and Section 401 water quality certification for the Corps' Section 404 permit, because they are the exclusive means of regulating downstream water quality under the CWA. These proceedings have come and gone; the State fully assessed compliance with applicable water quality standards and derived limits and conditions in the permits deemed necessary to ensure that those standards will be maintained. EPA cannot second guess the State's decision-making now by reference to a new, *ad hoc* conductivity limit that has neither the force nor effect of law.

Response #106A – See Responses #154, 155, and 170.

Comment #107A – EPA deliberately excluded consideration of other water quality metrics when adopting the 404(b)(1) Guidelines.

Response #107A – See Response #110A.

Comment #108A – EPA initially proposed the 404(b)(1) Guidelines to require compliance with "any applicable State water quality standard, approved or promulgated by EPA under section 303 of the Act, or any applicable water quality criteria promulgated by EPA." 44 Fed. Reg. 54,222, 54,233 (Sep. 18, 1979).

Response #108A – The comment is descriptive of the September 18, 1979 Federal Register notice and is noted. To the extent the comment purports to address consistency with the Section 404(b)(1) Guidelines, see Response #110A.

Comment #109A – In the final 404(b)(1) Guidelines, however, EPA specifically limited the Guidelines to "any applicable state water quality standard," which EPA explained were the State's water quality standards in effect at the time. 45 Fed. Reg. 85,336, 85,343 (Dec. 24, 1980). EPA rejected consideration of the criterion promulgated by EPA.

Response #109A – The comment is descriptive of the December 24, 1980 Federal Register notice and is noted. To the extent the comment purports to address consistency with the Section 404(b)(1) Guidelines, see Response #110A.

Comment #110A – If the guidelines exclude consideration of 304(a) criteria properly promulgated by EPA, then they surely also exclude consideration of *ad hoc* limits that have not even gone through the 304(a) rulemaking process. Yet, EPA now seeks to include consideration of *ad hoc* limits that lack even the imprimatur of the CWA.

Response #110A – EPA disagrees that the Final Determination includes or incorporates an "*ad hoc*" water quality standard or Section 304(a) criterion. See Responses #170, 94A, and 97A. To the extent that the comment asserts that EPA may not consider changes in water chemistry as they impact water-dependent wildlife, EPA disagrees. To the extent that the comment asserts that the Section 404(b)(1) Guidelines limit EPA's consideration of changes in water chemistry to "any applicable state water quality standard," EPA also disagrees.

While the commenter does not specify which "other water quality metrics" (see Comment #107A) that EPA allegedly excluded from consideration, the 404(b)(1) Guidelines do not "deliberately exclude" consideration of changes in water chemistry or limit such consideration to final water quality standards. Additionally, while it is not clear what the commenter means by "excluding consideration of other water quality metrics," neither the 404(b)(1) Guidelines nor their preamble limit EPA to sole consideration of water quality standards when determining whether a discharge will be permitted. EPA may use "factual determinations, evaluations, and tests" to measure or consider the extent to which a discharge will "cause or contribute to significant degradation of waters of the United States." *See* 40 C.F.R. pts. 230.10(c), 230.60, and 230.61.

EPA's consideration of the effect of elevated levels of in-stream conductivity on the naturally occurring aquatic community does not lack the "imprimatur of the CWA" as the commenter suggests. Rather, it is the product of EPA's consideration under CWA § 404(c) of "unacceptable adverse effects on… wildlife." *See* 33 U.S.C. § 1344(c). Also see Response #170.

Comment #111A – EPA Fails To Take into Account Important Indicators of Ecological Health, and Instead Relies on Conductivity and Changes in EPT Composition, Which Are Overly Narrow Indicators of Ecosystem Health. The Recommended Determination wrongly contends that the permitted fills will cause conductivity to rise, and that this rise will cause unacceptably adverse changes in macroinvertebrate communities.

Response #111A – See Responses #7 and 66.

Comment #112A – EPA overstates the value of conductivity as an indicator of ecological health, misrepresents the potential impacts on the macroinvertebrate community, and fails to show any adverse effect to a 404(c) resource.

Response #112A – See Responses #7 and 66.

Comment #113A – EPA fails to establish a unique correlation between conductivity and the projected changes to the composition of a subset of macroinvertebrates,

Response #113A – See Responses #66, 69, 70, 78, 118A, 165A, 180A, and 181A. It is not clear what the commenter means by the term "unique correlation" means.

Pond et al. (2008) looked at the association between elevated conductivity on macroinvertebrate assemblages in mined-only sites (no residences or other stressors). Pond et al. (2008) found that 17 out of 20 (85%) of WVSCI scores (WVDEP's current listing method) were less than or equal to 68 when conductivity was greater than 500 µS/cm. See Responses #33, 35, 78, 81, 118A, 119A, 165A, 180A, and 181A. Pond et al. (2008), WVDEP data, and the draft conductivity benchmark report (including draft SAB peer review comments, SAB 2010) establish the link between conductivity and degradation or macroinvertebrate assemblages.

The cumulative impact analysis included in Appendix 5 indicates that conductivity will increase due to mining activity and showed that the effect of residences on conductivity was minor in the Coal River watershed.

Bernhardt et al. 2010 (in review) indicates that conductivity will increase with mining and these conductivity levels are associated with macroinvertebrate degradation. Bernhardt et al. supports both the EPA conductivity benchmark and the analysis contained in Appendix 5.

EPA has never asserted that conductivity is the only stressor in these systems, but that it is a major stressor. For example, in our assessments of WVSCI scores in the Recommended Determination (Appendix 2), we specifically analyzed the effects of elevated conductivity as a single stressor and the additive effects of elevated conductivity and degraded physical habitat (Appendix 2 of the RD).

Comment #114A – The Recommended Determination misrepresents the relationship between conductivity and macroinvertebrates and compounds this error by inappropriately focusing on an extremely narrow change in the composition of a small part of the macroinvertebrate community, to the exclusion of far superior indicators of ecological health, such as the West Virginia Stream Condition Index ("WVSCI").

Response #114A – To the extent the comment asserts that EPA has not established a relationship between conductivity and effects on the naturally occurring benthic macroinvertebrate population, see Responses #33, 66, 67, 71, 78, and 113A.

To the extent the comment asserts that EPA failed to consider the West Virginia Stream Condition Index (WVSCI), the comment is incorrect. EPA took a weight-of-evidence approach that is conservative and well accepted. EPA considered WVSCI scores as part of its weight of evidence approach. The Final Determination compares WVSCI scores in Pigeonroost Branch and Oldhouse Branch with those of nearby mine-impacted waters. In addition, the Final Determination refers to findings in the peer-reviewed literature (Pond, et al. 2008) based upon the WVSCI. In addition, the Final Determination summarizes an EPA Region III analysis of WVDEP ambient monitoring macroinvertebrate data from the Cumberland Mountains of the Central Appalachians subecoregion, the subecoregion in which the project is located. When conductivity levels were elevated above 500 µS/cm, the analysis showed that a majority of the sites were not fully supportive of aquatic life use, even when accounting for the possible confounding effects of acidic pH and habitat degradation. For example, after removing low-pH sites, only 100 sites out of 417 sites attained WVSCI scores greater than 68 when conductivity levels were greater than 500 µS/cm (76% of the sites reflected WVSCI scores less than 68).

When the potential confounding effect of habitat degradation was completely removed (this subset includes only sites with Rapid Bioassessment Protocol habitat scores greater than 140, indicating reference quality habitat), 62% of the sites still had WVSCI scores less than 68.

To the extent the comment criticizes EPA's consideration of genus-level data, EPA considered both family-level and genus-level data. It is appropriate for EPA to consider genus-level data in addition to family-level data. Genus-level data are generally accepted as providing a more refined and accurate analysis than the more coarse family-level WVSCI (see, for example, Guerold 2000, Hawkins et al. 2000, Lenat and Resh 2001, Arscott et al.2006). EPA's inquiry under Section 404(c) considers whether there is an unacceptable adverse effect on wildlife. While West Virginia's use of a family-level metric is one measure of effects on wildlife, it is not the sole measure, nor is it a basis for restricting EPA's inquiry. It is appropriate for EPA to consider impacts to wildlife at the genus level. Restoring and maintaining the biological integrity of the Nation's waters is part of the objective of the Clean Water Act. Over the years, various definitions have been given to the term "biological integrity." EPA's working definition that has been in place since 1981 is: "the capability of supporting and maintaining a balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of the natural habitat of the region." (http://www.epa.gov/bioindicators/html/biointeg.html). This definition includes protection of macroinvertebrate communities, as well as fish populations.

The genus level approach is consistent with the approach used in EPA's Wadeable Streams Assessment (EPA 841-B-06-002 December 2006), the first-ever statistically valid survey of biological condition of small streams in the United States.

To the extent the comment's reference to a small part of the macroinvertebrate community refers to EPA's consideration of EPT taxa composition, EPA disagrees that it was inappropriate to consider these taxa. Ephemeroptera richness and abundance are good metrics to detect impacts. EPT taxa make up a large percentage of the naturally occurring macroinvertebrate assemblage in Appalachian headwater streams. For example, mayflies often make up 30-50% of the community abundance and ~20% of the biodiversity in undisturbed headwater Appalachian streams sampled in the spring. See Response #75. Further, EPA notes that % EPT is a component metric of the WVSCI. For the WVSCI, the % EPT best standard value is 91.9%. In other words, in order for a site to score 100 on the %EPT metric, the 200-organism subsample must have ≥91.9% of the individuals in the subsample belonging to the EPT orders. The total taxa best standard value is 21 and the best standard value for EPT taxa is 13 (family level). The natural community of the invertebrate community in these streams is dominated by EPT and WVDEP recognizes this in the metrics and best standard values used in the WVSCI.

However, focusing on %EPT alone can be misleading as there are members of these orders that are tolerant to pollution and become dominant in streams draining valley fills (e.g., Hydropsychidae, Philopotamidae). EPA's rationale for using the individual E, P, and T metrics is covered in the Final Determination, appendices and response to comments on the Proposed Determination. See Responses #64 and 85.

EPA notes that throughout its comments, the commenter states that EPA focuses only on "change in EPT composition." This phrase is misleading. The "change in composition" to which the commenter refers is a wholesale disappearance (e.g., extirpation, death, avoidance), not of individuals or even species, but of every individual within every species constituting an entire genus. In its draft review comments on the ORD Conductivity Benchmark Report, the Science Advisory Board (SAB 2010) has stated: "The complete loss of a genus is an extreme ecological effect and not a chronic response. Thus, a benchmark based on extirpation may not be protective of the stream ecosystem."

When data are analyzed at the family level (such as WVSCI richness measures) to indicate a loss of taxa, the ecological effect is even more extreme. Every individual in every species within several genera must be extirpated within each family. For example in Pigeonroost, five different genera within the family Ephemerellidae were collected. All five of these genera would have to be extirpated before the WVSCI taxa richness metric would indicate a loss of a family. Therefore, family-level metrics alone are less sensitive for determinations of significant degradation of aquatic life habitat.

Comment #115A – West Virginia, which has primary authority over its water quality, has rejected EPA's proposed reliance on conductivity and narrow macroinvertebrate composition changes.

Response #115A –To the extent the phrase "primary authority over its water quality" refers to West Virginia's authority to promulgate and interpret its water quality standards, see Response #154. As stated in Responses #170 and 94A, EPA does not agree that this action imposes a new water quality standard. To the extent the comment asserts that WVDEP recently has issued guidance discussing conductivity, the comment characterizes WVDEP's guidance, which speaks for itself and the comment is noted. As stated in Responses #170 and 94A, EPA has evaluated changes in water chemistry because changes in water chemistry frequently have a corresponding impact on the naturally occurring aquatic community. In this action, EPA uses 500 µS/cm as a dose-response threshold that corresponds to adverse effects on the integrity of the benthic macroinvertebrate community and has been observed in numerous studies, including those conducted by researchers in other states. See Response #34 and Appendix 2.

As stated in Response #12, macroinvertebrates are considered "wildlife." With respect to WVDEP's interpretation of its narrative water quality criterion, see Responses #103 and 158A. Also see Responses #33, 66, 67, 118A, and 165A.

Comment #116A – EPA provides no reason to think these factors represent better, or even good, indicators of aquatic ecosystem health, much less that EPA's predicted impacts will result in an unacceptable adverse effect on 404(c) resources.

Response #116A – See Responses #33, 66, 67, 114A, 124A, and 125A.

Comment #117A – EPA Focuses on Extremely Narrow Indicators of Aquatic Ecosystem Health

Response #117A – See Responses #33, 64-67, 75, 80, 124A, and 125A.

Comment #118A – Throughout the Recommended Determination and RD Appendix 1, EPA uses terms like “extirpate,” “impact,” “degrade,” “diversity,” “impaired,” “hinder,” “taxa loss,” “richness,” “altered,” “affected,” “composition,” “shifts,” and “changes.” As a result, EPA’s claim regarding the correlation between conductivity and macroinvertebrates is a moving target.

Response #118A – Correlation is a statistical test. Taking a weight of evidence approach, EPA’s analyses of WVDEP data, EPA data and the scientific literature find strong and statistically significant correlations between several measures of degradation of the macroinvertebrate community and increasing conductivity. Elevated conductivity downstream of mining activities has been consistently associated with degradation of instream macroinvertebrate assemblages by several independent studies (Fulk et al. 2003, Kennedy et al. 2003, Hartman et al. 2005, Pond et al. 2008, Pond 2010, Bernhardt et al. *in review*).

As for the terminology used by EPA, many of them are terms used widely in scientific literature and EPA bioassessment guidance and policy. Accordingly, it is assumed that persons experienced with bioassessment would understand their meaning. Nevertheless, EPA notes that many of the terms identified by the comment are interchangeable. (The word “hinder” is not used with respect to macroinvertebrates.) In the context that EPA uses them in the Final Determination, all basically point to the same thing (that increasing mining and conductivity in streams harms aquatic life).

Extirpate=local extinction, taxa loss
Impact=harm, or pollute, or degrade, alter, affect
Impair=depends upon context. In connection with a water quality standard, means failure to achieve the applicable water quality standard; otherwise, use of this term has its ordinary dictionary definition: damage, make worse, degrade
Shift, change=alter, affect, degrade, harm, impact
Diversity= richness
Composition= identity and makeup of community, used to determine richness

Also see Response #165A.

Comment #119A – As EPA explains, conductivity is simply the ability of a solution to carry an electric current at a specific temperature. It is not a pollutant, but a rough measure of ions or TDS in the water. Conductivity can also be used to measure salinity, because most TDS are technically salts, but it does not provide information related to specific constituents in the water. It has no causative relationship with macroinvertebrates or other organisms. Conductivity can be used as an indicator of water bodies that should be studied in greater detail, but it is not a good measure of aquatic ecosystem health. *See* Section IV.C.3, *infra*.

Response #119A – To the extent the comment asserts that conductivity is not a good measure of ecosystem health, see Comment Responses # 33, 35, 78, 81, 118A, and 165A.

To the extent the comment infers that conductivity, as a measure of salts, has no causative relationship with macroinvertebrates, the commenter is incorrect. The scientific literature has established that conductivity is a good measure of the ionic strength of chemicals dissolved in water. It is a good measure of the exposure of biota to dissolved salts and has been shown to be a good predictor of the combined toxic effects of the salt mixtures in streams of the Central Appalachian coal belt (Ecoregions 69 and 70). The causative nature of the salts measured by conductivity is demonstrated in Appendix A of *Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams* USEPA 2010a). That report also describes the specific constituents that contribute to elevated conductivity in West Virginia streams. The SAB review panel has strongly supported the use of conductivity as an aggregate measure of exposure to salts (SAB 2010).

With respect to the Spruce No. 1 mine, EPA expects that conductivity increases will have significant adverse effects on native aquatic macroinvertebrates and other wildlife that are not tolerant to increased conductivity. Invertebrate health depends upon an organism's ability to maintain certain concentrations of ions in their blood and tissues, which they pull from the water via specialized cells on their gills and body surfaces and lose through defecation/urination and diffusion. Native headwater invertebrates are adapted to streams with low dissolved solids (i.e., conductivity). In Central Appalachian mountaintop mining and valley fill operations, the ionic mixture emanating from fills is fairly predictable, and tends to be alkaline or circumneutral, have highly elevated concentrations of four major ions ($SO_4$, $HCO_3$, Mg, Ca), and have only slightly elevated concentrations of K, Na, and Cl. Elevated levels of ions can be individually toxic, but mixtures of these ions can be more toxic than the individual ions, since more than one ion is a potential toxicant. Elevated ion concentrations can also create a general osmoregulatory stress on organisms that are adapted to environments with low dissolved solids (i.e., conductivity) (Pond et al. 2008). Elevated conductivity can have a toxic effect because the ions, regardless of type, can overwhelm the respiratory system and other physiological processes leading to impaired breathing, dehydration, and decreased survival or reproduction. Thus, native Appalachian taxa adapted to naturally dilute streams can be harmed by elevated conductivity for these physiological reasons. See Appendix 1 for further detail on water quality and wildlife.

To the extent the commenter relies upon CH2M HILL's citation to Timpano et al. (2010) (Technical Evaluation Document, CH2M HILL pp 3-43-3-44), that study does not support the commenter's assertion.

CH2M HILL summarizes the study as follows:

> *"A recent Virginia study (Timpano et al., 2010) evaluated the relationships among several EPT/Ephemeroptera and other biotic metrics, as well as specific ions, TDS, and conductivity. This study controlled for habitat by selecting sites with habitat scores greater than 85 percent of the average score from reference sites. It found that no single water quality parameter was overwhelmingly correlated with the biotic metrics, but that sulfate generally had the strongest relationship. Calcium, sulfate, and magnesium were correlated with the greatest number of the biotic metrics; TDS and conductivity showed weaker correlations."*

First, the value of the study is somewhat limited because the sites in Timpano et al. 2010 do not represent the full range of water quality conditions downstream of mining. The sites examined in this study had a conductivity range of 25-970 µS/cm (Table 2 from Timpano et al. 2010). This range of conductivity is lower than the range observed downstream of surface mines and valley fills. For example, in Pond et al. 2008, the conductivity mean at mined sites was 1023 µS/cm and the range was 159-2540 µS/cm. As another example, the WVDEP Valley Fill Study dataset includes 51 fills with a mean conductivity of 1913 µS/cm and a range of 264-3736 µS/cm. The conductivity in Spruce Fork if the Spruce No.1 Mine were constructed as authorized is predicted to range between 615-1226 µS/cm, and the conductivity within Pigeonroost Branch and Oldhouse Branch is predicted to range from 500-1500 µS/cm. See Appendices 1 and 2. EPA also notes that sites with very poor water quality and high TDS can have physical habitat impairment caused by water quality degradation, such as mineral precipitates coating the natural substrate. It is possible that by selecting sites with good habitat, sites with worse water quality were excluded in the Timpano et al. study.

Second, Timpano recognized that these correlations apply only in the range of TDS tested, noting in the abstract that the correlations apply "*within the range of TDS that we measured (28-792 mg/L).* Therefore, extrapolation of Timpano et al.'s results beyond this range may not be appropriate. The lack of significant correlation with relative abundance measures could be due to the truncated conductivity gradient. (The study includes a truncated conductivity gradient to the extent that the highest conductivity found was 970 µS/cm and the median was only 490. Therefore, because approximately half of Timpano et al.'s sites have conductivity <500 µS/cm, the gradient for correlation analysis is shortened in comparison to the larger West Virginia dataset reported in Pond et al. (2008) and the WVDEP Valley Fill Study.) For comparison, data used in Pond et al. included *maximum* conductivity of 2540 µS/cm and *median* conductivity of 937 out of 27 sites influenced by valley fills. As noted in Table A1.3 of Appendix 1 of the Final Determination, streams draining valley fills near the Spruce No. 1 site typically have conductivity between 1000 and 2500 µS/cm. These values are above the *maximum* conductivity level in the Timpano et al. dataset, as noted in Table 2 below from Timpano et al.:

Table 2. Distribution statistics for selected water quality parameters (test sites only, n=17). All units mg/L unless noted.

| | Temp (°C) | pH (SU) | DO | Cond. (µS/cm) | TDS | $SO_4^{2-}$ | $HCO_3^-$ | $Ca^{2+}$ | $Mg^{2+}$ | $Na^+$ | $K^+$ | $Cl^-$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Minimum | 10.9 | 6.6 | 7.8 | 25 | 27.8 | 4.2 | 5.1 | 2.2 | 1.5 | 1.0 | 1.4 | 0.9 |
| 10th percentile | 12.1 | 7.1 | 8.2 | 216 | 126.2 | 56.6 | 19.6 | 22.5 | 10.9 | 4.3 | 1.8 | 1.0 |
| Median | 13.4 | 7.9 | 9.3 | 490 | 298.0 | 155.0 | 89.9 | 45.2 | 24.0 | 18.5 | 2.9 | 1.9 |
| 90th percentile | 15.0 | 8.3 | 10.0 | 856 | 593.1 | 420.5 | 173.2 | 95.7 | 54.8 | 52.2 | 4.4 | 8.6 |
| Maximum | 17.5 | 8.5 | 10.2 | 970 | 791.6 | 531.4 | 301.7 | 119.9 | 75.4 | 135.9 | 5.0 | 9.8 |

Third, we note that Mount et al. 1997 found that several ions are toxic (including sulfate, magnesium and potassium), not solely sulfate. Timpano et al. 2010 reported that conductivity was correlated significantly to all ions (Table 3). These results support that conductivity is a good surrogate indicator for component ions and TDS.

Table 3. Pearson product-moment correlations for major ions and related measures (test sites only, n=17). All correlations shown are significant ($p < 0.05$).

| | $Ca^{2+}$ | $SO_4^{2-}$ | TDS | Cond. | $Mg^{2+}$ | $K^+$ |
|---|---|---|---|---|---|---|
| $SO_4^{2-}$ | 0.96 | | | | | |
| TDS | 0.94 | 0.94 | | | | |
| Cond. | 0.92 | 0.90 | 0.98 | | | |
| $Mg^{2+}$ | 0.96 | 0.98 | 0.92 | 0.87 | | |
| $K^+$ | 0.76 | 0.70 | 0.85 | 0.87 | 0.69 | |
| $HCO_3^-$ | | | 0.50 | 0.56 | | 0.68 |

Finally, and perhaps most importantly, we note that Timpano et al. 2010 reports strong correlations between richness measures and conductivity, even using family-level taxonomy (see Table 5). Timpano stated that, "No single water quality parameter stood out as a lone predictor of biological condition, but $SO_4^{2-}$ may be the best choice among the water quality parameters we measured if use of a single parameter is desired." CH2M HILL does not report Timpano et al. correlation coefficients, which show that increasing conductivity was strongly correlated with degradation of the invertebrate community.

Timpano et al. 2010 supports that increased conductivity is significantly and strongly associated with reduction and extirpation of taxa. Note that the taxonomy is here is at family level or higher, so these reductions in taxa richness represent reductions in family and all genera belonging to those families. Here is the table from Timpano et al. 2010 that shows conductivity was strongly correlated to macroinvertebrate metrics:

Table 5. Pearson product-moment correlations for biological metrics and water quality parameters (test sites only, n=17). Metrics are as defined in Burton and Gerritsen (2003). All correlations are significant ( $p < 0.05$).

| Metric | $Ca^{2+}$ | $SO_4^{2-}$ | $Mg^{2+}$ | TDS | Cond. | $K^+$ |
|---|---|---|---|---|---|---|
| Number of EPT Taxa | -0.81 | -0.81 | -0.79 | -0.76 | -0.76 | -0.64 |
| Number of E Taxa | -0.75 | -0.79 | -0.77 | -0.71 | -0.71 | -0.59 |
| Number of P Taxa | -0.78 | -0.75 | -0.73 | -0.72 | -0.72 | -0.60 |
| Percent 5 Dominant Taxa | 0.75 | 0.71 | 0.71 | 0.64 | 0.62 | 0.52 |
| Number of Collector Taxa | -0.66 | -0.71 | -0.71 | -0.61 | -0.58 | -0.55 |
| Number of Taxa | -0.63 | -0.56 | -0.57 | -0.50 | -0.49 | |
| Number of T Taxa | -0.52 | | | | | |

Natural background conductivity in this region is very low: we estimate median conductivity of WVDEP regional reference sites in the Appalachian mountain region to be 49 µS/cm (n=125). Conductivity is routinely strongly and significantly associated with degrading macroinvertebrate assemblages in the Central Appalachians in the scientific literature. As we have commented elsewhere, 62% of WVDEP sites in ecoregion 69d with conductivity > 500 have impaired aquatic life use (WVSCI < 68) when habitat is reference quality (Rapid Bioassessment Protocol [RBP] > 140) and pH is 6-9. EPA agrees that other stressors and pollutants are important to consider. EPA has never suggested that conductivity is the only measure of aquatic ecosystem health that should be considered for assessments.

Comment #120A – EPA essentially claims that a rise in conductivity is correlated with a decrease in the total number of a subset of macroinvertebrate species, as well as an increase in more tolerant macroinvertebrate species. In other words, EPA predicts that subsequent sampling will find fewer individual organisms that are members of a certain subset of macroinvertebrate species, but more individual organisms that belong to other macroinvertebrate species. EPA refers to this phenomena in a number of ways, but it is perhaps best characterized as a change in EPT composition. EPA provides no justification for focusing on this subtle change, which is insignificant, or this small subset of macroinvertebrates, which do not correlate with aquatic ecosystem health.

Response #120A – See Responses #64, 66, 85, 114A, 116A, 124A, and 125A.

EPT represent a large proportion of the natural macroinvertebrate community in headwater streams. This is well established in our data, WVDEP data, and the literature. See Responses #116A and 117A.

EPA notes that throughout its comments, the commenter states that EPA focuses only on "change in EPT composition." This phrase is misleading. The "change in composition" to which the commenter refers is a wholesale disappearance (e.g., extirpation, death, avoidance), not of individuals or even species, but of entire genera of organisms. By contrast, when data are analyzed at the family level (such as WVSCI richness measures) to indicate a loss of taxa, several genera must be extirpated within each family. For example in Pigeonroost Branch, five different genera within the family Ephemerellidae were collected. All five of these genera would have to be extirpated before the WVSCI taxa richness metric would indicate a loss of a family. Therefore, family-level metrics alone are less sensitive for determinations of significant degradation of aquatic life habitat

Many multi metric indices used across the country use EPT richness as an indicator. In EPA Region 3, for example, Delaware, Maryland, Pennsylvania, Virginia, and West Virginia all use EPT richness and/or %EPT as component indicators in their multi metric indices because they have been independently tested by those states and are good indicators of aquatic ecosystem health. Within Appalachia, Kentucky and Tennessee also use these indicators.

EPA also found extirpation of many taxa downstream of mined sites.

Comment #121A – EPA Focuses on a Narrow Subset of Macroinvertebrates, EPT, and Ignores Other Information, without establishing that a change in the composition of this narrow subset represents an unacceptable adverse effect, or will lead to a material decline in the overall health of the aquatic ecosystem. *See* Justification at 3.

Response #121A – See Responses #114A, 116A, 124A, and 125A.

Comment #122A – The overall group of macroinvertebrates consists of approximately thirteen more specific groupings, called "Orders." Among these are Orders of insects, aquatic worms, crustaceans, and mollusks.

Response #122A – Comment noted.

Comment #123A – The Recommended Determination focuses on just three Orders of insects: Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies), which are collectively known as "EPT." Within these Orders are dozens of Families, and even larger numbers of Genus. For example, there are at least twenty-two families of caddisfly, *see* EPA, "Benthic Macroinvertebrate Identification." At the most specific level, there are over 2,000 distinct species of mayfly.

Response #123A – See Response #124A.

Comment #124A – EPT represent only a small element of the macroinvertebrate community. As can be seen in Table 6 of the Recommended Determination, EPT species represent fewer than half of all species collected in Pigeonroost and Oldhouse. By focusing on EPT alone, EPA ignores ten entire Orders of macroinvertebrates, including Diptera, which are the most diverse group of insects in the aquatic environment, representing 40 percent of the insect taxa. GEI Consultants, Inc. Ecological Division, *Final Report Technical Review: A Field-based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams* at 11 (Sep. 2010) (hereinafter "GEI1"), Exhibit 5; RD at 53-54.

Response #124A – See Responses #33, 64, 65, 66, and 85.

EPA took a weight-of-evidence approach that went beyond analyzing the EPT orders. This approach looked at genus level taxa richness, an O/E model based on genus-level data, and the family-level WVSCI. Also see Response #114A on % EPT and EPT richness best standard values for WVSCI and #125A on EPT composition at reference sites.

We noted in response to comments for the Proposed Determination (Response #75) that a large part of the macroinvertebrate assemblage in headwater streams are EPT organisms. So we are focusing on metrics (E, P, and T richness, combined EPT richness, % E, %P, and %T, and combined %EPT) that represent a major part of the assemblage that is naturally present and representative. As noted in Response #75, Ephemeroptera (mayflies) often make up 30-50% of the community abundance and ~20% of the total biodiversity in undisturbed Appalachian streams sampled in the spring. Thus, although sensitive EPT may make up roughly half the overall number of taxa, they are also the most abundant taxa within the undisturbed community.

The number of EPT taxa is a conventional metric used in stream biocriteria and bioassessment studies in many states and each order is also frequently assessed individually because each order offers important community-level information. It is used because many species that are sensitive to common stressors are members of those orders. Dipterans, in contrast, are seldom sensitive.

We should note that the commenter appears to be in favor of the WVSCI. Again, % EPT is a component metric of the WVSCI. For the WVSCI, the % EPT best standard value is 91.9%. In other words, in order for a site to score 100 on the %EPT metric, the 200-organism subsample must have ≥91.9% of the individuals in the subsample belonging to the EPT orders. The total taxa best standard value is 21 and EPT taxa best standard value is 13 (family level). So, clearly, the natural community of the invertebrate community in these streams is dominated by EPT and WVDEP recognizes this in the WVSCI.

In contrast, the WVSCI also includes % Chironomidae as a component metric. Chironomidae are one of the most abundant families of Diptera but are naturally found in very low numbers in samples collected from healthy wadeable streams in WV. For a site to score 100 on this metric, the 200-organism subsample should contain <1% of the organisms (2 individuals) that belong to this family. Increases in Chironomidae, therefore, are assessed by the WVSCI as representing degradation of the aquatic community (e.g., a lower WVSCI score). So, although Diptera are a diverse order of insects, they are not nearly as abundant in naturally healthy wadeable streams in Appalachia. EPA recognizes that Chironomidae can be diverse in terms of taxa, but are naturally found in low numbers. Furthermore, subsequent testing of the %Chironomidae and Chironomidae richness metrics for GLIMPSS in the Appalachian ecoregions (using thousands of additional WVDEP sites, including hundreds of additional reference sites than used in the original WVSCI development), found that this metric could not reliably detect stressed conditions, especially compared to the EPT-based metrics. Although Pond et al. (2008) reported increases in %Chironomidae at mined sites compared to unmined sites, the increase was not significant ($p>0.05$). Hence, EPA did not concentrate on this group of organisms for this 404(c) action.

However, focusing on the %EPT metric alone can also be misleading as there are members of these orders that are tolerant to pollution and can dominate the subsample in very polluted sites. For example, the Hydropsychidae caddisfly *Hydropsyche* and *Cheumatopsyche* can dominate the sample in severely impaired sites and lead to a high %EPT score. Our rationale for using the individual metrics is covered in the Proposed, Recommended, and Final Determinations, and in numerous responses to comments.

Commenter's claim that EPT is a narrowly focused metric is also not true. E, P, and T independently offer valuable insight into the makeup of stream benthic communities.
The table below shows that EPT collectively make up over half of the macroinvertebrate taxa at WVDEP reference sites while other taxa are naturally less represented (i.e., based on the WVDEP reference condition). While EPA believes all taxa should be considered, EPT offer the greatest amount of information. Maggots (Diptera) are also well represented but are known to *increase* in abundance and richness with increasing degradation. However, dipteran metrics typically display significant variability that may frequently obscure changes in the benthic community if used as a metric. Because analyses should focus on responsive metrics that have higher signal:noise ratios (Klemm et al. 2003), E, P, and T (or combined EPT richness) are more statistically reliable and responsive metrics compared to, say, the highly variable chironomid richness metric (e.g., between reference and stressed sites). Most other macroinvertebrate

orders/classes in the table below lack sufficient range in genus-level richness to provide any signal in detecting responses to adverse impacts.

| Mean Number of Genera found at Reference Sites in 69d (WVDEP database) | | |
|---|---|---|
| Taxonomic Group | Spring (n=30) | Summer (n=22) |
| # Ephemeroptera | 7.4 | 5.9 |
| # Plecoptera | 6.1 | 5.2 |
| # Trichoptera | 4.3 | 5.0 |
| # Odonata | <1 | <1 |
| # Megaloptera | <1 | <1 |
| # Hemiptera | <1 | <1 |
| # Coleoptera | 2.2 | 3.0 |
| # Chironomidae | 6.8 | 6.6 |
| # Non Chironomidae Diptera | 3.9 | 3.4 |
| # Gastropoda | <1 | <1 |
| # Crustacea | <1 | <1 |

While EPA does not recommend %EPT as a stand-alone metric to assess stream quality (see Appendix 2 of the Final Determination), we note that these groups of wildlife are not only rich in the project area, but they are also abundant. On average, EPT wildlife made up over 70% of the individuals in the spring, and 55% in summer Oldhouse and Pigeonroost Branches. In contrast, Dal-Tex (Beech and L.F. Beech) made up only 24% and 29% in the spring and summer, respectively. The following table shows %E, %P, %T, and combined %EPT between Spruce No. 1 streams and Dal-Tex streams. Again, use of these order-level metrics must be viewed carefully since some orders contain highly tolerant taxa; consideration for "increasing" and "decreasing" genera in response to water quality or habitat degradation must be made (see Appendix 2 of the Final Determination).

*Table depicting mean E, P, and T abundance within and adjacent to the project area.*

| Pigeonroost and Oldhouse (average) | | | | |
|---|---|---|---|---|
| | **% E** | **% P** | **% T** | **%EPT** |
| Spring (n=4) | 37.0 | 19.7 | 14.9 | 71.7 |
| Summer (n=2) | 20.6 | 15.3 | 19.1 | 55.0 |

| Beech and L.F. Beech (average) | | | | |
|---|---|---|---|---|
| Spring (n=5) | 1.1 | 17.3 | 5.3 | 23.6 |
| Summer (n=2) | 0.5 | 0.0 | 29.0 | 29.3 |

Comment #125A – EPA narrows its focus even further within the EPT orders.

Response #125A – EPT orders make up a large percentage of the individuals naturally present in wadeable streams. In headwater streams like Pigeonroost and Oldhouse, they are the dominant animals. By contrast, most have been lost from Dal-Tex streams due to water quality and habitat degradation from mining activities. When using WVDEP reference sites in ecoregion 69d, it is clear that EPT represent a large proportion of the individuals collected (see table of %EPT summary statistics below). Moreover, the %EPT in Pigeonroost and Oldhouse (see Response #124A) are highly comparable to WVDEP reference conditions, but %EPT in Dal-Tex significantly deviates from WVDEP reference conditions. See Appendix 2 of the Final Determination for analyses on individual EPT orders and see Response #124A regarding WVSCI best standard values for %EPT.

*Table depicting summary statistics for %EPT collected in ecoregion 69d*

| Ecoregion 69d | 5th %ile | 25th %ile | 50th %ile | 75th %ile | 95th %ile |
|---|---|---|---|---|---|
| Spring REF (n=30) | 51.1 | 58.6 | 71.5 | 81.6 | 89.6 |
| Summer REF (n=22) | 47.1 | 65.0 | 76.1 | 86.6 | 89.7 |

Appendix 2 of the Final Determination also points to stark differences in the expected, or natural distribution of %E, %P, and %T in WVDEP and Pond et al., (2008) data sets. Increased %T and %P at mined sites are driven by relatively facultative-to-tolerant organisms (e.g., Hydropsychid caddisflies, *Amphinemura* stoneflies) and thus by combining all orders together in the %EPT metric, realized impacts are often muted. This is why it is important to examine individual EPT orders in relation to reference conditions.

See Responses #65, 66, 75, 116A, and 136A.

Comment #126A – At some points, EPA limits its analysis to only Ephemeroptera (mayflies) and Plecoptera (stoneflies). RD at 52; RD App. 1 at 7-9 (focusing on only 39, then 9, species).

Response #126A – See Responses #124A and 125A. The commenter appears to have misunderstood the text. EPA's analyses of particular EPT orders was simply used as examples to show detailed information on how taxa, known to exist in the project area, will be lost within and downstream of the proposed mining and valley-fill activities. The analysis also points out that the richness of these groups in the project area rank very high compared to other streams in West Virginia.

Comment #127A – At other points, EPA excludes consideration of several genera of mayfly and caddisfly. RD App. 1 at 7-8. In the development of the Observed/Expected ("O/E") index, for example, EPA ignores the entire insect family Chironomidae, and excludes all taxa that appeared in less than 10 percent of samples. RD App. 1 at 10-11 n.4.

Response #127A – See Responses #124A and 125A. As described in Appendix 2, Chironomidae were excluded due to concerns that in some industry data sets these data are only identified to family, not genera. Also, excluding rare taxa is a standard practice and recommended when developing these types of models. See the citations in the Recommended Determination, Appendix 1.

Comment #128A – EPA also focuses on Ephemeroptera (mayflies) alone at the beginning of Appendix 1, and, as discussed further below, discounts confounders primarily through comparisons to Ephemeroptera. *See* RD App. 1 at 23, 30.

Response #128A – See Responses #78, 124A, 125A, 180A, and 181A. EPA used analysis of separate groups of aquatic insects such as mayflies as robust examples of adverse affects to wildlife. Ephemeroptera were not used the only consideration used to discount confounders such as impoundments; total generic richness and total EPT generic richness were also used.

Comment #129A – Even within Ephemeroptera, EPA often focuses only on the most sensitive species. *See* RD, App. 1 at 6 (discounting genera that appear in Spruce Fork, as well as Pigeonroost and Oldhouse).

Response #129A –See Responses #124A and 125A. Commenter appears to misunderstand the difference between the naturally occurring community in unimpaired headwater streams (such as Pigeonroost Branch and Oldhouse Branch) versus larger warmwater streams that are already impaired, like Spruce Fork. The sensitive taxa referenced in the comment are part of the naturally occurring community in unimpaired headwater streams such as Pigeonroost Branch and Oldhouse Branch. Accordingly, the analysis focuses on deviation of the reference condition (loss of sensitive species), which is most important here, and on whether the taxonomic makeup differs significantly from reference conditions (i.e., below 5th percentile of WVDEP reference distribution).

Comment #130A – As noted above, EPA uses a variety of words to describe both the phenomena and the affected community that make up its claim. This has the effect of confusing EPA's very specific claim regarding a narrow group of macroinvertebrates with a number of related claims. These should not be confused.

Response #130A – See Response #118A.

Comment #131A – The Recommended Determination does not claim that the total number of macroinvertebrates located in the streams will decrease. RD App. 1 at 30-31 (admitting that macroinvertebrate "abundance" and density may actually increase).

Response #131A – See Responses #64, 83, and 85. Macroinvertebrate density has long been recognized as a metric that either increases, decreases, or shows no trend in response to pollution. The variability has led scientists to accept that it is not a worthy metric. For example, increased density of pollution tolerant worms, snails, and maggots is a well-known response signature identified in streams below failing sewage-treatment plants (Hynes 1970).

Comment #132A – EPA provides no information to suggest that the authorized fills will reduce the abundance of macroinvertebrates in Pigeonroost, Oldhouse, or Spruce Fork. *See* RD at 51-57. In fact, studies of EPT composition changes in response to elevated conductivity have consistently failed to demonstrate a change in the overall abundance of macroinvertebrates. TED2 § 4.1. While certain species may become less abundant, other species become more abundant.

Response #132A – See Response #131A.

Comment #133A – EPA also does not establish that the authorized fills will reduce either the abundance of EPT, or the abundance of EPT as a percentage of the total macroinvertebrate community in the streams. Indeed, EPA appears to concede that neither the total EPT nor percentage of EPT are likely to diminish.

Response #133A – See Responses #64, 85, and 131A. As noted in the Final Determination, it is clear that the Spruce No. 1 project will significantly diminish EPT genera.

Comment #134A – In response to the likelihood that the fills will not impact the abundance of macroinvertebrates, and may even increase it, EPA meekly argues that "an increase in these metrics is not always 'beneficial.'" RD App. 1 at 31. EPA provides no factual support for this claim and does not cite to any data or studies.

Response #134A – See Response #131A. Increased abundance of pollution-tolerant species is a classic signature of degraded water quality and is not an indication of a healthy aquatic ecosystem.

Comment #135A – EPA claims that %EPT is not a good measure of water quality because streams with poor water quality can also have a high %EPT. RD App. 1 at 26-29.

Response #135A – Comment noted. See Response #124A with respect to EPA's use of multiple methods to verify impacts to the macroinvertebrate community. See also Responses #64 and 85.

Comment #136A – EPA claims that although WVDEP does not rely on %EPT to assess water quality, it uses the WVSCI, "other scores [used in the WVSCI] can be high enough for %EPT to obscure any relationships (i.e., correlations and regression-type analyses) between biological response metrics and stressors." *Id.* at 27. Not only does EPA not explain or support this vague claim, the only example EPA provides shows exactly the opposite. *See id.* at 26-27 (discussing an example of a water body with high %EPT, that nonetheless has a very low WVSCI). This is exactly what you would expect from WVSCI as a more comprehensive measure of water quality. This example shows that a high %EPT does not overwhelm the overall score, but rather that the WVSCI score is not unduly influenced by a single metric, whether it is %EPT or EPT richness.

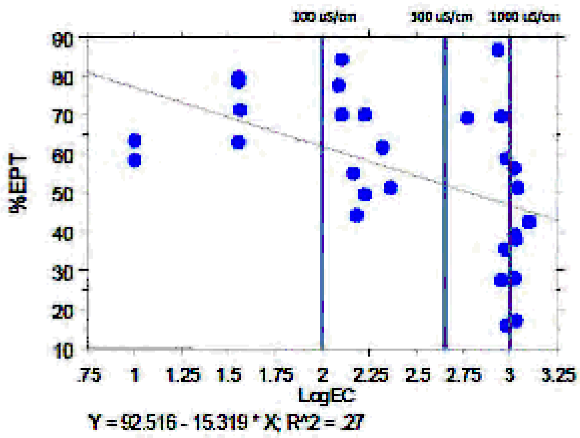
Response #136A – See Responses #64, 83, and 85, and Responses #82-91 regarding the CH2M HILL analysis. EPA believes that the discussion in the Recommended Determination cited by this comment and the associated example accurately reflects the need to ensure that biological metrics (%EPT and WVSCI) are interpreted appropriately.

With respect to the specific example cited above, this comment appears to misunderstand the text, so further explanation is provided here. A WVSCI score of 47 is quite high for a stream having only 3 families in the entire sample. (Further reinforcing the degradation of the stream, the caddisflies in the example cited by the commenter were coated in Mn and Fe precipitate.). Many scientists would agree that this site should score very low based on the quality of the assemblage. Yet in this case, WVSCI assigns it a score of 47 out of 100. Again, given that the sample contains only three families or organisms, a score closer to zero would be more intuitively appropriate given the extremely low quality of the community. When WVSCI scores like these are plotted in correlations/regression, they undoubtedly dilute real relationships. This example in the RD shows further evidence that %EPT and WVSCI can be poor indicators of significant adverse impacts and provide false positives of actual site condition. By including this example, EPA is further emphasizing that over-reliance on any single metric (including commenters' advocacy for WVSCI and %EPT – e.g., GEI Technical Report, Ex. 5) can create situations in which a clearly degraded biological community with many extirpated genera receives inappropriately high scores. EPA supplemented the WVSCI and %EPT metrics with other metrics that more fully and accurately characterize the health of the aquatic ecosystem.

TED at 3.2.2 states that "Similarly, the results of an ongoing study of mined and unmined streams in the Spruce No. 1 Mine project area (the Dal-Tex study), clearly show that there is a poor correlation between EPT and EC, as seen in Figure 3-15." "As these results show, conductivity accounts for only 27 percent of the variability in the percent EPT metric. This indicates that there are other variables that contribute to the widely scattered distribution of percent EPT, especially at the higher values approaching 1000 µS/cm, where there is a very wide distribution of the percent EPT results."

**FIGURE 3-15**

Regression Analysis of Percent EPT versus EC based on Dal-Tex Study Results.




EPA interprets the CH2M HILL data differently in that it is apparent that %EPT is not particularly sensitive to increased conductivity. Statistically speaking, Figure 3-15 appears to indicate a high degree of pseudoreplication (few individual points actually represent independent observations on independent streams); therefore these data violate assumptions of data independence and cannot be combined in this form to conduct a regression analysis. CH2M HILL's example using %EPT data from their Dal-Tex study streams clearly shows the ineffectiveness of this metric and EPA has documented in Appendix 2 of the Final Determination why this metric should not be used. To reiterate, communities from sites at the upper end of the conductivity scale in this graphic (CH2M HILL Figure 3-15) are obviously devoid of most sensitive native mayflies, stoneflies, and caddisflies and instead have likely been replaced by tolerant caddisflies (e.g., hydropsyhids/ philopotamids) and stoneflies (e.g., *Amphinemura*, capniids, taenioperygids). However, CH2M HILL did not provide raw taxonomic data for EPA review. The %EPT metric does not change strongly across the gradient because of the replacement of sensitive EPT taxa by a few more tolerant taxa.

Klemm et al. (2003) found the %EPT metric failed tests of inclusion for a multimetric-index for Mid Atlantic Highland streams because the signal:noise ratio was too low and the metric was subsequently rejected. Carlisle and Clements (1999) showed that most abundance, ratio-based, and functional feeding group metrics were either insensitive to mining metal pollution, highly variable, or both. They also showed the superiority of richness-based metrics to mining pollution.

Therefore, EPA disagrees with CH2M HILL's interpretation of the data and believes the data show that %EPT alone cannot be used to assess the health of the aquatic community.

Comment #137A – One section of the Recommended Determination meekly claims that the authorized discharges will decrease macroinvertebrate "diversity." RD at 52. The primary support that EPA marshals for its claim that macroinvertebrate and/or EPT diversity is likely to decrease at Pigeonroost, Oldhouse, or Spruce Fork is a misguided and unsupportable comparison to the Dal-Tex Complex. RD at 55-56. This technically inappropriate comparison is discussed further below.

Response #137A – See Responses #144A-151A for a discussion of the comparison to Dal-Tex. See Responses #64 and 85 for a discussion of macroinvertebrate diversity. Also see Response #56.

Comment #138A – A change in EPT composition, which is the Recommended Determination's primary claim, does not necessarily indicate a decrease in diversity of macroinvertebrates or EPT.

Response #138A – See Responses #64, 83, 84, 85, 125A, and 137A. See Response #124A regarding importance of EPT taxa richness and abundance in healthy wadeable Central Appalachian streams and use as component metrics in WVSCI (albeit at the family level). Evidence shows that many taxa (most of them EPT) are extirpated in Dal-Tex and other valley-filled streams. Because EPT also heavily weights another WVSCI metric (HBI), changes to EPT composition can severely alter this metric as well. Furthermore, decreases in overall diversity (or total richness) due to mining or increased conductivity might not be always apparent at every site (even though EPT composition, or other taxa, is radically altered). However, a loss of sensitive taxa and a concomitant increase in tolerant taxa reflects a departure from the naturally occurring community. (See Responses #136A and 137A.)

Comment #139A – As EPA concedes, the data shows that a drop in the abundance of certain species would be accompanied by a corresponding increase in the abundance of other species. *See, e.g.*, RD at 52; RD App. 1 at 26-27, 32.

Response #139A – See Response #138A. The comment appears to misunderstand how bioassessment works. Bioassessment uses healthy reference sites to explain what should be in streams. A series of metrics or models are used to describe the macroinvertebrate assemblage at reference sites. Significant departure from that structure can be measured. Changing the composition of an assemblage from the taxa that should be there, to a more tolerant assemblage that can tolerate the degraded water or habitat quality, represents a degradation of the assemblage, and bioassessment results capture this change.

States have recognized absence or reductions of the expected natural fauna of streams as part of their narrative water quality standards. For example, an excerpt from KY regulations (Section 1. Definitions, Kentucky Department for Environmental Protection [KYDEP] 2008) reads as follows: *(8) "Adversely affect" or "adversely change" means, for purposes of 401 KAR 5:026 through 5:031, 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.*

West Virginia also recognizes that a significant change in chemical, physical or biological components as part of its narrative standard: *"§47-2-3.2.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.*"

WVDEP has acknowledged that a "shift" in the macroinvertebrate community *can* constitute impairment, stating in their published 2008 Integrated List Report response to comments that: "A 'shift' in the benthic macroinvertebrate community of a stream can constitute biological impairment pursuant to 47CSR2 – 3.2.i, and the WVSCI (recognized as a "best science method" in the MTM/VF EIS) provides a sound scientific basis for assessment."

As addressed elsewhere, replacement of naturally occurring taxa with taxa that are pollution tolerant does not represent a healthy ecological assemblage. See Responses #124A, 131A, 134A, and 138A.

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**Note on #140A and Related Conductivity Benchmark Comments**

Many comments on the Proposed and Recommended Determinations reference the draft EPA report, *A Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams* USEPA 2010a). EPA's Section 404(c) Final Determination and its discussion of conductivity are not based on this conductivity benchmark value. Rather, EPA's Final Determination and its discussion of conductivity and its impacts on wildlife are based on a dose-response threshold of 500 µS/cm that corresponds to adverse effects on the integrity of the benthic macroinvertebrate wildlife community. Adverse effects of elevated conductivity above this threshold have been observed in numerous studies, including those conducted by researchers in other states. EPA references this report and the draft conclusions of EPA's Science Advisory Board (SAB 2010) within the Final Determination and these responses to comments as confirming evidence of the strong relationship between surface coal mining, elevated levels of total dissolved solids (conductivity), and impacts to macroinvertebrate wildlife. EPA notes that the report is undergoing independent peer review.

As USEPA (2010a) is undergoing peer review, the Science Advisory Board Panel has developed draft review reports synthesizing its deliberations. The SAB has made the Panel's December 28, 2010 draft report publicly available on its website. While these reports do not represent final consensus views, EPA references the SAB Panel's December 28, 2010 report (SAB 2010) as relevant information that reflects interim results of independent scientific review of *A Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams.* As noted above, EPA's Section 404(c) Final Determination and its discussion of conductivity are not based on this conductivity benchmark value. Rather, EPA's Final Determination and its discussion of conductivity and its impacts on wildlife are based on a dose-response threshold of 500 µS/cm that corresponds to adverse effects on the integrity of the benthic macroinvertebrate wildlife community. To the extent they are cited, the conductivity benchmark report (USEPA 2010a) and the SAB's draft review report (SAB 2010) are cited solely as supporting information.

EPA notes that the SAB's draft review comments are supportive of EPA's field-based benchmark derivation methodology and note that there is "clear evidence that valley fills are associated with increased levels of dissolved ions (measured as conductivity) in downstream waters, and that these increased levels of conductivity are associated with changes in the composition of stream biological communities" (SAB 2010).

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Comment #140A – EPA's complete data set shows that different macroinvertebrate species react differently to changes in conductivity. GEI1 at 7; GEI Consultants, Inc. Ecological Div., "Primary Technical Concerns with Proposed EPA Conductivity Benchmark" at 1 (undated) (hereinafter "GEI2"), Exhibit 6. Some species decrease as conductivity rises, while others increase. In addition, some species decrease when conductivity decreases, which is directly contrary to EPA's proposed correlation. This suggests that factors other than conductivity are influencing macroinvertebrate composition and further calls into question the utility of EPA's proposed conductivity limit. Other species have more complex correlations with conductivity, and increase abundance at a set point of conductivity, or at extreme lows or extreme highs. GEI2 at 1. Thus, species that were not seen in previous samples – either because the species is too uncommon to have appeared in a sample, or because the relevant metric excludes rare species – may appear as conductivity increases. *See, e.g.,* RD App. 1 at 10-11 (excluding species that occur at fewer than 10 percent of sites from consideration in the O/E metric).

Response #140A – For purposes of this Section 404(c) action and as outlined above, EPA relied on site-specific data and WVDEP data sets and predicts adverse effects based upon a dose-response threshold identified in the published, peer-reviewed literature and confirmed in other studies. EPA's Final Determination does not rely upon the draft conductivity benchmark value.

EPA disagrees with the substance of the comment. At issue is whether a particular assemblage represents what one would expect to find naturally occurring in a healthy stream. The WVSCI and the metrics EPA used assess the changes in the community compared to what would be there naturally. As stated earlier, individuals and taxa that belong to the EPT orders are an important and dominant part of the natural invertebrate assemblage in Appalachian headwater streams. These streams are naturally dilute and the taxa that are naturally present are often not tolerant of elevated TDS and conductivity.

The conductivity benchmark was designed to determine where taxa are extirpated on the conductivity gradient. This benchmark is under review by the SAB and has been independently supported by a recent study (Bernhardt et al. 2010, in review).

To the extent the comment is addressed to the O/E index used as part of the Final Determination analysis, the O/E index use of taxa with a probability of capture (Pc) of >0.1, this is a standard and recommended practice. VanSickle et al. (2007) found better sensitivity and precision of this index when Pc was increased incrementally up to 0.5. Pc>0.1 was used compared to using all taxa, to strike a balance between counting *most* taxa and VanSickle et al.'s recommendation of counting even *fewer* taxa (i.e., Pc>0.5). Phrased differently, rare and infrequent taxa are statistically unpredictable. It is appropriate to exclude rare and infrequent taxa from this type of index because one cannot be certain that the absence of the rare or infrequent taxa from a particular sample is caused by an impairing parameter or due to the fact that the taxa occurs infrequently and simply was not present.

See Responses #124A and 125A.

Comment #141A – A Mere Change in EPT Composition Does Not Independently Affect or Measure Aquatic Ecosystem Health, much less specific 404(c) resources. A change in EPT composition can have many causes, man-made and natural. Naturally occurring events, such as droughts, floods, and predator-prey interactions, may cause changes in these populations.

Response #141A – See Responses #113A-126A for a discussion of this issue.

Comment #142A – EPA's own data compels the conclusion that a specific EPT composition is not necessary to support all aquatic life uses.

Response #142A – To the extent the comment refers to the ORD Benchmark Report USEPA 2010a), EPA's Final Determination does not rely upon the draft conductivity benchmark value. Rather, the Final Determination's discussion of conductivity and its impacts on wildlife are based on a dose-response threshold of 500 µS/cm that corresponds to adverse effects on the integrity of the benthic macroinvertebrate wildlife community. EPA relied upon site-specific data and WVDEP data sets to make this determination, and predicts adverse effects based upon a dose-response threshold identified in the published, peer-reviewed literature and confirmed in other studies.

With respect to EPA's analysis for this Section 404(c) action, as explained in Response #33 and elsewhere in these responses to comments, EPA's action does not rely on a conclusion that the proposed discharges will violate water quality standards or impair "aquatic life uses" as noted by the commenter. To capture the impacts to aquatic wildlife, EPA's analysis focuses on impacts to the naturally occurring assemblage in wadeable streams in ecoregion 69d. EPT taxa are a major component of the macroinvertebrate community, and hence the aquatic ecosystem, in these streams. EPA's approach here does not differ from the approach used by states to conduct macroinvertebrate-based bioassessments of their waters. EPT is a common metric in state indices that support the aquatic life use because it is ecologically relevant and responsive to stressors. The WVSCI specifies levels of %EPT and EPT taxa that must be met. These best standard values are discussed in Response #114A. Pennsylvania, West Virginia, Maryland, Tennessee, and Kentucky consider the specific EPT composition in assessments of aquatic life use.

EPA's approach is consistent with standard bioassessment approaches, which compare the instream community to reference conditions. In WV, "comparable to reference condition" is described by WVSCI or metric values that are greater than the 5$^{th}$ percentile of metric values in the reference condition. See Response #163A.

For good quality reference sites, it is appropriate to choose a low % of reference condition, as is the case here where EPA and WVDEP used the 5th%. In other situations, where candidate reference sites include sites with more disturbance, a higher % might be appropriate (e.g. Ohio uses the 25th % of the reference condition).

Using the 5th% could be considered a less protective threshold, but we believe it is appropriate because the WVDEP reference sites and the unmined sites are of good quality.

Moreover, EPA also took a weight of evidence approach that went beyond analyzing the EPT orders. This approach looked at genus level taxa richness, an O/E model based on genus-level data, and the family-level WVSCI.

Comment #143A – The composition of EPT (or macroinvertebrates) in a given stream can vary considerably.

Response #143A – See Response #142A. EPA agrees that the composition of EPT within a stream can vary seasonally and spatially, but the accepted bioassessment methods used by EPA effectively address this natural variability.

For example, EPT varies with season naturally. This seasonal variability is dealt with in bioassessments by using index periods for a given method or comparing test sites to local reference sites that are sampled at the same time if the site must be sampled outside of the index period. The authors of the WVSCI cautioned against the use of WVSCI across multiple seasons or months, and recommended that when more data became available, that WVSCI should be re-evaluated and calibrated for seasonality. This is one reason EPA chose to evaluate other independent measures of macroinvertebrate health in addition to WVSCI.

The WVSCI and other bioassessment methods routinely rely on subsamples rather than whole samples collected at sites. This subsampling practice results in representative subsamples. This is an accepted standard practice in bioassessment and results in reliable estimates of aquatic life use condition with acceptable precision and ability to discriminate between impaired and healthy assemblages.

Bioassessments work by comparing test sites to what we would expect at reference sites. The reference sites define what the ranges of metrics can be in order to support the use. Although the metric values do vary at reference sties, bioassessment methods define protocols to define what is and what is not comparable to reference. These methods account for the natural variability found at reference sites. The use of reference sites to define attainment of the aquatic life use is established science.

The composition of EPT does not vary so much that it cannot be modeled or used as an effective indicator of aquatic ecosystem health. The Signal/Noise ratio of the EPT metric is strong. For example, the O/E analysis used 128 and 181 reference sites in the mountain ecoregion for spring and summer, respectively. With this very large reference site data set, EPT taxa made up 37 out of 51 (73%) macroinvertebrate genera collected in the spring, and made up 35 out of 51 genera (69%) in the summer. Eight EPT taxa are found > 74% of the time in WVDEP reference site 200 fixed count subsamples in the spring, while seven EPT were found >64% of the time at reference sites in the summer. The stonefly *Leuctra* was found 94% of the time in the WVDEP reference site subsamples (and 100% of the time in Pigeonroost and Oldhouse) but was entirely absent from Beech, L.F. Beech, and Spruce Fork. All of these more common, expected EPT were routinely found in Oldhouse and Pigeonroost (further indicating comparability to WVDEP's reference condition), but most of them were absent from Beech Creek and L.F. Beech Creek (indicating adverse impacts). Table 4 in Appendix 1 of the Recommended Determination shows probability of capture for organisms at reference sites. O/E models recognize that all EPT genera are not found at all reference sites all of the time and models that probability of capture.

Comment #144A – Indeed, the data presented by EPA shows that the EPT and macroinvertebrate communities vary considerably between Pigeonroost, Oldhouse, and Spruce Fork. RD App. 1 at 6-8. Table 2 in Appendix 1 shows that nine of the nineteen species of Ephemeroptera (mayflies) collected in Oldhouse and Pigeonroost appeared in only one creek or the other. Similarly, ten of the sixteen species of Plecoptera (stoneflies) appeared in only one stream or the other. *Id*. at 8.

Response #144A – The Ephemeroptera and Plecoptera tables in Appendix 1 represent multiple (and unequal) collections combined from EPA, Sturm Env., BMI, and WVDEP (WVDEP did not sample Oldhouse). The collections also represent varying kicknet sampling, Surber sampling, and qualitative handpicking from multiple stations in each stream. For these reasons, one would not necessarily expect a complete match in taxa between streams. Thus, the examples simply highlight that a high total richness (e.g., gamma diversity, or total taxa in a given area) of mayflies and stoneflies occurs in the project area.

However, when EPA compared their own 200 organism-subsample, 1 $m^2$ riffle samples across multiple seasons (excludes all other samples from Sturm Env., BMI, and WVDEP), a very high degree of overlap between mayflies in Pigeonroost and Oldhouse exists. The following table (EPA-collected 1 $m^2$ riffle sample with 200-organism subsample) shows that each site had 12 genera (alpha diversity, or richness at a single site), and out of 14 total genera (gamma diversity) (non-generic records such as "unidentified genus" were excluded), the two streams shared 10 genera (71.4%). This is in contrast to observations of wildlife in valley-filled streams (including L.F. Beech Creek and Beech Creek) where sites with conductivity level >500 µS/cm shared little, if any, mayfly taxa over multiple sites. Thus, beta diversity (change in species richness between 2 streams) is quite low (4 genera).

| Family | Genus | Oldhouse Branch | Pigeonroost Branch |
|---|---|---|---|
| Ameletidae | Ameletus | X | X |
| Baetidae | Acentrella | X | X |
| Baetidae | Baetis | X | X |
| Baetiscidae | Baetisca | | X |
| Ephemerellidae | Drunella | X | X |
| Ephemerellidae | Ephemerella | X | X |
| Ephemerellidae | Eurylophella | X | X |
| Ephemeridae | Ephemera | X | X |
| Heptageniidae | Cinygmula | X | X |
| Heptageniidae | Epeorus | X | X |
| Heptageniidae | Stenacron | X | |
| Heptageniidae | Stenonema | X | X |
| Isonychiidae | Isonychia | | X |
| Leptophlebiidae | Paraleptophlebia | X | |

WVDEP and EPA use subsampling in order to analyze benthic macroinvertebrate samples. Using these fixed count subsamples (200 for WVSCI) means that the data can't be used as a bioinventory of all taxa at each site. Instead, the subsamples provide an unbiased estimate of taxa. These approaches will not inventory all taxa and we do not expect complete agreement between sites. It is well known that beta diversity (diversity change across multiple streams) exceeds alpha diversity (richness in one stream). Despite some expected variability in subsamples, there was a high degree of overlap in alpha richness between Pigeonroost and Oldhouse. Moreover, the O/E standard deviation showed high precision among undisturbed sites at Spruce No. 1, and even higher similarity at Dal-Tex sites. This former observation indicates that Dal-Tex streams consistently had significantly fewer expected taxa (~70%) compared to reference. It is important to reiterate that bioassessments are based on what is expected at reference sites, stratified by season and ecoregion, and genus-level data provide more refined data compared to coarser family-level data. See Response #143A.

Comment #145A – The EPT composition in Seng Camp Creek was even more varied, and although EPA did not provide any data on the EPT composition of Spruce Fork, EPA indicated that it likely differs even further and lacks the sensitive EPT upon which the Recommended Decision inappropriately focuses. *See* RD App. 1 at 6-8 (stating that "many" of the mayfly genera found in either Pigeonroost or Oldhouse "have not been collected in Spruce Fork").

Response #145A – Spruce Fork and Seng Camp Creek assemblages represent degraded and impaired assemblages. WVDEP listed the entire length of Spruce Fork as biologically impaired (based on WVSCI score) on the 2010 303(d) list. In multiple samples within Spruce Fork, it is apparent that Spruce Fork suffers from adverse impacts and has low EPT richness compared to WVDEP reference sites and Oldhouse and Pigeonroost Branches. For example, in spring 1999-

2000, EPA recorded an average of only 7.4 EPT genera (range= 5-11), compared to Oldhouse (average=17.6, range= 17-19) and Pigeonroost (average=16.5, range=13-20).

Comment #146A – A change in the composition of EPT does not represent a reduction in ecological stream function. If species that perform a particular ecological function are reduced in number, they are replaced by other species that fill that niche.

Response #146A – See Responses #23, 61, 62, 74, 78, 86, 90, 147A, and 148A.

EPA notes that, throughout the comments, the commenter refers to "species," while EPA's analysis is at the family or genus level (and in fact the commenter generally advocates analysis at the family level). EPA assumes that the commenter's use of the term "species" is intended as shorthand for "taxa" rather than species-level analysis. The comment implicates two different concepts. First, the comment asserts that when a genus that feeds in a particular manner (for example, scraping) is extirpated, it is replaced with a more tolerant scraping genus. Second, the comment asserts that the replacement of a pollution-intolerant scraping genus with a tolerant scraping genus means that there is no impact to the aquatic ecosystem.

With respect to the first point, the commenter appears to rely upon GEI's report "(GEI) Technical Memorandum #2 Update on Issues for Further Investigation in Regard to the "Pond et al. Study" on Effects of Mountaintop Mining and Valley Fill on Benthic Invertebrate Communities." GEI's functional feeding group analysis of data from Pond et al. (2008) appears incorrect, probably because the functional feeding group designations used by GEI apparently did not follow those used by WVDEP and EPA Region III. The following tables (titled Table 1 and Table 2) were submitted by GEI in the above referenced technical memorandum. After the tables, we point out the inaccuracies, and explain that GEI likely did not follow feeding group designations recognized by WVDEP.

Table 1: Proportional abundance of functional feeding groups in the Pond/Passmore Study.

| Functional Feeding Group | Unmined Sites | Low Mining Activity | Moderate Mining Activity | High Mining Activity |
|---|---|---|---|---|
| Gather-collector | 29% | 23% | 24% | 24% |
| Scraper | 14% | 17% | 4% | 8% |
| Filter-collector | 12% | 20% | 24% | 24% |
| Predator | 21% | 26% | 20% | 28% |
| Shredder | 21% | 14% | 28% | 12% |
| Piercer | 2% | 0% | 0% | 4% |

Table 2: Proportional abundance of habit groups in the Pond/Passmore Study.

| Habit Group | Unmined Sites | Low Mining Activity | Moderate Mining Activity | High Mining Activity |
|---|---|---|---|---|
| Swimmer | 14% | 17% | 16% | 12% |
| Clinger | 62% | 71% | 68% | 80% |
| Burrower | 5% | 0% | 0% | 0% |
| Sprawler | 17% | 11% | 16% | 8% |
| Climber | 2% | 0% | 0% | 0% |

As stated above, the tables submitted by GEI contain several inaccuracies. For example, GEI stated that in the Pond et al. (2008) dataset, *"filterer-collectors increased between 8% and 12% from the sites without mining influence to the sites with mining influence."* As shown in Table A2.II below, Pond et al (2008) actually reports an increase from 8% to 33%). GEI stated that *"[t]he largest decrease in functional feeding groups was observed with scrapers, which decreased 10% between the sites without mines and the moderate mining activity sites,"* while Pond et al. (2008) reports a 20% reduction at "moderate" sites, and a 27% reduction at "high" sites. Pond et al. also noted that most mayflies that are eradicated below MTM/VF streams are scrapers. Finally, GEI stated that *"[a]ll other decreases or increases were 7% or less between sites without mining and sites with mining. As for the habit groups, almost all differences between percent composition of each group were small. This suggests that the overall function of the benthic invertebrate communities remained relatively unchanged even though the taxonomic composition changed."* GEI's Habit values are also incorrect based on WVDEP classifications. Data from Pond et al. 2008 show differences between unmined and mined sites with %Clingers (52% unmined vs. 35% mined) and %Sprawlers (26% unmined to 42% mined).

**From Final Determination, Appendix 2. Table A2.11. Mean relative abundance of functional feeding groups at unmined and mined sites (data from Pond et al. 2008). Mann-Whitney U-tests shown.**

| Mann-Whitney U-Test | | | |
|---|---|---|---|
| FFG (Richness) | Unmined | Mined | *P* |
| **# Collector-Gatherer Genera** | **10.5** | **8.2** | **0.03** |
| **# Scraper Genera** | **7.4** | **2.3** | **<0.0001** |
| # Collector-Filterer Genera | 3.0 | 4.1 | 0.07 |
| **# Predator Genera** | **7.2** | **4.4** | **0.01** |
| **# Shredder Genera** | **4.5** | **2.8** | **0.02** |
| # Piercer-Herbivore Genera | 0.1 | 0.0 | 0.46 |

| FFG (Rel. Abundance) | Unmined | Mined | *P* |
|---|---|---|---|
| % Collector-Gatherers | 29.5 | 32.0 | 0.61 |
| **% Scrapers** | **29.1** | **5.4** | **<0.0001** |
| **% Collector-Filterers** | **7.7** | **27.3** | **0.004** |
| % Predators | 8.4 | 6.8 | 0.19 |
| % Shredders | 24.8 | 28.3 | 0.72 |
| % Piercer-Herbivores | 0.1 | 0.1 | 0.91 |

As stated above, GEI's analysis of data from Pond et al. (2008) appears to be done incorrectly. EPA provides a more detailed breakdown of the functional feeding groups (as recognized by WVDEP) for the Pond et al. dataset below. We also provide Spearman correlations to specific conductance.

**Table showing mean functional feeding group metrics (richness and relative abundance) from Pond et al (2008) dataset.**

| FFG (Richness) | Unmined | Low | Medium | High | Combined Unmined + Mined (low) | Combined Mined (Medium+ High) | Mann-Whitney U-test | *P* | Correlation to Conductivity: Spearman *r* |
|---|---|---|---|---|---|---|---|---|---|
| **# Scraper Genera** | **7.4** | **5.0** | **2.1** | **0.9** | **6.4** | **1.4** | **333.5** | **0.000** | **-0.85** |
| **# Shredder Genera** | **4.5** | **3.4** | **2.0** | **2.0** | **4.1** | **2.6** | **244.0** | **0.021** | **-0.50** |
| **# Coll-Gatherer Genera** | **10.5** | **9.1** | **7.3** | **7.3** | **9.9** | **7.9** | **240.0** | **0.031** | **-0.48** |
| # Coll-Filterer Genera | 3.0 | 4.7 | 3.6 | 3.6 | 3.7 | 3.9 | 143.0 | 0.389 | 0.10 |
| # Predator Genera | 7.2 | 4.7 | 3.7 | 3.7 | 6.2 | 4.3 | 232.0 | 0.057 | **-0.44** |
| # Piercer-Herb Genera | 0.1 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 171.5 | 0.907 | -0.03 |

| FFG (Rel. Abundance) | Unmined | Low | Medium | High | Combined Unmined +Mined (low) | Combined Mined (Medium+ High) | Mann-Whitney U-test | *P* | Correlation to Conductivity: Spearman *r* |
|---|---|---|---|---|---|---|---|---|---|
| **% Scraper** | **29.1** | **7.6** | **9.1** | **1.6** | **18.4** | **5.4** | **304.0** | **0.000** | **-0.79** |
| % Shredder | 24.8 | 43.0 | 28.8 | 19.3 | 33.9 | 24.1 | 224.5 | 0.097 | -0.23 |
| % Coll-Gatherer | 29.5 | 28.5 | 32.3 | 33.7 | 29.0 | 33.0 | 149.0 | 0.437 | 0.04 |
| **% Coll-Filterer** | **7.7** | **14.6** | **17.5** | **41.2** | **11.2** | **29.4** | **78.5** | **0.005** | **0.60** |
| % Predator | 8.4 | 6.0 | 11.9 | 3.9 | 7.2 | 7.9 | 199.0 | 0.376 | -0.40 |
| % Piercer-Herbivores | 0.1 | 0.0 | 0.0 | 0.2 | 0.1 | 0.1 | 167.0 | 0.920 | 0.01 |

This analysis reveals categorical dose-response along unmined, low (<500), medium (500-1000), and high (>1000) conductivity. Functional feeding group richness for Scrapers, Shredders, and Collector Gatherers was higher at unmined sites and declined with increasing conductivity category. When "low" mining sites were combined with unmined (n=17; <500 µS/cm) and compared to combined "medium" and "high" mining sites (n=20; >500 µS/cm), there were significant alterations of trophic composition with genus-level scraper richness, shredder richness, collector-gatherer richness, %scraper abundance, and %collector-filterer abundance. This is in contrast to GEI and CH2M HILL's assertion that trophic function is maintained in streams below mined streams (when it is not) and points to the fact that data contained in Pond et al. (2008) had been misrepresented by commenters. See further analysis of functional feeding metrics in Final Determination, Appendix 2.

Accordingly, the assumption on which the comment is based (i.e., that scrapers will be replaced by scrapers, collectors will be replaced by collectors, etc.) is not supported. Regardless, the functional feeding classification used by the commenter (scraper, collector, etc.) describes *how* the organisms feed, but is not fully descriptive of *what* they feed upon. Even within the functional feeder classifications used by the commenter, different genera feed, process, digest, and excrete organic matter and algae differently and thus have different effects on overall stream functions. Moreover, it was apparent from the table above that the EPA found *diversity* of feeding groups significantly declined along a conductivity gradient. The diversity of scrapers, shredders, and collectors will be adversely affected in Pigeonroost and Oldhouse Branch.

EPA's analyses focus on biotic integrity, not trophic function, because intact biotic integrity implies a higher quality condition. For example, if we were to remove all the brook trout from a naturally reproducing brook trout stream and replace them with carp, the trophic function of that stream would be the same – e.g., humans could subsist on either carp or brook trout. However, the quality of the aquatic ecosystem has been significantly degraded.

It is also worth noting that functional feeding classification is not one of the metrics used by WVSCI.

Comment #147A – Data presented by CH2M HILL in the accompanying report, as well as numerous commenters to EPA's proposed conductivity limit, indicate that mined and unmined streams have approximately the same number of species within each feeding group (trophic level). This indicates that although mined streams saw a change in the composition of EPT, this change did not lead to a substantive change in feeding groups, and those streams did not see a substantive effect on the composition or function of these communities.

Response #147A – See Responses #23, 61, 62, 74, 78, 86, 90, 147A, and 148A. National ambient water quality criteria and state biocriteria are based on measures of the taxonomic composition of the exposed biotic communities, not upon feeding groups. There is no precedent in EPA policy or practices for basing decision-making upon changes in feeding groups, in contrast to the decades-long use of taxonomic composition for biological assessment and classification, as relied upon by EPA in this action.

To the extent the comment refers to the ORD Benchmark Report (EPA 2010a), EPA's Final Determination does not rely upon the draft conductivity benchmark value. Rather, the Final Determination's discussion of conductivity and its impacts on wildlife are based on a dose-response threshold of 500 µS/cm that corresponds to adverse effects on the integrity of the benthic macroinvertebrate wildlife community. EPA relied upon site-specific data and WVDEP data sets to make this determination, and predicts adverse effects based upon a dose-response threshold identified in the published, peer-reviewed literature and confirmed in other studies.

Moreover, CH2M HILL's raw taxonomic data was not provided, and, therefore, EPA cannot evaluate how the WVSCI metrics were calculated. EPA notes that CH2M HILL makes large assumptions about their data using an exceedingly narrow range of sites that are pseudoreplicated (lack independence). Moreover, the data only represent fall sampling, a time that WVDEP avoids for bioassessment. No information is given on size of the streams, age since mining, %mining in the watershed, distance to nearest fill, etc. No information is provided on the actual dates of the benthic samples. For these reasons, EPA questions the validity of CH2M HILL results.

Fall sampling is problematic for the following reasons:

(1) Very few (<1%) of WVDEP samples are from October/November (thus data collected in this season are uncharacteristic, or considered outliers in a statistical sense),
(2) At this time of year, massive egg hatches (or a hyporheic exodus) of winter stoneflies, mostly Allocapnia and Taeniopteryx (thousands per sq. meter) dominate the sample and completely obscure the assessment of the entire community.
(3) Many small streams that were dry in September/October start to flow when leaves fall

and evapotranspiration slows (thus raising the groundwater table and streamflow even when no rain has fallen). Thus, it gives only a very short colonization time for winter/spring species that have been living in the substrate or are experiencing massive egg hatch.
(4) The fresh leaf fall is unconditioned by fungi and bacteria and thus not edible, but probably most importantly, it clogs sample nets and makes it difficult or inefficient to process the sample and pick cryptic organism from the debris.

Comment #148A – EPA counters that the composition of feeding groups may change when the composition of EPT changes. One would expect this to be the case, however, and EPA notably does not allege that the *function* of the feeding groups will diminish.

Response #148A – See Response #146A. As stated in Response # 145A, *function* as used here by the commenter is not the same as stream ecosystem processes and rates of functioning. The commenters' interpretation merely refers to how an organism feeds, and what organisms feed upon is typically quite general and variable at that. Nevertheless, EPA's analysis in Appendix 1 of the Recommended Determination (to reconcile commenters' comments on the Proposed Determination) showed that mine-influenced %Collector-Filterers and %Scrapers departed significantly from what is expected (i.e., compared to unmined streams) indicating that trophic guilds were adversely affected by mining. Moreover, these feeding groups were significantly correlated to conductivity. (See Response #146A and Appendix 2, Table A2.11, for a direct comparison of mined and unmined streams with respect to functional feeding groups, which shows statistically significant differences in several groups.)

Comment #149A – These changes in EPT composition do not indicate degradation of aquatic life health because such changes do not necessarily result in losses in the functions of the EPT community as a whole.

Response #149A – See Responses #114A, 116A, 124A, 125A, 142A, and 146A.

Comment #150A – Moreover, this change in EPT composition does not indicate any impact on higher trophic level biota, because any decline in one population will be replaced by another that still satisfies the functional demands for the organisms that depend on macroinvertebrates. In fact, EPA makes no allegation that a change in EPT composition will result in an impact on higher trophic level species. This is because fish, birds, and other species that rely on macroinvertebrates are generalists, and are not dependent on a specific species of EPT.

Response #150A – See Responses #146A and 151A. See also Response #19. As set forth in Response #12, benthic macroinvertebrates are wildlife. The Final Determination identifies an unacceptable adverse effect on this wildlife.

EPA disagrees with the view that EPT composition does not indicate any impact on higher trophic level biota. Virtually all these species are dietarily opportunistic to some extent, which is not surprising given that they are migratory and frequently encounter novel environments as they migrate. But during migration all they have to do is fuel their own travel and survival; breeding season is another story. As Mulvihill has shown, Louisiana waterthrush are capable of adapting to some extent to compromised habitats, in this case streams polluted by mining, by foraging on other prey. But those individuals suffer lower productivity, and the young produced are of poorer quality. Similarly, Mattsson et al. (2009) has shown that occupancy of breeding sites by Louisiana waterthrush is affected by pollution.

So, while the birds will switch diets, and might even be able to produce some fledglings, those populations will not be as productive as before, individuals will likely not be able to survive as well, and density will decline unless supported from a source population elsewhere. But the statement that Louisiana waterthrush could "easily switch to other insects if necessary" is a gross oversimplification and does not accurately reflect the available information for this species.

Further, there remains the loss of nesting habitat and associated prey resources for Louisiana waterthrush, which is a headwater specialist by reason of its highly specialized foraging and nesting ecology. For every kilometer reach of unpolluted headwater stream that is filled, the local carrying capacity for Louisiana waterthrush is reduced by three pairs. (Mulvihill, 2010, personal communication via FWS)

Additionally, recent studies support the hypothesis that waterthrushes are strongly influenced by instream conditions as mediated by watershed size and benthic macroinvertebrate community composition further support the view that EPT composition does provide an impact on higher trophic-level biota. (Mordecai et al. 2010).

Comment #151A – After analyzing EPA's data, CH2M HILL concluded that there was no evidence that a change in EPT composition impacts higher trophic level biota.

Response #151A – See Response #150. Data shown by CH2M HILL do not support an assertion that sufficient or diverse food items or biomass (adult insect emergence) will be available to higher trophic levels such as birds or bats. First, these data represent a fall collection when many bird or bat species may not be present in the area. Spring data would be more ecologically relevant and informative, a time when bird species richness is higher, and when birds are expending more energy by defending territories, building nests, mating, and feeding young. Moreover, like with other CH2M HILL benthic analyses, EPA does not have access to any of the raw data for the bar charts in CH2MILL Tech. Evaluation (4.10). No information is given on size of the streams, age since mining, %mining in the watershed, distance to nearest fill, etc. No information is provided on the actual dates of the emergence samples.

Insects such as mayflies, stoneflies and caddisflies (EPT taxa) are considered to be wildlife themselves, and they also provide an important source of food for other wildlife that inhabit stream ecosystems. The high diversity that is frequently observed in headwater streams is influenced by the great physical habitat heterogeneity and wide range in local environmental conditions in these systems. This in-stream diversity likewise supports high diversity for those terrestrial organisms that rely on the macroinvertebrate food web. Researchers have established that stream insects provide an important source of food to the terrestrial wildlife that inhabit riparian areas, such as bats and birds (Nakano and Murakami 2001)

Comment #152A – West Virginia Uses a Far More Comprehensive Measure of Macroinvertebrate Populations as an Indicator of Ecosystem Health

Response #152A – See Responses #33, 66, 67, 71, 79, 114A, 116A, and 136A.

Comment #153A – EPA claims that conductivity is also "a good predictor of aquatic life use impairment." RD at 47-48. At most, conductivity can be used as an indicator or heuristic to highlight water bodies that should be studied in greater detail.

Response #153A – See Responses #35, 70, 78, 81, 118A, 119A, and 165A.

Comment #154A – In support of this claim, EPA cites to the Pond et al. 2008 study, which EPA proffers to support the conclusion that conductivity levels above 500 µS/cm are "strongly associated with high probability of degradation of native biota." RD at 48; RD App. 1 at 14. Both West Virginia and the Corps find EPA's reliance on the Pond study misplaced, because it ignores the numerous other important factors supporting aquatic life and is self-fulfilling.

Response #154A – See Responses #66 and 70. EPA notes that as of January 10, 2011, WVDEP continues to provide a link to a summary of the Pond, et al. (2008) study (*Downstream effects of Mountaintop Coal Mining on Benthic Communities)* and a powerpoint by one of its authors on WVDEP's Save Our Streams website at:
http://www.dep.wv.gov/WWE/getinvolved/sos/Pages/Macroinvertebrates.aspx

Pond et al. (2008) is one of a number of studies that contributes important new information to EPA's understanding of the adverse effects that will occur if the Spruce No. 1 Mine is constructed as authorized. (See Response #152). WVDEP's recent Valley Fill Study (WVDEP unpublished data 2010a) provides support for many of the conclusions drawn in Pond et al. (2008), as does Bernhardt (2010 in review). The ORD Conductivity Benchmark Report USEPA 2010a) and the recent SAB draft report on the ORD study (SAB 2010a) also support the conclusions drawn by Pond, et al. (2008). As has been discussed elsewhere, at the time the DA Permit for the Spruce No. 1 Mine was issued, the Corps' understanding of the relationship between conductivity and mining and the effect of conductivity on native benthic organisms was very limited. For example, the Corps assumed that elevated levels of conductivity were primarily caused by aluminum, iron, and manganese (Final EIS, Response to EPA Comment), whereas it is well understood now that elevated levels of conductivity are associated with elevated levels of total dissolved solids (i.e., salts). The Corps also either misunderstood or misinterpreted studies that were available at that time. See Response #86A. As far as EPA is aware, the Corps has not identified any studies or data that undermine the data and analysis in Pond et al. (2008).

Comment #155A – Although EPA claims that conductivity can independently indicate impairment, the study also used conductivity as an indicator of mining disturbance, which is self-serving, and eliminated more tolerant species from the analysis, which in turn increased the likelihood of demonstrating impairment. As the Corps' wrote, the study did not include caddisflies and "eliminated the more tolerant species of mayflies, which lowers the stream's scores and increase the likelihood of an impairment determination." *Id.* at 5-6.)

Response #155A – See Responses #66 and 70. Also, see Response #65 that addresses the concern regarding caddisflies, and #75 that addresses mayflies.

To the extent that the commenter believes Pond et al. (2008) used circular reasoning to arrive at the conclusion that conductivity can independently indicate impairment, EPA disagrees. The sites in the Pond et al. (2008) study had no residences and mining was the only stressor in the watershed. EPA relied on the well-documented notion that sulfate and conductivity indicate mining disturbance intensity (see citations in Pond et al. 2008; page 720), hence, the reason why it was used to categorize levels of disturbance. Pond et al. used conductivity (instead of sulfate) because sulfate was strongly associated with conductivity (linear modeled $R^2$= 0.94, p<0.0001) in the Bryant et al. 2002 MTM/VF PEIS chemistry dataset and because sulfate data were not collected at all sites used in Pond et al. (2008). The *a posteriori* correlations of many biological metrics, genus-level ordinations, and multimetric indices still showed conductivity was an extremely strong predictor of the biological community. These statistical findings have nothing to do with the categorization scheme (low, moderate, and high disturbance) used for mainly graphical purposes. Thus, no circularity in Pond et al.'s conclusions exist and EPA's use of the study's conclusions is appropriate. Conductivity was not used as a measure of impairment. The genus and family level invertebrate data and measures were used as measures of impairment.

Again, EPA relied on a weight of evidence approach in the RD, including use of genus level data and the family-level WVSCI. Furthermore, the commenter misinterprets the Pond et al. (2008) study. Correlations of biological metrics were performed on metals, habitat metrics, nutrients, and ions. A simple contingency analysis showed that when conductivity was greater than 500 µS/cm, the likelihood of impairment was significant. The increase in conductivity was most highly correlated to most metrics, multivariate genus ordination, and IBIs such as WVSCI and GLIMPSS. 100% of sites were impaired using GLIMPSS, while 85% were rated as impaired using WVSCI when conductivity was >500 µS/cm. Some sites were impaired at even lower concentrations, but Pond et al. chose 500 to be conservative (rather than protective). Caddisfly richness was not selected for use in the 2008 GLIMPSS for statistical reasons, not personal bias. However, a newly revised 2010 GLIMPSS for mountain streams in the spring now includes Trichoptera richness and the % Ephemeroptera metric does not exclude the tolerant mayfly *Baetis*. When comparing data from Pond et al. (2008) between these two versions of GLIMPSS, EPA maintains its contention that significant impacts occur when conductivity is >500 µS/cm.

Comment #156A – In fact, however, conductivity is a poor predictor of impairment. As the Corps explained, conductivity is far too broad and generic to be useful in managing water quality or ecosystem health.

Response #156A – See Responses #70, 78, 153A, 155A, and 165A. Conductivity is not “broad,” especially when used in the context of mountaintop mining and valley fill discharges in ecoregion 69d. It is highly predictable and tightly correlated to the dominant ion matrix discharging from these fills. In this regard, it is a superior indicator measure that can be measured instantaneously on site, is accurate, and is precise. For example, Pond et al. (2008) found that 17 out of 20 (85%) of WVSCI scores (WVDEP’s current listing method) were rated as impaired when conductivity was greater than 500 µS/cm. See Responses #33, 35, and 81.

EPA notes that the recent SAB draft report on the ORD Conductivity Benchmark Report (SAB 2010, reviewing USEPA 2010a) agreed that conductivity is an appropriate and protective surrogate measure for the component ions and that the data establishes a strong relationship between conductivity and extirpation of benthic macroinvertebrate taxa.

Also see Response #118A. The CH2M HILL report cites Timpano et al. (2010) that shows conductivity is strongly correlated to component ions, TDS, and biological metrics that VADEQ uses to determine impairment downstream of mined sites that have good physical habitat.

Comment #157A – West Virginia has also rejected conductivity as a stand-alone metric, because "more than a simple conductivity measurement is necessary to determine the heath of a stream." Instead, West Virginia uses the WVSCI, among other factors affecting the aquatic ecosystem, to enforce the State's narrative water quality standards.

Response #157A – See Responses #33, 35, 81, 116A, and 136A. The comment refers to a guidance document issued by WVDEP in summer 2010. As stated elsewhere, EPA's finding of unacceptable adverse effects under Section 404(c) is not dependent upon a finding that State water quality standards have been violated. Nevertheless, EPA notes that WVDEP's Coal River TMDL identifies waters within the Coal River sub-basin as impaired for ionic toxicity. With respect to its finding of unacceptable adverse effect, EPA used a weight of evidence approach water quality data, family and genus level macroinvertebrate data, fish assemblage data, and a review of the published literature.

As noted in Response # 114A, EPA considered WVSCI scores as part of its weight of evidence approach. The Final Determination compares WVSCI scores in Pigeonroost Branch and Oldhouse Branch with those of nearby mine-impacted waters. In addition, the Final Determination refers to findings in the peer-reviewed literature (Pond et al. 2008) based upon the WVSCI. In addition, the Final Determination summarizes an EPA Region III analysis of WVDEP ambient monitoring macroinvertebrate data from the Cumberland Mountains of the Central Appalachians subecoregion, the subecoregion where the project is located. When conductivity levels were elevated above 500 µS/cm, the analysis showed that a majority of the sites were not fully supportive of aquatic life use, even when accounting for the possible confounding effects of acidic pH and habitat degradation. For example, after removing low pH sites, only 100 of 417 sites had WVSCI scores greater than 68 when conductivity levels were greater than 500 µS/cm (76% of the sites reflected WVSCI scores less than 68). When the potential confounding effect of habitat degradation was completely removed (this subset includes only sites with Rapid Bioassessment Protocol habitat scores greater than 140, indicating reference quality habitat), 62% of the sites still had WVSCI scores less than 68.

Comment #158A – In addition to WVSCI, West Virginia takes a holistic approach and reviews other factors affecting the aquatic ecosystem to enforce its narrative water quality standards.

Response #158A – To the extent the comment asserts that WVDEP recently has issued guidance discussing how WVDEP interprets West Virginia's narrative water quality criterion, the comment characterizes WVDEP's guidance, which speaks for itself and the comment is noted.

As stated elsewhere, EPA's finding of unacceptable adverse effects under Section 404(c) is not dependent upon a finding that State water quality standards have been violated.

EPA also believes that the substance of the comment is inconsistent with West Virginia's recently submitted 2010 Section 303(d) List. EPA notes that in its recently submitted 2010 Section 303(d) List, WVDEP described its interpretation of West Virginia's narrative water quality criterion for purposes of identifying impaired streams under Section 303(d) as based solely upon WVSCI:

> *Narrative water quality criteria – biological impairment data*
> *The narrative water quality criterion of 47CSR2 – 3.2.i. prohibits the presence of wastes in state waters that cause or contribute to significant adverse impact to the chemical, physical, hydrologic and biological components of aquatic ecosystems. Streams are listed as biologically impaired based on a survey of their benthic macroinvertebrate community. Benthic macroinvertebrate communities are rated using a multimetric index developed for use in wadeable streams of West Virginia. The West Virginia Stream Condition Index (WVSCI) is composed of six metrics that were selected to maximize discrimination between streams with known impairments and reference streams. Streams with WVSCI scores of less than 60.6 are considered biologically impaired and included on the 303(d) list. Benthic macroinvertebrates are collected with a 500 mm mesh rectangular dip net. The kick sample is collected from the 1.0 $m^2$ area of substrate. Identifications are completed for a 200-organism subsample. The WVSCI was developed from data using these methods. Streams are listed as being biologically impaired only if the data was comparable (e.g., collected utilizing the same methods used to develop the WVSCI, adequate flow in riffle/run habitat, and within the current index period). Most streams with low biological scores are listed as having an unknown source/cause of impairment on the 303(d) List and most are listed, by default, for their entire length. It is doubtful that the entire length of every stream is impaired, but without further data, the exact length of impairment is unknown. Each listed stream will be revisited prior to TMDL development. The additional assessments performed in the pre-TMDL monitoring effort will better define the impaired length. The causative stressor(s) of the impairment and the contributing sources of pollution also will be identified during the TMDL development process. If the stressor identification process demonstrates that the biological impairment is not caused by a pollutant, then no TMDL will be developed.*

The same section of West Virginia's 2010 Section 303(d) List also included a chart describing "WVSCI Scoring Criteria" as ">68 Unimpaired," ">60.6 to 68 Gray Zone," and "<60.6 Impaired."

Also see Responses #66, 71, 81, 114A, 116A, and 136A.

Comment #159A – The Recommended Determination unjustifiably focuses exclusively on a single metric: a change in the composition of EPT. This analysis ignores five of the six macroinvertebrate metrics used in WVSCI, which are designed to give a complete picture of macroinvertebrate health.

Response #159A – See Responses #66, 76, 81, 85A, 86A, 114A, 116A, 124A, and 136A.

Comment #160A – The Recommended Determination also ignores all of the other metrics reviewed by the State and is a stark contrast to WVSCI's comprehensive assessment of aquatic ecosystem health.

Response #160A – See Responses #12, 66, 76, 81, 114A, 16A, 119A, 136A, and 165A.

Comment #161A – Such a narrow focus on a single macroinvertebrate metric is an inappropriate measure of impairment, significant adverse impact, or compliance with narrative water quality standards.

Response #161A – See Responses #12, 66, 76, 119A, 152A, 163A, and 165A.

Comment #162A – West Virginia does not use a change in EPT composition as an indicator of aquatic ecosystem health or to determine compliance with its narrative water quality standards.

Response #162A – See Responses #12, 66, 76, 119A, 162A, 163A, and 165A. See also Responses #124A, 125A, and 142A.

Comment #163A – EPA claims that "WVDEP has acknowledged that a 'shift' in the macroinvertebrate community can constitute impairment." RD App. 1 at 32 (emphasis omitted). This is refuted by the Justification, and the sentence cited by EPA to support this outlandish claim specifically states that such impairment is best measured by the WVSCI.

Response #163A – To the extent the comment asserts that WVDEP recently has issued guidance discussing how WVDEP interprets West Virginia's narrative water quality criterion, the comment characterizes WVDEP's guidance, which speaks for itself and the comment is noted.

As noted elsewhere, EPA's finding of unacceptable adverse effects under Section 404(c) is not dependent upon a finding that State water quality standards have been violated.

EPA also disagrees with the substance of the comment. In its response to comments on its 2008 Integrated Report submitted to EPA pursuant to 33 U.S.C. 1313(d), WVDEP stated that a shift in the macroinvertebrate population may represent impairment of the waterbody (WVDEP 2008). The commenter is correct that WVDEP uses WVSCI to measure biological impairment (see Response #158A). The WVSCI uses six (6) component metrics to summarize and analyze family-level macroinvertebrate taxa lists. The six metrics are total number of EPT (Ephemeroptera, Plecoptera, and Trichoptera, or mayflies, stoneflies, and caddisflies) taxa, total number of taxa, % of organisms that are EPT, % of organisms that are Chironomidae (midges), the % of organisms in the top two dominant taxa, and the Hilsenhoff Biotic Index. All metrics are computed at the family-level with a 200 fixed count subsample. The metrics are scored against Best Standard Values (BSVs) for the entire dataset, as a % of the BSV and normalized to a score of 100. The average of all six metrics makes up the final WVSCI score. The impairment threshold corresponds to the lower $5^{th}$% of the reference site scores. Accordingly, a shift in the macroinvertebrate community can change a WVSCI score from a score that is consistent with "unimpaired" to a score that is "impaired."

Also, see Responses #12, 66, 76, 119A, 142A, and 165A. Also see Responses #124A, 125A, and 142A.

Comment #164A – Unless there is evidence that a change in EPT composition has had a significant adverse impact on the rest of the aquatic ecosystem, a change in EPT composition alone will not result in a violation or degradation of West Virginia's narrative water quality standard.

Response #164A – As noted elsewhere, EPA's finding of unacceptable adverse effects under Section 404(c) is not dependent upon a finding that State water quality standards have been violated. Nevertheless, EPA also disagrees with the substance of the comment. A change in EPT composition can result in a change in the WVSCI score from a score that is consistent with "unimpaired" to a score that is "impaired." EPT taxa and individuals make up a large percentage of native taxa and individuals expected to be present in the aquatic ecosystem. See Responses #124A, 125A, 142A, and 163A.

Comment #165A – West Virginia analyzed the use of conductivity and a change in EPT composition, and concluded that "EPA's proposed limits are too narrowly focused on a single parameter and single aquatic species to determine the health of the impacted watershed." "An ecosystem does not exist at a single point and, accordingly, its health cannot be assessed at a single point."

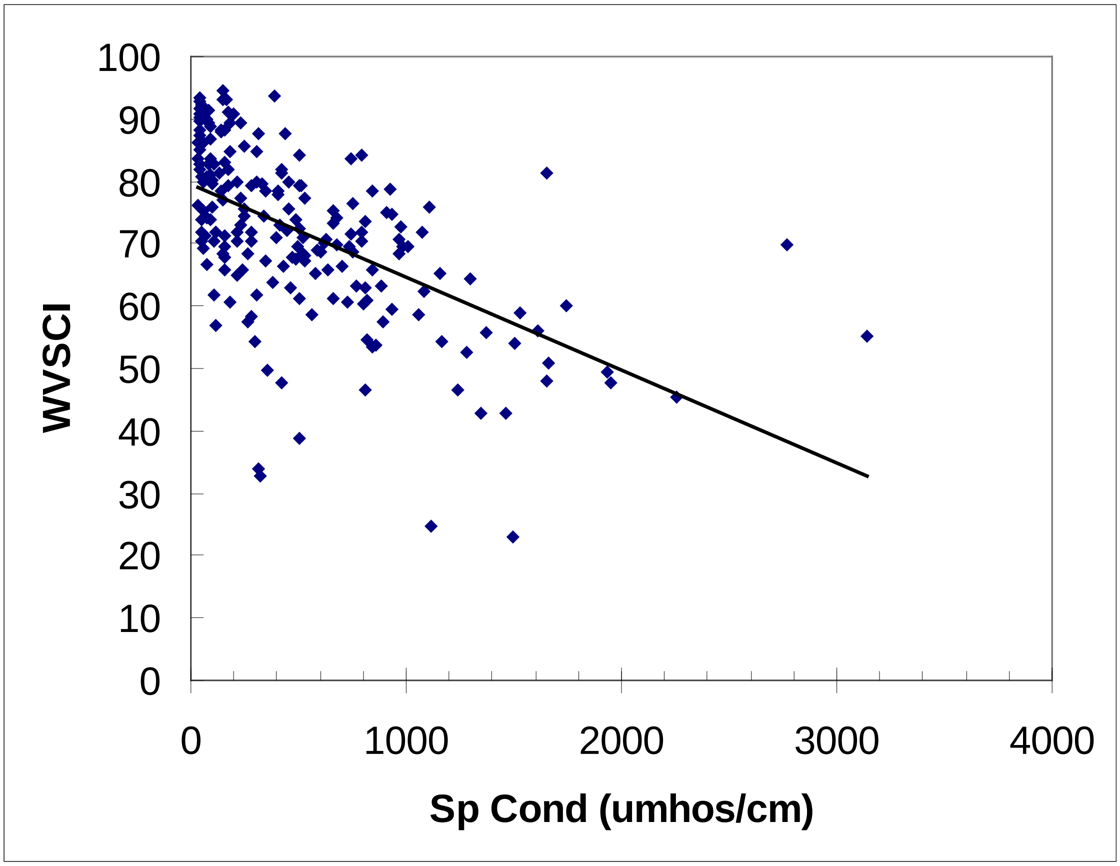
Response #165A – See Responses #12, 66, 76, and 119A.

The WVDEP analysis of the 5505 sites does not partition natural variability in the dataset due to bioregion. The EPA analysis of WVDEP data considered only those sites in Ecoregion in 69d, where the proposed project is located, to help partition natural variability in water quality. Natural background conductivity in this region is very low: We estimate median conductivity of WVDEP regional reference sites in the Appalachian mountain region to be 49 µS/cm (based on 128 sites (n=128)).

The WVDEP scatter plot did not try to filter out the effects of low pH and habitat degradation, or septic discharges on the macroinvertebrate assemblage, which can be common stressors in WV.

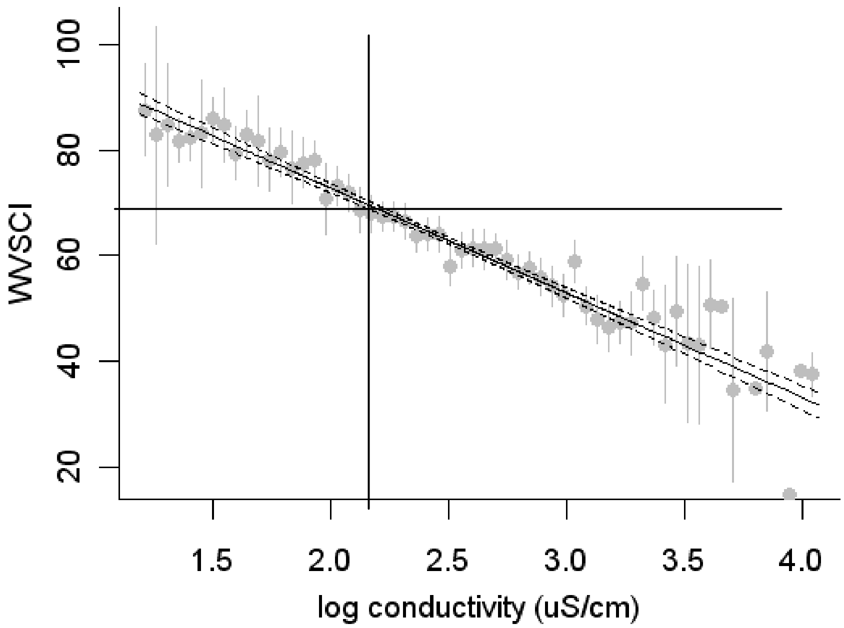
The following is an alternative analysis of the WVDEP data. EPA filtered the WVDEP dataset to include summer samples from sites (n=200) in ecoregion 69d (to classify by region and season), with watersheds < 6400 acres (to include smaller wadeable streams), RBP habitat scores > 140 (to exclude habitat as a stressor), pH 6-9 (to exclude low pH as a stressor) and fecal coliform < 400 col/100 ml (to exclude septic discharges as a stressor). This dataset shows a stronger relationship between increased conductivity and increasing impairment (decreased WVSCI scores) than the graphic submitted by HW.

*Plot of conductivity-WVSCI relationship using WVDEP Data following data filtering*




Another technique of plotting WVSCI versus conductivity (log transformed) would be to plot the mean WVSCI score within individual bins of increasing conductivity. This technique focuses on the central tendencies of the data and diminishes the effect of outliers on the relationship. The means must be bound by confidence intervals to show the variation, but the relationship is better visualized than showing all samples. The graphic below shows WVSCI scores from the filtered dataset used in EPA's draft conductivity benchmark report (USEPA 2010a, graph provided by L. Yuan, EPA ORD). Here, WVSCI scores below 68, on average, are found when conductivity is greater than 250 µS/cm.

*Plot of Conductivity-WVSCI Relationships Following Data Filtering*




The analysis in the Final Determination filtered out sites potentially impacted by habitat degradation and low pH. This type of filtering is necessary to examine correlations between specific pollutants and multi metric indices. EPA found that non-acidic sites with good habitat (RBP > 140) and elevated conductivity (> 500 µS/cm) had a high rate of degradation (62% of the sites in this class scored below 68, meaning the sites failed to achieve a WVSCI score consistent with fully supporting the aquatic life use). When sites have both poor habitat and high conductivity, there is a higher rate of degradation (89%). EPA has acknowledged that poor habitat can also cause or contribute to degradation (Appendix 1, Table A1.7).

Comment #166A – EPA's myopic focus on EPT composition obscures the fact that conductivity is poorly correlated with WVSCI scores. West Virginia considers streams that receive a WVSCI score below 60.6 to be impaired.

Response #166A – See Responses #35, 72, 114A, 116A, 136A, 165A, 169A, 180A, and 181A.

Comment #167A – Figure 1, which also appears in the WVDEP Justification document and is similar to one included in the initial CH2M HILL report (TED, Cmt. App.), makes clear that the "correlation" between conductivity and aquatic life use is tenuous at best.

Response #167A – See Responses #35, 72, 114A, 116A, 136A, 165A, 180A, and 181A.

Comment #168A – At very low conductivities, a huge number of streams have WVSCI scores below 60.6, and at a conductivity of 1000 µS/cm – double the *ad hoc* limit proposed by EPA – many streams had WVSCI scores above 60.6.

Response #168A – See Responses #72, 165A, and 169A.

To the extent the comment refers to 500 µS/cm as an "*ad hoc* limit," that value does not represent an ad hoc water quality standard or water quality criterion. 500 µS/cm represents a dose-response threshold that corresponds to adverse effects on the integrity of the benthic macroinvertebrate community and has been observed in numerous studies, including those conducted by researchers in other states. See Response #170.

With respect to Figure 1 submitted by commenters, the scatterplot did not filter out poor habitat sites or low pH sites and does not account for other stressors. Where other stressors are filtered out, the correlation with conductivity is much stronger. See Response # 165A.

Comment #169A – A WVSCI score above 68 indicates fill support of aquatic life uses, but West Virginia uses 68 as an impairment threshold in order to account for sampling errors to avoid misclassifications. EPA attempts to strengthen the relationship between conductivity and WVSCI scores by unilaterally raising the reference value of 68 to 72. EPA simply asserts, with no supporting data, that a review of all reference sites indicates that the 5$^{th}$ percentile of the reference scores is actually 72.

Response #169A – See Response #165A. EPA was not "attempting to strengthen the relationship between conductivity and WVSCI." Rather, as part of its weight of evidence approach, EPA considered the fifth percentile of available reference sites. The original WVSCI dataset included 107 reference sites statewide. WVDEP identified 68 as the score that correlates to the 5$^{th}$ percentile of the original 107 reference sites. Since 2000 when WVSCI was developed, additional reference sites have been identified. Several hundred (n=394) candidate reference sites are now available to better define reference conditions for aquatic life uses. All reference sites are identified in the WVDEP database. A current version of the WVDEP database can be obtained directly from WVDEP. EPA considered the 5$^{th}$ percentile of all currently available reference sites. The 5$^{th}$ percentile correlates to a WVSCI score of 72.

EPA's analysis for purposes of the Final Determination does not use a WVSCI score of 72 to reinterpret WVSCI and identify a new impairment threshold, but rather as a way to identify the 5$^{th}$ percentile reference conditions as part of EPA's weight of evidence approach. Both Appendix 1 and Appendix 2 of the Final Determination clearly identify that EPA was not reinterpreting WVDEP's interpretation of WVSCI, but rather identifying 72 as a 5$^{th}$ percentile of currently available reference sites. Indeed, the analysis in Appendix 1 uses scores of both 68 and 72. EPA does acknowledge, however, that the last column in Table A2.10 of Appendix 2 ("Fully Supports Aquatic Life Using WVSCI >72") is confusing despite the explanation in the text. Accordingly, that heading has been changed to: "Consistent with 5$^{th}$ percentile of all currently available candidate reference sites (WVSCI>72)." EPA notes that consideration of the WVSCI score of 72 in Table 10 clearly was not used to "strengthen" the correlation between conductivity and WVSCI. Table 10 simply identifies the biological scores at certain locations within Spruce Fork, Pond Fork, and the Little Coal River and does not include conductivity values or any attempt to correlate those biological scores to conductivity values.

Comment #170A – The variability in values for number of taxa is wide, suggesting that other stressors are better predicators of attainment or impairment. *See* Justification at 6 ("native aquatic life is protected at various values and ranges of specific conductance").

Response #170A – See Responses #35, 78, 116A, 119A, 136A, 165A, 180A, and 181A.

Comment #171A – Both the Corps and West Virginia find the WVSCI assessment to be a more comprehensive and superior measure of water quality, which correlated poorly with conductivity scores.

Response #171A – In addition to genus-level analysis, Pond et al. (2008) conducted analysis using the WVSCI metric and reached similar conclusions using both metrics; most notably, Pond et al. (2008) found that conductivity is an excellent predictor of aquatic life impacts. See Responses #66, 72, 114A, 119A, 156A, 157A, and 165A.

Comment #172A – The WVDEP called it a "loose and questionable causal relationship between conductivity and stream impairment," and concluded that "regulation solely via an indicator such as specific conductance is not the best way to protect against excursions from [the State's] narrative [water quality] standards." WVDEP adds that under the EPA-approved TMDL process, conductivity does not even become a likely stressor of a stream until it reaches 1075-1532.9 µS/cm, two to three times EPA's recommended limit.

Response #172A – See Responses #81, 114A, 156A, 157A, and 165A. EPA has found that the WVDEP "likely stressor" threshold is associated with an 85% impairment rate, using WVSCI. See Response #81.

Comment #173A – Although West Virginia uses WVSCI and other factors to determine "impairment," EPA proposes its own method of determining impairment using the O/E index. EPA declares that the 5th percentile of the reference site scores within the O/E index is an appropriate measure of impairment, because the WVSCI uses the 5th percentile of reference site WVSCI scores to create its impairment threshold. This attempt to equate the O/E index and WVSCI ignores the obvious fact that the scores and the indexes themselves *measure completely different things*.

Response #173A – As set forth in Responses #33 and 154, EPA's conclusion that the Spruce 1 mine as authorized would cause unreasonable adverse effects on wildlife is not dependent on a conclusion that West Virginia's water quality standards will be violated at or downstream of the site. The commenter misunderstands how EPA used the O/E Index. The O/E Index is not being used to replace WVSCI. Rather, both the O/E Index and WVSCI are two tools that EPA employed as part of a weight of the evidence approach to assessing the adverse effects that will be caused by construction of the Spruce No. 1 Mine as currently authorized. The O/E Index is a recognized and established method for analyzing the condition of the biological community. It simply compares the biological community that one would expect to find with the one that is actually there. In this Section 404(c) action, EPA used the O/E Index to predict the taxa loss that would be expected from the construction of the Spruce No. 1 Mine and to analyze potentially confounding effects such as habitat. The O/E Index was not the only analytical tool employed by EPA. As part of its weight of the evidence approach, EPA also analyzed WVSCI scores and used other analyses described in the Final Determination and in Appendix 2. To the extent the commenter believes the 5th percentile does not apply to O/E, EPA disagrees. The 5th percentile is part of the reference distribution, it still represents that when site conditions fall below this value (for any conceivable metric, index, or other quantitative measure for that matter), there is significant deviation from the reference condition.

EPA notes that it is not always appropriate to use the 5$^{th}$% as a threshold for significant degradation in bioassessments. The 5$^{th}$% of reference condition scores is appropriate when reference sites are in good condition and most of the variation in the candidate reference site scores is assumed to be natural. When candidate reference sites have more disturbance from sources of water quality pollution or habitat degradation, states often choose higher percentiles of the reference (e.g. Ohio uses the 25$^{th}$%, VA uses the 10$^{th}$ percentile) to acknowledge that some of the variation in candidate reference site scores is due to disturbance from stressors. The 5$^{th}$% is the minimum threshold used in state or EPA bioassessments, and is appropriate here because the reference sites are in good condition.

Also see Response #142A.

Comment #174A – Having equated the O/E and WVSCI, EPA declares that 85 percent of the sites in the Pond study with conductivity above 500 µS/cm were "impaired" and that O/E scores below the 5th percentile value represent an "unacceptable adverse effect." EPA provides no information to suggest that this conflation of O/E with WVSCI is appropriate, and it appears as if EPA has engaged in this exercise in order to circumvent the fact that the appropriate metric for determining impairment, WVSCI score, is poorly correlated with EPA's proposed conductivity limit.

Response #174A – See Responses #142A, 171A, and 173A.

Comment #175A – EPA's Proposed Correlation Between Conductivity and a Change in EPT Composition Ignores a Wide Range of Confounding Variables. EPA's contention that increased conductivity is strongly correlated with a change in the composition of EPT ignores other factors similarly correlated with a change in the composition of EPT. EPA provides no information to suggest that these other factors do not account for some or most of EPA's predicted change in EPT composition. Indeed the data suggests that this is what is occurring.

Response #175A – See Responses #35, 78, 118A, 119A, 165A, 180A, and 181A.

Comment #176A – EPA attempts to establish its proposed conductivity limit without any independent laboratory exposure studies. Instead, EPA has picked one metric that is correlated with a change in the composition of EPT (of which there are many) and declared it to be the cause of all observable macroinvertebrate community structure changes in extremely variable environments.

See Responses #78, 118A, 119A, and 165A to the extent that the comment applies to observed correlations between conductivity and EPA or WVDEP data.

The comment's reference to "conductivity limit" appears to refer to the ORD Conductivity Benchmark Report USEPA 2010a). As stated elsewhere, EPA's determination of unacceptable adverse effects under Section 404(c) does not depend upon the ORD Conductivity Benchmark Report.

Nevertheless, EPA disagrees with the substance of the comment. The conductivity benchmark is based on all macroinvertebrate genera, not just EPT. The specific mechanisms of toxicity are discussed in Appendix A of EPA's conductivity benchmark report (USEPA 2010a). The mechanism that is believed to be strongest in the streams with elevated conductivity is interference with the chloride pump by reducing or eliminating the bicarbonate gradient that enables chloride uptake. That and other mechanisms for the toxicity of salts to freshwater organisms are well known and well described in the literature.

The benchmark also is not based on an assumption that salts are "the cause of all observable macroinvertebrate community structure changes." Rather, it is based on the fact that the effects of salts are common in the region and can be analyzed without significant confounding by other potential causes. In its draft review comments, the SAB review panel has noted that EPA's field-based methodology "provide[s] improvement over a benchmark that might have been derived from laboratory test data using test species that are not native to the region and do not reflect the broad range of life stage and life history strategies" (SAB 2010, p. 2).

Comment #177A – EPA has not identified any published study indicating that sensitive invertebrate taxa exhibit acute or significant chronic toxicity at the proposed conductivity limit. If the proposed conductivity limit does have some toxicological significance, then EPA should be able to demonstrate some evidence that the particular EPT species EPA focuses on have a sensitivity to one or more of the water constituents that conductivity measures. Yet, EPA makes no attempt to explain the specific mechanisms of ion toxicity and has provided no toxicological explanation for the supposed causal relationship between the proposed conductivity limit and the specific EPT species.

Response #177A – EPA assumes the reference to "the report" refers to the draft Conductivity Benchmark Report (USEPA 2010a). As noted elsewhere, EPA's Final Determination does not rely upon the draft conductivity benchmark value. Rather, the Final Determination's discussion of conductivity and its impacts on wildlife are based on a dose-response threshold of 500 µS/cm that corresponds to adverse effects on the integrity of the benthic macroinvertebrate wildlife community. EPA relied upon site-specific data and WVDEP data sets to make this determination, and predicts adverse effects based upon a dose-response threshold identified in the published, peer-reviewed literature and confirmed in other studies.

Nevertheless, EPA disagrees with the substance of the comment. See Response #176A. These native biota are more ecologically relevant, and appear to be more sensitive to ionic toxicity, than the laboratory surrogates typically used in acute and chronic testing. Standard laboratory toxicity testing methods do not currently exist for more relevant and sensitive invertebrate taxa. EPA believes (and the SAB Panel has agreed in its draft comments – SAB (2010)) that conductivity is an appropriate and defensible measure for ionic toxicity and that field data using native invertebrates provide a more ecologically relevant endpoint.

Comment #178A – There are numerous other causes of changes in macroinvertebrate composition that EPA's proposed conductivity limit does not measure. These include changes to dissolved oxygen, hydrology, nutrients, organic-matter, pH, salinity, sediment loads, suspended solids, turbidity, water temperature, habitat, chemical levels, land use, droughts, floods, and interspecies competition, among others. EPA provides no data to suggest that these factors do not influence ecosystem health and the composition of the EPT community.

Response #178A – EPA assumes the reference to "the report" refers to the draft Conductivity Benchmark Report (USEPA 2010a). As noted elsewhere, EPA's Final Determination does not rely upon the draft conductivity benchmark value.

Nevertheless, EPA disagrees with the substance of the comment.

EPA agrees that other stressors and pollutants are important to consider. EPA has never suggested that conductivity is the only measure of aquatic ecosystem health that should be considered for assessments. However, the fact remains that conductivity is routinely strongly and significantly associated with degrading macroinvertebrate assemblages in the Central Appalachians according to analyses conducted by both EPA and independent sources, and as published in the scientific literature. In fact, Mingo Logan's comments cite a study that confirms conductivity is strongly correlated to several macroinvertebrate richness measures at sites with good habitat (Timpano et al. 2010). As we have noted elsewhere, 62% of WVDEP sites in ecoregion 69d with conductivity > 500 have degraded aquatic life use (WVSCI < 68) when habitat is reference quality (RBP > 140) and pH is 6-9.

In addition, EPA applied an accepted and peer reviewed approach, called an Observed/Expected index (O/E) (Hawkins 2006b, Van Sickle et al. 2005) to estimate and quantify the taxonomic changes in streams impacted from mining activities in the Spruce Fork watershed. In order to assess the influence of abiotic stressors on O/E score variation, a multiple regression analysis was performed on several habitat metrics plus conductivity, temperature, and pH across the 37-site dataset from Pond et al. (2008). The analysis shows that conductivity was the only metric significantly correlated with O/E values. Regression coefficients were not significant for sediment deposition, substrate embeddedness, channel alteration, riparian zone width, pH, or temperature. In fact, habitat offered little explanatory value in O/E variation.

See Responses #35, 78, 180A, and 181A. For analyses that filters out other potential stressors, see Response #165A.

Comment #179A – By merely arguing that conductivity is a *superior* indicator of changes in EPT composition, EPA implicitly concedes that other factors, which are not measured by conductivity, impact EPT composition. In fact, EPA acknowledges that "habitat can strongly affect" the composition of the macroinvertebrate community. RD App. 1 at 16. This is confirmed by various studies which show that habitat is an important contributor to the health of the aquatic ecosystem.

Response #179A – See Responses #33, 78, 165A, 178A, 180A, and 181A.

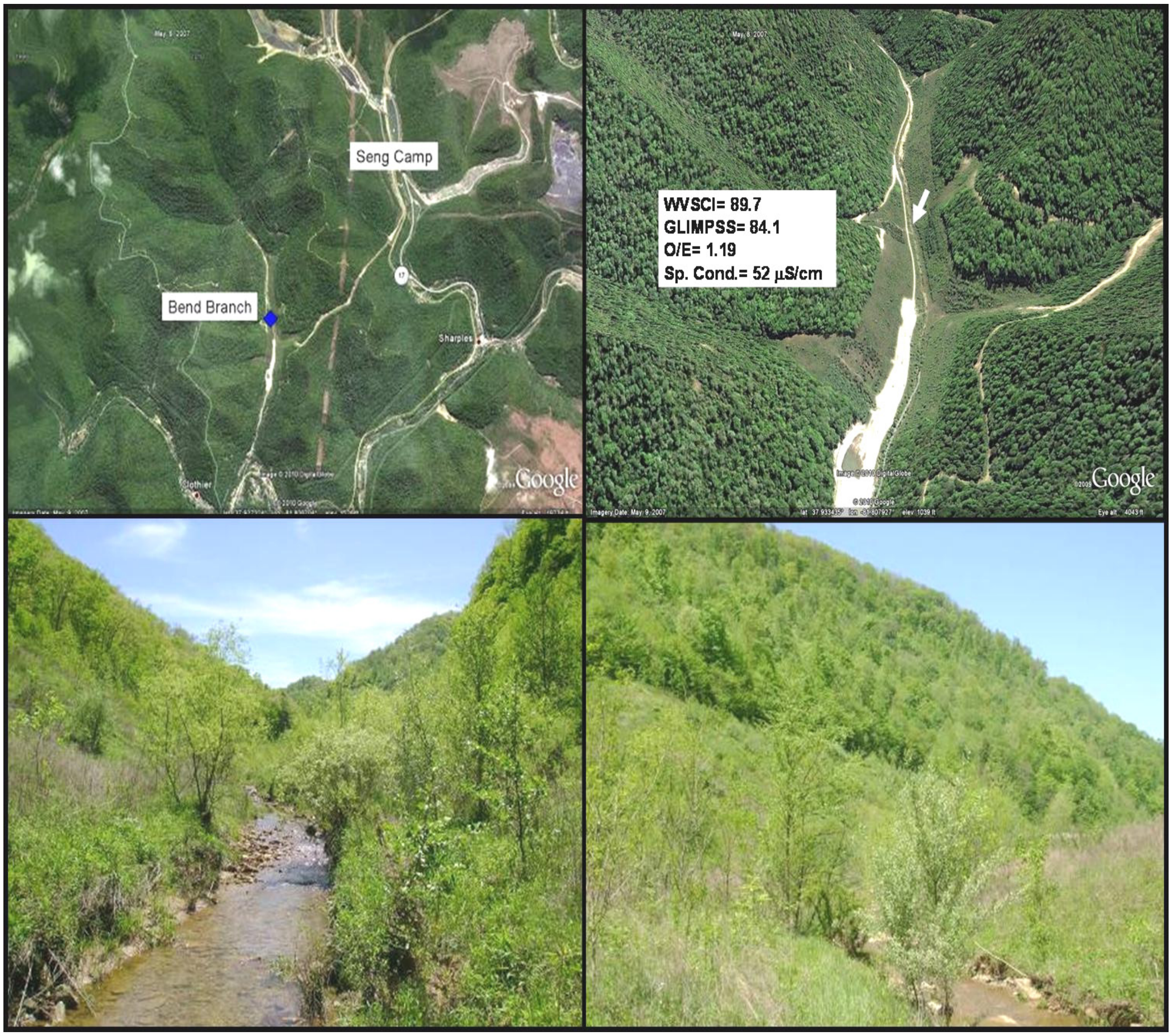
Comment #180A – Despite the importance of habitat, EPA did not adequately analyze habitat as a confounding variable. Instead, EPA's O/E scores were based on sites with uniformly favorable habitat, and are therefore unreliably skewed. Only 5 of the 40 sites studied had habitat scores less than 140. Without a representative selection of habitat scores, EPA could not meaningfully assess the impact of habitat on EPT scores. This is a significant omission, since habitat is a better predictor of degradation, as measured by WVSCI scores.

Response #180A – EPA disagrees. The range or gradient of habitat scores in Pond et al. (2008) was more than sufficient for regression-type analysis, much like the range in pH and D.O. values. However, the main point of EPA's analysis in the Final Determination is to determine whether there will be unacceptable adverse effects. In order to analyze the potential effect from increased levels of conductivity, EPA needed, to the extent possible, to evaluate the effect of conductivity free of possible confounding influences, such as habitat. Accordingly, part of the analysis was limited to sites with good habitat so that the effect of conductivity could be analyzed. This is an appropriate and generally accepted method.

To the extent the commenter asserts that habitat is a predictor of degradation, EPA does not disagree. That is precisely why EPA excluded habitat as a confounding variable.

EPA notes that Timpano et al. (2010) cited elsewhere by the commenter confirms that conductivity is strongly and significantly correlated to degradation of the macroinvertebrate community at sites with good habitat, even though Timpano et al. 2010 does not cover the more degraded range of water quality typically found downstream of valley fills in the Central Appalachians (see Response 118A, 119A). This study also tried to negate the effects of habitat, or filter our habitat degradation, and independently confirms that elevated conductivity degrades the macroinvertebrate assemblage, based on several richness metrics (including EPT taxa, E taxa and P taxa).

EPA acknowledges that local habitat degradation can impair benthic communities at the reach scale, but contends that the contributing watershed and water quality carry more weight in shaping the overall community in headwater streams like Pigeonroost and Oldhouse. As an example from the field, EPA found additional evidence that conductivity shapes benthic communities more than habitat in this ecoregion using data from Bend Branch, a headwater stream adjacent to Seng Camp Creek. EPA found evidence of full benthic attainment despite degraded, reach scale habitat conditions (low suboptimal RBP habitat score of 120-129). In Bend Branch (total catchment size ~1550 acres, equivalent in size to L.F. Beech at Dal-Tex), the upper watershed is completely forested (but like Pigeonroost, was heavily logged for high-value tree species roughly 25 years ago). This contributing watershed currently delivers water to the impacted reach with conductivity = 52 µS/cm. The photographs below show aerial and streamside views of Bend Branch from May 2007 when WVDEP sampled macroinvertebrates. The benthic community is very high quality and highly comparable to WVDEP reference conditions (WVSCI 89.7, Genus O/E=1.19, EPT generic richness=21), despite having degraded overall habitat.




*Figures showing Bend Branch example. Clockwise from top left, Bend Branch watershed showing densely forested uplands; close-up of sample reach (arrow) with biological indices; reach looking downstream of sample location; reach looking downstream of sample location.*

In another "habitat vs. conductivity" example, EPA drew from WVDEP's benthic community assessment in Jimmy Fork, another Coal River Basin tributary located about 15 miles north of Spruce No. 1 mine. The site drains 730 acres (slightly larger than Oldhouse Branch) and its catchment was heavily logged prior to the 2002 WVDEP biological assessment (see figure below). The RBP habitat score was only 117, and notably, sediment deposition, embeddedness, channel alteration and riparian zone scored marginal to poor (e.g., scoring between 5 and 10 out of a possible 20). Despite these significant habitat limitations, Jimmy Fork had a biological assemblage that scored exceptionally high (WVSCI=97.8, O/E=1.14, EPT=23). The April sample contained 11 mayfly genera, 7 stonefly genera, and 5 caddisfly genera which ranks it very high alongside Oldhouse Branch.

The conductivity in Jimmy Fork was 65 µS/cm and no mining or valley-filling had occurred in its headwaters. See figure below for aerial photos of Jimmy Fork.

*Figure showing aerial photo of Jimmy Fork watershed and sample location.*

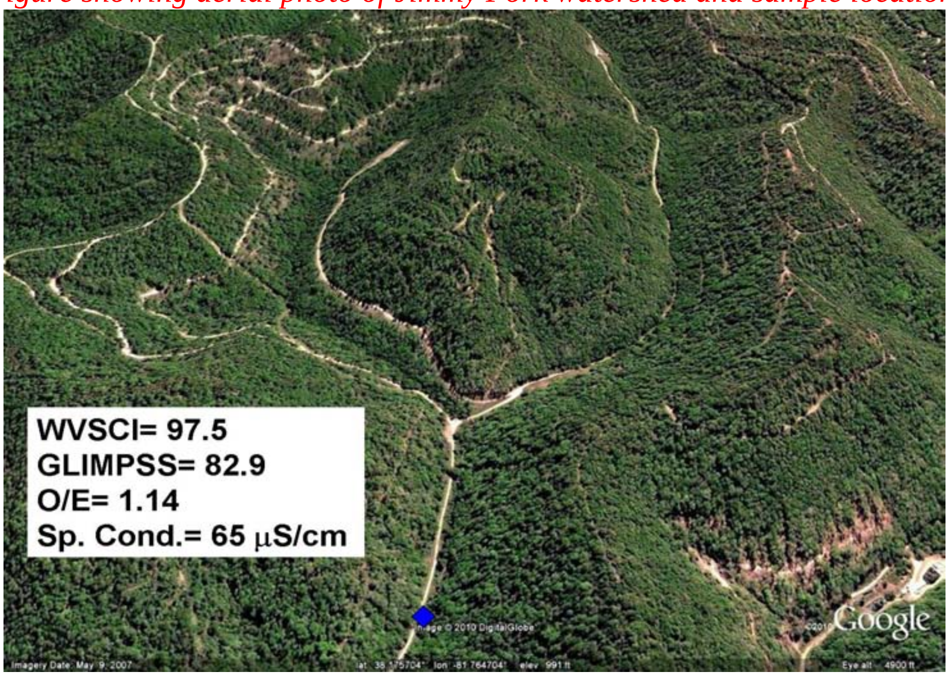


*Figure showing close-up view of valley, sample location, and biological indices.*

Comment #181A – In order to discount confounding factors, EPA primarily compared those factors to Ephemeroptera (mayflies), and excluded consideration of the rest of the macroinvertebrate community. To distinguish impoundment as a factor, for example, EPA relies on the correlation between Ephemeroptera and conductivity at impounded sites. This is inappropriate because the proposed correlation is between conductivity and all three Orders of EPT, not just Ephemeroptera.

Response #181A – See Responses #75 and 78. EPA disagrees. In its Final Determination analysis, EPA used EPT in the analysis of impoundments as a confounding factor. EPA did not solely rely on Ephemeroptera in this example (Appendix 1 of RD; Figure A6) and indeed confirmed that other metrics (total taxa richness and EPT richness) both significantly declined along a conductivity gradient below mined-only/ impounded-only sites. In the regression, conductivity explained 37% ($p<0.001$) of the variance in total taxa and 52% ($p<0.001$) of the variance with EPT richness. Prominently, 80% of the variance in Ephemeroptera richness was explained by conductivity at mined, impounded sites. This not only shows evidence that mayflies and other EPT are severely affected with increasing conductivity but indicates that when conductivity was relatively low (a situation that occurred at only 5 impounded mine sites), mayflies and other EPT were significantly more diverse and abundant, even below impoundments.

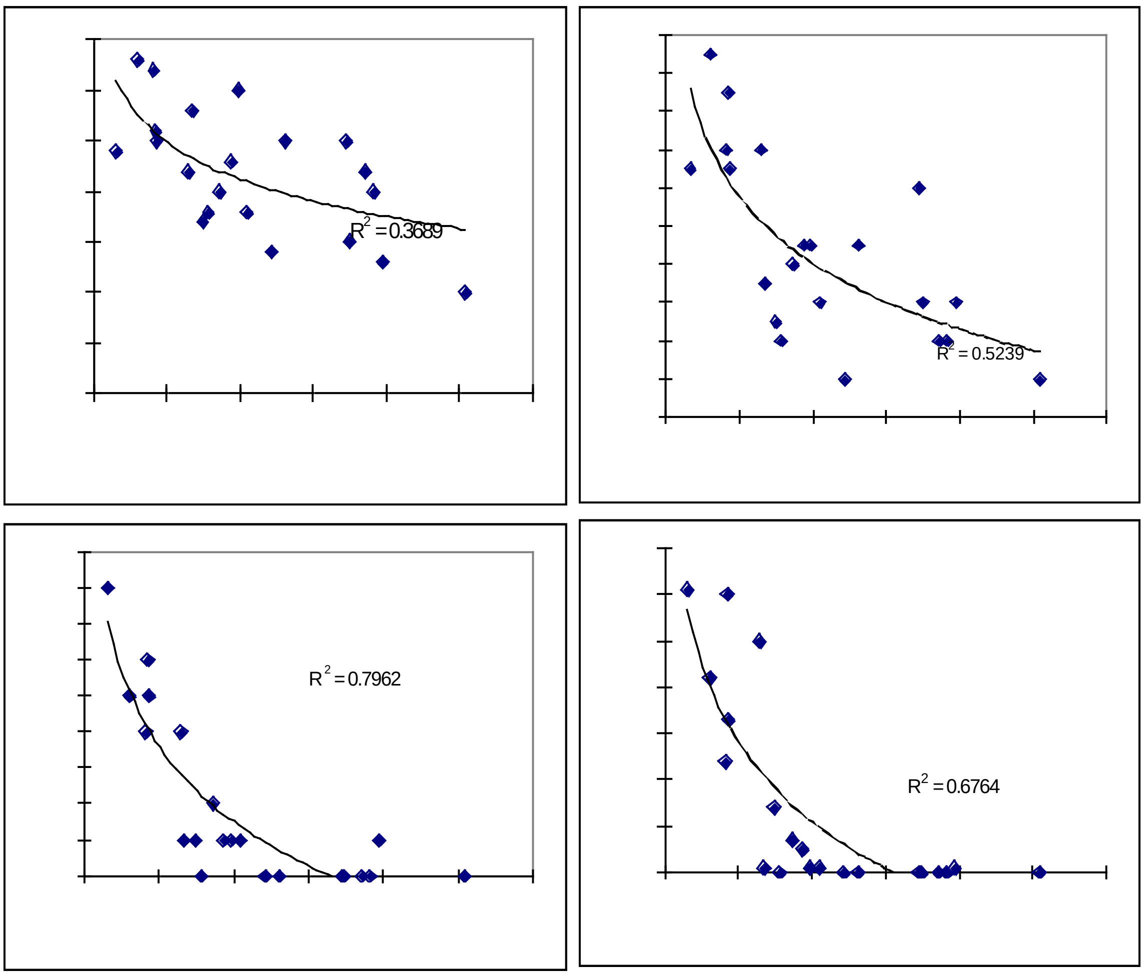



*Figure 6. Relationships between conductivity and macroinvertebrate metrics (Total Generic Richness, EPT Generic Richness, Ephemeroptera Generic Richness, and % Ephemeroptera Abundance) for mine site receiving streams located below in-stream impoundments (EPA data).*

If the macroinvertebrate responses below valley fills were caused solely by the presence of upstream sediment ponds, the relationship between conductivity and macroinvertebrate metrics would be insignificant downstream of impounded sites.  Instead, the loss of taxa is strongly and significantly related to conductivity.

Furthermore, EPA has observed that when ponds had been removed during the reclamation phase of mining, degraded communities persisted in the ionically rich waters and were dominated by relatively tolerant organisms (e.g., filter-feeding hydropsychid caddisflies such as *Cheumatopsyche*, *Hydropsyche* and *Ceratopsyche*), indicating that the impoundment was not the main reason for impaired biological communities.

Merricks et al. (2007) investigated longitudinal patterns in macroinvertebrate metrics downstream of four valley fills in southern WV and reported a more tolerant and degraded community both directly downstream of valley fills, as well as downstream of the sedimentation ponds.   Table II shows mean conductivity, pH, alkalinity and hardness at the sites.   Table V and VI show mean benthic metrics and habitat assessment scores for the local reference site and for the 4 valley-filled sites.  Sites FMC-D, TF-D1, LF-D1, and LF-D2 are all located downstream of the fills and upstream of the sedimentation ponds.  The sites downstream of the valley fills but upstream of the pond show reduced EPT richness, %EPT, E richness, %E, P richness, %P, etc. (EPA also notes that the local reference site used in this study was not of high quality.  Despite that, Merricks et al. (2007) still found significant differences between the local reference site and the valley-filled sites.)

We also note that Merricks et al. (2007) – tables included below – concluded that although “coal mining-related disturbances to stream systems often occur as physiochemical alterations due to acid mine drainage and habitat disturbance due to stream sedimentation. Our results give no indications of such factors acting as major influences at the sampling sites.” Merricks et al (2007) did find some exceedances of water quality criteria for Fe, Al, Zn and Se, stating, “Water-column Fe (in Five Mile Creek, 2002) and Zn (in Trace Fork, 2004) exceedances of WQC at sites above the ponds appear to be mitigated by passage of water through the ponds, and water-column Al and Mn demonstrate some tendency to decline with passage through the ponds but not consistently.”

EPA concludes from this study and other analyses that elevated conductivity is strongly associated with degraded benthic macroinvertebrate assemblages both upstream and downstream of sedimentation ponds.  Furthermore, sedimentation ponds should have some positive effects on downstream water quality, as they are designed to reduce total suspended sediment and to facilitate removal of precipitated metals, but their ability to remove total dissolved solids, or reduce conductivity is minimal.

**Table II** Mean conductivity, pH, alkalinity, and hardness (± standard deviation) in 2002

| | Conductivity | | pH | | Alkalinity | | Hardness | |
|---|---|---|---|---|---|---|---|---|
| | µS/cm | | | | | | mg/L as $CaCO_3$ | |
| Reference site | | | | | | | | |
| REF | 247 ± 87 | | 7.2 ± 0.36 | | 72 ± 52 | | 86 ± 20 | |
| Five Mile Creek | | | | | | | | |
| FMC-D | 1,557 ± 544* | A | 7.42 ± 0.20 | B | 328 ± 88* | A | 993 ± 343* | A |
| FMC-1 | 991 ± 421* | B | 8.02 ± 0.14* | A | 200 ± 70* | B | 551 ± 233* | B |
| FMC-2 | 965 ± 420* | B | 8.37 ± 0.47* | A | 196 ± 70* | B | 557 ± 232* | B |
| FMC-3 | 923 ± 380* | B | 8.14 ± 0.21* | A | 216 ± 95* | B | 544 ± 226* | B |
| Trace Fork | | | | | | | | |
| TF-D1 | 1,310 ± 323* | B | 7.84 ± 0.13* | C | 240 ± 24* | BC | 743 ± 123* | BC |
| TF-1 | 1,248 ± 323* | B | 8.13 ± 0.03* | A | 222 ± 20* | C | 699 ± 121* | C |
| TF-2 | 1,231 ± 312* | B | 8.15 ± 0.03* | A | 222 ± 30* | C | 710 ± 129* | BC |
| TF-3 | 1,200 ± 288* | B | 8.15 ± 0.08* | A | 217 ± 26* | C | 687 ± 121* | C |
| TF-D2 | 1,643 ± 370* | A | 7.98 ± 0.09* | B | 352 ± 35* | A | 1,078 ± 182* | A |
| TF-1B | 1,355 ± 352* | AB | 8.13 ± 0.06* | A | 265 ± 37* | B | 855 ± 204* | B |
| TF-2B | 1,310 ± 327* | B | 8.22 ± 0.06* | A | 258 ± 34* | BC | 819 ± 196* | BC |
| Lavender Fork | | | | | | | | |
| LF-D1 | 3,050 ± 883* | A | 8.09 ± 0.03* | AB | 239 ± 23* | A | 2,384 ± 678* | A |
| LF-D2 | 2,497 ± 780* | A | 7.93 ± 0.18* | B | 296 ± 77* | A | 1882 ± 707* | AB |
| LF-1 | 2,720 ± 929* | A | 8.09 ± 0.05* | AB | 217 ± 62* | A | 1,904 ± 596* | AB |
| LF-2 | 2,667 ± 939* | A | 8.10 ± 0.06* | AB | 218 ± 59* | A | 1,830 ± 526* | B |
| LF-3 | 2,657 ± 956* | A | 8.11 ± 0.08* | A | 218 ± 63* | A | 1,812 ± 554* | B |

*Significantly different from REF.
Stations with different letters are significantly different from one another, based on comparisons within watershed groupings.

**Table V** Mean benthic macroinvertebrate metrics (± standard deviations) and habitat assessment scores

| Stations | Total richness | | EPT richness | | % EPT | | % *Chironomidae* | | Habitat |
|---|---|---|---|---|---|---|---|---|---|
| Reference | | | | | | | | | |
| REF | 15.8 ± 2.5 | | 7.5 ± 1.0 | | 73.4 ± 3.4 | | 9.8 ± 3.3 | | 152 |
| Five Mile Creek | | | | | | | | | |
| FMC-D | 11.8 ± 2.2 | b | 2.0 ± 0.8 | c* | 5.8 ± 3.0 | b* | 53.3 ± 7.5 | a* | 132 |
| FMC-1 | 19.5 ± 2.1 | a | 6.8 ± 1.5 | b | 17.4 ± 3.1 | ab* | 35.6 ± 9.6 | ab | 138.5 |
| FMC-2 | 21.5 ± 3.3 | a* | 9.5 ± 1.3 | a | 18.3 ± 4.0 | ab* | 28.5 ± 14.2 | b | 147 |
| FMC-3 | 18.8 ± 1.0 | a | 7.3 ± 1.0 | ab | 28.5 ± 16.5 | a* | 24.3 ± 6.1 | b | 117.5 |
| Trace Fork | | | | | | | | | |
| TF-D1 | 10.0 ± 2.9 | b* | 1.0 ± 1.4 | b* | 5.8 ± 9.1 | b* | 32.0 ± 15.1 | a | 144 |
| TF-1 | 10.3 ± 2.2 | b | 2.8 ± 1.5 | ab* | 31.7 ± 6.3 | a* | 18.5 ± 1.2 | a | 146 |
| TF-2 | 11.3 ± 1.3 | b | 2.0 ± 0.8 | ab* | 18.1 ± 1.0 | ab* | 19.5 ± 4.6 | a | 142.5 |
| TF-3 | 10.8 ± 2.2 | b | 2.0 ± 0.8 | ab* | 15.2 ± 1.4 | ab* | 35.6 ± 6.4 | a | 107 |
| TF-D2 | 10.0 ± 2.7 | b* | 1.8 ± 1.7 | ab* | 19.3 ± 22.2 | ab* | 41.5 ± 19.6 | a* | 127.5 |
| TF-1B | 13.3 ± 1.5 | ab | 3.3 ± 1.0 | ab* | 19.5 ± 6.6 | ab* | 29.7 ± 12.1 | a | 134 |
| TF-2B | 17.0 ± 1.4 | a | 4.0 ± 1.4 | a* | 23.1 ± 8.8 | ab* | 33.5 ± 7.9 | a | 119.5 |
| Lavender Fork | | | | | | | | | |
| LF-D1 | 10.5 ± 2.4 | ab | 3.0 ± 0.8 | b* | 8.5 ± 3.2 | b* | 49.3 ± 11.2 | a* | 126 |
| LF-D2 | 9.0 ± 1.8 | b* | 2.5 ± 1.0 | b* | 23.8 ± 18.0 | ab* | 30.8 ± 14.8 | a | 118 |
| LF-1 | 12.3 ± 2.4 | ab | 4.8 ± 1.0 | ab | 32.3 ± 8.3 | ab* | 35.6 ± 7.7 | a | 130 |
| LF-2 | 12.5 ± 1.7 | ab | 5.5 ± 1.3 | a | 32.3 ± 15.9 | ab* | 53.2 ± 14.9 | a* | 140 |
| LF-3 | 14.8 ± 1.7 | a | 6.0 ± 1.4 | a | 35.9 ± 4.7 | a* | 37.2 ± 9.4 | a | 157.5 |

*Significantly different from REF.

Stations with different letters are significantly different from one another, based on comparisons within watershed groupings.

**Table VI** Mean benthic macroinvertebrate metrics (± standard deviations) for Ephemeroptera, Plecoptera, and Trichoptera taxa

| Stations | *Ephemeroptera* | | | | *Plecoptera* | | | | *Trichoptera* | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Richness | | % | | Richness | | % | | Richness | | % | |
| Reference | | | | | | | | | | | | |
| REF | 2.5 ± 0.6 | | 16.9 ± 7.7 | | 3.5 ± 0.6 | | 52.8 ± 4.1 | | 1.5 ± 1.3 | | 3.7 ± 3.8 | |
| Five Mile Creek | | | | | | | | | | | | |
| FMC-D | 0.3 ± 0.5 | b* | 0.63 ± 1.2 | b* | 0.8 ± 0.5 | c* | 2.1 ± 1.6 | b* | 1.0 ± 0.8 | b | 3.0 ± 2.5 | a |
| FMC-1 | 1.3 ± 0.5 | ab* | 6.1 ± 2.0 | a* | 2.0 ± 0.8 | b | 3.6 ± 1.1 | b* | 3.5 ± 1.3 | a* | 7.6 ± 2.7 | a |
| FMC-2 | 1.8 ± 0.5 | a | 2.5 ± 1.6 | b* | 3.3 ± 0.5 | a | 10.7 ± 4.0 | ab* | 4.5 ± 1.3 | a* | 5.0 ± 1.2 | a |
| FMC-3 | 2.0 ± 0.8 | a | 2.7 ± 1.5 | b* | 2.3 ± 0.5 | ab | 16.3 ± 9.3 | a* | 3.0 ± 0.8 | ab | 9.6 ± 10.7 | a |
| Trace Fork | | | | | | | | | | | | |
| TF-D1 | 0 | b* | 0 | a* | 0.3 ± 0.5 | a* | 0.5 ± 1.1 | a* | 0.8 ± 1.0 | a | 5.2 ± 8.1 | c |
| TF-1 | 1.0 ± 0.8 | a* | 2.0 ± 1.7 | a* | 0.8 ± 1.0 | a* | 1.5 ± 2.0 | a* | 1.0 ± 0.0 | a | 28.2 ± 6.4 | a* |
| TF-2 | 0 | b* | 0 | a* | 0.5 ± 0.6 | a* | 1.6 ± 2.4 | a* | 1.5 ± 0.6 | a | 16.5 ± 2.6 | b* |
| TF-3 | 0.5 ± 0.6 | ab* | 1.7 ± 2.0 | a* | 0.5 ± 0.6 | a* | 2.2 ± 2.7 | a* | 1.0 ± 0.0 | a | 11.3 ± 2.2 | bc |
| TF-D2 | 0 | b* | 0 | a* | 1.3 ± 1.3 | a* | 16.5 ± 19.3 | a* | 0.5 ± 0.6 | a | 2.7 ± 3.1 | c |
| TF-1B | 0 | b* | 0 | a* | 1.5 ± 1.3 | a* | 7.9 ± 5.3 | a* | 1.8 ± 0.5 | a | 11.6 ± 4.4 | bc |
| TF-2B | 0 | b* | 0 | a* | 2.3 ± 1.0 | a | 15.3 ± 7.1 | a* | 1.8 ± 0.5 | a | 7.9 ± 2.5 | bc |
| Lavender Fork | | | | | | | | | | | | |
| LF-D1 | 0 | a* | 0 | a* | 2.0 ± 0.8 | b | 6.6 ± 3.5 | b* | 1.0 ± 0.0 | b | 1.9 ± 0.7 | b |
| LF-D2 | 0 | a* | 0 | a* | 1.5 ± 0.6 | ab* | 20.2 ± 20.2 | ab* | 1.0 ± 0.8 | b | 3.6 ± 3.2 | ab |
| LF1 | 0 | a* | 0 | a* | 2.3 ± 0.5 | ab | 8.3 ± 3.9 | ab* | 2.5 ± 1.0 | a | 24.0 ± 6.3 | a* |
| LF2 | 0 | a* | 0 | a* | 3.5 ± 1.3 | ab | 20.7 ± 9.5 | ab* | 2.0 ± 0.0 | ab | 11.6 ± 10.7 | b |
| LF3 | 0 | a* | 0 | a* | 3.8 ± 1.5 | a | 29.1 ± 2.9 | a* | 2.3 ± 0.5 | ab | 6.7 ± 2.5 | ab |

*Significantly different from REF.

Stations with different letters are significantly different from one another, based on comparisons within watershed groupings.

*Tables from Merricks et al. (2007)*

Comment #182A – In order to appropriately address confounders, EPA must analyze their relationship with all of EPT, not simply the one (E) that shows the weakest correlation.

Response #182A – See Response #181A.

Comment #183A – EPA's inappropriate method of discounting confounders also ignores the fact that Ephemeroptera represent only 16.5 percent of the genera in the dataset analyzed by EPA.

Response #183A – First, EPA did also consider EPT taxa and WVSCI when evaluating the effects of confounders. Second, to the extent that Ephemeroptera were used as a representative taxon, it is because they are the most taxa-rich Order among the sensitive EPT genera. See Response #124A. The purpose of the analysis of confounding is to determine whether the response to salts can be explained in whole or part by responses to other stressors. Hence, the metric used must be representative of the response to salts and it would not be appropriate to use pollution tolerant taxa.

Comment #184A – And as commenters to the proposed conductivity limit have noted, there is no clear relationship between the number of Ephemeroptera genera and conductivity. Figure 2 shows the poor the correlation between Ephemeroptera and conductivity.

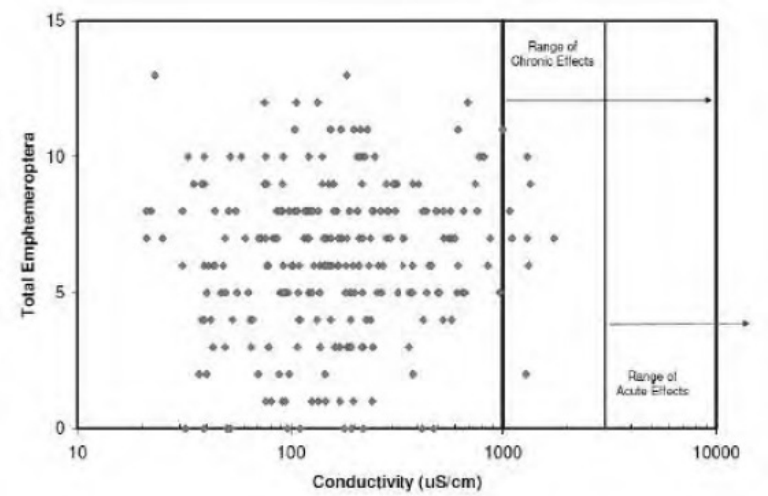



**Figure 2. Total Ephemeroptera Genera and Conductivity. TED2 § 3.2.2.**

Response #184A – This comment references the draft EPA report, *A Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams* USEPA 2010a). EPA's Section 404(c) Final Determination and its discussion of conductivity, which includes a dose-response model to predict conductivity levels, are not based on this conductivity benchmark value. EPA references this report and the draft conclusions of EPA's Science Advisory Board within the Final Determination and these responses to comments as confirming evidence of the strong relationship between surface coal mining, elevated levels of total dissolved solids (conductivity), and impacts to macroinvertebrate wildlife. EPA notes that the report is undergoing independent peer review. We also note that the Science Advisory Board's draft review comments are supportive of EPA's field-based benchmark derivation methodology and note that the review panel emphasizes that there is "clear evidence that valley fills are associated with increased levels of dissolved ions (measured as conductivity) in downstream waters, and that these increased levels of conductivity are associated with changes in the composition of stream biological communities" (SAB 2010).

EPA's Final Determination and its discussion of conductivity and its impacts on wildlife, however, are based on a dose-response threshold of 500 µS/cm that corresponds to adverse effects on the integrity of the benthic macroinvertebrate community. Adverse effects of elevated conductivity above this threshold have been observed in other studies, including those conducted by researchers in other states.

Nevertheless, EPA disagrees with the comment. As shown in the conductivity benchmark report, the linear correlation coefficient for the number of Ephemeropteran genera and conductivity in the State of West Virginia's data set is -0.63. The commenters do not indicate how they generated their scatter plot and do not provide any statistical methods or results. Further, they do not explain why their assertion differs from the statistical results in the Agency's conductivity benchmarks report or results in the peer-reviewed literature such as Pond et al. (2008).

See Response #118A. Again, we note that elsewhere in Mingo Logan's comments, Mingo Logan cites to Timpano et al. (2010), which independently confirms that loss of E taxa are correlated to increasing conductivity downstream of mining, even when using coarser family-level taxonomy. As a means of isolating TDS effects, Timpano et al. (2010) identified 17 headwater streams in Virginia's coalfield region that represent a gradient of TDS concentrations, where influence from non-TDS stressors was minimized (*i.e.*, pH between 6.0 and 9.0, low metal concentrations, reference-quality habitat, primarily forested land-use). Dominant components of TDS were sulfate (46% by weight, mean), bicarbonate (26%), and calcium (13%). Several benthic macroinvertebrate richness measures, including E richness, were correlated negatively with increasing conductivity and TDS ($p < 0.05$).

Comment #185A – The fact that Ephemeroptera are poorly correlated with conductivity undermines both EPA's analysis of confounders and EPA's proposed conductivity limit itself.

Response #185A – The premise of the comment, i.e., that Ephemeroptera are poorly correlated with conductivity, is incorrect. As discussed elsewhere (see Response #181), effects on Ephemeroptera are strongly correlated with conductivity.

Comment #186A – If a poor correlation with Ephemeroptera is a sufficient reason to discount confounders, then the same poor correlation with conductivity should eliminate conductivity as well.

Response #186A – See Responses #181 and 185A. Ephemeroptera taxa richness and %E (as well as any other ecologically relevant benthic metrics) are well correlated with conductivity, and Ephemeroptera are less well correlated with all of the potential confounders as shown in Appendix B of the conductivity report.

As stated in earlier responses, in the Final Determination, EPA considered numerous EPA and non-EPA analyses as well as published articles that indicate strong and significant correlations between increasing conductivity and/or component major ions and degrading macroinvertebrate assemblages (Fulk et al. 2003, Kennedy et al. 2003, Hartman et al. 2005, Pond et al. 2008, Pond 2010, Timpano et al. 2010, Palmer et al. 2010, Bernhardt et al. *in review*).

Comment #187A – Such inconsistent evaluation of conductivity and various confounders undermines EPA's proposed conductivity level and calls into question EPA's failure to independently examine other confounders.

Response #187A – This comment references the draft EPA report, *A Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams* USEPA 2010a). EPA's Section 404(c) Final Determination and its discussion of conductivity, which includes a dose-response model to predict conductivity levels, are not based on this conductivity benchmark value. EPA references this report and the draft conclusions of EPA's Science Advisory Board within the Final Determination and these responses to comments as confirming evidence of the strong relationship between surface coal mining, elevated levels of total dissolved solids (conductivity), and impacts to macroinvertebrate wildlife. EPA notes that the report is undergoing independent peer review. We also note that the Science Advisory Board's draft review comments are supportive of EPA's field-based benchmark derivation methodology and note that the review panel emphasizes that there is "clear evidence that valley fills are associated with increased levels of dissolved ions (measured as conductivity) in downstream waters, and that these increased levels of conductivity are associated with changes in the composition of stream biological communities" (SAB 2010).

EPA's Final Determination and its discussion of conductivity and its impacts on wildlife, however, are based on a dose-response threshold of 500 µS/cm that corresponds to adverse effects on the integrity of the benthic macroinvertebrate community. Adverse effects of elevated conductivity above this threshold have been observed in other studies, including those conducted by researchers in other states.

To the extent that this comment refers solely to the conductivity benchmark, that study used a consistent method to independently evaluate potential confounders in Appendix B of the conductivity benchmark report. That analysis has been favorably reviewed by the SAB in its draft comments. Additional potential confounders are being evaluated for the final report.

Note that for other data analyses and publications considered and incorporated within the Final Determination, the Agency also considered major confounding factors (pH, habitat degradation, natural classification, seasonal calibrations, etc). See Responses #143A, 165A, 180A, and 181A.

Comment #188A – EPA's Estimate of a Change in EPT Composition Is Based Entirely on an Unsupportable Comparison to the Dal-Tex Complex. EPA provides no information to suggest that the authorized fills will cause conductivity levels or macroinvertebrate composition changes similar to those at the Dal-Tex Complex.

Response #188A – It is the best professional judgment of EPA that comparisons between the Dal-Tex Complex and Spruce No. 1 are valid and relevant, as outlined in Appendices 2 and 4. The Corps' Final EIS repeatedly looks to the Dal-Tex complex to predict impacts from the Spruce No. 1 mine. See Responses #30 and 29A.

Furthermore, the conductivity levels at the Dal-Tex complex are comparable to conductivity ranges found downstream of other valley fills. WVDEP data indicate that the mean conductivity in Left Fork Beech Creek was 2426 µS/cm in 2002-2003 (n=12) and in Beech Creek was 1432 µS/cm (n=12) in 2002-2003. For example, in Pond et al. 2008, the conductivity mean at mined sites was 1023 µS/cm and the range was 159-2540 µS/cm (see Table 3 from Pond et al. 2008 below).

Table 3. Chemical and habitat variables at mined and unmined sites. Chemical values are in mg/L unless otherwise specified; *p* values are associated with comparisons between mined and unmined sites done with Kruskal–Wallis 1-way analysis of variance using the Mann–Whitney *U*-statistic. Total P was not detected in any samples (0.05 mg/L detection limit). RBP = Rapid Bioassessment Protocol.

| Variable | Mined | | Unmined | | |
|---|---|---|---|---|---|
| | *n* | Mean (range) | *n* | Mean (range) | *p* |
| Watershed area ($km^2$) | 27 | 4.9 (0.5–15.9) | 10 | 3.0 (0.8–7.0) | 0.516 |
| Elevation (m) | 27 | 313.2 (230–500) | 10 | 307 (259–421) | 0.973 |
| Temperature (°C) | 27 | 11.7 (7.8–18.2) | 10 | 12 (7.3–16.5) | 0.682 |
| pH (SU) | 27 | 7.9 (6.3–8.9) | 10 | 7.1 (6.1–8.3) | 0.005 |
| Specific conductance (µS/cm) | 27 | 1023 (159–2540) | 10 | 62 (34–133) | 0.000 |
| Embeddedness score | 27 | 13.6 (3–18) | 10 | 16.4 (12–19) | 0.004 |
| Sediment deposition score | 27 | 13.4 (6–18) | 10 | 14.8 (10–19) | 0.229 |
| Channel alteration score | 27 | 14.7 (7–19) | 10 | 16.8 (15–18) | 0.011 |
| Riparian zone width score | 27 | 14.5 (7–20) | 10 | 16.4 (9–20) | 0.143 |
| Total RBP habitat score | 27 | 147.8 (126–171) | 10 | 158.5 (141–168) | 0.006 |
| $HCO_3$ | 13 | 183 (10.7–501.8) | 7 | 20.9 (6.1–35) | 0.002 |
| Al (µg/L) | 13 | 96 (<50–272) | 7 | 92.5 (<50–183) | 0.380 |
| Ba (µg/L) | 13 | 41.1 (22–68) | 7 | 39.6 (15–72) | 0.692 |
| Ca | 13 | 137.5 (38–269) | 7 | 7.5 (2.7–12) | 0.000 |
| Cl | 13 | 4.6 (<2.5–11) | 7 | 2.8 (<2.5–4) | 0.022 |
| Cu (µg/L) | 13 | 2.6 (<2.5–3.4) | 7 | 2.9 (<2.5–5) | 0.496 |
| Hardness | 13 | 801.4 (225–1620) | 7 | 42 (17–72) | 0.000 |
| Dissolved Fe (µg/L) | 13 | 91.8 (<50–281) | 7 | 74.3 (<50–185) | 0.362 |
| Total Fe (µg/L) | 13 | 275.6 (66–650) | 7 | 176 (65–471) | 0.322 |
| Pb (µg/L) | 13 | 1.2 (<1–4) | 7 | 1.2 (<1–2.1) | 0.496 |
| Mg | 13 | 122.4 (28–248) | 7 | 4.3 (2.3–7) | 0.000 |
| Dissolved Mn (µg/L) | 13 | 113.4 (6.5–853) | 7 | 20.9 (<5–55) | 0.165 |
| Total Mn (µg/L) | 13 | 141.4 (9–904) | 7 | 34.1 (<5–83) | 0.143 |
| Ni (µg/L) | 13 | 14.2 (<10–59) | 7 | <10 | 0.287 |
| $NO_3$-N | 13 | 3.4 (0.8–16.5) | 7 | 0.4 (0.1–0.9) | 0.001 |
| K | 13 | 9.9 (3–19) | 7 | 1.6 (1.3–2) | 0.000 |
| Se (µg/L) | 13 | 10.6 (<1.5–36.8) | 7 | <1.5 | 0.001 |
| Na | 13 | 12.6 (2.6–39) | 7 | 2.4 (0.7–5.5) | 0.001 |
| $SO_4$ | 13 | 695.5 (155–1520) | 7 | 16 (11–21.6) | 0.000 |
| Zn (µg/L) | 13 | 9.1 (<2.5–27) | 7 | 10.2 (3.3–23.4) | 0.322 |

The WVDEP initiated a Valley Fill Study to examine the water quality downstream of 51 valley fills (WVDEP 2010 unpublished data). WVDEP shared the preliminary dataset of this study with EPA (Table 1 shows descriptive statistics for the 51 valley fills). The mean conductivity of valley fills in the WVDEP data set is 1913 µS/cm with a range of 264-3736 µS/cm. Only two fills had conductivity < 500 µS/cm and these were relatively small fills (50 acres and 177 acres of drainage area) and were both still under construction at the time of sampling.

*Table 1. Descriptive Statistics for Age, Size, and Water Quality Parameters for 51 Valley Fills (sites located at toe of fill). (WVDEP 2010)*

| Parameter | n | Mean | Std Dev | C.I. of Mean | Max | Min | Median | 10% | 90% |
|---|---|---|---|---|---|---|---|---|---|
| Fill Age | 18 | 14 | 7 | 4 | 27 | 1 | 15 | 2 | 23 |
| Fill Size (Delineated Acres) | 51 | 159 | 239 | 67 | 1583 | 18 | 100 | 44 | 268 |
| Conductivity | 51 | 1913 | 961 | 270 | 3736 | 264 | 1564 | 910 | 3362 |
| pH | 50 | 7.31 | 0.643 | 0.183 | 8.39 | 5.45 | 7.44 | 6.49 | 8.135 |
| Temp | 50 | 14.5 | 1.9 | 0.5 | 21.9 | 10.6 | 14.5 | 12.3 | 16.0 |
| Al_Tot | 17 | 0.226 | 0.522 | 0.268 | 2.17 | 0.02 | 0.04 | 0.02 | 0.536 |
| Ca_Tot | 17 | 258 | 127 | 65 | 409 | 85 | 272 | 104 | 404 |
| Cu | 17 | 0.003 | 0.001 | 0.001 | 0.009 | 0.003 | 0.003 | 0.003 | 0.003 |
| Hardness | 17 | 1734 | 918 | 472 | 3090 | 594 | 1630 | 624 | 2940 |
| Fe_Tot | 17 | 0.388 | 0.451 | 0.232 | 1.77 | 0.02 | 0.15 | 0.026 | 0.846 |
| Mg_Tot | 17 | 264 | 151 | 77 | 502 | 80 | 271 | 84 | 468 |
| Mn_Tot | 17 | 1.903 | 3.929 | 2.020 | 14.100 | 0.020 | 0.191 | 0.036 | 8.296 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| K | 17 | 18 | 8 | 4 | 33 | 6 | 18 | 7 | 28 |
| Se | 17 | 0.014 | 0.016 | 0.008 | 0.061 | 0.001 | 0.007 | 0.002 | 0.036 |
| Na | 17 | 8 | 3 | 2 | 15 | 3 | 8 | 4 | 12 |
| Zn | 17 | 0.084 | 0.208 | 0.107 | 0.834 | 0.005 | 0.009 | 0.005 | 0.278 |
| Acidity | 17 | 5 | 0 | 0 | 5 | 5 | 5 | 5 | 5 |
| Alkalinity | 17 | 229 | 149 | 77 | 594 | 11 | 225 | 30 | 433 |
| Bicarbonate | 17 | 229 | 149 | 77 | 594 | 11 | 225 | 30 | 433 |
| Chloride | 17 | 26 | 13 | 7 | 40 | 10 | 20 | 10 | 40 |
| Sulfate | 17 | 1343 | 783 | 403 | 2530 | 324 | 1330 | 387 | 2496 |
| TDS | 17 | 2078 | 1074 | 552 | 3590 | 707 | 2050 | 775 | 3552 |
| TSS | 17 | 5 | 6 | 3 | 22 | 2 | 3 | 2 | 13 |

The WVDEP dataset includes 7 valley fills that were constructed post 2005 with modern mining techniques. Conductivity measurements are available for all 7 valley fills with a mean of 1193 µS/cm and a range of 264 to 2259 µS/cm. Several of the fills were in construction at the time of the sampling. Regarding the newer fill with conductivity of 2259 µS/cm, WVDEP noted that it was "top notch fill construction."

Finally, we note that the Final Determination does not use the average or maximum values from streams draining the Dal-Tex complex when modeling post-mining downstream conductivity. The Final Determination uses conservative values of average conductivity (500 and 1000 µS/cm) for post-mining average conductivity in Pigeonroost Branch, Oldhouse Branch and Seng Camp Creek (Recommended Determination, Appendix 2). Based on data from other sites as discussed above, EPA believes that the post-mining conductivity likely will be on average > 500 µS/cm. Furthermore, an independent modeling technique based on conductivity and % mining (presented in Appendix 5 of the Final Determination) supports the modeling results presented in the Final Determination.

Comment #189A – EPA generates its projected change in EPT composition by comparing the existing condition of Pigeonroost and Oldhouse to the existing condition of Beech Creek and other receiving streams within the Dal-Tex Complex. On that basis, EPA speculates that the condition of Pigeonroost and Oldhouse after the completion of the Spruce No. 1 Mine will mirror the current condition of Beech Creek. *Id.* at 51. But EPA cannot support any such prediction.

Response #189A – EPA believes that conditions below the proposed fills in Pigeonroost and Oldhouse Branches will closely approximate conditions below the fills in L.F. Beech and Beech (which are consistent with conditions found among many valley-filled streams across the ecoregion). EPA is confident in this prediction based upon the fact that the Dal-Tex mine is nearby, that it mines the same geologic strata, and that the Corps considered Dal-Tex to be predictive of impacts at Spruce No. 1 (see Responses #30 and 29A). The data from Dal-Tex are consistent with EPA's (and other researchers') examinations of many valley-filled streams in ecoregion 69d of WV and KY. The biological signature is profound, predictable, and imminent. Literature citations or government data on these predicted impacts are found throughout the Final Determination and Appendices.

Also see Response #188A.

Comment #190A – EPA misleadingly contends that "the 2006 Spruce No. 1 EIS states that impacts from the Spruce No. 1 Mine are expected to be similar to those from the Dal-Tex operation." As Mingo Logan has explained, the DEIS says no such thing. *See id*. at 37. The quoted language instead refers to similarities in "topography, geology, and mineral resources," not water quality impacts and impacts on the aquatic ecosystem. DEIS at 3-15. Thus, the principal justification for comparing modern day Pigeonroost, Oldhouse and Spruce Fork to modern day Dal-Tex is unsupported by the only material cited by EPA.

Response #190A – See Responses #30 and 29A.

Comment #191A – While the Spruce No. 1 Mine and the Dal-Tex Complex are located in the same area of West Virginia, any similarities end there. The Dal-Tex Complex is almost three times as large as the Spruce No. 1 Mine on an acreage basis, includes underground mines, and has been actively mined since the early 1900s, much of it before the passage of SMCRA.

Response #191A – See Responses #30, 29A, 31A, 33A, and 34A.

Comment #192A – Extensive historical underground mining is situated above the drainage and contributes discharges to the surface water system. As such, the Dal-Tex Mine site has multiple and significantly different source areas.

Response #192A – See Responses #30, 14A, 29A, 31A, and 49A.

Comment #193A – As Mingo Logan has also explained, modern mining practices and techniques further differentiate the Spruce No. 1 Mine, and limit conductivity increases downstream. *See* Section IV.A, *supra*.

Response #193A – See Responses # 30, 14A, 28A, 29A, 36A, 50A, and 188A.

Comment #194A – Aside from these important differences, EPA's comparison between the Spruce No. 1 subwatershed and the Dal-Tex subwatershed is flawed in its own right. First and foremost, EPA provides no information about the EPT baseline of the Dal-Tex Complex before the extensive historical mining there. As a result, EPA cannot demonstrate that the existing EPT population at the Dal-Tex Complex is the result of mining; much less a result of discharges of fill material comparable to those authorized by Mingo Logan's 404 permit. Without a baseline, EPA has no basis for its statements like "past mining by Mingo Logan has led to the estimated extirpation of ~70% of the native expected taxa in their adjacent Dal-Tex mine operation." RD at 56.

Response #194 A – EPA is unaware of any premining baseline data for the streams that drain the Dal-Tex complex. EPA notes that, as the operator of that complex, the permittee (whom the commenter represents) would be in the best position to offer such data and has not done so. Nevertheless, the Corps found mining operations and conditions at Dal-Tex sufficiently similar to Spruce No. 1 that it relied upon comparison of water quality at Dal-Tex to make its determinations in the Spruce No. 1 DEIS and FEIS, apparently without objection from the permittee at that time. See Responses #29A and 188A. To the extent the commenter points to pre-existing mining activities at the Dal-Tex site, EPA notes that the commenter has also identified discharges from various pre-existing mining activities at the Spruce No. 1 Mine site. See Comment #44A, 46A. The available data indicate that water quality conditions in streams draining the Dal-Tex complex are similar to the conditions downstream of other valley fills, including more recently constructed fills.

Comment #195A – While EPA shows that the species of EPT vary between the Spruce No. 1 subwatershed and the Dal-Tex subwatershed, EPA's data also shows an equal if not greater variation between species of EPT as between Pigeonroost, Oldhouse and Seng Camp. This demonstrates how dynamic the EPT populations are, and how additional measures, as reflected in WVSCI, are needed to assess impacts to biotic integrity and wildlife inhabiting streams.

Response #195A – See Responses #143A and 144A for further explanations of noted differences between Spruce No. 1 streams. To the extent that commenter believes EPT taxa are too dynamic, data presented in Appendix 2 indicate that the variation in EPT taxa between Pigeonroost Branch and Oldhouse Branch is not nearly as variable as the comparison between Spruce No. 1 streams and Dal-Tex streams. (EPA notes that Seng Camp Creek has been significantly impacted and therefore would not be expected to be comparable to Pigeonroost Branch and Oldhouse Branch, both of which have been only minimally impacted.) Low between-site variability in Dal-Tex streams would be expected due to the pollution signature. Variability between Oldhouse and Pigeonroost is consistent with natural variability. EPA reported the entire set of mayfly or stonefly taxa found in Spruce No. 1 streams to illustrate the entire set of potential mayfly and stonefly wildlife that could be lost as a result of fill material placed in both Pigeonroost and Oldhouse Branches. To the extent that commenter states that WVSCI is needed to assess impacts to biotic integrity and wildlife, WVSCI was performed at Dal-Tex and the data reveal that Dal-Tex wildlife are indeed impaired (based on WVSCI <68), whereas Pigeonroost and Oldhouse Branches are not.

Comment #196A – EPA Has Not Demonstrated That the Authorized Fills Will Have an Unacceptable Adverse Effect on a 404(c) Resource

Response #196A – See Responses #3 and 6 for a discussion of fish, Response #8 for a discussion of salamanders, Response #12 for a discussion of macroinvertebrates, Response #19 for a discussion of water-dependent birds, and Response #167.

Comment #197A – EPA fails to establish that a change in the makeup of a subset of macroinvertebrates would be a "significant" loss of macroinvertebrates.

Response #197A – See Responses #12 and 167.

One measure of significance is deviation from WVDEP's reference condition. As explained elsewhere, due to the quality of WVDEP's reference sites, the Final Determination generally has considered deviation below $5^{th}$ percentile (in WV) of the reference distribution, a significant effect. This is consistent with the way that WVDEP interprets its WVSCI metric. See Responses #142A and 169A.

Comment #198A – EPA fails to establish that either this change in macroinvertebrates or EPA's predicted rise in conductivity will have any impact on aquatic ecosystem health.

Response #198A – See Responses #165A-168A.

EPA has established that increased conductivity caused by construction of the Spruce No. 1 Mine as currently authorized will lead to extirpation of all individuals and all species within suites of genera or entire families of macroinvertebrates as measured by comparison to the WVDEP reference condition using WVSCI. Using a reference condition is an established technique in bioassessment science. These organisms comprise a significant percentage of the naturally occurring aquatic community in the receiving streams.

Comment #199A – EPA may not appropriately consider impacts to macroinvertebrates without demonstrating a resultant, unacceptable adverse impact to a 404(c) resource. As Mingo Logan explained in its initial comment, macroinvertebrates are not "wildlife," within the context of Section 404(c), or are otherwise a 404(c) resource. *See* Cmt. at 90-91. Yet, EPA has presented no information to suggest that an increase in conductivity or a change in EPT composition will adversely affect a 404(c) resource.

Response #199A – See Response #12.

Comment #200A – Even if macroinvertebrates were a 404(c) resource, EPA presents no evidence that macroinvertebrate or EPT in Spruce Fork will diminish after the Spruce No.1 Mine is fully constructed or that losses of macroinvertebrates or select EPT species in Pigeonroost or Oldhouse Creeks will be significant to the macroinvertebrate community or to aquatic ecosystem health. EPA simply fails to demonstrate any unacceptable adverse impact to macroinvertebrates in the authorized fill or downstream.

Response #200A – See Responses #198A and 219A, and Response #212A regarding the extent of downstream water quality impacts. The Final Determination makes clear that the impacts to macroinvertebrate wildlife are significantly adverse, both within the project area and as a result of downstream water quality degradation.

Comment #201A – EPA Provides No Information To Suggest That Trophic Function or Higher Order Biota, or any 404(c) resource Will Be Disrupted by alleged impacts to macroinvertebrates. Indeed, the Recommended Determination does not once claim that a shift in the relative abundance of certain species of EPT is correlated with the populations or health of any of the 404(c) resources.

Response #201A – See Responses #12, 146A, 150A, 203A, and 204A.

To the extent the comment refers to the Section 404(c) resources, EPA has established impacts to the naturally occurring benthic macroinvertebrate community, which are wildlife. See Response #12. EPA must protect the structure of invertebrate communities in order to protect the wildlife habitat and aquatic life use in streams. EPA predicts more than a "shift in relative abundance of certain species of EPT" – EPA predicts the extirpation of ~70% of the native expected invertebrate taxa in the affected streams (see RD, Appendix 1, O/E model; also see Appendix 2 of the Final Determination). This means the loss of all individuals that comprise all species within each genus that will be extirpated.

In addition, changes in the macroinvertebrate community can affect how organic matter is transformed into energy sources for downstream organisms. See Response #146A. For a discussion of the potential impact on the Louisiana waterthrush, see Response #150A.

Comment #202A – Neither the Pond study, nor EPA's proposed conductivity limit addresses impacts to fish or wildlife. The SAB panel pointedly noted that only macroinvertebrate genera were used to develop the proposed conductivity limit, and that "the WV database did not include fish, amphibians or mollusks."

Response #202A – EPA assumes that the "Pond study" refers to Pond et al. (2008). EPA has not proposed a conductivity "limit" in the context of this 404(c) action, nor does the conductivity benchmark reflect a water quality criterion (see Responses #97A and 105A). EPA assumes the commenter's reference to a "proposed conductivity limit" refers to a scientific report released by EPA titled "A Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams" USEPA 2010a) that is currently undergoing review by the Science Advisory Board. To the extent the commenter asserts that the analyses in Pond, et al. 2008 and the numeric derivation of the conductivity benchmark in "A Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams" are focused on impacts to benthic macroinvertebrates, the commenter is correct. To the extent the commenter asserts those analyses do not address "wildlife," EPA disagrees. See Response #12.

Comment #203A – EPA has not established that a change in EPT composition will cause any adverse impacts to predator species or other higher trophic level biota. The Recommended Determination does not provide any data to suggest that a change in EPT composition will disrupt the trophic function of the EPT or macroinvertebrate communities. Any decline in one population of EPT species will be replaced by another that still satisfies the functional demands for the organisms that depend on macroinvertebrates. TED2 § 4.1.1. This is because fish, birds, and other species that rely on macroinvertebrates are generalists, and are not dependent on a specific species of EPT. *Id.*

Response #203A – See Responses #12, 146A, 150A, 203A, and #204A. Insects such as mayflies, stoneflies and caddisflies (EPT taxa) are considered to be wildlife themselves (See Response #12), and they also provide an important source of food for other wildlife that inhabit stream ecosystems. The high diversity that is frequently observed in headwater streams is influenced by the great physical habitat heterogeneity and wide range in local environmental conditions in these systems. This in-stream diversity likewise supports high diversity for those terrestrial organisms that rely on the macroinvertebrate food web (Clarke et al. 2008). Researchers have established that stream insects provide an important source of food to the terrestrial wildlife that inhabits riparian areas, such as bats and birds (Nakano and Murakami 2001).

It is important to consider effects on the naturally occurring structure of the aquatic ecosystem because we know that a community that is similar in structure to reference (same kinds of animals in similar proportions) is most likely to be functioning similar to a reference community. This is the foundation of bioassessment as practiced by EPA, states, and tribes.

We also note that CH2M HILL is careful to state in the TED2 § 4.1.1 that "the presence or numbers of a *single species* does not necessarily have a substantive effect…". EPA's macroinvertebrate analyses are not focused on single species. EPA's analyses focus on mean values of 6 entire genera of Ephemeroptera alone, representing many species.

Also see Responses #13, 146A-149A, 150A, 151A, and 204A. See Response #19 for a discussion of the effects on water-dependent birds. Also, see Responses #119A-122A for additional discussion of ecological function and effects on higher trophic level biota.

Comment #204A – The most direct evidence that conductivity does not result in adverse effects to such higher trophic resources is that Spruce Fork, which has a conductivity value over 500 µS/cm, and a different distribution of EPT taxa than either Pigeonroost or Oldhouse, has maintained a healthy fish assemblage for the last 60 years. RD at 32, 60; TED2 § 3.2.3.

Response #204A – See Response #203A. EPA notes that WVDEP's 2010 Section 303(d) list of impaired waters lists the entire length of Spruce Fork as biologically impaired. The comment misstates EPA's characterization of the fish assemblage. While EPA agrees that the fish assemblage is not impaired based upon currently used metrics, EPA also stated that Spruce Fork fish assemblages "are not representative of pristine conditions and it is likely that some of the more sensitive species have been historically extirpated from past anthropogenic activities, including mining." We do not know at what point in a trajectory of recovery this fish assemblage is in because we have no reference to compare to.

The earliest records for sampling in the Little Coal drainage comes from Van Meter and Taylor, who collected in Spruce and Pond Fork in 1949. They seined the stream and it is difficult to compare what they found with what we see today, but their field notes say of the Pond Fork site that it was "polluted beyond words" and only a few fish were collected (WVDNR 2009). This is the case for many of the sites of this size we see in West Virginia – the fish assemblage today is likely the result of past pollution (*Sensu* Harding et al, 1998).

We do, however, have candidate reference sites for macroinvertebrates because some small watersheds were never badly polluted in the past or were affected but able to recover because many macroinvertebrates have a terrestrial stage and can fly to repopulate streams that have recovered, given enough time and a longitudinal connectedness to a potential source of colonists. EPA has relied upon these reference sites to support its assessment of the impacts on wildlife that will result upon construction of the Spruce No. 1 Mine, and has utilized the available, limited data on fish populations in Spruce Fork to assess impacts to these wildlife.

Comment #205A – EPA Fails To Demonstrate an Unacceptable Adverse Effect Within the Footprint of the Authorized Fill. EPA asserts that the macroinvertebrates that live within the footprint of the authorized fill will be destroyed. RD at 51. But EPA provides no reason to think that the macroinvertebrate community as a whole will suffer any significant effect from this loss. TED2 § 3.2.2; 4.1.1.

Response #205A – See Responses #21 and 62. EPA notes that throughout its comments, the commenter states that EPA focuses only on "change in EPT composition." This phrase is misleading. The "change in composition" to which the commenter refers is a wholesale disappearance (e.g., extirpation, death, avoidance), not of individuals or even species, but of every individual within every species constituting every extirpated genus. In its draft review comments on the ORD Conductivity Benchmark Report, the Science Advisory Board (SAB 2010) has stated: "The complete loss of a genus is an extreme ecological effect and not a chronic response. Thus, a benchmark based on extirpation may not be protective of the stream ecosystem."

Comment #206A – EPA simply assumes that any potential loss of certain EPT species within the footprint of the fill will be significant. RD at 51. EPA provides no data to support this assumption. In fact, any loss of EPT in the footprint of the fills will have an inconsequential impact on the macroinvertebrate and EPT community in the area and an inconsequential impact on downstream macroinvertebrate and EPT abundance and diversity. TED2 § 4.1.2. EPA effectively concedes this point when it notes that the macroinvertebrates with which it is concerned are "naturally ubiquitous across the region, not rare, or endangered." RD App. 1 at 32. Any loss of sensitive EPT cannot therefore have any "significant" impact on the species community within the area.

Response #206A – See Responses #9, 21, and 62, and Appendix 5 of the Final Determination regarding cumulative effects.

EPA disagrees. As stated in the Final Determination, it is apparent that within the Coal River watershed, very few high-quality (or reference-quality streams) exist. Out of approximately 250 stations sampled by the WVDEP in the Coal River sub-basin since 1996, only 3 (~1%) are designated as reference sites (which are sites represented predominantly by sensitive EPT genera and total individuals). One of these three reference sites is White Oak Branch, which flows into Spruce Fork immediately upstream of Oldhouse Branch and Pigeonroost Branch. The WVDEP defines reference conditions as those conditions that "describe the characteristics of waterbody segments least impaired by human activities and are used to define attainable biological and habitat conditions. Final selection of reference sites depends on a determination of minimal disturbance, which is derived from physio-chemical and habitat data collected during the assessment of the stream sites." Reference sites are used to determine the score that represents the threshold between impaired and non-impaired sites. Because Oldhouse Branch and Pigeonroost Branch have similar high-quality characteristics as White Oak Branch, they are important within the context of the larger Coal River sub-basin and Headwaters Spruce Fork sub-watershed because they represent some of the few stream systems supporting least-disturbed conditions within those watersheds.

Commenters have taken the statement that affected genera are "naturally ubiquitous across the region, not rare, or endangered" out of context. This statement is designed to acknowledge the importance of the macroinvertebrate taxa that will be lost as a result of construction of the

Spruce No. 1 Mine, and to reinforce the ecological relevance of these taxa as indicators of and critical elements within high-quality headwater streams communities within the ecoregion. The Final Determination clarifies that because the macroinvertebrate taxa that exist in Pigeonroost Branch and Oldhouse Branch are recognized within the ecoregion as important contributors to stream ecosystems, and because these taxa are used as indicators of stream health, the loss of these taxa and the broader macroinvertebrate community is significant.

See Response #246A(ix), which highlights the significant difference in macroinvertebrate communities (including EPT) between high-quality headwater streams and sediment ditches. This difference highlights the fact that impacts to "the species community within the area" will in fact be significant. Also see Response #218A with respect to the fact that species will be unable to drift or relocate "within the area" affected by the Spruce No. 1 mine, which reinforces the significance of impacts to the macroinvertebrate community.

Comment #207A – Indeed, such impacts to macroinvertebrates would also be expected at *any* surface mine in the United States, and *any* fill requiring a 404 permit. Macroinvertebrates inhabit all waters of the United States, and any fill placed in such waters will inevitably impact macroinvertebrates to some degree.

Response #207A – The Final Determination is based upon data and analyses that are specific to the Spruce No. 1 Mine in the context of its receiving waters and their aquatic-dependent wildlife. It does not extend to "any" surface mine in the U.S. or "any" fill requiring a Section 404 permit.

Comment #208A – If EPA could base its 404(c) determination on fill impacts to macroinvertebrates, it would destroy the carefully balanced structure of the 404 permitting process. Section 404(c) would become the rule, not the exception, and would render every 404 permit uncertain and subject to the whim of EPA.

Response #208A – The Final Determination is not based upon generic impacts to macroinvertebrates. It is based upon data and analysis that is specific to the Spruce No. 1 Mine in the context of its receiving waters and their aquatic-dependent wildlife. The Final Determination fully supports EPA's determination that specification of Pigeonroost Branch and Oldhouse Branch as disposal sites for the construction of valley fills associated with the Spruce No. 1 Mine as currently authorized will have unacceptable adverse effects on wildlife.

Comment #209A – This proves too much and greatly exceeds the circumscribed authority that Congress granted EPA under Section 404(c) as a small check in the overall 404 statutory scheme, which explicitly approves the discharge of fill material into waters of the United States.

Response #209A – See Responses #9 and 12.

Comment #210A – EPA Has Failed To Demonstrate That the Authorized Discharges Will Have an Unacceptable Adverse Effect Downstream. The central thrust of EPA's conductivity and macroinvertebrate argument is that the permitted fills in Pigeonroost and Oldhouse will cause conductivity to rise in those streams and in Spruce Fork, and lead to a change in EPT composition. This argument suffers from several flaws.

Response #210A – See Responses #166A-172A.

Comment #211A – Mingo Logan does not believe that EPA has the authority to base the exercise of its 404(c) authority on downstream impacts, where the downstream discharges are controlled by a permit issued under Section 402. Cmt. V.A.

Response #211A – See Responses #28 and 155.

Comment #212A – First, the flow and watershed contribution of Pigeonroost and Oldhouse to Spruce Fork is nominal. Pigeonroost and Oldhouse constitute only 9.92 percent of the watershed at the point just downstream of the Spruce No. 1 Mine. Moreover, these two streams represent only 6.6 percent of the measureable flow at that point. They are therefore not significant contributors to the Spruce Fork watershed, and do not provide significant dilutive capacity.

Response #212A – First, EPA believes that flows from Pigeonroost Branch and Oldhouse Branch, which even by the commenter's calculations are 9.92 percent of the watershed of Spruce Fork when measured just downstream of the Spruce No. 1 Mine, currently supply significant freshwater dilution to the mainstem of Spruce Fork. Second, post-mining, rather than supplying freshwater to the mainstem of Spruce Fork, these tributaries will become sources of selenium and conductivity to the remaining downstream portions of these tributaries and to the mainstem of Spruce Fork. Furthermore, flows in Pigeonroost and Oldhouse Branches are likely to increase post-mining. Daily stream flows downstream of mined sites with valley fills generally are greater than daily stream flows downstream of unmined sites during periods of low stream flow. In addition, valley-fill sites have a greater percentage of baseflow and a lower percentage of flow from storm runoff than unmined sites (Wiley et al. 2001). EPA believes that the increased conductivity loading will have a significant effect on downstream water quality in the mainstem of Spruce Fork. EPA used two models to analyze this effect.

1) The first model is a published and peer-reviewed model that uses watershed area as a tributary weighting factor (Johnson et al. 2010). The pre-mining average and maximum conductivity in mainstem Spruce Fork, downstream of the project area, were compared to measured conductivity values from the PEIS. For example, Table 1 shows the freshwater dilution effects of Pigeonroost and Oldhouse on the mainstem of Spruce Fork for average conductivity. Orange boxes indicate input values that are measured average conductivity values, taken from the EIS for the Spruce No. 1 Mine. This model shows both Pigeonroost and Oldhouse deliver freshwater dilution to the mainstem of Spruce Fork, which reduces conductivity in the mainstem of Spruce Fork to improve downstream of Pigeonroost and Oldhouse Branches.

Table 1. Pre-mining (indicates dilution)

Orange Avg values from EIS

| Stream ID | Area (km2) | Input Cond | Pred. Cond |
|---|---|---|---|
| Spruce upstream Oldhouse | 55.9 | 656 | 633 |

| | | | |
|---|---|---|---|
| Oldhouse | 2.4 | 98 | |
| Spruce upstream Pigeonroost | 59.0 | 633 | 592 |
| Pigeonroost | 6.0 | 189 | |
| Spruce upstream Seng Camp | 71.1 | 592 | 552 |
| Seng Camp | 13.2 | 340 | |
| Spruce downstream Seng Camp | 84.3 | 552 | 552 |

The measured average conductivity value in the EIS dataset for mainstem Spruce Fork downstream of Seng Camp Creek was 570 µS/cm (compared to 552 µS/cm modeled). This comparison shows that the model underestimated pre-mining conductivity in mainstem Spruce Fork downstream of Seng Camp Creek, so EPA considered the post-mining conductivity predictions to be conservative. Because the model does not adjust watershed areas for post-mining conductivity estimates, increased flows in valley filled streams post-mining will not be captured in the model, and this will also cause the model to underestimate post-mining conductivity.

Post-mining average and maximum conductivity values expected for filled tributaries were conservative (500 and 1000 µS/cm average and 1000 and 1500 µS/cm maximum). For comparison, in Pond et al. 2008, the conductivity mean at mined sites was 1023 µS/cm and the maximum was 2540. (See Response #188A). For example, Table 2 shows the effects of degraded water quality flowing from Pigeonroost and Oldhouse Branches on the mainstem of Spruce Fork post-mining if post-mining average conductivity levels in those tributaries are 1000 µS/cm. Conductivity will increase in the mainstem of Spruce Fork downstream of both Pigeonroost and Oldhouse. Data from Seng Camp Creek are included because the DSF monitoring station is below Seng Camp Creek, and provides information that allows EPA to test the model by comparison to data from DSF.

Table 2. Post-mining (indicates degradation)

Orange Avg values estimated for filled streams

| Stream ID | Area (km2) | Input Cond | Pred. Cond |
|---|---|---|---|
| Spruce upstream Oldhouse | 55.9 | 656 | 670 |
| Oldhouse | 2.4 | 1000 | |
| Spruce upstream Pigeonroost | 59.0 | 670 | 701 |
| Pigeonroost | 6.0 | 1000 | |
| Spruce upstream Seng Camp | 71.1 | 701 | 748 |
| Seng Camp | 13.2 | 1000 | |
| Spruce downstream Seng Camp | 84.3 | 748 | 748 |

*Note: EPA includes Seng Camp Creek in this analysis to represent future conditions as a result of continued mining in Seng Camp Creek. See Response #52A.*

The following information can also be found in Final Determination, Appendix 1, and is included here to show all results of the modeling.

Overall, this model indicated that if the resulting post-mining conductivity is maintained at 500 µS/cm in the three tributaries located on the project area, which is the best-case scenario presented here, the conductivity levels in the mainstem of Spruce Fork downstream of the project area will increase from 552 µS/cm on average pre-mining to 614 µS/cm on average post-mining. EPA believes this model provides evidence that the flow from Oldhouse Branch and Pigeonroost Branch currently provide significant freshwater dilution to the mainstem of Spruce Fork. This model predicts that mining will increase loading of TDS from Oldhouse Branch and Pigeonroost Branch and will have a significant effect on downstream water quality. See Final Determination Appendix 1 for more detail.

*Modeled conductivity downstream of Spruce No. 1 project area pre and post-mining*

| | Pre-mining Conductivity* Modeled | Pre-mining Conductivity* Measured | Post-mining Conductivity Modeled | Post-mining Conductivity Modeled |
|---|---|---|---|---|
| | Avg µS/cm | | Avg µS/cm | Avg µS/cm |
| Spruce Fork upstream of Oldhouse Branch | 656 | | 656 | 656 |
| Oldhouse Branch | 98 | | 500 | 1000 |
| Pigeonroost Branch | 189 | | 500 | 1000 |
| Seng Camp Branch | 340 | | 500 | 1000 |
| Spruce Fork downstream of Seng Camp Branch | 552 | 570 | 614 | 748 |
| | Max µS/cm | | Max µS/cm | Max µS/cm |
| Spruce Fork upstream of Oldhouse Branch | 1130 | | 1130 | 1130 |
| Oldhouse Branch | **300 | | 1000 | 1500 |
| Pigeonroost Branch | 318 | | 1000 | 1500 |
| Seng Camp Branch | 616 | | 1000 | 1500 |
| Spruce Fork downstream of Seng Camp Branch | 960 | 1080 | 1095 | 1228 |

* Measured values taken from Spruce No. 1 EIS baseline water quality monitoring data.
** This value was estimated from premining measured values in Oldhouse Branch and Pigeonroost Branch

Input value – measured
Input value – predicted post-mining
Modeled value

Comment #213A – Second, EPA concedes that few if any sensitive EPT live in Spruce Fork. RD App. 1 at 6. And few of the tolerant EPT found in Spruce Fork are found in Pigeonroost and Oldhouse. *See* RD App. 1 at 26. Thus, without regard to the permitted fills in Pigeonroost and Oldhouse, whatever sensitive EPT may be in those creeks are not providing any benefit to the EPT composition in Spruce Fork. As a result, EPA cannot demonstrate that any change in the EPT composition in Pigeonroost and Oldhouse will adversely impact the ecological health in Spruce Fork.

Response #213A – See Responses #112A-122A and 145A.

The Final Determination does not rely on a conclusion that EPT in Pigeonroost Branch and Oldhouse Branch are providing macroinvertebrate enrichment to Spruce Fork via dispersal. Rather, EPA concludes that discharges from the Spruce No. 1 Mine as currently authorized would cause unacceptable adverse effects.

Comment #214A – Section 404(c) does not give EPA authority over other land uses, such as upland mining activities, or mining point source discharges regulated under Section 402. EPA does not establish whether any conductivity increase in Spruce Fork will come from the permitted discharges, the upland activities at the mine regulated under SMCRA, or some other factor like habitat change.

Response #214A – See Responses #28, 151, 155, and 13A.

Comment #215A – Conductivity results from rainfall or other water sources running across exposed rock and soil. TED2 § 3.2.1. It does not result from the authorized discharges, per se, and in fact conductivity would be expected to rise somewhat whether the permitted fills were constructed or not.

Response #215A – EPA believes conductivity emanates from a number of sources, including infiltration of flow through unconsolidated materials in valley fills and from stormwater contaminated by exposure to disturbed rock strata on the surface. The commenter disregards that construction of the valley fill plays an integral role in the mine plan as currently authorized and, but for the discharge of fill material creating the valley fill, most of the effluent discharges (including stormwater that comes into contact with exposed rock and soil) would not occur. Accordingly, the contribution of pollutants to downstream waters through the discharge of contaminated stormwater is a secondary effect of the discharge of fill material. *See* 40 C.F.R. § 230.11(h). It is appropriate for EPA to consider whether the placement of fill will have an unacceptable effect even though the mechanism may involve secondary effects of the fill.

The courts have upheld EPA determinations of unacceptable adverse effects where the adverse effects are the result of secondary effects of the fill. This occurs, for example, in the cases where the courts have upheld EPA's Section 404(c) determinations based on the flooding effects of impoundments. *See, e.g., James City County Virginia v. EPA*, 12 F.3d 1330 ($4^{th}$ Cir. 1993); *Alameda Water & Sanitation District v. Reilly*, 930 F. Supp. 486 (D. Colo. 1996). In those matters, the unacceptable adverse effects found by EPA were not necessarily within the footprint of the fills creating the impoundments but in the secondary flooding effects. Similarly, it is appropriate for EPA to consider effects to downstream waters that will be caused by discharges associated with the project. The fact that WVDEP may have authorized those discharges through the NPDES permit does not preclude EPA from considering the secondary effects. See Responses #28 and 155.

It is also important to note that the secondary downstream effects from placement of the valley fills will arise not only from export of pollutants, but also from removal of Pigeonroost Branch and Oldhouse Branch as sources of freshwater dilution to downstream waters.

Comment #216A – Elsewhere, EPA has suggested that its concerns about conductivity are raised by any land disturbance which exposes previously unweathered rock to the elements even when no filling is proposed. For example, EPA has opposed draft Section 402 permits for mining ventures over issues concerning conductivity where the only discharges proposed were stormwater discharges from on-bench sediment control structures associated with a highwall mining operation. *See*, *e.g.*, Letter from Evelyn S. MacKnight, Chief, NPDES Permits Branch, EPA Region III, to Jeffrey Parsons, WVDEP (Oct. 28, 2010), Exhibit 7.) *Id.* All areas of the mine site that would expose rock are potential causes of an increase in conductivity (as are agricultural and forestry operations to name a few.

Response #216A – The letter referenced in the comment does not assert that EPA has concerns about conductivity whenever there is "any land disturbance which exposes previously unweathered rock to the elements even when no filling is proposed" or related to agricultural or forestry operations. The referenced letter is an "interim objection" to an NPDES permit at another mining facility. The interim objection was issued because EPA lacked sufficient information to evaluate that permit. The regulations and memorandum of agreement between West Virginia and EPA governing EPA's review of NPDES permits allow EPA to issue an interim objection to seek additional data to inform its permit review. EPA's comments in the referenced letter are very specific and are based on an analysis of site-specific data provided with the NPDES permit application. The letter cannot be viewed as a blanket statement from EPA.

A comparison between levels of conductivity generated by mining and non-mining operations (such as agricultural and forestry activities) is beyond the scope of this Final Determination. See Response #217A.

Comment #217A – All water on site that is exposed to rock and soil, whether rainfall or underground, is a potential source of increased conductivity.

Response #217A – See Response #215A. The data and analyses provided in the Final Determination and its appendices support EPA's determination that construction of the Spruce No. 1 Mine as currently authorized will result in unacceptable adverse effects to wildlife.

Comment #218A – Fourth, EPA's data makes clear that a change in EPT composition has numerous potential causes. EPA explicitly concedes that habitat causes such change, and the data suggests that habitat may in fact be a superior indicator. TED2 § 3.2.2. Because EPA cannot show that any projected EPT composition change will be caused by an increase in conductivity, or the water constituents measured by conductivity, EPA cannot base its Recommended

Determination on a rise in conductivity. Moreover, EPA cannot demonstrate that the decrease in abundance of certain species represents a loss of those organisms. As the Pond study on which EPA relies acknowledges, a decrease in abundance may simply reflect relocation to a preferable habitat. TED2 § 3.2.2.

Response #218A – The comment is inaccurate in that the data do not "suggest habitat may in fact be a *superior* indicator" and EPA did not "explicitly concede" this notion, but acknowledges that habitat degradation *can* lead to adverse impacts to macroinvertebrates. The Final Determination includes analyses that account for habitat degradation as a confounding variable. See Responses #114A, 119A, 165A, 180A, and 181A.

To the extent that commenter states, "EPA cannot demonstrate the decrease in abundance of certain species represents a loss of those organisms," EPA disagrees. First, the scientific literature indicates that biological communities respond predictably to changes in their environment. Fundamentals of population biology and stream ecological theory imply that radical alteration of natural community composition, including the decline of the effective population size of many species (to the extent that many once common and abundant species are now exceedingly rare in streams affected by valley fills), means that the community is inhibited, distressed, or impaired. While reduction or absence of only a few expected species is a less severe impact, O/E values showed that on average, MTM/VF streams including the Dal-Tex sites routinely lost 50-70% of their expected fauna based on WVDEP's statistical subsampling.

In a Kentucky study (Pond 2010), all organisms were sorted and identified from the sample and all available habitats were thoroughly surveyed. Data from Pond (2010) indicated that the entire species pool of mayflies was eradicated from valley-filled streams with high conductivity and that a statistical changepoint (threshold) as low as 175 µS/cm led to significant population declines of Ephemeroptera. EPA notes that Kentucky statutes recognize that community composition is protected in water quality standards where they define *"Adversely affect" or "adversely change" means, for purposes of 401 KAR 5:026 through 5:031, 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.*" See Response #139A. While Kentucky's statutes are not legally applicable in West Virginia, this demonstrates that EPA's approach is consistent with that of a neighboring state.

To the effect that the commenter states that "a decrease in abundance may simply reflect relocation to a preferable habitat," this conclusion is unfounded. In reference to Pond et al (2008)'s "drift" postulations, the authors acknowledged drift occurs but this does not explain why the expected organisms do not recolonize the vacated habitat once conditions improve. Relocation via behavioral drift to a "preferred habitat" cannot occur when the pollution plume extends for kilometers downstream (like below most MTM/VF operations and predicted downstream of Spruce No. 1 as shown in Appendix 5 of the Final Determination). In this case, the drift is catastrophic and the sensitive animals perish as they succumb to toxic conditions. In many of the high conductivity streams that EPA has studied (e.g., Green et al. 2000; Pond et al. 2008; Pond 2010; unpublished EPA data), "preferred habitat" (as suitable substratum, velocity, depth, shade, etc.) is indeed present, but the naturally occurring organisms are absent.

Comment #219A – Fifth, even if EPA could demonstrate that a change in EPT composition resulted from the authorized discharges alone, EPA must still demonstrate that the effect is adverse and significant or unacceptable. EPA cannot show either. All streams have different compositions of EPT, and EPA has admitted that the relevant sensitive EPT are ubiquitous. *See* RD App. 1 at 32. If the species are everywhere, and every stream has a different EPT composition, then a shift in ubiquitous species for two creeks cannot be a significant adverse effect for macroinvertebrates within the region.

Response #219A – See Response #167. Also, see Responses #113A-122A.

EPA agrees that there is some natural variation in the composition of invertebrate communities from stream to stream, but disagrees that all good quality streams have such "different EPT composition" that there is no reliable reference condition signal which can be used to judge when invertebrate assemblages and the aquatic life use are impaired by stressors. The EPT composition and richness of reference streams can and is routinely defined by states for use in bioassessments.

Often, the threshold for a significant departure from reference is at the extreme end of the reference condition values (e.g. the lower $5^{th}$ % of reference), indicating that much of the variation in invertebrate assemblages found at reference sites is considered to be natural. Despite this variation in the natural condition, the EPT richness metric is routinely used by many states in bioassessment metrics in order to reliably assess attainment or impairment of the aquatic life use because it is a reliable and ecologically meaningful indicator of impairment. Essentially, the signal provided is higher than the noise or variation in the invertebrate assemblages at reference. As described elsewhere, the taxa found within the EPT Orders make up an important component of the invertebrate assemblage at reference sites. See Responses #116A and 124A.

As described elsewhere, EPA used widely accepted bioassessment techniques and metrics to determine that significant degradation will occur downstream of the project area. EPA determined that the expected water quality degradation will significantly degrade the macroinvertebrate assemblages and impair the aquatic life use as measured by the bioassessment tool currently used by WVDEP (the family level WVSCI compared to a regional reference condition). EPA also used an O/E model and other metrics that use more refined genus-level data to provide evidence of significant adverse effect, in order to supplement the family-level WVSCI.

Furthermore, high quality streams have significantly higher within-stream similarity compared to between-stream similarity as demonstrated with the multi-response permutation procedure (MRPP) and reported in Pond et al. (2008). There we found that within-group variability was lowest in unmined and low disturbance sites and greatest in the high disturbance sites.

See Response #206A for a description of the appropriate context for EPA's statement regarding the ubiquity of EPT taxa.

Comment #220A – EPA Has Not Established That Golden Algae Growth Is Likely or Even Plausible. The Recommended Determination claims that the authorized fills: "are **likely** to **contribute to** in stream conditions **in or near** Spruce Fork that **may** support the growth of golden algae (*Pyrmnesium parvum*)." RD at 60 (emphasis added). The numerous caveats in this claim indicate that even EPA does not take it very seriously. And with good reason. EPA's concerns rest entirely on a bloom that occurred in 2009 in Dunkard Creek, West Virginia, approximately 225 miles from the Spruce No. 1 Mine. The operation associated with the Dunkard Creek incident is an underground mine, not a surface mine like the Spruce No. 1 Mine.

Response #220A – EPA disagrees. Construction of the Spruce No. 1 Mine as currently authorized will contribute to conditions that would support growth of golden algae (*P. parvum*) if the algae is introduced into the area through waterfowl. EPA takes the increased risk of golden algae contamination from the project very seriously. Construction of the Spruce No. 1 Mine as currently authorized will increase in-stream conductivity and create ponds where water can collect, two conditions that would support the growth of golden algae if it is introduced into the system. The fact that the Spruce No. 1 Mine is a surface mine and not an underground mine is not relevant to the creation of conditions that would support the growth of golden algae. See also Responses #221A, 222A, 223A, 224A, 225A, and 17B-19B.

Comment #221A – In all the years of mining in West Virginia and Pennsylvania, the 2009 incident in Dunkard Creek remains the only documented bloom of this toxic algae associated with a pond and creek downstream from a mine site.

Response #221A – The invasion of golden algae into this region should be viewed in the larger context of its invasion into North America. Since its discovery in the Pecos River of Texas in 1985 (it first documented occurrence in North America), golden algae has spread to 14 additional states. Pennsylvania and West Virginia are the most recent additions to the spread of this invasive species.

From October 8 to October 29, 2009, WVDEP sampled 32 streams outside of the Dunkard Creek watershed. These are streams that WVDEP considered being at risk for golden algae invasion based on elevated conductivity. Spruce Fork and West Fork of Pond Fork were among these sites indicating that WVDEP considers them at risk enough to monitor for golden algae.

During this round of sampling, five streams outside of the Dunkard watershed were positive for *P. parvum*. The laboratory runs duplicate samples on this *P. parvum* analysis. Three of the five samples had duplicates that did not score similarly (the analysis is a genetic screen for *P. parvum*) and had estimated counts of < 300 cells. The other two samples – Tenmile Creek of West Fork and Cabin Creek of the Upper Kanawha – had higher counts (440 and 137,306) with both replicates scoring similarly. While WVDEP has disavowed the Cabin Creek sample based on best professional judgment, Cabin Creek was re-sampled on November 18, 2009 and was still positive for *P. parvum*, although the counts were much lower.

*P. parvum* was discovered in Whitely Creek during sampling on September 29 and October 28, 2009. *P. parvum* was detected in Whitely during a round of sampling on November 9, 2009. At the same time, *P. parvum* was detected in an unnamed tributary to Enlow Fork.

During the fall of 2009, an aquatic life kill was reported in a private pond in the Tenmile Creek watershed in southwestern Pennsylvania that may be a result of *P. parvum*.

Sampling on September 17, 2010 detected golden algae in ponds of the Bailey mine. Subsequently, sampling on September 29, 2010 detected golden algae in three additional ponds and a pond slurry area. Sampling in Enlow Fork found golden algae in Enlow Fork and Talley Run, a tributary to Enlow Fork.

Therefore, EPA concludes that the conditions that support golden algae growth are present in several streams in the region, including Spruce Fork and some of its tributaries. See also Responses #17B-19B.

Comment #222A – The Spruce No. 1 Mine sites are associated with much smaller intermittent headwater streams that are not comparable to the larger permanent Dunkard Creek. TED2 § 4.3.1.

Response #222A – EPA disagrees. Headwater streams to be impacted by the Spruce No. 1 Mine are integral to the larger Spruce Fork. Both Spruce Fork (approx. 0.2%) and Dunkard Creek (approx. 0.1%) have gradient less than 1% and areas of slow-moving water. Moreover, EPA is unaware of – and the commenter has not pointed to – any evidence that golden algae depend upon watershed area. In fact, the golden algae bloom extended very far upstream in the Dunkard Creek watershed, and was present in a beaver dam pond in a watershed < 4 square miles. This size is not incomparable with the streams and their drainage areas that would be impacted by the Spruce No. 1 mine.

Sedimentation ponds and sediment ditches associated with the Spruce No. 1 mine will also contain ponded water, providing conditions favorable to the growth of golden algae.

Comment #223A – Importantly, Dunkard Creek differs markedly from the area around the Spruce No. 1 Mine in water chemistry and stream conditions.

Response #223A – See Responses #222A, 224A, and 225A.

Comment #224A – The 2009 algal bloom in Dunkard Creek was associated with a warm pond that fed into the creek during conditions of elevated chloride, sulfate, and conductivity. Dunkard Creek had a conductivity value of over 25,000 µS/cm in the area of the bloom. By contrast, the conductivity values at Spruce No. 1 Mine sites averaged 20 to 440 in 2008 and 2009, or *approximately 50 to 1,000 times less* than the conductivity value at Dunkard Creek during the bloom.

Response #224A – It is unclear what data and what sites the commenter refers to with respect to the statement that "the conductivity values at Spruce No. 1 Mine sites averaged 20 to 440 in 2008 or 2009." Baseline conductivity values for Pigeonroost Branch, Oldhouse Branch and Spruce Fork can be found in the Final Determination and appendices. Regardless, what should be considered are not baseline conductivity values, but predicted conductivity values following construction of the Spruce No. 1 Mine as currently authorized.

The commenter is correct that conductivity values at Dunkard Creek were extremely elevated. However, to the extent that the commenter asserts that golden algae can bloom only at the extremely elevated levels found in Dunkard Creek, the commenter is incorrect. Growth studies by Hambright (2010) demonstrate that the lower limit for growth is estimated to be between 500 and 1000 mg/L TDS (conductivity 714-1428 µS/cm). Predicted conductivity levels for Pigeonroost Branch, Oldhouse Branch, and Spruce Fork following construction of the Spruce No. 1 Mine fall within this range.

Comment #225A – Dunkard Creek is a chloride-dominated system, unlike the Spruce No. 1 Mine drainages. For example, recently collected water quality data from the outlet pond at the Left Fork of Beech Creek showed a chloride concentration of 15 mg/L, at least 1,000-fold less than in Dunkard Creek during the golden algae bloom, which saw chloride of up to 6,000 mg/L. TED2 § 4.3.1.

Response #225A – Based on the best-available scientific information, the levels of total dissolved solids (and conductivity) are more important to the growth of golden algae than is the ion mixture. This conclusion is supported by Baker (2009), where both artificial seawater and artificial lake water were tested. Excerpts of Baker (2009) are provided below.

*General culture methods*—The strain of *P. parvum* culture used in this study (Culture Collection of Algae at the University of Texas at Austin, UTEX LL 2797) was isolated by J. Glass from a bloom in Texas and used in previous laboratory studies (Baker et al. 2007; Grover et al. 2007). For stock cultures, an artificial seawater (ASW) medium was prepared according to Kester et al. (1967), diluted to a working salinity of 5.8 g $L^{-1}$ in ultrapure water (Millipore Milli-Q, 18 MΩ $cm^{-1}$), and then enriched with f/2 levels of nitrogen (N), P, trace metals, and vitamins (MacLachlan 1973). In the trace-metals solution, an equimolar amount of ferric chloride was substituted for ferrous ammonium sulfate due to the toxicity of ammonium to *P. parvum* (Grover et al. 2007). An additional medium simulated inland waters of western Texas affected by *P. parvum* using an ion composition similar to Lake Whitney, Texas, which was ascertained during an active bloom. This artificial lake-water (ALW) medium was modified from ASW as follows: the same molar concentration of Mg was added as $MgSO_4$ instead of $MgCl_2$ to produce higher sulfate concentrations; eightfold higher additions of $CaCl_2 \cdot 2H_2O$ were used; and eightfold higher additions of $NaHCO_3$ were added aseptically after autoclaving. For both ASW and ALW, full-strength preparations of the basal salts were diluted as needed with ultrapure water to achieve experimental salinities.

*Excerpt from Baker (2009)*

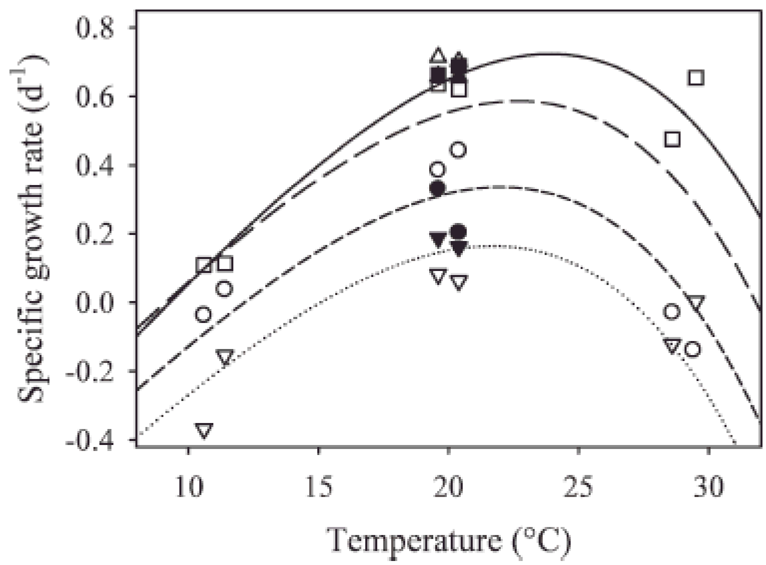



Fig. 1. Specific growth rate of *P. parvum* in the nutrient-sufficient experiment. Symbols show growth rate under different salinity and ion composition: Triangles = 0.5 g $L^{-1}$; circles = 1.0 g $L^{-1}$; squares = 4 g $L^{-1}$. Open symbols = ASW medium; closed symbols = ALW medium. Curves show the fitted regression model (Eq. 4) for different salinities: solid curve = 4 g $L^{-1}$; long-dashed curve = 2 g $L^{-1}$; short-dashed curve = 1 g $L^{-1}$; dotted curve = 0.5 g $L^{-1}$.

*Excerpt from Baker (2009).*

Comment #226A – In short, EPA's suggestion that stream chemistry at the Spruce No. 1 Mine resembles that of Dunkard Creek misses the mark by a factor of a 100 to 1,000. There is simply no reason to expect the permitted fills to cause a golden algal bloom at the Spruce No. 1 Mine.

Response #226A – EPA disagrees. See Responses #220A-225A.

Comment #227A – EPA's Limited Discussion of Wildlife in the Recommended Determination Fails To Meet EPA's Burden

Response #227A – EPA disagrees. See Response #6 for a discussion of fish, Response #8 for a discussion of salamanders, Response #12 for a discussion of macroinvertebrates, Response #19 for a discussion of water-dependent birds, and Responses #175A-186A.

Comment #228A – EPA Fails To Demonstrate an Unacceptable Adverse Effect on Salamanders. The Proposed Determination estimated that the permitted fills would potentially extirpate 20 million salamanders. *See* 75 Fed. Reg. 16,788, 16,799 (Apr. 2, 2010). The Recommended Determination reduces that estimated impact to salamanders by 99 percent. RD at 58-59 (estimating that 200,000 stream dwelling salamanders will be buried).

Response #228A – See Response #8.

Comment #229A – As with macroinvertebrates, EPA overstates its case. Salamanders of the type potentially impacted by the authorized fills *are ubiquitous*. As a result, similar impacts to salamanders would be expected at any surface mine in West Virginia, indeed at many similar projects throughout the United States, such as highway construction and other infrastructure changes. Such impacts are to be expected at *any* fill requiring a 404 permit in a known salamander habitat.

Response #229A – See Responses #8, 9, and 10.

Comment #230A – As such, EPA's objection based on effects to common ubiquitous salamanders would again undermine the entire 404 program and effectively outlaw these types of permitted discharges. This is directly contrary to Congress' intent in creating Section 404 of the CWA and authorizing these fills in SMCRA. *See OVEC*, 556 F.3d at 186, 190; Cmt. II.A.

Response #230A – See Responses #8, 9, and 10.

Comment #231A – EPA contends that stream salamanders are not expected to return to the Spruce No. 1 Mine site due to the burial of existing habitat and the inadequacy of proposed mitigation to replace the habitat required by these species. RD at 59. As detailed by CH2M HILL in the accompanying report, however, surveys of streamside salamanders conducted in valley fill and reference streams in southern West Virginia indicate that salamander populations are likely to persist in the downstream reaches of Pigeonroost Branch and Oldhouse Branch, with their diversity and abundance dependent in part on the availability of suitable rocky substrates. TED2 § 4.2. Although salamander abundance was greater in the reference streams, salamanders were still abundant in the valley fill streams, and species richness between the two groups was almost identical. *See* TED2 § 4.2.

Response #231A – See Response #8. EPA continues to expect that salamanders in extensively disturbed local populations will not be reestablished in suitable habitats because of limited interaction in watersheds. Additionally, downstream salamander populations will likely face additional stress of elevated levels of selenium, and potentially other contaminants.

Comment #232A – EPA Has Not and Cannot Demonstrate Unacceptable Adverse Effects to Fish. EPA concedes that there are few if any fish in Pigeonroost Branch and Oldhouse Branch. RD at 31 ("only a few species"). The potential loss of these few fish, which do not even appear year round, cannot be significant.

Response #232A – See Responses #1, 3, 5 and 94.

Comment #233A – EPA has not established the condition precedent that Pigeonroost, Oldhouse, or Spruce Fork contains a "fishery." Section 404(c) only authorizes EPA to withdraw a specification when it determines that there will be an unacceptable adverse effect on a "fishery." 33 U.S.C. § 1344(c). The provision does not mention individual species, meaning that Congress intended 404(c) to protect large-scale resources. It is unreasonable to conclude that Congress included “fishery” along with similar large-scale resources and also intended “fish” to be separately included in wildlife.

Response #233A – See Responses #2 and 12.

Comment #234A – EPA further acknowledges that “[t]he fish assemblages in Spruce Fork are in relatively good condition . . . [and] it appears that the fish within Spruce Fork are fairly tolerant of increases in conductivity and total dissolved solids.” RD at 60. Thus, the fills in the Seng Camp Creek subwatershed have not adversely affected fish downstream.

Response #234A – See Response #5. As outlined in Responses #24A and 204A, due to the limited amount of information about historical fish assemblages in Spruce Fork, EPA does not agree that past adverse effects have not occurred.

Comment #235A – The last sentence regarding effects of degraded water quality due to selenium on downstream fish populations is incomplete (sentence cuts off) and is in any event contradicted by EPA’s admission that Spruce Fork has fish assemblages “in relatively good condition.” RD at 60. Further, there is no evidence of impairment of fish or wildlife populations attributable to selenium discharges from Spruce No. 1 Mine and no reason to expect that there will be any such impairment as discussed above in the section of these comments regarding selenium.

Response #235A – See Responses #4, 5, 29, 92, and 24A.

Comment #236A – EPA presents no reason to expect that fills in Pigeonroost Branch and Oldhouse Branch will cause such an effect. EPA has not established that selenium concentrations in Spruce Fork could conceivably exceed the numeric criterion for selenium, nor cause any significant bioaccumulation or other adverse effect on fish.

Response #236A – EPA notes that the Final Determination is not based upon a conclusion that there will be violations of West Virginia’s narrative water quality standard for selenium, but upon the Spruce No. 1 mine’s unacceptable adverse effects on wildlife.

EPA disagrees with the commenter’s conclusions. See Responses #14A (WVDEP unpublished data 2010), 47A (discussing Discharge Monitoring Report results exceeding 5 μg/L downstream of the Spruce No. 1 mine in Seng Camp Creek), and 24A and 63A (WVDEP 2010, WVDEP 2009a).

Comment #237A – EPA Fails To Demonstrate an Unacceptable Adverse Effect on Water Dependent Birds. After contending in the Proposed Determination that the authorized fills would have unacceptable adverse effects on six separate species of birds, EPA now only claims that one species may be impacted.

Response #237A – Only one water-dependent bird species, the Louisiana waterthrush, is included as a basis for EPA’s Final Determination. See Responses #13, 14, and 19.

Comment #238A – The basis for the Recommended Determination does not include any mention of other bird species, such as those EPA included in the Proposed Determination. This includes the Kentucky warbler, the Cerulean warbler, the Swainson's warbler, worm-eating warblers, and the wood thrush. This is undoubtedly because, as Mingo Logan pointed out, none of these species are considered water-dependent. Thus, the authorized fills into Pigeonroost Branch and Oldhouse Branch do not impact them. Mingo Logan will be prejudiced if EPA reverses course and relies upon these species in the future.

Response #238A – See Response #14. The basis for the Final Determination is limited to impacts to wildlife that depend upon the impacted aquatic resources for all or part of their lifecycles. While EPA considers the impacts from forest fragmentation, including impacts to upland species, to be of concern (and therefore has described them), these do not form a basis for the Final Determination**.**

Comment #239A – EPA fails to demonstrate that even the remaining species, the Louisiana waterthrush, will suffer any significant adverse impacts from the permitted fills. Because EPA cannot show that the Louisiana waterthrush inhabits the Spruce No. 1 Mine area, or that its diet depends on the composition of macroinvertebrates, EPA cannot base its 404(c) determination on impacts to the Louisiana waterthrush.

Response #239A – See Responses #13, 17, and 19.

Comment #240A – The waterthrush is not a federally-listed threatened or endangered species. In fact, although the Louisiana waterthrush has been designated a bird of conservation concern ("BCC") by the U.S. Fish and Wildlife Service, no state-listed or federally-listed threatened or endangered bird species (or candidate species) have been identified in or near the project area and no impacts to any such species are expected.

Response #240A – EPA considers the U.S. Fish and Wildlife Service designation of the Louisiana waterthrush as a bird of conservation concern (BCC) as a serious indicator for the species. Comments provided by the USFWS support EPA's position that the loss of sensitive invertebrate species will likely result in adverse impacts to birds. According to the USFWS, the Louisiana waterthrush is an area-sensitive riparian-obligate species that nests and forages along headwater streams of intact interior forests. Moreover, its breeding success is dependent on the diverse and productive assemblage of aquatic insects supported by healthy headwater systems (Mattson et al. 2009). Studies indicate that breeding territory density and occupancy were reduced along streams where benthic macroinvertebrate communities had been degraded due to anthropogenic land uses and/or acidification. In the case of mountaintop mining in Central Appalachia, excessive alkaline mine waters simplify and impair naturally occurring aquatic insect populations whose patterns of life history phenology aptly coincide with critical Louisiana waterthrush feeding behavior. For example, stream communities dominated by hydropsychid caddisflies and elmid beetles (like below many valley fills) likely have sporadic and often simplified emergence patterns not conducive to Louisiana waterthrush foraging. Management for this species has focused on protecting core wooded riparian habitat, including establishment of undisturbed riparian forest cover, and preservation and improvement of water quality to ensure aquatic insect biomass and diversity.

For water-dependent wildlife, such as the Louisiana waterthrush, preservation of large tracts of forest containing headwater streams is necessary for the conservation of this species in the central Appalachians. The Louisiana waterthrush is particularly vulnerable to degradation of water quality and aquatic insect communities (Mattsson and Cooper 2006, Mulvihill et al. 2008).

Comment #241A – As Mingo Logan discussed in its initial comment, the waterthrush is not likely to be affected by the loss of riparian habitat associated with the Spruce No. 1 Mine. The bird prefers mature deciduous or mixed forests with moderate to sparse undergrowth near rapid-flowing streams with clear water (Cornell University, 2010b). The proposed project area contains young to middle-aged forests with relatively few mature trees. Without suitable habitat, the bird is less likely to nest or roost at the project site.

Response #241A – See Responses #13 and 240A.

Comment #242A – Also, changes in stream habitats are not likely to significantly affect potential foraging areas used by the waterthrush. The bird's diet is varied and is not composed solely of the more sensitive EPT that are common to headwater streams. TED2 § 4.4. As discussed at length above, EPA has not shown that there will be a decrease in macroinvertebrates or EPT. Recent studies suggest that the relative abundance of all macroinvertebrate taxa was more important than EPT species richness. TED2 § 4.4.

Response #242A – See Responses #13, 17, 19, 150A and 151A.

EPA considers complete loss of stream habitats associated with mining projects to be considerably more serious than "changes" in stream habitats and would significantly diminish foraging areas used by Lousiana waterthrush. Breeding waterthrushes nest and forage primarily on the ground along medium- to high-gradient, first- to third-order, clear, perennial headwater streams flowing through closed-canopy forest (Mengel 1965, Ross et al. 2004, Mulvihill et al. 2008, Mattsson et al. 2009). In areas affected by drought, breeding streams may become intermittent by the time young birds reach fledging age (Robinson 1990). In parts of its breeding range, the species occurs in late-successional, but not in mid- or early-successional forests (Buffington et al. 1997). Breeding Louisiana waterthrushes rely extensively for food on adult and immature stages of aquatic invertebrates including trichopterans, ephemeropterans, chironomids, stratiomyiids, tipulids, coleopterans, hemipterans, neuropterans, plecopterans, and diplopods (Eaton 1958). The species is also reported to occasionally eat odonate nymphs, dytiscid beetle larvae, cicadas, geometrids, spiders, scorpions, crustaceans, earthworms, and salamanders (Mattsson et al. 2009). Because of the diversity of these food sources, good water quality is a key component of the species' breeding habitat.

Breeding territory density and occupancy were reduced along streams where benthic macroinvertebrate communities had been degraded due to anthropogenic land uses and acidification (Mattsson and Cooper 2006, Mulvihill et al. 2008). Lower breeding territory densities occurred along streams impacted by acid mine drainage than along circumneutral streams (Mulvihill 1999, Mulvihill et al. 2008). Similarly, some indices of benthic macroinvertebrate integrity were higher where breeding Louisiana waterthrushes were present than areas from which they were absent (Mattsson and Cooper 2006), and stream reaches where breeding birds were detected had a greater proportion of pollution-sensitive benthic macroinvertebrates than reaches where they were not detected (Stucker 2000).

For water-dependent wildlife, such as the Louisiana waterthrush, preservation of large tracts of forest containing headwater streams is necessary for the conservation of this species in the central Appalachians. The Louisiana waterthrush is particularly vulnerable to degradation of water quality and aquatic insect communities (Mattsson and Cooper 2006, Mulvihill et al. 2008).

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**General Response Regarding Mitigation**: Several of Comments #243A-304A raise specific questions regarding EPA's conclusions as to the effectiveness of mitigation required by the Spruce No. 1 permit. Under Section 404(c), EPA has discretionary authority to prohibit, restrict, or withdraw the specification of a defined area as a disposal site whenever it determines that the discharge will have an unacceptable adverse effect on a number of identified categories. Therefore, as a legal matter, EPA can make a determination that a discharge of dredged or fill material will cause unacceptable adverse effects without consideration of compensatory mitigation. The statutory standard does not mention mitigation directly and authorizes EPA to determine what constitutes an unacceptable adverse effect. In other words, EPA does not need to determine that proposed mitigation is somehow flawed or insufficient in order to conclude that a proposed or authorized discharge would have unacceptable adverse effects.

While EPA has chosen to provide explanations in response to these comments below, EPA's action does not depend on a conclusion that the proposed mitigation is flawed or insufficient. Historically, EPA frequently has evaluated whether mitigation will offset effects to an acceptable level in connection with Section 404(c) actions, and that evaluation has been found appropriate by the courts. Among other things, EPA may evaluate, as it does here, whether a mitigation plan that focuses on quantity fails to account for the quality of the impacted resources. That evaluation confirms EPA's conclusions as to the unaaceptability of the adverse effects on wildlife.

Further, many of the comments rely on the Fourth Circuit's holding in *Ohio Valley Environmental Coalition v. Aracoma Coal Company*, 556 F.3d 177 (4th Cir. 2009) ("*OVEC").* The *OVEC* case decided whether the Corps had acted arbitrarily and capriciously in issuing certain permits involving discharges of dredged and/or fill material associated with surface coal mining. In implementing the arbitrary and capricious standard, the court as a legal matter gave substantial deference to the Corps' interpretation of its regulations and guidance in determining whether to issue those permits. In so doing, the court deferred to the Corps' application of the 1-1 linear replacement guidance provided in RGL 02-02. It did not, however, conclude that either the statute or the regulations required such a result and, therefore, an alternate understanding of the statute and regulations can also be appropriate.

EPA also notes that RGL 02-02 was specifically rescinded by the 2008 Mitigation Rule. Although the Spruce No. 1 Mine predates this rule and is therefore not subject to its requirements, this rule contains extensive scientific information which speaks to the numerous challenges associated with ensuring effective stream mitigation, particularly stream establishment (i.e., creation). Since the scientific information contained in the 2008 Mitigation Rule is relevant to the discussion and analysis of the potential efficacy of the Spruce No.1 Mine's proposed compensatory mitigation plan, EPA has referred to this scientific information in support of its determination in this matter. Finally, in contrast to the Court's review of the Corps' permitting decision, when exercising its authority pursuant to Section 404(c), EPA must determine whether unacceptable adverse effects will occur. That is a different legal standard from the one the Court evaluated in *OVEC.*

EPA has not repeated this introductory response in each of the comments below, but hereby incorporates it into these responses.

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Comment #243A – VII The Permit's Mitigation Requirements Meet All Applicable Legal Requirements, Have a High Likelihood of Successfully Offsetting the Authorized Impacts, and Will Assure That the Overall Impacts Authorized Under the Permit Will Not Have an Unacceptable Adverse Impact on Wildlife

Response #243A –EPA disagrees with the commenter's overall characterization, consistent with Responses #244A-304A below.

Comment #244A – Section V.C of the Recommended Determination alleges that there are "fundamental flaws with the proposed attempts to mitigate for unavoidable environmental impacts of the Spruce No. 1 mine," RD App. 3 at 1, and that the mitigation provided for in the Compensatory Mitigation Plan ("CMP") "is not likely to offset anticipated impacts." RD at 65. However, this permit's robust and comprehensive mitigation requirements are consistent with all applicable regulatory requirements, utilize all available and practicable methodologies for the assessment of stream functions and mitigation success, provide for the determination of mitigation success based on the adoption of future functional assessment methodologies, and in the event of mitigation failure, require the applicant to undertake corrective action and/or additional mitigation sufficient to meet all performance standards, including the undertaking of stream restoration which has a documented history of success. As a result, the stream mitigation for this permit has a high likelihood of successfully offsetting the authorized impacts.

Response #244A – See Responses #27, 37, 38 and 40.

Comment #245A – The Recommended Determination makes numerous statements that are unsupported by references or documentation, making it impossible for Mingo Logan to engage in meaningful comment on those claims. For example, EPA asserts that "there are alternative configurations that would avoid much of the discharges to Pigeonroost Branch and Oldhouse Branch," RD at 65, but EPA does not provide any information about those alternatives. Mingo Logan cannot give a meaningful response to EPA's assertion because EPA does not explain these "alternative configurations" or how they avoid discharges to the two creeks.

Response #245A – An EPA determination under CWA Section 404(c) concluding that discharges would result in an unacceptable adverse impact to aquatic resources does not require a finding by EPA that alternatives to such discharges are available. In the current circumstances, EPA has found that discharges to waters of the U.S. associated with the Spruce No. 1 mine will result in unacceptable adverse effects to wildlife regardless of whether alternatives to the discharge are or are not available that would avoid or minimize the environmental and water quality impacts to waters of the U.S.

EPA has raised the issue of alternatives to emphasize the Agency's concerns regarding discharges authorized by the Spruce No. 1 permit, concerns that are magnified by the likelihood that they could be largely avoided by utilizing alternative mining configurations. The record for this action includes an extensive analysis by Morgan Worldwide mining consultants that, according to the analysis, identifies an engineeringly feasible and cost-effective configuration for the Spruce mine that eliminates valley fills in both Pigeonroost and Oldhouse Branches by relying on increased hauling of excess spoil to Seng Camp Creek and placement of greater volumes of spoil back on the mine bench. EPA has raised specific mining alternatives to the Mingo Logan Company including the option of eliminating the valley fill at Oldhouse Branch, the most ecologically important stream at the Spruce Mine, or phasing construction of valley fills, which has been a practicable option at other mines in Appalachia that allows for more effective assessment and minimization of water quality impacts. During the consultation process, Mingo Logan was not willing to pursue either of these options, raising concerns about regulatory certainty and costs. The company did not provide additional detailed information to support their conclusions.

As a result, EPA's Final Determination reiterates the conclusion that there are practicable alternatives that would significantly reduce and/or avoid anticipated environmental and water quality impacts to Pigeonroost Branch and Oldhouse Branch. This further emphasizes the unacceptability of the adverse environmental impacts that would occur upon construction of the Spruce No. 1 mine. As noted in the Final Determination, EPA makes no determination at this time as to these alternatives' compliance with the Guidelines or acceptability under §404(c).

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*Introduction to Responses #246Ai-246ix: Comments #246Ai-246ix discuss statements from the Recommended Determination that the commenter felt were inaccurate, unsupported, or unclear. EPA includes each of these statements, along with an explanation, below.*

Comment #246A(i) – In addition, the following are unsupported statements included in the Recommended Determination and Appendix 3 for which a meaningful response cannot be made: "Overall, through onsite visits and biological data collection, Region III conservatively estimates that, within the mine footprints of Right Fork Seng Camp, Pigeonroost, and Oldhouse Branch, over five miles of stream (~ 27,000 feet) are perennial." *Id*. at 67;

Response #246A(i) – EPA's estimates regarding the perennial nature of these streams are based on actual field data from Green and Passmore (1999) and reconciling Paybins (2003) cutoffs. Also see Responses #46 and 246A(ii).

Comment 246A(ii) – "Even when the sediment ditches are enhanced for benthic substrata and riparian vegetation, such as through adding boulder clusters every 500-1000 feet, resulting water quality will likely be so degraded that the ditches will not meet or exceed pre-mining water chemistry baselines." *Id*. at 69;

Response #246A(ii) – The Recommended Determination and Final Determination explain that, consistent with on observations of other on-bench SMCRA drainage or erosion control ditches (Kirk 1999a, Green et al. 2000, and Gingerich 2009), EPA believes the Compensatory Mitigation Plan (CMP)'s proposed conversion of these ditches will not successfully replace the impacted resources, alone or in concert with other proposed mitigation contained in the CMP. More than 50% of the linear stream length in the Spruce mitigation plan relies on conversion of on-bench SMCRA drainage or control ditches. Available data show that water quality in these types of sedimentation ditches in the Appalachian region is typically highly degraded as a result of the water in these ditches percolating through mine spoil (Gingerich 2009). Even when the sedimentation ditches are enhanced for benthic substrata and riparian vegetation, such as by adding boulder clusters, the resulting water quality will be so degraded that the ditches will not meet pre-mining water chemistry baselines, especially in the case of high quality streams such as Pigeonroost Branch and Oldhouse Branch.

Regarding the Corps' stream classification assessment, EPA is concerned that the Spruce No. 1 Mine CMP is based upon a significant misclassification of impacts to perennial and intermittent streams, resulting in a baseline from which to calculate necessary stream compensation that grossly underestimates the reach of streams in these categories. EPA's conclusions regarding the length of stream in each category in the Final Determination are determined from onsite visits and biological data collection. This information supports EPA's estimates that, within the mine footprints of Pigeonroost Branch and Oldhouse Branch, approximately four miles of stream (~20,000 feet) are perennial.

As noted in Appendix 3, "perennial" refers to streams flow year round and support indicator biota associated with flowing water that have at least a 6-month life cycle (Type 1), or that have non-contiguous surface flow during drought conditions but still support indicator biota associated with flowing water that have at least a 6-month life cycle (Type 2). Appendix 3 provides a conservative estimate of perennial waters (relying upon Type 1 perennial only) concluding that at least 20,000 feet of stream within the mine footprints of Pigeonroost Branch and Oldhouse Branch are perennial.

EPA's calculation is in contrast to the DA Permit estimation of 165 feet of perennial waters within the entire project area. The Corps' significant underestimate of perennial waters at Spruce results in a correspondingly low calculation of compensatory mitigation necessary to offset impacts to these more ecologically important stream reaches. The resource type plays an important role in the types of expected aquatic communities, the degree in which each resource provides structure and function, and the amount of organic matter and nutrients (and contaminants) ultimately retained or loaded to receiving streams. This misclassification means that the compensatory mitigation plan does not properly account for, and therefore will not offset, the full range of adverse impacts related to the project. A more detailed description of EPA's analysis of stream type is described in Appendix 3. See also Response #46.

Comment #246A(iii) – "As a result of this degraded water chemistry, these created waterbodies would be unlikely to support the healthy and diverse biological communities that they are intended to replace." *Id*.

Response #246A(iii) – See Appendix 3.

In a pre-mined condition, these headwater streams are recipients of allochthonous material (i.e., material originating from outside of the stream system) and water inputs (i.e., surface, subsurface, and groundwater) from the surrounding forested communities. The post-mined environment, however, creates severely altered conditions in stream courses that are not destroyed by valley fills. Those alterations include:

- Elimination of water and processed organic material from former upstream tributaries that will be under valley fills.
- Altered contributions of water and allochthonous material from the surrounding upland watershed, due to the altered character of the soil and vegetation communities in a post-mine environment.
- Altered hydrograph with new flow regimes that markedly depart from that under which the streams have evolved.
- Altered timing, temperature and chemical composition of post-mine discharges of water to receiving streams.

The Spruce No. 1 Mine will profoundly alter the contributing watershed. Effectively, the new landscape would widely depart from that within which the stream network has evolved. The subsequent ecosystem is an entirely new system. Based on available information, the proposed mitigation will not replace the structure and function of the pre-mined conditions including those elements that are dependent on contributions from the surrounding watershed. These concerns regarding the proposed mitigation are shared by the USFWS, whose comment letter to EPA regarding the Recommended Determination states that "…the currently-proposed mitigation for these impacts is unlikely to adequately compensate for the loss and degradation of these streams, their biological productivity and diversity, or their ecological integrity."

Comment #246A(iv) – The post-mined environment creates "severely altered conditions in stream courses that are not destroyed by valley fills," including "[a]ltered hydrograph with new flow regimes that markedly depart from that under which the streams have evolved" and "[a]ltered timing, temperature and chemical composition of post-mine discharges of water to receiving streams." *Id*. at 70;

Response #246A(iv) – See Response #246A(iii). The following citations are included in the Final Determination in support of these conclusions: Pond et al (2008), U. S. EPA (2005a), USEPA (2003), Wiley et al. (2001), Wiley and Brogan (2003), and Bryant et al. (2002). It should be noted that all of these documents were in the record associated with the Recommended Determination

Comment #246A(v) – Some of the regulatory definitions of ephemeral, intermittent and perennial streams "are based on arbitrary watershed areas or flow cutoffs." RD App. 3 at 1;

Response #246A(v) – This statement is not included in the Final Determination.

Comment #246A(vi) – "Most scientists agree that classifying streams by single abiotic or hydrological parameters for assessing aquatic life potential is unsatisfactory . . . ." *Id*.;

Response #246A(vi) – The word "most" has been changed to "many" in Appendix 3 of the FD. Also see the following citations that are included in the Recommended Determination, Final Determination, and their supporting appendices: Boulton (1989), Williams and Hynes (1977), Williams (1996), and Williams (1987).

Comment #246A(vii) – "[T]he water quality [in on-bench sediment ditches] (e.g., salinity) is so degraded that it could potentially foster the establishment of toxic Golden Algae." *Id*. at 6;

Response #246A(vii) – Appropriate citations have been added to Appendix 3 of the Final Determination, including Hambright (2010), Roelke et al. (2010), Baker et al. (2009), and Sager et al. (2008).

Comment #246A(viii) – "Even when the sediment ditches are enhanced for benthic substrata and riparian vegetation (e.g., boulder clusters every 500-1,000 ft), the water quality will likely be so degraded that the ditches will not meet or exceed pre-mining WVSCI scores required by the permit's Special Conditions." *Id.*;

Response #246A(viii) – See Responses #39 and 244A.

Comment #246A(ix) – "EPA has observed the following conditions in these sediment ditches, in comparison to natural high-gradient streams: 1) Altered flow regime (e.g. unnaturally low velocities), 2) Altered temperature regime (e.g., extreme high temperatures), 3) Severely contaminated water (e.g., ions, metals), 4) Depauperate and tolerant biota (e.g., typical of roadside ditches/urban swales)." *Id.* at 6-7.

Response #246A(ix) – See Responses #39, 55, and #246A(ii).

Degraded water chemistry caused by the addition of TDS and selenium as a result of water percolation through mine spoil typically leads to degraded biological communities. The proposed constructed stream channels have not been shown to meaningfully reduce the concentrations of these ions in the water flowing through them. Because of this degraded water chemistry, any created waterbodies would not support the healthy and diverse biological communities that they are intended to replace. Moreover, the water quality (e.g., salinity) would be so degraded that it will foster conditions favorable to the establishment of toxic golden algae. EPA has observed that such on-bench ditches have been found to reach very warm temperatures in the summer months, often approaching 30 degrees Celsius, thus precluding many EPT taxa adapted to cool/cold headwater streams found in the project area. A higher degree of diel variation, typical of shallow lentic systems, is also probable to occur in sediment ditches, compared to natural headwater streams.

A comparison of family-level macroinvertebrate data between sediment ditches and Pigeonroost Branch and Oldhouse Branch reveals marked differences in species richness and very little taxonomic overlap. Based upon Kirk (1999a) and EPA data, total familial richness in sediment ditches ranged between 4 to 11 taxa, with 0 to 3 families of Ephemeroptera, Plecoptera or Trichoptera (EPT) taxa present. In contrast, total familial richness at Oldhouse Branch and Pigeonroost Branch was 40, with 26 families of EPT taxa present.

Of the taxa collected in the sediment ditches, only seven (out of 84 taxa) were also present in Oldhouse Branch and Pigeonroost Branch. With regards to the taxa present in the sediment ditches that were not found in Oldhouse Branch and Pigeonroost Branch, Pond et al. (2008) found that these taxa do not generally occur at sites unaffected by mining. These data demonstrate that taxonomic assemblages in sediment ditches are not only less diverse than streams unaffected by mining, but include a suite of tolerant organisms not found in high quality headwater streams unaffected by mining, such as Oldhouse Branch and Pigeonroost Branch (see table below).

| Collection Date: | | | Oct. 8, 1999 | Oct. 8, 1999 | Oct. 8, 1999 | Oct. 8, 1999 | Oct. 26, 1999 |
|---|---|---|---|---|---|---|---|
| Site | | | Vance Branch | Rollem Fork | Left Fork | Honey Branch | Stanley Fork |
| Method | | | Ponar | Ponar | Ponar | Ponar | Kick Net |
| Order | Family | Genus | Sediment Ditch | Sediment Ditch | Sediment Ditch | Sediment Ditch | Sediment Ditch |
| Oligochaeta | Oligochaeta | Oligochaeta | 8 | 1088 | 240 | 192 | 0 |
| Basommatophora | Physidae | Physella | 0 | 0 | 0 | 0 | 4 |
| Ephemeroptera | Baetidae | *Baetis* | 4 | 0 | 8 | 272 | 0 |
| Ephemeroptera | Caenidae | *Caenis* | 0 | 0 | 104 | 0 | 0 |
| Trichoptera | Polycentropodidae | *Polycentropus* | 0 | 0 | 8 | 0 | 0 |
| Diptera | Certopogonidae | Unid. Ceratopogonid | 64 | 448 | 40 | 800 | 52 |
| Diptera | Chironomidae | Unid. Chironomid | 340 | 1024 | 480 | 816 | 163 |
| Diptera | Empididae | *Hemerodromia* | 0 | 0 | 0 | 0 | 3 |
| Diptera | Simuliidae | *Simulium* | 0 | 0 | 0 | 0 | 8 |
| Diptera | Stratiomyiidae | *Odontomyia* | 0 | 0 | 0 | 0 | 1 |
| Diptera | Tipulidae | *Tipula* | 0 | 0 | 16 | 0 | 1 |
| Coleoptera | Dytiscidae | *Cybister* | 0 | 0 | 8 | 0 | 0 |
| Coleoptera | Dytiscidae | *Laccophilus* | 8 | 0 | 0 | 0 | 0 |
| Coleoptera | Dytiscidae | Unid. Dytiscid | 0 | 0 | 0 | 16 | 0 |
| Coleoptera | Hydrophilidae | *Berosus* | 0 | 16 | 0 | 0 | 0 |
| Coleoptera | Haliplidae | *Peltodytes* | 0 | 0 | 0 | 32 | 0 |
| Odonata | Coenagrionidae | Unid. Coenagrionid | 0 | 0 | 80 | 48 | 15 |
| Odonata | Lebellulidae | Unid. Libellulid | 32 | 0 | 104 | 0 | 0 |
| Hemiptera | Mesoveliidae | Unid. Mesoveliid | 0 | 0 | 24 | 0 | 0 |
| | | **Total Richness** | **6** | **4** | **11** | **7** | **8** |
| | | **EPT Richness** | **1** | **0** | **3** | **1** | **0** |
| All data as reported by Kirk (1999) except Stanley Fork (collected by US EPA Region III). | | | | | | | |
| Note: Coenagrionidae, Chironomidae and Ceratopogonidae collapsed to family-level for Stanley Fork ditch. | | | | | | | |
| Chironomidae found 100% of time at Unmined sites because this family is found in virtually all aquatic habitats. | | | | | | | |

EPA believes these created streams converted from erosion control channels would be considered degraded and would not successfully replace Pigeonroost Branch and Oldhouse Branch as sources of freshwater dilution with healthy biological communities and water quality, either alone or in concert with other mitigation contained in the CMP.

A more detailed discussion of the limitations of on-bench sedimentation ditches for mitigation is provided in Appendix 3.

Comment #247A – In addition, the Recommended Determination makes many claims and includes many citations that were not included in its Proposed Determination. For example, in Appendix 3, EPA claims that there is no evidence that the 71 acres of riparian forest to be restored or created by Mingo Logan will replace lost natural riparian ecosystems. RD App. 3 at 10. Also, EPA contends that the connectivity channels provided for in the Spruce No. 1 Mine permit will not offset buried stream resources. App. 3 at 11.

Response #247A – See Responses #14, 27, and 39.

Comment #248A – [A] number of the citations used in the Recommended Determination are not included in the list of references in Appendix 5. As such, Mingo Logan has been deprived of meaningful opportunity to comment on these claims and supporting citations. [For instance, "Fritz (2007)" is cited to on page 3 of Appendix 3, but the Appendix 5 list of references only includes "Fritz (2006)." In addition, EPA cites to "(EPA-Wheeling 2007)" in the text of Appendix 3, RD App. 3 at 3, but the Appendix 5 list of references does not include a citation to "(EPA-Wheeling 2007)".

Response #248A – In making this determination, EPA relied primarily on publicly available documents and peer-reviewed data. We have also relied, in part, on unpublished state and federal data and other unpublished information. In addition, while EPA made its best effort to provide the public with notice through the Proposed Determination of the wide range of sources of data and information the agency would be considering, there are references to additional studies and data and information in the supporting documents for the Final Determination. A Final Determination is not a rule and is not required to undergo notice and comment rulemaking; therefore, the Agency can rely on any documents, data and information that it is reasonable for the agency to rely on, based on factors including source and methodology.

With respect to this specific comment, inconsistencies in the References Appendix have been addressed. The Recommended Determination References Appendix includes citations for Fritz et al. (2006), Fritz et al. (2008), and Fritz (2010). References to Fritz (2007) in the Recommended Determination should have been Fritz (2008) and have been corrected in the Final Determination. Similarly, the Recommended Determination References Appendix includes the citation Pond and Passmore (2008). References to "EPA-Wheeling 2007" in the RD should have been Pond and Passmore (2008) and have been corrected in the FD.

Comment #249A – EPA fails to articulate a clear relationship between the Recommended Determination and Appendix 3: Mitigation Issues. Several of the claims made in the text of the Recommended Determination are neither supported in the text nor by evidence in Appendix 3. For example, EPA states that "[d]ata show that water quality in these types of sediment ditches in the MTM region is typically highly degraded as a result of water in these ditches percolating through mine spoil," but does not provide any support in the text or in Appendix 3 for this statement or explain which data EPA is referring to. RD at 69.

Response #249A – A citation to Gingerich 2009 has been added to the FD to address this comment. Data from Gingerich (2009) further support the conclusions of Kirk (1999a and 1999b) and Green et al. (2000), which were cited in the Recommended Determination.

Comment #250A – Appendix 3 adds several factual contentions that are not articulated in the text of the Recommended Determination as grounds for EPA's recommendation to revoke Mingo Logan's Section 404 permit. For instance, in Appendix 3, EPA contends that the enhancement and restoration provided for in the Spruce permit are inadequate to replace the functions at the impacted creeks. RD App. 3 at 9-10. In addition, in Appendix 3, EPA also claims that the riparian forest to be restored or created by Mingo Logan will not replace lost natural riparian ecosystems. *Id*. at 10. Also, in the Appendix, EPA contends that the connectivity channels provided for in the Spruce No. 1 Mine permit will not offset buried stream resources. *Id.* at 11. None of these claims are made in the Recommended Determination.

Response #250A – See Responses #27, 39, and 50. The Recommended Determination, like the Final Determination, includes the entirety of the main document and all of its appendices. The fact that a statement only appears in the appendices, therefore, has no legal significance. In response to this comment, however, EPA has ensured that the text of the Final Determination includes these factual conclusions as outlined in the appendices.

Comment #251A – EPA does not dispute Mingo Logan's comments in response to the Proposed Determination, that the mitigation required in the 404 permit comports with all applicable legal requirements for compensatory mitigation. Of the regulatory materials for wetland and stream mitigation that were available during the lengthy permitting process, RGL 02-2 was the most detailed and recent explanation of compensatory mitigation requirements and the only one that dealt explicitly with stream mitigation. *See OVEC*, 556 F.3d at 203-04 (relying on RGL 02-2 as the basis for determining the amount of stream compensation). In the absence of standard functional assessment methods for the stream impacts and mitigation during the permitting process, and consistent with RGL 02-2, the mitigation requirements of Mingo Logan's permit are based on a linear footage, rather than a functional, basis. Department of the Army Individual Clean Water Act Section 404 Permit Record of Decision for Mingo Logan Coal Company, Spruce Fork No. 1 Mine, File Number 199800436-3 at 33 (Jan. 2007) ("ROD"), Cmt. Ex. 29. Thus, the only compensatory mitigation measure that was required during the permitting process was stream replacement on a one-to-one linear foot basis. *OVEC*, 556 F.3d at 204.81 The required mitigation for this permit exceeds a 2:1 linear foot ratio and far surpasses the applicable 1:1 ratio for the permitted stream impacts.

Response #251A – Concerns raised by EPA and FWS throughout the review of this project question whether the various compensatory mitigation plan components would even deliver the 1:1 linear foot replacement of streams called for in RGL 02-2. See also Responses #37 and 38.

Comment #252A – Since the issuance of this permit, the Interagency Review Team, including the Huntington District, has recently issued the West Virginia Stream and Wetland Valuation Metric (May 13, 2010), *available at* http://www.lrh.usace.army.mil/kd/go.cfm?destination=Page&Pge_ID=1072 ("SWVM") to be utilized in determining the mitigation credits to be awarded to stream mitigation banks, in-lieu fee programs, and permittee responsible mitigation in West Virginia. Corps Huntington Dist., "Guidance on the West Virginia Interagency Review Team Initiatives Administered in Accordance with the 2008 Final Rule on Compensatory Mitigation for Losses of Aquatic Resources Within the U.S. Army Corps of Engineers, Huntington and Pittsburgh Districts" at 1, 6 (Feb. 1, 2010), *available at* http://www.lrh.usace.army.mil/Documents/index.cfm?id=17046&pge_prg_id=11693&pge_id=1072 ("Interagency Guidance on Compensatory Mitigation Rule"); Instruction Document, The West Virginia Stream and Wetland Valuation Metric (Mar. 2, 2010), *available at* http://www.lrh.usace.army.mil/Documents/index.cfm?id=17408&pge_prg_id=11693m&pge_id=1072 ("SWVM Instruction Document").

Response #252A – Comment noted.

Comment #253A – More than one year after the Corps issued the permit, EPA and the Corps promulgated new mitigation regulations, but, consistent with the Administrative Procedure Act, these subsequent mitigation requirements do not apply to previously issued permits. 73 Fed. Reg. 19,594, 19,608 (Apr. 10, 2008); *see also OVEC*, 556 F.3d at 198 n.14. In any event, as discussed in previous comments, Mingo Logan's permit is consistent with the applicable standard of the agencies' new mitigation regulations because it provides for stream replacement on a one-to-one linear foot basis.

Response #253A – See Responses #37, 38, and 48. As noted in Section V.E.3.a of the Final Determination:

> *"EPA recognizes that the effective date of the regulations governing compensatory mitigation that were promulgated at 73 Fed. Reg. 19594 (April 10, 2008) is June 9, 2008, and therefore were not in effect when the Corps of Engineers issued DA Permit No. 199800436-3 (Section 10: Coal River). Nevertheless, the above-quoted statement, taken from the preamble to those regulations, represents the most recent regulatory statement by the agencies regarding types and effectiveness of mitigation and summarizes scientific research and literature that is applicable to consideration of the likely efficacy of the compensatory mitigation proposed for the Spruce No. 1 Mine."*

Comment #254A – EPA nowhere attempts to demonstrate that the permit's required mitigation falls short of these applicable regulatory requirements. Rather, EPA seeks to overturn a mitigation program that fully complies with all applicable standards by simply casting doubt on its likelihood of success. In this process, EPA effectively seeks to override the standards for mitigation applied by the Corps to this permit, defended by the United States in litigation, and affirmed by the Fourth Circuit in *OVEC*, 566 F.3d 177 (4th Cir. 2009). Section 404(c) simply does not confer such authority on EPA.

Response #254A – See Responses #37 and 38.

Comment #255A – EPA's mitigation discussion focuses solely on the CMP and ignores the permit's numerous and detailed requirements for stream mitigation, which assure that adequate mitigation will occur for the authorized impacts. Specifically, the Corps has imposed a series of mitigation requirements for this permit that: (1) substantially exceed the 1:1 linear foot ratio established in applicable regulatory provisions; (2) establish a robust monitoring program that evaluates the effectiveness of mitigation on physical, chemical, and biological parameters in the mitigated streams; (3) set detailed minimum performance standards that, among other measures, utilize several EPA-developed assessment methods; (4) provide for adjustment of the performance standards to accommodate a new functional assessment method for headwater streams that may be developed or approved by EPA in the future; and (5) direct that corrective and remedial action and/or additional mitigation must be performed if the performance standards are not satisfied, including the undertaking of stream restoration. Most of EPA's arguments reflect EPA's new view that some or all of the required mitigation will fail, but these arguments ignore the permit's comprehensive mitigation requirements that not only establish performance conditions, but require remedial action in the event of failure.

Response #255A – See Responses #27, 37, 39, 42, and 48.

Comment #256A – EPA asserts that "[t]here is no evidence in the peer-reviewed literature that the type of stream creation included in the CMP will successfully replace lost biological function and comparable stream chemistry to high quality stream resources, such as the Pigeonroost Branch and Oldhouse Branch." RD at 66. However, this assertion is inconsistent with EPA's recent approval of Section 404 permits for three other sites that use onsite stream creation: Hobet 45, Peg Fork and Pine Creek No. 1. As shown in Exhibit 8, the mitigation plans approved by EPA at each of these sites provide for significant amounts of stream creation. On a linear foot basis, stream creation accounts for approximately the same amount of mitigation for Peg Fork as restoration and enhancement, approximately double the amount of the mitigation for Hobet 45, and more than five times the amount for Pine Creek. In addition, Pine Creek's mitigation plan provides for the creation of 12 intermittent segments and four ephemeral segments of erosion control channels as well as 12 intermittent and four ephemeral connectivity channels—the very forms of stream creation whose efficacy EPA disputes for the Spruce No. 1 Mine permit. In light of the significant amount of stream creation that EPA has approved for these recently permitted sites, it is inconsistent for EPA to maintain that the efficacy of all stream creation included in the Spruce Fork permit has not been demonstrated and is certain to fail. Indeed, EPA bears the burden of establishing that the stream creation required by the permit will not succeed. A few studies conducted at unrelated sites showing that stream creation is difficult do not meet this burden, especially when EPA has recently approved of the use of stream creation in several comparable instances.

Response #256A – None of the comparisons offered by Mingo Logan are germane or appropriate. Spruce No. 1 Mine involves the special challenges of compensating for the impacts associated with valley fills in the high quality stream resources of Pigeonroost Branch and Oldhouse Branch. The Hobet 45 project did not involve valley fills and is thus an inappropriate comparison. The Peg Fork and Pine Creek No.1 examples offered by Mingo Logan do involve valley fills. However, they differ from the Spruce No 1 Mine in a number of critical ways. Peg Fork and Pine Creek No.1 involved impacts to stream resources that, based on available data, appear to be of lower quality than those found at Pigeonroost Branch and Oldhouse Branch, increasing the likelihood of adequate compensation. Also, in both Peg Fork and Pine Creek No.1, the project proponents agreed to sequence the construction of future valley fills based on the outcome of downstream water quality and biological monitoring – a condition rejected by the proponent of the Spruce No. 1 Mine. Finally, there is no legal basis in the CWA or its implementing regulations to support the commenter's assertion that "EPA bears the burden of establishing that the stream creation required by the permit will not succeed." See also Responses #37 and 50.

Comment #257A – As explained previously, the mitigation provided for in this permit is entirely consistent with all of the applicable compensatory mitigation requirements. As discussed in previous comments, at the time of permit issuance, all of the applicable regulatory provisions authorized stream creation as an acceptable form of mitigation, and none of them prohibited stream creation. In fact, in virtually identical circumstances to those applicable to this permit, the Fourth Circuit in *OVEC* ruled that creation is an acceptable form of mitigation for headwater streams in Appalachia. *OVEC*, 556 F.3d at 205.

Response #257A – EPA disagrees. As noted in the Final Determination, EPA believes that the proposed compensatory mitigation plan will not adequately offset the proposed impacts to Pigeonroost Branch and Oldhouse and is not consistent with the 404(b)(1) Guidelines. See Responses #244A-258A and #260A-304A.

RGL 02-2 recognized that reliance on a linear foot replacement ratio can be problematic. It cautioned the Corps to "evaluate such surrogate proposals carefully because experience has shown that stream compensation measures are not always practicable, constructible, or ecologically desirable." In this instance, the Corps ignored the repeated input from EPA and the USFWS regarding whether the proposed compensatory mitigation plan for this permit would actually or effectively deliver the desired ecological outcome. See also Response #37.

Comment #258A – Mingo Logan disagrees with EPA's extreme pessimism about the likelihood of success of the stream creation required by this particular permit. As discussed below, based on prior experience and improvements in mitigation techniques, the stream creation component of its overall mitigation plan will likely succeed.

Response #258A – See Responses #37 and 39.

Comment #259A – As explained previously, the mitigation provided for in this permit is entirely consistent with all of the applicable compensatory mitigation requirements. As discussed in previous comments, at the time of permit issuance, all of the applicable regulatory provisions authorized stream creation as an acceptable form of mitigation, and none of them prohibited stream creation. In fact, in virtually identical circumstances to those applicable to this permit, the Fourth Circuit in *OVEC* ruled that creation is an acceptable form of mitigation for headwater streams in Appalachia. *OVEC*, 556 F.3d at 205.

Response #259A – See Response #257A.

Comment #260A – As explained at great length in Mingo Logan's comments to the Proposed Determination, this permit is replete with conditions which assure that, even if EPA's dire predictions about the failure of the permit's stream creation techniques come to pass, adequate compensatory mitigation will be attained at this site. Recognizing the uncertainty concerning the success of stream mitigation, the Special Conditions establish a robust monitoring program over a minimum of 10 years to evaluate whether the mitigation is satisfying detailed performance standards. If those standards are not met, the Special Conditions require performance of corrective actions, adaptive management, and remedial measures on the mitigated stream segments or at new mitigation sites. Thus, if the stream creation or other mitigation measures fail, as hypothesized by EPA, the Special Conditions clearly require that Mingo Logan must either revise the existing mitigation plan to meet the success criteria or provide additional mitigation. Special Conditions 18, 19. *See* Cmt. Ex. 1. Such additional mitigation would likely include stream restoration, which the EPA recognizes has a documented history of success. 73 Fed. Reg. at 19,597; TED2 § 5.1.

Response #260A – See Responses #27, 37, 39, 41, 43, and 44.

Comment #261A – In the Recommended Determination, EPA uses language from the new mitigation regulations promulgated by the Corps and EPA over one year after this permit was issued to evaluate the "likely efficacy of the compensatory mitigation proposed for the Spruce No. 1 Mine." RD at 66-67 n.19. EPA's quotation is a thinly veiled attempt to impose standards from the new mitigation regulations on a previously issued permit—an unlawful retroactive application of regulations.

Response #261A – See Responses #37, 251A, and 253A.

Comment #262A – The 404(b)(1) Guidelines provide for "habitat development . . . to produce a new or modified environmental state of higher ecological value by displacement of some or all of the existing environmental characteristics." 40 C.F.R. § 230.75(d) (2007). Similarly, both the Mitigation MOA and RGL 02-2 describe creation or establishment of new aquatic resources as a permissible form of mitigation. Mitigation MOA, Section II.C.3; RGL 02-2, Section 2.e.1.

Response #262A – EPA is not arguing categorically that creation or establishment of aquatic habitat can never be effective. Rather, EPA has repeatedly raised concerns regarding the specifics of the creation components of the compensatory mitigation plan for the Spruce No. 1 Mine and its inappropriate reliance on sediment ditches as functional replacement for natural watercourses. See also Response #39.

Comment #263A – EPA claims that the CMP is based upon a misclassification of impacts to perennial and intermittent streams and that this alleged misclassification "has a critical impact upon the type of mitigation that would be required to offset these impacts." RD at 67. Moreover, EPA believes that "new field studies, using more up-to-date assessment tools, would provide a more accurate representation of the proposed impacts to water resources." RD App. 3 at 1. Mingo Logan has already addressed this issue in its comments on EPA's Proposed Determination.

Response #263A – See Responses #46, 48, 246(A)(i), and 246(A)(ii).

Comment #264A – Although EPA asserts that "[d]efinitions of ephemeral, intermittent and perennial streams vary widely among regulatory agencies," *id.*, it does not dispute the applicable regulatory definitions that the Corps used for this permit. The definitions of ephemeral, intermittent, and perennial streams that the Corps used for this permit are currently the only regulatory definitions within the Section 404 program.

Response #264A – See Responses #37, 46, and 47.

Comment #265A – EPA relies on the 2003 Paybins paper as the basis for its determination that the mitigation provided for in this permit is based on a misclassification of stream resources, contending that the Paybins paper advocates the use of drainage area as the sole basis for determining perennial and intermittent streams. RD App. 3 at 3-5. However, the Paybins study used by EPA does not support EPA's contention. The study was conducted over a limited time period and with some inherent error given the data collection and analysis techniques. TED2 § 5.2. The Paybins study does shed light on the inherent variability of first-order watersheds, but does not justify a definition of perennial or intermittent streams based exclusively on the drainage area acreages utilized by EPA. *Id.* In fact, the author acknowledges "the local conditions for small headwater basins are extremely variable, and relations of these conditions to intermittent and perennial points could not be defined within this limited study." K.S. Paybins, *Flow Origin, Drainage Area, and Hydrologic Characteristics for Headwater Streams in the Mountaintop Coal-Mining Region of Southern West Virginia, 2000-01* at 18, Water Resources Investigation Rpt. 02-4300, U.S. Geological Survey, Charleston, WV (2003), *available at* http://pubs.usgs.gov/wri/wri02-4300/pdf/wri02-4300.book.pdf. Thus, Paybins is a limited study which does not support a redefinition of stream classifications based exclusively on drainage area acreage.

Response #265A – See Response #46. Using the best available information, EPA uses the range of watershed sizes that were found by Paybins (2003) to produce Perennial or Intermittent flow. The full paragraph from Paybins (2003) quoted by the commenter above starts on page 17 and reads:

> *The uncertainty in these results associated with GPS and mapping methods employed in this study is unknown, but the magnitude and significance of regression relations identified above suggest that the patterns identified here are robust for this small dataset. Variations in drainage-area size upstream of intermittent and perennial points over time probably are affected by antecedent climatic conditions and drainage basin conditions. However, the local conditions for small headwater basins are extremely variable, and relations of these conditions to intermittent and perennial points could not be defined with this limited study.*

As shown, the "extremely variable" conditions whose relationship "could not be defined" do not change or otherwise limit the findings of the report, but raise the point that with a larger dataset the estimation technique could likely be refined and made more accurate by generating separate estimates based on set categories of local conditions. EPA uses Paybins (2003) as a relevant citation because EPA Region III has confirmed independently with field data that catchment areas found in Paybins (2003) are very realistic (see Pond and Passmore 2008) EPA also relied on information from other Appalachian studies.

For example, in Oldhouse Branch the applicant's point of demarcation for an ephemeral/intermittent cutoff occurs at a 255-acre watershed size (6 times the size of Paybins' median value for perennial streams). EPA believes this is an incorrect demarcation because in dry conditions of September 1998, EPA found flowing water and long-lived, obligate aquatic organisms at this location. This information was not addressed by the Corps or the applicant. Therefore, EPA questions the entire delineation and classification of stream resources on the project area. The following table summarizes drainage area cutoffs (from locations throughout the Appalachians and Allegheny Plateau) for at least, intermittent streams.

**Mean Catchment Areas of streams by location as interpreted from researcher's cutoffs for ephemeral/intermittent or ephemeral/perennial.**

| Location | Ecoregion | N | Catchment Area (in acres) | Source |
|---|---|---|---|---|
| Robinson Forest (KY) | 69 | 3 | 10.4 | Fritz (unpub.) |
| Robinson Forest (KY)* | 69 | 8 | 12.5* | Svec et al. 2005 |
| E. Kentucky other (KY)* | 69 | 5 | 19.8* | Svec et al. 2005 |
| Coopers Rock SF (WV) | 69 | 4 | 20.6** | EPA R3 (unpub.) |
| Upper Ohio Valley (WV/OH/PA) | 70 | 19 | 5.3 | WJU (unpub.) |
| EAP-TNC (OH) | 70 | 4 | 18.8 | Fritz (unpub.) |
| Wayne NF (OH) | 70 | 2 | 5.7 | Fritz (unpub.) |
| WV MTM Region (WV) | 69 | 36 | 14.5 | Paybins 2003 |
| NC Mountains (NC) | 66, 67 | 36 | 5.1 | NCDWQ (unpub.) |

*Although considered "ephemeral" by the authors (a priori), all of these smaller catchments flowed for >50% duration over both 13 mo. and 24 mo. periods during "average" and "below average" precipitation years.
**EPA found no intermittency; this represents perennial/ephemeral cutoff.

Comment #266A – Although EPA obliquely critiques the definitions with its assertion that "the presence or absence of continuous surface water alone is not a good predictor of aquatic life potential." RD App. 3 at 1, EPA, does not cite to a regulatory definition which supports either of its asserted grounds for defining perennial and intermittent streams. If EPA disagrees with the existing definitions, it should ask the Corps, the Office of Surface Mining Reclamation & Enforcement ("OSM"), or WVDEP to amend them and apply the amended definitions prospectively. EPA may not, however, impose a new classification scheme retroactively.

Response #266A – EPA's concern focuses on the Corps' failure to apply consistently and appropriately its existing definitions and utilize the best-available science to identify perennial, intermittent and ephemeral streams in this instance. EPA is not disagreeing with current definitions, only their application to circumstances at the Spruce No. 1 Mine.

Comment #267A – The definitions of ephemeral, intermittent, and perennial streams are contained in the Corps nationwide general permit regulations. 72 Fed. Reg. 11,092, 11,196-97 (Mar. 12, 2007).

Response #267A – See Responses #37, 46, and 47.

Comment #268A – EPA has proposed two different and conflicting grounds for classifying streams as perennial rather than using consistent criteria for stream classification. For the Oldhouse Branch, EPA appears to be using a drainage area acreage criterion purportedly based on the Paybins study. RD App. 3 at 2-3. However, for the middle branch of Pigeonroost where the drainage acreage falls below the average threshold espoused by EPA, EPA uses some unarticulated biological criteria. *Id*. at 5. EPA's use of these biological criteria call into question the validity or applicability of the drainage area acreage criterion. In fact, these competing criteria justify the continued use of the existing regulatory definitions of ephemeral, intermittent, and perennial streams until more consistent and definitive results can be obtained.

Response #268A – EPA is not proposing two different or conflicting grounds for stream classification. However, EPA still believes that the characterization of stream resources in the DA Permit is not accurate. In applying best-available science, EPA relies partly on the watershed size estimation techniques developed by Paybins (2003) to assess stream flow because of its specificity to this sub-ecoregion (see also Response #265A). Catchment areas depicting a high probability of flow based on Paybins (2003)'s technique should not necessarily contradict the Corps' use of physical features to define the extent of ephemeral, intermittent, or perennial flow. However, the biological assemblages are a more direct measure of hydrologic status. If anything, Paybins (2003) cutoffs in Spruce No. 1 project area are conservative, since EPA found perennial flow and long-lived biota at a site draining as little as 15 acres (middle branch of Pigeonroost) which the commenter correctly notes. Thus, where site-specific biological data are also available to supplement watershed information, EPA appropriately considers the relevant life history requirements of key biological species, in this case applicable flow duration requirements. This approach assures a more technically valid and consistent determination of stream flow characteristics.

Comment #269A – EPA also cites to on-the-ground field observations in the Spruce No. 1 Mine project area from 1999. RD App. 3 at 3 (citing Green and Passmore, 1999).

Response #269A – Comment noted.

Comment #270A – During the lengthy permit process, EPA had ample opportunity to object under 404(q) or 404(c) and raise any genuine issue of misclassification prior to the permit issuance. The streams at issue have not changed since that time. And, as is evidenced by EPA's reliance on the 2003 Paybins study, EPA's argument for misclassification is primarily based on information that was available prior to permit issuance. EPA cannot lawfully revisit these issues three years after the permit has been issued.

Response #270A – EPA's use of its CWA Sections 404(q) and 404(c) authorities are discretionary. Decisions made at the time regarding use of these discretionary authorities in this case cannot be interpreted to mean that genuine issues regarding the effective classification of streams at the Spruce No. 1 mine did not exist. To the contrary, EPA's detailed review under CWA Section 404(c) demonstrate that the Corps did not consistently apply its definitions in its classification of streams at the site and, as a result, has underestimated the nature and extent of aquatic impacts associated with the project. This conclusion is supported by site-specific information collected by EPA at the Spruce mine following issuance of the permit in 2007. As a matter of law, the CWA and EPA's implementing regulations clearly contemplate that EPA may withdraw an existing specification for discharges of dredged or fill material in waters of the U.S.

See Responses #152 and 153.

Comment #271A – Even assuming that EPA could lawfully apply retroactively some new and unarticulated stream classification, at base the classification of the streams is irrelevant to the mitigation required for this particular permit. As described above, applicable regulatory provisions require that "mitigation projects for streams should generally replace linear feet of stream on a one-to-one basis." RGL 02-2, Section 2.d.5. This regulation does not specify that the replacement linear feet of stream should be any specific kind of stream. Nor does the RGL establish a requirement for in-kind replacement for streams. RGL 02-2, Section 2.h. In fact, as the Fourth Circuit ruled when construing the 1:1 linear standard, "[n]othing in the Corps' CWA guidance requires that only in-kind . . . mitigation measures be used." *OVEC*, 553 F.3d at 204.

Response #271A – See Responses #39 and #44.

EPA disagrees with the commenter's claim that "the classification of the streams is irrelevant to the mitigation required for this particular permit." The Corps and EPA have long recognized that having a clear understanding of the type of aquatic resource that is being impacted is fundamental to developing a sound and effective compensatory mitigation plan because different aquatic resources (i.e., different types of wetlands and different types of streams) perform different suites of ecological functions which must each be addressed in the compensatory mitigation plan.

Since the 1990 Memorandum of Agreement (1990 MOA) between EPA and the Department of Army regarding Mitigation requirements under the Section 404(b)(1) Guidelines, the Corps and EPA have had a preference for "in-kind" mitigation for impacts to wetlands (i.e., that the mitigation wetland be of a similar structural or functional type as the impacted wetland). Similarly the 1990 MOA states that "In determining compensatory mitigation, the functional values lost by the resource to be impacted must be considered." These principles were echoed in 2002, when the Corps and EPA released RGL 02-2 which states that "Under existing law the Corps requires compensatory mitigation to replace aquatic functions unavoidably lost or adversely affected by authorized activities" (Section 1.a. Purpose). RGL 02-2 recognizes that the only way to determine what functions are lost at the impact site **and** could potentially be offset at the mitigation site is to collect detailed and reliable baseline information and that such baseline information should include the aquatic resource "type" (e.g., wetland type, stream type, etc) at both the impact and mitigation sites:

> ***Baseline Information:*** *As part of the permit decision Districts will include approved, written compensatory mitigation plans describing the location, size, type, functions and amount of impact to aquatic and other resources, as well as the resources in the mitigation project. In addition, they should describe the size, e.g., acreage of wetlands, length and width of streams, elevations of existing ground at the mitigation site, historic and existing hydrology, stream substrate and soil conditions, and timing of the mitigation. Baseline information may include quantitative sampling data on the physical, chemical, and*

> *biological characteristics of the aquatic resources at both the proposed mitigation site and the impact site. This documentation will support the compensatory mitigation requirement.*

Additionally, RGL 02-2, in its discussion of Goals and Objectives of a compensatory mitigation plan further highlights the importance of identifying the "types" of resources that will be impacted because this relates directly to the "functions" that are being lost at the impacts site and that must be addressed in the compensatory mitigation plan:

> ***Goals and Objectives:*** *Compensatory mitigation plans should discuss environmental goals and objectives, the aquatic resource type(s), e.g., hydrogeomorphic (HGM) regional wetland subclass, Rosgen stream type, Cowardin classification, and functions that will be impacted by the authorized work, and the aquatic resource type(s) and functions proposed at the compensatory mitigation site(s). For example, for impacts to tidal fringe wetlands the mitigation goal may be to replace lost finfish and shellfish habitat, lost estuarine habitat, or lost water quality functions associated with tidal backwater flooding.*

In their 2008 Mitigation Regulations, the Corps and EPA codified the "in-kind" preference for impacts to all aquatic resources including streams stating that "In general, in-kind mitigation is preferable to out-of-kind mitigation because it is most likely to compensate for the functions and services lost at the impact site" (33 CFR 332.3(e)(1) / 40 CFR 230.93(e)(1)). Although this project is not subject to the 2008 Mitigation Rule, the Rule's preference for in-kind mitigation and emphasis on the importance of resource type is mirrored in the provisions of RGL 02-2, which stress the importance of evaluating the types of aquatic resources that will be impacted so that proposed compensatory mitigation plans can most effectively offset lost ecological functions and services.

Comment #272A – EPA misunderstands the import of classifying streams and ignores the protective requirements of the permit. Regardless of the applicable regulatory requirements, the Corps has included in this permit numerous performance measures that assess the aquatic life potential in mitigation streams. These performance standards ensure that the mitigation will offset the full range of adverse impacts related to the project, and that if the mitigation is inadequate, corrective actions, adaptive management, remedial measures and/or additional mitigation will be taken on the mitigated stream segments or at new mitigation sites to attain compensatory mitigation. Thus, regardless of the appropriate classification for each of these streams, the permit assures that the lost aquatic life potential and other physical, chemical, and biological functions of the impacted streams will be offset by mitigation that provides comparable aquatic life potential and comparable functions.

Response #272A – See Responses #37, 39, 40, 42, and 46.

Comment #273A – EPA further claims that because of the alleged misclassification of streams, "any calculations of debits and credits, and subsequent offsets using the Stream Habitat Unit method ("SHU"), or any other known method or compensation ratio, would be misleading and not fully compensatory for the destroyed natural resources." RD App. 3 at 5. However, there are several fundamental misunderstandings with this statement. First, the SHU is not the basis for establishing compensatory mitigation requirements. As explained in previous comments, the SHU methodology was used in the EIS as one means to gather and assess baseline data on the impacted streams, but it was not used by the Corps to determine the appropriate amount of mitigation. Instead, based on the applicable provisions of RGL 02-2, the Corps based the mitigation on achieving at least a 1:1 ratio between the linear feet of impacted and mitigated streams. Moreover, as discussed more fully in a later section, the permit's performance measures were based on tests which directly or indirectly reflect the chemical and biological condition of the stream including EPA's *A Stream Index for West Virginia Wadeable Streams* (Mar. 28, 2000, revised July 21, 2000), *available at* http://www.dep.wv.gov/WWE/watershed/bio_fish/Documents/WVSCI.pdf ("WVSCI"), and the EPA's *Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates, and Fish* (2d ed. 1999), *available at* http://water.epa.gov/scitech/ monitoring/rsl/bioassessment/index.cfm ("RBP"). The Corps was clear that its permit conditions, not stream classification, are the basis for mitigation performance.

Response #273A – In both the Recommended Determination and Final Determination, EPA recognized the Corps' use of the SHU to set compensatory mitigation requirements for this project. For example, see Footnote 22 of the Final Determination:

> *"Even though the Corps did not finally rely solely on the SHU for mitigation requirements, the Corps did not categorically prevent the permittee from using this approach as a basis for its mitigation plan, and thereby allowed Mingo Logan to use this approach to help justify their mitigation performance and success criteria."*

See also Response #51.

To the extent that the commenter refers to the Special Conditions addressing RBP and WVSCI as performance measures, EPA contends that these performance measures (especially WVSCI scores of ~80) have never been demonstrated as achievable for converted on-bench sediment ditches. The CMP for the Spruce No. 1 project includes more than 40,000 feet of these ditches. Special conditions on the permit, including the requirement to perform adaptive management if it does not succeed, do not answer how the functions of the high-quality headwater streams on site will be replaced.

Comment #274A – Even if EPA's new approaches were utilized and stream classification were relevant to the adequacy of mitigation, the result would be the same, i.e., the classification of the mitigation imposed by the permit would fully offset the impacts to Pigeonroost and Oldhouse. As evidenced by the figure in the permit depicting the location of the various forms of mitigation, many of the created streams will be established in the areas close to Oldhouse and Pigeonroost and will likely have drainage areas whose acreages exceed the threshold for perennial streams espoused by EPA. The linear feet of these created streams exceed the linear feet impacted within Oldhouse and Pigeonroost. Thus, under the drainage area acreage-based classification, the mitigation streams are likely to have the same classification as the impacted streams.

Response #274A – Stream classification <u>is</u> relevant to establishing appropriate compensatory mitigation requirements because the replacement of the lost structure and function requires proper identification at both the impact and compensation sites. In addition, given the significant alteration of the headwater stream ecosystem that will occur – as outlined in Appendix 3 – EPA does not necessarily believe that the watershed area and stream classification relationships outlined in Paybins (2003) (based on natural Appalachian headwater streams and their drainage areas, not streams created on the mined area) would also apply in profoundly altered post-mining watersheds. Moreover, as outlined in Appendix 3, the mere presence of perennial flow in created streams does not suggest full replacement of the ecological functions of high-quality perennial (or intermittent or ephemeral) headwater streams. This is particularly true where such streams are likely to have degraded water chemistry and unhealthy biological communities, as is likely to occur on the Spruce No. 1 project site. See Response #246(A)(iv).

Comment #275A – EPA claims that the CMP is "based upon an inadequate functional assessment of the impacted resources" and that as a result, the "current CMP does not adequately account for or replace the functional components of the lost streams." RD at 68. In this argument, EPA focuses exclusively on the CMP and the SHU assessment methodology, but as explained in Mingo Logan's prior comments, the adequacy of mitigation must be based on the entirety of the permit and its conditions, which assure full compensatory mitigation. Furthermore, as discussed in prior comments, EPA misunderstands the role of SHU in this permit process. The Corps did not use the SHU methodology to determine the appropriate amount of mitigation. Rather, the Corps determined the amount of mitigation required based on the requirement to achieve at least a 1:1 ratio between the linear feet of impacted and mitigated streams. Moreover, the SHU methodology was not the determining factor used by the Corps to establish the various mitigation performance and success criteria.

Response #275A – See Responses #43, 44, 46, and 51.

Comment #276A – Contrary to EPA's repeated assertions, full replication of all physical, chemical, and biological functions of impacted streams was not the standard for full compensatory mitigation at the time and in the circumstances presented by this permit. Instead, the 1:1 linear foot standard applied at the time of permit issuance under RGL 02-2 and *OVEC*, and remains so even under the subsequently developed mitigation rule. It is undisputed that there was no functional assessment method available prior to the issuance of the Corps permit for the Spruce No. 1 Mine. Instead, the Corps relied on the available and frequently used stream assessment methodologies developed by EPA: the WVSCI and the RBP. As indicated by the RBP, WVSCI, and the *OVEC* court, the RBP and WVSCI operate, at a minimum, as surrogates for assessing physical, chemical, and biological functions of streams. *See* Cmt. at 133-34. With its argument that the mitigation is based on an inadequate functional assessment, EPA is essentially arguing that EPA's own methodologies are inadequate but nowhere in the Proposed Determination, Recommended Determination, or the voluminous permit record does EPA present a functional assessment methodology for streams that improves upon these existing methodologies and meets its exacting, theoretical requirements. However, by establishing a performance standard keyed to these EPA methodologies, the Corps has assured that the mitigation will achieve full functional replacement of physical, chemical, and biological functions within the practical limits of assessment methodology in existence during the permit process.

Response #276A – The section 404(b)(1) Guidelines establish the legal basis for requiring compensatory mitigation that replaces lost chemical, physical, and biological functions of waters to be impacted by a DA permit. In 2007, the agencies relied, in part, on clarification of the Guidelines provided in the 2002 Regulatory Guidance Letter entitled *Guidance on Compensatory Mitigation Projects for Aquatic Resource Impacts Under the Corps Regulatory Program Pursuant to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act (RGL 02-2).* RGL 02-2 states that Section 404 permit program's regulations require appropriate and practicable compensatory mitigation to replace functional losses to aquatic resources (Section 2.c.). RGL 02-2 further clarifies the following: (Section 2.d.1. – Functional Assessment)

> *The objective is to offset environmental losses resulting from authorized activities. The ecological characteristics of aquatic sites are unique. Therefore, when possible, Districts should use a functional assessment by qualified professionals to determine impacts and compensatory mitigation requirements. Districts should determine functional scores using aquatic site assessment techniques generally accepted by experts in the field or the best professional judgment of Federal, tribal, and state agency representatives, fully considering ecological functions included in the 404 (b)(1) Guidelines.*

RGL 02-2's clarifying the requirements of the Guidelines makes clear that functional replacement of waters must be accomplished in mitigating for waters impacted by a permit and that a functional assessment is necessary to assure that impacted functions and values are properly assessed. EPA's evaluation of the Corps permit record demonstrates that an effective functional assessment was not conducted for the Spruce permit and that the company's mitigation plan does not adequately replace stream functions that will result from proposed mining activities in waters of the U.S. In its comments on both the Proposed and Recommended Determinations, USFWS concurred with EPA's evaluation in this regard.

The RBP can be effective at evaluating the physical habitat in a stream, while WVSCI can be effective at evaluating biological functions. Neither is effective at assessing chemical characteristics and functions of streams. As evidenced by recent studies (Pond et al. 2008, EPA 2010a) chemical monitoring is critical to ensuring long-term restoration of the physical, chemical, and biological functions provided by the streams. The West Virginia Stream and Wetland Valuation Metric (SWVM) recognizes the important of evaluating the physical, biological and chemical integrity of streams by including the RBP and the WVSCI along with water quality data. See also Responses #41, 46, and 157.

Comment #277A – EPA's attack on the WVSCI is not only contrary to the applicable regulatory requirements, it is also inconsistent with current practices and other provisions of the Recommended Determination. For example, EPA's repudiation of the WVSCI is inconsistent with EPA's approval of the SWVM and with several, individual stream mitigation banks, which use the WVSCI as a basis for determining mitigation credits. SWVM Instruction Document at 2; TED2 § 5.1. EPA does not explain how the WVSCI can serve as one of the bases for determining mitigation under SWVM and for certain stream mitigation banks but is inadequate as one of the measures for assessing stream mitigation performance for the Spruce No. 1 permit. Moreover, EPA does not explain how the WVSCI is used in an attempt to validate its preferred method for measuring the quality of Oldhouse and Pigeonroost Creeks but is a completely inadequate method for measuring the performance of mitigation streams. RD at 24, 57-58.

Response #277A – The West Virginia Stream and Wetland Valuation Metric (SWVM) recognizes the importance of evaluating the physical, biological and chemical integrity of streams by including the RBP and the WVSCI along with water quality data. Thus, EPA's approval of the SWVM's use in other projects affirms EPA's contention that reliance on only the WVSCI's biological assessment is inadequate to assess the physical, chemical and biological integrity of streams.

See Response #71.

Comment #278A – Another of the permit's several performance measures is the RBP. In the Recommended Determination, EPA repudiates the validity of EPA's own RBP protocol—a protocol whose use was upheld by *OVEC*—and argues that the Fritz study has shown that the RBP habitat assessment does not account for the total ecological "currency" at the site. RD at 68. Again, this repudiation of the RBP for the Spruce No. 1 Mine is inconsistent with EPA's approval of the SWVM and of several, individual stream mitigation banks, which use the RBP as a basis for determining mitigation credits. SWVM Instruction Document at 2; TED2 § 5.1. Moreover, this repudiation of the RBP by EPA has not been reflected in authoritative headquarters action, such as the official withdrawal of the RBP. Finally, EPA's repudiation of this longstanding methodology cannot be justified by a single study. The Fritz study is quite limited and it does not develop a scientifically-based and practical functional assessment methodology to replace the RBP and other existing assessment methods. The Fritz paper focuses narrowly on a single metric which can be influenced by factors which do not have a strong relationship to a biologically healthy, functioning stream. The Fritz leaf breakdown metric is not the functional assessment methodology EPA is seeking and its narrow, single metric focus is not nearly as indicative of stream functions as the RBP, the multi-factor WVSCI, or the suite of other performance standards imposed on this permit. TED2 § 5.5.

Response #278A – EPA does not believe that the Final Determination or Recommended Determination "repudiates the validity" of the RBP for assessing habitat quality. Rather, EPA speaks to the appropriate use of the RBP approach in the context of the Spruce No. 1 project. RBP is generally an appropriate tool for evaluating physical structure of stream habitat. It does not address stream biology, chemical integrity or directly measure any stream functions. The West Virginia Stream and Wetland Valuation Metric (SWVM) recognizes the importance of evaluating the physical, biological, and chemical integrity of streams by including the RBP and the WVSCI along with water quality data. See also Responses #37, 39, and 41.

EPA also recognizes that Fritz et al. (2010) found that RBP was a poor indicator of one stream function, leaf litter breakdown, in restored channels draining valley fills. Because chemical extremes can strongly structure biological processes and thus functional integrity, this underscores the need to address all three aspects (i.e., physical, biological and chemical) of stream ecosystems and use as many measures and indicators as possible to assess overall stream structure and function.

Comment #279A – Beyond the numerous existing performance standards, the permit issued to the Spruce No. 1 Mine contains additional and extraordinary assurance of the use of functional assessment in determining mitigation success. As explained in prior comments, the permit contemplates the potential future development of functional assessment protocols for headwater streams in West Virginia and provides that "[u]pon finalizing these stream assessment protocols, the permittee shall use these tools to assess the success of the proposed mitigation sites." Special Condition 22. *See* Cmt. Ex. 1. Thus, if the Corps and EPA agree on a new functional assessment methodology for streams, it will be used to measure the success of the mitigation required under the permit.

Response #279A – EPA does not believe the compensatory mitigation will adequately offset the proposed impacts, as detailed in Appendix 3. Furthermore, while the permit requires biological and chemical monitoring, it does not provide any action to be taken if monitoring reveals that biological or chemical parameters are being adversely impacted. For example, while Special Condition 13 suggests biological scores "should" be comparable to baseline scores, Special Condition 5 states that the compensatory mitigation obligation is satisfied when the Corps has verified that the mitigation area is "intended" to become functioning jurisdictional waters, not when that goal is actually achieved.

Comment #280A – EPA Does Not Demonstrate That Mitigation in Erosion Control Channels Will Not Succeed. EPA further argues that the proposed conversion of erosion control channels "is unlikely to successfully replace the impacted resources." RD at 69. EPA fails to provide citations to support some of the key points to this argument. Moreover, much of the data that EPA uses to support this claim was known prior to permit issuance and was not the basis of an EPA objection. *E.g.*, RD App. 3 at 6 (citing Kirk (1999); Green (2000)). EPA had ample opportunity during the lengthy permit process to raise any genuine issue about the conversion of erosion control channels prior to the permit issuance but did not do so.

Response #280A – See Responses #11A and 270A. As noted in the Final Determination, additional studies have been published since permit issuance that further confirm EPA's concerns that erosion control channels are unlikely to successfully replace the impacted resources (e.g., Gingerich, 2009). See also Responses #24, 36, 39, and 152.

Comment #281A – EPA states that "[d]ata show that water quality in these types of sediment ditches in the MTM region is typically highly degraded as a result of water in these ditches percolating through mine spoil," but does not provide any citation or explain which data EPA is referring to. RD at 69. In addition, EPA states that "the water quality (e.g., salinity) is so degraded that it could potentially foster the establishment of toxic Golden Algae," without any citation or data to support that statement. RD App. 3 at 6. Because EPA does not cite or identify the studies that provided the basis for these statements, it is not possible to meaningfully evaluate or comment on these claims.

Response #281A – See Responses #36, 39, and 246A(vii).

Comment #282A – EPA wrongly contends that the use of erosion control channels will not compensate for the loss of high quality stream resources. RD App. 3 at 6. As explained in prior comments, EPA's pessimism on stream creation is unfounded and conflicts with the applicable regulatory requirements. But the short answer is that the Corps designed specific performance measures that will assure replacement of the stream's functions. And, if the degradation that EPA hypothesizes does occur, Mingo Logan will have to perform corrective action, adaptive management, remedial measures, and/or additional or alternative mitigation sufficient to provide full compensation.

Response #282A – See Responses #39, 42, and 46.

Comment #283A – With respect to the success of erosion control channels as mitigation, one of the key studies upon which EPA relies contradicts EPA's conclusions. The Kirk study concludes: "'If constructed properly, these sediment control ponds and sediment ditches can do a splendid job in removing solids and other water contaminants both by filtration and by precipitation prior to reaching downstream areas.'" TED2 § 5.3. Moreover, beyond contribution to improved quality, the Kirk study also finds that the erosion control channels "'provide aquatic habitats for countless abundances of aquatic insects, amphibians, reptiles, and potentially even fish.'" *Id*.

In fact, a quick review of active erosion control channels prior to mitigation supports the findings of the Kirk study. Exhibit 9 contains a photograph that depicts an active erosion control channel at the Aracoma Coal mining site, which is lined with trees on one side of the channel and herbaceous vegetation on the other. Similarly, at the nearby Dal-Tex property, there are erosion control channels with comparable configurations, lined with trees on one side and herbaceous vegetation on the other side, including wetlands vegetation. Like the channel at Aracoma in Exhibit 9 and the channels at Dal-Tex, the erosion control channels at Spruce No. 1 Mine will be lined with trees and herbaceous vegetation during their active phase. Once mitigation is undertaken, the channel bottoms, banks, and course will be modified as required by the mitigation plan to provide a bottom which is 85 percent free of sediment, bank protection measures, riffle/pool complexes, aquatic habitat structures, and meanders, and the current herbaceous vegetation on one side of the channel will be replaced with native trees and shrubs, leaving a mitigated stream channel with native trees and shrubs along both banks. Special Conditions 8, 9, 10, 11, 19, and 20. *See* Cmt. Ex. 1. As explained in TED2, such in-stream and riparian habitat correlates strongly to a healthy, functioning stream. TED2 § 5.3. In addition, as explained in a recently issued Regional Guidebook, riparian tree and herbaceous vegetation contribute to biochemical processing and habitat functions. United States Army Corps of Engineers Engineer Research and Development Center, *Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Headwater Streams in Western West Virginia and Eastern Kentucky* (July 2010) ("Regional Guidebook"), *available at* http://www.lrh.usace.army.mil/kd/go.cfm?destination=ShowItem&Item_ID=19397. Thus, as evidenced by these examples, Mingo Logan has a sound empirical basis for its expectation that the mitigation in and near erosion control channels at Spruce No. 1 Mine will result in a healthy, functioning stream.

Response #283A – While Kirk (1999a) and the selected examples described by commenter show the ability to partially offset impacts to aspects of stream structure, they do not demonstrate that the high quality physical, chemical, and biological functions provided by Pigeonroost Branch and Oldhouse Branch can be adequately offset. See also Responses #39 and #276A.

To the extent that the commenter cites Kirk's (1999a) value judgment that the ditches do a "splendid" job, this characterization is not supported by data; the study does not adequately explore chemical attenuation and only relies on conjecture of assumed habitat quality. Chemical concentrations (e.g., ions) in these channels will still be harmful to the indigenous fauna known to occur in Pigeonroost and Oldhouse Branch or in similar unimpaired streams found throughout the ecoregion. Planting trees and building habitat structures has not been shown to mitigate the harsh chemical conditions that will exist in the created channels, likely leading them to not replace the functions of high-quality aquatic communities in Pigeonroost and Oldhouse Branch.

The commenter cites the Corps' "*Operational Draft Regional Guidebook for the Functional Assessment of High-gradient Ephemeral and Intermittent Streams…*" as evidence that riparian and herbaceous vegetation contribute to biochemical processing and habitat functions. However, the commenter fails to recognize that one component of or contributor to a function is not sufficient for stream function. Without a healthy chemical composition to the water, the riparian vegetation means little to overall biochemical processing.

Comment #284A – In support of its pessimism, EPA cites studies performed by Kirk in 1999 and Green in 2000 and a master's thesis by Gingerich in 2009. Both the Kirk and Green studies were available during the permit proceeding and did not form the basis of an objection by EPA.

Response #284A – See Responses #24 and 276A.

Comment #285A – The Gingerich thesis is not even publicly available today.

Response #285A – It is clear from the following comments that commenters have had the opportunity to review Gingerich (2009) (see Comments #286A and 287A). Therefore, the accessibility of this document is apparently not a concern.

Comment #286A – Green and Gingerich do not support EPA's conclusion that all created water bodies in mined areas will exceed water quality standards. The Green study evaluated a single erosion channel under conditions that are not representative of the mitigation requirements applicable to the Spruce No. 1 Mine. TED2 § 5.3. The Kirk study and the Gingerich thesis actually support the view that erosion control ditches can provide effective water quality and habitat functions and result in taxa abundance and diversity that support a balanced aquatic community. *Id*. As explained above, the Kirk study finds that erosion control channels perform an excellent job at removing water contaminants and provide aquatic habitats with abundant insects, amphibians, reptiles, and potentially even fish. The Gingerich thesis notes that there can be a macroinvertebrate and amphibian species shift in erosion control channels, but the abundance and richness of these species remains similar between erosion control channels and reference cites—a condition that supports a balanced aquatic community. *Id.*

Response #286A – Commenters have not shown why the adverse conditions found in the water control features assessed in the Green et al. (2000) and Gingerich (2009) studies will not occur on the Spruce No. 1 site. Commenters have highlighted that some erosion control channels have been shown to support "balanced" biological communities, but they fail to highlight that the balanced biological communities identified are representative of degraded streams, not the high-quality streams currently existing on the Spruce No. 1 site. Moreover, despite the commenter's attempt to show that Green et al. (2000) is not applicable, the benthic data in the table below (Appendix 3, Table A3.1) show that the Kirk (1999a and 1999b) and Green et al. (2000) sites are actually very similar in community composition. Therefore, it is apparent that these post-reclamation sediment ditches harbor a highly tolerant group of organisms and lack naturally occurring EPT taxa found in Pigeonroost and Oldhouse Branches.

| Collection Date: | | | Oct. 8, 1999 | Oct. 8, 1999 | Oct. 8, 1999 | Oct. 8, 1999 | Oct. 26, 1999 |
|---|---|---|---|---|---|---|---|
| Site | | | Vance Branch | Rollem Fork | Left Fork | Honey Branch | Stanley Fork |
| Method | | | Ponar | Ponar | Ponar | Ponar | Kick Net |
| Order | Family | Genus | Sediment Ditch | Sediment Ditch | Sediment Ditch | Sediment Ditch | Sediment Ditch |
| Oligochaeta | Oligochaeta | Oligochaeta | 8 | 1088 | 240 | 192 | 0 |
| Basommatophora | Physidae | Physella | 0 | 0 | 0 | 0 | 4 |
| Ephemeroptera | Baetidae | *Baetis* | 4 | 0 | 8 | 272 | 0 |
| Ephemeroptera | Caenidae | *Caenis* | 0 | 0 | 104 | 0 | 0 |
| Trichoptera | Polycentropodidae | *Polycentropus* | 0 | 0 | 8 | 0 | 0 |
| Diptera | Certopogonidae | Unid. Ceratopogonid | 64 | 448 | 40 | 800 | 52 |
| Diptera | Chironomidae | Unid. Chironomid | 340 | 1024 | 480 | 816 | 163 |
| Diptera | Empididae | *Hemerodromia* | 0 | 0 | 0 | 0 | 3 |
| Diptera | Simuliidae | *Simulium* | 0 | 0 | 0 | 0 | 8 |
| Diptera | Stratiomyiidae | *Odontomyia* | 0 | 0 | 0 | 0 | 1 |
| Diptera | Tipulidae | *Tipula* | 0 | 0 | 16 | 0 | 1 |
| Coleoptera | Dytiscidae | *Cybister* | 0 | 0 | 8 | 0 | 0 |
| Coleoptera | Dytiscidae | *Laccophilus* | 8 | 0 | 0 | 0 | 0 |
| Coleoptera | Dytiscidae | Unid. Dytiscid | 0 | 0 | 0 | 16 | 0 |
| Coleoptera | Hydrophilidae | *Berosus* | 0 | 16 | 0 | 0 | 0 |
| Coleoptera | Haliplidae | *Peltodytes* | 0 | 0 | 0 | 32 | 0 |
| Odonata | Coenagrionidae | Unid. Coenagrionid | 0 | 0 | 80 | 48 | 15 |
| Odonata | Lebellulidae | Unid. Libellulid | 32 | 0 | 104 | 0 | 0 |
| Hemiptera | Mesoveliidae | Unid. Mesoveliid | 0 | 0 | 24 | 0 | 0 |
| | | **Total Richness** | **6** | **4** | **11** | **7** | **8** |
| | | **EPT Richness** | **1** | **0** | **3** | **1** | **0** |
| | | | | | | | |
| All data as reported by Kirk (1999) except Stanley Fork (collected by US EPA Region III). | | | | | | | |
| Note: Coenagrionidae, Chironomidae and Ceratopogonidae collapsed to family-level for Stanley Fork ditch. | | | | | | | |
| Chironomidae found 100% of time at Unmined sites because this family is found in virtually all aquatic habitats. | | | | | | | |

Comment #287A – The examples given by EPA as the basis for its concerns about erosion control channels do not predict conditions at the Spruce No. 1 Mine. RD App. 3 at 6-8. For example, the mean conductivity for the Gingerich data is over 2000 µS/cm and the mean conductivity for the Green data is 2200 µS/cm, both of which are almost triple the worst case average projected by EPA in its conductivity analysis for the Spruce No. 1 site. RD at 51. EPA's examples are inapposite to the stream mitigation required by the Spruce permit because the WVSCI scores are so low at EPA's example sites that, were they to occur at the Spruce No. 1 site, the mitigation would fail the stringent performance criteria and remedial action or alternative mitigation would be required. Thus, the data cited by EPA is neither relevant to the wetland stream creation proposed for Spruce No.1 Mine nor to the permit conditions applicable to Mingo Logan's entire mitigation program.

Response #287A – The predicted conditions for the onsite compensation, while likely not as poor as those found on the Green et al. (2000) and Gingerich (2009) data, still represent degraded conditions in terms of chemical and biological function. See Response #283A. In addition, through EPA's own observations (see Appendix 3 of the Final Determination), sediment ditches exhibit altered flow regime, altered temperature regime, severely contaminated water, and depauperate and tolerant biota. The Spruce No. 1 permit does not identify how their sediment ditches will be different from those observed by Green et al. (2000), Gingerich (2009), Kirk (1999a and 1999b), or EPA and the remedial actions and alternative mitigation are similarly unspecified and unknown.

Comment #288A – EPA contends that erosion control channels "should be considered sources of pollution rather than a mitigation feature" because "[d]ata show that water quality in sediment ditches in previously mined areas is highly degraded." RD App. 3 at 6. However, aside from the fact that EPA's examples are inapposite, EPA has failed to account for the legal requirements applicable to these erosion control channels. Under the Spruce No. 1 Mine permit issued by WVDEP, these erosion control channels cannot be utilized as mitigation structures until they are released from SMCRA regulation. Under Mingo Logan's SMCRA permit, before the channels are released, they must meet all applicable Section 402 effluent limitations without treatment. Thus, contrary to EPA's assertion, the water quality in the erosion control channels will not be highly degraded because the channels must comply with EPA's own effluent limitations before they will be used as mitigation features.

Response #288A – See Responses #28, 37, 39, 283A, 286A, and 302A. To the extent the commenter asserts that the erosion control ditches will not become sources of total dissolved solids/conductivity or selenium because they must meet all applicable Section 402 effluent limitations without treatment, EPA notes that the NPDES permit does not include effluent limitations for conductivity or selenium for the outfalls associated with the sediment control structures, and therefore such (non-existent) limitations for conductivity or selenium are unlikely to meaningfully control these parameters.

Comment #289A – Ecological Services of Headwaters Streams and Upland Watersheds Will Be Restored by the Mitigation Required Under the Permit.

Response #289A – See Responses #37 and 39.

Comment #290A – The Recommended Determination claims that "[t]he CMP does not account for the loss of ecological services of headwater streams" and that any "[a]ssumptions that much of the structure and function of the pre-mined conditions can be recaptured with mitigation are very optimistic and highly speculative." RD at 69-70. EPA could have raised this claim during the lengthy permit proceeding or in a 404(q) elevation or 404(c) veto prior to the permit issuance, but did not. EPA asserts that the areas upstream of mitigation sites will have been altered to such a degree that mitigation streams will not perform the same biological functions as impacted streams. RD at 70. But this concern is itself speculative and ignores not only the multi-faceted mitigation program imposed on Mingo Logan, which includes stream enhancement, restoration, and creation but also the robust monitoring program contained in the Special Conditions to assess the success of this multi-faceted program at each of the proposed mitigation sites. If the mitigation streams do not perform the functions as assessed by performance criteria, then permit conditions require corrective action, adaptive management, remedial measures and/or additional mitigation to provide assurance of adequate mitigation.

Response #290A – See Responses #24, 37, 39, 41, and 42.

Comment #291A – To the extent that EPA contends that there is inadequate mitigation for the loss of upland areas, this concern is outside the scope of the CWA. According to the Congressional scheme, this loss of upland areas due to surface mining is addressed under SMCRA. And, with respect to Spruce No. 1 Mine, the WVDEP has imposed numerous mitigation requirements in the SMCRA permit to compensate for the temporary impacts to upland areas. Moreover, EPA's concern is unfounded, because in order to comply with SMCRA, Mingo Logan must implement a comprehensive reforestation plan for the upland mined areas at the Spruce site. As such, in postmining conditions, those areas upgradient of mitigation streams will be vegetated and ultimately forested.

Response #291A – See Responses #9, 10, and 14. EPA's Final Determination is focused on unacceptable adverse effects to wildlife, not on impacts to upland areas.

Comment #292A – **EPA's Contention That Stream Restoration and Enhancement Required by the Permit Will Be Unsuccessful Is Unfounded.** In the Appendix but not the Recommended Determination, EPA contends that the enhancement and restoration provided for in the Spruce No. 1 Mine permit are inadequate to replace the functions lost at the impacted creeks. RD App. 3 at 9. Much of EPA's claim is based on information that was known prior to the permit's issuance, such as the type of enhancement and restoration techniques to be used in Spruce Fork and Rockhouse Creek. Moreover, EPA's claims that enhancement and restoration are scientifically unfounded, *id*., are completely belied by the applicable regulatory requirements for stream compensation, which authorize enhancement and restoration as acceptable forms of stream mitigation. For example, RGL 02-2 lists both enhancement and restoration as methods for compensatory mitigation. RGL 02-2, Section 2.h.

Response #292A – See Responses #37 and 39-44.

Comment #293A – As noted in previous comments, EPA has also recognized that stream restoration has a documented history of success. For example, in the new Corps and EPA compensatory mitigation regulations, the agencies note that "[t]here is a growing body of research that documents successful outcomes for stream restoration projects . . . " and that "[s]uccessful outcomes for stream restoration with respect to water quality, habitat creation, species recovery and recreation, have been documented by Baron and others; (2002); Buijse and others (2002); Muotka and Pekka (2002); Nakamura and Kunihiko (2006); and Petersen (1999)." 73 Fed. Reg. at 19596-97.

Response #293A – In the section of the preamble to the 2008 Mitigation Rule cited by the commenter, the Corps and EPA recognize that there have been examples of successful stream *restoration* projects (however, it is important to note that none of these studies involved mitigation projects associated with valley fills). This discussion comes after a lengthy discussion in the preamble that describes the lack of such examples of successful stream *creation* (i.e., establishment) or re-establishment projects as contemplated by the Spruce No. 1 Mine CMP. In fact, the many challenges associated with stream creation lead the agencies to include provisions in the rule specifically discouraging stream creation (FR 73 at 19596). Further, both stream restoration and stream creation are problematic in the context of mitigation for the impacts associated with the valley fills proposed for the Spruce No. 1 Mine because there is no evidence that either can effectively address the water quality impacts expected from this project (i.e., elevated selenium and total dissolved solids / conductivity) .

Comment #294A – As explained in the attached report, there is a strong body of evidence indicating the success of stream restoration. [The success of stream restoration is underscored by several of the completed projects identified by the Canaan Valley Institute at http://www.canaanvi.org/canaanvi_web/streamrestoration.aspx?collection=highlighted_projects&id=599.] TED2 § 5.1. For example, at a site in Clayton County, Georgia, approximately 4,000 feet of East Jester's Creek was restored between 2003 and 2004 using the Rosgen's natural channel design techniques. Prior to this date, the diversity of the benthic macroinvertebrates was depressed with about 19 species in one study area and 22 species in another study area with an EPT index of about 2. In 2007, after restoration, the macroinvertebrate community showed a marked improvement, with 33 species in one study area and 36 species in another section of East Jester's Creek. The corresponding EPT indices had risen to 9 in one section and 8 in another part of the creek. This reflects a substantial improvement of the habitat and the benthic community. *Id.* Moreover, there are a number of examples of stream mitigation banks that have been approved by EPA and other permitting agencies based on the use of stream restoration and enhancement designs. *Id.* As shown by each of these examples from West Virginia and throughout the country, EPA's pessimism about the efficacy of restoration and enhancement for offsite streams is unfounded. EPA's complaints about the lack of a functional assessment methodology are belied by these mitigation banks, which have been approved by Interagency Review Teams including EPA, because the methods utilized at these approved stream banks to determine credits and assess success (e.g., RBP, WVSCI, Rosgen methods) are among the many performance standards imposed on this permit. Based on this extensive experience on stream restoration and enhancement, Mingo Logan is optimistic that the stream enhancement and restoration required by this permit will succeed. In any event, if EPA's dire predictions are correct and the stream restoration and enhancement required by the permit are unsuccessful, the permit conditions require corrective action, adaptive management, remedial measures and/or additional or alternative mitigation to assure adequate compensatory mitigation.

Response #294A – See Responses #37, 39-44, and 293A.

The example offered by Mingo Logan from Clayton County, GA is neither germane nor appropriate. It does not have the serious specific water quality concerns (e.g., TDS, Selenium) that are present in Rockhouse and Spruce Fork, nor the expected conditions that will occur downstream of Pigeonroost and Oldhouse Branches caused by the construction of valley fills. Further, stream restoration has not been shown to be successful when significant landscape modifications lead to large-scale changes in hydrology and chemical changes to water supply. EPA acknowledges that stream restoration utilizing the principles of Natural Channel Design (NCD) can improve stream habitat and sedimentation – where these are the limiting factors – and improve biological function. However, if water quality is a limiting function, reliance on NCD alone is problematic.

Commenters have not provided any examples of stream restoration or creation practices that have addressed water quality concerns such as those identified with the Spruce No. 1 Mine. In the examples from Canaan Valley Institute's website offered by the commenter, the information provided sorely lacks detailed data, before-and-after comparisons, information on what ecological lift was achieved, and what prevailing water chemistry existed at the sites. One example provided on the website shows Horseshoe Run (see photo below). EPA and WVDEP studied this stream prior to restoration and found that it supported WVSCI scores ranging from 75-85, and Mid-Atlantic fish IBI scores ranging from 73-77 with conductivity <100 µS/cm. Here, biological lift will not be readily detected since the stream already supported healthy fish and sensitive macroinvertebrate populations prior to restoration.

In the Recommended and Final Determinations, EPA does not conclude that NCD does not provide *some* benefits, but EPA does disagree that enhancement work in Rockhouse or Spruce Fork will equate to adequate compensation for buried headwater streams in Pigeonroost and Oldhouse. Again, in a 2008 Federal Register notice, the Corps and EPA clarified the need to identify streams as "difficult-to-replace" aquatic resources and acknowledged the special need to avoid and minimize impacts to these resources.

Comment #295A – Although EPA expresses concern with the restoration activities in Rockhouse Fork due to the presence of several pollutants and conductivity, the restoration in Rockhouse Fork will be effective and provide lift. As explained in TED2, habitat is an important determinant of functioning streams, and Rockhouse Creek and others of similar state, once stabilized, will provide the hydrology necessary to allow current engineering and environmental planning technologies to be applied for the restoration of habitat and functional, biologically diverse streams. TED2 § 5.4. Like the restored streams identified in these numerous reports, which had previously experienced low quality due to inadequate flow, degraded habitat, or chemical contamination, Rockhouse Creek can be expected through common mitigation techniques to experience similar levels of restoration.

Response #295A – Natural Channel Design (NCD) can improve stream habitat and where that is the limiting factor improve biological function. However, if water quality is a limiting function, reliance on NCD alone is problematic. The commenter has not provided any examples of stream restoration practices that have addressed water quality concerns such as those identified with the Spruce No. 1 Mine. Regarding Rockhouse Creek, although the restoration proposed may restore aquatic habitats, it does not address water quality concerns in Rockhouse Creek (i.e., several pollutants and conductivity) that will likely remain limiting factors for the restoration of biological and chemical function.

To the extent the commenter cites restoration efforts in New Mexico, EPA recognizes that acid mine drainage is a severe form of impact to aquatic organisms and biological lift is readily apparent once chemical pollution is abated. Similarly, where alkaline mine drainage is involved (e.g., Rockhouse Creek), an aquatic community still exists (albeit degraded and lacking naturally occurring sensitive species). Significantly improving the aquatic community would require control of the adverse chemical effects. EPA maintains that simple channel reconfiguration and enhancements cannot restore chemically sensitive species (i.e., naturally occurring fauna) where chemical pollution is the limiting factor.

Comment #296A – The Permit Provides for Adequate Riparian Planting of Native Vegetation

Response #296A – See Response #27.

Comment #297A – In the Appendix but not the Recommended Determination, EPA claims that there is no evidence that the 71 acres of riparian forest to be restored or created by Mingo Logan will replace lost natural riparian ecosystems. RD App. 3 at 10. This is an entirely new claim neither made during permit issuance, in the Proposed Determination, or in the Recommended Determination, even though the plantings were well known during the permit process.

Response #297A – See Response #27.

Comment #298A – EPA's claim that the re-vegetation plan is inadequate because it includes "nonnative" species, *id*., does not take account of the permit's special conditions. Special Condition 10, which applies to riparian revegetation, specifically requires that Mingo Logan submit a detailed revegetation plan, "**consisting only of native non-invasive species** . . ." Special Condition 10 (emphasis in original). *See* Cmt. Ex. 1. Special Condition 20 underscores this requirement, stating that the planting plan must consist of "species that are non-invasive and native to Logan County." Special Condition 20. *See* Cmt. Ex. 1. Thus, contrary to EPA's unsupported claim, the permit conditions fully provide for adequate riparian planting of native vegetation.

Response #298A – Out of the 11 tree species listed in the CMP, only two, red maple (*Acer rubrum*) and American sycamore (*Platanus occidentalis*), are suitable choices for riparian planting. The others are not found within or near the project area. While the cited permit condition may prohibit the project proponent from planting these non-native species, because of these omissions in the compensatory mitigation plan, it remains unclear what species will be planted on the site or whether these species will be appropriate for the project area, as if no planting plan were submitted at all.

Comment #299A – EPA's Pessimism About the Efficacy of Connectivity Channels as Stream Mitigation Is Unfounded

Response #299A – Comment noted.  However, EPA disagrees with the conclusion reached by the commenter, consistent with Responses #300A-304A.

Comment #300A – In the Appendix but not the Recommended Determination, EPA contends that the connectivity channels provided for in the Spruce No. 1 Mine permit will not "offset buried stream resources." RD App. 3 at 11.97 Again, this is an entirely new claim neither made during permit issuance, in the Proposed Determination, or in the Recommended Determination, even though the location of these channels was well known during the permit proceedings.

Response #300A – Connectivity channels, erosion control ditches, and other forms of on-site water control features proposed as compensatory mitigation are addressed in Section V.C.1 and Appendix 3 of the Recommended Determination, Section V.E.3. of the Final Determination, and Appendix 3 of the Final Determination.  Further, the Recommended Determination, like the Final Determination, includes the entirety of the main document and all of its appendices.  The fact that a statement only appears in the appendices, therefore, has no legal significance.  See also Response #39.

Comment #301A – EPA's pessimism about the efficacy of connectivity channels as stream mitigation find little support. For example, included in Exhibit 10 are two photographs of a connectivity channel on the nearby Dal-Tex property. The connectivity channel is meandering through the center of each of these photographs. There is substantial tree and herbaceous vegetation on both sides of the connectivity channel providing significant shading, nutrient sources, sediment control, and habitat. As explained in TED2, such habitat correlates strongly to a healthy, functioning stream. TED2 § 5.5. In addition, as explained in the Regional Guidebook, such riparian tree and herbaceous vegetation contribute to biochemical processing and habitat functions. Regional Guidebook at 43. The connectivity channels provided for in the Spruce No. 1 Mine permit will be at least as biologically active as the channel in these photographs. Thus, as evidenced by this example, Mingo Logan has a sound empirical basis for its expectation that the mitigation in the connectivity channels at Spruce No. 1 Mine will result in a healthy, functioning stream.

Response #301A – See Responses #37, 39, and 283A.

As previously noted, stream restoration and enhancement projects that employ the principles of Natural Channel Design (NCD) can improve stream habitat and where that is the limiting factor improve biological function.  However, if water quality is a limiting factor as is expected to be the case with the Spruce No. 1 Mine, reliance on NCD alone is problematic.  Again, commenters have not provided any examples of stream restoration practices that have addressed water quality concerns such as those identified with the Spruce No. 1 Mine.  See Response #295A.

Comment #302A – EPA also claims that the connectivity channels provided for in the Spruce No. 1 Mine permit "are expected to have minimal function for [ ] water quality reasons." RD App. 3 at 11. However, as discussed in the section on erosion control channels, to comply with SMCRA, the water in the connectivity channels must be in compliance with all of the applicable effluent limitations without any prior treatment before they can be used as mitigation. Thus, due to the conditions of the SMCRA permit, the use of these connectivity channels for mitigation are expected to result in a functional stream from a water quality perspective.

Response #302A – See Responses #283A, 288A, and 304A. In addition, even if the connectivity channels on the Spruce No. 1 site are deemed compliant with SMCRA based on the effluent composition, protection against increased ionic strength (e.g., conductivity), is still problematic in the connectivity channels as well as downstream. Moreover, if the existing downstream habitat is degraded, as is predicted due to the significant change in hydrology for these channels, or if the biological function of the stream is degraded, the creation of the connectivity channels will represent a net reduction in stream function.

Comment #303A – If the connectivity channels do not meet performance criteria, corrective action, adaptive management, remedial measures and/or additional mitigation will be required under the permit.

Response #303A – See Response #42.

Comment #304A – EPA contends that there will be such substantial flow in the connectivity channels that there will be downcutting leading to increased sedimentation and degradation of biological communities. RD App. 3 at 11. However, the problem of excess flow velocity and potential downcutting is frequently encountered at existing streams and hydrologists and stream designers are fully capable of avoiding or minimizing these effects with the appropriate stream meanders, contouring, and amendments. For instance, Rosgen has developed, tested, implemented and monitored numerous projects for nearly four decades of stream restoration projects using a "Natural Channel Design" ("NCD") that has been shown to successfully manage these conditions for streams and channels similar to the connectivity channels proposed for the Spruce No. 1 Mine. With appropriate planning and design following Rosgen's concepts, channel morphology and stream flows can be managed to avoid downcutting for these channels. TED2 § 5.4.

Response #304A – Natural Channel Design (NCD) techniques have been used successfully to control stream downcutting. However, the mitigation plans associated with the connectively channels for the Spruce No. 1 mine do not include supporting information such as plans, designs, and channel cross-sections that indicate that NCD techniques are indeed proposed for use in this instance. It is also important to note that NCD techniques have not been proven to be effective in high-gradient and highly altered landscapes (e.g., both surface and subsurface disturbance) such as those found on surface coal mining sites.

Comment #305A – EPA Has Waived Reliance on "Other Considerations".

Response #305A – Section VI, "Other Considerations", of the RD and FD states:

*"This section identifies other, additional considerations that are of concern to EPA but are not part of the basis for our conclusion that the impacts will have an unacceptable adverse effect on wildlife."*

EPA includes this discussion to recognize additional significant environmental, public health, environmental justice impacts associated with the Spruce No. 1 Mine that are relevant to EPA's and the Corps' broader responsibilities in reaching permit decisions under the Clean Water Act and other statutes and policies, including the National Environmental Policy Act and the Environmental Justice Executive Order (E.O. 12898). EPA understands that the impacts identified in Section VI are not directly relevant to the Agency's conclusions under Section 404(c). However, EPA includes this section to emphasize for the public the broader impacts of the project as proposed as they relate to EPA's legal responsibilities. EPA takes seriously each of its responsibilities to assure effective protection for coalfield communities from environmental, human health, and water quality impacts associated with surface coal mining activities.

Comment #306A – Section VI of the Recommended Determination mentions other concerns that do "not form[] the basis of the Recommended Determination." RD at 8; at 71. Mingo Logan believes that each of these concerns is unfounded. But Mingo Logan relies on EPA's representation that they are not the basis of the Recommended Determination and, therefore, Mingo Logan does not address them in these comments. Mingo Logan will be prejudiced if EPA attempts to rely on one of these "other considerations" in its Final Determination. If, for some reason, EPA decides to rely on one of these factors, Mingo Logan requests an opportunity to respond to those allegations.

Response #306A – EPA has retained Section VI in the Final Determination, consistent with the additional explanation provided in the Final Determination. Also see Response #305A above.

Comment #307A – EPA has neither the legal authority nor an adequate factual basis to act under 404(c). EPA has not met its burden of demonstrating that the permitted fills in Pigeonroost and Oldhouse will have an unacceptable adverse effect on any of the 404(c) critical areas. The Administrator should therefore determine that no action under 404(c) is appropriate, rescind the Recommended Determination, and terminate this proceeding.

Response #307A – For reasons elaborated in considerable detail in EPA's Final Determination and the extensive record prepared by EPA to support the Agency's Final Determination in this matter, and consistent with the Clean Water Act, EPA has the clear legal authority under the CWA and its implementing regulations and the factual support to act under Section 404(c) in these circumstances. EPA's Assistant Administrator for Water has acted consistent with the law and the record before him in withdrawing the specification for the Spruce No. 1 Mine and prohibiting future mining-related discharges similar in their nature and scale to the Spruce No. 1 mine that would have similar chemical, physical, and biological effects as the Spruce No. 1 Mine.

**Comments submitted by the West Virginia Department of Environmental Protection (WVDEP) on November 29, 2010, regarding EPA's Recommended Determination**

**Introductory Response:** Several of the comments submitted by WVDEP raise very specific questions regarding West Virginia's Water Quality Standard for Selenium and its narrative Water Quality Standards. In particular, the comments raise questions about how to properly evaluate compliance with those Water Quality Standards. While EPA has chosen to provide explanations in response to these comments below, EPA's action does not rely on a conclusion that the proposed discharges will violate Water Quality Standards. Rather, EPA has evaluated the expected impact of the proposed discharges on water quality. Discussions of the specific Standards provide information and context, but do not form the basis of the Final Determination. As EPA has stated clearly in other Responses:

> While the Final Determination refers to some of West Virginia's numeric and narrative water quality criteria, the Final Determination is based upon a finding of unacceptable adverse effects to wildlife. This determination is qualitatively different than and is not dependent upon a measure of compliance with water quality standards. To be clear, EPA's conclusion that the Spruce 1 mine as authorized would cause unacceptable adverse effects on wildlife is not dependent on a conclusion that West Virginia's water quality standards will be violated at or downstream of the site.

Response #33.

EPA has not repeated this discussion in each of the responses below, but hereby incorporates it into those responses.

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Comment #1B – "It is disappointing that EPA never engaged WVDEP in the Spruce decision once EPA decided there was a problem with the permit. WVDEP is the primary regulator of all mining-related activity in West Virginia; therefore, it would be impossible to develop a fair and consistent permit process by focusing on the Section 404 aspect…."

Response #1B – EPA respects WVDEP's important role under the Surface Mining Control and Reclamation Act (SMCRA) and the Clean Water Act (CWA) in the regulation of mining-related activities in West Virginia. EPA views its authority under CWA § 404(c) not as a substitute for the State's or the Corps' responsibilities, but rather as providing the opportunity for an independent review of projects that have the potential to cause unacceptable environmental impacts to the Nation's aquatic resources. EPA's § 404(c) regulations recognize an important role for the State in the consultation process with EPA, the company, landowner, and the Corps to identify potential corrective actions to reduce adverse project impacts. EPA appreciates that the Secretary of the WVDEP was personally able to participate in discussions with the EPA Assistant Administrator for Water in November 2010 to assess potential corrective actions for the Spruce No. 1 Mine. EPA also conducted a public hearing on the Spruce No. 1 Mine in Charleston, West Virginia, at which the State participated and provided written comments supporting the mine as permitted. EPA has carefully considered the input that WVDEP provided on the Spruce No.1 mine when developing its Final Determination.

Comment #2B – WVDEP expressed concern that EPA has focused on "unacceptable adverse effects." WVDEP states that previously EPA's focus had been on whether discharges from the Spruce No. 1 Mine would cause or contribute to a violation of West Virginia's Water Quality Standards. WVDEP "do[es] not believe EPA can carve the term 'unacceptable adverse impact' out of the overall context of the Clean Water Act and give it a meaning and application that is completely distinct from that of State water quality standards. It is West Virginia's position that its properly promulgated water quality standards are, in fact, the measurements by which both 'unacceptable adverse impacts' and 'significant loss of or damage to' are defined. All of EPA's concerns about 'unacceptable adverse impacts' on wildlife from the Spruce permit are based on water quality, which is directly regulated by the State water quality standards. Interpretation and enforcement of such standards is uniquely a State issue."

Response #2B – This comment reflects a misunderstanding regarding the standard established by Congress and reiterated in EPA's regulations applicable to the Agency's review of proposed or authorized discharges to waters of the U.S. under CWA § 404(c). The Act makes clear that EPA has the authority to prohibit or restrict proposed or permitted discharges whenever the Agency determines that such discharges would result in an "unacceptable adverse effect" to certain aquatic resources, including wildlife.

EPA's experience with § 404(c) shows that the meaning and application of the term "unacceptable adverse effects" may be, and is often, distinct from a state water quality standard. EPA recognizes that there are circumstances where water quality impacts associated with a particular discharge may cause or contribute to both unacceptable adverse effects under § 404(c) and to a violation of water quality standards. Importantly, however, the use of § 404(c) clearly demonstrates that unacceptable adverse effects may also occur absent a violation of water quality standards (e.g., see EPA Final Determination regarding the Yazoo Pumps, August 2008). Conversely, a finding that a discharge would cause or contribute to a violation of a water quality standard does not necessarily mean that it will result in an unacceptable adverse effect under § 404(c), although it would be inconsistent with the 404(b)(1) Guidelines (see 40 CFR 230.10(b)). A determination that a particular discharge will result in acceptable adverse effects under the Act is, therefore, not "uniquely a state issue."

In this case, EPA has conducted an extensive analysis and assessed the likelihood that the Spruce No. 1 Mine, as permitted, would result in direct and indirect environmental effects constituting a significant and unacceptable degradation of aquatic resources, including wildlife resources. While EPA's analysis uses some of the same tools used by WVDEP to assess its waters and EPA believes that the nature and extent of biological impacts to stream life from discharges from the Spruce No. 1 Mine may be consistent with a violation of the state's narrative standard, such determination is not necessary for EPA to find unacceptable adverse effects under § 404(c).

See also Response #33.

Comment #3B – WVDEP questions EPA's position that its Final Determination is based on emerging science because many of the studies cited are several years old, and some date as far back as 1980.

Response #3B – See Response #152. EPA noted in its July 30, 2002 letter to WVDEP regarding the NPDES permit for the Spruce No. 1 Mine: "It is apparent that there is a potential for stream impairment at the proposed Spruce No. 1 Surface Mine due to drainage from the valley fills, but the extent of any impairment and feasible measures for minimizing detrimental impacts is not known at this time." As detailed in Response #152, much has been added to our knowledge about the effects discussed in the Final Determination by more recent science that has coalesced into a solid scientific foundation for many of EPA's concerns. That new information, combined with previously recognized effects, leads to EPA's Final Determination. As noted in Appendix 7, EPA has evaluated more than 100 references in this Final Determination that were not available at time of permit issuance.

Comment #4B – WVDEP states that EPA may not rely upon emerging science to exercise its § 404(c) authority to make what WVDEP terms a "regulatory decision that [is] retroactive" in the absence of policy development that has undergone either formal rulemaking or legislation.

Response #4B – EPA recognizes that instances where the need to act occurs after a permit has issued are legal, but should be rare. The scientific literature, both current and emerging, has coalesced to consistently document the significant environmental and water quality impacts associated with the direct burial of high-quality headwater streams and consequently elevated downstream levels of conductivity and selenium, both of which have adverse effects on wildlife. EPA's Final Determination pursuant to § 404(c) has evaluated this recent science in the context of the Spruce No. 1 Mine and has concluded that the project as proposed will have unacceptable adverse effects on wildlife. See Responses #152 regarding new information that has arisen since the Corps' 2007 permit for the Spruce No. 1 Mine. EPA's § 404(c) action applies this new scientific information in the context of EPA's existing Clean Water Act authorities, which it has exercised carefully in this case and throughout the Agency's history.

Comment #5B – WVDEP represents that it has developed explicit State guidance titled *Permitting Guidance for Surface Coal Mining Operations to Protect West Virginia's Narrative Water Quality Standards* that would apply to future permits.

Response #5B – As stated in Response #2B, EPA's finding of unacceptable adverse effects under § 404(c) is not dependent upon a finding that State water quality standards have been violated. Nevertheless, EPA acknowledges that in August, after publication of the Proposed Determination, WVDEP issued the policy referenced above. Consistent with WVDEP's comments elsewhere (see Comment #13B), EPA has responded to WVDEP's policy by requesting a technical-level meeting so that EPA may fully understand the underpinnings of WVDEP's conclusions and how WVDEP intends to apply its guidance. EPA renews its invitation to initiate technical-level discussions. See Response #154.

Comment #6B – WVDEP believes that EPA is misapplying the term "unacceptable adverse effect" as that term is defined at 40 CFR § 231.2(e). "We believe that the Clean Water Act's regulatory scheme is designed to allow an acceptable level of impacts to the nation's waters that will allow protection of the environment and a modern human society to exist." WVDEP interprets the Recommended Determination as finding an unacceptable adverse effect whenever there is any discernible change in baseline conditions, regardless of how insignificant.

Response #6B – EPA's § 404(c) action for the Spruce No. 1 Mine is consistent with the term "unacceptable adverse effect" as defined at 40 CFR § 231.2(e) and with Congressional intent as embodied in § 404(c). Moreover, this action is not based on a mere discernible change in baseline conditions. As set forth in detail in the Final Determination, it is based upon the adverse effects of burying more than six miles of high-quality headwater streams that support some of the few remaining "least disturbed" conditions within the Headwaters Spruce Fork sub-watershed and the Coal River sub-basin. Burying these streams will have unacceptable adverse effects both within the footprint of the permitted fills and as a result of associated impacts to wildlife in downstream waters.

Comment #7B – WVDEP reiterates an earlier comment that it believes the effects identified are generic and would apply to any large-scale construction projected in the forested areas of West Virginia.

Response #7B – See Response #122 to WVDEP's earlier comment.

Comment #8B – WVDEP believes that EPA's interpretation of the terms "unacceptable" and "adverse" as used in § 404(c) are inconsistent with the way those terms are used in West Virginia's water quality standards.

Response #8B – See Response #2B. EPA is not interpreting the term "unacceptable adverse effect" as that term (or as words within that term) is used in West Virginia State law. Rather, EPA is applying that term as used in CWA § 404(c) and EPA's implementing regulations. To the extent EPA's interpretation under 404(c) is the same or different from how the State interprets that term in another context is not relevant. It appears that West Virginia's Code of State Rules (CSR) 47-02 – which contains West Virginia's water quality standards – does not use the term "unacceptable," and while CSR 47-02 does use the term "adverse" (for example, CSR 47-02-3.2.i, which prohibits discharges that materially contribute to "any other conditions … which adversely alters the integrity of the waters of the State, including wetlands; no adverse impact to the chemical, physical, hydrologic or biological components of aquatic ecosystems shall be allowed"), it does not define that term.

Comment #9B – WVDEP believes that instream levels of specific conductivity have no regulatory significance because there is no numeric state or federal water quality criterion for specific conductivity.

Response #9B – As set forth elsewhere, EPA's § 404(c) action is based upon EPA's determination that the specification of Pigeonroost Branch and Oldhouse Branch as disposal sites for the discharge of dredged or fill material associated with the Spruce No. 1 Mine will have unacceptable adverse effects on wildlife. That finding does not depend upon a finding of violation of state or federal water quality standards. As noted in Response #94A, EPA does not believe that the Final, Recommended, or Proposed Determinations contain a proposed or final water quality standard.

With respect to conductivity, EPA's Final Determination does evaluate the effects of elevated conductivity from the Spruce No. 1 Mine on wildlife. EPA uses a dose-response threshold of 500 µS/cm within the analysis that corresponds to adverse effects on the integrity of the benthic macroinvertebrate community and has been observed in numerous studies, including those conducted by researchers in other states. See Responses #34 and 78 and Appendices 1 and 2. See also Response #170 and 2B.

Comment #10B – WVDEP believes that the relationship between conductivity and aquatic life is too variable.

Response #10B – EPA disagrees. In the Final Determination, EPA uses 500 µS/cm as a dose-response threshold that corresponds to adverse effects on the integrity of the benthic macroinvertebrate community and has been observed in numerous studies, including those conducted by researchers in other states. See Responses #34, 78, 81, and 119A, and Appendices 1 and 2. In addition, EPA notes that draft comments from EPA's Science Advisory Board review panel (SAB 2010) have supported EPA's use of conductivity as a metric for protecting aquatic communities and have reiterated the strong relationship between elevated conductivity and extirpation of aquatic wildlife.

Comment #11B – WVDEP believes that impacts to aquatic life when conductivity is between 300 µS/cm and 500 µS/cm are "so small as to be basically no impact at all."

Response #11B – EPA disagrees. Studies demonstrate that, when instream conductivity levels reach 500 µS/cm at a particular site, we would expect approximately 22 native genera of macroinvertebrates (or 15% of total native genera in the aquatic macroinvertebrate community) to be extirpated from that site. EPA notes that the loss is not of individual organisms, but of every individual belonging to each genus that is extirpated. EPA does not agree that this amounts to a loss "so small as to be basically no impact at all." Pond et al. (2008) found that 17 out of 20 (85%) of WVSCI scores (WVDEP's current listing method) scored less than or equal to 68 on the WVSCI when conductivity was greater than 500 µS/cm. Furthermore, EPA also found a high rate of degradation (62%) using the WVSCI at 417 sites with reference-quality habitat sampled by WVDEP in ecoregion 69d. See Responses #33, 35, 78, 81, 118A, 119A, 165A, 180A, and 181A).

Comment #12B – "Although the relationship between a West Virginia Stream Index (WVSCI) score and conductivity levels is loose enough to make conductivity level a much less reliable predictor of WVSCI score or ecosystem health, relatively insignificant levels of ecosystem impacts occur at significantly higher levels of specific conductance."

Response #12B – EPA does not agree that the relationship between WVSCI and conductivity levels is "loose." For example, Pond et al. (2008) found that 17 out of 20 (85%) of WVSCI scores (WVDEP's current listing method) were less than or equal to 68 when conductivity was greater than 500 µS/cm. See Responses #33, 35, 78, 81, 118A, 119A, 165A, 180A, and 181A.

Comment #13B – WVDEP believes science alone cannot establish policy, and that "EPA should engage the State in a debate about the level of impacts that are acceptable to society and that balance the interest of environmental protection with the reality of a complex modern society."

Response #13B – EPA agrees that policy considerations can involve assessment of a number of relevant scientific, legal, economic, social, and other issues. We feel strongly, however, that the more the policy question deals with a technical issue such as protection of water quality, public health, and the environment, the greater the reliance on sound science is necessary and appropriate. EPA is eager to work with West Virginia, the public, stakeholders, and our federal partners as we make key policy choices regarding review of surface coal mining projects and assuring effective protection under the law for coalfield communities who rely on clean water and a healthy environment.

Comment #14B – WVDEP notes an exhibit in the Recommended Determination overlaying the Spruce No. 1 Mine over downtown Pittsburgh. WVDEP notes that urban areas are a significant source of stream destruction and degradation. WVDEP notes that urban streams and landscape are destroyed, whereas mined areas will be reclaimed.

Response #14B – The exhibit to which WVDEP refers was intended solely to demonstrate scale. EPA agrees that urbanization is a source of stream destruction and degradation and, in fact, EPA in the past has exercised its § 404(c) authorities in connection with construction of urban development projects in waters of the U.S. where such actions were found to cause unacceptable adverse effects. See, e.g., Final Determination of the U.S. Environmental Protection Agency's Assistant Administrator for Water, Concerning Wetlands Owned by the Russo Development Corporation in Carlstadt, New Jersey, Pursuant to § 404(c) of the Clean Water Act, available at http://water.epa.gov/lawsregs/guidance/wetlands/upload/RussoFD.pdf; Final Determination of the U.S. Environmental Protection Agency's Assistant Administrator for External Affairs Concerning the Swedens Swamp Site in Attelboro, Massachusetts Pursuant to § 404(c) of the Water Act, available at: http://water.epa.gov/lawsregs/guidance/wetlands/upload/AttleboroFD.pdf.

Also see Response #32A.

Comment #15B – WVDEP asserts that impact to the macroinvertebrate community from the Dal-Tex operation is not significant. The primary sampling point for those impacts is the mouth of Beech Creek, which had a WVSCI score of 63.5 in 2002. WVDEP characterizes this WVSCI score as "not considered to be impaired." WVDEP also states that "the genus-based GLIMPSS score at this point was only ranked as mildly impaired." WVDEP also notes that EPA recognizes the presence of a "high quality fishery" at this location.

Response #15B – EPA notes that the commenter has described only the higher of two samples taken on the same date at the mouth of Beech Creek and omitted mention of the lower score. The two samples had WVSCI scores of 63.5 and 54, for an average score of 58.8, which is characterized by WVSCI as impaired. Moreover, while WVDEP does not consider a WVSCI score of 63.5 as impaired, WVDEP stated in its response to comments on its 2010 Section 303(d) list that "A WVSCI score that falls within the gray zone (60.6-68.0) does not indicate an unimpaired condition." The version of the Genus Level Index of Most Probable Stream Status (GLIMPSS) used by WVDEP for this sample has a "slightly impaired" category that ranges from a score of 39 to a score of 62. Beech Creek at this sample location scored 39.3, which is only marginally above the category of "moderately impaired." Finally, EPA referred to a "locally important" rock bass and smallmouth bass fishery in Spruce Fork that EPA concluded was neither impaired nor in reference condition. See Response #204A.

Comment #16B – WVDEP states that the Dal-Tex operation was constructed prior to State-imposed requirements of materials handling plans for selenium-bearing materials and other materials likely to introduce pollutants of concern. WVDEP further states that the Spruce No. 1 Mine is required to implement materials handling plans where new mining activities have occurred, that where those plans are being implemented levels in selenium in the discharges have remained below 5 ug/ml, and that the only discharges with elevated levels of selenium occur from areas within the Spruce No. 1 site that were mined previously.

Response #16B – See Responses #14A, 44A, 47A, 49A, 74A, 79A, and 188A.

Comment #17B – With respect to EPA's determination that construction of the Spruce No. 1 Mine as currently authorized could result in the spread of golden algae, WVDEP states that it "there is no logical reason to believe such an outbreak could occur in Logan County." WVDEP states that Spruce Fork was sampled for *P. parvum* in October 2009 and the algae were not detected in Spruce Fork. WVDEP agrees that *P. parvum* was detected in Cabin Creek at the same time and at a level that was cause for concern. WVDEP now states that it has reason to believe that the detection in Cabin Creek may have been in error. WVDEP bases this on the fact that an outbreak of *P.parvum* did not occur in the fall of 2009, subsequent sampling in Cabin Creek did not detect *P. parvum* in 2010, and the testing laboratory apparently detected *P. parvum* in blind "clean" samples indicating the potential for laboratory error.

Response #17B – The invasion of golden algae into this region should be viewed in the larger context of its invasion into North America. Since its discovery in the Pecos River of Texas in 1985 (its first documented occurrence in North America), it has spread to 14 additional states. Pennsylvania and West Virginia are the most recent additions to the spread of this invasive species. Given the ease with which golden algae may be transported by waterfowl, EPA believes that potential sources of golden algae remain.

From October 8 to October 29, 2009, WVDEP sampled 32 streams outside of the Dunkard Creek watershed. These are streams that WVDEP considered being at risk for golden algae invasion based on elevated conductivity. Spruce Fork and West Fork of Pond Fork were among these sites, indicating that WVDEP considers them at risk enough to monitor for golden algae.

During this round of sampling, five streams outside of the Dunkard watershed were positive for *P. parvum*. The laboratory runs duplicate samples on this *P. parvum* analysis. Three of the five samples had duplicates that did not score similarly (the analysis is a genetic screen for *P. parvum*) and had estimated counts of < 300 cells. The other two samples – Tenmile Creek of West Fork and Cabin Creek of the Upper Kanawha – had higher counts (440 and 137,306) with both replicates scoring similarly. While EPA notes that WVDEP has disavowed the Cabin Creek sample based on best professional judgment, EPA notes that it is difficult to reconcile the very high count in Cabin Creek with laboratory error, and that WVDEP has not provided for comparison the results of the blank samples discussed in its comments.

*P. parvum* was also discovered in Whitely Creek during sampling on September 29 and October 28, 2009. *P. parvum* was detected in Whitely during a round of sampling on November 9, 2009. At the same time, *P. parvum* was detected in an unnamed tributary to Enlow Fork.

Sampling on September 17, 2010, by another mining company in the Bailey mine detected golden algae. Subsequently, sampling conducted on September 29, 2010, detected golden algae in three additional ponds and a pond slurry area. Sampling in Enlow Fork found golden algae in Enlow Fork and Talley Run, a tributary to Enlow Fork. All of these results further demonstrate the reasonableness of EPA's conclusion that the Spruce No. 1 Mine as authorized could result in conditions that could facilitate a golden algae bloom.

Comment #18B – WVDEP further states that the streams within the Spruce No. 1 Mine area are higher gradient than Dunkard Creek and accordingly less conducive to *P.parvum*.

Response #18B – EPA disagrees. Because Pigeonroost Branch and Oldhouse Branch will be buried by valley fills, the most relevant point of comparison is Spruce Fork downstream of the project. Both Spruce Fork (approx. 0.2%) and Dunkard Creek (approx. 0.1%) have gradient less than 1% and areas of slow-moving water. Pooled habitats with little to no flow are common in streams like Spruce Fork in low-flow conditions of September and October, when TDS is highest. In addition, DA Permit No. 199800436-3 (Section 10: Coal River) authorizes construction of numerous sedimentation ponds in Pigeonroost Branch and Oldhouse Branch, which will create areas of pooled habitat more favorable to *P. parvum.* During low flows, conductivity is typically highest, increasing the possibility that blooms could occur in very slow-moving residual pools within the channel.

Comment #19B – WVDEP further states that it now believes that the events of Dunkard Creek in September 2009 represent an isolated incident and that *P. parvum* is unlikely to occur in waters below what WVDEP characterizes as an "extreme" level of conductivity (2000 µS/cm or greater).

Response #19B – EPA hopes that WVDEP is correct and that the type of aquatic life kill associated with blooms of golden algae in Dunkard Creek in September 2009 is not repeated. Nevertheless, while our understanding of golden algae is still developing, EPA cannot ignore the science that does exist. The commenter is correct that conductivity values at Dunkard Creek were extremely elevated. However, to the extent that the commenter asserts that golden algae can bloom only at the extremely elevated levels found in Dunkard Creek, the commenter is incorrect. Growth studies by Hambright (2010) demonstrate that the lower limit for growth is estimated to be between 500 and 1000 mg/L TDS (conductivity 714-1428 µS/cm). Limits for growth in Lake Granbury and Lake Whitney, Texas were estimated to be approximately 0.5psu (~1000 µS/cm) (Roelke 2010). Predicted conductivity levels for Pigeonroost Branch, Oldhouse Branch, and Spruce Fork following construction of the Spruce No. 1 Mine fall within this range.

Comment #20B – West Virginia is the third most forested state in the U.S., at 78% cover. WVDEP considers this statistic "amazing" in light of its assertion that nearly the entire State has been clear-cut more than once. The state-wide forest acreage increased from 1949 to 1989 and thereafter has stabilized. Logan, Boone, Lincoln, Mingo and Wyoming counties have individual county-based forest acreage in excess of 86%.

Response #20B – The comment is noted. EPA notes that the bases for the Final Determination are limited to impacts to wildlife that depend upon the impacted aquatic resources for all or part of their lifecycles. While EPA considers the impacts from forest fragmentation, including impacts to upland species, to be of concern and, therefore, has described them, these do not form a basis for the Final Determination**.** EPA further notes that its cumulative impacts analysis is based on percent watershed area that consists of mining land use, not percent forest cover.

Comment #21B – The Statewide Forest Resource Assessment indicates that the area for the Spruce No. 1 Mine has over 85% riparian forest cover using a HUC-8 boundary.

Response #21B – See Response #20B.

Comment #22B – EPA misunderstands the ability to reclaim forest areas. EPA's misperception apparently is based upon the fact that many reclaimed areas were not intended for forested post-mining land use, but were reclaimed as Fish and Wildlife Habitat for the habitat diversification advantages associated with early successional habitat. Prior to 2005, less than 50% of permitted mining acreage featured forestland or a forestry-based post-mining land use. Since 2005, more than 85% of permitted mining area has a forestry-based post-mining land use. In addition, the West Virginia Surface Mine Rule has incorporated best available reforestation science concepts from OSM's Appalachian Regional Reforestation Initiative and its Forestry Reclamation Approach. The goal of both OSM programs is to re-establish valuable native hardwood forests on mined lands in Appalachia. WVDEP is considered a leader in this application. While full restoration of mature forest takes time, other species will benefit from intervening successional habitats.

Response #22B – EPA notes that the bases for the Final Determination is limited to impacts to wildlife that depend upon the impacted aquatic resources for all or part of their lifecycles. While EPA considers the impacts from forest fragmentation, including impacts to upland species, to be of concern and, therefore, has described them, these do not form a basis for the Final Determination**.** EPA commends the stated goal of re-establishing valuable native hardwood forests on mined lands in Appalachia and efforts to achieve that goal. See Responses #17 and 18.

Comment #23B – With respect to upland forests, WVDEP comments that the Recommended Determination implies that any project that alters existing habitat and diminishes it for current or potential species is significant degradation. The Recommended Determination fails to account for the importance of habitat that will be created for other species.

Response #23B – See Responses #17 and 18.

Comment #24B – The Recommended Determination creates a standard of protection that is greater than that required by the Endangered Species Act.

Response #24B – EPA disagrees. To the extent the comment asserts that EPA's action is unauthorized because EPA has not found adverse effects to species identified as threatened or endangered under the Endangered Species Act, § 404(c) does not require the presence of a threatened or endangered species. Indeed, § 404(c)'s unqualified reference to "wildlife" demonstrates that Congress did not intend to limit § 404(c) to impacts to threatened or endangered species. EPA further disagrees that the Recommended or Final Determination creates any "standard" of general application. Instead, EPA's action implements the language of § 404(c) and 40 CFR § 231.3(e) to specific discharges based upon detailed and site-specific information.

Comment #25B – The U.S. Congress has not granted a wilderness designation to the Pigeonroost Branch and Oldhouse Branch drainages.

Response #25B – EPA assumes the commenter is referring to the Wilderness Act and the National Wilderness Preservation System (16 U.S.C. §§ 1131-1136). The commenter is correct that the Pigeonroost Branch and Oldhouse Branch drainages have not been designated by Congress under the Wilderness Act. EPA notes that such designations are limited by the Wilderness Act to federally owned land. Moreover, EPA's Final Determination does not depend upon a Congressional designation under the Wilderness Act.

Comment #26B – The Recommended Determination reflects an inappropriate value judgment favoring mature forest over early successional plant communities. Early successional plant communities would benefit a number of important declining species including Bobwhite quail, American woodcock, horned larks, eastern meadowlarks, golden winged warblers, bobolinks, grasshopper, vesper and Henslow's sparrows, Northern harriers, and short-eared owls. As a group, eastern grassland bird species are more imperiled than the birds of the interior forest.

Response #26B – EPA notes that the basis for the Final Determination is limited to impacts to wildlife that depend upon the impacted aquatic resources for all or part of their lifecycles. While EPA considers the impacts from forest fragmentation, including impacts to upland species, to be of concern and, therefore, has described them, these do not form a basis for the Final Determination.

As a factual matter, EPA does not agree with the comment. The discussion of forest impacts does not represent a value judgment favoring mature forest species over other species, and this action should not be viewed as expressing a preference for one type of ecosystem over another. Rather, it is an expression of EPA's concern regarding the impacts from alteration of the naturally occurring balance between mature forest and successional forest habitats. (See Response #18.)

In its natural condition, the Appalachian landscape is dominated by interior forest. A decrease in forest cover followed by conversion to grasslands or other land cover has the potential to shift the fauna of the region from that found in intact, high-elevation forest to one dominated by grassland and edge-dwelling species. Wickham et al. (2007) found that the pattern of deforestation from mountaintop mining-valley fills (MTM-VF) is destroying interior forest at a greater rate than would be expected from the overall rate of deforestation. Because of fragmentation, the area of interior forest lost was 1.75–5.0 times greater than the direct forest lost between 1992 and 2001. An increase in habitat fragmentation has the potential to isolate natural populations, reduce population sizes, reduce gene flow, increase the risk of extirpation or extinction of rare species, and increase the rate of invasion by exotic species, especially plants (Harper et al., 2005; Ewers and Didham, 2006). Fragmentation of the terrestrial environment due to mining, projected from land cover data in the West Virginia Gap Analysis Program and the permit rates observed during the 10 years preceding the publication of the Programmatic Environmental Impact Statement (PEIS), indicates a:

- 40% increase in the number of isolated forest habitat fragments,
- 41% decrease in the average size of habitat fragments from 24.64 to 14.3 acres and,
- 2.7% increase in the amount of edge habitat, caused by fragmentation of interior forests USEPA 2003).

Comment #27B – The Recommended Determination discounts economically important game species such as cottontail rabbit, ruffed grouse, wild turkey, and white-tailed deer, for which the edge of forest effect and early successional habitats are highly sought, especially when limited in nature or when in juxtaposition (checkerboard-like) with nearby forested tracts.

Response #27B – See Response #26B.

Comment #28B – The discussion of invertebrates is generic in nature and seems to imply the negative cumulative effects of historical no-law and pre-law mining as confounded by logging, oil and gas drilling, off-road vehicles, improper sanitary sewer, and littering will be sustained by the proposed operation. In the face of such cumulative past impacts, the tabulated presentation of such a diverse macroinvertebrate assemblage is a testament to the resilience of the ecosystem.

Response #28B – EPA disagrees that the discussion of invertebrates is generic. EPA's analysis relies upon site-specific data. Because the valley fills in Pigeonroost Branch and Oldhouse Branch have not yet been constructed, the associated effects have not occurred. Accordingly, it is necessary for EPA to look to similar operations to predict impacts. Consideration of data from similar and/or nearby operations to predict impacts is an accepted practice and is not "generic." Indeed, WVDEP's Selenium Implementation Guidance (available at http://www.dep.wv.gov/dmr/handbooks/Documents/ Permitting%20Handbook/sect32.pdf) recommends use of data from adjacent facilities to determine potential discharges of selenium. Also see Response #29A with respect to comparisons to existing mines.

Comment #29B – Though salamanders may be minimally affected on a percentage-of-landscape basis, reptiles on the other hand, may be enhanced as demonstrated by the PEIS. Again, reptile habitat may be limited within this zone of monoculture, but diversity and species richness applies to them nonetheless. This obvious omission further implies professional bias for mature growth forest wildlife over all other components of the ecosystem.

Response #29B – The comment appears to assert that improved diversity and species richness for reptiles should be considered as offsetting impacts to the amphibian community. EPA's determination of unacceptable adverse effects is not based upon a preference for amphibians over reptiles, but upon the degree of departure from the naturally occurring balance between the two, and the nutrient-cycling function that these salamanders play in the eocosystem. EPA's determination also considers how the discharges will affect the composition of the naturally occurring salamander population. Plethodontid salamanders, which are keystone species in forested ecosystems and headwater streams, do not occur on mine sites (several forest ravine and headwater stream species are essentially decimated). See Response #9.

Comment #30B – The Recommended Determination acknowledges the resilience of the fish community, noting that the fish community is neither reference condition nor impaired and that the observed fish community is difficult to analyze.

Response #30B – EPA agrees that the fish community in Pigeonroost Branch, Oldhouse Branch, and Spruce Fork is neither reference condition nor impaired and that it is difficult to analyze the fish community. To the extent the comment implies that the fish community will not suffer adverse effects, the Final Determination recognizes that fish can also be affected directly through direct toxicity or reproductive toxicity. EPA analysis regarding the harm to the fishery as a result of a golden algae bloom and/or selenium impacts are based on impacts to Spruce Fork, downstream of the valley fills at the project area. See also Responses #24A and 204A.

Comment #31B – In cooperation with WVDNR, WVDEP has conducted brown trout fingerling stockings in the Spruce drainage per the cooling influence of gravity-fed mine waters. The Recommended Determination does not even consider the survival of brown trout and the recreational opportunities provided. The proposed mitigation should support potential inclusion of Spruce Fork as a WVDNR spring season put-and-take stocked trout fishery, a major economic and recreational enhancement to the community.

Response #31B – According to the WVDNR's website, WVDNR stocks Spruce Laurel Fork and Pond Fork with fingerling brown trout. According to personal communication with WVDNR trout biologist Mike Shingleton, Spruce Fork has been stocked in the past. EPA participated in fish surveys in summer 2010 (July 7-8, 2010) that caught brown trout and one brook trout in Spruce Laurel Fork and one brown trout in Spruce Fork. EPA notes that the presence of stocked trout in streams is not remarkable and in terms of indicators such as the Mid-Atlantic Index of Biotic Integrity (IBI), stocked trout are not considered an indicator other than the location where the stocking has occurred. In terms of the Mid-Atlantic IBI, stocked trout are counted as introduced species and score negatively on the index. EPA's Final Determination on the Spruce No. 1 Mine is focused on unacceptable adverse effects to naturally occurring wildlife, and the presence of stocked trout does not inform that determination.

Comment #32B – The baseline information on bats in the Recommended Determination is generic, does not support a concern that rare or endangered species will be adversely affected, and fails to reflect WVDEP's expertise. WVDEP notes that it has received numerous federal agency awards for its bat discoveries and efforts to protect the Indiana bat.

Response #32B – EPA notes that the basis for the Final Determination is limited to impacts to wildlife that depend upon the impacted aquatic resources for all or part of their lifecycles. While EPA considers the impacts to the bat population to be of concern and, therefore, has described them, these do not form a basis for the Final Determination**.** EPA encourages efforts by WVDEP to protect the Indiana bat and other bat species.

Comment #33B – The Recommended Determination's characterization of the small-footed bat as rare is questionable based on coal applicant-related data showing it to be one of the more frequently captured bats in the West Virginia coalfields.

Response #33B – See Response #32B. EPA continues to express concern for this species based on current reports and largely due to the threat from white nose syndrome (WNS). The Center for Biological Diversity formally petitioned the Secretary of the Interior on January 21, 2010 to list the eastern small-footed bat *Myotis leibii* and northern long-eared bat *Myotis septentrionalis* as Threatened or Endangered species and to designate critical habitat concurrent with listing.

NatureServe (2010) lists *M. leibii* as critically imperiled (S1) in Alabama, Arkansas, Massachusetts, Maryland, Maine, New Hampshire, New Jersey, Oklahoma, Pennsylvania, West Virginia, Virginia, and Vermont and imperiled (S2) in Georgia, Kentucky, North Carolina, and New York. It is listed as a state species of special conservation concern in Connecticut, Massachusetts, Maryland, Missouri, North Carolina, New Jersey, New York, Ohio, Oklahoma, Tennessee, Virginia, West Virginia, and Georgia; state-listed as threatened in Pennsylvania and Vermont; and state-listed as endangered in New Hampshire. It is also a federally designated species of special concern, and a former Category 2 listing candidate. All of these designations were made prior to the advent of WNS.

*M. leibii* is relatively widespread in southeastern Canada and the eastern U.S., but its distribution within this range is uneven and populations are generally small ("few high quality occurrences exist" – NatureServe (2009). NatureServe (2009) ranks the eastern small-footed bat as critically imperiled in Alabama, Arkansas, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, Oklahoma, Pennsylvania, South Carolina, Vermont, Virginia, **West Virginia**, and Quebec, and imperiled in Kentucky, New York, North Carolina, Tennessee, and Ontario. *M. leibii* was historically found in Alabama, Arkansas, Connecticut, Delaware, Georgia, Kentucky, Massachusetts, Maryland, Maine, Missouri, North Carolina, New Hampshire, New Jersey, New York, Ohio, Oklahoma, Pennsylvania, **West Virginia**, Vermont, Virginia, Ontario, and Quebec.

The largest known populations of *M. leibii* occur in Pennsylvania, New York, **West Virginia**, and Virginia (NatureServe 2009). The total count for all identified hibernacula is roughly 3,000 individuals, 60 percent of which were found in two locations in New York State (Amelon and Burhans 2006a). This species is most often detected during hibernation; 125 hibernacula containing *M. leibii* have been identified across the species' geographic range, though most contain just a few individuals (Amelon and Burhans 2006a).

Comment #34B – It is inappropriate for EPA to conclude that the proposed mitigation is insufficient due to failure to replace lost functions. Functional assessment is a relatively new concept that was not discussed in connection with Section 404 permits until three to four years ago, and up until last year, the Corps did not have a functional assessment methodology.

Response #34B – See Responses #37, 39, 41, 43, and 44. Assessing ecosystem function is not in fact a new concept; the 404(b)(1) Guidelines at 230.11(e) include a longstanding requirement to assess "the nature and degree of effect that the proposed discharge will have…on the structure **and function** of the aquatic ecosystem and organisms" (emphasis added).

Based on this provision, both EPA and the USFWS have repeatedly identified problems with the mitigation techniques that are part of the Compensatory Mitigation Plan (CMP) for the Spruce No. 1 Mine. EPA Region III's comments on the 2006 draft and final EISs for the Spruce No. 1 Mine expressed concerns that the compensatory mitigation plan did not adequately mitigate all adverse impacts and was inadequate in terms of its lack of functional assessment, as well as whether proposed headwater stream creation would in fact replace the functions of impacted resources. EPA Region III emphasized the importance of headwater stream functions that would be lost and likely not replaced, particularly by the conversion of existing drainage channels to streams as described in the CMP. In its December 4, 2001 letter, the USFWS expressed similar concerns that the proposed mitigation was unlikely "to provide sufficient mitigation for permanent stream and riparian habitat loss and for the losses of the functions and values of the stream to aquatic species in the fill footprint and to the downstream ecosystem." These concerns were reiterated by the USFWS in its June 2, 2010, and December 16, 2010, letters commenting on the EPA Region III Proposed Determination and Recommended Determinations, respectively. While a specific functional assessment methodology for Appalachian headwater streams was proposed by the Corps this year, it has long been understood that headwater streams are more than mere conduits of flow, but serve as the primary locus of interaction between the river continuum and the surrounding environment and as such perform important chemical and biological functions.

Moreover, the Final Determination is not dependent upon the presence or absence of a headwater stream assessment protocol. The Final Determination is based upon a finding that Pigeonroost Branch and Oldhouse Branch support some of the few remaining "least disturbed" conditions in the Headwaters Spruce Fork sub-watershed and Coal River sub-basin. As such, they perform important functions to these larger watersheds, including but not limited to provision of clean, freshwater dilution. The Final Determination is based upon a finding that destruction of these resources through the construction of valley fills will not only remove the beneficial functions performed by Pigeonroost Branch and Oldhouse Branch but will also convert those waters into contributors of additional stressors to downstream waters. The Final Determination concludes, based upon the available studies and other information regarding stream creation science, that the project as authorized will result in unacceptable adverse effects.

Comment #35B – EPA's expectation as stated in the Recommended Determination that mitigation should create/restore streams that are capable of sustaining comparable biological communities and chemical and physical characteristics of the streams that have been eliminated is similar to comments that EPA has made regarding West Virginia's in-lieu fee program. These demands threaten both permittee-provided mitigation and the in-lieu fee program because it is rarely possible to replace lost flow regimes, structural habitat, water chemistry characteristics, and biological community with precisely the same regime, habitat, characteristics, and community as EPA demands. EPA's comments also are inconsistent with and are more stringent than the requirements of the 2008 Mitigation Rule.

Response #35B – A discussion of West Virginia's in-lieu fee program is beyond the scope of this action. EPA does note that, in connection with proposals to rely upon the in-lieu fee program as mitigation for proposed surface coal mining impacts, EPA has commented that it is unaware of any proposed in-lieu fee projects located in the same watershed as the proposed Spruce No. 1 Mine. EPA further notes, as stated in Response #36B, that EPA has not demanded precise replacement, but rather stated its longstanding expectation that stream creation or restoration must do more than supply linear feet of channel that conveys flowing water with degraded water quality, and must provide generally the suite of functions comparable to that which existed before.

As stated in the preamble to the 2008 Mitigation Rule, in-kind functional replacement of aquatic resources will help prevent degradation and may even improve the quality of aquatic resources in the United States (73 F.R. 19601):

> *The rule states that the compensatory mitigation should be of a similar type (e.g., Cowardin and/or hydrogeomorphic class) to the affected aquatic resource, unless the district engineer determines using the watershed approach described in the rule (see § 332.3(c) [§ 230.93(c)]) that out-of-kind compensatory mitigation will better serve the aquatic resource needs of the watershed. The term ''in-kind'' in § 332.2 [§ 230.92] is defined to include similarity in structural and functional type; therefore, the focus of the in-kind preference is on classes of aquatic resources (e.g., forested wetlands, perennial streams). However, all compensatory mitigation projects should provide a high level of functional capacity, even when compensating for degraded or low quality resources. Replacement ratios may be used to adjust for the relative quality of impact sites and mitigation projects, where appropriate. With this rule, we are moving towards greater reliance on functional and condition assessments to quantify credits and debits, instead of surrogates such as acres and linear feet. We believe that more frequent use of such assessment methods will help improve the quality of aquatic resources in the United States.*

Comment #36B – The Mitigation Rule regulations focus in part on the practicability of mitigation. Under the watershed approach taken by the Mitigation Rule, consideration of mitigation "should not focus exclusively on specific functions (e.g. water quality or habitat for certain species), but should provide, where practicable, the suite of functions typically provided by the affected resource." 40 CFR § 230.93(c)(2)(i). WVDEP further states that the approach to mitigation should be flexible to address the needs of the watershed while remaining practicable for the permittee, and out-of-kind mitigation may be authorized where more appropriate for offsetting losses to aquatic resources from the permitted impacts. (citing 73 Fed. Reg. at 19598, 19632). All of this is inconsistent with what WVDEP characterizes as EPA's "demand" for replacement of lost functions with precisely the same functions.

Response #36B – While the Mitigation Rule is not directly applicable to this permit, EPA believes that the Final Determination is consistent with EPA's longstanding positions regarding mitigation. Neither the Recommended Determination nor the Final Determination "demands" that mitigation exactly replace lost flow regime, structural habitat, characteristics, and community with precisely the same functions. Both the Recommended Determination and the Final Determination conclude that the Compensatory Mitigation Plan will not offset the impacts to aquatic resources and the aquatic ecosystem to acceptable levels. While EPA does not "demand" precise replacement of each and every function, a mitigation plan that would offset to acceptable levels the impacts that will occur from construction of the Spruce No.1 Mine must provide "the suite of functions typically provided by the affected resource."

The CMP includes stream creation and/or restoration based largely on linear foot replacement of flowing channel. The headwater streams being destroyed, however, are more than channels conveying flow. Those streams interact with the surrounding environment to provide important chemical and biological processes. Particularly in light of the profound change in the surrounding landscape and in the relationship between the stream and the surrounding landscape that will be caused by the project, there is no evidence that created flowing channels will support the chemical and biological functions performed by the destroyed streams. Indeed, WVDEP's comments acknowledge the difficulty of replacing stream function. Moreover, there is evidence that on-bench channels will contain and export water that has elevated levels of conductivity or other polluting parameters. See Responses #37, 39, 41, and 43, and Appendix 3.

Comment #37B – WVDEP questions EPA's concern that the local community lacked necessary information and opportunity to participate. WVDEP points to the number of public meetings held (at least six) and the number of attendees (including approximately 2000 at one hearing) contrasted with a community located in a census block group which contains 335 people.

Response #37B – Region III appreciates that the Corps conducted public meetings to give the local community an opportunity to participate in the EIS process. Region III remains concerned, however, that the Corps did not fully consider and address the potential for disproportionately high and adverse effects on the local community and that the community did not have the necessary information, or the opportunity, to meaningfully participate in the EIS process. Specifically, EPA is concerned the community was not informed when changes were made to different aspects of the mine during the permitting and EIS process. The Spruce No. 1 permit application changed significantly from its initial proposal in 1997 to the final permit issued ten years later. These significant changes prevented the local community from meaningfully commenting on the final aspects of the mine.

Comment #38B – WVDEP cites a critique of the Hendryx studies relied upon by EPA in discussing potential human health considerations in the Recommended Determination. WVDEP notes that Zaidel and Borak (2010) expressed a "number of methodological concerns in the Hendryx research," including that most of the referenced health data was not based on ATDSR-recognized health figures and that data was gathered from telephone interviews.

Response #38B – EPA notes that the basis for the Final Determination is limited to impacts to wildlife that depend upon the impacted aquatic resources for all or part of their lifecycles. While EPA acknowledges that the study of human health impacts associated with the type of mining activity planned for the Spruce No. 1 Mine, the studies referenced in the Recommended and Final Determinations raise concerns that should be further explored. While the effects on human health do not form a basis for the Final Determination, EPA considered the concerns raised by these studies sufficient to warrant description.

Both the Recommended and Final Determinations explicitly state that the studies reviewed by EPA by their nature could not and do not establish any causal linkage between surface coal mining and these elevated rates of adverse health effects, but because they point to significant associations between surface coal mining and elevated rates of adverse health impacts, the results warrant more research using rigorous epidemiological methods.

Comment #39B – WVDEP points out that co-association of trends does not equal causation and that co-association of health issues and impaired waters in the same area does not equate to causation.

Response #39B – See Response #38B.

**Comments Submitted by District Engineer Robert D. Peterson on September 29, 2010, Regarding EPA's Recommended Determination**

Comment #1C – Col. Peterson's November 29, 2010 letter to EPA concludes that "[I]t remains my opinion that the Huntington District has no basis to take any corrective action regarding the 404 permit we issued on January 22, 2007 for discharges associated with the Spruce No.1 Surface Mine."

Response #1C – While EPA respects the position of Col. Peterson, EPA disagrees with his conclusion. EPA acknowledges that EPA's assessment of, and conclusions regarding, the Spruce No. 1 Mine's unacceptable adverse effects on wildlife represent EPA's independent judgment and authority under § 404(c). As outlined in the Recommended Determination and reiterated in the Final Determination, EPA has concluded that the Spruce No. 1 Mine as currently authorized is inconsistent with the Section 404(b)(1) Guidelines (40 C.F.R 230), including failure to minimize (230.10(a)), significant degradation of waters of the United States (230.10(c)), and minimization of adverse impacts to aquatic ecosystems (230.10(d)). As outlined in the Final Determination and in Response #152, significant new scientific information exists to confirm and strengthen EPA's concerns regarding the Spruce No. 1 Mine. This information has informed EPA's § 404(c) review and supports EPA's Final Determination.

## II. Response to Comments Received on the Spruce No. 1 Mine 404(c) Proposed Determination

Comment #1 – Shellfish Beds and Fishery Areas: "EPA has failed to identify any adverse impacts to "fish," let alone shellfish beds or fishery areas, and therefore impacts to these resources cannot form the basis for the exercise of EPA's authority under Section 404(c)."

> "There Are Few If any "Fish" In The Streams At Issue."
>
> "EPA's Proposed Determination contains no claim that the discharges authorized in the Section 404 permit will cause impacts to shellfish beds."
>
> "EPA's Proposed Determination does not allege that the areas to be impacted from the discharges authorized by the 404 permit are fishery areas. EPA has not identified any fisheries in the impacted areas because there are no fisheries in Seng Camp Creek, Pigeonroost Branch, or Oldhouse Branch. CH2M HILL's review confirms this point by explaining that these intermittent and ephemeral streams are low in stream order, have few if any fish, and are far from the type of water body able to support a "stock of fish," or that might constitute a "fishery area."
>
> "Because no available information - in the DEIS or even alleged in the Proposed Determination - suggests that there are fishery areas in the project area, EPA cannot use impacts to fishery areas as a basis for its 404(c) determination."
>
> "With respect to fish, there are few if any fish in the streams to be impacted. Any fish that have been identified are downstream of the fill location and would not be impacted by the loss in benthics that would occur as a result of the loss of portions of these headwater streams."

Response #1 – EPA disagrees. EPA does not assert there will be unacceptable adverse impacts on shellfish beds. However, EPA disagrees that there are no impacts to fish and disagrees that the impacts to fish are irrelevant to EPA's conclusion that the Spruce No. 1 mine, as authorized, will cause unacceptable adverse effects on wildlife. The Final Determination states that the fish assemblages in Pigeonroost Branch and Oldhouse Branch are typical of headwater streams and reflect good quality. Based upon several sampling efforts, it has been found that Pigeonroost Branch supports a fish assemblage that includes blacknose dace, creek chub, mottled sculpin, stonerollers, and smallmouth bass; and Oldhouse Branch supports a fish assemblage of blacknose dace and creek chub. Filling Oldhouse Branch and Pigeonroost Branch will result in the loss of fish directly from the fills. The fish found in surveys of Oldhouse Branch and Pigeonroost Branch are typical of assemblages found in streams of that size and typical of streams that were sampled by Fulk et al (2003).

The statement by the commenter that Pigeonroost Branch and Oldhouse Branch are ephemeral or intermittent and therefore do not support a fishery is not on point for multiple reasons. First, perennial sections of both streams will be filled. Second, smallmouth bass were present in

Pigeonroost Branch during May 2008 sampling by Decota consulting (WVDNR Fish Database 2009), indicating at least seasonal use of this stream by smallmouth bass and possible spawning use of this stream by smallmouth bass. Third, filling of the intermittent and ephemeral portions of the streams will have adverse effects on the downstream perennial waters.

The Final Determination considers the impact on Spruce Fork from discharges of fill material to Pigeonroost Branch and Oldhouse Branch. The commenter does not appear to contest that Spruce Fork supports a locally important rock bass and smallmouth bass fish assemblage. The commenter's statement that "smallmouth bass and rock bass would not be impacted by the loss of sensitive invertebrate species such as mayflies as a result of the discharge of valley fill material because they feed on a wide variety of aquatic and terrestrial invertebrates and feed more heavily on fish as they grow" incorrectly implies that EPA is of the opinion that impact to these fishes will be entirely dietary. Rather, the Final Determination recognizes that fish can also be affected through reproductive toxicity.

Finally, EPA's analysis regarding the harm to fish populations as a result of a golden algae bloom and/or selenium impacts are based on impacts to Spruce Fork, which is downstream of the valley fills as permitted at the Spruce No. 1 Mine. See Response #36.

Comment #2 - Also, Hunton and Williams (HW) suggest that the fish found in Pigeonroost or Oldhouse Branches and the Spruce Fork watershed do not constitute a "fishery" as defined under federal law and therefore are not subject to the CWA 404(c).

> "There Are No "Fishery Areas" In The Streams At Issue"
>
> Section 404(c) does not authorize EPA to exercise its 404(c) authority on the basis of impacts to fish writ large. Section 404 instead refers specifically to "fishery areas." Fishery areas are different from simply the existence of some fish in a specific location. The Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. $5 1801-1884), the comprehensive federal statute enacted to provide for the conservation and management of the fisheries, defines "fishery" as
>
>> (a) one or more stocks of fish which can be treated as a unit for purposes of conservation and management and which are identified on the basis of geographical, scientific, technical, recreational, and economic characteristics; and
>>
>> (b) any fishing for such stocks.
>
> "This definition of "fishery areas," is narrower than simply "fish in a specific location," and is consistent with the scope of the other resources listed in Section 404(c) and EPA's regulatory definition of "unacceptable adverse effect," which focus on public and resource areas rather than specific species. See 33 U.S.C. 5 1344(c); 40 C.F.R. 5 231.2(e). EPA must therefore base its 404(c) determination on impacts to a "stock[] of fish which can be treated as a unit for purposes of conservation and management and

> which are identified on the basis of geographical, scientific, technical, recreational, and economic characteristics." See 16 U.S.C. 5 1802(13).”

Response #2 – EPA disagrees with the assertion that impacts on the fish community present here cannot form a basis for action under Section 404(c). Section 404(c) provides no definition of “fisheries.” The Magnuson-Stevens Fisheries Conservation and Management Act was first enacted in 1976 (see 90 Stat. 331) – four years after Section 404(c) (see 86 Stat. 816). Accordingly, the reference to “fisheries” in Section 404(c) should not be construed as a reference to a statutory definition that did not yet exist. EPA’s implementing regulations at 40 CFR Part 231 do not provide a definition of fisheries, but do state that the applicable portions of the Section 404(b)(1) Guidelines should be considered. Section 230.51(a) of the Section 404(b)(1) Guidelines defines “recreational and commercial fisheries” as “consist[ing] of harvestable fish, crustaceans, shellfish and other aquatic organisms used by man.” The fish assemblages in Spruce Fork and at least Pigeonroost Branch qualify as fisheries under that definition.

Moreover, and with respect to EPA’s § 404(c) determination for the Spruce No. 1, Mine, fish are also “wildlife” within the meaning of § 404(c). Accordingly, it is appropriate to consider the adverse impacts on fish as wildlife. See Response #12.

Comment #3 – HW also suggest that even if there are fish in Pigeonroost, Oldhouse Branches and Spruce Fork, these fish are in downstream portions of these streams and the impacts of valley fills will not be significant on these fishery resources. The following comments were submitted to support these claims:

> “In 2002, Stauffer and Fenari located two habitat-generalist minnow species in Pigeonroost Branch - blacknose dace and creek chub (Semotilus atromaculatus). No fish were located in Oldhouse Branch, and Seng Camp was not surveyed. Significantly, both of the survey stations where fish were found were located downstream of the proposed Spruce Mine valley fills. As the CH2M HILL Technical Evaluation Document concluded, the further upstream one goes (and therefore closer to the valley fill location), the potential for the occurrence of fish becomes even more unlikely.”
>
> “…..because the survey stations were downstream of the proposed valley fills, they represent areas impacted by the 402 discharges rather than by the 404 discharges, and the potential for the occurrence of fish would be even lower in the upstream areas that would be impacted by the valley fills.”
>
> The CH2M HILL Technical Evaluation Document also determined that if any fish were impacted by the 404 permit, the loss of those few species would have minimal impacts on the downstream population.
>
> “Accordingly, the likelihood that the valley fill will impact fish is low and the likelihood that any impact would be significant (unacceptably adverse) is simply unsupportable by the science."

Response #3 – EPA disagrees. The Stauffer and Ferrari surveys were conducted in 1999 (Pigeonroost Branch) and 2000 (Oldhouse Branch). These surveys were conducted during a severe drought in Southern West Virginia. Despite the drought, Stauffer and Ferrari found fish typical of streams of this size. More recent data from Pigeonroost Branch, generated by Decota Consulting in 2008 and 2009, indicates that smallmouth bass and mottled sculpin, in addition to the creek chub and blacknose dace collected in 1999, are present within the permit area of the fill.

EPA's findings in the Final Determination state that direct impacts to fish from the Spruce No. 1 Mine will be the total loss of five naturally occurring fish populations within the project area. The Final Determination also states that the project will create conditions considered favorable to the growth of golden algae (*Prymnesium parvum),* which has caused large aquatic life kills. Fish also would be likely to be exposed to increases in selenium concentrations, which would lead to bioaccumulation in fish tissues and to reproductive effects. Additionally, increases in conductivity and total dissolved solids will have a significant adverse effect on aquatic macroinvertebrates, some of which are preferential prey items for the fish species present in these streams, and, as a result, these fish will likely be similarly adversely affected.

Comment #4 – HW also comments that studies relied upon in the Proposed Determination do not support EPA's § 404(c) action and that because EPA did not raise these issues in the Draft EIS they cannot raise these fishery issues now:

> "The only study EPA specifically cites to support its contention that Mingo Logan's Section 404 regulated "valley fills" will have unacceptable adverse effects on downstream fish populations in the main stem of Spruce Fork is Fulk et al. (2003)."
>
> "This study was available to EPA during the permitting process, but EPA failed to raise any concerns on this basis in the DEIS. These potential impacts therefore fall within the areas that EPA has said it would not revisit."
>
> "The CH2M HILL Technical Evaluation Document similarly concluded that EPA had overstated the findings of Fulk, which found downstream effects to be limited to streams smaller than Spruce Fork."
>
> "As stated, downstream effects were limited to streams with drainages less than 10 $km^2$ and these effects were observed in filled and mined sites, indicating that the impacts were not unique to valley fills. Ultimately, Fulk concluded that higher order streams like Spruce Fork were not adversely affected by valley fills."
>
> "Even if EPA can justify the exercise of its 404(c) authority on impacts resultant from discharges authorized under the State's 402 authority, and can justify contravening its own policy not to revisit issues that were raised in the permitting process, the Fulk study does not provide a sufficient basis for the 404(c) determination."

Response #4 – EPA disagrees. EPA's conclusions based upon impacts to fish are not based solely upon Fulk (2003). The Fulk study showed that assessment scores from the sites downstream of valley fills were significantly lower than scores from sites without mining in the watershed, indicating that fish communities were degraded in sites downstream of valley fills. In addition to the Fulk study, EPA's conclusions that there will be impacts to fish also are based upon the potential for the project if constructed as currently authorized to create conditions that will promote the growth of golden algae. EPA's conclusions also are based upon evidence from the constructed portion of the project that the materials handling plan as implemented by Mingo Logan is not preventing discharges of elevated levels of selenium, and from the unlikelihood that the materials handling plan will prevent the project from causing increased loadings of selenium to downstream waters. Therefore, EPA's analysis concludes that the project as currently authorized will discharge elevated levels of selenium. The discussion of Fulk (2003) is additive to this discussion. Furthermore, the Final Determination is not limited to consideration of downstream impacts but, rather, includes EPA's findings on the direct impacts to the waters that would be filled.

Comment #5 – HW comments suggest that "downstream fishery areas and fish will not be adversely affected" and cites Fulk and other studies to support these comments:

> "Although they are not entirely clear, EPA's comments as to Spruce Fork appear to relate to the potential impacts from the discharge of pollutants and changes in conductivity. Because Spruce Fork is downstream of the filled areas, these impacts will result, if at all, from discharges from the sediment ponds, which are regulated by Mingo Logan's Section 402 NPDES permit."
>
> "Of the four Spruce Fork sites sampled by Stauffer, the most downstream site was MT-48lPSU-45. It is located downstream of both the Spruce operation and the Dal-Tex mine. The Dal-Tex operation mined over 6,600 acres from 1984 to 1999 and contributes much of its drainage to Spruce Fork above sample location MT-48lPSU-45. The species richness in Spruce Fork actually increased as it passed Dal-Tex (from 14 upstream to 20 downstream), and exhibited a species richness as high as any of the 73 sites that Stauffer examined in two States. It also exhibited a total number of individuals among the highest examined."
>
> "Accordingly, notwithstanding two decades of mining by Dal-Tex, EPA's studies demonstrate that the areas downstream still support a healthy and important bass fishery."
>
> "That Spruce Fork will continue to support a healthy bass population is also supported by EPA's own work in Twentymile Creek of the Gauley River. Although the sampled waters had higher conductivity in 2007, the study found the fish community of the mainstem of Twentymile Creek to be in "good condition." See Borsuk, F. et al., EPA Region 111, Biological Assessment of the Effects of MTWVF Mining on Twentymile Creek Watershed 2000 versus 2007."
>
> "Thus, EPA's speculation that the discharges from the sediment ponds might impact any downstream fishery area in Spruce Fork is undermined by the very studies EPA cites. EPA has not alleged that there are fish in the impacted streams, must less a fishery, and can only point to hypothetical impacts to downstream areas from discharges authorized

> under a different permit - a conclusion for which EPA does not even marshal any support. As a result, EPA cannot rely on impacts to fisheries as a basis for its Proposed Determination."

Response #5 – EPA does not assert there will be unacceptable adverse impacts on fisheries. However, EPA disagrees that there are no impacts to fish and disagrees that the impacts to fish are irrelevant to EPA's conclusion that the Spruce No. 1 mine, as authorized, will cause unacceptable adverse effects on wildlife. EPA believes the fish community faces increased risk. The fish community in Spruce Fork is in relatively good condition. Also, Spruce Fork is a locally important rock bass and smallmouth bass fishery.

Species richness is not a good measure of impact unless watershed area is accounted for, as species richness increases with watershed area. (Even then species richness per se may not be a good environmental indicator). The IBI of McCormick et al. (2001) does adjust for watershed area. PSU 45 is the largest site sampled by Stauffer and Ferreri (2002). When compared to streams of a similar size (e.g., Twelvepole Creek) sampled for the PEIS, Spruce Fork actually has 3 to 4 fewer species.

The Twentymile Creek analysis indicates a fish assemblage was not impaired. . One of the metrics of the fish IBI that did decrease over time was the percentage of invertivores and piscivores (primarily rock bass and smallmouth bass).

Comment #6 – HW comments that the loss of invertebrate species found in Pigeonroost and Oldhouse Branches and subsequent losses and impacts downstream in Spruce Fork will not result in adverse impacts to fisheries or fish:

> "Loss Of Sensitive Invertebrate Species Will Not Result In Adverse Impacts To Fishery Areas Or Fish."
>
> "Although not directly stated, EPA also appears to argue that filling the portions of the headwater streams may result in the loss of some sensitive species of aquatic benthic macroinvertebrates, which in turn may impact food supplies for fish downstream. Yet, according to the CH2M HILL Technical Evaluation Document, which is based on available studies, these sensitive aquatic insect species (Ephemeroptera, Plecoptera, and Trichoptera, "EPT") were less diverse and less abundant in the streams to be impacted by the valley fills. In turn, the EPT species were more plentiful and diverse downstream. CH2M HILL concluded that any loss of EPT species as a result of the valley fills will have a negligible impact, if any, on downstream fish resources."
>
> "Similarly, EPA may be trying to argue that higher conductivity levels in downstream sections may result in impacts to EPT species or wildlife, which in turn may impact downstream fish resources."
>
> "In any event, CH2M HILL concluded that the fishery survey and impact evaluations indicate that the invertivore fish species and wildlife that rely substantially on immature aquatic insects as a food source, including EPT taxa, are widely distributed and abundant

in the main stem of Spruce Fork in spite of valley fill activities occurring upstream in the watershed."

Response #6 – EPA disagrees. Food web effects from the loss of invertebrate species will likely affect animals dependent on insect larvae and emergent adults as prey, including fish, amphibians, bats, birds, reptiles and small mammals (Baxter et al. 2005). In particular, mayflies (Ephemeroptera) tend to be a preferred prey item for juvenile Smallmouth Bass (Easton et al. 1996), an important sport fish in Spruce Fork, and anticipated declines in mayfly immediately downstream of valley fills will likely have adverse effects on this sport fishery, as reduced mayfly populations will be present and there will be a reduced pool of colonizers to repopulate areas where populations were impacted. Moreover, the permitted fill will eliminate populations of invertebrates in upstream reaches, reducing the number of invertebrates in the drift and the transport of organic matter into these downstream reaches.

See also Response #1 and #3.

Comment #7 –**Wildlife –** HW comments suggest any impacts to wildlife are overstated by EPA and therefore EPA cannot establish that the discharges associated with the 404 permit will result in any unacceptable adverse effect on wildlife. They state:

> "In any event, EPA cannot establish that the discharges associated with the 404 permit will result in any unacceptable adverse effect on "wildlife," even broadly interpreted to include insects";
>
> "Filling Of Portions Of These Streams Will Not Cause Significant Impacts To Macroinvertebrates, Fish, Or Wildlife."
>
> "With respect to wildlife, EPA has provided no evidence of any wildlife species that would be adversely effected by the loss of benthics that come from the filling of the headwater streams."
>
> "Contrary to EPA's statements in the Proposed Determination, according to several fish and benthic surveys, sensitive macroinvertebrates are less diverse and less abundant in smaller headwater streams. Instead, the further downstream and the larger the watershed, the more abundant and diverse the macroinvertebrate community becomes. As CH2M HILL has concluded, the loss of any benthic macroinvertebrates from the fill permit will have only a minimal impact, if any, on the larger benthic community, much less on fish or wildlife resources."

Response #7 – EPA disagrees. As detailed in the Final Determination, Pigeonroost Branch and Oldhouse Branch and their tributaries are some of the last remaining streams within the Headwaters Spruce Fork sub-watershed and the larger Coal River sub-basin that represent "least-disturbed" conditions and habitat that is essential for many species in the watershed. As such, they perform critical hydrologic and biological functions, support diverse and productive biological communities, contribute to prevention of further degradation of downstream waters, and play an important role within the context of the overall Headwaters Spruce Fork sub-watershed and Coal River sub-basin. Within the streams and riparian areas of the project area, over 84 taxa of macroinvertebrates are documented to exist, as well as between 13 to 46 species of reptiles and amphibians, 4 species of crayfish, 5 species of fish, and at least one water-dependent bird species.

The direct impacts to these headwater stream systems, through burial of these diverse and healthy wildlife communities and their habitat, will result in unacceptable adverse effects on wildlife, particularly to macroinvertebrate, salamander, fish, and water-dependent bird populations. Through the loss of stream macroinvertebrate and salamander communities, there will be, in turn, substantial effects on both aquatic and terrestrial vertebrate populations that rely on these communities as a food source.

The burial of these streams will lead to discharges of TDS and selenium, which will result in unacceptable adverse effects on wildlife in downstream waters. Increased salinity levels will lead to loss of macroinvertebrate communities and population shifts to more pollution-tolerant taxa, specifically the extirpation of ecologically important macroinvertebrates. In addition to these unacceptable adverse impacts, loss of macroinvertebrate prey populations, increased risk of harmful golden algal blooms, and additional exposure to selenium will have an unacceptable adverse effect on the 26 fish species found in Spruce Fork as well as amphibians, reptiles, crayfish, and bird species that depend on downstream waters for food or habitat.

Based on this information, and in addition to the unacceptable direct wildlife effects of authorized fills, EPA has concluded that the discharges of dredged or fill material to Pigeonroost Branch and Oldhouse Branch as currently authorized by DA Permit No. 199800436-3 (Section 10: Coal River) will have unacceptable adverse effects on wildlife downstream of the Spruce No. 1 Mine.

Comment #8 – HW further specifies that impacts to salamanders are exaggerated and that the types of salamanders impacted are common “garden variety” species not worthy of a 404(c) action.

> “EPA Exaggerates And Misstates The Potential Impacts To Salamanders.”
>
> “EPA points to garden-variety "fill" impacts to common salamanders as a reason to exercise its 404(c) authority.”
>
> “To the extent valley fill impacts to salamanders now qualify as unacceptable adverse effects to critical resources or wildlife under 404(c), then almost all development projects that involve filling aquatic resources will be subject to unilateral reversal by EPA under 404(c).”
>
> “In any event, EPA grossly exaggerates and over-estimates any potential impacts. The impacts to salamanders that may result from the discharges authorized under the Section 404 permit will be localized to the area to be filled. The salamander population as a whole will remain vibrant.”

> "Moreover, while salamanders may be displaced by the authorized discharges, there will be no appreciable loss of the salamander population as a whole, let alone a "significant loss." Those species that will relocate from the filled areas will return, and any impacted populations will regenerate, bolstered by the abundant surrounding populations."
>
> "A careful analysis of EPA's calculation makes clear that EPA's proposed estimate of 20 million impacted salamanders is misplaced and grossly exaggerated. To generate this inflated number, EPA has multiplied the acreage of the total project (2,278 acres) by a number that EPA derived from an unrelated study (8,000-12,000 salamanders and larva/acre). Under 404(c), however, EPA can only consider impacts from the discharges into waters of the United States authorized under the Section 404 permit, which represent only 8.11 acres, or approximately 0.35 percent of the total project area. This means that even if EPA's estimate of the number of salamanders per acre is otherwise accurate, the real number of salamanders that could potentially be impacted from the authorized fills constitutes less than half of 1 percent of the figure offered in the Proposed Determination. EPA's estimate, however, is not otherwise accurate."

Response #8 - EPA does not agree that "the salamander population as a whole will remain vibrant." HW provides no scientific basis for this assumption. In fact, the PEIS on MTM/VF showed that headwater and forest plethodontid salamanders were largely absent from the Dal-Tex mine. A study by Gingerich (2009) found no headwater-type salamanders utilizing sediment control ditches. EPA acknowledges that some stream-dwelling salamanders will survive in off-site or downstream reaches, but the footprints of the mine-through and fill areas will decimate the salamander populations.

Petranka et al. (1993) presented a conservative estimate that there are about 4,050 salamanders per acre of mature forest floor in Eastern forests (10,000/ha). Twice as many larval salamanders would occur. The forests within the Spruce No. 1 project area were selectively logged (only commercially valuable species such as oak) roughly 30 years ago (USACE 2006b). Other species of trees (e.g., Beech, Maples, Hemlock, Sycamores, Buckeye) were left, and may represent large parcels of forest >50-75 yrs old, likely representing "mature" forest (sensu Petranka et al. 1993) with intact forest floors and downed rotting wood. Other studies have indeed quantified lower salamander density in response to "clear-cutting", a technique not used in Spruce area in recent times. One study (Harper and Guynn 1999) found no difference in salamander abundance between forests 13-39 yrs vs. >40 yrs old. They estimated 0.9 salamanders/$m^2$ in their Appalachian study sites in North Carolina. This figure corresponds strongly to Petranka et al. (1993) "mature" estimates. Furthermore, density estimates from Southwestern Virginia (same ecoregion as Spruce) by Harpole and Haas (1999) indicated nearly 2,000 terrestrial salamanders per acre in areas recently logged for group tree species (such as oaks).

Based on Mingo Logan's estimate of ~8 acres of filled stream channel, approximately a quarter of a million stream-dwelling salamanders are present in the project area and will be killed directly, and their habitat will be lost forever. Stream-dwelling salamanders have been surveyed in White Oak Branch (Appendix B, Patnode et al 2005). White Oak Branch had good numbers of Northern Dusky (9 adult, 7 larvae), Appalachian Seal (15 adult, 12 larvae), and Two Lined salamanders (1 adult and 15 larvae). These numbers represent densities in a 12 square meter plot that includes dry and wetted portions of the stream channel. Salamander populations in Pigeonroost and Oldhouse Branch are likely very similar to those in White Oak Branch. Williams (2003) found mean densities within reference reaches of Pigeonroost, Bend Branch (another tributary of Spruce Fork), and Ash Fork (a tributary of Gauley River) at more than 6 salamanders per $m^2$. In the Williams' study, the majority of the total catch of salamanders was found in Pigeonroost. Using these numbers from White Oak Branch and Pigeonroost, EPA estimates aquatic salamanders are indeed abundant (~5-6 per square meter) along stream channels in the project area.

USFWS scientists also provide support to the views discussed above. During preparation for the Recommended Determination, EPA Region III coordinated fish and wildlife issues with the West Virginia Field Office of the USFWS. USFWS states that "[w]hile range-wide populations of common species may not be significantly impacted, the salamander communities in individual headwater systems behave essentially as isolated populations because there is limited interaction (immigration and emigration) with communities in adjacent watersheds (Dr. Thomas Pauley, Marshall University, personal communication). Therefore, the "populations" within the watersheds that will be impacted by fill (the footprints of the valley fills and the downstream toxicity in the form of elevated conductivity, selenium, and potentially other contaminants), are very unlikely to "remain vibrant" and very likely to be significantly impacted."

Additionally, the USFWS states that they are "unaware of any peer-reviewed literature that supports the contention that salamanders are capable of "relocating" from or returning to filled areas. They are small animals with very small home ranges and are of limited mobility. Those that exist in the areas to be filled are much more likely to be killed in situ by the fill and associated earth-disturbing construction activities than they are to relocate and return once the fill has been placed. Even if a small segment of those populations could do so, the possibility is remote that there will be, in the reasonably foreseeable future, any habitat at the fill sites resembling that which they formerly occupied. To our knowledge, it has not been demonstrated that salamanders return to surface-mined areas and achieve densities similar to those that occurred prior to mining."

Finally, USFWS states that "Because the valley fills are very likely to increase conductivity and selenium levels in the receiving waters below them, salamanders that are not directly buried and killed beneath the fills are also likely to be impacted – directly via exposure to these contaminants and perhaps indirectly via impacts of contaminants on food sources. Such impacts are likely to occur as far downstream as elevated conductivity, selenium or other pollutants persist, and to affect any salamanders that spend some part of their life in the aquatic environment or in riparian terrestrial habitats immediately adjacent to these degraded streams." (J. Zelenak USFWS, personal communication 8/2010).

Comment #9 – HW comments on salamanders also suggests that the CWA 404(c) regulations never intended inclusion of common, abundant species such as the salamanders in Pigeonroost or Oldhouses Branches. They further suggest that inclusion of these types of wildlife would mean EPA would have to veto ever Corps permit due to the prevalence of this type of wildlife in every permitted fill.

"These species are not what Congress intended to protect in creating EPA's limited 404(c) veto authority, which the statutory text and legislative history make clear was intended to protect certain critical areas."

"EPA has said it can only exercise its 404(c) authority if it demonstrates that the authorized discharges will result in "significant loss of or damage to" wildlife. Far from "significant," impacts to non-threatened, widespread, and abundant species are precisely the sort of impacts one expects in any permit to discharge dredged or fill material."

"The Corps has issued, and continues to issue, such permits on a regular basis. EPA has reviewed all of those permits, and despite their garden-variety impacts to wildlife, EPA has not exercised its 404(c) authority."

Response #9 – EPA disagrees. Section 404(c) does not define "wildlife." EPA's implementing regulations at 40 CFR § 231.2(e) refers to appropriate portions of the Section 404(b)(1) Guidelines. The Section 404(b)(1) Guidelines do not limit consideration of wildlife in the way suggested by the commenter. See Response #12. The courts have upheld previous Section 404(c) actions based upon similar considerations. *See, e.g., James City County, Virginia v. EPA,* 12 F.3d 1330, 1336-38 ($4^{th}$ Cir. 1993) (EPA appropriately considered such things as impacts to small mammals and invertebrates who could not escape the fill, destruction of reptile and amphibian habitat, impacts to downstream waters, impacts to a heron rookery, and impacts to existing fish assemblages).

The Central Appalachian ecoregion has some of the greatest aquatic animal diversity of any area in North America, especially for species of amphibians, fishes, mollusks, aquatic insects, and crayfishes. Salamanders in particular reach some of the highest levels of North American diversity in the Central Appalachian ecoregion. The Nature Conservancy has identified this region as one of North America's prominent biodiversity hotspots of rarity and richness (Stein et al. 2000).

To the extent that the commenter believes that the salamanders documented in the project area are "non-threatened, widespread, and abundant species," the commenter dismisses the very significant role that common salamander species play in ecosystem functioning. Because forest and stream salamanders are "keystone" predators (i.e., have no redundant representation and "exert disproportionate biotic regulation within an ecosystem because elimination causes changes in community functions not performed by other species"; Davic and Welch, 2004), the most common and abundant species play a more significant role in nutrient cycling and moderating food web dynamics than do rare and uncommon salamanders, or ones occurring at low abundance. The disturbances associated with the Spruce No. 1 Mine will decimate these dominant top predators (directly under fill or through clearing, grubbing, burning, and excavation) thereby resulting in profound alteration of critical ecosystem functions (Davic and Welch 2004).

While the Corps is authorized to permit discharges of fill to waters of the U.S. subject to the considerations described in the Section 404(b)(1) Guidelines, and many discharges of fill material will result in some impact to wildlife, the Final Determination also takes into consideration the magnitude of the adverse effect and the context in which it would occur. As set forth in the Final Determination, the Headwaters Spruce Fork watershed and the Coal River Sub-basin are already heavily impacted, and Pigeonroost Branch and Oldhouse Branch represent some of the last remaining watersheds supporting conditions that are consistent with "least disturbed" conditions. As such, they are valuable in and of themselves, and they play an important part in maintaining the integrity of the overall watershed. The Final Determination is consistent with EPA's longstanding interpretation that the term "unacceptable" refers to the significance of the adverse effect, for example whether it is one that the aquatic ecosystem cannot afford. *See* 44 Fed. Reg. 58076, 58078 (Oct. 9, 1979).

See also Response #10.

Comment #10 – HW comments suggest that these types of impacts were considered in the CWA 404 and SMCRA permitting processes and raising these issues now would contradict the authority under SMRCA.

> "Moreover, these run-of-the-mill impacts were deemed acceptable when Congress enacted Section 404 and when Congress enacted SMCRA; the latter specifically authorizing valley fills."
>
> "EPA cannot now claim that these impacts are an "unacceptable adverse effect." Resting the exercise of its 404(c) authority on this basis would undermine the entire 404 permitting process and refute the grant of authority contained in SMCRA."

Response #10 – See Response #9. Congress did not limit EPA's Section 404(c) authority to particular types of projects, and nothing in SMCRA precludes EPA from exercising its authority under Section 404(c). To the contrary, Section 702(a) of SMCRA (30 U.S.C. § 1292(a)) specifically states that SMCRA does not supersede, amend, or modify any part of the Federal Water Pollution Control Act.

Comment #11 – HW comments suggest that because concerns regarding impacts to wildlife resources were not raised during the permitting process that EPA cannot raise these issues to support the 404(c).

> "Neither EPA nor the U.S. Fish & Wildlife Service ("USFWS") raised concerns with impacts to wildlife during the Corps's permitting review. Now, however, EPA identifies potential impacts to "wildlife" in the Proposed Determination including alleged impacts to birds, bats and salamanders."
>
> "Finally, while EPA has said that it would not use its 404(c) authority to revisit issues raised in the permitting process, see 44 Fed. Reg. 58,076, 58,077 (Oct. 9, 1979), that is precisely what EPA is doing. As with every other issue raised in the Proposed Determination, impacts to salamanders were considered in the permitting process."

> "For EPA to now use salamanders as a basis for the exercise of its 404(c) authority would contravene its own beliefs about its 404(c) authority."

Response #11 – EPA disagrees. The commenter states both that neither EPA nor USFWS raised impacts to wildlife as a basis for arguing that impacts to salamanders should not be considered as part of this action *and* that impacts to the salamander population were raised and considered and cannot be raised now. Neither interpretation is correct. The cited preamble refers to issues that were resolved during the permitting process, not merely raised. In connection with its review of the draft and final Environmental Impact Statements (EIS), EPA consistently raised concerns regarding the scale and severity of adverse effects of this project and whether those effects would be adequately mitigated. For example, EPA's June 6, 2006 technical comments on the draft EIS raised concerns regarding potential adverse impacts to water quality, uncertainties regarding the proposed mitigation, need for additional analysis of potential environmental justice issues, and lack of study related to the cumulative impact of multiple mining operations within the Little Coal River watershed. In a letter dated October 23, 2006, EPA noted that the Final EIS did not adequately address many of EPA's concerns. The same is true of concerns raised by FWS.

In review of the draft EIS, the FWS requested analyses of amphibian/reptile habitat effects in both their May 14, 2001 letter and December 4, 2001 letter to the Corps. In their December 4, 2001 letter, they specifically indicated that the project area contained fish and wildlife habitat of unusually high value, including amphibian and reptile habitat, which required more detailed evaluation. Similarly, EPA raised concerns regarding the characterization of habitat on site in its September 20, 2001 letter, stating that the small streams within the project area contain prime amphibian habitat, and these streams provide important aquatic habitat for amphibians that larger streams do not.

See Response #24.

Comment #12 - The comments further suggest that EPA has no authority to support its 404(c) with impacts to sensitive macroinvertebrates because they state that insects are not considered "wildlife" under EPA's own definition of wildlife.

> "EPA also identifies potential impacts to mayflies, stoneflies, caddisflies and other macroinvertebrates."
>
> "EPA's regulations define "wildlife" as "resident and transient mammals, birds, reptiles, and amphibians."
>
> "Insects are not "wildlife" under EPA's own definition of wildlife and therefore cannot form the basis for its Proposed Determination."
>
> "As discussed previously, macroinvertebrates do not qualify as either "fishery areas" or "wildlife" under established definitions of those terms. In addition, EPA has not shown that impacts to benthic macroinvertebrates will result in any adverse impacts to wildlife or fish."

Response #12 – EPA disagrees. Macroinvertebrates are generally recognized as wildlife, including by the US Fish and Wildlife Service (USFWS), USDA Forest Service, The Nature Conservancy, State Natural Heritage programs, and the West Virginia Division of Natural Resources (WVDNR).

The U.S. Fish and Wildlife Service (USFWS) considers insects to be wildlife. Currently, within the U.S., the USFWS lists 50 species of insects as endangered under the Endangered Species Act (ESA), and another 10 species as threatened under the ESA. Insects represent 10.4 % of all currently-listed animals in the U.S. and 4.4 % of all listed species, including plants (http://ecos.fws.gov/tess_public/pub/boxScore.jsp). Several dozen other insects are candidates for listing under the ESA, including the Sequatchie caddisfly (*Glyphopsyche sequatchie*), a trichopteran found in Tennessee.

The State of West Virginia also considers insects to be wildlife, and includes insects on its list of rare, threatened and endangered species. Many aquatic insects are listed, including: 12 species of stoneflies, two species of mayflies, and 73 species of dragonflies and damselflies (West Virginia Natural Heritage Program 2007). Scientists and environmental consultants who collect benthic macroinvertebrates in West Virginia must obtain a wildlife collection permit from WVDNR. Neighboring state wildlife agencies, including the Virginia Department of Game and Inland Fisheries, also treat insects as wildlife.

EPA is authorized to initiate an action under Section 404(c) whenever it finds "an unacceptable adverse effect on municipal water supplies, shellfish beds and fishery areas (including spawning and breeding areas), wildlife, or recreational areas" without putting any limitation on the term "wildlife." The regulations referenced by the commenter refer to a portion of the Section 404(b)(1) Guidelines, specifically 40 CFR 230.32. The commenter focuses on subsection 230.32(a), which states: "Wildlife associated with aquatic ecosystems are resident and transient mammals, birds, reptiles, and amphibians." The commenter, however, reads Section 230.32 out of context and in a manner that distorts its plain meaning. Subsection 230.32 is the third of three regulations within Subpart D, which must be read together. Subpart D is set forth below:

> **Subpart D—Potential Impacts on Biological Characteristics of the Aquatic Ecosystem**
>
> Note: The impacts described in this subpart should be considered in making the factual determinations and the findings of compliance or non-compliance in subpart B.
>
> **§ 230.30 Threatened and endangered species.**
>
> (a) An endangered species is a plant or animal in danger of extinction throughout all or a significant portion of its range. A threatened species is one in danger of becoming an endangered species in the foreseeable future throughout all or a significant portion of its range. Listings of threatened and endangered species as well as critical habitats are maintained by some individual States and by the U.S. Fish and Wildlife Service of the Department of the Interior (codified annually at 50 CFR 17.11). The Department of

Commerce has authority over some threatened and endangered marine mammals, fish and reptiles.

(b) Possible loss of values: The major potential impacts on threatened or endangered species from the discharge of dredged or fill material include:

(1) Covering or otherwise directly killing species;

(2) The impairment or destruction of habitat to which these species are limited. Elements of the aquatic habitat which are particularly crucial to the continued survival of some threatened or endangered species include adequate good quality water, spawning and maturation areas, nesting areas, protective cover, adequate and reliable food supply, and resting areas for migratory species. Each of these elements can be adversely affected by changes in either the normal water conditions for clarity, chemical content, nutrient balance, dissolved oxygen, pH, temperature, salinity, current patterns, circulation and fluctuation, or the physical removal of habitat; and

(3) Facilitating incompatible activities.

(c) Where consultation with the Secretary of the Interior occurs under section 7 of the Endangered Species Act, the conclusions of the Secretary concerning the impact(s) of the discharge on threatened and endangered species and their habitat shall be considered final.

**§ 230.31 Fish, crustaceans, mollusks, and other aquatic organisms in the food web.**

(a) Aquatic organisms in the food web include, but are not limited to, finfish, crustaceans, mollusks, insects, annelids, planktonic organisms, and the plants and animals on which they feed and depend upon for their needs. All forms and life stages of an organism, throughout its geographic range, are included in this category.

(b) Possible loss of values: The discharge of dredged or fill material can variously affect populations of fish, crustaceans, mollusks and other food web organisms through the release of contaminants which adversely affect adults, juveniles, larvae, or eggs, or result in the establishment or proliferation of an undesirable competitive species of plant or animal at the expense of the desired resident species. Suspended particulates settling on attached or buried eggs can smother the eggs by limiting or sealing off their exposure to oxygenated water. Discharge of dredged and fill material may result in the debilitation or death of sedentary organisms by smothering, exposure to chemical contaminants in dissolved or suspended form, exposure to high levels of suspended particulates, reduction in food supply, or alteration of the substrate upon which they are dependent. Mollusks are particularly sensitive to the discharge of material during periods of reproduction and growth and development due primarily to their limited mobility. They can be rendered unfit for human consumption by tainting, by production and accumulation of toxins, or by ingestion and retention of pathogenic organisms, viruses, heavy metals or persistent synthetic organic chemicals. The discharge of dredged or fill material can redirect, delay, or stop the reproductive and feeding movements of some species of fish and crustacea, thus preventing their aggregation in accustomed places such as spawning or nursery grounds and potentially leading to reduced populations. Reduction of detrital feeding species or other representatives of lower trophic levels can impair the flow of energy from primary consumers to higher trophic levels. The reduction or potential elimination of food chain organism populations decreases the overall productivity and nutrient export capability of the ecosystem.

**§ 230.32 Other wildlife.**

(a) Wildlife associated with aquatic ecosystems are resident and transient mammals, birds, reptiles, and amphibians.

(b) Possible loss of values: The discharge of dredged or fill material can result in the loss or change of breeding and nesting areas, escape cover, travel corridors, and preferred food sources for resident and transient wildlife species associated with the aquatic ecosystem. These adverse impacts upon wildlife habitat may result from changes in water levels, water flow and circulation, salinity, chemical content, and substrate characteristics and elevation. Increased water turbidity can adversely affect wildlife species which rely upon sight to feed, and disrupt the respiration and feeding of certain aquatic wildlife and food chain organisms. The availability of contaminants from the discharge of dredged or fill material may lead to the bioaccumulation of such contaminants in wildlife. Changes in such physical and chemical factors of the environment may favor the introduction of undesirable plant and animal species at the expense of resident species and communities. In some aquatic environments lowering plant and animal species diversity may disrupt the normal functions of the ecosystem and lead to reductions in overall biological productivity.

Note: Possible actions to minimize adverse impacts regarding characteristics of biological components of the aquatic ecosystem can be found in subpart H.

The fact that Section 230.32 is titled "*Other* Wildlife" (emphasis added) informs how Section 230.32 should be interpreted and confirms that Section 230.32 must be read together with Sections 230.30 and 230.31. The term "Other" modifies the description of the organisms in Section 230.32(a), and the term "Wildlife" refers back to the organisms described in the rest of Subpart D, i.e., Sections 230.30 and 230.31, including insects.

This is consistent with the definition of "unacceptable adverse effect" in 40 CFR 231.2(e): "impact on an aquatic or wetland ecosystem which is likely to result in significant degradation of municipal water supplies (including surface or ground water) or significant loss of or damage to fisheries, shellfishing, or wildlife habitat or recreation areas. In evaluating the unacceptability of such impacts, consideration should be given to the relevant portions of the section 404(b)(1) guidelines (40 CFR part 230)." Section 231.2(e) refers to impacts on an "aquatic ecosystem" which, as defined in Section 230.31 would include aquatic insects.

The commenter's interpretation excluding insects presents an overly strained interpretation and is inconsistent with Section 404(c), Section 231.1(e) and Section 230.32. Indeed, the reading proposed by the commenter limiting wildlife to those organisms described in Section 230.32 would exclude fish (as well as insects) from the term "wildlife" and would represent a significant restriction at odds with the broad language of the statute.

Comment #13 – HW suggests that EPA has not established unacceptable adverse impacts to bird species at the project site. "EPA Has Failed To Establish That The Birds Listed In The Proposed Determination Will Be Impacted At All By The Discharges Authorized In The 404 Permit." The commenter further states that the bird species mentioned in EPA's proposed determination are either not present in the project area or do not rely on Pigeonroost or Oldhouse Branches as foraging/feeding areas. The commenter provides life history requirements of bird species mentioned by EPA to support the comments.

> "With respect to each bird species mentioned in the Proposed Determination, the species either does not depend on the impacted waters for its diet, or does not reside in the project area."
>
> "Although streams and forests on the proposed mine site provide for some life history requirements, the neo-tropical bird species discussed in the Proposed Determination do not generally depend on either the ephemeral and intermittent streams or the mixed age forest in the project area to meet those requirements."
>
> "As the life history requirements make clear, all of the bird species referenced in the Proposed Determination, with the exception of the Kentucky Warbler, prefer dense, mature interior forests. The proposed area and surrounding forests, by contrast, are all young to middle-aged forests with relatively few mature trees. DEIS at 3-135. It is thus not clear that these species even inhabit the project area."
>
> "… the Louisiana Waterthrush prefers dense, mature forests, which are not found at the project site. Thus, the only species likely to be found at the project site (the Kentucky Warbler) is not likely to be impacted by the discharge of fill material, and the only species likely to be impacted by the discharge of fill material (the Louisiana Waterthrush) is not likely to be found at the project site. EPA has therefore failed to demonstrate how an unacceptable adverse effect could result to birds from the very outset."

Response #13 – The basis for the Final Determination is limited to impacts to wildlife (including bird species) that depend upon the impacted aquatic resources for all or part of their lifecycles. While EPA considers the impacts from forest fragmentation, including impacts to upland species, to be of concern and, therefore, has described them, these do not form a basis for the Final Determination**.**

EPA scientists continue to believe, as does the USFWS (August 2010), that past selective logging in some parts of the project area would not preclude use of the site by forest interior species of migratory birds or that birds currently using the project area during the breeding season will be unaffected by the mine and associated valley fills. The USFWS evaluated the terrestrial habitats of the project area and concluded that construction of the mine was likely to impact migratory birds via the loss and fragmentation of forest habitat, decreasing habitat heterogeneity, increasing isolation of populations, and increasing exposure to nest predators and parasites (U.S. FWS 1998b).

The USFWS also expressed concerns specific to bird populations within the Coal River Sub-basin related to adverse impacts of the Spruce No. 1 Mine. These concerns included "direct loss of habitat and direct and indirect loss of food resources, for forest interior and riparian-obligate species of migratory birds, including six species the Service considers Birds of Conservation Concern (i.e., Cerulean, Kentucky, Swainson's, and worm-eating warblers; Louisiana waterthrush; and wood thrush)" (USFWS 2008).

The USFWS also continues to believe that construction of the Spruce No. 1 Mine will adversely impact these and other forest-breeding migratory birds. The valley fills will result in the permanent loss of headwater streams that may be used by Louisiana waterthrushes. The USFWS indicates they are unaware of peer-reviewed research that suggests that these birds will simply relocate to an adjacent, unimpacted watershed and have comparable survival and reproductive success. The downstream increases in conductivity, selenium and perhaps other contaminants are also likely to adversely affect those waterthrushes not excluded by the direct impacts of the fill via impacts to their food base. In some freshwater food webs, selenium has bioaccumulated to four times the level considered toxic, which can expose birds to reproductive failure when they eat fish or insects with high selenium levels.

Selenium is being and will be discharged into the environment as a result of the proposed mining activity at the Spruce No. 1 Mine. According to a review by the USFWS (2005), the level of selenium loading in aquatic invertebrates (e.g., May et al. 2001; Swift 2002), which are important to the diets of aquatic-dependent wildlife such as breeding waterfowl, will provide a pathway for selenium bioaccumulation. As an example, the established dietary toxicity thresholds for mallard ducks (i.e. a ubiquitous species of water fowl) indicates that selenium in the aquatic food web would pose a severe toxic reproductive risk (Heinz et al. 1987; Heinz et al. 1989; Stanley et al. 1994; Stanley et al. 1996; Heinz and Hoffman 1996; Heinz and Hoffman 1998; Ohlendorf 2003) because the mallard duck dietary EC-10 for selenium is 4.87 ug/g with an upper 95% confidence limit of 5.74 ug/g (Ohlendorf 2003).

Comment #14 – HW comments state that any impacts from the project to upland forest and its subsequent adverse impacts on birds from forest fragmentation is not an activity covered under 404(c). The comments suggest that even if forest impacts do occur these impacts are not long term and therefore will not result adverse impacts to birds.

> "Further, any impacts on these birds results from forest fragmentation, rather than the permitted fill activity, and thus fall outside of Section 404(c)."

> "EPA alleges that reduction of forest patch size and fragmentation of habitats may greatly affect the distribution and abundance of the Cerulean Warbler. But, the scope of the

Corps's Section 404 authority and, therefore, EPA's Section 404(c) authority, does not extend outside the "waters of the United States." See OVEC, 556 F.3d at 195."

"Therefore, EPA cannot lawfully rely on the effects of reduced forest patch size and forest fragmentation on the Cerulean Warbler as support for its Proposed Determination."

"Finally, even EPA's assumption that long-term forest fragmentation will result from the Spruce No. 1 mining activity is outdated and not supported by recent studies."

Response #14 – The basis for the Final Determination is limited to impacts to wildlife that depend upon the impacted aquatic resources for all or part of their lifecycles. While EPA considers the impacts from forest fragmentation, including impacts to upland species, to be of concern and, therefore, has described them, these do not form a basis for the Final Determination**.**

Comment #15 – Comments suggest that EPA reliance on forest fragmentation studies is flawed and outdated. Furthermore, the comments state that recent studies show that post-mined areas, lacking forests, provide valuable habitat for wildlife.

"Even EPA's assumption of long-term forest fragmentation from the surface mining itself finds little basis in current research results."

"Moreover, while the forest recovers, the site will provide valuable habitat for grassland birds and other grassland species that the United States has noted are elsewhere in decline."

Response #15 – See Response #14. While the bases of the Final Determination are limited to impacts to wildlife that depend upon the impacted aquatic resources for all or part of their life cycles, EPA's description of its other concerns related to forest fragmentation and the effect on upland wildlife is well-founded. The USFWS evaluated the terrestrial habitats of the project area and concluded that construction of the Spruce No. 1 Mine was likely to impact migratory birds via the loss and fragmentation of forest habitat, decreasing habitat heterogeneity, increasing isolation of populations, and increasing exposure to nest predators and parasites (U.S. FWS 1998b).

Among the many migratory birds likely to breed in the project area, there are six species that the USFWS has designated as Birds of Conservation Concern (BCC) within the Appalachian Mountains Bird Conservation Region (AMBCR) that may be impacted by Mountaintop Mining-Valley Fills (MTM-VF). These include the Cerulean, Kentucky, Swainson's, and worm-eating warblers, the wood thrush, and the Louisiana waterthrush. The first five of these are also designated as BCC species within the USFWS's Northeast Region as a whole and nationally (USFWS 2008). The first four are also considered to be among the 100 most at-risk bird species in North America (Wells 2007). Among the BCC species in the AMBCR, the Louisiana waterthrush, Cerulean warbler, and worm-eating warbler are likely the most susceptible to the impacts of MTM-VF.

The Louisiana waterthrush is an area-sensitive riparian-obligate species that nests and forages along headwater streams of intact interior forests; it relies for breeding success on the diverse and productive assemblage of aquatic insects supported by healthy headwater systems (Mattson et al. 2009). Cerulean and worm-eating warblers are also both area-sensitive species that rely on large blocks of intact, mature, interior forest habitats to support productive breeding populations. The Cerulean warbler breeding population is thought to have declined by about 75% over the past 45 years – the most dramatic decline of any North American warbler monitored by the Breeding Bird Survey (Sauer et al. 2005). All three species are threatened by the loss and fragmentation of these habitats (USFWS 2007a, Wells 2007), and the waterthrush is particularly vulnerable to degradation of water quality and aquatic insect communities (Mattsson and Cooper 2006, Mulvihill et al. 2008). MTM-VF, which occurs in areas where these three species occur at their highest densities, may pose the greatest threat to their breeding populations (Weakland and Wood 2005, Wells 2007).

Comment #16 – HW comments state that "EPA's allegation regarding the extent of adverse affects to the Cerulean Warbler from forest fragmentation is disputable and likely exaggerated." And "As wildlife populations would be expected to recover during and following mine reclamation, deforestation and forest fragmentation will not have unacceptable adverse effects on the Cerulean Warbler."

Response #16 – See Response #14. While the bases of the Final Determination are limited to impacts to wildlife that depend upon the impacted aquatic resources for all or part of their life cycles, EPA's description of its other concerns related to forest fragmentation and the effect on upland wildlife is well-founded. EPA scientists have been supported in their view by the opinions provided by the U. S. Fish and Wildlife Service (USFWS) that Cerulean warblers are among the many migratory birds likely to breed in the project area and which will be negatively impacted by the project. Cerulean and worm-eating warblers are both area-sensitive species that rely on large blocks of intact, mature, interior forest habitats to support productive breeding populations. The Cerulean warbler breeding population is believed to have declined by about 75% over the past 45 years – the most dramatic decline of any North American warbler monitored by the Breeding Bird Survey (Sauer et al. 2005). Both species are threatened by the loss and fragmentation of these habitats (USFWS 2007, Wells 2007). Deforestation associated with the Spruce No. 1 Mine may adversely impact their breeding populations (Weakland and Wood 2005, Wells 2007).

The USFWS also specifically states in their December 4, 2001 letter on the Draft EIS for Spruce to Colonel John D. Rivenburgh, (Huntington District Engineer) that: "Logan County is a breeding area for Cerulean warblers (Buckelew and Hall, 1994) and even the brief CWWAP (Cerulean Warbler Atlas Project) surveys identified 200 Cerulean warblers in Logan County (Dr. Ronald A. Cantebury, personal communication)." Moreover, the letter indicated that large blocks of forest (i.e., equal to or greater than 1730 acres for the Middle Atlantic States; Robbins et al., 1989) located in Logan County and also likely contained within the proposed project area is Cerulean warbler habitat."

EPA also based its estimates on established scientific methods utilized by researchers in the preparation of the Mountaintop Mining / Valley Fills in Appalachia Programmatic

Environmental Impact Statement USEPA 2003, 2005a) and do not accept HW assertions regarding EPA not using current research results and that forest recovery will provide valuable habitat for grassland species. Creating grassland ecosystems cannot replace the functions of forest ecosystems.

Comment #17 – HW comments propose that the project's impact to 2,278 acres of forest habitat is inconsequential because "the limited amount of habitat affected, relative to that available in the surrounding area, should not be expected to result in substantive population reductions of any local wildlife species." The commenter further suggests that the area in question and the state of West Virginia have ample forest resources to provide habitat for these bird species and their recovery post-mining should not be considered an issue.

> "Approximately 82 percent of the State of West Virginia will remain forested during and after operation of the Spruce No. 1 Mine, and other foreseeable mining operations. DEIS at 3-185. Therefore, adequate habitat will be available to support the known populations of these species."
>
> "Regardless of the availability of adequate habitat to support the known populations of these species, these populations are expected to recover during and after mine reclamation."

Response #17 – While the bases of the Final Determination are limited to impacts to wildlife that depend upon the impacted aquatic resources for all or part of their life cycles, EPA's description of its other concerns related to forest fragmentation and the effect on upland wildlife is well-founded. In the Spruce Fork sub-watershed, more than 34 past and present surface mine permits have been issued, which collectively occupy more than 33% of the land area. Additionally, more than 257 past and present surface mining permits have been issued in the Coal River sub-basin, which collectively occupy more than 13% of the land area (based upon the National Land Cover Database (NLCD) change product for 1992-2001 and WVDEP's GIS mining files). As the percentage of land cover affected by surface mines continues to increase in the Coal River sub-basin, as additional projects are proposed and authorized, additional mature forests will be lost which will likely have an affect on wildlife species reliant on these large forest blocks.

The USFWS also remains concerned about potential impacts of the project on a number of fish and wildlife resources and agrees with the EPA analysis and conclusions that construction of this project, as authorized, will likely result in impacts similar to those documented at the nearby Dal-Tex site. Additionally, the USFWS agrees that the preponderance of available scientific information strongly suggests that construction of the project as currently authorized would cause or contribute to significant degradation of waters of the United States, both on-site and in receiving water downstream of the mine. Such water quality degradation, combined with the direct, indirect, and cumulative effects of the loss of 2,278 acres of mature forest habitat, would result in unacceptable adverse impacts to aquatic communities and other wildlife in the affected headwater system, as well as the Spruce Fork Sub-watershed, Little Coal River Watershed, and the Coal River Sub-basin, each of which is already degraded from past mining activities. (USFWS comment letter on the Spruce RD, June 2, 2010).

In its natural condition, the Appalachian landscape is dominated by interior forest. A decrease in forest cover followed by conversion to grasslands or other land cover has the potential to shift the fauna of the region from that found in intact, high elevation forest to one dominated by grassland and edge dwelling species. Wickham et al. (2007) found that the pattern of deforestation from MTM-VF is destroying interior forest at a greater rate than would be expected from the overall rate of deforestation. Because of fragmentation, the area of interior forest lost was 1.75–5.0 times greater than the direct forest lost between 1992 and 2001. An increase in habitat fragmentation has the potential to isolate natural populations, reduce population sizes, reduce gene flow, increase the risk of extirpation or extinction of rare species and increase the rate of invasion by exotic species, especially plants (Harper et al., 2005; Ewers and Didham, 2006). Fragmentation of the terrestrial environment due to mining, projected from land cover data in the West Virginia Gap Analysis Program and the permit rates observed during the 10 years preceding the publication of the PEIS, indicates a:

• 40% increase in the number of isolated forest habitat fragments,
• 41% decrease in the average size of habitat fragments from 24.64 to 14.3 acres and,
• 2.7% increase in the amount of edge habitat, caused by fragmentation of interior forests USEPA, 2003.

Comment #18 - HW comments suggest that project's improved reclamation practices will not only restore the forests destroyed by the mining operation but will create similar or better habitat than is currently at the site. "The Spruce No. 1 Mine reclamation plan will use the improved reforestation practices and procedures. As a result, the reforestation of the project area should occur faster than past experiences and thereby provide a habitat similar to, if not better than, than the original habitat."

Response #18 – Under Section 404(c), EPA has discretionary authority to prohibit or withdraw the specification of a defined are as a disposal site whenever it determines that the discharge will have an unacceptable adverse effect on a number of identified categories. Therefore, as a legal matter, EPA can make a determination that a discharge of dredged or fill material will cause unacceptable adverse effects without consideration of any possible mitigation. The statutory standard does not mention mitigation and authorizes EPA to determine what an unacceptable adverse effect is. In other words, EPA does not need to determine that proposed mitigation is somehow flawed or insufficient in order to conclude that a proposed or authorized discharge would have unacceptable adverse effects.

As a factual matter, however, EPA disagrees with the commenter as well. It is incorrect to suggest that completely clear-cutting a mid-successional forest and replacing it with saplings could be considered similar or better habitat than currently exists at the site. The forest at the site is most likely 25 years or older and any replacement of that system would take at least that length of time or longer to achieve similar habitat and function. Furthermore, from an ecosystem compensation standpoint, most of the proposed tree (and shrub) species are "non-native" to the ecoregion, and thus not representative of Appalachian headwater areas. Mountaintop mining and associated valley fills alter the ecosystem in such a profound way as to leave hardly any ecosystem remnants after the fact. Effectively, the new landscape widely departs from that within which the stream network has evolved. The subsequent ecosystem, such as it is, is an entirely new system. The commenter's assumptions as to the recapture of much of the structure and function of the pre-mined conditions are very optimistic and highly speculative.

Additionally, the ecological elements should not be considered separately, but as part of an interconnected system.

1. Revegetation of mined sites with trees: In an effort to move beyond compaction of the post-mined ground surface, current designs aim to minimize compaction to improve the growth prospects for trees. As this initiation point effectively begins a primary successional process (rather than a secondary, post timber succession), the time lag for effective forest reestablishment is considerably lengthened. In the 25 years since the most recent selective cutting of the forest, the current state is an early to mid-successional community with few mature trees (except in riparian areas). Nevertheless the post-logging surface and subsurface of the forest floor was relatively intact with a functioning forest soil community and concomitant range of associated biogeochemical processes (i.e., the "bank account" described by Bormann and Likens, 1979). Residual woody debris accumulation and natural detrital processing continues apace.

The new experimental post-mined reestablishment of tree species on residual mined material ("topsoil substitute") will require a lengthened time interval before the entire suite of forest processes are established (if at all). If decades are required for a post logging rebound, true forest reestablishment may take additional decades, (or a century or more) on post-mined land.

2. Soil Dynamics/Detrital Pathways: Although the relatively thin natural topsoil is discounted as an effective soil medium, the replacement by or addition with a "topsoil substitute" (effectively crushed substrata) may be problematic. The raw material is effectively sterile basement material lacking in the living and non-living (particularly organic) components of a typical forest soil. The rate and character of the reestablishment of a viable forest soil community has received minimal attention thus far. Rather, biogeochemical processes (e.g., water infiltration, nitrification/denitrification, and organic accumulation and processing) are assumed to coincidentally develop along with tree growth with no effective substantiation or proposals for monitoring.

3. Linkage between Receiving Waters and the Contributing Watershed: It is well established that stream systems are dependent on the contributing watershed for their sustenance. In a pre-mined condition receiving streams are recipients of allochthonous material and water inputs (surface, subsurface and groundwater) from the surrounding forested communities with relatively short-lived disruptions caused by episodic timbering activities and many ecosystem attributes remaining intact. The post-mined environment presents the remaining stream courses (i.e., those not under valley fill rubble) with the following conditions:

a. Elimination of water and processed organic material from former upstream tributaries under valley fills.

b. Altered contributions of water and allochthonous material from the surrounding upland watershed. This is due to the altered character of the soil and vegetation communities in a post-mine environment.

c. Altered hydrograph with new flow regimes that markedly depart from that under which the streams have evolved.

d. Altered timing, temperature and chemical composition of post-mine discharges of water to receiving streams.

Each aspect of the altered environment is linked to the others and synergistic relationships cannot effectively be separated one from the other. Unfortunately, each separate aspect of the post-mine mitigation and restoration proposals attempts to do just that. Rather than look at the ecosystem as a whole under the various land use scenarios (i.e., pre-timbered, post-timbered, pre-mined, post mined), each post-mine mitigation/restoration “feature” addresses one particular ecosystem element and is thereby limited in the extent to which one element can be related to all of the others. This is particularly problematic where enhancement/restoration of stream and riparian communities are proposed in locations physically removed from the areas of impacts, or on top of totally new and extremely altered valley fills.

Comment #19 - HW comments state that “Any Loss of Sensitive Invertebrate Species Will Not Result In Adverse Impacts To Birds” and support these claims with the following:

> “…implied in this concern is the potential that the loss of emergent adults of these sensitive invertebrates could affect the normal feeding and life cycle of some wildlife that depend on them for food. But no such effect will result from the permitted fill.”
>
> “The Louisiana Waterthrush is the only species of the five birds described above that depends on aquatic organisms for its diet. It is therefore the only species that relies on food sources that EPA contends may be disrupted by the discharge of fill material. The Louisiana Waterthrush's diet is varied, however, and is not composed solely of the more sensitive invertebrates more common to headwater streams. Further, aquatic communities downstream from mine sites (though composed of more tolerant species) have a higher abundance of macroinvertebrates than the headwater streams that will be filled. Thus, even if the authorized fills would impact food sources of the Louisiana Waterthrush - which do not prefer the types of forest found in the project area - downstream sites would continue to serve as a potential food supply.”
>
> “Neither the bird or bat species EPA identifies depend on benthics for their diet.”
>
> “Instead, the evidence establishes that these species, if dependent at all, could easily switch to other insects if necessary.”

Response #19 – As stated in the Recommended Determination, EPA scientists believe that the loss of sensitive invertebrate species will likely result in adverse impacts to birds. According to USFWS, the Louisiana waterthrush is an area-sensitive riparian-obligate species that nests and forages along headwater streams of intact interior forests; it relies for breeding success on the diverse and productive assemblage of aquatic insects supported by healthy headwater systems

(Mattson et al. 2009). Studies indicate that breeding territory density and occupancy are reduced along streams where benthic macroinvertebrate communities had been degraded due to anthropogenic land uses including mining (Mulvihill 1999, 2008; Mattsson and Cooper 2009; O'Connell et al. 2003). For example, lower breeding territory densities have occurred along streams impacted by acid mine drainage more so than along circumneutral streams (Mulvihill 1999, 2008). The driver behind these lower densities is decreased food availability, as acid mine drainage has a similar effect on macroinvertebrate populations as alkaline drainage and salinity (Mulvihill 2008). Similarly, some indices of benthic macroinvertebrate integrity are shown to be higher where breeding Louisiana Waterthrushes are present than areas from which they are absent (O'Connell et al. 2003). Stream reaches where breeding waterthrushes were present also had a greater proportion of pollution-sensitive benthic macroinvertebrates than reaches where waterthrushes were absent, supporting the concept that good water quality is a key component of the species breeding habitat (Mulvihill 2008).

In addition to stream pollution from anthropogenic land uses, elevated predator numbers from landscape-scale forest fragmentation and the loss of riparian forest canopy could also negatively impact future population levels of the Louisiana waterthrush. Ongoing impacts associated with landscape disturbances, including defoliation, increased stream temperatures, and compositional shifts in benthic macroinvertebrate communities, also could reduce populations in the AMBCR. Therefore, measures of Louisiana waterthrush distribution and reproduction may be useful indicators of both stream and forest ecosystem integrity.

Management for this species has focused on protecting core wooded riparian habitat, including establishment of undisturbed riparian forest cover, and preservation and improvement of water quality to ensure aquatic insect biomass and diversity. For water-dependent wildlife, like the Louisiana waterthrush, preservation of large tracts of forest containing headwater streams is needed for the conservation of this species in the central Appalachians. The waterthrush is particularly vulnerable to degradation of water quality and aquatic insect communities (Mattsson and Cooper 2006, Mulvihill et al. 2008).

Comment #20 - HW comments state "No unacceptable adverse effects to bat species will occur, and EPA has not presented any basis on which impacts to bats could be used to justify the exercise of its 404(c) authority": and that "EPA Has Not Even Demonstrated That The Potentially Impacted Bats Inhabit The Project Area."

Response #20 - The bases of the Final Determination are limited to impacts to wildlife that depend upon the impacted aquatic resources for all or part of their life cycles. EPA's description of its other concerns related to impacts to the bat population, however, is well founded. EPA scientists continue to believe that large-scale mountaintop removal/valley fill mining has been identified among the threats to bat species in the region according to information supplied to EPA by the USFWS. Loss of the bat's habitat, foraging areas, and food sources – in conjunction with recently identified concerns related to white-nose syndrome – may result in unacceptable adverse impacts to these wildlife resources.

It is possible that Indiana bats could occur in or near the project area. If so, they could be negatively impacted by the loss of forest habitat associated with the Spruce No. 1 Mine and by the loss of headwater streams, riparian areas, and associated aquatic and terrestrial insects, as well as by the downstream degradation of these resources likely to be caused by the project.

Despite the mist net surveys conducted in the project area in 2000 and 2004, in which no Federally listed bats were captured, EPA continues to express concern for the potential loss of suitable bat habit. Although the capture of bats confirms their presence, failure to catch bats does not absolutely confirm their absence (USFWS 2007b, pg. 252). The project area occurs roughly midway between known hibernacula in northeastern Kentucky and southeastern West Virginia. Since the most recent surveys at the Spruce No. 1 site, maternity roosts have been documented in central and north-central Boone County. Additionally, a juvenile Indiana bat was captured on August 9, 2010 in southwest Fayette County, indicating the presence of a maternity colony in that area.

In their letter to EPA on December 16, 2010, the USFWS, West Virginia Field Office, states

> The Spruce No. 1 Mine is within the range of the endangered Indiana bat *(Myotis sodalis),* and it contains potential Indiana bat summer foraging and/or roosting habitat. No Indiana bats were captured during mist net surveys conducted at the site in 2004; however, survey results are valid for only 5 years. Any new or additional clearing or filling of potential Indiana bat habitat would need to be preceded by new mist net surveys.

Additionally, the USFWS was also recently petitioned to list the eastern small-footed bats and the northern long-eared bats under the Endangered Species Act (ESA). Five eastern small-footed bats and 16 northern long-eared bats were captured during mist net surveys conducted at the Spruce No. 1 project site in 2004, representing 7.6 and 24.2 percent, respectively, of all bats captured (USACE 2006a, Appendix M).

Comment #21 - HW comments suggest that Pigeonroost and Oldhouse Branches are unexceptional streams, and the adverse impacts associated with permitted valley fills will be insignificant to the Coal River Watershed. The commenter provides the following comments to support this claim:

> “The Streams At Issue Are Not Unique But Rather Common.”
>
> “EPA overstates the importance of these streams and its assertions are demonstrably incorrect.”
>
> “As stated by CH2M HILL, they do not provide unique functional values or reflect uncommon regional resources.”
>
> “In this regard, none of these streams are currently classified as outstanding national resource waters by the WVDEP.”
>
> “Objections to filling headwater streams, absent any specific impacts to the 404(c) critical areas, would therefore effectively nullify Congress' intent to authorize valley fills under SMCRA.”

Response #21 – EPA disagrees. First, there is no requirement under 404(c) that the aquatic resources at issue somehow be labeled "unique." Rather, 404(c) focuses on the question of whether the impacts to the aquatic resources at issue are unacceptable. Second, loss of Pigeonroost Branch and Oldhouse Branch will cause an adverse impact in the immediate project area and farther downstream. EPA believes that the streams are uncommon resources in terms of their quality and their diversity of invertebrates. For example, the mayfly and stonefly community is rich, with single-season sample richness in Oldhouse Branch ranking at the 95$^{th}$ percentile for mayflies, and the 98$^{th}$ percentile for stoneflies (out of 937 samples from the Central Appalachian ecoregion). Pigeonroost Branch, while incurring some pre-law mining disturbance, ranks in the 90$^{th}$ percentile for mayflies, and the 82$^{nd}$ percentile for stoneflies in this ecoregion. Moreover, the WVDEP has found that only ~1% of streams sampled in the Coal River basin (3 out of 251 sites) qualified for WVDEP reference designation (White Oak Branch being one of them); Oldhouse Branch is of similar or better quality to White Oak Branch and thus represents an uncommon resource in the Coal River basin.

EPA scientists believe that the function of providing good quality water to downstream reaches will be significantly degraded by the project as authorized. The project as authorized will result in increased loadings of total dissolved solids and selenium to downstream waters. Using a simple carbon-flow model (e.g., as demonstrated in the DEIS) does not give EPA assurances that the "quality of the carbon energy and other nutrients" delivered to downstream reaches will sustain naturally occurring biota, and the natural functions of headwater streams. Any offsets provided by drainage ditches and temporary sediment ponds were not sufficiently demonstrated by Mingo Logan.

USFWS also supports EPA's assessment of the quality of Pigeonroost Branch and Oldhouse Branch. In their December 26, 2006, letter to the U.S. Army Corps of Engineers (USACE) Pittsburgh District (Thomas R. Chapman, USFWS, to Ginger Mullins, USACE), the USFWS West Virginia Field Office wrote, with regard to the mitigation proposed for the stream impacts of the Spruce No. 1 mine:

> "The resources that are being lost are healthy, biologically functional streams. Erosion control structures and drainage ways lack the groundwater-derived and nutrient-rich base flow; temperature regimes; habitat diversity; gradient; floodplains; connectivity to downstream ecosystems; and other features of natural streams. In addition, the Service is unaware of any research that has determined that creating streams from drainage control structures was successful at replacing the functional aspects of metabolism of biota, particularly the primary producers, within the running waters as well as the dynamics of biogeochemical cycling."

As set forth in Response #10, SMCRA does not supersede the Clean Water Act and there is nothing in SMCRA that would preclude EPA's exercise of its Section 404(c) authority.

Comment #22 – HW suggests that EPA is claiming that Seng Camp Creek is a pristine aquatic resource and they provide some discussion as to why it should not be considered as such.

> "Also, it is important to note that a valley fill (VFIA) has already been constructed in Seng Camp. The proposed VFl(B) would be constructed on Seng Camp as well, and therefore the stream on which this valley fill would be placed has already been impacted by mining. Accordingly, it is inaccurate to characterize Seng Camp as a pristine headwater stream, as EPA appears to do."

Response #22 – The Proposed Determination did not propose, and the Final Determination does not withdraw specification of Seng Camp Creek as a site for the disposal of fill material. The Final Determination does not characterize Seng Camp Creek as a pristine headwater stream. To the extent Seng Camp Creek is discussed, it is with the purpose of demonstrating impacts from the operations in that watershed.

Comment #23 – To support the comments by HW that suggest Pigeonroost and Oldhouse Branches have no unique functions, HW provide analyses from the DEIS concluding that the filled areas and sediment ponds will have similar functions as those lost at Pigeonroost and Oldhouse:

> "The carbon flow function of the aquatic system after implementation of the proposed mountaintop mining/valley fill (MTM/VF) was calculated. The analysis concluded that the carbon input from the ponds and other drainage control facilities created as part of the mining operation would offset approximately 90 percent of the lost carbon flow resulting from valley fill operations. Extension of this analysis to other critical ecological functions including energy flow and, to a lesser extent, nutrient cycling is also documented and indicates lack of significant adverse impacts in these areas. Accordingly, there is no demonstration that the primary functions would be impacted by the loss of these headwater streams."
>
> "The Spruce Mine DEIS and FEIS (USACE 2006a, 2006b, respectively) demonstrate that the functions of primary production and energy flow in downstream reaches are not significantly affected by the proposed stream Valleyfills resulting from mining operations."

Response #23 – EPA disagrees. It is the best professional judgment of EPA scientists that the function of providing good-quality water to downstream reaches will be significantly degraded by the project as authorized and that the loss of that function contributes to EPA's conclusion that the project as authorized will cause unacceptable adverse effects on wildlife. The project will result in increased loadings of total dissolved solids and selenium to downstream waters. Using a simple carbon-flow model (e.g., as demonstrated in the DEIS) does not give EPA assurances that the "quality of the carbon energy and other nutrients" delivered to downstream reaches will sustain naturally occurring biota, and the natural functions of headwater streams. Any offsets provided by drainage ditches and temporary sediment ponds were not sufficiently demonstrated by Mingo Logan.

Additionally, comments by the USFWS directly refute the claims that carbon input from the ponds and other drainage control facilities would offset lost carbon flow resulting from valley fill operations. They state in their December 4, 2001, letter to the Huntington District Corps of

Engineers; "The PDEIS stated that proposed ponds are estimated to replace 90% of the primary and secondary production lost as a result of the proposed project. This will not be the case. Ponds are autochthonous systems. Streams depend on allochthonous organic inputs. Because of differences in size of production areas in small ponds and the stream riparian vegetation zones, it is illogical to conclude that ponds could replace lost stream production."

See Response #63.

Comment #24 – HW also suggest that because these valley fills were known for ten years and objections regarding impacts to these streams were never raised in the permitting process that EPA cannot raise these issues now.

Response #24 - See Responses #11 and #163. In its review of the draft and final EIS, EPA consistently raised concerns regarding the scale and severity of adverse effects of this project and whether those effects would be adequately mitigated. For example, EPA's June 6, 2006 technical comments on the draft EIS raised concerns regarding potential adverse impacts to water quality, uncertainties regarding the proposed mitigation, need for additional analysis of potential environmental justice issues, and lack of study related to the cumulative impact of multiple mining operations within the Little Coal River watershed. In a letter dated October 23, 2006, EPA noted that the Final EIS did not adequately address many of EPA's concerns.

While EPA agrees that it is preferable to resolve all issues as part of the permit process, EPA is not precluded from taking action at this time. First, nothing in 404(c) or the Agency's regulations implementing 404(c) bar EPA from using its 404(c) authority in situations where the Agency could have raised an issue previously but did not. Second, the Final Determination is based, in part, on an emerging body of science. Although some of the adverse effects of the project were known ten years ago, the true scope of the adverse effects became better understood as the science developed. For example, since permit issuance in early 2007, EPA and the Corps have come to acknowledge that headwater streams are a difficult to replace resource and stream creation is among the more difficult and least successful forms of mitigation. Additional studies have increased EPA's understanding of the effects of elevated levels of TDS and selenium discharged by mining operations, and additional data from the Dal-Tex operation and the constructed portion of the Spruce No. 1 Mine in Seng Camp Creek have become available. EPA is not precluded from re-evaluating the project as additional information and science are developed and clarify the anticipated effects, and EPA's preamble to the 404(c) regulations notes that EPA may exercise its authority based upon new information.

Comment #25 – HW suggest that the Pigeonroost and Oldhouse Branches are not subject to federal jurisdiction under the CWA and as such, if the CWA 404(c) is successful they will "challenge federal jurisdiction at a later time."

> "there is a serious question whether the streams that are the subject of this Proposed Determination are even subject to Corps and EPA jurisdiction under the CWA following the United States Supreme Court decisions in SWANCC and Rapanos and the agencies' Rapanos Guidance, EPA & Corps, Clean Water Act Jurisdiction Following the U.S. Supreme Court's Decision in Rapanos v. United States & Carabell v. United States."

"The waters at issue, by contrast, are mostly intermittent or ephemeral, and notwithstanding the assertions in the Proposed Determination, are likely not properly classified as "tributaries.""

Response #25 – To the extent the comment asserts that the authority of the Clean Water Act does not extend to Pigeonroost Branch and Oldhouse Branch and their tributaries, EPA disagrees. The scope of EPA's action is limited to the project as currently authorized by Permit No. 199800436-3 (Section 10: Coal River), which includes a finding by the Corps regarding scope of jurisdictional waters. Regardless, EPA believes that Pigeonroost Branch and Oldhouse Branch and their tributaries are within the scope of Clean Water Act authority under both standards described by the U.S. Supreme Court in *United States v. Rapanos*, 126 S.Ct. 2208 (2006). Information in the record demonstrates that the majority of the waters to be filled are relatively permanent, flowing geographic features with clear surface hydrology connections to downstream traditionally navigable waters. Relatively permanent waters are clearly jurisdictional post-Rapanos, and EPA concludes that the filling of those waters alone would cause an unacceptable adverse effect on wildlife. CWA jurisdiction extends beyond relatively permanent waters, though, and the record also shows that these waters have an effect on the physical, chemical, and biological integrity of downstream traditionally navigable waters and, therefore, possess the requisite "significant nexus" to those waters.

Comment #26 – HW comments state that "The Streams At Issue Are Not Characterized As Special Aquatic Sites Under The EPA's Regulations." and suggest "there is no support for EPA's arguments that such areas are "special."" Furthermore, they also state that EPA is attempting to make the case that headwaters are special and as such should have the benefit of regulatory protection under the CWA.

"Contrary to EPA's assertions, however, headwater streams do not enjoy any special regulatory status under either EPA's or the Corps's regulations."

"In particular, EPA's 404(b)(l) Guidelines specifically identify "special aquatic sites," which are defined to mean:"

> geographic areas, large or small, possessing special ecological characteristics of productivity, habitat, wildlife protection, or other important and easily disrupted ecological values. These areas are generally recognized as significantly influencing or positively contributing to the general overall environmental health or vitality of the entire ecosystem of a region.

"EPA's new-found emphasis on the importance of headwater streams is likely driven more by research developed to justify the jurisdictional status of these areas following Rapanos, and less by whether the loss of such streams would somehow result in unacceptable adverse effects on fishery areas and wildlife."

Response #26 – See Response #25. EPA's authority under Section 404(c) is not limited to areas designated as Special Aquatic Sites under the Section 404(b)(1) Guidelines. The Final

Determination is based upon the unacceptable adverse effects of this project to wildlife. The analysis of unacceptable adverse effects starts with the resources that will be filled, in this case headwater streams. An evaluation of the effects of the fills includes understanding of the functions provided by headwater streams generally and the important role that Pigeonroost Branch and Oldhouse Branch play within the context of the larger aquatic ecosystem.

Comment #27 – HW comments suggest that the adverse impacts to streams will be fully mitigated and therefore these impacts should not be considered under the CWA 404(c) action. They also state that EPA did not raise issues regarding adverse impacts to ecological functions and they provide statements suggesting EPA concurred with this assessment in the DEIS.

> "EPA Fails To Take Into Account The Fact That Impacts To Headwater Streams Will Be Fully Mitigated."
>
> "The Proposed Determination not only inflates the value of these streams, but also fails to account for Mingo Logan's compensatory mitigation plan, which explicitly requires that Mingo Logan establish riparian vegetative buffer zones surrounding the mitigation channels in an effort to replace the ecological functions that may be lost by the project."
>
> "Moreover, EPA's claim of the loss of nutrient cycling and its effect on the fish population of the Spruce Fork watershed contradicts EPA's previous statements in the record. Commenting on the DEIS, EPA stated that one feature of the Spruce Fork watershed was the low levels of nutrient export to streams in the watershed."
>
> "Because the nutrient export to streams in the watershed is already low, and Mingo Logan has proposed specific measures to increase the nutrient export to streams for the project, it is unclear how the alleged loss of ecological processes could result in "significant loss or damage to" the fish population of the watershed."

Response #27 - Under Section 404(c), EPA has discretionary authority to prohibit or withdraw the specification of a defined are as a disposal site whenever it determines that the discharge will have an unacceptable adverse effect on a number of identified categories. Therefore, as a legal matter, EPA can make a determination that a discharge of dredged or fill material will cause unacceptable adverse effects without consideration of any possible mitigation. The statutory standard does not mention mitigation and authorizes EPA to determine what an unacceptable adverse effect is. In other words, EPA does not need to determine that proposed mitigation is somehow flawed or insufficient in order to conclude that a proposed or authorized discharge would have unacceptable adverse effects.

As a factual matter, however, EPA disagrees with the commenter. EPA and FWS expressed concern regarding the adequacy of the mitigation plan in their comments on the draft EIS for this project. EPA believes that the project's adverse chemical impacts on native aquatic wildlife can not be ameliorated by the proposed compensation measures since the mitigation itself will result in adverse water quality conditions.

Furthermore, EPA does not believe the establishment of 25-50 foot riparian buffer zones will "replace the ecological functions lost by the project." EPA scientists have found that despite well-developed and mature riparian zones, 90% of sites directly downstream of valley fills continue to have degraded aquatic communities (Pond et al. 2008). EPA scientists continue to believe that the poor water quality in the mitigated channels will prevent the mitigation from "replacing ecological functions that may be lost by the project."

EPA believes that the loss of natural nutrient cycling could result in net export of ***excess*** nutrients (rather than natural retention, transformation, and delivery of natural concentrations of nutrients). HW also states that Mingo Logan has proposed specific measures to *increase* nutrient export. Intentional increases of nutrients to Spruce Fork or downstream watersheds is problematic from a water quality standpoint and would not be supported by EPA.

Out of more than 150 streams sampled by WVDEP, Oldhouse Branch has been shown to be one of the few remaining streams (i.e., less than 1% of Coal River Basin streams) that have high biological condition. EPA does not believe that the compensation plan can mitigate for these high-quality resources.

Comment #28 – HW suggest that EPA's water quality concerns regarding the Spruce No. 1 Mine project have been addressed through the NPDES program and even if there were water quality effects these impacts cannot legally be dealt with through the CWA 404(c) process.

> "EPA's Concerns About Water Quality Have Already Been Addressed And Are Insufficient to Satisfy EPA's Burden under Section 404(c)."
>
> "As with almost every fact listed in its Proposed Determination, EPA raised the issue of selenium in the NEPA process, and it was addressed."
>
> "Many of the concerns asserted by EPA relate to the NPDES permitted discharges rather than the fill discharge which is the only discharge relevant to the 404 permit."
>
> "These potential impacts are to downstream waters, however, meaning that they will result, if at all, from the discharges of water from the sediment ponds. Thus, the water quality concerns raised in the Proposed Determination neither fall within the factors that EPA may consider under Section 404(c), nor even derive from the discharges authorized under the Section 404 permit at issue."

Response #28 – To the extent the comment suggests that EPA may not legally consider changes in water chemistry that are proximately caused by the discharge of fill material as part of its Section 404(c) determination, EPA disagrees. The comment that the discharges from the sediment ponds do not derive from the discharges of fill material is incorrect. For purposes of this project, the discharge of fill material is inextricably linked to and is the proximate cause of the NPDES discharge. The sediment ponds referenced collect and discharge runoff and drainage from the valley fills. It is appropriate, therefore, for EPA to consider how construction of the valley fills and discharges from them change downstream water chemistry. "[R]ecognizing the EPA's expertise and concentrated concern with environmental matters, Congress gave the final decision whether to permit a project to that agency. Its authority to veto to protect the environment is practically unadorned. …. This broad grant of power to the EPA focuses only on the agency's assigned function of assuring pure water and is consistent with the missions assigned to it throughout the Clean Water Act." *James City County, Virginia v. EPA*, 12 F.3d 1330, 1336 (4th Cir. 1993).

For purposes of Section 404(c), it is appropriate for EPA to consider the effects of the project on water chemistry because changes in water chemistry often have an adverse effect on the aquatic ecosystem, including wildlife dependent upon water. EPA's consideration of impacts to downstream water chemistry and the corresponding impacts on aquatic ecosystems is consistent with EPA's approach in other Section 404(c) actions.

To the extent the comment asserts that EPA may not consider the project's effect on water chemistry or water quality because the Corps of Engineers may not consider water chemistry or water quality as part of the Section 404 process, the comment is inconsistent with the Clean Water Act and the Section 404(b)(1) Guidelines. Section 404(b) requires that the Corps apply the Section 404(b)(1) Guidelines. The Section 404(b)(1) Guidelines prohibit the Corps from issuing a permit for the discharge of dredged and/or fill material if it will cause or contribute to a violation of water quality standards, after consideration of disposal site dilution and dispersion or if it will cause or contribute to significant degradation of waters of the U.S. 40 CFR §§ 230.10(b)(1) & (c). Moreover, section 230.22 of the Section 404(b)(1) Guidelines specifically requires the Corps to consider changes in water chemistry: "the discharge of dredged or fill material can change the chemistry and physical characteristics of the receiving water…." 40 C.F.R. § 230.22(b) In addition, the Corps must obtain from the State a water quality certification under Section 401 of the CWA prior to permit issuance. *Id.* § 1341. If the State conditions its water quality certification, the Corps must incorporate those conditions into the Section 404 permit. *Id.* § 1341(d).

To the extent the comment asserts that EPA's consideration of the project's effects on water chemistry is not appropriate because consideration of water quality is solely the province of the State through its NPDES permit and Section 401 water quality certification, the comment is incorrect. As a general matter, it is expected that the considerations of the State through its NPDES and Section 401 programs and the Corps through application of the Section 404(b)(1) Guidelines will be sufficient to protect water quality and the environment. Recognizing, however, that there would be instances when a project could undergo regulatory review and still pose unacceptable adverse effects, Congress created Section 404(c) to give EPA a final "backstop" opportunity to ensure protection of the aquatic ecosystem. It is often the case that EPA exercises its authority under Section 404(c) even after authorized State agencies have approved the project. *See, e.g., City of Alma v. United States*, 744 F. Supp. 1546 (S.D. Ga. 1990).

The State's NPDES permit and Section 401 water quality certification do not preclude consideration of water quality or water chemistry issues that are not addressed or are inadequately addressed by the State. Moreover, the State's water quality certification under Section 401, while it may set a floor comprised of minimum requirements for achieving water quality, does not preclude the federal action agency from determining that more is required to achieve water quality.  Section 401(b) provides:

> Nothing in this section shall be construed to limit the authority of any department or agency pursuant to any other provision of law to require compliance with any applicable water quality requirements. The Administrator shall, upon the request of any Federal department or agency, or State or interstate agency, or applicant, provide, for the purpose of this section, any relevant information on applicable effluent limitations, or other limitations, standards, regulations, or requirements, or water quality criteria, and shall, when requested by any such department or agency or State or interstate agency, or applicant, comment on any methods to comply with such limitations, standards, regulations, requirements, or criteria.

33 U.S.C. § 1341(b).

Consistent with Section 1341(b), while the Corps generally will accept the State's Section 401 water quality certification as dispositive, the Corps recognizes that it has an independent duty to consider water quality.  Accordingly, the Corps accepts the input of EPA where EPA determines that the Section 401 water quality certification is insufficient or does not fully consider all water quality concerns:

> (d) *Water quality.* Applications for permits for activities which may adversely affect the quality of waters of the United States will be evaluated for compliance with applicable effluent limitations and water quality standards, during the construction and subsequent operation of the project as authorized. The evaluation should include the consideration of both point and non-point sources of pollution. It should be noted, however, that the Clean Water Act assigns responsibility for control of non-point sources of pollution to the states. Certification of compliance with applicable effluent limitations and water quality standards required under provisions of section 401 of the Clean Water Act will be considered conclusive with respect to water quality considerations unless the Regional Administrator, Environmental Protection Agency (EPA), advises of other water quality aspects to be taken into consideration.

33 CFR § 320.4(d).

To the extent the comment asserts that EPA may not raise concerns regarding changes in water chemistry that are a result of discharges through NPDES-permitted outfalls because EPA did not block issuance of the NPDES permit at the time of issuance, EPA disagrees.  EPA does not agree that its decision not to block the NPDES permit in 2002 precludes it from considering the impacts of discharges from the sediment ponds at the toes of the valley fills.   (WVDEP did not submit to EPA, and EPA did not review, the currently operative NPDES permit before permit issuance.) To the extent the commenter attempts to draw conclusions from EPA's failure to object to a renewal of the NPDES permit for the Spruce No. 1 Mine, EPA's objection authority is discretionary, and EPA's silence may not be interpreted as a statement that the permit terms are acceptable to EPA or consistent with the Clean Water Act.

Regardless, it is clear that EPA may consider as part of its Section 404(c) action new information that was unavailable to it in 2002. The commenter is correct that in 2002 EPA reviewed the draft NPDES permit and raised concerns regarding selenium. WVDEP represented that EPA's concerns regarding selenium would be addressed through a permit condition requiring study of the selenium content of certain strata and a feasibility study regarding materials handling. Since that time, EPA has reviewed discharge monitoring reports (DMRs) from the project which demonstrate that the materials handling plan as implemented has not prevented discharges of elevated levels of selenium. (See Response #29). In addition, in 2002, the significance of the impacts of elevated levels of selenium was relatively little understood. There have been a number of significant studies (including by WVDEP and many cited in the Final Determination and administrative record) that enhance the scientific basis for ensuring that aquatic organisms are not exposed to elevated levels of selenium. This is new information that may be considered by EPA. Similarly, in 2002, EPA raised concerns regarding potential levels of sulfates and conductivity. EPA's knowledge regarding the deleterious effect of elevated levels of conductivity and sulfates on the native benthic macroinvertebrate community was limited. Since that time, emerging science has increased dramatically EPA's level of understanding of the impacts of these stressors. Many of these studies are cited in the Final Determination and administrative record. This also represents new information that may be considered by EPA.

Accordingly, it was appropriate for EPA to consider the project's effects on water chemistry and water quality and EPA was not precluded from doing so by the State's NPDES permit and Section 401 water quality certification.

See Responses #152, #156.

Comment #29 – HW comments suggest that the current operational portions of the Spruce No. 1 project are in compliance with the NPDES permit and therefore pose no water quality problems downstream in Spruce Fork watershed.

> "EPA's Selenium Analysis Ignores Data Collected In Accordance With The Permit And Relies On The Comparison Of Two Dissimilar Projects: Dal-Tex and Spruce No. 1."
>
> "Even if it was lawful for EPA to raise its concerns about selenium discharges (which Mingo Logan disputes), the record does not support EPA's claims."
>
> "There Are Selenium-Specific Conditions In The 402 Permit, And Those Conditions Have Not Been Violated."
>
> "EPA acknowledges that the 402 permit includes conditions relating to selenium. These conditions ensure that any impacts associated with selenium in discharges from the Spruce Mine are controlled."
>
> "The Monitoring Data Collected To Date Demonstrates That Selenium Does Not Pose A Water Quality Concern."

"As described in more detail in the accompanying CH2M HILL Technical Evaluation Document, data from the discharges, as well as the receiving streams, confirm that selenium concentrations are well below the applicable water quality standards, and do not cause or contribute to any downstream impairments."

"Since December 2008, the average discharge concentration from the pond controlling the valley fill in the Right Fork of Seng Camp Creek (which is well above the locations of any fish found in pre-mining surveys) is 3.9 µg/L. The average selenium concentration recorded at the Mouth of Seng Camp since December 2008 is 1.2 µg/L. The average discharge of selenium from January 2007 to December 2008 at this same point was 1.8µg/L. Accordingly, the average selenium concentration at this point has decreased since the discharge began."

Response #29 – With respect to the comparison between discharges from the Dal-Tex operation and anticipated discharges from Spruce No. 1, it is the best professional judgment of EPA that comparisons between the two projects are valid and relevant as outlined in Appendices 1 and 4. (See Response #30, # 91, # 92, #29A).

Among other things, EPA's selenium analysis uses data from discharge monitoring reports (DMRs) from Outfalls 028 and 017. The commenter is correct that the selenium data reported on these DMRs does not represent a violation of the NPDES permit because the NPDES permit does not assign selenium limits to these outfalls, but merely requires monitoring and reporting. The data from the DMRs from Outfalls 028 and 017, however, shows that discharges from these outfalls have contained elevated concentrations of selenium above the effluent limitations that are in the permit for Outfalls 001 - 004. That this is occurring indicates that the materials handling plan as it is being implemented at the project site has not been effective in reducing selenium concentrations with respect to discharges from Outfalls 017 and 028. Outfall 028 handles discharges from Valley Fill 1A, which is partially constructed. See Response #44A, #47A, #48A, #49A.

EPA notes that the commenter's apparent reference to long term average values is not appropriate. The discharges should be analyzed in terms of average monthly values and trends in average monthly values.

The Recommended Determination included a technical review of 16 monthly DMR records for the Spruce No. 1 Outfall 028 (December 2008 to March 2010), which are summarized in Table A1.12 below, along with data from subsequently obtained DMRs for the months April – September 2010:

**Table A1.12. Total Recoverable Selenium (µg/L) for Outfalls 015, 017 and 028 for NPDES Permit WV1017021, Mingo Logan Coal Company Spruce No. 1 Mine. Note: Shaded areas indicate selenium concentrations exceeding 5 ìg/L.**

| Site Code | Site Location | Report Date | Min Value | Avg. value | Max value |
|---|---|---|---|---|---|
| 015 | Outlet 015 | 12/31/2008 | 0.00 | 0.00 | 0.00 |
| | | | | | |
| 017 | Outlet 017 | 12/31/2008 | 0.00 | 0.00 | 0.00 |
| 017 | Outlet 017 | 9/30/2009 | 19.20 | 19.20 | 19.20 |

| | | | | | |
|---|---|---|---|---|---|
| 028 | Outlet 028 | 12/31/2008 | 5.70 | 5.70 | 5.70 |
| 028 | Outlet 028 | 1/31/2009 | 9.80 | 9.80 | 9.80 |
| 028 | Outlet 028 | 2/28/2009 | 3.90 | 3.90 | 3.90 |
| 028 | Outlet 028 | 3/31/2009 | 0.60 | 1.00 | 1.40 |
| 028 | Outlet 028 | 4/30/2009 | 1.70 | 1.70 | 1.70 |
| 028 | Outlet 028 | 5/31/2009 | 2.50 | 2.50 | 2.50 |
| 028 | Outlet 028 | 6/30/2009 | 3.20 | 3.30 | 3.40 |
| 028 | Outlet 028 | 8/31/2009 | 1.25 | 3.48 | 5.70 |
| 028 | Outlet 028 | 9/30/2009 | 4.60 | 6.05 | 7.50 |
| 028 | Outlet 028 | 10/31/2009 | 3.00 | 3.00 | 3.00 |
| 028 | Outlet 028 | 11/30/2009 | 1.40 | 1.85 | 2.30 |
| 028 | Outlet 028 | 12/31/2009 | 1.80 | 1.85 | 1.90 |
| 028 | Outlet 028 | 1/31/2010 | 3.40 | 3.80 | 4.20 |
| 028 | Outlet 028 | 2/28/2010 | 3.80 | 4.50 | 5.20 |
| 028 | Outlet 028 | 3/31/2010 | 4.70 | 6.10 | 7.50 |
| 028 | Outlet 028 | 4/30/2010 | 3.8 | 4.40 | 5.00 |
| 028 | Outlet 028 | 5/31/2010 | 4.70 | 7.60 | 10.50 |
| 028 | Outlet 028 | 6/30/2010 | 11.40 | 11.50 | 11.60 |
| 028 | Outlet 028 | 7/31/2010 | 6.40 | 8.50 | 10.40 |
| 028 | Outlet 028 | 8/31/2010 | 4.80 | 10.65 | 14.80 |
| 028 | Outlet 028 | 9/30/2010 | 4.80 | 9.40 | 11.00 |

For a discussion of Outfall 028, see Response #47A, #48A, #49A.

A comparison of selenium concentrations between the monitoring stations located in Seng Camp Creek upstream (USCB) and downstream (DSCB) of the mining activity for the period December 2008-September 2010 shows that discharges from the Spruce No. 1 mine in the Seng Camp Creek sub-watershed are contributing to elevated levels of selenium instream. Selenium concentrations at Station DSCB during this period had average monthly values ranging from <0.60 to 2.85 ìg/L with nearly all average monthly values greater than the detection limit of 0.6 ìg/L. The summarized data for the upstream monitoring station USCB (Upstream Seng Camp Creek) for the same time period, documented that average monthly values ranged from <0.60 to 0.80 ìg/L. The majority average monthly values were below the detection limit of 0.6 ìg/L and the highest monthly average value was 0.80 ìg/L. To the extent the commenter asserts that the concentrations of selenium in Seng Camp Creek come from discharges associated with activities that pre-date construction of the Spruce No. 1 Mine, EPA notes that WVDEP sampling for the 2002-2003 time period (prior to construction of Spruce No. 1 in Seng Camp Creek) found selenium levels in Seng Camp Creek to be below detection levels. See Appendix 1, Table A1.10.

In addition to discharges of elevated concentrations of selenium, the project also will have the effect of increasing selenium concentrations in downstream waters by removing Pigeonroost Branch and Oldhouse Branch as sources of dilution that moderate downstream selenium concentrations. EPA evaluated the in-stream DMR monitoring data from December 2008 to September 2010 from several ambient monitoring stations associated with the Spruce No. 1 mine as authorized project: Stations DSCB (Downstream Seng Camp Creek, located at the mouth of Seng Camp Creek), USCB (Upstream Seng Camp Creek), USF (Upstream Spruce Fork), DSF (Downstream Spruce Fork, located downstream of Seng Camp Branch), DPB (downstream

Pigeonroost Branch, at mouth of Pigeonroost Branch) and DOB (Downstream Oldhouse Branch, at mouth of Oldhouse Branch). As explained below, this analysis shows that Pigeonroost Branch and Oldhouse Branch are providing dilution that is helping to maintain reduced selenium concentrations in Spruce Fork.

The Spruce Fork watershed upstream of Pigeonroost Branch and Oldhouse Branch (Station USF) has average monthly selenium concentrations ranging from 0.9 ìg/L to 10.90 ìg/L (August 2010), with nine monthly average concentrations greater than 5 ìg/L based on the in-stream DMR data for the December 2008 to September 2010 time period. It should be noted that the last 6 months of available DMR data (April 2010 to September 2010) for USF had monthly selenium concentrations above the 5 ìg/L potentially indicating new selenium contamination sources. The downstream Spruce Fork (DSF) site has concentrations that are significantly lower, and does not have any average monthly selenium concentrations above 5 ìg/L, with the highest monthly average selenium concentration during the time period (December 2008 to September 2010) being 2.50 ìg/L (May 2010). This suggests that Pigeonroost Branch and Oldhouse Branch (along with other tributaries that enter Spruce Fork between the monitoring stations) provide clean dilution water to the main stem of Spruce Fork. This conclusion is supported by the very low levels of selenium in Pigeonroost Branch and Oldhouse Branch. During the same December 2008 to September 2010 time frame, the DMR reports indicate almost all of the average monthly selenium measurements at both Pigeonroost Branch and Oldhouse Branch were below the detection limit of 0.6 ìg/L. The single detection of selenium during the time period in Oldhouse Branch was 0.9 ìg/L during July 2009 (a maximum value). All monthly average selenium concentrations in Pigeonroost Branch were below the detection limit from December 2008 through June 2010 except the monthly average in August 2009 which had a value of 1.3 ìg/L (maximum value was 1.9 ìg/L). However, the monthly average selenium concentrations for the July 2010 to September 2010 time period documented a developing selenium problem in Pigeonroost Branch. The monthly average selenium concentration in July 2010 was 2.7 ìg/L, August 2010 was 2.6 ìg/L and September 2010 was 1.4 ìg/L.

By way of example, the average monthly selenium concentration at the USF monitoring location for the month of April 2010 is reported on the DMR as 10.60 ìg/L. The average monthly concentration at the DSF location for April 2010 is reported on the DMR as 0.90 ìg/L. For April 2010, the DMR reports average monthly selenium concentrations at Pigeonroost Branch and Oldhouse Branch as below the detection level of 0.60 ìg/L. While Pigeonroost Branch and Oldhouse Branch are not the only contributing tributaries between the USF and DSF stations, this data strongly suggests that they are contributing dilution.

The importance of Pigeonroost Branch and Oldhouse Branch as sources of dilution is increased by recent evidence that concentrations of selenium in White Oak Branch (immediately upstream of Oldhouse Branch) are elevated, and thus White Oak Branch also is contributing selenium loadings to Spruce Fork upstream of the project area. DMR records for the April 2010 to September 2010 for the DWOB (Downstream White Oak Branch) indicate that average monthly concentrations of selenium in White Oak Branch have ranged from 5.50 ìg/L (April 2010) to 10.1 ìg/L (August 2010). It is EPA's understanding that the recent concentrations of selenium in White Oak Branch may be associated with diversion of contaminated water from a refuse impoundment on Little White Oak Branch. It is EPA's understanding this diversion affects only the downstream portions of White Oak Branch, and a review of the DMR data for the upstream White Oak Branch station (UWOB) would seem to confirm this understanding (Mr. Dennis Stottlemyer, WVDEP, personal communication).

The valley fills for Pigeonroost Branch and Oldhouse Branch, if constructed, will eliminate the freshwater dilution contributions from both of these tributaries. Selenium values will also increase at both outlet points on Oldhouse and Pigeonroost Branch during and post-mining. The increased selenium concentrations combined with the elimination of the dilution water from these two tributaries will cause the selenium concentrations and loadings in Spruce Fork to increase.

Although the active discharges at the Spruce No. 1 Mine Complex and surrounding mines (e.g., Dal Tex Mine Complex) may be discharging selenium in the form of selenate, the scientific literature supports the fact that the net outcome of the Se recycling process in a watershed is a gradual build-up of selenite and organo-Se in the aquatic ecosystem which have been documented to bioaccumulate in the foodchain to fish and other aquatic organisms. A case in point is the Mud Fork Reservoir which documents the problem with the discharge of selenium into the aquatic environment in the Appalachian Coalfields as it will eventually cause environmental harm (e.g. fish deformities and fish consumption advisories). Although selenate is the typical form of selenium entering streams, the eventual outcome will be selenium bio accumulation into aquatic foodwebs of the Appalachian Coalfields. In addition, selenate also accumulates in the aquatic foodchain. See also Response #30, # 92.

Comment #30 – HW also suggest that any comparison of potential water quality concerns (i.e., selenium and TDS) between the Spruce No. 1 Mine and the adjacent Dal-Tex mine operation is flawed.

> “EPA attempts to correlate historical selenium data from the Dal-Tex Mine with the potential for water quality exceedances at the Spruce Mine. However, these data are inapposite because of differences in mining practices, coal seams and material handling techniques at the two mines.”
>
> “The Dal-Tex Mine is located in an area that has been actively mined since the early 1900s. Impacts from these historic mining activities continue to influence the quality of the receiving streams in and around the Dal-Tex Mine. These impacts are exacerbated by differences in mining practices before the enactment of the SMCRA in 1977.”
>
> “By comparison, the area around the Spruce Mine has not been actively mined, and the impacts from historic mining activities are much more limited. Within the Spruce permit boundary, historical underground mining is limited to isolated areas along the eastern perimeter of the project area. This consists of an area within the Upper Stockton seam that was initially mined pre-Law and then re-mined in the late 1980s/early 1990s.”
>
> “Current operations at the two sites are also different. The nature and extent of the mining of the coal seams are different. Operations at the Spruce Mine will be more confined and

employ incidental contour mining within the designated fill areas. Moreover, the Spruce Mine will employ modern material handling and mining techniques such as enhanced erosion control, sedimentation control and selective handling of acidic or selenium-bearing overburden materials."

Response #30 – An analysis of the selenium issues and geology of the project site and Dal-Tex Mine site is contained in Appendices 1 and 4 and is summarized below:

The WV Geologic and Economic Survey (WV GES (2002)) stratigraphic distribution of Selenium (Se) shows that coal beds of the Allegheny and upper Kanawha Formations of the Middle Pennsylvanian exhibit the highest selenium contents. These include the Stockton and Coalburg Formations, which will be mined at Spruce No. 1.

The selenium content of West Virginia (WV) coals has been thoroughly examined and this data is available at the West Virginia Geological and Economic Survey (WVGES(2002)) website (http://www.wvgs.wvnet.edu/www/datastat/te/index.htm). From a total of 845 samples, Se concentrations are reported to range from 0 to 21.3 mg/kg with a mean concentration of 4.2 mg/kg and standard deviation of 2.83 mg/kg.

From the analysis of Se in the different coal beds, coals containing the highest selenium contents are in a region of south central WV, which includes the region of the Spruce No. 1 mine. In addition, the coal beds of the Allegheny and Upper Kanawha Formations exhibit the highest Se contents compared to coal beds both lower and higher in the geologic sequence. Formation cores analyzed by USGS (Paybins et al., 2000; Neuzil et al., 2005) also show similar trends. The coal beds to be targeted by the Spruce No 1 mine include 5-Block of the Allegheny Group and down to the Upper Stockton coal bed in the eastern portion of the project area. In the western portion of the project area, the mine plan includes extraction of coal through the Middle Coalburg coal bed. These coal beds are enriched in Se as evidenced by Se distribution data in the Spruce No. 1 column (DT0417) provided by the applicant for the NPDES permit application.

EPA scientists completed a review of rock cores and corresponding cross sections for the Dal-Tex mines including the Gut Fork mine compared to the Spruce No 1 mine. For the most part, the formations are repeated from the Dal-Tex mine complex to the Spruce No 1 mine location. Indeed, as stated by the permittee, the same coal beds are proposed to be developed for the Spruce No 1 mine as for the Dal-Tex mine. Essentially, all the formations in the Dal-Tex complex that had in the past showed high Se levels and have led to environmental releases are present in the Spruce No 1 complex. According to the Se data in the rock core column, many of the rock formations above and below the coal beds also contained high levels of Se. For example, the shale rock above the Lower Stockton contains as high as 6.63 mg/kg Se. This rock layer may need to be removed to get to the Stockton and may contribute to Se releases.

Furthermore, to the extent the comment asserts that "the modern material handling and mining techniques used at the Spruce Mine, including enhanced erosion control, stormwater management requirements, and selective handling of high selenium overburden materials, will prevent unacceptably adverse water quality impacts," See Response #14A.

EPA is aware that elevated Se concentrations have been reported from other streams that drain areas impacted by MTM in southern West Virginia (Bryant, et al. 2002; Ferreri, et al., 2004; Vespe, et al., 2004), including streams draining the nearby Dal-Tex operation, other streams in the Coal River, and areas impacted by coal surface mining and reclamation in Ohio (Bonta and Dick, 2003). Given that in surface mining most or all of the coal is removed, the source of Se in these streams is more likely to be the associated strata disturbed by mining operations that are also high in Se.

See Response #29, #14A, #29A, #44A, and #47A.

Comment #31 – HW comments also suggest that any potential problems with selenium at the project site will be effectively managed by Mingo Logan.

> "The permit also requires Mingo Logan to develop and implement a plan for selective handling of overburden to minimize selenium impacts. Specifically, the plan requires isolation of selenium materials on-site - an approved method for the handling of such material."

Response #31 – See response #29, #14A, #29A, #44A, #47A, #48A, #49A.

Comment #32 – HW suggests that EPA cannot use the conductivity values stated in the proposed determination to conclude water quality impairment because those values have not been accepted by WVDEP and that the science used to draw these conclusions is still in review.

> "EPA Cannot Justify Its Ad Hoc Value For Conductivity."
>
> "Instead of deferring to the State's translation, EPA proposes an entirely new conductivity value of 500 µS/cm."
>
> "The study on which EPA appears to rely, "A Field-based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams," was released to the public around the same time as the Proposed Determination. The conclusions reached in this document, however, have not been finalized and cannot be relied upon. The document states specifically that it is a draft that should not be cited or quoted, and does not represent an EPA determination. Until it is subjected to the rigorous review process, including peer review before EPA's Science Advisory Board, it is inappropriate to apply any of its conclusions."

Response #32 – In preparing the Final Determination, EPA relied upon a wide range of information and data, including the Interagency Mountaintop Mining/Valley Fills in Appalachia Programmatic Environmental Impact Statement (2005), and information gathered by the WVDEP, including an assessment of the Coal River sub-basin conducted in 1997, data collected to support the 2006 Coal River sub-basin total maximum daily load (TMDL), and WVDEP and nationally available GIS data. EPA also reviewed the 2006 Spruce No.1 EIS, and other sources of data including studies conducted by EPA scientists and discharge monitoring reports generated by Mingo Logan. In addition, EPA reviewed available data and literature documenting impacts from similar projects and consulted a wide range of peer reviewed studies and literature. The administrative record cites to hundreds of published studies. EPA also communicated with the US Fish and Wildlife Service Elkins Field Office on impacts to fish and wildlife resources in the project area. The record amply supports the Final Determination's conclusions regarding unacceptable adverse effects on wildlife from increased levels of conductivity.

To the extent the ORD Benchmark Conductivity Report is referenced, as noted elsewhere, EPA's Final Determination does not rely upon the draft conductivity benchmark value. Rather, the Final Determination's discussion of conductivity and its impacts on wildlife are based on a dose-response threshold of 500 µS/cm that corresponds to adverse effects on the integrity of the benthic macroinvertebrate wildlife community. To the extent that document is referenced in the Final Determination, it provides supporting data.

To the extent the comment asserts that WVDEP has not accepted EPA's analysis of conductivity, see Response #9B.

Comment #33 – HW further comments that reliance upon EPA's own multi-metric index to determine water quality impairment is inappropriate because WVDEP does not agree with that approach.

> "Further, the conclusions in that document are tied to the use of a multi-metric index of EPA's own making known as the Genus Level Index of Most Probable Stream Status ("GLIMPSS'). The GLIMPSS, however, is not recognized by WVDEP as a measure of compliance with its water quality standards. Indeed, it has been expressly rejected by WVDEP."
>
> "WVDEP uses the WVSCI instead. It was developed by Tetra Tech Inc. under a contract with EPA, and its use has been approved by EPA. As discussed by CH2M HILL, the WVSCI does not demonstrate any significant correlation between benthic macroinvertebrate index scores and conductivity anywhere near the ranges claimed by EPA."

Response #33 – While the Final Determination refers to some of West Virginia's numeric and narrative water quality criteria, the Final Determination is based upon a finding of unacceptable adverse effects to wildlife. This determination is qualitatively different than and is not dependent upon a measure of compliance with water quality standards. To be clear, EPA's conclusion that the Spruce 1 mine as authorized would cause unacceptable adverse effects on wildlife is not dependent on a conclusion that West Virgnia's water quality standards will be violated at or downstream of the site.

The Final Determination's finding of unacceptable adverse effects does not depend upon GLIMPSS. Among other things, the Final Determination relies on a variety of data, including direct comparison of genera that are present or absent in Pigeonroost Branch and Oldhouse Branch as compared with nearby mine-impacted streams, and a calculation of Observed/Expected ratio. The administrative record includes hundreds of studies.

The Final Determination also compares WVSCI scores in Pigeonroost Branch and Oldhouse Branch with those of nearby mine-impacted waters. In addition, the Final Determination refers to findings in the peer-reviewed literature (Pond, et al. 2008) based upon the WVSCI. The Final Determination also summarizes an EPA Region III analysis of WVDEP ambient monitoring macroinvertebrate data from the Cumberland Mountains of the Central Appalachians subecoregion, the subecoregion where the project is located. When conductivity levels were elevated above 500 µS/cm, the analysis showed that a majority of the sites were not fully supportive of aquatic life use, even when accounting for the possible confounding effects of acidic pH and habitat degradation. For example, after removing low pH sites, only 100 sites out of 417 sites attained WVSCI scores greater than 68 when conductivity levels were greater than 500 µS/cm (76% of the sites reflected WVSCI scores less than 68). When the potential confounding effect of habitat degradation was completely removed (this subset includes only sites with Rapid Bioassessment Protocol habitat scores greater than 140, indicating reference quality habitat), 62% of the sites still had WVSCI scores less than 68.

Comment #34 – HW also claims that EPA "misinterpreted WVDEP's correlation of conductivity to WVSCI scores."

> "EPA cites a conductivity value of 500 µS/cm as WVDEP's impairment threshold. But, quite to the contrary, WVDEP uses this value as a flag in designating the highest attaining sites (i.e., those at the complete opposite end of the spectrum). For its impairment decisions, WVDEP uses a conductivity value that is two to three times higher than the one cited by EPA."

Response #34 – The table on page 33 of the Proposed Determination to which this comment refers does not appear in the Final Determination. In addition, the comment misinterprets the table. The introductory sentence states that the table summarizes "WVDEP data and scientific literature" – it does not purport that WVDEP uses 500 µS/cm as an impairment threshold. The 500 µS/cm value is derived from the scientific literature and corresponds to a dose-response threshold that corresponds to significant adverse impact for benthic integrity. This threshold has been independently observed in Appalachian studies by other agency researchers in KY, MD, and VA.

For purposes of clarity, below is the stressor identification analysis threshold for ionic strength used by WVDEP for the Coal River TMDL:

| Candidate Cause | Elimination (Rule out stressors at these thresholds) | Strength of Evidence* (Evidence for each candidate cause as stressor) |
|---|---|---|

| | Parameter | Elimination Threshold | Parameter | Candidate Stressor Threshold |
|---|---|---|---|---|
| Ionic Strength | Conductivity | Max < 300 umhos | Conductivity | Considered as an independent stressor in non- |

| | | | | |
|---|---|---|---|---|
| | | | | acidic, non-AMD streams, when conductivity values exceed elimination thresholds and sulfates and chloride violate conditions listed as follows |
| | Sulfates | Max < 75 mg/l | Sulfates | Very high: Min. > 100<br><br>High: Median > 100 |
| | Chloride | Max < 10 mg/l | Chloride (little data) | Very high: Min. > 10<br><br>High: Median > 10 |

*WVDEP Table 2-1: Stressor Identification Analysis Thresholds, Dunkard Creek, Camp Creek of Twelvepole, Upper Ohio River South, and Youghilgheny River TMDLs Technical Report (2009)*

In more recent TMDLs, WVDEP has used the following stressor identification threshold analysis for ionic strength:

| Candidate Cause | Parameter | Elimination (rule out stressors at these thresholds)<br><br>Elimination threshold | Strength of Evidence (Evidence for Each Candidate Cause as stressor)<br><br>Candidate Stressor thresholds |
|---|---|---|---|
| Ionic strength | Conductivity | < 326.9 umhos | Consider as independent stressor in non-acidic, non-AMD streams, when conductivity values met threshold ranges and sulfates and chloride violate conditions listed as follows<br>>1533 Definite stressor<br>1075-1532.9 Likely stressor<br>767-1074.9 Possible stressor<br>517-766.9 Weak stressor<br>327-516.9 Equivocal or no Trend |

| | | | | |
|---|---|---|---|---|
| | Sulfates | <56.9 mg/l | > 471<br>290-416.9<br>202-289.9<br>120-201.9<br>57-119.9 | Definite stressor<br>Likely stressor<br>Possible stressor<br>Weak stressor<br>Equivocal or no Trend |
| | Chloride | < 60 mg/l | >230.0<br>160.1-229.9<br>125.1-160<br>80.1-125<br>60.1-80.0 | Definite stressor<br>Likely stressor<br>Possible stressor<br>Weak stressor<br>Equivocal or no Trend |

*WVDEP Table 7-4: Stressor Identification Analysis Thresholds, Draft Coal River Watershed TMDLs Technical Report (2006)*

See Response #81 for an analysis of WVSCI scores at these stressor thresholds. EPA scientists determined the proportion of WVDEP sites in ecoregion 69d that had WVSCI scores equal to or below 68 in each WVDEP stressor threshold category (see table in response #81). For example, the WVDEP candidate stressor threshold for conductivity as a "likely stressor" (1075-1532.9 µS/cm) is strongly correlated with WVSCI scores equal to or below 68 (89% for all sites and 85% for sites with RBP habitat scores greater than 140).

Comment #35 – HW further claim that collected data counter the relationship suggested by EPA between conductivity and biological impairment.

> "...benthic macroinvertebrate data collected from mined and unmined streams, including those in the immediate vicinity of the Spruce Mine, refute the causative relationship that EPA claims to exist between conductivity and biological impairment. These data and related studies demonstrate that stream condition is affected by a number of confounding factors, and that conductivity alone is not determinative. Despite EPA's contention that 500 µS/cm is an appropriate impairment value, there are extensive data showing unimpaired streams with elevated conductivity values well above the one proposed by EPA."

Response #35 – Data and analyses shown by CH2M HILL in Volume IV (Figure 4) from Armstead, et. al. (2006) are flawed since the data (supplied by Argus Energy LLC) are highly pseudo-replicated from the same sites and over multiple seasons and years. Moreover, they failed to account for multiple stressors not related to mining, and the taxonomic data have known QA/QC issues. The samples taken often reflected drought conditions and the calculation of the WVSCI scores appear flawed (e.g., scoring a zero cannot occur with WVSCI unless zero organisms were collected, indicating a failure to follow standard operating procedures resulting in an assessment that is not comparable). Finally, the data provider has historically used "full picks" instead of 200 organism subsamples, which is inconsistent with WVSCI protocols and can over-inflate the WVSCI.

Analysis from Zipper and Berenzweig, 2007 used by CH2M HILL was reviewed by EPA at the request of VADEQ; the report was criticized and rejected by both EPA Region III scientists and VADEQ and the authors made no subsequent attempts to reconcile EPA scientists' concerns. To the best of EPA's knowledge, the document remains in perpetual "Draft" status with no peer review since review comments were never reconciled or addressed. Specifically, no seasonal or regional partitioning was done, improper use of statistics was applied, and there was a failure to control for confounders. Consequently this makes this study a poor example to demonstrate the effects of conductivity below MTM/VF operations in Central Appalachia.

CH2M HILL's graphic from WVDEP 2010c (Figure 9) is misleading. Plotting the "swarm" of all sites under all influences and conditions masks relationships. In Figure 10, a more relevant attempt was made by WVDEP to filter for low pH, habitat (although it was not stated how), limestone region, and season (although it was not stated what season this represents and why other seasons were not presented also). Based on the data distribution, the data should have been fitted with a logarithmic function

Finally, despite the fact that the Proposed Determination analyzes taxa loss at the genus level, the CH2MHILL report does not investigate genus-level taxonomic information. Genus level analysis provides a more refined and accurate representation of the full range of diversity and condition of the aquatic ecosystem and for identifying loss of taxa associated with the activities at issue. WVDEP has a robust genus-level dataset (greater than 1000 sites in the Central Appalachian ecoregion).

The preliminary data from ongoing CH2M HILL studies in the vicinity of the Spruce No. 1 Project area are insufficient and misleading. The study contains too few sites, many sites are not independent (e.g., having upper-, mid-, and lower- sections on the same stream) and the sites were sampled at times that WVDEP considers inappropriate for use of WVSCI (fall and winter). The several figures that simultaneously graph richness, percent abundance, total individuals, and conductivity values are misleading because the scales are so vastly different that the figure obscures any realized changes in the measurements.

Comment #36 – HW comments suggest that potential for golden algae has been addressed under the NPDES and 401 certification processes and they contradict EPA's claims that the Spruce No. 1 Mine project could result in conditions that may result in blooms of toxic golden algae.

> "West Virginia already addressed (and EPA reviewed) such concerns as part of the NPDES permit and 401 certification process. Even if EPA could lawfully raise this concern now, there is no basis for it in the record."

> "…the causative factors associated with blooms of *Prymnesium parvum* are well known and include a combination of salinity, TDS, nutrients, light, temperature and pH. These factors combined to cause a bloom and fish kill in Dunkard Creek, but are not present in the Spruce Creek watershed."

> "The conditions at the Spruce mine's discharge sites are unlikely to result in the growth of the algae. Moreover, there are controls included in the NPDES permit, the 401

> certification, and the 404 permit itself that further protect against the creation of conditions that would foster the growth of the algae."

Response #36 - The identification of *P. parvum* in 2009 in Dunkard Creek was the first identification of this invasive aquatic species in the Mid-Atlantic States. Since the NPDES permit and Section 401 water quality certification were issued prior to this occurrence, they did not account for new information demonstrating that conditions in West Virginia can support growth of golden algae or for the fact that introduction of this algae means that it has potential to spread by waterfowl. As noted in the Final Determination, subsequent to the identification of *P. parvum* in 2009 in Dunkard Creek, WVDEP identified Spruce Fork as a "water of concern" with respect to golden algae. The science is still emerging regarding P. parvum blooms in Appalachian waters, and subsequently its ecology in this new habitat is still being studied. EPA believes, however, that the causative factors are present in the Spruce Fork Watershed and construction of the Spruce No. 1 Mine will contribute to conditions that support golden algae if introduced and these factors are documented in the Final Determination.

Comment #37 – HW comments regarding compensatory mitigation suggest that the project has met all its legal requirements and has complied with Corps and EPA guidance regarding mitigation. They further state that the plan employs current stream mitigation practices that will ensure that any adverse impacts will be brought down to an acceptable level through this mitigation.

> "The Permit's Mitigation Requirements Meet All Applicable Legal Requirements And Will Ensure That Any Adverse Impacts Will Not Be Unacceptable."
>
> "EPA has not established that the impacts to fish and wildlife are "unacceptable" in the first instance. Nevertheless, assuming that EPA could somehow adduce sufficient evidence to satisfy this statutory standard, the mitigation required by the permit certainly reduces the fish and wildlife effects to an acceptable level."
>
> "Importantly, EPA nowhere attempts to demonstrate that the Permit's required mitigation falls short of the regulatory requirements applicable during the lengthy permit process."
>
> "EPA raises a number of questions in Section IV.B.4 of the Proposed Determination, but ignores the voluminous material in the record of the Corps's proceedings, which addresses the points raised by EPA."

Response #37 – To the extent that the commenter asserts the mitigation plan proposes stream creation and restoration at a ratio greater than 1:1 and therefore complies with RGL 02-02 and is consistent with the court's holding in *Ohio Valley Environmental Coalition v. Aracoma Coal Company*, 556 F.3d 177 ($4^{th}$ Cir. 2009) ("*OVEC*"), the comment is not relevant to this action. The *OVEC* case decided whether the Corps had acted arbitrarily and capriciously in issuing certain permits involving discharges of dredged and/or fill material associated with surface coal mining. In implementing the arbitrary and capricious standard, the court as a legal matter gave substantial deference to the Corps' interpretation of its regulations and guidance in determining whether to issue those permits. In so doing, the court deferred to the Corps' application of the 1:1 linear replacement guidance provided in RGL 02-02.

By contrast, when exercising its authority pursuant to Section 404(c), EPA must determine whether unacceptable adverse effects will occur. Under Section 404(c), EPA has discretionary authority to prohibit or withdraw the specification of a defined area as a disposal site whenever it determines that the discharge will have an unacceptable adverse effect on a number of identified categories. Therefore, as a legal matter, EPA can make a determination that a discharge of dredged or fill material will cause unacceptable adverse effects without consideration of any possible mitigation. The statutory standard does not mention mitigation and authorizes EPA to determine what an unacceptable adverse effect is. In other words, EPA does not need to determine that proposed mitigation is somehow flawed or insufficient in order to conclude that a proposed or authorized discharge would have unacceptable adverse effects. Historically, EPA frequently has evaluated whether mitigation will offset effects to an acceptable level in connection with Section 404(c) actions, and that evaluation has been found appropriate by the courts.

Among other things, EPA may evaluate, as it does here, whether a mitigation plan that focuses on quantity fails to account for the quality of the impacted resources:

> The defendants have also shown record support for the conclusion that even after mitigation the three proposals for the Two Forks Dam would result in significant and unacceptable adverse impacts. Essentially, the proposed mitigations placed emphasis on quantity rather than quality in substitutions of aquatic and recreational results. As an example, the applicants suggested conditions requiring replacement of 36,000 pounds of lost trout biomass with a replacement of 33,000 pounds of in-stream trout biomass and provision of an additional 200,000 pounds of reservoir trout biomass through a game fish stocking of the reservoir under a $ 10 million trust fund plan. The mitigation plan also showed an increase in recreational uses of the reservoir. However, the EPA decided that these quantity replacements were not an adequate substitute for the quality of the trout stream and white water recreation provided by the unobstructed river flow.
>
> It is important in this regard to recognize the limitations on this court's authority in an APA review. The plaintiffs have made a strong case that their substitutions are adequate but they have not presented a sufficient showing to require a finding that the contrary analysis made by the EPA was arbitrary and capricious.

Alameda Water & Sanitation District v. Reilly, 930 F. Supp. 486, 492-93 (D. Colo. 1996). In this case, EPA has found that the mitigation that is proposed will not offset adverse effects to the level of acceptability.

EPA and FWS repeatedly have expressed concerns that the mitigation plan will not replace the lost functions and resources. As detailed in the Final Determination, based on WVDEP monitoring data, Pigeonroost Branch and Oldhouse Branch represent some of the few remaining "least disturbed" conditions within the Coal River sub-basin. They perform important functions including primary production and contribution of dilution to downstream waters. Destruction of

Pigeonroost Branch and Oldhouse Branch will not only remove the functions they perform but will also convert them to sources of additional pollutant loads. While there may be instances where physical replacement on a linear basis may suffice to reduce impacts to acceptable levels, that is not the case here where the lost resources represent some of the few remaining "least disturbed" conditions and make important contributions to the overall health of downstream waters. The record demonstrates that proposed mitigation is unlikely to replace the lost functions or to mitigate effects to acceptable levels. The proposed mitigation relies heavily upon linear replacement. Stream creation is among the most difficult and least successful forms of mitigation and streams have been identified by EPA and the Corps as difficult to replace resources. EPA is unaware of (and commenter has not pointed to) any studies that demonstrate that the mitigation techniques being proposed are likely to result in replacing the functions being provided by the lost resources. EPA's concern is enhanced because the mitigation relies upon use of on-site sediment control structures to replace naturally occurring streams. These sediment control structures may themselves become sources of pollutants. See Response # 39.

Comment #38 – HW suggests that EPA is imposing a functional replacement standard on the Spruce No. 1 project that is not consistent with other projects or consistent with the federal guidelines on mitigation.

> "Section 404(c) does not allow EPA unilaterally to impose a "no net loss" or full functional replacement standard. As the Proposed Determination recognizes, EPA can act only if there are unacceptable effects on fish or wildlife that are not mitigated to "acceptable" levels."
>
> "In this process, EPA also effectively seeks to override the standards for mitigation applied by the Corps and recently affirmed by the Fourth Circuit in OVEC, 556 F.3d 177."

Response #38 – See Response #37.

Comment #39 - HW suggests that the mitigation requirements placed as conditions of the Spruce No. 1 permit are robust, employ methods approved by EPA and contain the requirement of remedial action if the standards are not realized. HW suggests that these measures ensure a high likelihood of mitigation success and as a result there will be no unacceptable impacts to aquatic resources in the long term.

> "The Corps has imposed a series of mitigation requirements that: (1) substantially exceed the 1:l linear foot ratio established in applicable regulatory provisions; (2) establish a robust monitoring program that evaluates the effectiveness of mitigation on physical, chemical, and biological parameters in the mitigated streams; (3) set detailed, minimum performance standards that, among other measures, utilize several EPA developed assessment methods; (4) provide for adjustment of the performance standards to accommodate a new functional assessment method for headwater streams that may be developed by EPA in the future; and (5) direct that corrective and remedial action must be performed if the performance standards are not satisfied. These robust and comprehensive mitigation requirements are based, in significant measure, on current and

future EPA assessment methods.  As a result, the stream mitigation for this permit has a high likelihood of successfully offsetting the authorized impacts. Thus, the fish and wildlife impacts of the permit, as mitigated, cannot be demonstrated to be "unacceptable."”

“The Corps faithfully followed all applicable regulatory requirements. The result is a series of permit conditions that will ensure successful, and "practicable," functional stream mitigation.”

Response #39 - While EPA recognizes that the project includes mitigation efforts (including stream creation and enhancement of existing streams) to compensate for unavoidable adverse impacts, we believe that the high quality resources to be impacted cannot be considered as adequately compensated through linear creation of channel.  Additionally, the current mitigation plan does not adequately account for the quality and function of the impacted resources, including the in-stream biota and chemistry component.  The current mitigation plan also ignores the poor water quality that will likely exist in the created channels and the pollutants exported off site.

Studies have demonstrated, moreover, that replacement of streams is among the most difficult and frequently unsuccessful forms of mitigation. Even if stream structure and hydrology can be replaced, it is not clear that replacing structure and hydrology will result in true replacement of functions, especially the native aquatic community and headwater functions. Moreover, the mitigation does not account or compensate for many of the downstream impacts caused by the project. Finally, there is no evidence in the peer-reviewed literature that the type of stream creation in the CMP will successfully replace lost biological function and comparable stream chemistry.

Despite that the USACE’s Special Conditions identify, for example, biological scores (WVSCI) and habitat (RBP) similar to or better than pre-mine conditions in the created ditches, they fail to account for high failure rates associated with stream creation restoration projects (Bernhardt et al. 2007; Palmer et al. 2009).  Given what EPA currently knows of the physical, chemical and biological conditions in several example on-bench ditches, compensation for buried headwater streams is very unlikely to be attained.  The table below shows the benthic macroinvertebrate genera found in five sediment ditches compared to the frequency these same taxa are found at unmined sites. Clearly these ditches do not fully replace the functions of natural headwater streams where normally greater than 30 invertebrate genera would be found.

| Collection Date: | | | Oct. 8, 1999 | Oct. 8, 1999 | Oct. 8, 1999 | Oct. 8, 1999 | Oct. 26, 1999 |
|---|---|---|---|---|---|---|---|
| Site | | | Vance Branch | Rollem Fork | Left Fork | Honey Branch | Stanley Fork |
| Method | | | Ponar | Ponar | Ponar | Ponar | Kick Net |
| Order | Family | Genus | Sediment Ditch | Sediment Ditch | Sediment Ditch | Sediment Ditch | Sediment Ditch |
| Oligochaeta | Oligochaeta | Oligochaeta | 8 | 1088 | 240 | 192 | 0 |
| Basommatophora | Physidae | Physella | 0 | 0 | 0 | 0 | 4 |
| Ephemeroptera | Baetidae | *Baetis* | 4 | 0 | 8 | 272 | 0 |
| Ephemeroptera | Caenidae | *Caenis* | 0 | 0 | 104 | 0 | 0 |
| Trichoptera | Polycentropodidae | *Polycentropus* | 0 | 0 | 8 | 0 | 0 |
| Diptera | Certopogonidae | Unid. Ceratopogonid | 64 | 448 | 40 | 800 | 52 |
| Diptera | Chironomidae | Unid. Chironomid | 340 | 1024 | 480 | 816 | 163 |
| Diptera | Empididae | *Hemerodromia* | 0 | 0 | 0 | 0 | 3 |
| Diptera | Simuliidae | *Simulium* | 0 | 0 | 0 | 0 | 8 |
| Diptera | Stratiomyiidae | *Odontomyia* | 0 | 0 | 0 | 0 | 1 |
| Diptera | Tipulidae | *Tipula* | 0 | 0 | 16 | 0 | 1 |
| Coleoptera | Dytiscidae | *Cybister* | 0 | 0 | 8 | 0 | 0 |
| Coleoptera | Dytiscidae | *Laccophilus* | 8 | 0 | 0 | 0 | 0 |
| Coleoptera | Dytiscidae | Unid. Dytiscid | 0 | 0 | 0 | 16 | 0 |
| Coleoptera | Hydrophilidae | *Berosus* | 0 | 16 | 0 | 0 | 0 |
| Coleoptera | Haliplidae | *Peltodytes* | 0 | 0 | 0 | 32 | 0 |
| Odonata | Coenagrionidae | Unid. Coenagrionid | 0 | 0 | 80 | 48 | 15 |
| Odonata | Lebellulidae | Unid. Libellulid | 32 | 0 | 104 | 0 | 0 |
| Hemiptera | Mesoveliidae | Unid. Mesoveliid | 0 | 0 | 24 | 0 | 0 |
| | | **Total Richness** | **6** | **4** | **11** | **7** | **8** |
| | | **EPT Richness** | **1** | **0** | **3** | **1** | **0** |
| | | | | | | | |
| All data as reported by Kirk (1999) except Stanley Fork (collected by US EPA Region III). | | | | | | | |
| Note: Coenagrionidae, Chironomidae and Ceratopogonidae collapsed to family-level for Stanley Fork ditch. | | | | | | | |
| Chironomidae found 100% of time at Unmined sites because this family is found in virtually all aquatic habitats. | | | | | | | |

The USACE's Special Conditions performance standards for Spruce No. 1 (i.e., WVSCI and RBP Habitat Score) are ineffectual since existing evidence reveals that the created channels will fail to meet those special conditions; especially WVSCI greater than 80 for most sites. Moreover, a greater than 1:1 mitigation ratio requirement in the Special Conditions is ineffective for compensation because the record shows that converted sediment channels are likely to export poor, degraded water. Any conditions for corrective, after-the fact remedial measures imposed by the Corps are also problematic because the fill will already be in place. Thus, without data showing that this form of stream creation is likely to successfully replace lost functions of a fully functional Appalachian mountain stream, there is no basis in the record to support a finding that the mitigation will decrease effects to acceptable levels.

Moreover, while the permit requires biological and chemical monitoring, it does not provide any action to be taken if monitoring reveals that biological or chemical parameters are being adversely impacted. For example, while Special Condition 13 suggests biological scores "should" be comparable to baseline scores, Special Condition 5 states that the compensatory mitigation obligation is satisfied when the Corps has verified that the mitigation area is "intended" to become functioning jurisdictional waters, not when that goal is actually achieved.

Furthermore, the USFWS (5/30/2010 letter) concurs that proposed mitigation is inadequate stating "… it is difficult to replace the stream functions when they have not been adequately assessed. Second, creating streams using on-site drainage ditches, enhancement measures that include channel or habitat improvement and changing the classification of a stream from intermittent to perennial is not sufficient to replace the quality of the streams impacted." USFWS also disagreed with applicant's assertion that on-site erosion control structures are equivalent of existing streams. The drainage ditches are designed strictly with a physical component and lack a replacement of stream function. The existing water courses are healthy, biologically functional streams. The erosion control structures are designed to convey water, not replace or restore ecological services. Erosion control structures lack the groundwater-derived and nutrient-rich base flow, temperature regimes, habitat diversity, natural gradient, floodplains, connectivity to downstream ecosystems and other features of natural streams.

See also Response #37.

Comment #40 – HW suggests that the project complies with all the mitigation requirements including avoidance.

> "Consistent with RGL 02-2, the CMP analyzed in detail on-site avoidance and minimization actions, goals and objectives of the compensatory mitigation plan, site selection, the mitigation work plan and description of construction activities, performance standards, site management and maintenance plan, monitoring and long term management plan, contingency plan, adaptive management, and financial assurances."

Response #40 – Under Section 404(c), EPA has discretionary authority to prohibit or withdraw the specification of a defined area as a disposal site whenever it determines that the discharge will have an unacceptable adverse effect on a number of identified categories. Therefore, as a legal matter, 404(c) provides EPA with the authority to "veto" a project even if the project proponent had avoided discharges when possible and minimized discharges that could not be avoided. The statutory standard does not mention the avoidance and minimization requirements of the Guidelines and authorizes EPA to determine what an unacceptable adverse effect is. EPA's Final Determination, therefore, is not dependent on a finding that the project failed to avoid or minimize discharges.

EPA disagrees, however, that discharges were sufficiently avoided and minimized here. EPA maintains that there appear to be additional practicable alternative project configurations and practices that would significantly reduce and/or avoid anticipated environmental and water quality impacts to Pigeonroost Branch and Oldhouse Branch. Moreover, § 230.10(a) establishes rebuttable presumptions that, in the case of non-water dependent projects (such as this), practicable, less environmentally damaging alternatives exist. EPA does not believe the permittee has carried its burden to clearly demonstrate that such alternatives do not exist.

During discussions before and during EPA's 404(c) action, Mingo Logan Company has expressed a willingness to take some additional steps focusing on best management practices to reduce impacts, but has been consistently unwilling to consider needed actions to further reduce the 35,000 feet of direct impacts of valley fills on headwater streams.

Because the scope of this Final Determination is limited to withdrawal of specification of Pigeonroost Branch and Oldhouse Branch as disposal sites for discharges of dredged or fill material in connection with the Spruce No. 1 Mine, EPA takes no position as to whether less damaging alternatives would be likely to result in acceptable or unacceptable effects on wildlife or satisfy the § 404(b)(1) Guidelines. However, the facts that such alternatives appear to exist based on extensive experience with other mining operations in Appalachia, and that the permittee has not clearly demonstrated to the contrary, further enhance our assessment of the unacceptability of the impacts that we previously described.

Comment #41 – HW suggests that the compensatory mitigation plan (CMP) for Spruce No. 1 used the appropriate evaluation protocols, including EPA methods and WVDEP's WVSCI, to assess the resources at the project site in order to create the mitigation plan and as such the mitigation plan is "sufficient to offset unavoidable impacts to waters of the U.S."  They further state that although critical of these methods EPA never proposes alternative protocols.

> "Much of the CMP addressed the development of baseline information for the onsite streams to be impacted and the offsite streams to be enhanced."
>
> "The CMP selected representative locations on both onsite and offsite streams and then undertook a chemical analysis and a habitat assessment at each location."
>
> "The habitat assessment employed two EPA methodologies: the EPA's *Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates, and Fish* and Region III's and EPA's *A Stream Index for West Virginia Wadeable Streams."*
>
> "At the time of permit issuance, the governing provision for the development of baseline information on impacted aquatic resources was set forth in RGL 02-2."
>
> "Rather, instead of requiring full compensation for area and function, the applicable regulatory provisions and case law simply state that, when an accepted functional assessment methodology is not available for streams, full compensatory mitigation can be achieved by mitigation of at least the same number of linear feet of stream as would be impacted. That is the governing standard for stream mitigation at this site and it has been more than completely satisfied by a mitigation plan providing more than 2:l linear feet of compensatory mitigation."
>
> Thus, the mitigation imposed by the special conditions "has been developed in accordance with the Corps regulatory guidance letter dated December 24, 2002, incorporates a watershed approach and is sufficient to offset unavoidable impacts to waters of the U.S."
>
> "Throughout this entire section of the Proposed Determination, EPA never specifically identifies the functions which must be assessed, the accepted methodologies for assessing such functions, or the performance standards which must be used to assure successful replacement of functions."
>
> "Moreover, nothing in EPA's comments nor its Proposed Determination establishes that EPA's bioassessment methodologies, the RBP and the WVSCI, are invalid or are not an appropriate quantitative method for obtaining baseline information on stream structure and function. Moreover, the Proposed Determination does not provide any indication of

> what existing stream assessment method is mandated for headwater streams to replace the RBP and WVSCI."

Response #41 – See Response #37, 39,and 43.

Comment #42 – The HW comments suggest that the CMP's special conditions and the monitoring plan is sufficient to ensure success or require remedial action if it is not. "Recognizing the uncertainty concerning the success of stream mitigation, the Special Conditions establish a robust monitoring program over a minimum of 10 years to evaluate whether the mitigation is satisfying detailed performance standards."

> "In order to ensure compliance with these performance standards, the Special Conditions impose multiple evaluations of mitigation performance and the implementation of adaptive management, contingency plans, corrective actions, and remedial measures in the event of mitigation failure."
>
> "In the event of a failure to meet performance criteria, the Special Conditions require performance of corrective actions, adaptive management, and remedial measures on the mitigated stream segments or at new mitigation sites."

Response #42 – See Response # 37, 39 and 41 above.

Comment #43 – HW appears to acknowledge the fact that an appropriate functional assessment has not been developed for stream systems and discusses the special condition in the permit that requires the use of such a protocol to assess the mitigation sites when one is developed by EPA.

> "These performance standards take account of the current lack of an accepted functional assessment methodology for headwater streams and the efforts of federal and state environmental agencies to develop a headwater stream assessment procedure for the State of West Virginia. Special Condition 22 at 7. See Exhibit 1. As recounted in the Special Conditions,
>
>> Efforts are also underway by the USEPA to facilitate the development of a functional assessment protocol to measure ecosystem functions of headwater streams and assess functional impacts that result from valley filling activities in the Appalachian Coal Region of West Virginia using established protocols. USEPA proposes to develop a functional stream assessment that can be used by regulators and to justify the use of structural measures in assessing functions of waters. USEPA has proposed to develop and assess rapid techniques to measure functional properties (i.e., organic matter decomposition rates; nutrient transport and uptake; primary production and metabolism; secondary production; and organic matter retention and transport) and to assess the relationships between functional and structural measures."
>
> "The Special Conditions require that this headwater stream assessment protocol will be used, along with the other detailed performance standards, to determine whether the

stream mitigation is successful: "Upon finalizing these stream assessment protocols, the permittee shall use these tools to assess the success of the proposed mitigation sites."

"For this permit, the Corps has done what is "practicable" given the absence of existing regulatory tools to assess specific functions at the impacted or mitigation streams. If there is a difficulty or perceived inadequacy, it is only because of EPA's failure to develop an accepted methodology for assessing the functions of headwater streams. At base, the Proposed Determination on this issue stands for the insupportable proposition that EPA's continued failure to develop an accepted headwater stream assessment protocol is a sufficient ground for overturning a permit issued over three years ago. EPA's failures, however, do not provide grounds for determining an existing and lawful permit to be "unacceptable.""

Response #43 – EPA disagrees. The Final Determination is not dependent upon the presence or absence of a headwater stream assessment protocol. The Final Determination is based upon a finding that Pigeonroost Branch and Oldhouse Branch support some of the few remaining "least disturbed" conditions in the Headwaters Spruce Fork sub-watershed and Coal River sub-basin. As such, they perform important functions to these larger watersheds, including but not limited to provision of clean water dilution. The Final Determination is based upon a finding that destruction of these resources through the construction of valley fills will not only remove the beneficial functions performed by Pigeonroost Branch and Oldhouse Branch but will also convert those waters into contributors of additional stressors. The Final Determination concludes, based upon the available studies and other information regarding stream creation science, that the project as authorized will result in unacceptable adverse effects.

See also Response #37and 39.

Comment #44 – HW states that there is no requirement for mitigation to be founded on baseline data and that stream structural attributes can be used as a surrogate for a functional analysis.

"Any suggestion by EPA that baseline information must assess stream functions directly is contradicted by applicable law and regulation. As explained above, neither RGL 02-2 nor the new mitigation regulation requires the quantitative assessment of stream functions, particularly when no functional assessment methodology is available."

"Just as in OVEC, "[t]he Corps currently does not have a functional assessment protocol in place for use in West Virginia" which "generally means assessing stream structure as a surrogate for function." OVEC, 556 F.3d at 198. The United States has successfully asserted, and the courts have ruled, that the Corps can use "stream structure as a surrogate for assessing stream function" in such situations."

Response #44 – See Response #37, 39, 41 and 43. Also, because EPA believes that the resources proposed to be impacted are of such high quality, we believe it is extremely unlikely that high-value streams such as these can be replaced by on-site stream creation techniques involving conversion of sedimentation ditches fed by mine spoil runoff and seepage.

The importance of detailed baseline information in the development of sound compensatory mitigation plans was clearly articulated in RGL 02-2 which includes the following discussion of baseline information:

> **Baseline Information:** As part of the permit decision Districts will include approved, written compensatory mitigation plans describing the location, size, type, functions and amount of impact to aquatic and other resources, as well as the resources in the mitigation project. In addition, they should describe the size, e.g., acreage of wetlands, length and width of streams, elevations of existing ground at the mitigation site, historic and existing hydrology, stream substrate and soil conditions, and timing of the mitigation. Baseline information may include quantitative sampling data on the physical, chemical, and biological characteristics of the aquatic resources at both the proposed mitigation site and the impact site. This documentation will support the compensatory mitigation requirement.

Comment #45 – HW states that "EPA cannot complain that the impacted or mitigated streams were not assessed using a functional assessment methodology that did not exist at the time of permit issuance and does not exist today."

Response #45 – See Responses #37, 39, 41, 43 and 44 above.

Comment #46 – HW comments refute EPA's claims that there is a misclassification of stream resources at the project site (i.e., between the amount of perennial, intermittent and ephemeral streams) and also suggest that EPA did not raise the issue in the past. Finally, HW comments that EPA does not provide the science or the studies behind the claims of stream misclassification.

> "EPA certainly knew about the nature, size, location, and drainage area of each of the streams proposed to be impacted and never raised this issue of alleged misclassification during the approximately seven years between the time of the delineation (2000) and the time of permit issuance (2007)."
>
> "EPA had a full opportunity to challenge the classification during this permit process, or to declare a special case and make the jurisdictional determination and stream classifications, but chose not to do so."
>
> "Because EPA does not cite or identify the studies that may provide the basis for misclassification, it is still not possible to meaningfully evaluate or comment on EPA's claim."

Response #46 - EPA disagrees. In regard to Spruce No. 1, differentiating the types of expected aquatic communities, the degree in which structure and function is provided, and amount of organic matter and nutrients (and pollutants) ultimately retained or loaded to receiving streams is critical.

Many scientists agree that classifying streams by single abiotic or hydrological parameters for assessing aquatic life potential is unsatisfactory for several reasons. First, hydrological parameters vary temporally and seasonally and can be difficult to measure accurately. Second, several abiotic parameters determine whether a stream can support aquatic life (e.g. length of dry period, connectivity through subsurface or interstitial flow, presence and quantity of refugia) (Boulton 1989, Williams and Hynes 1977, Williams 1987). Third, many aquatic invertebrates have generalized adaptations for surviving periods of low or no surface flow (Williams 1996). Biological assemblage data can indicate the long-term hydrological characteristics of streams because many of the species are long lived and require flowing water for their life cycles. Consequently biological data can be used in conjunction with hydrologic data to more accurately describe or confirm the long-term hydrologic characteristics of streams.

Acknowledging that the stream class determinations made by Decota Consulting (on behalf of Mingo Logan) were based on WVDEP's guidance document (dated Oct. 25, 1999), the actual results do not correspond with independent data (see Green and Passmore, 1999), and new scientific information concerning the designation of these stream types (Paybins 2003; Svec et al.2005: Fritz et al., 2006, 2008; Pond and Passmore 2008). Overall, through onsite visits and biological data collection, EPA conservatively estimates that, within the mine footprints of Right Fork Seng Camp, Pigeonroost, and Oldhouse Branch, over five miles of stream (~27,000 feet) are perennial. This is in contrast to the DA Permit estimation of 165 feet of perennial waters within the entire project area.

On-the-ground field observations in the Spruce No. 1 project area also support the conclusion that stream resources have been underestimated. A field reconnaissance by EPA (accompanied by Sturm Environmental, Inc.) during dry conditions in September 1998 (reported in Green and Passmore, 1999) found distinct perennial benthic communities (i.e., long-lived taxa representative of perennial conditions) in the upper reaches of Seng Camp, Pigeonroost, and Oldhouse that were largely not acknowledged by the USACE during the permit process. This 1999 EPA report was sent to Huntington District USACE Regulatory Branch Chief (M.D. Gheen) on July 29, 1999 and was subsequently published in the Corps' September 2006 FEIS, but was not incorporated into the analysis.

This misclassification has a critical impact upon the type of mitigation that would be required to offset these impacts. The resource type plays an important role in the types of expected aquatic communities, the degree in which each resource provides structure and function, and the amount of organic matter and nutrients (and contaminants) ultimately retained or loaded to receiving streams. This misclassification means that the compensatory mitigation plan does not properly account for, and therefore would not offset the full range of adverse impacts related to the project. A more detailed description of EPA's analysis of stream type is described in Appendix 3.

Notwithstanding the strong record support for EPA's conclusion that the streams on the site were misclassified by the Corps, the impacts to the wildlife in those streams and downstream from those streams are the same regardless of the scientific classification of those streams. EPA's Final Determination, therefore, is not dependent on a reclassification of these streams.

Comment #47 – HW suggest that there is only one regulatory definition for stream types and that definition was used by Mingo Logan to determine stream type for impact analysis and to determine appropriate mitigation. Additionally, HW claims that stream type is irrelevant for determining mitigation requirements.

> "At the time of permit issuance and even after the issuance of the new mitigation regulation, there was only one regulatory definition of ephemeral, intermittent, and perennial streams within the Section 404 program, which is contained in the Corps nationwide general permit regulations."
>
> "Wholly apart from the reasonableness of the classification method used by the Corps, the classification of the streams is legally irrelevant to the mitigation required for this particular permit."
>
> "…where no accepted functional assessment methodology is available for streams, the applicable regulatory provisions require that "mitigation projects for streams should generally replace linear feet of stream on a one-to-one basis. (RGL 02-2, Section 2.d.5.) This regulatory provision does not specify that the replacement linear feet of stream should be of any specific kind of stream, nor does the RGL establish a requirement for in-kind replacement for streams."
>
> "In fact, as the Fourth Circuit ruled when construing the 1:l linear foot standard, "[n]othing in the Corps CWA guidance requires that only in-kind . . . mitigation measures be used." OVEC, 553 F.3d at 204. Thus, under the applicable regulatory provisions, Mingo Logan was not required to provide in-kind replacement, provided that at least a 1: 1 linear foot ratio was attained."

Response #47 – See Response #37 & 46 above.

Comment #48 – HW also states that "EPA also fails to explain which streams would be reclassified under its proposed new classification methodology and what impact such reclassification would have on the amount of required mitigation." HW claims that even under a new stream classifications the CMP would still provide greater than 1:1 replacement for every stream type impacted and that 1:1 replacement is an adequate compensation for impacts to lost stream resources.

> "Thus, even if the applicable provision required 1:l in-kind mitigation for each stream classification, the shift of a few thousand linear feet of stream into the intermittent or perennial categories, as alluded to in the Proposed Determination, would not impair the 1: 1 ratio required by the applicable regulatory provisions for each of the stream classifications and would not, in any event, be so large as to make the impacts, as mitigated, "unacceptable.""
>
> "In virtually identical circumstances to those presented here, the OVEC court affirmed the applicability of the 1:l linear foot mitigation standard for headwater streams and that the 1:l standard satisfies the objective of full compensatory mitigation."

Response #48 – See Response #37 and 46 and  and Appendix 3 for a more detailed description of EPA's analysis of stream type classification.  Moreover, EPA has no assurance that the proposed mitigation ratios are capable of offsetting the loss of Oldhouse and Pigeonroost Branch.  The streams of Pigeonroost and Oldhouse Branch have been shown to exhibit high water quality and high functioning capacity.  Given the difficulty of stream re-establishment to mitigate for impacts to streams in general, EPA believes it is even more unlikely that high value streams such as these can be replaced by on-site stream creation techniques involving conversion of sediment ditches.  EPA believes that the mitigation for the Spruce No. 1 project is unlikely to offset the anticipated impacts to an acceptable level.

Comment #49 – HW comments that "….it is unclear whether a shift in classification for impacted streams from intermittent to perennial would result, in EPA's view, in a greater length of streams with higher stream functions."

Response #49 – The shift described by EPA is actually from "ephemeral" status (e.g., only flows in response to precipitation) to "perennial". The starting point for an adequate compensatory mitigation plan is accurate characterization of the impacted resources.  In regard to Spruce No. 1, differentiating the types of expected aquatic communities, the degree to which structure and function is provided, and amount of organic matter and nutrients (and pollutants) ultimately retained or loaded to receiving streams is critical to ensure adequate compensation for lost resources.  See also Response #46 above.

Comment #50 – HW suggests that EPA has developed new standards for mitigation and applied them only to the Spruce No. 1 project.

> "According to EPA, those steps include: 1) a full assessment of "the range of physical, chemical and biological features that contribute to the pre-project level of function of targeted ecological systems;" 2) development of "a range of mitigation practices that fully compensate for all lost or modified features (physical, chemical, biological) and the concomitant loss of both function and areal extent;" and 3) development of a monitoring protocol and remedial activities to offset any mitigation failure."
>
> "EPA does not cite to any applicable regulatory provisions that require these three steps, and in fact there are none. This is simply a new standard devised by EPA for the purpose of this proceeding which does not comport with the mitigation standards applicable to this permit, the case law, or even EPA's new regulations promulgated more than a year after permit issuance.  EPA cannot base a finding of "unacceptability" on such an alleged "standard.""

Response #50 –   See Response #37.

Comment #51 – HW suggests that regarding the Stream Habitat Unit ("SHU") Assessment (SHU) "EPA misunderstands the role of the SHU in this permit process."

> "The SHU methodology was used in the EIS as one means to gather and assess baseline data on the impacted streams, FEIS, pp. 2-72 through 2-73, 2-94, but it was not used by the Corps to determine the appropriate amount of mitigation.
> Instead, based on the applicable provisions of RGL 02-2, the CMP based the mitigation on achieving at least a 1: 1 ratio between the linear feet of impacted and mitigated streams. In the Special Conditions regarding mitigation, the Corps explicitly superseded the approach to mitigation taken in the FEIS and replaced this approach with the November 2006 CMP."
>
> "Just as EPA does in this Proposed Determination, the OVEC plaintiffs contended that the Corps improperly relied on the SHU methodology to determine the appropriate amount of compensatory mitigation, and just as in the permit at issue here, the Corps utilized the SHU to provide supplemental baseline data regarding stream habitat. The Corps did not rely on the SHU to determine the appropriate amount of mitigation but instead established the required mitigation based on one-to-one linear foot replacement."

Response #51 – Even though the Corps did not rely solely on the SHU for mitigation requirements, the Corps did not prevent the permittee from using this approach as a basis for its mitigation plan, thereby allowing Mingo Logan to use this approach to help justify mitigation performance and success criteria.

Comment #52 – HW also comments that "EPA also asserts that enhancement must be provided at greater than a 1:1 ratio to compensate for lost functions, but this assertion is seeking to apply the wrong standard. The 1:1 linear foot standard does not specify the type of mitigation needed to satisfy the ratio."

Response #52 – The CMP proposes over 11,000 feet of "enhancement", and over 7,000 feet of "restoration" for adverse stream impacts from the Spruce No. 1 Mine. The notion that enhancement (e.g., stream bank protection, adding structural complexity in the form of boulder clusters, j-hooks, vortex rock weirs, etc.) can replace the functions and values lost from burial of high quality streams on a foot per foot basis is unfounded. The 2,500 feet of "enhancement" activities in Rockhouse Fork will likely gain little biological lift since this stream is chemically polluted (i.e., high Se, conductivity, and sulfates). Some sections of Spruce Fork proposed for enhancement appear to be, for the most part already physically intact, ecologically functioning streams. The diagrams of enhancement techniques (i.e., vortex weirs, j-hooks, boulder clusters) pictured in Exhibits 7-15 of the CMP, and to be deployed in Spruce Fork and Rockhouse, give no assurances whatsoever that lost headwater stream structure and function will be offset by enhancements in the mitigated stream segments.

The on-site "restored" sections of stream in connection with sedimentation ponds and mine-through areas will also not function like pre-mining streams because of chronic chemical pollution leaching from mine spoils and valley fills (e.g., Fritz et al 2010). The term "restoration" means to the manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural or historic functions. Because water quality drives the structure of aquatic communities more in affected mined streams, simply applying a "natural channel design" component and riparian plantings will not re-establish the naturally occurring indigenous wildlife or ecosystem functions that currently exist in Pigeonroost and Oldhouse. Furthermore, these so-called "restored" segments will continue to export degraded water further downstream to Spruce Fork and the Little Coal River.

Comment #53 – HW criticizes EPA's assertion that on-site stream creation using drainage ditches should not be considered mitigation and claims that EPA is currently approving such practices in other mining projects.

> "In virtually identical circumstances to those applicable to this permit, the Fourth Circuit in OVEC ruled that creation is an acceptable form of mitigation for headwater streams in Appalachia. In that case, the plaintiffs challenged the conversion of sediment ditches into new stream channels, claiming that such stream creation was scientifically untested and unsound and thus could not qualify as an acceptable mitigation measure. In light of the Corps effort to "make complex predictions within its area of special expertise" and "the monitoring plans in place [which] allow the Corps to reevaluate their efficacy determinations as the stream creation projects progress," the Fourth Circuit upheld the Corps's imposition of stream creation as "the most appropriate and practicable means of compensating for anticipated impacts and losses of value."
>
> "Moreover, EPA's current concern about the success of stream creation is at odds with its position on contemporaneous mining permits conveyed to the Huntington District. Corps Memorandum for Record at 21. In those permits, EPA suggested the practice of using sediment control structures on the down-dip end of reclaimed mine sites - a practice adopted by the CMP for this component of the mitigation plan."

Response #53 – See Response #37.

Comment #54 – HW comments suggest that in criticizing the on-site stream creation EPA is not taking into account the features of the CMP designed to mitigate water quality problems and to replace the lost stream functions.

> "Aside from ignoring the legal requirements applicable to the stream creation authorized under the permit, EPA has also ignored the numerous features of the permit and CMP which are intended to create a stream that not only conveys water but that also replaces the stream's structure and functions."
>
> "Rather than a simple structure to convey water, the created streams will be carefully designed to mimic the features of a natural stream, in order to provide stream stability, nutrient cycling, and functioning aquatic and riparian habitat."
>
> "Equally important, this concern ignores the many features contained in the CMP and required by the Special Conditions that will mimic the structure, aquatic habitat, and nutrient production of a natural stream of a similar Rosgen type."

Response #54 – See Response #37, 39 and 41. While EPA recognizes that the project includes mitigation efforts (including stream creation and enhancement of existing streams) to compensate for unavoidable adverse impacts, we remain concerned that known compensatory mitigation techniques would be unlikely to replace the high quality resources in Pigeonroost Branch and Oldhouse. There is no evidence in the peer-reviewed literature that the type of stream creation included in the CMP will successfully replace lost biological function and comparable stream chemistry to high quality stream resources, such as Pigeonroost Branch and Oldhouse Branch. Studies have demonstrated that replacement of streams is among the most difficult and frequently unsuccessful forms of mitigation. Even if stream structure and hydrology can be replaced, it is not clear that replacing structure and hydrology will result in true replacement of functions, especially the native aquatic community and headwater functions.

Comment #55 – HW comments criticize EPA's concerns that on-site mitigation in the form of drainage ditches has the potential to export poor water quality.

> "Another concern raised in the Proposed Determination is that restored or created on-site streams have "the potential to export poor-quality water to downstream waters" and "cause additional adverse impacts downstream." This concern, which seems to be based on a caricature of the created streams as mere "erosion control structures" and is not supported by any EPA data, ignores the water quality certification granted by the State for the authorized discharges, including the mitigation plan."
>
> "Moreover, this concern ignores the Special Conditions that require a robust monitoring program, including chemical monitoring of water quality in mitigated stream segments utilizing EPA approved methods. Special Conditions 14, 15,22 at 4-5,7." See Exhibit 1. These water quality data will be used, along with any functional stream assessment methodology developed by EPA, to assess the success of proposed mitigation sites. Special Condition 22 at 7. See Exhibit 1. Thus, any residual concern about impacts on downstream water quality is fully addressed by the monitoring of water quality."

Response #55 – EPA believes this form of compensation for the burial of high quality headwater streams is inappropriate because aquatic physical, chemical, and biological quality will be highly degraded. These ditches represent completely different and degraded aquatic systems, and thus will not compensate for lost Appalachian headwater streams. Even when the applicant enhances the sediment ditches for benthic substrata and riparian vegetation (e.g., boulder clusters every 500-1000 ft), the water quality will likely be so degraded that the ditches will not meet or exceed pre-mining WVSCI scores required by the USACE Special Conditions. EPA provides a thorough discussion of this issue in Appendix 3 of the RD.

Furthermore, despite assurances from HW which state "Thus, any residual concern about impacts on downstream water quality is fully addressed by the monitoring of water quality," The commenter does not explain how monitoring and/or assessment alone will resolve any water quality concerns. EPA remains concerned that monitoring water quality without any proposed treatment would not address the degradation of water quality, onsite and downstream.

Also, see Response #37 and #39 above.

Comment #56 – HW comments state that, contrary to EPA's claims in the Proposed Determination the permit has provisions for water quality and biological diversity monitoring and that this monitoring will be used as measures of success for the mitigation.

> "The Special Conditions require the collection of water chemistry and physiochemical parameters in accordance with EPA's "Interim Chemical/Biological Monitoring Protocols for Coal Mining Permit Applications." Special Condition 14 at 4. See Exhibit 1. They also require the monitoring of physical habitat and benthic communities utilizing the EPA's RBP and WVSCI, which at a minimum assess structure as a surrogate for the chemical and biological condition of the stream, as authorized in OVEC. Special Condition 13 at 4. See Exhibit 1."

Response #56 – See Response # 37 and 39. It is unclear how monitoring of water chemistry, physiochemical parameters, physical habitat and benthic communities will mitigate for any impacts from degraded water quality in the mitigation structures. The available data clearly indicate that these structures will not replace the lost stream functions and in fact will contribute to water quality degradation of downstream waters.

Comment #57 – "The Proposed Determination concludes with the observation that stream creation is "difficult and frequently unsuccessful" and "there is no evidence in the peer-reviewed literature that the type of stream creation proposed in the CMP will successfully replace lost biological function and comparable stream chemistry." As explained in previous sections, stream creation in Appalachia has been authorized by the courts as an acceptable form of mitigation. Therefore, the difficulty of stream creation and potential lack of success is not a lawful basis for prohibiting stream creation or finding any potential adverse effects to be "unacceptable.""

Response #57 – See Response #37, 39, 41 & 44. There is no evidence in the peer-reviewed literature that the type of stream creation included in the CMP will successfully replace lost biological function and comparable stream chemistry to high quality stream resources, such as Pigeonroost Branch and Oldhouse Branch or mitigate the impacts to an acceptable level. Studies have demonstrated that replacement of streams is among the most difficult and frequently unsuccessful forms of mitigation. Even if stream structure and hydrology can be replaced, it is not clear that replacing structure and hydrology will result in true replacement of functions, especially the native aquatic community and headwater functions.

The USFWS recently (letter of June 2, 2010) expressed similar concerns for the currently proposed mitigation including:

- Impact to the high-quality headwater stream in and downstream of the project area have not been adequately quantified;
- The proposed mitigation is unlikely to sufficiently compensate for the expected loss of, and degradation to, these systems;
- Appropriate performance standards have not been developed to determine if and when mitigation has successfully compensated tor lost or diminished physical, chemical and biological processes and ecological functions of the impacted streams.

Comment #58 – HW comments state "Mingo Logan Has Demonstrated That The Permitted Action Is The Least Environmentally Damaging Practicable Alternative."

> "Although EPA had several opportunities to comment on alternatives during this lengthy permit proceeding, EPA never identified this specific alternative for the Corps's consideration. Moreover, even today, EPA does not attempt to and cannot demonstrate that the sequential fill "approval" alternative mentioned in the Proposed Determination is practicable or less environmentally damaging than the Spruce No. 1 project that has already been approved."
>
> "The Corps has exhaustively and consistently analyzed alternatives during the lengthy Spruce No. 1 EIS and permitting process."
>
> "The Corps Conducted A Robust And Complete Alternatives Analysis Of The Spruce No. 1 Mine."

Response #58 – see Response #40.

Comment #59 – HW comments also suggest "The Corps has already considered EPA's comments regarding alternatives and has secured project changes as a result. EPA cannot now "redo" the previous process. In any event, EPA has not and cannot demonstrate that either a sequential fill "approval" alternative or the use of "side hill" fills would be less environmentally damaging than the approved Spruce No. 1 project" and "The Corps Conducted A Robust And Complete Alternatives Analysis Of The Spruce No. 1 Mine."

Response #59 – Neither the Proposed Determination nor the Final Determination suggest that EPA's finding of unacceptable adverse effects can be resolved through use of side hill fills or sequential approval of valley fills (by which EPA assumes the commenter refers to the concept that only one valley fill at a time is authorized and constructed and that information from monitoring the impacts of the preceding valley fill is used to make decisions about authorization of future fills). To the contrary, the Final Determination withdraws specification of Pigeonroost Branch and Oldhouse Branch as disposal sites for the discharge of dredged or fill material. The permittee has not demonstrated, and the Corps has not considered, whether the project purpose can be met without permanent discharge of fill material to Pigeonroost Branch and Oldhouse Branch through alternatives mine design and/or construction techniques.

Comment #60 – HW comments states that "The Corps has exhaustively and consistently analyzed alternatives during the lengthy Spruce No. 1 EIS and permitting process" and that as a result the authorized Spruce No. 1 Mine project is the least damaging alternative. They further state that EPA's proposed alternative of sequential fills is not deemed practicable by Mingo Logan because among other things it would not meet the project purpose.

> "Mingo Logan Has Demonstrated That The Permitted Action Is The Least Environmentally Damaging Practicable Alternative."

"Although EPA had several opportunities to comment on alternatives during this lengthy permit proceeding, EPA never identified this specific alternative for the Corps's consideration. Moreover, even today, EPA does not attempt to and cannot demonstrate that the sequential fill "approval" alternative mentioned in the Proposed Determination is practicable or less environmentally damaging than the Spruce No. 1 project that has already been approved."

EPA has not and cannot demonstrate that either a sequential fill "approval" alternative or the use of "side hill" fills would be less environmentally damaging than the approved Spruce No. 1 project."

"EPA's Fill "Approval" Alternative Is Not Practicable. The only alternative mentioned by EPA is a sequential fill "approval" system. This is not a practicable alternative because it does not meet the overall project purpose, would have significant costs, and is logistically impracticable. Moreover, this suggested alternative would not be less environmentally damaging to the aquatic ecosystem."

"In addition to failing to meet the project purpose, EPA's "approval" alternative imposes unreasonable costs."

"Logistics Make Sequential Approval Impracticable."

"A Sequential Fill "Approval" Alternative Is Not Less Environmentally Damaging."

"The Fill "Approval" Alternative Is Not Lawful."

Response #60 – See Response # 40 and #59

**Comments submitted by Hunton and Williams also contained specific technical criticisms of EPA's Proposed Determination on the Spruce No. 1 Surface Mine in Logan County, West Virginia. That document and its analyses were produced by CH2M HILL, environmental consultants for Hunton and Williams. The comments can be found in Hunton and Williams's submission at Volume IV CH2M HILL, Technical Evaluation Document. Those specific comments are addressed below.**

Comment #61 - CH2M HILL suggests that there will be insignificant impacts to primary production and energy flow at the project site as a result of the authorized valley fills. "The Spruce Mine DEIS and FEIS (USACE 2006a, 2006b, respectively) demonstrate that the functions of primary production and energy flow in downstream reaches are not significantly affected by the proposed stream valleyfills resulting from mining operations."

Response #61 **–** EPA disagrees. Headwater streams such as Pigeonroost and Oldhouse Branches play an important role in the ecosystem far beyond the mere transport of water from one point to another. Appalachian headwater streams and their wildlife inhabitants convert organic matter from the surrounding landscape (such as leaf litter) and transform it into nutrients and energy that can be transported and consumed by downstream ecosystems. They also play an important role in storing, retaining and transporting nutrients, organic matter, and sediment. In addition they perform hydrologic functions related to downstream flow regimes, moderating flow rate and temperature. "Value of Headwater Streams: Results of a Workshop" from PEIS on MTM/VF (EPA 2003; http://www.epa.gov/region03/mtntop/pdf/appendices/d/value-of-headwater-streams/headwater.pdf); Fischenich, J.C. (2006).

Pigeonroost and Oldhouse Branches are performing a vital water quality function by providing good quality water dilution to downstream reaches in Spruce Fork, moderating concentrations of selenium and conductivity in those waters. This function will be significantly degraded by the project if constructed as authorized. The project as authorized will result in increased loadings of total dissolved solids and selenium to downstream waters.

See also Response #25.

Comment #62 - "There is no demonstration by USEPA that the loss of the impacted streams would cause an adverse impact. These streams are not uncommon resources in the area and do not provide unique ecological functions."

Response #62 **–** See Response #21 & 23. Based on a comparison of their macroinvertebrate communities, Oldhouse Branch and Pigeonroost Branch are of comparable quality to White Oak Branch, recognized by the WVDEP as supporting least-disturbed, reference quality conditions. Accordingly, Oldhouse Branch and Pigeonroost Branch reflect least-disturbed conditions and represent some of the few remaining streams within the Coal River sub-basin that have not been significantly adversely impacted by human disturbances. Water chemistry data for Pigeonroost Branch and Oldhouse Branch also reflect healthy streams with little human disturbance. Based on the WVDEP dataset (2002-2003), Oldhouse Branch had an average conductivity level of 90 µS/cm, which is below that of White Oak Branch, a nearby reference-quality stream. A WVDEP report states: "Since reference sites reflect least-degraded conditions, it is vital that the WVDEP do its part in fulfilling the mission of preserving the high quality of these rare and important streams. It is also important that the agency make a concerted effort to find the apparently few remaining streams within the watershed that have not been significantly impacted by human disturbances" (WVDEP 1997a).

Comment #63 - "There is no demonstration by USEPA that primary functions (e.g., carbon flow and energy transfer) would be impacted by loss of the headwater streams. The analyses described in the Spruce Mine DEIS and FEIS (USACE 2006a, 2006b, respectively indicate that these functions would be largely offset with the drainage control plan. A review by USEPA (2009) found that there are no reported studies from other mining operations that reach a different conclusion."

Response #63 - See Response #25 & #62. Using a simple carbon-flow model (e.g., as demonstrated in the DEIS) does not give assurances that the "quality of the carbon energy and other nutrients" delivered to downstream reaches will sustain naturally occurring biota, and the natural functions of headwater streams. Any offsets provided by drainage ditches and temporary sediment ponds were not sufficiently demonstrated.

In addition, comments made by the USFWS in their December 4, 2001 letter to the Huntington District Corps of Engineers support EPA's conclusions that a simple carbon flow model is not sufficient to characterize headwater stream function, as primary and secondary production (i.e., carbon flow) alone does not adequately describe the function of stream systems. They state; "Truncating a stream system by burial of its headwaters will affect downstream organic transport. This section of the PDEIS assessed only primary and secondary production... Neither source, transport nor spiraling of energy through the system was assessed." Further, they state, "Because of differences in size of production areas in small ponds and the stream riparian vegetation zones, it is illogical to conclude that ponds would replace lost stream production. Additionally, the PDEIS has not considered the differences in pond riparian vegetation or the differences in processing rates that might occur in streams and ponds."

Comment #64 - CH2M HILL'S comparison of the WVSCI and GLIMPSS suggests that a group of organisms referred to as EPT taxa (Ephemeroptera, Plecoptera, and Trichoptera -or mayflies, caddisflies, and stoneflies) is considered as the primary grouping of the most sensitive species for assessing habitat disturbance or pollutant effects, which are the classical indicators of stream health in BMI studies (Barbour et al., 1999).

Response #64 – The Final Determination does not depend upon an analysis using GLIMPSS. See Response #33. With respect to EPT taxa, EPA believes the comment is partially correct, but EPT genus-level richness is a much more accurate and sensitive metric than %EPT abundance. Richness measures can detect wholesale changes in community composition. The metric %EPT can have a high value (indicating good conditions) whether the community is dominated by several sensitive EPT taxa or by one to a few tolerant genera belonging to the orders Ephemeroptera (e.g., *Baetis, Plauditus, Caenis, Isonychia*), Plecoptera (e.g., *Amphinemura, Allocapnia, Taeniopteryx*) and Trichoptera (e.g., mostly Hydropsychidae, Hydroptilidae, and the philopotamid, *Chimarra*) which are typically not present or naturally abundant in these streams. CH2M HILL relied on the aggregate %EPT abundance metric in their analysis, which can be misleading when %EPT is dominated by known pollution tolerant genera within these orders. CH2M HILL also sampled macroinvertebrates during fall and winter, precisely the time when two families of mining-tolerant winter stonefly populations hatch and their abundances increase exponentially in Central Appalachian streams. The increased abundance of these families can influence %EPT metric, and mask the fact that other species of EPT might have been extirpated or adversely affected by mining.. CH2M HILL did not provide taxa lists of their study and thus EPA can not fully review their findings. It is EPA's best professional judgment that each EPT order be analyzed separately to maximize diagnostic power of the effects to steam communities since each order responds differently to various stressors, and naturally occurring taxa within each group are intended to be protected under the CWA.

Comment #65 – Other comments on GLIMPSS by CH2M HILL include the criticism that:

> "GLIMPSS index emphasizes the most sensitive EPT genera to determine a BMI based score of stream condition. It drops a major and common BMI group, the caddisflies, from its evaluation and counts mayflies and stoneflies independently instead of using the full suite of EPT organisms."
>
> "In addition, the GLIMPSS index adds "intolerant taxa" as a separate metric, although that metric is known to be highly correlated to the EPT taxa and thus adds redundancy to the E and P metrics already in use."

Response #65 - The Final Determination does not depend upon an analysis using GLIMPSS. See Response #33. To the extent the comment extends to EPA's focus on the effects of mining on sensitive taxa, these taxa reflect unimpaired conditions, as found at regional reference sites. To the extent sensitive taxa make up the majority of the native wildlife expected in natural streams across the ecoregion (and in which WVDEP has designated as reference quality streams), then it is appropriate to consider those sensitive taxa.

EPA did in fact consider and report on caddisflies. Fourteen (14) genera were encountered in Spruce No. 1 streams, but only 7 genera were found at streams draining Mingo-Logan's Dal-Tex MTM operation. This indicates that caddisfly generic richness was sensitive to mining and valley fill impacts on the Dal-Tex site.

To the extent GLIMPSS was used, in terms of intolerant taxa, EPA scientists tested for redundancy when selecting metrics for GLIMPSS. The intolerant richness metric passed all redundancy tests among all metrics used while developing the GLIMPSS, indicating that it brought new information to the assessment and should be retained. Furthermore, many intolerant taxa typical of reference streams are not EPT taxa (e.g., some Coleoptera, Odonata, Diptera); this is one reason why genus-level data are superior to family-level data as genus-level data provide enough resolution to identify the sensitive taxa in these other orders. In addition, there are also many EPT genera that are not considered "intolerant taxa".

Comment #66 – CH2M HILL comments suggest that; "In summary, the GLIMPSS index overemphasizes the importance of mayfly and stonefly abundance, and these organisms tend to be the most sensitive (intolerant) of the species evaluated. In correspondence of July 10, 2009, WVDEP (Hoffman, 2009, personal communication) rejected the notion that the genus level impacts identified in the Pond/Passmore study serve as an appropriate measure of compliance with West Virginia's narrative water quality standard, stating as follows:

> "The WVDEP understands that the Pond study found a shift in the benthic macroinvertebrate community downstream from mining activity but did not otherwise correlate this finding with any significant or adverse impairment of the ecosystem. Where the only impacts to this component of the ecosystem are diminished numbers of certain genera of mayflies, without evidence that this has had any adverse impact of any significance on the rest of the ecosystem, the State cannot say that there has been a violation of its narrative standard."

Response #66 – See Response to #33 & #65. EPA notes that as of January 10, 2011 WVDEP continues to provide a link to a summary of the Pond, et al. (2008) study (*Downstream effects of Mountaintop Coal Mining on Benthic Communities)* and a powerpoint by one of its authors on WVDEP's Save Our Streams website at:
http://www.dep.wv.gov/WWE/getinvolved/sos/Pages/Macroinvertebrates.aspx

To the extent the comment is intended to suggest that EPA's consideration of biota at the genus level is inconsistent with WVDEP's use of the family-level WVSCI metric to interpret compliance with West Virginia's narrative water quality criterion, we disagree. EPA's inquiry under Section 404(c) considers whether there is an unacceptable adverse effect on wildlife. While West Virginia's use of a family-level metric is one measure of effects on wildlife, it is not the sole measure, nor is it a basis for restricting EPA's inquiry. It is appropriate for EPA to consider impacts to wildlife at the genus level. Restoring and maintaining the biological integrity of the Nation's waters is part of the objective of the Clean Water Act. Over the years, various definitions have been given to the term "biological integrity." EPA's working definition that has been in place since 1981 is: "the capability of supporting and maintaining a balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of the natural habitat of the region." (http://www.epa.gov/bioindicators/html/biointeg.html). This definition includes protection of macroinvertebrate communities, as well as fish populations.

The genus level approach is consistent with the approach used in EPA's Wadeable Streams Assessment (EPA 841-B-06-002 December 2006), the first-ever statistically valid survey of biological condition of small streams in the United States. It is also consistent with biological monitoring programs in surrounding states, including Kentucky, Pennsylvania, Maryland and Ohio.

EPA did not limit its analysis to genus-level impacts. To the extent the comment discusses reliance on the Pond, et al 2008 study, that study conducted analyses using both the genus-level GLIMPSS and West Virginia's WVSCI metric (which is used by WVDEP to assess water quality impairments as part of West Virginia's bi-annual integrated report pursuant to Section 303(d) of the Clean Water Act) and reached similar conclusions using both metrics. Pond et al. 2008 not only found more than "diminished numbers of certain genera of mayflies," but reported strong evidence of (1) impacts to many other forms of benthic wildlife (including stoneflies and caddisflies), (2) impacts based on 15 out of 17 different community metrics tested, and (3) impacts based on the WVSCI. The published Pond et al. study found many EPT taxa were extirpated or severely reduced downstream of MTM operations (see Appendix 2). The authors do mention significant "shifts" in composition, but actually point to the WVSCI scores (and for comparison, the more refined genus-level metrics) as indicating probable "violations of narrative standards." Declining WVSCI scores are in direct response to these "shifts." Hence, "shifts" in community structure can indicate that benthic populations are harmed and eradicated downstream of mining operations. Many of the sites that are included in the study have been already listed on the WVDEP 303(d) list as biologically impaired, signifying consistency between the Pond study and WVDEP's interpretation of its narrative criterion. More specifically, Pond et al. 2008 found that 17 out of 20 (85%) of WVSCI scores (WVDEP's current listing method) were rated as not achieving unimpaired status (i.e., WVSCI score $\leq$ 68) when conductivity was greater than 500 µS/cm. EPA's position, published in Pond et al. 2008, is in concordance with WVDEP monitoring and assessment methods and WVDEP's impairment listings.

To the extent the comment asserts that shifts in the macroinvertebrate community are not adverse effects to wildlife, EPA disagrees. See Response # 12. In addition, shifts in benthic community structure are indicators of adverse effects not only to macroinvertebrate communities, but also to broader ecosystem functions, including organic matter transport, productivity in streams and food web interactions. Data from Hartman et al 2005, and Pond et al. 2008 showed significant "shifts,' among other strong evidence, to demonstrate significant degradation downstream of MTM/VF. As stated in EPA's Wadable Stream Assessment (EPA 841-B-06-002 December 2006), macroinvertebrates are good indicators of biological integrity "because of their inherent capacity to integrate the effects of the stressors to which they are exposed, in combination and over time. Stream macroinvertebrates generally cannot move very quickly or very far; therefore, they are affected by, and may recover from, a number of changes in physical conditions (e.g., habitat loss), chemical conditions (e.g., excess nutrients), and biological conditions (e.g., the presence of invasive or non-native species). Some types of macroinvertebrates are affected by these conditions more than others."

Furthermore, WVDEP has acknowledged that a "shift" in the macroinvertebrate community can constitute impairment, stating in their published 2008 Integrated List Report response to comments that: "A 'shift' in the benthic macroinvertebrate community of a stream <u>can</u> constitute biological impairment pursuant to 47CSR2 – 3.2.i, and the WVSCI (recognized as a "best science method" in the MTM/VF EIS) provides a sound scientific basis for assessment."

Comment #67 - "Separate reviews of the Pond/Passmore Study have raised additional concerns (CH2M HILL, 2009; GEI, 2009). CH2M HILL made the following observations about that study:

> "The study compared family-level and genus-level macroinvertebrate data to assess MTM impacts. However, the evaluation used different metrics with differing discriminatory ability, which adversely affected the validity of the comparison."

Response #67 - One of the main goals of the Pond et al. (2008) study was to actually test metrics (at genus vs. family level) for their discriminatory ability to detect mining impacts. Similar metrics were paired by taxonomic level to directly test this hypothesis.

Comment #68 - "The study methods description **(1)** omitted important details about how study sites were selected, **(2)** why BMI sampling focused only on riffles, **(3)** how many sites in each mining category were represented by monthly water quality data, and **(4)** other aspects of data collection that may have materially affected the analysis and conclusions."

Response #68 – EPA disagrees. It is important to note that the Final Determination does not rely exclusively upon Pond et al.2008, but on a range of literature and data, including site-specific data and comparative data from the Dal-Tex mine. The administrative record cites to hundreds of published studies and articles. To the extent that Pond et al. 2008 is cited and relied upon, **(1)** From Pond et al. 2008, page 719: "We selected sites to provide a range of mining intensity and water quality typical of MTM in this ecoregion." So, rather than selecting just the worst MTM streams, the study attempted to locate mined sites that had minimal disturbance and relatively good water quality. This demonstrates that the design of the study was intended to study the full range of water quality associated with mining activity and was in fact unbiased. **(2)** For direct comparison to WVDEP assessment methodology, benthic sampling focused on riffles, as specified in the WVDEP method. **(3)** Within each mining category, sites were fairly evenly distributed with respect to full monthly water quality (i.e., three low disturbance sites, five medium disturbance sites, and four high disturbance sites). **(4)** it is not clear from CH2M HILL comments which "other aspects" of data collection need to be clarified.

Comment #69 - "The assignment of conductivity ranges to the low, medium, and high categories of mining disturbance appears to have been arbitrary, yet these ranges drive the presentation and interpretation of data and lead to broad generalizations that are not demonstrated to be valid."

Response #69 - EPA disagrees. It is important to note that the Final Determination does not rely exclusively upon Pond et al. 2008, but on a range of literature and data, including site-specific data and comparative data from the Dal-Tex mine. The administrative record cites to over 250 published studies and articles. To the extent that Pond et al. 2008 is cited and relied upon, the division of low, medium, and high categories of conductivity in the Pond study was set to allow for sufficient numbers of streams in each category. Biologically, these categories did behave differently, as statistically demonstrated by the Multi-Response Permutation Procedure (MRPP) analysis and subsequent graphical interpretations reported in the publication. Streams with low conductivity were most often not degraded, while streams with medium and high conductivity were degraded. Moreover, there was a strong correlation between declining biological condition (via several metrics) and increasing conductivity (using either continuous data or categorical data). The 500 µS/cm threshold demarcating "Low" from "Medium" also corresponded to effect levels independently found in a study of mining impacts in Kentucky streams (Pond 2004), thereby forming an initial basis for testing this threshold in WV streams.

Comment #70 - "The availability of a full suite of chemical analyses for only 20 of the 37 sites limits the conclusions that can be drawn regarding specific causes of impairment because conductivity was used as a toxicity surrogate and conductivity is affected by a wide variety of inorganic constituents."

Response #70 - EPA disagrees. It is important to note that the Final Determination does not rely exclusively upon Pond et al. 2008, but on a range of literature and data, including site-specific data and comparative data from the Dal-Tex mine. The administrative record cites to over 250published studies and articles. To the extent that Pond et al. 2008 is cited and relied upon, EPA scientists and other researchers (Howard et al. 2001, Pond 2004, Hartman et al. 2005, Merricks et al. 2007, and Pond 2010) have found that conductivity is an excellent predictor of aquatic life impacts. In Central Appalachian MTM/VF operations, the ionic mixture emanating from fills is fairly predictable. Effluents tend to be alkaline or circumneutral, have highly elevated concentrations of four major ions (SO4>HCO3>Mg≈Ca) and have only slightly elevated concentrations of K, Na, and Cl. These major ions can be individually toxic, and mixtures of these ions can be more toxic than the individual ions, since more than one ion is a potential toxicant. The mixture can also create a general osmoregulatory stress on organisms that may not depend on ionic makeup. EPA's use of conductivity as an "indicator" of the strength of ion concentrations for these mining effluents is an acceptable practice. As an analogy, EPA and state water quality standards have long recognized the use of e. coli bacteria as an "indicator" of other harmful pathogens that might be present in the water. These pathogens (e.g., those that cause shigellosis, salmonella, hepatitis, gastroenteritus, etc.) are not measured routinely, and thus e. coli criteria are designed to "protect" people from adverse effects of other waterborne pathogens.

Comment #71 - Other observations of the study by GEI, an environmental consulting firm, included in the CH2M HILL comments include:

> "The WVSCI is a published family-level index developed by Tetra Tech for WVDEP under a contract with USEPA. It is well-documented and does a good job of discriminating between unaffected and impacted streams; the USEPA proposed genus level index is not well-documented."

Response #71 - To the extent the comment is directed toward the GLIMPSS metric, see Response #33. To the extent the comment is directed toward Pond et al. 2008, it is important to note that the Final Determination does not rely exclusively upon Pond et al. 2008, but on a range of literature and data, including site-specific data and comparative data from the Dal-Tex mine. It is also important to note that Pond et al. 2008 undertook analyses using both the GLIMPSS and WVSCI metrics. Moreover, the administrative record cites to over 250 published studies and articles. To the extent the comment is intended to suggest that EPA should have relied exclusively upon WVSCI, see Response #66. EPA further notes that the WVSCI document was published in 2000. Since publication of WVSCI in 2000, the data and science have progressed. Since publication of WVSCI, the number of available reference sites has increased from 107 to 394 and ten additional years of genus-level data has become available. EPA used genus-level data in its Wadeable Streams Assessment and many of the states neighboring West Virginia have begun assessing their waters using a genus-level metric. GLIMPSS was developed at the request of and with the assistance of WVDEP as a way to update WVDEP's assessment methodology.

EPA has expressed its expectation that WVDEP cooperate in initiating an external peer-review of GLIMPSS as the next step in that process.

Comment #72 - "The use of conductivity as a measure of impairment is inappropriate, especially because studies have identified streams with high WVSCI scores ("unimpaired") that have high or variable conductivity."

Response #72 – EPA disagrees. It is the best professional judgment of EPA that 500 µS/cm represents an appropriate dose-response threshold that corresponds to significant adverse impact for benthic integrity. This threshold has been independently observed in Appalachian studies by other agency researchers in KY, MD, and VA. EPA has reviewed the data presented purporting to demonstrate sites that have high WVSCI scores and elevated conductivity. The effect of conductivity may depend upon the ionic mixture and the native benthic community. However, the best research available points to a consistent dose-response in central Appalachia. The studies identified by the commenter are not believed to present reliable data for the following reasons: (1) those studies used samples with family-level data which would not reflect changes in less tolerant genera; (2) they failed to partition seasonal and regional factors; (3) they included pseudo-replicated data; (4) they had poor taxonomic quality control; and (5) failed to account for confounders in the dataset where conductivity was low. All of these factors make the various correlation statistics from these studies unreliable. Moreover, the relatively few sites in the cited datasets that score above 68 (the lowest WVSCI score identified by WVDEP as associated with full support of the narrative water quality criterion) at conductivity greater than 500 µS/cm supports EPA's use of this concentration for indicating likely impacts to native Central Appalachian aquatic life (see Responses #19 and #20).

Comment #73 - There are other possible reasons for differences in macroinvertebrate indices between affected sites and sites not attributable to pollutants or pollution, including hydrological modification effects and changes in food resources below impoundments.

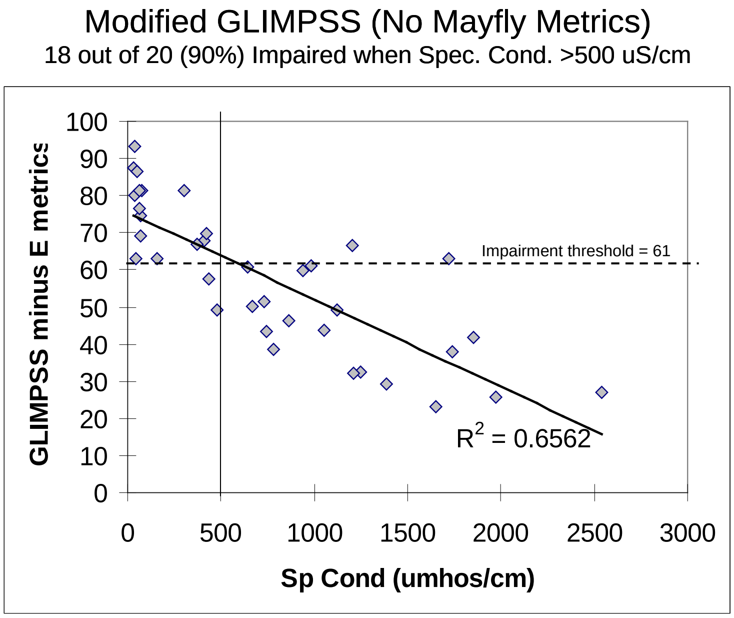
Response #73 - See Response #78.

Comment #74 - "Although there were some differences between mined and unmined sites, the proportional abundance of functional feeding groups and invertebrates with different habits was maintained downstream from mined sites, which suggests that community function was maintained despite species shifts."

Response #74 - CH2M HILL relies on analyses conducted by GEI using data supplied under FOIA from Pond et al. 2008. EPA's review of this analysis notes that the calculations of functional feeding groups FFG are incorrect (compared to EPA's use of WVDEP FFG designations). See FFG discussion in Response #77 below.

Comment #75 - "The review of the genus-level index suggested some biases and over-emphasis of the role of Ephemeroptera on the overall index; in addition, it pointed to several conditions under which the index did not perform well."

Response # 75 – To the extent the comment relates to reliance in the Final Determination on GLIMPSS or on Pond, et al. 2008, see Response #33 and 71. Ephemeroptera richness and abundance are good metrics to detect impacts because mayflies often make up 30-50% of the community abundance and ~20% of the biodiversity in undisturbed headwater Appalachian streams sampled in the spring. As a test of this comment, EPA re-calculated GLIMPSS without the 2 mayfly metrics (and re-calibrated 5th percentile threshold). The figure below demonstrates that this modified GLIMPSS is still strongly correlated to conductivity, and at sites greater than 500 µS/cm, 90% were rated as “impaired” (without use of mayfly metrics).




EPA figure showing a modified seven metric GLIMPSS (without mayfly metrics) applied to data from Pond et al 2008. This modified index did not use mayfly richness or mayfly abundance metrics but still shows a strong and significant relationship with conductivity and depicts that 90% of sites greater than 500 µS/cm are impaired.

The actual GLIMPSS used in Pond et al. 2008 is not calibrated for large warmwater rivers (a separate GLIMPSS is used), or true limestone springs (another index is under development). Neither of these two stream types was studied in Pond et al. 2008.

Comment #76 - “USEPA concluded in the April 2, 2010, FR Notice that the USACE and WVDEP "failed to consider adequately the potential for discharges of TDS from Spruce No. 1 to raise instream conductivity levels downstream of the project, resulting in impairment to the naturally occurring community." In making this statement, USEPA used a definition of impairment different from that used by WVDEP in interpreting its narrative WQS applicable to biological integrity. Further, USEPA did not cite the approved WV WQS, nor did it utilize specific stream assessment information developed by WVDEP.”

Response # 76 - See Response #33 and #66.

EPA's analysis of genus-level data supplements and further refines the analysis using WVSCI. The scientific literature widely recognizes that genus-level data is more accurate than family-level data when analyzing biodiversity loss and other measures of significant degradation of wildlife. Several neighboring states (KY, PA, MD, OH) use genus-level data in their stream assessments. EPA also uses genus-level data in national stream assessments. It is appropriate, therefore, for EPA to consider genus-level data to analyze significant adverse effects on wildlife.

Comment #77 – "Although USEPA did not cite the draft Benchmark Document, which would establish an entirely new conductivity value for protection of aquatic life, the agency appears to have relied on the draft Benchmark Document and related studies to treat conductivity as a causative agent related to impairment of biological integrity of streams. The conclusions reached in the draft Benchmark Document, however, have not been finalized; their validity cannot be relied upon until the draft Benchmark Document has gone through a rigorous review process, including peer review before the SAB."

Response #77 – See Response #32.

Comment #78 – "A review of available information indicates that the relationship between conductivity and biological impairment is affected by a number of factors. Some of these, such as hydrological modification and changes in food characteristics, are not related to specific pollutants or pollution and are ignored in the USEPA evaluation."

Response # 78 – While impacts to aquatic communities can occur directly from in-stream impoundments, it does not appear from the data that impoundments are the primary causes of aquatic life impairment below valley fills. While it is generally true that filter feeders increase below impoundments, EPA scientists have found that when ponds had been removed during reclamation, degraded communities persisted and were dominated by tolerant organisms, indicating that the impoundment was not the main reason for impaired biological communities.

Using data collected from the PEIS in WV, Armstead et al. 2004 found that the "most significant changes in stream biological community are the shifts in the functional feeding groups toward more filter feeding organisms and the reduction of the mayfly community in [downstream of] [valley] fill and fill/residentially influenced sites." Their analysis showed that scrapers (algal grazers) and shredders (feed upon fallen leaves) (most of these functional feeders are mayflies and stoneflies) were strongly reduced below valley fills in the winter and spring, respectively. Armstead et al. 2004 believed that **"**the changes in community structure may result from the presence of ponds and changes in temperature regimes." They further stated that "the reduced mayfly populations in the fill and fill/residentially influenced sites are not uncommon in areas with mining influence or below impoundments."

EPA Region III data show that communities downstream of mining sediment control ponds (n=21) still respond strongly to a specific conductance gradient. This analysis effectively removes any effects of the ponds since all of the sites are downstream of ponds. Conductivity explained 80% of the variance associated with mayfly generic richness (see figure below) in analyses of macroinvertebrate communities at sites downstream of ponds. If the presence of ponds were responsible for the degradation of the macroinvertebrate community, there would be no relationship between conductivity and metrics downstream of ponds.  Therefore, significant degradation of water quality is much more strongly correlated to the adverse impact on macroinvertebrate community structure than the presence of sediment ponds downstream of MTM operations with valley fills.

Comment #79 - “WVDEP currently uses the WVSCI to evaluate biological integrity of streams in West Virginia and to determine whether streams are meeting narrative criteria contained in the WV WQS. A USEPA contractor developed the WVSCI and USEPA continues to approve this assessment methodology through its approval of 303(d) lists of impaired streams developed by WVDEP. It is a balanced BMI index for assessing stream condition.”

Response #79 – See Response #33 & #71.  The commenter is correct that through its approval of WVDEP’s Section 303(d) lists, EPA has approved WVDEP’s continued use of WVSCI as its tool for assessing whether streams are failing to achieve the narrative water quality criterion.  EPA’s approvals have, in part, been based upon WVDEP’s recognition that there has been significant development of the science and data since WVSCI was published in 2000 and upon the fact that WVDEP has taken steps to update its assessment tool, such as its request to EPA for assistance in developing GLIMPSS.  EPA has expressed its expectation that WVDEP cooperate in initiating an external peer-review of GLIMPSS as the next step in that process.  EPA has also expressed its expectation that, consistent with neighboring states, WVDEP will consider a peer-reviewed GLIMPSS or other appropriate genus-level methodology as part of its 2012 assessment.

Comment #80 - The GLIMPSS index, developed by USEPA scientists, provides a more detailed metric, but is biased toward responses of the more sensitive BMI species. The GLIMPSS index is not currently used to establish impairment based on the WV WQS; therefore, conductivity thresholds based on the GLIMPSS index should not be used to determine stream community impairment.

Response #80 – See Response #33, #65, #66, #71, and #79.  EPA’s analyses focus on the effects of mining on sensitive taxa because these taxa reflect unimpaired conditions, as found at regional reference sites.  To the extent that sensitive taxa make up the majority of the native wildlife expected in natural streams across the ecoregion (and in which WVDEP has designated as reference quality streams), then it is appropriate to consider those sensitive taxa.  Many of the sensitive taxa that EPA is concerned about are naturally ubiquitous across the region (i.e., not rare or endangered).  Therefore, when results show that nearly all of these sensitive animals are extirpated (as in similar MTM streams and Dal-Tex): there is a significant deviation from natural or baseline conditions.  While it is true that sensitive taxa can be affected by any land use disturbance or other permitted activity, the preponderance of evidence points to declines and extirpation of both sensitive and common native taxa downstream of MTM operations similar to the Spruce No. 1 proposal.

Comment #81 - “Conductivity thresholds being developed by WVDEP for use in TMDL stressor identification and analysis rely on much higher levels than those used by USEPA in the April 2, 2010, FR Notice.”

Response #81 – See Response #66 and #78. EPA's inquiry under Section 404(c) considers whether there is an unacceptable adverse effect on wildlife. While West Virginia's interpretation is one measure of effects on wildlife, it is not the sole measure, nor is it determinative of EPA's inquiry. WVDEP's TMDL thresholds are summarized in Response #34. It is our understanding that WVDEP developed these thresholds using visual analysis of scatter plots of conductivity and macroinvertebrate metrics with no robust statistical analysis of these data.

The CH2M HILL Technical Evaluation document presents these WVDEP thresholds for conductivity, sulfate and chloride. On page 11, the CH2M HILL report appears to endorse two of the thresholds for conductivity as more appropriate than those used by EPA in the Spruce No. 1 PD: "…WVDEP's impairment thresholds for conductivity (> 1075 µS/cm " likely and > 1533 µS/cm definite) is two to three times the value cited by EPA in its Proposed Determination."

To respond to this comment, EPA scientists determined the proportion of WVDEP sites in ecoregion 69d that had WVSCI scores ≤ 68 in each WVDEP stressor threshold category (see table below). The stressor levels offered in the CH2M HILL comments are associated with very high levels of degradation of the aquatic life use. For example, the WVDEP candidate stressor threshold for conductivity as a "likely stressor" (1075-1532.9 µS/cm) is associated with an extremely high percentage of sites that have WVSCI scores less than or equal to 68 (89% for all sites and 85% for sites with RBP habitat scores greater than 140) of the aquatic life use. The 500 µS/cm dose response threshold considered in the Final Determination corresponds most closely to the WVDEP candidate threshold range of 327-516.9 µS/cm (WVDEP describes this level as "equivocal or no trend"). At this stressor level, 58% of the WVDEP sites in ecoregion 69d scored less than or equal to 68. When only considering those sites with very good habitat quality (RBP scores greater than 140), 45% of the sites scored less than or equal to 68. (see also Response #74).

The table below shows WVDEP sites in Ecoregion 69d with pH greater than 6-9. Table shows number and percent of sites not achieving unimpaired status (EPA recognizes that WVDEP considers a WVSCI score < 60.6 to be impaired and scores in the 60.6-68 range to be in a "gray zone." For purposes of this table, EPA uses WVSCI score ≤68 consistently with WVDEP as a score that does not reflect fully achieving the aquatic life use)) in each WVDEP stressor threshold category for all sites, and for sites with RBP scores greater than 140.

| WVDEP Stressor Thresholds | Evidence as conductivity as a cause of stress (WVDEP narrative description) | #Total Sites | #Sites not achieving unimpaired status | % Sites not achieving unimpaired status |
|---|---|---|---|---|
| <326.9 | Eliminated | 514 | 190 | 37 |
| 327-516.9 | Equivocal | 187 | 109 | 58 |
| 517-766.9 | Weak | 181 | 126 | 70 |
| 767-1074.9 | Possible | 116 | 87 | 75 |
| 1075-1532.9 | Likely | 55 | 49 | 89 |

| | | | | |
|---|---|---|---|---|
| >1533 | Definite | 43 | 41 | 95 |
| WVDEP Stressor Thresholds and Habitat > 140 | | | | |
| <326.9 | Eliminated | 215 | 34 | 16 |
| 327-516.9 | Equivocal | 65 | 29 | 45 |
| 517-766.9 | Weak | 62 | 33 | 53 |
| 767-1074.9 | Possible | 31 | 20 | 65 |
| 1075-1532.9 | Likely | 13 | 11 | 85 |
| >1533 | Definite | 12 | 10 | 83 |

In 2006, WVDEP participated in a causal assessment of the Clear Fork watershed using the EPA stressor identification process (USEPA 2010b). Clear Fork is a tributary to the Big Coal River and is located approximately 20 miles east of the Spruce No. 1 mine area, and in the same ecoregion. In this case study, EPA's Stressor Identification Guidance (USEPA 2000) was used to identify and rank stressors that impaired the aquatic community and stressor response threshold values were based on several statistical analyses of WVDEP statewide data. Stressor values below the reference site 95$^{th}$ percentile (less than 185 µS/cm) were considered to estimate the range of the stressor with almost no adverse effect on biological response. Stressor values above the "plausible threshold" (greater than 185 µS/cm) were not associated with the best biological conditions, indicating slight to moderate degradation. Stressor values greater than the "substantial effects threshold" (greater than 300 µS/cm) were almost always associated with substantial biological degradation, and these stressor levels were considered strong evidence of a candidate cause of biological impairment.

These studies and data provide a weight of evidence that supports conclusions in the Final Determination regarding impacts of conductivity at ranges lower than those identified by WVDEP for purposes of its TMDL program.

Comment #82 - "No clear causative relationship has been established between the WVSCI and conductivity, as noted by data examined from a number of sources, including recent data from sites in close proximity to the Spruce Mine project. Clearly, a number of factors influence stream condition, but there are extensive data showing unimpaired streams with elevated conductivity levels well beyond the values suggested by USEPA as being damaging to stream function."

Response #82 – See Response #33, #35 and #81.

Comment #83 - "Total number of organisms among both the reference and the mined streams are comparable and no substantive difference can be seen between the two data sets. This is an important observation because, regardless of the species present, these data indicate that there are available food sources for fish and other organisms that may occupy these water bodies regardless of the shift in community composition."

Response #83 - This statement is confusing in that the investigators carried out 200±20% organism subsampling at these sites. EPA cannot determine if these sites contained a similar number of organisms per area since CH2M HILL stopped counting at 200±20%. Moreover, Region III does not believe that total macroinvertebrate abundance or density are appropriate metrics to determine effects, as the response of these metrics can be highly variable, and an increase in these metrics is not always "beneficial." While certain pollutants can sharply decrease invertebrate abundance (e.g., toxicants or sediment); it is well known that this measure is highly variable across both impacted sites and undisturbed sites and has been shown to be unreliable for impact assessment. In fact, it has been well known for decades that higher densities often result from a pollution signature. For example, discharges from improperly operated sewage treatment plants or confined animal feeding operations can release organic waste which provides an abundance of food for some tolerant, opportunistic macroinvertebrates (e.g., tolerant worms, midgeflies, and hydropsychid caddisflies). This increased abundance can result from discharges having excess nutrients, organic wastes, or other pollutants. Thus, the idea that coal mining is not adverse because it increases or does not change "total" abundance below the mine operation (at the expense and demise of sensitive, indigenous taxa) is flawed.

See Response #66, and #85

Comment #84 – "Total number of species identified between the two stream categories indicates a reduction in number of species for the mined streams. However, the diversity is still high for all sampled water bodies. For example, the number of species for the reference streams ranged from 27 to 44 species, and for the mined streams this range in species was from 24 to 38."

Response #84 – EPA disagrees. While the total number of taxa is a reasonable proxy for assessment of stream quality, the comment fails to discuss whether there was a turnover of sensitive vs. tolerant taxa at these sites. For example, the reported data does not identify whether there were differences in the change of sensitive taxa vs. tolerant taxa. Without access to the underlying raw data (taxonomic lists and counts), EPA is unable to analyze the meaning of the total taxa values in the context of adverse effects or conclude that use of total taxa as a proxy would be reasonable here.

Comment #85 - "The reduction in percent of EPT and the increase in chironomids was the most obvious difference between the two sample sets. However, comparing these data based only on non-mined and mined streams may not provide the only basis for these differences."

Response #85 - The sample sets of CH2M HILL are insufficient to support the conclusions that the commenter draws. For example, it includes two reference streams (five sites are further nested within those two streams, introducing pseudo-replication). Moreover, it includes only three mined sites. Testing only two reference streams versus three mined streams is not a robust dataset. Even with this limited dataset, CH2M HILL data appear to confirm a loss of EPT taxa and an increase in more tolerant taxa at some sites. Again, EPA did not have the raw data for this review.

The CH2M HILL report relies on %EPT as a measure of more sensitive organisms in the assessment. The metric %EPT can be misleading.

The %EPT (relative abundance of mayflies+stoneflies+caddisflies) metric can be one of the most misleading benthic metrics used in assessments of headwater streams of the Appalachian coalfields. It is misleading because relative abundance metrics can mask shifts in species composition if there are increases in dominant taxa while sensitive taxa decline. Specifically some of the tolerant, component genera of EPT increase in abundance following disturbance and dominate streams influenced by chemical or habitat stress, while the more sensitive members of these orders decline or are extirpated. Hence, while the %EPT metric indicates that a high percentage of the individuals in the sample belong to those orders, it does not reveal that the more sensitive *genera* have been extirpated and the remaining individuals at mined sites are largely tolerant or facultative members of those orders. EPA Region III found that two components of %EPT (%P and %T) showed no significant difference between unmined and MTM streams in WV due to the presence of tolerant genera within those generally sensitive orders. It is important to note that in streams with discharges of severely degraded water (e.g., conductivity indicator >2000 µS/cm), even the more tolerant species can be harmed.

In headwater streams (e.g., <3 sq. miles), %EPT is not an effective indicator of impairment because several pollution tolerant taxa belonging to the orders Ephemeroptera (e.g., *Baetis*, *Plauditus*, *Caenis*, *Isonychia*), Plecoptera (e.g., *Amphinemura*, *Allocapnia*, *Taeniopteryx*) and Trichoptera (mostly Hydropsychidae, Hydroptilidae, and the philopotamid, *Chimarra*) are typically not present or naturally abundant in these streams. These taxa have life history strategies and physiological adaptations that allow them to become dominant in streams under increasing chemical or habitat stress. The occurrence of these tolerant taxa within the generally sensitive EPT orders, results in a metric that can not consistently distinguish effects due to environmental stressors. To demonstrate this, the distribution of the three component orders of %EPT across mined and unmined streams was examined in Pond et al. 2008. Mann-Whitney U-tests (SYSTAT v. 13) were performed to determine differences in mean relative abundance of %E, %P, and %T between the two categories (Mined and Unmined). There was no significant difference between mined and unmined sites for both %P and %T. On average, %T was greater at mined sites and was attributed to increases in tolerant hydropsychids, hydroptilids, and/or philopotamids. % P was often dominated at mined sites by the facultative nemourid, *Amphinemura*, while many sensitive stoneflies typical of unmined sites were extirpated. This is such a commonly recognized issue that some states (e.g., PA and VA) have excluded more tolerant and ubiquitous genera or families such as *Baetis* and Hydropsychidae before calculating %EPT.

For example, hydropsychid caddisflies can account for >90% of the total sample abundance and is a common biological signature in streams draining some MTM/VF operations. This dominance indicates severe water quality degradation, but these caddisflies can tolerate these degraded conditions, even when coated in oxides of Mn and Fe precipitate, and calcium minerals. In one unnamed tributary to Leatherwood Creek (Clay Co., WV), %EPT was 90.7% and the WVSCI score was 47.4, despite only having 4 total genera (3 hydropsychid genera, one orthoclad midge) in the 200 organism subsample.

Seasonality alone can influence %EPT abundance. For example, a December sample from a headwater reference site (Twin Branch) in Mingo County, WV, yielded 94% EPT individuals where 92% was comprised of a single winter stonefly, Allocapnia. Twin Branch had a WVSCI score of 65.2. In a mined stream in Nicholas Co. (Neff Fork), Allocapnia+Taeniopteryx made up 73% of the EPT found in a Novemeber 1999 sample (WVSCI=90.5). Winter Stonefly eggs (Allocapnia and Taeniopteryx) hatch in early fall (i.e., at the time of leaf fall and cooler stream temperatures). Predictably, massive populations (often >1000/m2) inhabit the riffles of Central Appalachian streams only from mid-October to late-December. They are ubiquitous colonizers and tolerant of highly adverse conditions including total dissolved solids. In these examples, the %EPT metric is providing a false positive signal, indicating a high proportion of the sample is composed of nominally sensitive EPT individuals, while in fact only tolerant caddisflies or winter stoneflies are present, and most other taxa were largely absent. While the WVSCI scores at these sites can be low enough to indicate impairment, scores at other sites can be high enough for %EPT to obscure any relationships (i.e., correlations and regression-type analyses) between biological response metrics and stressors.

The inability of this metric to detect wholesale changes in the invertebrate community from a diverse, sensitive assemblage to one dominated by tolerant individuals of a few taxa makes it an inappropriate metric to elucidate water quality effects on macroinvertebrate communities. Further, a reliance on %EPT can lead to misinterpretation of biological condition or stressor-relationships. Because genus-level taxonomic data and genus-based community metrics allow for the detection of shifts in community composition, they are a more accurate way of assessing impacts and should be used, where available, and limitations of the accuracy and variability of certain metrics (e.g. %EPT) must be understood.

Comment #86 - “Surveys for benthic invertebrates that have been conducted recently (fall 2009 and winter 2010) and are described above also have been summarized as to their functional feeding groups, both by number of species and total number of organisms, for representative reference streams and for streams that have been affected by mining or logging activities.”

Response #86 – The commenter does not specify which sites were only affected by “logging activities”. See EPA Response #77 section on functional feeding groups. There is considerable debate on the use of functional feeding groups in bioassessment or for assessing “function” in streams; most macroinvertebrates are omnivorous and do not fall neatly in the categories described by CH2M HILL. Functional feeding group metrics are not often used for Indices of Biological Integrity (IBIs) because they do not work well to discriminate known reference sites from known stressed sites, a central test of metrics for inclusion in an IBI. Functional ecologists do not rely on FFGs as used in the “functional” context here by CH2M HILL. “Functional” feeding groups refer to how organisms feed, not exactly what they eat or how the stream actually functions. Using this as the basis to determine impacts from MTM is flawed because it fails to account for protection of the naturally occurring community.

The following Figure 13B (CH2M HILL page 53) is an example of a misleading graphic because of the scale that both richness and % abundance metrics are plotted. Nevertheless, it appears that scrapers were severely diminished at the Davis Branch and Gibson Branch sites, a finding that is similar to EPA’s (see FFG comparison in Response #77).

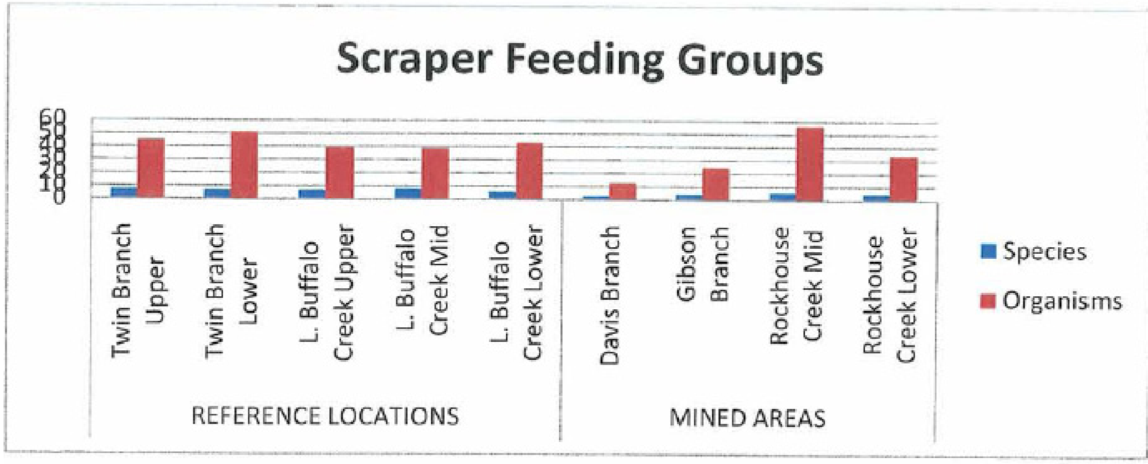



FIGURE 13B
Summary of Scraper Feeding Groups

Another example of a misleading graphic by CH2M HILL is shown below (CH2M HILL Volume IV, p 57). In this graphic, it is too difficult to make any meaningful comparisons concerning biology versus chemistry. The chemical data appear to be incorrect since the L Buffalo Lower station sulfate value is higher than conductivity. This is analytically impossible. Moreover, %EPT is not an appropriate indicator of stream quality in MTM/VF streams as stated above.

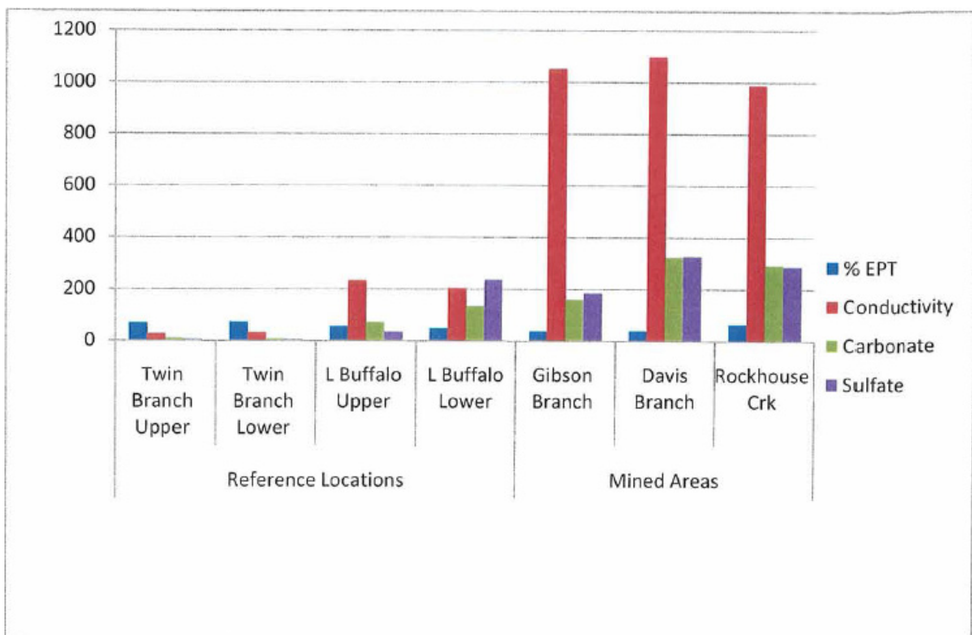



FIGURE 17
Comparison of Percent EPT and Selected Chemical Parameters

Comment #87 - "These data make it clear that the direct correlation proposed in the USEPA FR Notice between conductivity and impacts to the percent of EPT among the stations is not valid. There is a clear difference between the higher EPT percentages and low conductivities (as well as sulfate and carbonate ions) found at Twin Branch as compared with most other stations; however, there is a clear exception at one of the Rockhouse Creek stations, where the percent of

EPT (64 percent) is nearly the same as, or higher than, percentages at the reference stations (48 percent to 71 percent), but the conductivity value is nearly the highest among all the stations at almost 1,000 μS/cm."

Response #87 – EPA disagrees. The data and analyses from CH2M HILL do not indicate that it is "clear that the direct correlation" between conductivity and aquatic life attainment is invalid. With respect to the commenter's reliance on the %EPT metric, see Response #85. With respect to the Rockhouse Creek data, EPA has sampled Rockhouse 8 times and all sample events showed impairment using the WVSCI metric. However, we do acknowledge that it is in slightly better condition than streams associated with Mingo Logan's Dal-Tex mine (Beech Creek and LF Beech Creek). Because CH2M HILL did not provide genus-level taxa lists for their study, EPA is unable to compare CH2M HILL's results with EPA's genus-level analysis and is unable to determine whether the samples support the conclusions that CH2M HILL seeks to draw.

Comment #88 - "While these studies to date reflect only two sampling events, they provide an initial site specific assessment of how and whether mining operations could affect biological communities and water quality in freshwater streams and do not support the USEPA assertions concerning a direct correlation between conductivity levels and ecological functions of headwater streams. The overall diversity of species present is still relatively high, and at least one station surveyed among the mined streams included a relatively high percentage of EPT taxa.

Nevertheless, there appears to be a shift in taxa from less tolerant to more tolerant taxa in the mined streams. The cause of this shift is unclear from the data. The cause or causes could be the modification of habitat (removal of the tree canopy as well as the construction of ponds) or geochemical, but there is no clear evidence that the act of filling itself, apart from overall habitat modification and chemical changes induced by general land disturbance, is a significant contributor to this shift."

Response #88 - EPA does not agree with these conclusions for reasons specified in a number of responses above. We note that CH2M HILL does acknowledge the "chemical changes induced by general land disturbance" and we assume they mean the degradation of water quality caused by mining. Since CH2M HILL does not provide any data on habitat quality, the representations about habitat quality are unsupported. EPA's best professional judgment is that habitat degradation does contribute to significant degradation of aquatic life in some streams with degraded water quality caused by mining, but when the effects of habitat degradation are removed, our data analyses still indicate degradation of the aquatic community that is strongly correlated to degraded water quality (see Responses #78 and 82). Furthermore, EPA scientists believe that the presence of sediment ponds is not what is causing the degradation of the community based on analyses of sites with sediment ponds (see Response #78). CH2M HILL does not provide any data analyses of the effect of ponds to support the conclusions in their comments.

Comment #89 - "There appears to be no change in the overall abundance of benthic invertebrates between the mined and reference streams. These data indicate that even in streams with high conductivity values (exceeding 800 -1000 µS/cm), an abundant and diverse community of benthic invertebrates is present."

Response #89 - See Response #78, #83 and #84.

Comment #90 - "The leaf litter and stick surveys indicated a substantial reduction in the breakdown of these materials in the mined streams as compared to the reference streams that may be indicative of a shift in the trophic distribution of invertebrates as compared to reference streams."

Response #90 - These sorts of measurements are known to be quite variable with regard to streams, times, treatments, and other physical, biological, and chemical differences. The number of streams tested is far too small to draw conclusions. However, it appears that mining has had a significant effect on organic matter processing compared to CH2M HILL's "reference sites". Faster or slower breakdown rates compared to reference is a cause for concern since it represents significant departure from expected headwater stream functioning.

Comment #91 - "Water quality analyses indicated higher concentrations of selected ions, specifically sulfates and carbonates, along with TDS and conductivity in the mined streams as compared to the reference streams. However, comparisons among the stations suggest that the correlations between these higher numbers and changes in the sensitive benthic invertebrates (i.e. percent EPT) are not consistent for all stations surveyed."

Response #91 - We note CH2M HILL acknowledges degradation of water quality at their mined sites. See Responses #64 and 85 discussing the use of %EPT as CH2M HILL's general indicator of stream health. CH2M HILL did not provide taxa lists of their study and thus EPA could not review the actual taxa that make up the %EPT metric. As discussed above, the %EPT metric can provide inaccurate assessments of the health of the aquatic community and steam condition.

Comment #92 - "Monitoring conducted pursuant to the NPDES permit demonstrates that discharges from the Spruce Mine are protective of applicable selenium criteria (i.e., no violations and no reason to postulate impairments). In addition, the form of selenium in these discharges is expected to be in the most oxidized form, which has the lowest potential for bioaccumulation in fish and other aquatic organisms."

Response #92 – See Response #29 above regarding selenium discharges from operational parts of the Spruce No. 1 mine.

In regards to selenium it is apparently true that the form of selenium in the Spruce Fork watershed is expected to be in the most oxidized form, which has the lowest potential for bioaccumulation in fish and other aquatic organisms. However, EPA cautions against the broads use of this conclusion. Selenium typically enters a stream or river as selenate (Cutter and Bruland 1984; Chapman et al. 2009). This is not only true in the coalfields of Appalachia but in most streams. If the stream flows into a wetland-type environment (i.e., wetland, stream backwater, eddy, lake, etc.) then selenate is recycled into particulate Se. More organo-Se and selenite is produced as the recycling process continues over time. The net outcome of the recycling process in a watershed is a gradual build-up of selenite and organo-Se in the ecosystem (Chapman et al 2009). As noted by Cutter and Bruland (1984), this is a one-way process, as it would take 'hundreds of years' for selenite to reoxidize back to selenate (Chapman et al. 2009). Therefore, even though selenium may be entering the aquatic ecosystem as selenate, the eventual outcome is that selenium will build-up in the aquatic ecosystem and may cause environmental harm to fisheries and other wildlife.

It is also true that selenate is not as bioaccumulative in nature as selenite in aquatic ecosystems. The various species of aqueous selenium (i.e., selenate, selenite and organic selenides) can be accumulated at significantly different rates (Chapman et al 2009). Selenate is a form of selenium that is taken into algal cells through the sulfate uptake pathway, which requires algal cells to expend energy to take up dissolved selenium (Chapman et al 2009). Selenite, by contrast, is rapidly accumulated into algal cells without using the sulfate uptake pathway (Reidel et al 1991; Hu et al 1997; Chapman et al 2009). The primary route of selenium bioaccumulation is dietary exposure up through the food chain not through direct accumulation from the aqueous phase. According to the literature, the greatest manifestation of selenium accumulation is the bioconcentration step of Se from the aqueous phase into algae and bacteria that serve as the food web base (Chapman et al 2009). The dietary exposures lead to the accumulation of Se into fish and other wildlife.

Comment #93 - “Selenium data from the Dal-Tex Mine are not representative of potential impacts from the Spruce Mine because of differences in mining practices, extent of extraction in the various coal seams, and material handling techniques at the two mines. The modern material handling and mining techniques used at the Spruce Mine, including enhanced erosion control, stormwater management requirements, and selective handling of high selenium overburden materials, will prevent unacceptably adverse water quality impacts.”

Response #93 – See Response #30.

Comment #94 - “The review and analysis of existing fish population survey data found that the information available in the permitting record for the Spruce Mine was adequate to evaluate the potential impacts of the proposed project on downstream fish resources. Furthermore, the review found no new fish information that would change the assessment of impacts or necessitate a change to the prior permitting decisions.” The key conclusions of this review include the following:

> “The smallmouth bass and rock bass populations in Spruce Fork would not be directly affected by Valleyfills because they are limited in their distribution to higher order streams downstream from the project and the fish community in Spruce Fork is healthy. No populations of sport-fish species were detected in the small streams downstream from the proposed Valleyfills and none occur in the ephemeral and intermittent headwaters that would be affected by Valleyfills. Furthermore, smallmouth bass and rock bass would not be impacted by the loss of sensitive invertebrate species such as mayflies as a result of the discharge of VF material because they feed on a wide variety of aquatic and terrestrial invertebrates and feed more heavily on fish as they grow.”

> "No fish are likely to occur in the small intermittent and ephemeral headwaters streams that would be directly impacted by the discharge of VF material. The ecological assessment by Fulk et al. (2003) indicated that downstream effects to fish communities would be limited to smaller streams with drainage areas less than 10 km2 and therefore, these effects would be limited to intermittent and perennial reaches of Oldhouse Branch, Pigeonroost Branch, and Seng Camp Creek downstream from the valleyfills. However, surveys in the small streams downstream from proposed valleyfills found few or no fish, and the species found there were also found in Spruce Fork, which would not be impacted. Therefore, the loss of any fish in these smaller streams would result in only minor adverse impacts, if any, to downstream fish populations in Spruce Fork."

> "The fish assemblage in Spruce Fork currently is healthy and impact analyses conducted by Fulk et al. (2003) suggest that larger watershed size buffers these streams from the downstream effects of valleyfills. Fourth-order and larger streams downstream from the project area (i.e., Spruce Fork) support the greatest diversity of fish species, including the sport fishes rock bass and smallmouth bass and a variety of invertivore species, including minnows, darters, mottled sculpin, and northern hog sucker. Higher order streams such as Spruce Fork, although downstream from numerous valleyfills in tributary streams, had relatively high IBI scores that compare favorably with unmined and reference conditions, indicating no evidence for downstream fish community effects of valleyfills."

> "Although IN (invertivore) fish species, which are most diverse and abundant in Spruce Fork, may feed on immature mayflies, stoneflies, and caddisflies during certain life stages and seasons, they consume a wide variety of aquatic insects, microcrustaceans, and other aquatic invertebrates. Spruce Fork currently supports populations of 5 species of darters, which comprise a substantial proportion of the fish assemblage (Stauffer and Ferreri, 2002). Therefore, downstream IN fish species populations in Spruce Fork would not be impacted by the loss of sensitive invertebrate species populations in headwater streams as a result of the proposed Spruce Mine valleyfills."

Response #94 **–** See Response #1, #3, and #5. EPA disagrees with the statement that "No populations of sport-fish species were detected in the small streams downstream from the proposed valleyfills and none occur in the ephemeral and intermittent headwaters that would be affected by valleyfills." It is not only intermittent and ephemeral sections of Pigeonroost Branch and Oldhouse Branch that will be filled – perennial sections of both streams will be filled. In addition, smallmouth bass were present in Pigeonroost Branch during the May 2008 sampling by Decota consulting (WVDNR collecting permit database) indicating at least seasonal use of this stream by smallmouth bass and possible spawning use of this stream by smallmouth bass.

The statement: "smallmouth bass and rock bass would not be impacted by the loss of sensitive invertebrate species such as mayflies as a result of the discharge of VF material because they feed on a wide variety of aquatic and terrestrial invertebrates and feed more heavily on fish as they grow." implies that EPA is of the opinion that impact to these fishes will be primarily dietary. Fish can be affected directly through direct toxicity or reproductive toxicity.

Filling Oldhouse and Pigeonroost Branches will result in the loss of fish directly from the fills. Also, the fish found in surveys of Oldhouse and Pigeonroost branch are typical of assemblages found in streams of that size and typical of streams that were sampled by Fulk et al (2003).

Comment #95 - "The causative factors associated with blooms of *Pvymnesium paruum* are well known. However, these factors do not appear to be present in the Spruce Creek watershed. Thus, Golden Algae is not likely to appear in the Spruce Creek watershed as a result of Construction or operation of the Spruce mine."

Response #95 – See Response #36.

**Comments were received from the general public, industry groups, WVDEP, congressional representatives and environmental groups. Those comments tended to be general in nature and there contents are summarized below according to the area of potential impact.**

**Adverse Impacts of the Proposed Project to Water Quality and Water Quality Issues in General**

Comment #96 - Comments in disagreement with EPA's conclusions on water quality generally argue that the state has a process for approving permits, the process was followed for this permit, and the process did not identify water quality threats. Comments in this regard state:

> "..the project's National Pollutant Discharge Elimination System (NPDES) permit, which WVDEP claims Spruce Mine has generally complied with, and which EPA agreed to back in 2003."
>
> WVDEP feels that issues relating to the potential adverse water quality impacts on aquatic ecosystems as part of the NPDES permit were resolved in 2003 by WVDEP and EPA.
>
> Since the issuance of the water quality certification by the WVDEP on December 19, 2005, the EPA "has never provided this agency with information that could lead us to conclude that the certification was deficient." WVDEP suggests that the continued water quality concerns raised by EPA contradict the Spruce No. 1 Mine compliance with the NPDES permit according to WVDEP records.
>
> EPA had ample opportunity through the NPDES permitting program to address its concerns related to water quality standards.
>
> Several comments also suggest that the permit is "in compliance with all applicable Total Maximum Daily Loads and West Virginia's federally approved anti-degradation policy."

Response #96 – See Responses #24, #28, #29, #33, and #156.

Comment #97 – Several commenters, including and especially WVDEP, see this action as an affront to WVDEP's water quality permitting authority, and suggest that EPA is questioning WVDEP's permitting authority and their commitment to uphold the state water quality standards. Comments include:

> EPA is attempting to interpret West Virginia's water quality standards, substituting its own judgment for that of the state and trampling the distinctions of authority established by the CWA.
>
> Any interpretation and implementation of West Virginia water quality standards is the responsibility of the Legislature and the WV DEP…both of which have already determined through the issuance of the related state permits that the Spruce Mine complies with the Clean Water Act.

West Virginia's water quality standards were correctly interpreted and implemented with respect to the Spruce Mine permit.

EPA's proposed after the fact veto exceeds EPA's 404(c) authority" and "the EPA veto amounts to an override of state Clean Water Act actions in granting NPDES permits and 401 water quality certifications.

EPA is attempting to interpret West Virginia's water quality standards, substituting its own judgment for that of the state and trampling the distinctions of authority established by the CWA.

Response #97 – It is appropriate for EPA to consider changes in water chemistry because adverse changes in water chemistry frequently have a corresponding impact on wildlife that live in or depend upon the water. EPA's consideration of changes in water chemistry as a result of the project is based upon known effects on water dependent wildlife in the area. The fact that WVDEP issued an NPDES permit and a CWA Section 401 water quality certification for this project does not mean that EPA's action inappropriately usurps the regulatory authorities of WVDEP. In any complex project, multiple authorizations by federal, state and local authorities may be required. With respect to the Section 404 authorization, however, "recognizing the EPA's expertise and concentrated concern with environmental matters, Congress gave the final decision whether to permit a project to that agency. Its authority to veto to protect the environment is practically unadorned." James City County v. EPA, 12 F.3d 1330, 1336 (4th Cir. 1993), cert. denied, 513 U.S. 823 (1994).

To the extent the comment assumes that WVDEP and the West Virginia Legislature have sole authority regarding the quality of West Virginia's waters, that is not the case. As stated above and in response to Comment #98, to the extent EPA considered changes in water chemistry that will be caused by the project as authorized, those water chemistry changes were considered in the context of their effects on water-dependent wildlife and were not outside EPA's authorities. As set forth in Response #154, as demonstrated by numerous examples throughout the Clean Water Act, the protection of West Virginia's waters and the wildlife that depend upon them is a shared responsibility. For example, while West Virginia is tasked in the first instance with developing water quality standards, those standards must be submitted to and approved by EPA. *See* 33 U.S.C. § 1313(c). Similarly, decisions by a state regarding which of its waters are impaired must be submitted to and approved by EPA. *Id.* § 1313(d). Issuance of protective NPDES permits is also a shared responsibility, as EPA has authority to review and object NPDES permits that the state proposes to issue. *Id.* § 1342(d); 40 CFR § 123.44. EPA also has authority to inform the Corps that a state's CWA Section 401 water quality certification does not sufficiently address all relevant water quality issues. *See* 33 CFR § 320.4(d). The fact that EPA chose not to exercise its ability to object to the NPDES permit does not preclude EPA from taking this action under Section 404(c). See Response #28, #154. #156.

Comment #98 - Commenters question whether EPA has the authority to develop new water quality standards and suggest that in this case EPA has developed an "ad hoc" water quality standard for conductivity. These same commenters suggest that the EPA "has set standards for water quality for mine sites that are discriminatory and unattainable and virtually guarantee the elimination of coal.

> Several comments suggest that EPA's 500 μS/cm conductivity standard is arbitrary and has no established regulatory significance, since the EPA National Recommended Water Quality Criteria 2006 has no recommended criteria for specific conductance pertaining to freshwater aquatic life. They further point out that there are no established regulatory water quality criteria for TDS.

Response #98 – See Response #33 and #170.

Comment #99 – Commenters believe that the Spruce No. 1 Mine is currently in compliance with its authorized permits. Comments include:

> WVDEP and Hunton & Williams suggest that the continued water quality concerns raised by EPA contradict the Spruce No. 1 Mine compliance with the NPDES permit according to WVDEP records.
>
> WVDEP argues that EPA's "Proposed Determination's statement that recent NPDES discharge monitoring reports show that the constructed portion of the Spruce No. 1 project is discharging selenium at levels that exceed West Virginia's numeric water quality standard is misleading" as the "only excursions from the selenium water quality standard reported in connection with the NPDES permit have been at instream monitoring points that are upstream of the Spruce No. 1 discharges."
>
> Issues relating to selenium discharges were addressed through permits from the Surface Mining Program and the National Pollutant Discharge Elimination System (NPDES) permit, and through the Clean Water Act Section 401 certification.
>
> WVDEP issued the water quality certification on December 19, 2005 and EPA has never indicated any deficiencies in the certification since its issuance.
>
> There are no violations of the selenium-specific conditions in the 401 permit.
>
> Monitoring data collected from the discharges and from the receiving streams "confirm that selenium concentrations are well below the applicable water quality standards and do not cause or contribute to any downstream impairments.
>
> TDS and/or conductivity any potential adverse impacts from both these parameters were addressed during the NPDES permitting process.
>
> According to WVDEP, their records reveal that the Spruce No. 1 Mine NPDES permit is in compliance with all applicable TMDLs. As the permit now stands the effluent limitations are in compliance with all applicable TMDLs and West Virginia's federally approved anti-degradation policy.

> The Corps found the project… would neither violate water quality standards nor contribute to significant degradation of waters of the United States.

Response #99 – See Responses #28, #29, #92 and #93.

Comment #100 - Hunton & Williams suggest that EPA's claims that the discharges do not comply with applicable water quality criterion for selenium are insufficient to satisfy EPA's burden under Section 404(c).

Response #100 – The comment suggests that clarification is necessary. EPA does not intend to suggest that current discharges of selenium from the constructed portion of the project do not comply with the applicable water quality criterion for selenium. EPA's point is that elevated levels of selenium in those discharges serve as a predictor for levels at other as yet unconstructed outfall[s] at the Spruce No. 1 Mine, and that these selenium levels are harmful to wildlife. EPA's Final Determination is based on a finding of unacceptable adverse effects to wildlife, not upon a violation of West Virginia water quality standards. See Responses #29, #92, #93, and #170.

Comment #101 - EPA's selenium analysis ignores data collected in accordance with the permit and relies upon the comparison of two dissimilar projects.

Response #101 - See Responses #29, #30, #92 and #93.

Comment #102 - WVDEP contends that the most recent WVSCI data contradict EPA's assertion of a poor biologic condition in Spruce Fork.

Response #102 – This comment is contradicted by the 2010 Integrated Report recently submitted by WVDEP to EPA pursuant to 33 U.S.C. 1313(d). In that report, WVDEP identifies the entire length of Spruce Fork as biologically impaired based on WVSCI data. In addition, EPA believes that a comprehensive, scientific case has been made regarding poor biologic condition in Spruce Fork in the RD and Appendix 1. For instance, the RD and Appendix 1 contain WVDEP data and assessments that confirm that the aquatic life is adversely impacted not only in the nearby mined streams, but further downstream, on the main stem of Spruce Fork, Pond Fork and the Little Coal River. Additionally see Responses #23, #34, #35, #65, #77, #78, #83, and #89.

Comment #103 - WVDEP points to a study (referred to as "Pond"), which indicates a shift in the benthic macroinvertebrate community downstream from mining activity, but does not correlate this finding with any significant impairment in the ecosystem.

Response #103 - The Spruce No. 1 Recommended Determination at Appendix 1 and our responses above to CH2M HILL's report elsewhere in this response to comments provide in depth data on loss of invertebrates and diversity in the project area. This information also provides analysis using WVDEP's data to show that the conductivity thresholds in Pond and WVDEP comparable stressor thresholds used in TMDL program correspond to adverse effects using WVDEP WVSCI. In its response to comments on its 2008 Integrated Report submitted to EPA pursuant to 33 U.S.C. 1313(d), WVDEP stated that a shift in the macroinvertebrate population may represent impairment of the waterbody.

Comment #104 - Several commenters contend that the action taken by the EPA is about the coal mining industry in general and not about water quality suggesting that EPA wants to dismantle the coal mining industry. Other comments in this regard:

> Commenters claim that EPA does not provide data or scientific evidence to back their claims on water quality. EPA is taking selected pieces of data and using it to forward their own agenda.
>
> Some public hearing participants argue that EPA is targeting the mining industry. "Be concerned about water quality and not an individual industry" and "The EPA has set standards for water quality for mine sites that are discriminatory and unattainable and virtually guarantee the elimination of coal."
>
> One commenter suggested that "water quality in West Virginia is better now than it has been during the past 60 years. If EPA wants better and cleaner water, why don't they force people to stop running their raw sewage into creeks."

Response #104 – The commenters are correct that EPA has expressed concerns regarding the environmental (and specifically water quality) effect of mountaintop removal mining. That form of surface coal mining has had impacts on the environment, using explosives to access coal seams and generating large volumes of waste that bury adjacent streams. Numerous studies have indicated that the resulting waste that then fills valleys and streams can significantly compromise water quality, often causing permanent damage to ecosystems and rendering streams unfit for swimming, fishing and drinking. It is estimated that almost 2,000 miles of Appalachian headwater streams have been buried by mountaintop coal mining. EPA's Office of Research and Development (ORD) also conducted a literature review of peer-reviewed studies focusing on aquatic environmental and water quality impacts of mountaintop mining and valley fills. The draft report among other conclusions, found:

- Burial of headwater streams by valley fills causes permanent loss of ecosystems.
- Concentrations of salts as measured by conductivity are, on average, 10 times higher downstream of mountaintop mines and valley fills than in un-mined watersheds.
- The increased levels of salts disrupt the life cycle of freshwater aquatic organisms and some cannot live in these waters.
- Water with high salt concentrations downstream of mountaintop mines and valley fills is toxic to stream organisms. To date, there is no evidence that streams that undergo a restoration process have returned to their normal ecological functions after the mining is completed.

A recently published literature review by non-government scientists and academics reaches similar conclusions. M. Palmer, et al. 2010.

Nevertheless, it would be incorrect to construe this action or EPA's other statements as an attack on surface coal mining generally. EPA is taking this action because we believe that the Spruce No. 1 Mine would eliminate the entire suite of important physical, chemical and biological functions provided by the streams of Pigeonroost Branch and Oldhouse Branch including maintenance of biologically diverse wildlife habitat. Impacts to these functions at the scale associated with this project will result in unacceptable adverse effects, particularly in light of the extensive historic stream losses in the Spruce Fork and Coal River watersheds. EPA also does not believe the potential impacts of these stream resources can be adequately mitigated to reduce the impacts to an acceptable level by the compensatory mitigation described in the compensatory mitigation plan.

This fact-specific action does not mean that EPA's intention is to shut down mining. To the contrary, in the time since EPA sent its letter on October 16, 2009 notifying the Corps of EPA's intent to initiate the Section 404(c) process, Section 404 permits for at least two large surface coal mining operations (Hobet No. 45 and Coal-Mac Pine Creek Surface Mine) have been issued, one of which will be operated by a corporate sibling of the permittee in this action.

EPA believes that jobs and environmental health should not be mutually exclusive. In fact EPA believes the best way forward is by using the best available science, following the law, and setting comprehensive guidance that sets clear benchmarks for preventing significant and irreversible damage to Appalachian watersheds at risk from mining activity.

Comment #105 - Comments in agreement with EPA's conclusions on water quality generally argue that the permit represents a potential threat to water quality and some comments base their arguments on data and other affected mining areas. Comments include:

> The FWS argue that "available data strongly suggest the project will discharge and export selenium downstream at levels that will exceed West Virginia's numeric water quality standard."
>
> Substantial scientific evidence is available from previous mountaintop mine operations that suggests the degradation of water quality is likely to be in violation of the West Virginia water quality standards.
>
> Some public hearing participants stated in regard to mountaintop mining and valley fills that the "water quality standards need to be upheld and enforced."
>
> Proposed discharges of mining waste exposes the adjacent streams and watersheds to pollutants, degrading the water quality. This in turn increases the biological impairment of the streams and watershed due to increased levels of TDS and conductivity.
>
> Friends of the Earth et al. state: "The Spruce discharges would likely lead to higher levels of conductivity, selenium, metals, and other contamination in downstream waters. As EPA's proposed determination demonstrates, there is substantial evidence that the permitted discharges would likely cause violations of West Virginia's narrative water quality standards for selenium, and for biological impairment due to the increased levels of TDS, sulfate, and conductivity that are expected from this project.

Response #105- Comments are noted.  EPA believes its Final Determination is consistent with these comments.

Comment #106 - Several commenters point out that the Spruce Fork is already designated as biologically impaired and any additional discharges into the streams would be in violation of the West Virginia anti-degradation policy.

> FWS expresses particular concern with the increases in TDS and conductivity by stating the project "would effectively convert Oldhouse Branch, Pigeonroost Branch, and Seng Camp Creek from high quality, low conductivity (90-199 µS/cm) headwaters with healthy and diverse populations of aquatic organisms into conduits of high levels of TDS that would be discharged from the proposed mine site."
>
> FWS suggests that "the project, as proposed, would eliminate several of the few remaining sources of freshwater dilution in the Spruce Fork sub-watershed.
>
> FWS also identifies that the main stem of the Spruce Fork downstream of the project currently has conductivity levels exceeding 500 µS/cm ("high probability of impairment to native biota.
>
> FWS "agrees that the preponderance of available scientific information strongly suggests that construction of the project as currently authorized would cause or contribute to significant degradation of waters of the United States, both on-site and in receiving waters downstream of the proposed mine,"
>
> One comment noted that "In accordance with the West Virginia anti-degradation policy, no new discharges of pollutants are allowed into streams that have been identified with a TMDL." According to Earthjustice et al., Spruce Fork has been designated as biologically impaired and the West Virginia Department of Environmental Protection (WVDEP) does not plan to develop a TMDL for its impairment until 2025, even though "there are already TMDLs on Spruce Fork and other affected streams." In addition to Spruce Fork, WVDEP has recognized Seng Camp Creek as being biologically impaired but will not complete a TMDL for its impairment until 2013. Earthjustice et al. argue that West Virginia has the "opportunity and duty to address" these water quality impairments.

Response #106 – See Response #102.  EPA believes its Final Determination is consistent with these comments with respect to the adverse effects of construction of the Spruce No. 1 mine as currently authorized.  EPA notes that the pace of WVDEP's TMDL development is beyond the scope of this action.

Comment #107 - Most commenters that supported EPA and its authority under the Clean Water Act contend that the water quality standards need to be upheld in order to protect the drinking water, environment and health within the communities surrounding Spruce No.1 Mine. Specifically, Earthjustice et al., discusses the extent of degradation in connection to the Spruce No. 1 mine: "…wherever the discharge of fill material results in physical modification and elimination of portions of headwater streams," this discharge causes water quality impacts that a section 402 NPDES permit concerned with the level of downstream pollution is not equipped to address. In other words, downstream impacts must be considered not just in terms of pollution or the addition of impairment to waterways, but also in terms of the loss of positive contributions that streams were previously providing to those waterways as part of the previously healthy water system.

Response #107 – Comments are noted. EPA believes its Final Determination is consistent with these comments with respect to the adverse effects of construction of the Spruce No. 1 mine as currently authorized.

**Quality of Stream Resources**

Comment #108 - One person commented that the Pigeon Roost and Old House Branch are intermittent streams, not perennial as EPA has defined them and that even in years of heavy rain, such as 2005 and 2009, the streams are "dry with no flow at all."

Response #108 – EPA has field macroinvertebrate data showing that Pigeonroost and Oldhouse support aquatic taxa that require flowing water for their life cycles. The presence of these organisms supports EPA's conclusions regarding stream flow characteristics. These data are presented in the Final Determination and Appendix 3. In addition, the watershed areas of Pigeonroost and Oldhouse are consistent with the size of watersheds found to support perennially flowing streams in Appalachia. (Paybins, 2003).

See Response #46.

Comment #109 - Hunton & Williams LLP further suggest that "the streams at issue are not characterized as special aquatic sites under EPA's Regulations. Further suggest that the headwater streams are "unremarkable" and "may not be subject to federal jurisdiction under the Clean Water Act.

Response #109 – See Response #21, #25, #26, and #46.

Comment #110 - Hunton & Williams LLP point out that at the time of permit issuance, the applicant complied with the development of the proper baseline information of aquatic resources.

Response #110 – This action does not represent a finding (one way or the other) by EPA as to whether the permittee satisfied bare minimum legal and process requirements. The question presented by Section 404(c) is not whether the Corps or the permittee followed appropriate procedures. Had Congress intended merely for EPA to supervise the process, Congress could have said so. Instead, Section 404(c) authorizes EPA to act whenever it determines, after notice and opportunity for a public hearing, that discharge to the defined area will have an unacceptable adverse effect on municipal water supplies, shellfish beds and fishery areas (including spawning and breeding areas), wildlife, or recreation areas. In considering the qualitatively different question posed by Section 404(c), the Final determination and Appendix 3 provide data demonstrating that the baseline classifications of the aquatic resources were not properly identified. Overall, through onsite visits and biological data collection, Region III conservatively estimates that, within the mine footprints of Pigeonroost Branch and Oldhouse Branch, approximately four miles of stream (~21,000 feet) are perennial. This is in contrast to the DA Permit estimation of 165 feet of perennial waters within the entire project area. The resource type plays an important role in the types of expected aquatic communities, the degree in which each resource provides structure and function, and the amount of organic matter and nutrients (and contaminants) ultimately retained or loaded to receiving streams. A detailed description of EPA's analysis of stream type is described in Appendix 3 of the RD.

Comment #111 - Several commenters agreed with EPA's assessment of cumulative impacts in the Coal River Watershed. They were concerned with cumulative impacts on the Coal River Watershed and Spruce Fork of the Little Coal River claiming they are already impacted by coal mining activities and further degradation would be unacceptable and that very little has been done to determine the cumulative impacts of all of these mountaintop removal mining permits. Comments include:

> "The Coal River is one of the most mining-affected watersheds within the region of southern West Virginia, where there is an already high area harmed by mountaintop removal or other strip mining. In that area of the state, a number of other local watersheds have already had between 9.5% and 37% of the first order streams destroyed or slated for destruction by valley fills."

> "The best available science indicates that it is not safe to allow mining to harm more than 5-10% of a watershed, as this likely takes the watershed beyond a point from which it might have a reasonable chance to recover."

Response #111 – EPA remains concerned about cumulative impacts to the Coal River sub-basin as described in the Final Determination.

Comment #112 - FWS expressed concern regarding adverse effects on downstream receiving waters and aquatic and terrestrial wildlife of the Spruce Fork Sub-watershed, Little Coal River Watershed, and the Coal River Sub-basin.

Response #112 – Comments are noted. EPA believes the Final Determination is consistent with these comments.

Comment #113 - Some commenters disagreed with EPA's determination of adverse cumulative impacts. Most notably Hunton & Williams LLP, legal counsel for Mingo Logan and WVDEP. Their comments suggest that EPA's cumulative impacts discussion focuses almost exclusively on the impacts of upland forest removal – not the impacts of discharges of fill material" and suggest that "the decrease in forest cover is not an activity regulated by Section 404."

Response #113 – See Response #14.

Comment #114 - They also address the issue of potential cumulative impacts to downstream water quality and suggest that "West Virginia's NPDES and water quality standards programs prevent cumulative water quality impacts by capping the concentrations for pollutants that can be discharged."

Response #114 – Comment is noted. For the reasons set forth in the Final Determination, EPA has concluded that the specification of Pigeonroost Branch and Oldhouse Branch as disposal sites for the discharge of dredge or fill material, as currently authorized, will have unacceptable adverse effects on one or more of the Section 404(c) categories.

**Human Health and EJ**

Comment #115 - Several commenters had concerns related to human health and the environmental costs of mountaintop mining and valley fills. They state that adverse impacts related to destructive strip mining far outweighs any short-term benefits that a few short-term jobs gives. Other comments related the belief that there is a disproportionately high human health impacts on mining communities and that low-income communities experience a disproportionate share of this type of environmental devastation and as such mountaintop removal sites are environmental justice concerns and they appreciate the EPA's recognition of these serious issues. Specific comments include:

> "Surface mining decreases education levels in the area, increases migration away from coal communities, and creates lower life expectancies in the area."
>
> "Study found that a low level of stream ecological integrity is significantly correlated with digestive, breast, respiratory, and urinary cancer rates, and that a high coal mining index is significantly correlated with respiratory cancer and other types of cancer."
>
> One person claims that stream water quality degradation due to mining has been linked to cancer in nearby residents.
>
> "Impacts on local watersheds are putting human health at risk - and this mine would further limit future economic opportunities for surrounding communities which are already facing the impacts of long term poverty."
>
> "the peer-reviewed science does not support the coal industry's claim that environmental and human health will not be impacted by mountain top mining at this location."

Response #115 – Interest in the overall environmental and human health effects from mountain top mining has been increasing, a growing body of research has suggested that health disparities are not uniformly distributed across the Appalachian region but are concentrated in areas, like the Spruce No. 1 Mine project area, where MTM activity takes place. Region III has conducted a preliminary review of existing literature on health impacts from MTM. The bases for the Final Determination is limited to impacts to wildlife that depend upon the impacted aquatic resources for all or part of their life cycles. While EPA considers the emerging scientific literature tending to suggest an association between MTM activity and a variety of health disparities to be of concern and therefore has described them, these do not form a basis for the Final Determination.

The studies reviewed by Region III sought to evaluate whether associations between MTM and health exist. These studies do not provide direct assessments of environmental air and water quality in mining areas in relation to individual exposures and health outcomes. However, the results of these associational studies identify significant correlations between MTM activity and a variety of health disparities. These study findings indicate that health disparities are elevated in Appalachian coal mining regions for mortality rates, chronic respiratory, cardiovascular, and kidney disease, and for some forms of cancer including lung cancer. These studies by their nature could not and do not establish any causal linkage between MTM and these elevated rates of adverse health effects, but because they point to significant associations between MTM and elevated rates of adverse health impacts, the results warrant more research using rigorous epidemiological methods. The existing body of literature suggests that various negative health outcomes are not the result of a single exposure, but may reflect chronic exposures to multiple environmental contaminants, both air and/or water, which will vary for each individual.

Comment #116 - Other commenters raise the issue of clean drinking water:

> "the people Appalachia need clean water even more than they need the few mining jobs that MTR offers."
>
> **"**a report for the Logan County Sharples area found a significant risk of well water contamination from mining-related impacts and "high sensitivity" to coal mining and similar impacts."
>
> "Because Logan County has a federal poverty rate of 23.1 %, people most impacted by the Spruce Mine may have fewer financial resources to buy replacement water if their private wells are polluted by mining."

Response #116 – EPA has received anecdotal accounts correlating surface coal mining activity and mountaintop mining with degradation of private drinking water wells. EPA also has received anecdotal accounts that some Appalachian residents rely upon headwater streams as a source of drinking water. Ensuring that all citizens have access to clean drinking water is an important priority for EPA, and EPA encourages citizens to report instances in which a source of drinking water on which they rely has been polluted by surface coal mining or any other human activity. Nevertheless, based on the evidence available to EPA, EPA has not determined that construction of valley fills in Pigeonroost Branch and Oldhouse Branch as currently authorized will cause an unacceptable adverse effect upon a known source of drinking water.

Comment #117 - Ohio Valley Environmental Coalition discusses the air quality impacts from dust created by mountaintop mining.

Response #117 – EPA has received anecdotal accounts of excessive dust related to mountaintop mining activities that raise concern. EPA encourages citizens to report instances of excessive dust from mountaintop mining so that the matter can be better understood. The Final Determination is not based upon air quality concerns.

Comment #118 - Some commenters mentioned intimidation that accompanied the Dal-Tex operation above Blair that need to "be included as direct impacts in this current evaluation." They noted that the previous expansion of the Dal-Tex mine operation impacted Blair with the "loss of home, community, heritage, mountains and streams. Just because they were impacted by this mine proposal over a decade ago is no reason not to count their losses as direct impacts attributable to Spruce No. 1."

Response #118 – EPA encourages citizens who believe they have been subject to unlawful intimidation to report the matter to appropriate local, state or federal law enforcement authorities. As noted in the Final Determination, EPA remains concerned about potential disproportionate impacts on local residents and the cultural and community impacts. While EPA considers the cultural and community impacts to be of concern and therefore has described them, these do not form a basis for the Final Determination.

Comment #119 - Commenters also disagreed that there were adverse environmental impacts as a result of mining stating that "mining had actually improved conditions in the area."

Response #119 – As set forth in Response #104, EPA is taking this action based upon facts and data specific to the Spruce No. 1 project. This action should not be viewed as an effort to stop surface coal mining in Appalachia. EPA is taking this action because we believe that the Spruce No. 1 Mine would eliminate the entire suite of important physical, chemical and biological functions provided by the streams of Pigeonroost Branch and Oldhouse Branch including maintenance of biologically diverse wildlife habitat.

Comment #120 - Several commenters, including those at the May 18, 2010 public hearing noted that mining in these low income communities strengthens the economy and that "Without mining, there would be no jobs, no taxes, and no government checks to live from!"

Response #120 – EPA recognizes the important role that surface coal mining plays in West Virginia's economy. It would be incorrect to construe this action as an attack on mountaintop mining or surface coal mining generally. EPA is taking this action because we believe that the Spruce No. 1 Mine would eliminate the entire suite of important physical, chemical and biological functions provided by the streams of Pigeonroost Branch and Oldhouse Branch including maintenance of biologically diverse wildlife habitat. Impacts to these functions at the scale associated with this project will result in unacceptable adverse effects, particularly in light of the extensive historic stream losses in the Spruce Fork and Coal River watersheds. EPA also does not believe the potential impacts of these stream resources can be adequately mitigated to reduce the impacts to an acceptable level by the compensatory mitigation described in the compensatory mitigation plan (CMP).

This fact-specific action does not mean that it is EPA's intention to shut down mining. To the contrary, in the time since EPA sent its letter on October 16, 2009 notifying the Corps of EPA's intent to initiate the Section 404(c) process, Section 404 permits for at least two large surface coal mining operations (Hobet No. 45 and Coal-Mac Pine Creek Surface Mine) have been issued, one of which will be operated by a corporate sibling of the permittee in this action.

EPA believes that jobs and environmental health should not be mutually exclusive. In fact EPA believes the best way forward is by using the best available science, following the law, and setting comprehensive guidance that sets clear benchmarks for preventing significant and irreversible damage to Appalachian watersheds at risk from mining activity.

Comment #121 – Finally several commenters, particularly those at the public hearing suggested that EPA "care(s) more about salamanders and bugs than they do about hard-working West Virginia families."

Response #121 – See Response #120.

**Consistency with the CWA 404(c) and the 404(b)(1) Guidelines**

Comment # – Several commenters, most notably WVDEP and Hunton and Williams LLP (Counsel for Mingo Logan), disagrees with EPA's determination regarding the proposed determination's conformity with the CWA 404 (c) criteria and also Spruce No. 1 Mine's compliance 404(b)(1) Guidelines. WVDEP commented that "EPA has not been able to validate an unacceptable adverse effect to municipal water supplies, shellfish beds, fisheries, wildlife or recreational areas." Additionally, WVDEP refers to the EPA's action under Section 404(c) as generic, and could describe any large-scale construction project in West Virginia engaged in earth disturbance.

Response #122 – As set forth in Response #171, EPA does not assert there will be unacceptable adverse effects to municipal water supplies, shellfish beds or recreational areas. With respect to fisheries, see Response #1, #2, #3, #4, #5. To the extent the comment states that this action is "generic and could describe any large scale construction project … engaged in earth disturbance," EPA's determination is based on site-specific data and data from other facilities engaged in surface coal mining where impacts can be expected to be similar to those from Spruce No. 1. For purposes of this determination, EPA has not reviewed, nor has the commenter provided EPA with, data from other types of large-scale construction project for comparison.

Comment #123 - Obama Administration's Obstruction of Coal Mining Permits in Appalachia investigative report concluded that EPA "…is using the Clean Water Act Section 404 permitting process to dismantle the coal industry in the Appalachian region." Others commenters felt the same way stating:

> "Abuse of the federal-state relationship and especially an abuse of the handful of states in Appalachia which EPA seems to have targeted for what appears to be an anti-coal mining crusade" and further suggests that "this targeting is obvious in the Detailed Guidance policy issued by EPA earlier this year for enhanced scrutiny of permits in only the Appalachian states."

Response #123 – See Responses #120, #121.

Comment #124 - U.S. Representative Nick J. Rahall at the Public Hearing on the EPA's proposed veto of Spruce No. 1 Mine 404 Permit, May 18, 2010 commented that "(t)he EPA has a legitimate role as part of the surface coal mine permitting process in helping to achieve the balance between energy development and environmental protection." He also suggested "(t)his is the kind of action that invites critics to accuse the EPA of making decisions based on political ideology."

Response #124 – EPA thanks Congressman Rahall for his comments. EPA recognizes the need to balance energy development and environmental protection. As EPA has stated, this action is limited to the Spruce No. 1 Mine as authorized. It neither precludes mining at this site with a different configuration or techniques that do not cause the impacts described in the Final Determination, nor does it preclude mining elsewhere.

This fact-specific action does not mean that EPA intends to shut down mining. To the contrary, in the time since EPA sent its letter on October 16, 2009 notifying the Corps of EPA's intent to initiate the Section 404(c) process, Section 404 permits for at least two large surface coal mining operations (Hobet No. 45 and Coal-Mac Pine Creek Surface Mine) have been issued, one of which will be operated by a corporate sibling of the permittee in this action.

EPA believes that jobs and environmental health should not be mutually exclusive. In fact EPA believes the best way forward is by using the best available science, following the law, and setting comprehensive guidance that sets clear benchmarks for preventing significant and irreversible damage to Appalachian watersheds at risk from mining activity.

Comment #125 – Many Public Hearing participants expressed the view that the Spruce No.1 Mine was one of the most extensively reviewed permits and was found not to have significant detrimental impacts. Additional comments included the sentiment that there should be a common-sense permitting process where the rules are clearly laid out, not constantly changing.

Response #125 – EPA agrees that the Spruce No. 1 Mine was the subject of an Environmental Impact Statement and a Clean Water Act Section 401 water quality certification and underwent permitting processes by WVDEP under SMCRA and the NPDES program and the Corps of Engineers under Section 404. To the extent the comment states that the Spruce No. 1 Mine was found not to have significant detrimental impacts, that is incorrect. The Corps of Engineers did not make a finding of no significant impact under the National Environmental Policy Act. As is clear from the summary in the Final Determination, the project has a long history of controversy, including multiple lawsuits. During the course of that controversy, various parties (including EPA) voiced concerns. For much of the project history, however, while EPA raised concerns, EPA was aware that the full scope of the types of impacts that were concerning EPA was developing. EPA noted in its July 30, 2002 letter: "It is apparent that there is a potential for stream impairment at the proposed Spruce No. 1 Surface Mine due to drainage from the valley fills, but the extent of any impairment and feasible measures for minimizing detrimental impacts is not known at this time." As detailed in Response #152, much of what we know about the effects discussed in the Final Determination has emerged in recent years. That new information, combined with previously recognized effects, lead to EPA's Final Determination. To the extent commenters recommend a more transparent and simplified permit process for surface coal mine projects, the comments are noted. As with most complex activities, large-scale surface coal mine projects are subject to a variety of regulatory requirements. EPA recognizes the need to work with the regulated community transparently and in advance to resolve concerns.  Indeed, EPA notes that EPA has worked with permittees (including a corporate sibling of the permittee in this action) to resolve concerns.

Comment #126 – The USFWS, however, agrees with EPA's proposed determination commenting that they  "agree that the preponderance of available scientific information strongly suggests that construction of the project as currently authorized would cause or contribute to significant degradation of waters of the United States, both on-site and in receiving waters downstream of the proposed mine," suggesting that there may be other less environmentally damaging practicable alternatives that have not been considered.

Response #126 – The Comment is noted.  EPA believes that the Final Determination is consistent with this comment.

Comment #127 – Several commenters applauded EPA for vetoing the Spruce No. 1 Mine. Friends of the Earth et al. state that all contributing organizations "strongly support EPA's proposal to veto the Army Corps of Engineers' permit for the Spruce No. 1 Mine in Logan County, West Virginia."  Other comments in this regard include:

> Earthjustice et al. discusses the negative impacts of allowing the permit to proceed: "If mining were to proceed, the Spruce No. 1 Mine would destroy great expanses of Appalachian mountains, forests, and waterways. It would cause irreparable harm to already devastate local watersheds and the communities, fisheries, and wildlife that rely on them.
>
> Several commenters were "greatly encouraged by the EPA's recent actions to enforce the Clean Water Act by proposing to veto the Spruce No. 1 Mine" and that "it is not enough to simply restrict the permit or reduce the scope of the project to a lesser number of valley fills".
>
> Based on the factual record, the best available science, and the legal requirements of the Clean Water Act, EPA must veto the Spruce permit to prevent these unacceptable adverse effects.

Response #127 – These comments are noted.  EPA believes that the Final Determination is consistent with these comments.

**Miscellaneous Comments**

Comment #128 - Several public hearing participants asked for the EPA "to work with the coal industry in finding reasonable solutions to the environmental concerns of the Agency, rather than creating policies which are designed to be unachievable."

Response #128 – See Response #120, #121, ,#124, #125, #130.

Comment #129 – Several commenters believed that the action taken by the EPA "appears to be political, not scientific" and "is unwarranted, unfair, and unprecedented persecution of the central Appalachian coal industry."

Response #129 – See Response #120, #121.

**Economics/Jobs Comments**

Comment #130 – Some commenters, notably industry, were concerned that EPA would set a dangerous precedent by revoking or restricting permits after issuance and that this uncertainty would result in lost revenue that "could cause a mining company collapse, and scare future investors and banks away from mining projects." Comments include:

> In addition to discouraging corporate investment, the Chamber of Commerce comments suggest that banks will be reluctant to finance projects that require Section 404 permits, and interest rates on such financing could rise steeply.
>
> National Mining Association suggest that business plans and investments need to have assurance from regulatory agencies that permits, once issued, won't be revoked and that they need certainty and predictability.
>
> EPA's interpretation of section 404(c) has the potential to frustrate economic development by creating uncertainty as to the effectiveness of validly issued permits…
>
> Some commenters believe that the "proposed action could cause decreased investment in the mining industry and related industries."
>
> Ohio Coal stated its concern that the proposed action has "wider impact than just the Spruce mine site."

Response #130 – EPA appreciates that businesses need certainty. EPA does not believe that this action introduces additional uncertainty. EPA's interpretation of Section 404(c) as authorizing EPA to withdraw specification following permit issuance was publicized in 1979 when EPA promulgated 40 CFR Part 231. In the first action undertaken by EPA pursuant to Section 404(c), EPA restricted discharges to the North Miami Landfill, a site that previously had been specified by the Corps through a Section 404 permit. *See* http://water.epa.gov/lawsregs/guidance/wetlands/upload/NorthMiamiFD.pdf. EPA also has taken action under Section 404(c) with respect to specification of a site (Lake Alma impoundment) following a court decision overturning a previously issued Section 404 permit as to which EPA previously had withdrawn its objections. *See* http://water.epa.gov/lawsregs/guidance/wetlands/upload/LakeAlmaFD.pdf. In addition, EPA has taken action under Section 404(c) with respect to an after-the-fact permit. See Russo Devel. Corp. v. Reilly, No. 87-3916, 1990 U.S. Dist. LEXIS 15859 (D.N.J. Mar. 16, 1990).

EPA believes that the Spruce No. 1 Mine represents a unique set of circumstances. As is clear from the summary in the Final Determination, the project has a long history of controversy, including multiple lawsuits. During the course of that controversy, EPA frequently voiced concerns. For much of the project history, however, while EPA raised concerns, EPA was aware that the full scope of the types of impacts that were concerning EPA was developing. EPA noted in its July 30, 2002 letter: "It is apparent that there is a potential for stream impairment at the proposed Spruce No. 1 Surface Mine due to drainage from the valley fills, but the extent of any impairment and feasible measures for minimizing detrimental impacts is not known at this time." As detailed in Response #152, much of what we know about the effects discussed in the Final Determination has emerged in recent years. That new information, combined with previously recognized effects, lead to EPA's Final Determination.

EPA believes that the public expects EPA to respond to a critical mass of science that demonstrates unacceptable adverse effects will occur. At the same time, EPA recognizes that instances where the need to act occurs after a permit has issued are legal, but should be rare. EPA recognizes the need to work with the regulated community transparently and in advance to resolve concerns. Indeed, EPA notes that EPA has worked with permittees (including a corporate sibling of the permittee in this action) to resolve concerns.

Comment #131 - The overall comments from industry gave the sense that the proposed veto will have a negative impact on the local economy and the coal mining industry in general because of the potential for loss of jobs in the region. Comments include:

> "For EPA to veto this permit creates uncertainty for the industry and economy in general and that "the proposed veto will have a negative impact on jobs and on the local, county, state, and national economies."
>
> Others argue that coal plays a significant role in the national economy, and that EPA's current proposed action could have far-reaching economic impacts, well beyond the borders of West Virginia.
>
> The City of Jenkins, Kentucky commented that "without these mines and/or hollow fills there would not be space for a number of developments."

Response #131 – EPA recognizes that businesses need certainty. See Response #130. EPA also recognizes the role that coal plays in the national economy. See Response #120 and #121.

Comment #132 – Specifically, Mingo Logan owners of the Spruce No. 1 Mine state that they are "suffering capital losses due to EPA's action, but the local citizenry, which rely on the economic stimulation this project would bring to the region, lose the opportunity to provide a decent quality of life for their families; and that EPA's decision could result in the permit holder losing significant economic investments in the permitted project and terminating hundreds of workers. Additionally, the United Company, owners of the Spruce No. 1 Mine land holdings indicate that:

> "The United Company provides an economic impact estimate of the proposed veto that includes over $2 billion in lost revenues, $100 million in lost severance tax revenue to West Virginia and more than $100 million more of lost direct wages and benefits to more than 250 workers."

The United Company also challenged EPA's authority to veto the project and suggested that the "EPA veto would amount to a regulatory taking."

Response #132 – See Response #130 above. While EPA recognizes that Mingo Logan has made significant investments in planning for operations at the Spruce No. 1 Mine, the types of investments by Mingo Logan prior to issuance of the DA permit in early 2007 are the same types of investments that any permit applicant would make and do not guarantee authorization to proceed. EPA recognizes that this circumstance differs somewhat because a permit has issued. To the extent mining has commenced, EPA's Final Determination does not extend to Mingo Logan's discharge of fill in the Seng Camp Creek watershed. With respect to Pigeonroost Branch and Oldhouse Branch, to EPA's knowledge, Mingo Logan has not exercised its option under its voluntary agreement to notify plaintiffs in the OVEC lawsuit of any expansion of mining activities to those areas. To the extent Mingo Logan has invested resources toward activities that would result in discharges of dredged and/or fill material to Pigeonroost Branch and Oldhouse Branch, those investments were made in the context of an ongoing court proceeding without a guaranteed outcome. To the extent the commenter asserts that this action amounts to a regulatory taking, EPA disagrees. This action is limited to withdrawal of specification of Pigeonroost Branch and Oldhouse Branch as disposal sites for the discharge of dredged and/or fill material associated with the construction of the Spruce No. 1 Mine as currently authorized. It does not forbid mineral extraction. As such, EPA believes that this action does not constitute a regulatory taking under current case law.

Comment #133 - The Obama Administration's Obstruction of Coal Mining Permits in Appalachia investigative report, submitted as comments on the Spruce No. 1 Mine Proposed Determination states that the "EPA is currently delaying review on 190 coal mining permits." The report indicates that the economic impacts resulting from EPA delaying review on these 190 permits according to the report are as follows:

- "Roughly 1 in every 4 coal mining jobs in the Appalachian region will be at risk of elimination, 81 small businesses will lose significant income and will be at risk of bankruptcy and over 2 years of America's coal supply will be in jeopardy
- "These permits are expected to produce over 2 billion tons of coal throughout the life of operations, support roughly 17,806 existing and new jobs, and support 81 small businesses
- "EPA's delays in handling these permits are jeopardizing jobs in Appalachia and the energy security of the nation
- The EPA's "…actions will negatively impact 162,000 direct and indirect jobs in the Appalachian Region
- "…the state (of West Virginia) will lose an estimated $217 million in tax revenue annually," which "will have severe economic repercussions in rural communities
- "…cause drastic increases in American energy prices due to decreases in supply
- "…it's likely to take as long as 5 years for coal production in Appalachia to get back on track even if all of the permits in question are approved

Response #133 - See Response #120, #121, and #130.

Comment #134 – Several commenters suggested that EPA did not have the authority to veto the project post-permit issuance and they recommend that "EPA address any concerns it may have regarding permit provisions in a full and transparent matter (manner) during the permitting process, not afterward."

Response #134 – See Response #130, #159, #160, #161, #162, #163, and #168.

Comment #135 – Several commenters felt that "mountaintop mining actually destroys more coal mining jobs than it creates, as miners are replaced as quickly as possible with heavy equipment operated by few." Bill Maxey, former Chief of the West Virginia Forestry Division, commented that "It is a sad irony that mountaintop mining removal actually destroys more coal mining jobs than it creates; union miners are expediently replaced by relatively few heavy-equipment operators. This irresponsible excavation of coal makes the landscape so unsightly that it ruins tourism."

Response #135 – The comment is noted.

Comment #136 – Other commenters that agreed with EPA's proposed determination suggested that mountaintop mining projects like the Spruce No. 1 Mine result in a "scar on the landscape then discourages tourism." Other comments included:

> "mountaintop mining could create long-term economic issues due to environmental degradation and water pollution."
>
> "The stream degradation and economic and environmental damage that mountaintop removal mining in West Virginia and elsewhere in Appalachia has caused over the last decade is staggering."
>
> Ohio Valley Environmental Coalition argues that mountaintop mining's negative impact on water quality can also negatively impact the local economy
>
> Recent economic analyses have recognized that industry's requests, as in this permit; to be able to destroy local waters in the interest of their short-term profit would come at a net economic cost to Appalachian states and local communities, without long-term economic development benefits.

Response #136 – The comments are noted.

**Proposed Mitigation and Mis-Classified Resources**

Comment #137 – The USFWS supported EPA's proposed determination regarding the inadequacy of currently proposed mitigation measures. They commented that there is considerable uncertainty regarding the ability to effectively compensate for the unavoidable losses of the physical, chemical, and biological processes and ecological functions of the headwater systems. Other comments supporting EPA's proposed determination regarding the Spruce No. 1 mitigation plan include:

Several commenters referenced a quote by Dr. Margaret A. Palmer of the University of Maryland Center for Environmental Science stating that "…the streams that are buried when rocks and dirt are dumped over the side of the mountain into the valleys below are gone forever, and there is no evidence to date that mitigation actions can compensate for the lost natural resources and ecological functions of the headwater streams that are destroyed."

There is a "lack of a good track record for mitigation measures, such as the creation of new streams."

Response #137 –The comment is noted.  EPA believes that the Final Determination is consistent with the comment.

Comment #138 – The USFWS also supported EPA's conclusion that the applicant has underestimated the extent of stream resources adversely affected by the project, stating that "the impacts to the high-quality headwater streams affected by the mine have not been accurately described or quantified. Therefore, the currently proposed mitigation for these impacts is very unlikely to adequately compensate for the loss and degradation of these streams, their biological productivity and diversity, or their ecological functions."

Response #138 – The comment is noted.  EPA believes that the Final Determination is consistent with the comment.

Comment #139 - Hunton & Williams LLP suggests that the proposed mitigation is adequate to reduce adverse impacts to an acceptable level and that at the time of permit issuance, the applicant complied with the standard mitigation development protocols and included the proper baseline information of aquatic resources in their compensatory mitigation plan.  Others commented in this regard, stating that:

"The permit applicant had indeed established a proper baseline for existing aquatic resources."

A general disagreement with EPA's claim that the quality and function of the impacted resources were not appropriately assessed and accounted for in the mitigation plan.

WVDEP describes the proposed mitigation measures as sufficient.

Fourth Circuit Court concluded that "the mitigation measures reflect the Corps" determinations of the most appropriate and practicable means of compensating for anticipated impacts and losses of value.

Response #139 – See Responses #27, #37, #39, #41, #43, #137, and #157

**Wildlife Comments**

Comment #140 – The USFWS agreed with EPA's proposed determination regarding impacts to wildlife providing the following comments regarding the project:

> The project will result in "the likely loss of macroinvertebrate genera (diversity and abundance) and the cascading biological consequences of that loss on other aquatic and terrestrial wildlife."
>
> That one adverse impact of the proposed project includes "the direct loss of a significant number of salamanders, indirect effects to perhaps many more, and the effects of those losses on other aquatic and terrestrial wildlife.
>
> FWS contends the project will result in "degraded fish communities, including reduced diversity and abundance."
>
> The direct loss of habitat and indirect loss of food resources for migratory birds, including six species FWS considers Birds of Conservation Concern.
>
> The project will result in "direct loss of habitat, and direct and indirect loss of food resources, for a variety of bat species, many of which are already threatened by the spread of white-nose syndrome in West Virginia and which may require additional protection in the near future."

Response #140 – The comments are noted. EPA believes the Final Determination is consistent with these comments.

Comment #141 - FWS is also specifically concerned about increased conductivity and total dissolved solids (TDS) as a result of the proposed action, stating that "discharges will likely increase specific conductivity in these streams to levels similar to those in adjacent, previously mined watershed (971-2,246 µS/cm), which are elevated well above levels considered protective of aquatic life, and which would impair downstream aquatic life uses via acute toxicity to native aquatic organisms."

Response #141 - The comments are noted. EPA believes the Final Determination is consistent with these comments.

Comment #142 – Others in agreement with EPA's proposed determination regarding adverse impacts to wildlife provided the following comments:

> Commenters reference studies to indicate that discharges of mining waste identified as "valley fills" from Spruce Mine No. 1 operations (and mountaintop mining in general) will have adverse affects on stream fish communities. They argue that the proposed project will lead to the contamination, deformation, or destruction of fish.
>
> A commenter mentioned that there are "strong restrictions about fish consumption already due to current contamination. Increased mining activity will only exacerbate the problem."

> Earthjustice et al. contends the Spruce No. 1 Mine will "cause irreparable harm to already devastated local watersheds and communities, fisheries, and wildlife."
>
> Commenters identify several species of birds that are of concern, some of which are described as declining species. Many of these birds depend on the headwater streams for foraging on insects, breeding, or nesting areas. "These birds depend on mature deciduous forests for breeding, feeding, and cover and mountain top/valley fill mining is not a management tool that will help increase populations of these birds, but rather will convert or degrade habitat needed to support breeding pairs."
>
> "It's a basic tenet of ecology that all life on earth is interconnected. Keeping ecosystems such as the Appalachian mountains intact is essential to the proper function to the natural systems on which all life depends. We cannot radically alter the land on such a large scale without negative consequences."
>
> Ohio Valley Environmental Coalition provided a discussion on the adverse impacts of mining on fish, stating that: "Increased mining activity will only exacerbate the problem of the bioaccumulation of toxic heavy metals in fish in the watershed where the Spruce Mine is located."

Response #142 – The comments are noted. The Final Determination describes EPA's findings regarding unacceptable adverse effects.

Comment #143 - Comments in disagreement with EPA's conclusions on wildlife generally argue that more weight should be given to local people than certain species of wildlife, that the project would not impact wildlife resources, or that the permit was reviewed and approved and the review process did not identify threats to wildlife. Hunton and Williams LLP and CH2M HILL's comments further suggest that insects are not considered "wildlife" and therefore are not subject to the criteria of the CWA 404(c) regulations. Specifics comments regarding macroinvertebrates include:

> The fact that "the impacts to freshwater macroinvertebrates are outside EPA's jurisdiction."
>
> The West Virginia Coal Association states that "While the proposed determination is full of observations regarding impacts to benthic macroinvertebrates, i.e. bugs, the agency has not demonstrated the connection between bugs and the areas for which EPA can exercise its veto authority.
>
> EPA's concerns about loss of invertebrate species are not supported and that available studies indicate that "sensitive aquatic insect species were less diverse and less abundant in the streams to be impacted by valley fills."

> With respect to wildlife, EPA has provided no evidence of any wildlife species that would be affected by the loss of benthics that come from the filling of the headwater streams.

Response #143 – See Response #12.

Comment #144 - CH2M HILL's (Contractors for Mingo Logan) Technical Evaluation Document (included as an Appendix to Hunton and Williams LLP comments) regarding macroinvertebrates suggested that:

> "EPA's concerns about loss of invertebrate species are not supported and that available studies indicate that "sensitive aquatic insect species were less diverse and less abundant in the streams to be impacted by the valley fills."
>
> Also, although they acknowledge "a shift in the benthic macroinvertebrate community downstream from mining activity" they comment that EPA can "not correlate this finding with any significant impairment to the ecosystem."
>
> Although "the shift in species indicate some water quality impact that may be effecting change, the availability of the species as a food source for fish and any other wildlife who may depend upon these appear to be unaffected."

Response #144 - Region III's RD and Appendix 1 of the RD provide evidence of the presence of sensitive macroinvertebrates in the project area. Additionally, CH2M HILLs own data shows evidence of loss of invertebrate species and replacement of sensitive species with more tolerant species. CH2M HILL also acknowledges loss of invertebrate species and the degradation of water quality. See Response #65.

Comment #145 – Other comments suggest that "studies performed in the area also showed that few fish species existed in the streams." Other comments regarding fish in the area include:

> EPA's study by Fulks et al (2003), suggests that mountaintop mining does not have "adverse impacts from valley fills to fish populations."
>
> EPA doesn't provide valid scientific support for impacts on fish or other impacts stipulated in the Clean Water Act. EPA provides only general descriptions of impacts that can easily be refuted.

Response #145 - See Response #1, #2, #3, #4, #5.

Comment #146 - CH2M HILL's Technical Evaluation Document suggests that "the causative factors associated with blooms of *Prymnesium parvum* are well known…and are not present in the Spruce Creek watershed.

Response #146 - See Response #36.

Comment #147 - Hunton and Williams LLP and CH2M HILL' also comment that "EPA is focusing on "garden-variety salamanders" and that there are "no rare or endangered salamanders on the Spruce Mine site, let alone in the areas to be impacted". REPEAT

Response #147 - See Response #8, #9.

Comment #148 - Some commenters suggested that EPA has not, and cannot, establish any unacceptable adverse effect to birds or bats from the permitted fill activity. Other comments include:

> The fact that the "project area has been previously logged and therefore does not provide habitat for these birds."
>
> Hunton & Williams claim the project area lacks the preferred habitat for bats and the animals are not likely to be found. They point out the "mist net surveys" conducted in July 2000 and May 2004 did not identify any protected species of bats in the project area.

Response #148 – See Response #15, #16, #19, #20.

Comment #149 - WVDEP disagreed with EPA's determination on wildlife, contending that "the impact concerns described in EPA's proposed determination are not specific to aquatic ecosystems but are focused more on upland impacts such as "deforestation, impacts on bats, birds, terrestrial salamanders," and stating specifically that according to "EPA's study by Fulks et al (2003)," mountaintop mining does not have "adverse impacts from valley fills to fish populations."

Response #149 – With respect to Fulk, et al. 2003, see Response #4. The bases for the Final Determination are limited to impacts to wildlife that depend upon the impacted aquatic resources for all or part of their life cycles. While EPA considers the impacts from forest fragmentation and impacts to upland species, to be of concern and therefore has described them, these do not form a basis for the Final Determination.

Comment #150- Some comments acknowledge potential impacts to wildlife, but opine that benefits of the mining project outweigh the risks.

Response #150 – See Responses #120, #121, #124, #125, #130.

**HW also submitted comments related to policy questions underlying this action and the legality of EPA's Section 404(c) action.**

Comment #151 – EPA's action under Section 404(c) is unlawful because it conflicts with the Surface Mining Control and Reclamation Act, which specifically authorizes mountaintop removal mining and the construction of valley fills in water courses.

Response #151 – EPA disagrees. EPA acknowledges that SMCRA identifies mountaintop removal as a form of surface coal mining operations (30 U.S.C. § 1291(28)(A)) and recognizes the possibility excess spoil being placed in waters of the United States (30 U.S.C. § 1265(b)(22)(D)). Nevertheless, nothing in SMCRA or the CWA precludes EPA from exercising its authority under Section 404(c) in connection with a specific surface coal mining operation. SMCRA states that it does not supersede, amend, modify or repeal the Clean Water Act and/or other state or federal laws protecting water quality (30 U.S.C. § 1292(a)(3)). By way of analogy, other federal laws authorize federal participation in highway construction, but would not preclude exercise of EPA's Section 404(c) authority in the context of a particular highway project.

Comment #152 – EPA's Section 404(c) action is not lawful because EPA previously had agreed to authorization of a larger configuration of fill under a nationwide permit.

Response #152 – EPA disagrees. EPA acknowledges that in 1999, EPA sent a letter acquiescing in the Corps' determination to authorize a larger configuration of the Spruce No. 1 mine pursuant to Nationwide Permit 21 (an authorization that was later withdrawn in response to litigation), and that EPA's determination to exercise its authority under Section 404(c) in 2010 represents a reversal of that earlier position. EPA's determination that construction of valley fills in Pigeonroost Branch and Oldhouse Branch will have unacceptable adverse effects on wildlife is appropriate in light of new information that was not available to EPA in 1999. In 1999, EPA's understanding of the potential adverse effects to wildlife was far more limited than it is today.

In 1999, EPA did not have the benefit of the Interagency Mountaintop Mining/Valley Fills in Appalachia Programmatic Environmental Impact Statement (Programmatic EIS), which was published for comment in draft form in 2003 and finalized in 2005. EPA also did not have the benefit of numerous scientific studies published since that time that have informed EPA's understanding of the effects of this project, some of which are described below. EPA did not have the benefit of the Coal River TMDL, which was approved at approximately the same time that the individual permit issued in 2007. EPA also did not have the benefit of site-specific data from the portion of the project that has been constructed in the Seng Camp Creek watershed.

Much of the scientific understanding of the effects of the project has been developed since 1999. For example, in 1999, the impacts on benthic macroinvertebrates from construction of valley fills was not well-studied. As part of the subsequent Programmatic EIS, a number of studies were conducted that demonstrated a link between construction of valley fills and adverse effects to downstream benthic macroinvertebrates. Corresponding water chemistry analysis identified elevated levels of selenium, sulfates and conductivity, parameters that previously had not been considered in connection with impacts from surface coal mining. The draft Programmatic EIS was sent out for public notice in 2003, but was not in final form until 2005. Studies have furthered our understanding of the relationship between elevated levels of total dissolved solids and/or conductivity and adverse effects on the benthic macroinvertebrates. Surface coal mining with alkaline discharges, including mountaintop coal mining with valley fills, has degraded water quality and macroinvertebrate assemblages in numerous streams in the Central Appalachian Mountains (Green et al. 2000, Howard et al. 2001, Bryant et al. 2002, Pond and McMurray 2002, Pond 2004, Hartman et al. 2005, Merricks et al. 2007, Pond et al. 2008, Palmer et al. 2010, Fritz et al. 2010, Pond 2010). Correlations have been observed between degraded instream benthic communities and elevated specific conductivity or TDS downstream of mining activities (Fulk et al. 2003, Kennedy et al. 2003, Hartman et al. 2005, Pond et al. 2008, Pond 2010). Alkaline coal mining discharges have been found to be toxic to typical WET surrogates (e.g. *Ceriodaphnia dubia*) and to the mayfly *Isonychia bicolor*,where elevated conductivity and the resulting ion toxicity were identified as the major candidate stressor (Kennedy et al. 2003, Kennedy et al. 2005, Merricks et al. 2007, Echols et al. 2009).

EPA's understanding of adverse effects from selenium associated with surface coal mining likewise has vastly expanded since 1999. As noted above, the Programmatic EIS identified selenium as an environmental issue in the Appalachian Coal Fields (Bryant et al. 2002). The West Virginia Geological and Economic Survey (2002) report identified trace metals (e.g. selenium) in West Virginia coals. In 2003 US Fish and Wildlife Service surveys determined that selenium in surface waters in southern West Virginia is bioavailable, and that violations of the EPA selenium water quality criterion may result in selenium concentrations in fish that could adversely affect fish reproduction. In some cases, fish tissue concentrations were near levels believed to pose a risk to fish-eating birds. (USFWS 2004). The Acid Mine Drainage Federal Consortium issued a white paper on the treatment and prediction of selenium (Bevans et al 2005). Vesper et al. completed a study (included in USEPA 2005a) on the speciation of selenium in a West Virginia watershed (i.e. Mud River) which identified that approximately 90% of the selenium was in the bioavailable form, selenate. In the summer/fall 2005, WVDEP implemented a statewide assessment of selenium in fish tissue. In the Spring 2006, WVDEP implemented a targeted selenium assessment study of reference streams and lakes, fly ash impoundments and valley fill streams. The WVDEP studies confirmed that a selenium problem existed in the Appalachian Coal Fields. In the summer/fall 2006 through the present, the WVDEP has been investigating the effects on selenium on fish, macroinvertebrates, birds, amphibians, etc. specifically in the Mud River watershed. A major environmental problem with selenium has been documented in the Mud River watershed and reservoir. Dr. Lemly, an international expert, evaluated the WVDEP Mud River watershed data and issued a warning that 'The Mud River ecosystem is on the brink of a major toxic event' due to selenium poisoning (Lemly 2008). WVDEP studies on the effects of selenium on aquatic (fish) communities came to our full attention in February 2009 with the publication of the WVDEP Document: Selenium Bioaccumulation Among Select Stream and lake Fishes in West Virginia. In addition, a January 2010 WVDEP document provided to the WV legislature entitled: Selenium-Induced Developmental Effects Among Fishes in Select West Virginia Waters added to EPA's understanding. In addition, POTESTA & Associates and West Virginia University have implemented studies on selenium in West Virginia waters. Finally, SETAC convened a PELLSTON Workshop entitled: Ecological Assessment of Selenium in the Aquatic

Environment (February 2009). Other studies that have contributed to a greater understanding of the adverse effects of selenium include: Bonta, J .V., & Dick, W. A. (2003), Chapman et al. (2009), Diehl, S.F., et. al (2005), Ferreri, C.P. et. al (2004), Lemly, D. M. (2009), Palmer et al. (2010), Neuzil, S.G. et. al. (2005), Vesper, D. et. al. (2008).

EPA's participation in development of the 2008 Mitigation Rule also brought new information to EPA's attention. Scientific research has demonstrated that replacement of streams is among the most difficult and frequently unsuccessful forms of mitigation (Bernhardt et al 2007). Based upon this study and other research, the Corps and EPA stated in the response to comments on the 2008 Compensatory Mitigation for Losses of Aquatic Resources Final Rule

> We recognize that the scientific literature regarding the issue of stream establishment and re-establishment is limited and that some past projects have had limited success (Bernhardt et al 2007). Accordingly, we have added a new paragraph at 33 CFR 332.3(e)(3) [40 CFR 230.93(e) (3)] that specifically notes that there are some aquatic resources types that are difficult to replace and streams are included among these. It emphasizes the need to avoid and minimize impacts to these 'difficult-to-replace' resources and requires that any compensation be provided by in-kind preservation, rehabilitation, or enhancement to the extent practicable. This language is intended to discourage stream establishment and re-establishment projects while still requiring compensation for unavoidable stream impacts in the form of stream corridor restoration (via rehabilitation), enhancement, and preservation projects, where practicable.

In 2010, Palmer et al. published a literature review describing the effects of mountaintop removal mining. Similarly, EPA's Office of Research and Development also has conducted a literature review. While ORD's literature review is undergoing external peer review, the studies cited therein inform EPA's growing understanding of the effects of mountaintop mining.

EPA's determination that construction of valley fills in Pigeonroost Branch and Oldhouse Branch as currently authorized will have unacceptable adverse effects on wildlife is informed by information unavailable to EPA in 1999. EPA believes it is appropriate for EPA to respond to new scientific information.

Comment #153 – EPA's Section 404(c) action is not lawful because EPA elected not to use its "elevation" authority under CWA Section 404(q), did not refer the project to the Council on Environmental Quality under the National Environmental Policy Act and 42 U.S.C. § 7609, and did not exercise its Section 404(c) authority prior to permit issuance.

Response #153 – EPA disagrees. To the extent the commenter asserts that EPA could or should have elevated the Corps' permit decision following issuance of the Final EIS, the commenter is incorrect regarding EPA's ability to elevate a permit decision. Pursuant to the 1992 Clean Water Act Section 404(q) Memorandum of Agreement Between EPA and the Department of the Army, EPA reserves its ability to elevate a specific permit decision within the time period for the public to comment on the Corps' public notice of the permit application. This occurs very early in the process, not following issuance of a Final EIS. Similarly, EPA reserves its ability to elevate an Environmental Impact Statement to CEQ by rating the draft EIS either a "3" ("Inadequate" –

meaning the draft EIS does not adequately assess the potentially significant environmental impacts of the proposal, or the reviewer has identified alternatives outside the spectrum of those analyzed in the EIS which should be analyzed) or a "U" ("Environmentally Unsatisfactory"). In this instance, while the 2002 draft EIS was rated with a "3", the 2006 draft EIS was rated "EC-2," a rating which would not allow EPA to elevate the EIS to CEQ. EPA's initial EC-2 rating was based in part on an assumption that EPA's technical comments would be appropriately resolved. With respect to the timing of the Section 404(c) action, see Responses #159, #160, #161, #162, and #163.

Comment #154 – EPA's Section 404(c) action is not lawful because exclusive authority to adopt, implement, interpret, and certify compliance with water quality standards belongs to the State, not EPA.

Response #154 – See Response #33. To be clear, EPA's conclusion that the Spruce 1 mine as authorized would cause unacceptable adverse effects on wildlife is not dependent on a conclusion that West Virginia's water quality standards will be violated at or downstream of the site. Notwithstanding that point, EPA disagrees with the commenter's contention that EPA plays little or no role in the life of a water quality standard. The CWA assigns EPA a significant oversight role in the adoption, interpretation, and implementation of state water quality standards. The provisions of the Clean Water Act that address establishing and interpreting water quality standards provide that EPA has authority to determine whether a State's water quality standards or interpretation thereof are sufficiently protective. Pursuant to Section 303(c), new or revised water quality standards must be submitted by the State to EPA for review and approval. 33 U.S.C. § 1313(c). Such revised water quality standards do not take effect until approved by EPA. EPA also has authority to establish water quality standards for a State where EPA determines that new or revised standards are necessary to meet the requirements of the Clean Water Act. *Id.* § 1313(c)(4)(B). Section 303(d) requires that the State's interpretation as expressed through its periodic identification of water quality impaired segments must be submitted to EPA for review and approval, as must the State's calculation of total maximum daily loads. *Id.* § 1313(d). The State's issuance of an NPDES permit (including provisions within an NPDES permit to address water quality) is subject to EPA's authority to review, object, and where EPA's objection is not resolved, issue the NPDES permit itself. *Id.* §1342(d).

The commenter interprets a Section 401 water quality certification as providing both a floor and a ceiling on protection of water quality. To the extent the commenter asserts that the Section 401 water quality certification provides a floor for protection of water quality, the commenter is correct, and the federal license or permit must incorporate as conditions any limitations or monitoring requirements included in the State's Section 401 water quality certification. To the extent the commenter asserts that the Section 401 water quality certification imposes a ceiling – i.e., precludes a federal agency from determining that more is required to satisfy applicable water quality standards than the State's Section 401 water quality certification suggests, that proposition finds no support in the statute. To the contrary, Section 401 allows the States to waive water quality certification either affirmatively or by inaction. Nothing in Section 401 suggests that where a State waives water quality certification, the federal permitting authority is foreclosed from including conditions designed to protect water quality. Indeed, such an interpretation would be inconsistent with the remainder of the CWA. For example, where EPA is the permit issuing authority, a State's waiver of its Section 401 water quality certification would not override EPA's obligation as the permit issuing authority to comply with Section 301(b)(1)(C) and ensure that the NPDES permit included provisions necessary to attain and maintain water quality standards. Just as a State's waiver of certification does not operate to preclude the permit issuing authority from including conditions to protect water quality, so too the State's issuance of a water quality certification does not preclude the federal agency from determining that additional water quality conditions are necessary. That the State's water quality certification does not create a ceiling on water quality protection finds support in Section 401(b), which provides:

> Nothing in this section shall be construed to limit the authority of any department or agency pursuant to any other provision of law to require compliance with any applicable water quality requirements. The Administrator shall, upon the request of any Federal department or agency, or State or interstate agency, or applicant, provide, for the purpose of this section, any relevant information on applicable effluent limitations, or other limitations, standards, regulations, or requirements, or water quality criteria, and shall, when requested by any such department or agency or State or interstate agency, or applicant, comment on any methods to comply with such limitations, standards, regulations, requirements, or criteria.

33 U.S.C. § 1341(b).
Consistent with Section 1341(b), while the Corps generally will accept the State's Section 401 water quality certification as dispositive absent evidence from EPA to the contrary, the Corps recognizes that it has an independent duty to consider water quality. Accordingly, the Corps accepts the input of EPA where EPA determines that the Section 401 water quality certification is insufficient or does not fully consider all water quality concerns. 33 C.F.R. § 320.4(d).

With respect specifically to the Section 401 water quality certification issued by WVDEP for the Spruce No. 1 Mine, EPA notes that subsequently, in the context of considering permit modifications for selenium at other sites, West Virginia's Environmental Quality Board criticized WVDEP's general approach to requiring surface mining operations to adequately address selenium: "What is perhaps even more amazing is how little WVDEP seems to expect from the coal industry." *West Virginia Highlands Conservancy, et al. v. McClung,* Appeal Nos. 07-10-EQB & 07-12-EQB, Final Order, slip op. at 28 (June 12, 2008). While that decision considered schedules for compliance at existing mines, the EQB's criticism of WVDEP's oversight of the selenium issue supports that WVDEP's Section 401 water quality certification should not be considered a "ceiling" precluding additional consideration of potential water quality concerns.

To the extent the comment asserts that EPA may not consider changes in water chemistry or water quality as part of its Section 404(c) determination, see Response #28. To the extent the comment asserts that any consideration of water chemistry or water quality is foreclosed because WVDEP's issuance of an NPDES permit and Section 401 water quality certification, see Response # 154 and #155.

Comment #155 – EPA's Section 404(c) action is not lawful because it considers the effects of discharges other than of dredged and fill material. Specifically, EPA's Section 404(c) action is not lawful because it considers the effects of effluent from the sediment ponds that are authorized by an NPDES permit.

Response #155 – EPA disagrees. EPA's finding of unacceptable adverse effect is based upon a number of effects including those that will be caused within the footprint of the valley fills and effects to downstream waters that will be caused by the discharge of fill. EPA acknowledges that discharges from the valley fills that are collected in and discharged from sediment control structures are regulated as point source discharges of effluent under the NPDES program rather than as discharges of fill material under Section 404, but nothing in Section 404(c) or Section 402 precludes EPA from considering such downstream effects of the fill. Section 404(c) directs that EPA may take action whenever it determines that the discharge of dredged or fill material into a specified area will have an unacceptable adverse effect. The commenter disregards that but for the discharge of fill material creating the valley fill, the effluent discharge would not exist. Accordingly, the contribution of pollutants to downstream waters through the discharge of effluent from the valley fill is a secondary effect of the discharge of fill material. *See* 40 C.F.R. § 230.11(h). It is appropriate for EPA to consider whether the placement of fill will have an unacceptable effect even though the mechanism may involve secondary effects of the fill. The courts have upheld EPA determinations of unacceptable adverse effects from fills where the adverse effects are the result of secondary effects of the fill. This occurs, for example, in the cases where the courts have upheld EPA's Section 404(c) determinations based on the flooding effects of impoundments. *See, e.g., James City County, Virginia v. EPA*, 12 F.3d 1330, 1336-38 ($4^{th}$ Cir. 1993). In those matters, the unacceptable adverse effects found by EPA were not necessarily within the footprint of the fills creating the impoundments but in the secondary flooding effects. Similarly, it is appropriate for EPA to consider effects to downstream waters that will be caused by export of pollutants from the valley fills. The fact that WVDEP may have authorized those discharges through the NPDES permit does not preclude EPA from considering the secondary effects of the fill.

It is also important to note that the secondary downstream effects from placement of the valley fills will arise not only from export of pollutants from the valley fills but also from removal of Pigeonroost Branch and Oldhouse Branch as sources of freshwater dilution to downstream waters. Section V.D.1.a. of the Final Determination discussing selenium and Section V.D.1.b. discussing conductivity provide data demonstrating that Pigeonroost Branch and Oldhouse Branch are providing freshwater dilution that moderates levels of selenium and conductivity within Spruce Fork. The loss of this dilution function also is a secondary effect of placement of the fill and is not authorized through the NPDES program.

Comment #156 – EPA's Section 404(c) action is not lawful because EPA either failed to object or withdrew its objections to WVDEP's authorization pursuant to an NPDES permit of discharges of effluent from the sediment ponds.

Response #156 – EPA acknowledges that, while the NPDES permit for this project has been the subject of significant comment and objection by EPA, EPA ultimately did not prevent WVDEP from issuing the NPDES permit. EPA's authority to formally object to the issuance of a State NPDES permit is a discretionary authority under CWA § 402(d) and its implementing regulations. It is a wholly separate authority from EPA's authority under 404(c) and the statute provides different standards for action under the two authorities ("unacceptable adverse effects" under § 404(c) and "outside the guidelines and requirements of this Act" under § 402(d)). EPA's decision not to prevent WVDEP from issuing an NPDES permit to the Spruce Mine in 1999 and 2002, therefore, has no legal relevance to EPA's authority to veto the project under CWA § 404(c).

The history of EPA's interaction with WVDEP regarding the NPDES permit reveals that EPA consistently has raised concerns regarding the adverse effects from this project in 1999 and again in 2002. EPA's determination that construction of valley fills in Pigeonroost Branch and Oldhouse Branch will have unacceptable adverse effects on wildlife is appropriate in light of new information that was not available to EPA in 1999 or 2002. In 1999 and 2002, EPA's understanding of the potential adverse effects to wildlife was far more limited than it is today. See Response #152.

In 1998 and again in 2002, EPA Region III reviewed draft NPDES permits for discharges from the Spruce No. 1 mine submitted by the West Virginia Department of Environmental Protection (WVDEP) pursuant to Section 402 of the Clean Water Act, 40 CFR § 123.44, and the *Memorandum of Agreement Regarding the Administration and Enforcement of the National Pollutant Discharge Elimination System (NPDES) in West Virginia (1982)* (MOA). EPA acknowledges that in August 1998, EPA issued a specific objection to a draft NPDES permit for the project. The basis for Region III's objection was concern that there had been no demonstration that the discharges would meet applicable effluent limitations and water quality standards. EPA's August 4, 1998 specific objection letter stated that EPA would remove its objection if assured that all valley fills had been minimized or avoided to the maximum extent feasible and that mitigation would be adequate to offset project impacts and be at a ratio of at least 2:1.

EPA also expressed concern that it lacked sufficient information to evaluate the potential effects on downstream aquatic life and habitat posed by the discharges, including on a cumulative basis. EPA conducted a public hearing on October 24, 1998. Following the public hearing, EPA notified WVDEP that it would withdraw its objection if certain conditions were met. These included mitigation conditions; inclusion of biomonitoring provisions, and agreement that the permittee would follow a specific mining sequence and exercise best efforts to conduct mining phases within the timeframes provided. EPA acknowledges that, on January 7, 1999, EPA confirmed that WVDEP had met the conditions of the specific objection. EPA notes that this history demonstrates that, even as early as 1999, EPA had significant concerns regarding potential adverse effects from the Spruce No. 1 Mine. EPA's determination that construction of valley fills in Pigeonroost Branch and Oldhouse Branch will have unacceptable adverse effects on wildlife is appropriate in light of new information that was not available to EPA in 1999. In 1999, EPA's understanding of the potential adverse effects to wildlife was far more limited than it is today. See Response #152.

EPA acknowledges that on July 30, 2002, EPA issued a specific objection to draft NPDES Permit WV1017021 Modification No. 1. The bases for the specific objection were studies conducted in connection with the then pre-draft Programmatic EIS. Those studies compared monitoring results of streams with valley fills to streams without valley fills, including three streams located within the proposed mining area. The study results indicated impairment of aquatic life and significantly higher levels of selenium, sulfates, and conductivity for streams with valley fills. The specific objection letter stated: "It is apparent that there is a potential for stream impairment at the proposed Spruce No. 1 Surface Mine due to drainage from the valley fills, but the extent of any impairment and feasible measures for minimizing detrimental impacts is not known at this time."

In response, WVDEP proposed revised effluent and in-stream monitoring conditions for selenium, revision to benthic sampling requirements, a condition to address feasibility of special handling of selenium-bearing strata, and a condition requiring that flow characteristics downstream from fills and sediment ponds in White Oak Branch and an unnamed tributary of Pigeonroost Branch approximate pre-mining conditions to the maximum extent feasible. WVDEP did not propose changes to the permit to address sulfates or conductivity, but offered to work with EPA regarding evaluation of potential impacts from those parameters. EPA acknowledges that, by letter dated December 3, 2002, EPA acknowledged that its specific objections had been resolved.

EPA notes that this history demonstrates that EPA has consistently expressed concerns regarding the effects on downstream water quality and aquatic life of discharges from the Spruce No. 1 mine. EPA's determination that construction of valley fills in Pigeonroost Branch and Oldhouse Branch will have unacceptable adverse effects on wildlife is appropriate in light of new information that was not available to EPA in 2002. As noted above, EPA's 2002 specific objection letter indicates that much was unknown at that time regarding the extent of impairment and feasible measures to address it. In 2002, EPA's understanding of the potential adverse effects to wildlife was far more limited than it is today. While the studies referenced in the specific objection letter ultimately became part of the Programmatic EIS, at the time of EPA's specific objection, the draft Programmatic EIS had not been written. Subsequent to EPA's specific objection, the draft Programmatic EIS was released for public comment in 2003, and the public comment period closed January 21, 2004. Ultimately, two public hearings were held on the draft Programmatic EIS and more than 83,500 comments were received. The Programmatic EIS was not finalized until 2005. In addition to the final Programmatic EIS, numerous studies made available to EPA since 2002 have supplied new information and informed EPA's understanding of the adverse effects from the project. See Response #152.

To the extent the commenter attempts to draw conclusions from EPA's failure to object to a renewal of the NPDES permit for the Spruce No. 1 Mine, EPA's objection authority is discretionary, and EPA's silence may not be interpreted as a statement that the permit terms are acceptable to EPA or consistent with the Clean Water Act. See Response #155.

Comment #157 – EPA's Section 404(c) action is not lawful because the U.S. Court of Appeals for the Fourth Circuit upheld the validity of the Section 404 permit in *OVEC v. U.S. Army Corps of Engineers.*

Response #157 – EPA disagrees. EPA assumes the comment is referring to the Fourth Circuit's decision in *OVEC v. Aracoma Coal Company*, 556 F.3d 177 (4th Cir. 2009). That decision is a narrow one. As described by the author of the majority opinion, "the appeal … asked us to determine only the narrow and rather fact-specific question of whether the Corps abused its discretion in exercising its CWA Section 404 authority to grant four individual fill permits." *OVEC v. Aracoma Coal Co.*, 567 F.3d 130, 131-32 (4th Cir. 2009) (in banc) (Gregory, J., concurring in denial of rehearing in banc). DA Permit No. 199800436-3 (Section 10: Coal River) is not among the four individual permits considered in that decision.

To the extent the commenter is asserting that this action is foreclosed because the Corps' processing of DA Permit No. 199800436-3 (Section 10: Coal River) is identical or analogous to its processing of the four permits at issue in *Aracoma Coal*, the question whether the Corps abused its discretion with respect to DA Permit No. 19980436-3 (Section 10: Coal River) is currently the subject of a pending lawsuit, *OVEC v. U.S. Army Corps of Engineers*, Civ. Action Nos. 3:05-0784; 3:06-0438 (S.D. W.Va.). EPA need not pre-determine how the decision in *Aracoma Coal* will be applied in that pending litigation or otherwise reach a conclusion as to whether the Corps abused its discretion in issuing the permit in order to determine under Section 404(c) that specification of Pigeonroost Branch and Oldhouse Branch as authorized will have unacceptable adverse effects.

The question presented by Section 404(c) is not whether the Corps followed appropriate procedures or abused its discretion. Had Congress intended merely for EPA to supervise the Corps' exercise of its discretion, Congress could have said so. Instead, Section 404(c) authorizes EPA to act whenever it determines, after notice and opportunity for a public hearing, that discharge to the defined area will have an unacceptable adverse effect on municipal water supplies, shellfish beds and fishery areas (including spawning and breeding areas), wildlife, or recreation areas. In light of the qualitatively different question posed by Section 404(c), the decision in *Aracoma Coal* is of limited import, given the narrow nature of that decision. For example, with respect to the Corps' announcement post-decision that it would work with EPA to develop a stream function assessment methodology, the author of *Aracoma Coal* stated: "This kind of protocol may well be the best way to measure stream function for purposes of 40 C.F.R. § 230.11(e), the question before us in this appeal was not whether the Corps used the *best* method for measuring stream function. Instead we were asked simply to determine whether the Corps' approach was arbitrary or capricious." *OVEC v. Aracoma Coal Co.*, 567 F.3d 130, 131-32 (4th Cir. 2009) (in banc) (Gregory, J., concurring in denial of rehearing in banc).

Comment #158 – EPA's Section 404(c) action is unlawful because Congress assigned exclusive authority to regulate coal mining to the State under SMCRA and exclusive authority to authorize discharges of effluent to the State in the NPDES program, and exclusive authority to authorize the discharge of dredged and/or fill material to the Corps under Section 404. "EPA has no authority – under Section 404(c) or otherwise – to completely upend this clearly defined statutory scheme."

Response #158 – To the extent the comment states that EPA may not exercise its authority under Section 404(c) in the context of a specific surface coal mining operation because authority to regulate coal mining is assigned to the State under SMCRA, see Response # 151. To the extent the comment states that EPA may not consider the effect from export of pollutants from the valley fills to downstream waters because the mechanism is a discharge authorized by an NPDES permit, see Response #155 & # 156. To the extent the comment states that EPA's exercise of its

Section 404(c) authority conflicts with the Corps' exclusive authority to issue permits under Section 404 (absent delegation to a State, a circumstance not present here) because "Congress intended the Corps to issue Section 404 permits, subject to a limited EPA review before permit issuance," EPA disagrees. To the extent the comment is premised on commenter's assertion that EPA may not exercise its Section 404(c) authority following issuance of a permit, see Response #159, #160, #161, #162, #163, and #164. To the extent the comment is premised on what commenter terms EPA's "limited" review, EPA's finding of unacceptable adverse effects is within the scope of Section 404(c).

Comment #159 – The commenter asserts that EPA lacks authority under Section 404(c) to withdraw specification of a discharge site after the Corps has issued a permit for the discharge.

Response # 159 – EPA disagrees. A determination after issuance of DA Permit 199800436-3 to withdraw specification of Pigeonroost Branch and Oldhouse Branch and their tributaries as a disposal site for excess spoil in the manner currently authorized by that permit is within EPA's authority under Section 404(c), EPA's action is consistent with the plain text of Section 404 of the Clean Water Act, EPA's implementing regulations, EPA's longstanding (30 years) interpretation of Section 404(c), and the interpretation of the only courts to have considered the issue.

Section 404(c) refers twice to the "withdrawal" of specification:

> 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 unacceptable adverse effect on municipal water supplies, shellfish beds and fishery areas (including spawning and breeding areas), wildlife, or recreational areas ….

The term "withdraw" means "to take back or away (something bestowed or possessed)." *Webster's Third New International Dictionary (unabridged)* 2626 (1976). Because "withdraw" means to take back something that has already been granted, the plain language of Section 404(c) authorizes EPA to take back a specification that the Corps has granted through the issuance of a Section 404 permit. Nothing in the language of Section 404 suggests a temporal limitation on the use of EPA's authority. To the contrary, Section 404(c) authorizes EPA to exercise its authority "whenever" the Agency determines that a specification will have adverse environmental effects. 33 U.S.C. § 1344(c).

EPA issued regulations in 1979 that expressed the Agency's interpretation that Section 404(c) provides authority to withdraw a specification after the Corps issues a permit. See 40 C.F.R. § 231.1(c) (EPA's authority applies to "all existing, proposed or potential disposal sites" and it applies "whenever [EPA] is considering whether the specification of any defined area as a disposal site should be prohibited, denied, restricted, or withdrawn."); id. § 231.2(a) ("withdraw specification" defined to mean, "to remove from designation any area already specified as a disposal site by the [Corps]"). Furthermore, EPA made its interpretation clear in the preamble to the 1979 regulations, where EPA explained that its Section 404(c) authority can be exercised "before a permit is applied for, while an application is pending, or after a permit has been issued." 44 Fed. Reg. 58,076 (Oct. 9, 1979); see also 44 Fed. Reg. at 58,077 ("the regulations do not restrict EPA's right to act after a permit has been issued").

Previous Section 404(c) actions have been consistent with this interpretation. EPA's very first Section 404(c) action was consistent with this interpretation. In 1981, EPA restricted discharges to the North Miami Landfill, a site that previously had been specified by the Corps through a Section 404 permit. *See* http://water.epa.gov/lawsregs/guidance/wetlands/upload/NorthMiamiFD.pdf. EPA also has taken action under Section 404(c) with respect to specification of a site (Lake Alma impoundment) following a court decision overturning a previously issued Section 404 permit as to which EPA previously had withdrawn its objections. *See* http://water.epa.gov/lawsregs/guidance/wetlands/upload/LakeAlmaFD.pdf.

The only two courts to consider the issue have stated that EPA has authority to undertake the Section 404(c) process after a permit is issued. City of Alma v. United States, 744 F. Supp. 1546 (S.D. Ga. 1990); Russo Devel. Corp. v. Reilly, No. 87-3916, 1990 U.S. Dist. LEXIS 15859 (D.N.J. Mar. 16, 1990). EPA notes that Arch Coal is currently challenging EPA's authority to act in a lawsuit pending in the District Court for the District of Columbia, and incorporates the government's briefs defending EPA's authority to act into the record for this action.

Comment #160 – "Specification" of a disposal site is an action taken by the Corps separately from and earlier in time than the issuance of the Section 404 permit, and that the term "withdraw" in Section 404(c) is limited to withdrawal of a specification after it occurs, but before the permit is issued.

Response #160 – EPA disagrees. In connection with issuance of Section 404 permits (including this one), the Corps does not take a separate action to "specify" a disposal site separately from issuance of the permit itself. As is clear from both the statute and the regulations the disposal site is specified as part of the permit. Section 404(a) and (b) make clear that the Corps specifies disposal sites as part of Section 404 permits. 33 U.S.C. § 1344(a) ("The [Corps] may issue permits . . . for the discharge of dredged or fill material into the navigable waters at specified disposal sites"); § 1344(b) ("each such disposal site shall be specified for each permit by the [Corps]").

Neither the CWA nor the Corps' regulations provide (nor does the commenter point to) a process for specifying a disposal site separately from and before issuance of a Section 404 permit. *See* 33 C.F.R. Parts 320, 323, 325. Rather, as is the case with DA Permit 199800436-3, the location for the discharge of dredged and/or fill material is identified in the Section 404 permit when it is issued. *See* 33 C.F.R. Part 325, Appendix A.
The fact that Congress used the term "specification" rather than "permit" in Section 404(c) does not place a temporal limitation on EPA's authority that is bounded by the date of permit issuance. For purposes of Section 404(c), the term "specification" is necessarily broader than the term "permit" because there are situations in which a discharge is authorized but a permit issued

by the Corps is not required. The various circumstances under which a disposal site is specified are identified at 40 C.F.R. § 230.2(a), which states in relevant part:

> The Guidelines are applicable to the specification of disposal sites for discharges of dredged or fill material into waters of the United States. Sites may be specified through:
>
> (1) The regulatory program of the U.S. Army Corps of Engineers under sections 404(a) and (e) of the Act (see 33 CFR Parts 320, 323 and 325);
>
> (2) The civil works program of the U.S. Army Corps of Engineers (see 33 CFR 209.145 and section 150 of Pub. L. 94–587, Water Resources Development Act of 1976);
>
> (3) Permit programs of States approved by the Administrator of the Environmental Protection Agency in accordance with section 404(g) and (h) of the Act (see 40 CFR parts 122, 123 and 124);
>
> (4) Statewide dredged or fill material regulatory programs with best management practices approved under section 208(b)(4)(B) and (C) of the Act (see 40 CFR 35.1560);
>
> (5) Federal construction projects which meet criteria specified in section 404(r) of the Act.

Section 230.2(a)(1) describes the circumstance under which a site is specified is "through" the regulatory program of the Corps under Section 404(a), i.e, through permit issuance, not separate and apart from it. By using the term "specification," Congress covered the scenario under which a Section 404 permit is the vehicle by which a disposal site is specified and other scenarios in which a disposal site is specified outside the Corps regulatory program under Section 404(a) as described in Section 230.2(a)(2)-(5).

Comment #161 – Commenter points to statements by Senator Muskie as evincing that Congress did not intend for EPA to exercise its authority pursuant to Section 404(c) after a permit has been issued by the Corps.

Response #161 – EPA disagrees. While Senator Muskie does refer to "prior to the issuance of any permit to dispose of spoil," his floor statement does not add to an understanding of any temporal aspect of Section 404(c). The statement of a single senator, even the sponsor of the legislation, does not override the language of the legislation itself, particularly where the term at issue ("withdraw") is unambiguous. Senator Muskie does not provide any indication of how the term "withdraw" is to be interpreted. Nothing in Senator Muskie's statement identifies any process for site specification outside the permit process.

Consistent with ordinary principles of statutory construction, the term "withdraw" must have some meaning independent of "prohibit" and "deny." If EPA's authority is limited to the time prior to issuance of the permit, then it would be "prohibiting" or "denying," not "withdrawing," because the site "to be used" (to use Senator Muskie's terminology) would not yet be "given," there would be nothing to "take away," and the term "withdraw" would have no independent meaning.

Comment #162 – Commenter discussed "specifications" as something separate from identification of the disposal site.

Response #162 – Commenter also discussed "specifications," which the commenter defined as "the selection of the disposal site, the type of material to be deposited at that disposal site, the amount of such material to be deposited, as well as other aspects of the proposed discharge at the proposed disposal site." The term "specifications" does not appear in Section 404(c), and the relationship that the commenter seeks to draw between "specifications" (as defined by the commenter) and temporal limitation on exercise of EPA's authority pursuant to Section 404(c) is unclear. EPA notes that Section 404(c) does authorize EPA to "restrict" specification of a disposal site. The Corps restricts discharges of dredged and/or fill material through conditions described in the Section 404 permit. However, this does not have any bearing on any temporal limitation on EPA's authority.

Comment #163 – Commenter stated that EPA cannot exercise its Section 404(c) authority after permit issuance because such an action would conflict with the exclusive authority of the Corps to issue, suspend, modify or revoke a Section 404 permit.

Response #163 – EPA disagrees. While the Corps has authority to issue, suspend, modify or revoke Section 404 permits, the commenter overstates the "exclusive" nature of that authority. Nothing in Section 404(a) speaks to any temporal limit on Section 404(c). Moreover, the comment disregards EPA's shared responsibilities under Section 404. For example, pursuant to Sections 404(g), (h) & (i), it is EPA, not the Corps, that authorizes States to implement Section 404 (i.e., to issue permits pursuant to Section 404) in lieu of the Corps. *See* 33 U.S.C. §§ 1344(g), (h) & (i). As the U.S. Court of Appeals for the Second Circuit has noted: "In short, both EPA and the Corps are responsible for administering the program for granting permits for discharges of pollutants into wetlands under § 404. The Corps has the authority to issue permits following the 404(b)(1) guidelines developed by it and EPA; EPA has the authority under § 404(c) to veto any permit granted by the Corps." *Bersani v. Robichaud,* 850 F. 2d 36, 40 (2d Cir. 1988).

The commenter's reference to *Coeur Alaska, Inc. v. Southeast Alaska Conservation Council, et al.*,129 S. Ct. 2458 (2009) does not support the conclusion that the commenter draws. The Supreme Court in *Coeur Alaska* decided two questions: (1) whether a discharge of slurry containing mine tailings could appropriately be regulated by the Corps under Section 404 as opposed to by EPA under Section 402 of the CWA; and (2) whether the Corps' permit was lawfully issued in light of regulations promulgated by EPA under Section 306 of the CWA that prohibit mines like Coeur Alaska's from discharging process wastewater. The Supreme Court in *Coeur Alaska* does state as part of its recitation of the facts that "EPA had the statutory authority to veto the Corps permit, and prohibit the discharge…. After considering the Corps findings, the EPA did not veto the Corps permit, even though in its view, placing the tailings in the lake was not the 'environmentally preferable' means of disposing of them. [citation omitted] By declining to exercise its veto, the EPA in effect deferred to the judgment of the Corps on this point." 129 S. Ct. at 2465. It is noteworthy that the Supreme Court refers to EPA's authority to veto "the Corps *permit*," and makes no reference to a separate specification process. While the Court refers to EPA's ability under Section 404(c) to "prohibit" a discharge, the Court makes no reference to and does not discuss "withdrawal" of specification in Section 404(c).

EPA's action also is not inconsistent with Sections 404(q) and 404(p) of the CWA. Section 404(q) recognizes that EPA and other federal agencies play an important role in assuring that discharges authorized by a Section 404 permit do not cause unacceptable impacts. Section 404(p) cross-references Sections 1319 (enforcement) and 1365 (citizen suits). Section 404(p), by its own terms, therefore, relates to compliance with the CWA for purposes of enforcement (i.e, the concept of permit compliance as a shield from enforcement actions) and simply does not speak to EPA's authority under Section 404(c).

Comment #164 – Commenter stated that that EPA cannot exercise its Section 404(c) authority after permit issuance because such an action would conflict with the concept of final agency action under the Administrative Procedure Act.

Response #164 – EPA's exercise of its Section 404(c) authority after the Corps has issued a permit does not conflict with the concept of a permit being a final agency action. The commenter is correct that issuance of a permit by the Corps pursuant to Sections 404(a) and (b) is a final agency action that is reviewable under the Administrative Procedure Act. EPA's withdrawal of specification under Section 404(c) is a separate agency action reviewable on its own merits. EPA's veto authority is a "safeguard" added to the Corps' permit-issuing authority focused on EPA's role and expertise on environmental matters.

In its decision in *James City County, Virginia v. EPA*, 12 F.3d 1330, 1335-36 (4th Cir. 1993), *cert. denied*, 513 U.S. 823 (1994), the U.S. Court of Appeals for the Fourth Circuit explained the relative roles and decisions of the Corps and EPA as follows:

> Congress obviously intended the Corps of Engineers in the initial permitting process to consider the total range of factors bearing on the necessity or desirability of building a dam in the Nation's waters, including whether the project was in the public interest. For example, as stated earlier, under 40 C.F.R. § 230.10, in deciding whether to issue a permit, the Corps takes into account the availability of practicable alternatives to the proposed project, whether the proposed discharge would violate environmental laws or significantly degrade national waters, and whether adequate measures are taken to minimize harmful effects. In addition to these environmentally-based criteria, the Corps conducts a "public interest review" which, inter alia, takes into account the public and private need for the project, whether the same result could be achieved through other means, and the "extent and permanence" of the benefits and harms the proposed project is likely to produce. 33 C.F.R. § 320.4(a). Ultimately, however, recognizing the EPA's expertise and concentrated concern with environmental matters, Congress gave the final decision whether to permit a project to that agency. Its authority to veto to protect the environment is practically unadorned. It is simply directed to veto when it finds that the discharge "will have an unacceptable adverse effect on municipal water supplies,

shellfish beds and fishery areas (including spawning and breeding areas), wildlife, or recreational areas."

While the commenter poses a hypothetical in which a court has already upheld the Corps issuance of a Section 404 permit prior to EPA's exercise of its Section 404(c) authority, that is not the case here and therefore there is no need for EPA to address that hypothetical.

Comment #165 – Commenter states that there are "serious questions whether the streams that are the subject of the Proposed Determination would qualify as jurisdictional waters under the CWA" and reserves the right to contest CWA jurisdiction.

Response #165 – See Response #25.

Comment #166 – EPA may not base its Section 404(c) action on impacts to upland forests.

Response #166 – See Response #14.

Comment #167 – EPA must establish that adverse effects to one or more of the resources identified in Section 404(c) are "significant." "The limited impacts that EPA speculates will result from the discharges authorized in the 404 permit are neither significant nor of commensurate seriousness with EPA's action to withdraw a permit three years after it was issued…"

Response #167 – To the extent the comment states that a Section 404(c) action must be based upon unacceptable adverse effects and that 40 C.F.R. § 231.2(e) defines unacceptable adverse effects in terms of "significant" degradation or loss, EPA agrees and has met that standard here. To the extent the comment asserts that the adverse effects considered by EPA are "speculative," EPA disagrees. Since valley fills have not yet been constructed in Pigeonroost Branch or Oldhouse Branch, EPA's determination is necessarily predictive, but that does not mean that it is speculative. EPA's determination is based upon extensive data, including data collected from the nearby Dal-Tex operations; the Spruce No. 1 Final EIS stated that the project's impacts would be comparable to those from Dal-Tex. It is also based upon data from the portion of the Spruce No. 1 Mine constructed in Seng Camp Creek. In addition, it is based on data demonstrating effects from other large surface coal mining operations with valley fills. EPA believes the adverse effects are unacceptable consistent with 40 C.F.R. § 231.2(e). Pigeonroost Branch and Oldhouse Branch and their tributaries are some of the last remaining streams within the Headwaters Spruce Fork sub-watershed and the larger Coal River sub-basin that represent "least-disturbed" conditions. As such, they perform important hydrologic and biological functions, support diverse and productive biological communities, contribute to prevention of further degradation of downstream waters, and play an important role within the context of the overall Headwaters Spruce Fork sub-watershed and Coal River sub-basin. The Spruce No. 1 Mine as currently authorized would bury virtually all of Oldhouse Branch and its tributaries and much of Pigeonroost Branch and its tributaries under excess spoil generated by surface coal mining operations. In addition to burying all wildlife within the footprint of the valley fills and removing Pigeonroost Branch and Oldhouse Branch as sources of important hydrologic and biological functions, the project will convert Pigeonroost Branch and Oldhouse Branch to sources of pollutants that will further negatively impact downstream waters.

Comment #168 – EPA's Section 404(c) action is unlawful because it is inconsistent with EPA's statements in the preamble to 40 CFR part 231. "EPA has also said that it will only exercise its 404(c) authority after a permit has been issued where EPA was not given an opportunity to review the matters at issue, or where substantial new information has been brought to EPA's attention only after the permit was issued. *See* 44 Fed. Reg. at 58,077."

Response #168 – The commenter does not correctly summarize statements made by EPA in the preamble to 40 C.F.R. Part 231. With respect to exercise of its discretion to initiate Section 404(c) proceedings following permit issuance, EPA stated:

> EPA agrees with the suggestion that it would be inappropriate to use 404(c) after issuance of a permit where the matters at issue were reviewed by EPA without objections during the permit proceeding, or where the matters at issue were resolved to EPA's satisfaction during the permit proceeding, unless substantial new information is first brought to the Agency's attention after issuance.

44 Fed. Reg. at 58,077.

EPA's October 2006 letter to the Corps regarding the Final EIS identifies a number of concerns raised by EPA that were not resolved to EPA's satisfaction. See Response #153. Moreover, significant new information was brought to EPA's attention following permit issuance regarding the adverse effects of elevated levels of conductivity and selenium and the limited success of stream establishment and restoration projects as mitigation. See Response #152 for a full discussion of the development of the science and EPA's record of concerns throughout the permitting process.

Comment #169 – Because Section 404(c) does not reference the Section 404(b)(1) Guidelines, EPA may not consider the Section 404(b)(1) Guidelines in determining whether there are adverse effects under Section 404(c). To the extent the 404(b)(1) Guidelines may be considered, consideration should be limited to the portions of the Section 404(b)(1) Guidelines that discuss municipal water supplies, shellfish beds, fishery areas, wildlife and recreation areas, specifically, 40 C.F.R. §§ 230.32(a), 230.50, and 230.52.

Response #169 – EPA disagrees. EPA's § 404(c) regulations at 40 CFR 231.2(e) provide that in evaluating the "unacceptability" of impacts, consideration should be given to the "relevant portions of the § 404(b)(1) Guidelines." As discussed in the Final Determination, EPA has identified numerous inconsistencies with the requirements of the § 404(b)(1) Guidelines. In Sections V.C. and V.D. of the Final Determination, EPA determined that there are unacceptable adverse impacts to wildlife, and the Agency's evaluation of compliance with relevant portions of the Guidelines in Section V.E. provides support and confirmation of the conclusion that the impacts are unacceptable.

While the standard in Section 404(c) does not require EPA to find a violation of the Section 404(b)(1) Guidelines in order to conclude that a discharge of dredged or fill material will have an unacceptable adverse effect, it is EPA's longstanding interpretation that EPA may evaluate the applicable portions of the Section 404(b)(1) Guidelines in determining whether an unacceptable adverse effect has occurred. In defining unacceptable adverse effect, EPA did recognize that some portions of the Section 404(b)(1) Guidelines may address a greater range of resources than those considered under Section 404(c). Accordingly, EPA inserted the term "relevant portions" into the regulation. See 44 Fed. Reg. at 58078. EPA did not identify which portions of the Section 404(b)(1) Guidelines are "relevant." To the extent the comment suggests that the only portions of the Section 404(b)(1) Guidelines that are relevant to EPA's determination are Sections 230.32(a), 230.50, and 230.52, EPA disagrees. For purposes of this determination, the portions of the Section 404(b)(1) Guidelines that are relevant are identified in the Final Determination.

Comment #170 – EPA has created and applied a water quality standard without going through the process defined by the CWA and its implementing regulations. EPA cannot bootstrap the Section 404(b)(1) Guideline's direction that the Corps consider violations of water quality standards through Section 404(c) to impose an *ad hoc* water quality criterion value of 500 µS/cm.

Response #170 – EPA disagrees with the commenter's suggestion that EPA has created and applied a water quality standard. The commenter is correct that the Proposed Determination extensively discusses the adverse effect of the Spruce No. 1 Mine as authorized on downstream water chemistry. As both the Proposed and Final Determinations make clear, EPA's consideration of changes in water chemistry and water quality is based upon the fact that adverse changes in water chemistry frequently have a corresponding adverse effect on native aquatic wildlife and water-dependent communities. Accordingly, it is appropriate for EPA to consider as part of its Section 404(c) action changes in water chemistry as those changes affect wildlife and fisheries.

EPA's consideration of increased levels of conductivity and total dissolved solids predicted to emanate from construction of the valley fills in Pigeonroost Branch and Oldhouse Branch as currently authorized and the corresponding effect on the native benthic macroinvertebrate community is not tantamount to an *ad hoc* water quality criterion. In the Final Determination, EPA uses 500 µS/cm as a dose response threshold that corresponds to adverse effects on the integrity of the benthic macroinvertebrate community and has been observed in numerous studies, including those conducted by researchers in other states. See Response #34 and Appendix 1.

The Proposed and Final Determinations do refer to West Virginia's approved selenium chronic numeric water quality criterion. However, reference is informational and the Final Determination is not dependent upon a finding that the numeric selenium water quality criterion will be violated. The Proposed Determination also refers to West Virginia's narrative water quality criterion. The Final Determination is not dependent upon a finding that West Virginia's narrative water quality criterion will be violated. To the extent that the Proposed or Final Determinations references West Virginia's narrative criterion, EPA does so by relying on the

West Virginia Stream Condition Index (WVSCI), which is the same metric used by WVDEP to interpret its narrative criterion for purposes of its bi-annual list of impaired waters pursuant to Section 303(d) of the CWA. The Proposed and Final Determination include references to a WVSCI score of 68, which is the lowest WVSCI score that WVDEP identifies as fully supporting the aquatic life use and narrative criterion.

See also Response # 33.

While neither the Proposed nor Final Determinations purport to provide a numeric conductivity value as an interpretation of West Virginia's narrative water quality criterion, EPA notes that narrative criteria have the same effect and importance as numeric criteria, and interpretation of narrative criteria is a routine measure for filling an important gap in Clean Water Act protection. See 54 Fed. Reg. 23868, 23875 (June 2, 1989). EPA's regulations recognize that, in order to be implemented, narrative criteria may from time to time have to be translated into numeric values on an *ad hoc* basis using best available science. *See* 40 C.F.R. § 122.44(d)(1)(vi); *American Paper Institute v. EPA,* 996 F.2d 346 (D.C. Cir. 1993).

Comment #171 – The Proposed Determination provides no bases for finding unacceptable adverse effects to municipal water supplies, shellfish beds, fisheries, or recreation areas.

Response #171 – EPA does not assert there will unacceptable adverse effects to municipal water supplies, shellfish beds, fisheries, or recreation areas. With respect to unacceptable adverse effects on fisheries, see Response #1, #2, #3, #4, and #5.

Comment #172 – The Corps appropriately considered Environmental Justice issues.

Response #172 – EPA appreciates that the Corps included a discussion of environmental justice in the Spruce No. 1 EIS. As noted in EPA's comment letters in June and October 2006, however, EPA remains concerned that the Corps did not fully consider and address the potential for disproportionately high and adverse effects on the population and that the local community did not have the necessary information, or the opportunity, to meaningfully participate in the EIS process. Specifically, EPA is concerned the community was not informed when changes were made to different aspects of the mine during the permitting and EIS process and therefore was not able to meaningfully comment on the final aspects of the mine.

Comment #173 – EPA's assertion that the Spruce Mine "… is located in a Census block group where the per capita income is roughly half that of the national average and $6,000 less than the West Virginia state average" is incorrect. The average income in Logan County is $30,520, while the average income in West Virginia is $31,344.

Response #173 – EPA's census data comes directly from the U.S. Census Bureau and is quoted correctly. According to the 2000 Census, the Spruce No. 1 Mine is located in a census block group where the per capita income is $15,411. This is roughly half the national average of $29,469 and $6,000 less than the West Virginia state average of $21,738. EPA believes the averages from West Virginia's Bureau of Employment Programs (WVBEP) referenced above refer to median household income, not per capita income. According to QuickFacts from the US

Census Bureau, in 2008 the median household income in Logan County was $33,866, which is almost $4,000 less than the West Virginia state average of $37,528.

Comment #174 – EPA has not appropriately evaluated environmental justice issues in light of the Corps' conclusion that average income in Logan County would decrease if the Spruce Mine were not constructed.

Response #174 – The environmental justice analyses included in the Recommended Determination and Final Determination build upon the analysis contained in the Proposed Determination to include a specific acknowledgment of the loss of jobs and tax revenues that commenters have shared with EPA with regards to this Section 404(c) action. EPA notes that the Corps' conclusion that average income would decrease without construction of the Spruce No. 1 Mine is a result of broader trends in income and employment in Logan County as a result of ongoing "negative changes in the mining industry" (DEIS at 3-199).

Comment #175 – The Corps appropriately considered socio-cultural issues, including that coal mining has been the predominant economic driver in Logan County since the early 1900s.

Response #175 – EPA remains concerned that the Corps did not fully consider and address socio-cultural issues. While coal mining may have been the predominant economic driver in Logan County since the early 1900s, it does not mean that no other socio-cultural issues exist. The Corps' narrow focus on economic issues does not fully capture the socio-cultural issues that would be affected by the Spruce No. 1 Mine.

Comment #176 – No residents living near the Spruce No. 1 Mine testified against the project during EPA's May 18, 2010 hearing.

Response #176 – EPA disagrees with this assertion. EPA received comments from multiple West Virginia residents, both at the May 18, 2010 hearing and in writing, who opposed the Spruce No. 1 Mine. Furthermore, no address information was requested at the public hearing. Accordingly, unless a commenter so disclosed, it would be impossible to determine whether those who testified were nearby residents.

Comment #177 – EPA may not base its Section 404(c) action on cumulative impacts.

Response #177 – While EPA's determination that the Spruce Mine, as authorized, would have unacceptable adverse effects on wildlife is not dependent on consideration of cumulative impacts, EPA disagrees that evaluation of cumulative impacts is improper. To the extent that the Spruce No. 1 Mine as authorized in combination with past, present, and reasonably foreseeable activities will have an adverse effect on wildlife that depend upon the impacted aquatic resources for all or part of their life cycles, those impacts may be evaluated as part of EPA's Section 404(c) determination. Congress did not place any limitation on the term "wildlife" in Section 404(c). The implementing regulations define "unacceptable adverse effect" as "impact on an aquatic or wetland ecosystem which is likely to result in significant degradation of municipal water supplies (including surface or ground water) or significant loss of or damage to fisheries, shellfishing, or wildlife habitat or recreation areas. In evaluating the unacceptability of such impacts, consideration should be given to the relevant portions of the section 404(b)(1) guidelines (40 CFR part 230)." The basis for the Final Determination is limited to impacts to wildlife that depend upon the impacted aquatic resources for all or part of their life cycles. While EPA considers the cumulative impacts from forest fragmentation and other aspects of the Spruce No. 1 Mine to upland species to be of concern, and therefore has described them, these do not form a basis for the Final Determination.

Comment #178 – Consideration of cumulative water quality impacts as part of the Section 404(c) action unlawfully usurps the State's exclusive authority under CWA Section 401 and to prepare a cumulative hydrologic impact analysis under SMCRA.

Response #178 – EPA disagrees. To the extent the comment asserts that the State's authority to regulate surface coal mining under SMCRA precludes exercise of EPA's Section 404(c) authority, see Response #151. To the extent the comment asserts that the State's issuance of a water quality certification under CWA Section 401 precludes EPA from considering the effect of the construction of valley fills in Pigeonroost Branch and Oldhouse Branch on downstream water chemistry and water quality, see Response #154.

Comment #179 – Consideration of forest fragmentation and canopy loss as part of the cumulative impact analysis is unlawful because those impacts are not the result of the discharge of dredged and/or fill material.

Response #179 – While forest fragmentation and canopy loss are not a direct effect, but for specification of Pigeonroost Branch and Oldhouse Branch as disposal sites for valley fills as authorized, these effects would not occur. Congress did not place any limitation on the term "wildlife" in Section 404(c). The implementing regulations define "unacceptable adverse effect" as "impact on an aquatic or wetland ecosystem which is likely to result in significant degradation of municipal water supplies (including surface or ground water) or significant loss of or damage to fisheries, shellfishing, or wildlife habitat or recreation areas. In evaluating the unacceptability of such impacts, consideration should be given to the relevant portions of the section 404(b)(1) guidelines (40 CFR part 230)." The bases for the Final Determination are limited to impacts to wildlife that depend upon the impacted aquatic resources for all or part of their life cycles. While EPA considers the impacts from forest fragmentation to upland species, to be of concern and therefore has described them, these do not form a basis for the Final Determination.

As set forth in the Final Determination and in Response #15, headwater streams provide an important interface between the forest canopy and downstream waters. The presence of forest canopy regulates water temperature and provides much of the plant energy that is converted in headwater streams to energy for downstream organisms. To the extent that loss of canopy is attributable to specification of Pigeonroost Branch and Oldhouse Branch, and to the extent that loss of canopy has an adverse effect on the aquatic ecosystem and the wildlife therein, it is an appropriate consideration under Section 404(c).